

**ENVIRONMENTAL DIPLOMACY AND NATIONAL INTEREST:
A CASE STUDY OF THE IMPORTED EUCALYPTUS TREES
IN KENYA, 1997 – 2010**

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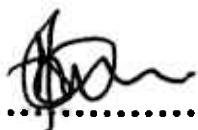
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DECLARATION

This research project is my original work and has not been submitted for the award of a degree to any other University.



23/11/11

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Date

This research project has been submitted for examination with my approval as the University supervisor.



23/11/2011

Dr. Ibrahim Farah

Date

DEDICATION

To my parents and to the peoples of the east and horn African sub-region and beyond with the hope that we shall become 'the humming bird' and be the first to conserve our environment for the sake of the future.

Acknowledgements

First of all, I thank God for everything!

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Abstract

Environmental security has become of greatest concern not only in Africa but also globally. "The Coming Anarchy" an Atlantic monthly article by Kaplan popularized the idea that environmental pressures can contribute directly or indirectly to conflict therefore bringing about environmental insecurity. As a result, causes of environmental degradation have been taken seriously and most nations are working towards sustainable development. Therefore it has been every country's interest to curb environmental threats by participating in the international conventions and introducing legal system in their respective countries. Afforestation and reforestation is environment friendly and enhances the fight against climate change in the world. However, some countries have gone ahead to introduce genetically modified tree species for various purposes. According to the research carried out using questionnaires it has been found out that the eucalyptus trees imported to the country have been known to be of economic value but on the other hand the tree has been proved to be unfavourable to the environment in some regions in Kenya.

List of Abbreviations

AU	African Union
ACCNNR	African Convention on the Conservation of Nature and Natural Resources
COMESA	Common Market for Eastern and Southern Africa
CO ₂	Carbon Dioxide
EAC	East African Community
ESP	Environmental Security Programme
EMCA	Environmental Management and Coordination Act
ELLR	Environment and Land Law Reports
FSI	Foreign Service Institute
GIP	Government Incentive Policy
GMO's	Genetically Modified Organisms
GCC	Global Climate Coalition
GOK	Government of Kenya
GDP	Gross Domestic Product
ISS	Institute for Security Studies
IPPC	International Plant Protection Convection
IUCN	International Union for Conservation of Nature and Natural Resources
KNCLR	Kenya National Council for Law Reporting
KEPHIS	Kenya Plant Health and Inspectorate Service
KEFRI	Kenya Forestry Research Institute
LMO's	Living Modified Organisms
MDG's	Millennium Development Goals
NBC	National Biosafety Committee
NET	National Environmental Tribunal
NEMA	National Environmental Management Authority
NPPO	National Plant Protection Organization
O ₂	Oxygen
PPA	Plant Protection Act
PIP	Plant Import Permit
PEP	Plant Export Permit
UPOV	International Union for the Protection of New Varieties of Plants
UN	United Nations
UNBC	United Nation's Brundtland Commission
UNCED	United Nations Conference on Environment and Development
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Program
UNEP	United Nations Environment Programmes
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations-Habitat
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

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CHAPTER ONE INTRODUCTION TO THE STUDY

Background of the Study

Most African countries are fighting against environmental insecurity factors and have embraced on achieving effective sustainable development. Article 2(1,a,ii) of Kyoto protocol stipulates

“afforestation and reforestation as a measure to protect and enhance sinks and reservoirs of greenhouse gases to promote sustainable forest management and also forms of agriculture in light of climate change considerations.”¹

In this regard, different species of trees have been introduced and planted. Some of these trees are observed to be friendly and unfriendly co-currently to the ecosystem. Most have proved to be of human benefit economically, providing energy source and food. These tree species especially in Kenya e.g. eucalyptus species are imported from South Africa and planted without further research on the survival and effects to the ecological unit.

The exotic eucalyptus plantations cover approximately 10 million ha of land worldwide. Eldridge says that these trees are mainly used for economic purposes.² Native to the Australian continent and its northern neighbors, Eucalyptus is the most widely planted hardwood tree in the world and constitutes one of the world’s main sources of biomass. India is the largest planter with 8 million ha, followed by Brazil in the state of

¹ See, Kyoto Protocol Convention

² K. Eldridge., J.Davidson., C.Harwood.,; G.Van Wyk., Eucalyptus Domestication and Breeding. Oxford Science Publications, Oxford, UK, 1997

Rio Grande do Sul by Frederico de Albuquerque in 1868³ with 3 million ha,⁴ while in Australia and particularly Tasmania, has had a move towards Eucalyptus plantations in addition to the 41 million ha of natural Eucalyptus forest.⁵ However, the number of new species drastically grew due to new modifications by researchers suiting the countries soil.

Genetically modified Eucalyptus was reported in 2004, and 34 field trials were announced worldwide.⁶ Amongst 700 Eucalyptus species, Teulieres affirms that *E. grandis* is the most widely cultivated species in subtropical and warm temperate regions, *E. camaldulensis* is the most common species in arid and semi-arid lands and *E. globulus* is the main species in temperate climates free of severe frosts.⁷ The exotic species was introduced in Portugal in the 19th century and today, Eucalyptus globulus (*E. globulus*) is the main eucalypt species planted in Portugal and occupies an area of 530 000 ha as Sidaway indicates.⁸ In many parts of Ethiopia, afforestation with exotic species, in particular *E. globulus*, *E. camaldulensis*, *E. sligna*, *E. citriodora*, and *E. tereticornis* has become a high priority in recent years. Pohjonen and Pukkala explains that Eucalypt plantations alone cover more than 100 000 ha⁹

³ P.T.Z Antas., A.C. Almeida., Bird community of Eucalyptus plantation and adjacent Atlantic Forest Reserve. Espírito Santo State, South Eastern Brazil. Ostrich. 1998, p69: 417.

⁴ D.Junghans., A. Alfenas., S. Brommonschenkel, S. E. Oda., Mello, D.Grattapaglia, Resistance to rust (*Puccinia psidii* Winter) in Eucalyptus: mode of inheritance and mapping of a major gene with RAPD markers. Theor Appl Genet, 2003,108:175–180.

⁵ Ibid, pp 175.

⁶ See, FAO Preliminary review of biotechnology in forestry, including genetic modification Forest Genetic Resources Working Papers FGR/59E. Forest Resources Development Service, Forest Resources Division. FAO, Rome, 2004

⁷ C. Teulieres and C. Marque, ed. E.C. Pua and M.R. Davey., Eucalyptus. Berlin Heidelberg Springer-Verlag , Vol. 60, 2007, p387.

⁸ S. Sidaway, The availability and use of Eucalyptus pulps. Tappi. 1988, 71:47-54.

⁹ V. Pohjonen and T. Pukkala. Eucalyptus globulus in Ethiopian Forestry. (1990) Forest Ecology and Management 36: 19–31.

Most of the eucalyptus trees grown in South Africa are technologically engineered to make them environment-friendly, to enhance faster growth, and to make them grow straight and uniform, making them ideal for products needed in the market. As a result, the country has become Africa's leading producer of hardwood products made out of eucalyptus woodlots grown on an estimated 2.4 million acres countrywide. This figure compares poorly to Kenya's 148,000 acres. Eucalyptus products from South Africa are therefore exported to different countries including Australia the motherland of eucalyptus.¹⁰

Waruru states that South Africa introduced the *Eucalyptus grandis* and *Eucalyptus camaldulensis* species to Kenya.¹¹ The trees had continued to gain popularity because of its fast and outstanding growth as observed by Florence¹² and a source of income to the farmers but only to find out that they "...threaten biodiversity"¹³ as Maathai advises.

Statement of the Research Problem

Kenya being a member of the international union for the protection of new varieties of plants (UPOV), it's bound to the seeds and plant varieties (plant breeder's rights) regulations.¹⁴ Kenya has also set forth regulations/procedures for importation of any form of plant material, such as seeds, cuttings, budwood, fresh fruits, flowers, plantlets, timber, and agricultural produce. These regulations are enforced through the Plant Protection Act

¹⁰ See Eucalyptus dilemma: [Is the tree worth growing commercially?](http://www.nation.co.ke) Also see: <http://www.nation.co.ke>

¹¹ M. Waruru, "Thirsty eucalyptus trees get the chop in Kenya" 30 September 2009, World Rainforest Movement.

¹² R.G Florence., Ecology and silviculture of eucalypt forests. (1996), CSIRO Publishing. Australia.

¹³ W. Maathai., Kenyan Nobel Peace Prize winner and environmentalist. (2009), 30 September.

¹⁴ See, As adopted and published on November 25, 1994, in the Official Kenya Gazette, Supplement No. 73, of November 25, 1994.

(Cap 324).¹⁵ These regulations are aimed at protecting Kenya's national interest in agriculture which is the mainstay of the economy.

However, in the recent past, Kenya has been known to import eucalyptus species i.e. *Eucalyptus grandis* and *Eucalyptus camaldulensis* from South Africa.¹⁶ These species have been found to have certain effects to the environment in some parts of Kenya. Eldridge indicates that the fitness of eucalyptus depends on various soil and environmental conditions.¹⁷ These specific eucalyptus trees from South Africa are known to develop deep roots which continue to uptake water during dry seasons, causing soil and ground depletion and the long term effect is fatal.¹⁸ The deep penetrating roots grow rapidly in extremely dry environments, since it would facilitate root growth through dry subsoil allowing the plant to reach deep water tables.¹⁹ Such opportunistic uptake is likely to increase the plant's success as a competitor for water. This has led to the decrease or no water in water sources and water tables²⁰ causing an increase of drying land that with time has led to population migration, deteriorating agricultural production and contribution to environmental degradation. Have the increase and plantation of the imported eucalyptus trees contributed to environmental threats raising concerns in environmental security?

¹⁵ See the Kenya Plant Health Inspectorate Service (KEPHIS), 1996. Plant importation procedures

¹⁶ M. Waruru. "Thirsty eucalyptus trees get the chop in Kenya" 30 September 2009, World Rainforest Movement.

¹⁷ K. Eldridge., J. Davidson., C. Harwood and H. Van Wyk (1994): Eucalypt domestication and breeding. Oxford, UK.

¹⁸ R.G Florence., Ecology and silviculture of eucalypt forests. (1996) CSIRO Publishing. Australia.

¹⁹ S.S.O. Burgess, M.A Adams, N.C Turner and C.K Ong. The redistribution of soil water by tree root systems. (1998) *Oecologia* 115: pp306–311.

²⁰ *Ibid*, p310

Objectives of the Study

The overall objective of the study is to critically assess the environmental threats emanating from the importation of Eucalyptus trees into Kenya. More specifically, the study aims to:-

- i. Provide an overview of the eucalyptus plantation and its effects to the environment;
- ii. Examine the role played by nations towards the importation of tree species;
- iii. Explore the theoretical linkages between environmental diplomacy and national interest.

Literature Review

Introduction

The literature review is divided into four subheadings: environmental diplomacy and national interest; the relationship between the eucalyptus species, environmental diplomacy and national interest; importation and lastly eucalyptus trees. This literature will give an understanding and establish the trends of different species i.e. imported eucalyptus species and the impacts on the environment from 1997 to 2010. This study will use past research of the species to compare on the behaviour of the species in different environs.

Environmental Diplomacy and National Interest

Odoyo mentions that environmental concerns have become of global interest. This was evident when environmental diplomacy became a concept during the 1992 United Nations Conference on Environment and Development (UNCED) also known as the Earth Summit, in Rio de Janeiro.²¹ This was the largest gathering of plenipotentiaries the world had ever seen and represented multilateral diplomacy in its widest definition. Nearly 180 nations participated, 118 at head of state level. In addition, dozens of United Nations (UN) and other intergovernmental organizations attended.²²

Every nation has national interests. In this case environmental affairs seized to be scientists concern and became every countries interest to protect the environment as a shared global phenomenon and a variable that defines security.²³ Therefore the two can not work without the other.

Relationship between Eucalyptus Species, Environmental Diplomacy & National Interest

Ogendo explains that climate change has caused harm in the world today and especially in Africa. These changes have been brought about by a combination of increased atmospheric concentrations of carbon dioxide which may alter weather patterns and

²¹ M.Odoyo, Environmental Diplomacy & Human Security. Concept Paper (2008), p.1.

²² E.R. Benedick, Diplomacy for the environment: the new generation of environmental dangers. (1999). pp 4-5.

²³ M.Odoyo, Environmental Diplomacy & Human Security. Op.cit, p.1.

changes in cropping systems.²⁴ He continues to say that soil moisture is the most important environmental factor for plant survival²⁵ but the increased temperatures in Africa for example the Sudan-Sahel region has been estimated an increase in temperature of between 1 degree Centigrade to 3 degrees Centigrade.²⁶ These high temperatures have been blamed to the greenhouse gases effect emitted from the Earth. This phenomenon has kept the surface of the Earth about 33 degrees centigrade warmer than it would otherwise be.²⁷

Re-afforestation is often seen as the most accessible technology in Africa today to reverse land degradation as Chattersson indicates²⁸ and to improve climate change especially in absorbing carbon dioxide (CO₂) and emitting oxygen (O₂) essential to humans and animals. Due to economic development and improvement of the standard of life, majority of people, inter-governmental organizations and States have ignored the environmental future prospects. However, international environmental management poses a dilemma since there is no international or multinational “government” that can enforce international environmental policy. As a result, effective environmental management seems to demand that countries cooperate openly and put their signatures on international agreements, treaties, and conventions. Many realist and neo-realist scholars

²⁴ O.H.W Ogendo., J.B, A Ojwang., Climate For Development: Climate Change Policy Options For Africa, (1995). Nairobi, Kenya, African Centre For Technology Studies, p.58.

²⁵ Ibid, p.31.

²⁶ E.R. Benedick, Diplomacy for the environment: the new generation of environmental dangers. Op.cit, p.178.

²⁷ O.H.W Ogendo., J.B, A Ojwang., Climate For Development: Climate Change Policy Options For Africa, p.11.

²⁸ M.T Chattersson, F.A Gulick, T. Resch., 1089. Desertification-rethinking forestry strategy in Africa: Experience drawn from USAID activities. In Role of Forestry in combating desertification. FAO Conservation Guide No. 21:91-102. FAO: Rome. & Salem B, Baumer MC. (1985). Role of forestry in the control of desertification. In sand Dune stabilization, Shelter Belts and Afforestation in Dry Zones. FAO conservation Guide No.10.FAO; Rome; p.89.

argue that no effective collective environmental protection is possible through the negotiation of treaties.²⁹

International Convention for the Protection of New Varieties of Plants is one of the agreements that came to place to provide and promote an effective system of plant variety protection with the aim of encouraging the development of new varieties of plants for the benefit of society.³⁰ This convention established the International Union for the Protection of New Varieties of Plants (UPOV), an intergovernmental organization with headquarters in Geneva. In this regard, signatory members in their participation came up with their country's acts and regulations to keep up with the protection of the new varieties of plants.

An updated status of membership as per January 2011, shows 68 memberships with only three African countries; Kenya, South Africa and Tunisia.³¹ In these efforts, Kenya came up with rules and regulations on importation of plants and plant products under the plant protection act cap 324.³² Some of these rules include thorough inspection in the entry points of the country for plant species that seem to have been broken. A number of international relations theories argue that far from having a clear and unambiguous meaning, 'the national interest' is a problematic term which is largely devoid of substantive content. While realists traditionally and constructivists more recently, claim that 'the national interest' is a key explanatory tool in the analysis and

²⁹ Ibid, p.4.

³⁰ B.Koo, P. G. Pardey, K.Qian., and Y. Zhang., An Option Perspective on Generating and Maintaining Plant Variety Rights in China (2003 December), p.4.

³¹ See, UPOV Convention, (1961); Revised, 1972, 1978 & 1991, Geneva

³² See Plant Protection Act (2009), Kenya, Cap 324.

understanding of contemporary foreign policy. Scott Burchill on the other hand argues that beyond the narrow aspect of security policy, the national interest has little residual value as an insight into the motivations of state policy in the external realm.³³

According to Falk, a world of sovereign states is unable to cope with endangered planet problems. Each government is mainly concerned with the pursuit of national goals. These goals are defined in relation to economic growth, political stability, and international prestige. The political logic of nationalism generates a system of international relations that is dominated by conflict and competition. Such a system exhibits only a modest capacity for international cooperation and coordination.³⁴

The economic factor interest has led most countries to grow the eucalyptus plant. Brazil for example has 3.5 million ha of Eucalyptus plantations that support many domestic and industrial activities. This large area was achieved initially through a government incentive policy (GIP) (1965–1985) and after this period by direct private investments.³⁵ However, externalities have always existed but, as the planet grows more crowded and per capita consumption rises, accompanied by the emergence of new polluting technologies³⁶ that lead to environmental degradation called the “tragedy of the commons.”³⁷

³³ Realist, marxist, anarchist, liberal, English school and constructivist theories of international relations See, Burchill Scott, Theories of International Relations. (1996), Third Edition, Palgrave Macmillan 2005 and australia in the world.

³⁴ R. Falk, Endangered Planet (1971) , pp 37-38.

³⁵ J. Luiz Stape, J. Leonardo Moraes Gonçalves and A. Natal Gonçalves, Relationships between nursery practices and field performance for Eucalyptus plantations in Brazil. (2001), Netherlands, Kluwer Academic Publishers, p.20.

³⁶ R. Dorfman., Economics of the environment. (1993) p.75.

³⁷ H. Garrett., Science: The tragedy of commons. (1968). New York, pp 1-8.

Importation

On a worldwide scale, numerous public or private research institutes are focusing their efforts on Eucalyptus genomics for species and traits of commercial interest relevant to the geographic zone.³⁸ South Africa was the first African Country to join UPOV in 1977,³⁹ and its government teamed up with the private sector to conduct ecological zoning aimed at determining particular areas fit for growing eucalyptus without affecting water flow. Most of the eucalyptus trees grown in South Africa are technologically engineered to make them environment-friendly, to enhance faster growth, and to make them grow straight and uniform, making them ideal for products needed in the market.⁴⁰

Their participation in UPOV gave rise to genetically modified organisms (GMO's) act in 1997 for implementation.⁴¹ The Act provide for measures to promote responsible development, production, use and application of GMO's. Among them is to ensure that all activities involving the use of GMO's (including importation, production, release and distribution) shall be carried out in such a way as to limit possible harmful consequences to the environment, to ensure that GMO's are appropriate and do not present a hazard to the environment.

³⁸ C. Teulieres and C. Marque, ed. E.C. Pua and M.R. Davey, Eucalyptus, (2007), Berlin Heidelberg Springer-Verlag , Vol. 60, p.387.

³⁹ See UPOV Convention (1961), Members of the International Union for the Protection of New Varieties of Plants, as revised at Geneva (1972, 78, 91)

⁴⁰ I. Esipisu., Eucalyptus dilemma: Is the tree worth growing commercially? May 31 2009, 'Horizons' pullout. See <http://www.nation.co.ke/oped/Opinion>

⁴¹ See UPOV Gazette, (2002 June) No. 93.

Kenya is known to import the eucalyptus species from South Africa in the recent past. Despite their fast growth for commercial use they have been known to degrade the environment in some parts of Kenya while in South Africa the same species adapt well to the environment i.e. Land degradation and depletion of water sources in areas grown. Since plant survival and development in the field depends on the interactions between plant morphological/physiological attributes and the environmental components of the site,⁴² Kenya as a member of UPOV came up with a Plant Protection Act to take care of the importation of plants, plant products and regulated articles. However, plant breeders and the authorized officers seem not to comply with the rules and regulations and lack of inspection or corruption at the entry point hence illegal importation.

Eucalyptus Trees

Sidaway describes eucalyptus pulps as the most preferred due to their lower production cost and their excellent bulk, softness, flexibility, formation, opacity, and porosity, which make them particularly suitable for tissue, printing, and writing grades of paper.⁴³ They also mature faster than all indigenous trees, they grow uniformly and straight, and they are hardwood.⁴⁴

Despite their most significant contribution on soil fertility just like any other tree, the evidence indicates that the added nutrients and organic matter from the presence of trees lead to favorable effects on soil fertility that more than compensate for any negative

⁴² J. Luiz Stape., J. Leonardo Moraes Gonçalves and A. Natal Gonçalves, Relationships between nursery practices and field performance for Eucalyptus plantations in Brazil. (2001). Netherlands, Kluwer Academic Publishers, p.31.

⁴³ R. Sidaway. Outdoor Recreation and Nature Conservation: Conflicts and their Solution [PhD Dissertation]. (1996) Edinburgh, UK: University of Edinburgh

⁴⁴ I. Esipisu, Eucalyptus dilemma: Is the tree worth growing commercially? May 31 2009, 'Horizons' pullout. Also See <http://www.nation.co.ke>

effects of trees from shading and competition for water.⁴⁵ Unfortunately, common problems of eucalyptus trees in most countries have been identified.

The trees are contributing to environmental degradation. They are capable of soil nutrients, moisture and ground water depletion due to the continued water uptake especially during the dry season.⁴⁶ The growth and viability of deep roots in extremely dry sub soils allows the plant to reach deep water tables.⁴⁷ Sinker roots of Eucalyptus tree reach the zone of capillary fringe up to a depth of 4.40 m, indicating that the Eucalyptus trees absorb capillary water of the ground water table.⁴⁸ Eucalyptus raises environmental concerns of its own. Fears are that they will deplete water supply, affect wildlife and reduce associated crop yields by rendering the land unfit for other agricultural crops. This has caused many countries in the region to discourage farmers from planting this exotic species.⁴⁹

Jacobs observed that most of the Eucalyptus species growing in savanna woodlands in Australia have “dimorphic” root systems, with a layer of shallow roots which spreads out possibly 30 m from the trunk in sandy soils, and deep tap roots which

⁴⁵ Ibid, p.103.

⁴⁶ R.G Florence., Ecology and silviculture of eucalypt forests. (1996) CSIRO Publishing. Australia; White D. A, Turner N. C and Galbraith J. H (2000): Leaf water relations and stomatal behavior of four allopatric Eucalyptus species planted in Mediterranean southwestern Australia. *Tree Physiology* pp.20: 1157-1165.

⁴⁷ S.S.O Burgess, M.A Adams, N.C Turner and C.K Ong, The redistribution of soil water by tree root systems. *Oecologia* (1998) pp.115: 306–311.

⁴⁸ J. Ram, V. K. Garg, O. P. Toky, P. S. Minhas, O. S. Tomar, J. C. Dagar, S. K. Kamra, Biodrainage potential of Eucalyptus tereticornis for reclamation of shallow water table areas in north-west India. (2006), p.147.

⁴⁹ K. Shem., M. Catherine, C. Ong., Gas exchange responses of Eucalyptus. C. Africana and G. robusta to varying soil moisture content in semi-arid (Thika) Kenya (2008) p.239.

enable the tree to survive in dry seasons.⁵⁰ In biodrainage studies conducted in irrigated lands in Australia⁵¹ the spatial extent of lowering of shallow ground water table underneath the adjacent fields was up to a maximum distance of 40 meters from the plantation boundary.⁵²

In spite of this, K. M. Tiwari the then President, Forest Research Institute, Dehra Dun, India, advocated that there is no scientific basis in the popular fallacy that Eucalyptus lowers the ground water table.⁵³ He continued to advocate the controversy that Eucalyptus lowers the ground water table was not true and that its origin was from the historical fact that in the early nineteenth century Eucalyptus were planted in the Pontine Marshes near Rome and these marshes subsequently dried and reclaimed.⁵⁴

The average productivity of the Eucalyptus forests rise from 12 m³ ha⁻¹ year⁻¹ to 40 m³ ha⁻¹ year⁻¹ through technological developments in genetics, forest establishment practices, and their interactions.⁵⁵ Genetic improvements were obtained through the use of improved seeds and clones, and forest establishment improvements that included site preparation, fertilization, and pest and weed control.⁵⁶ This explains the

⁵⁰ M. R Jacobs , Growth habits of the Eucalypts. Commonwealth Government Printer, (1955) Canberra Kapoor AS (2001) Biodrainage—a biological option for controlling waterlogging and salinity. Tata McGraw Hill Publishing Company Limited, New Delhi, p.315.

⁵¹ A. F., Heuperman .Trees in irrigation areas; the biopumping concept. Trees Natural Resource (1992) pp.34:20–25.

⁵² Ibid, p.148.

⁵³ K. M. Tiwari., R. S Mathur , Water consumption and nutrient uptake by Eucalyptus. (1983) Indian Forester pp.109: 851–860.

⁵⁴ D.N. Tewari.. Monograph on Eucalyptus. Indian Council of Forestry Research and Education, (1992). Dehra Dun (India). Surya Publications, Dehra Dun (India), p.361.

⁵⁵ K.G. Eldridge., J. Davidson., C. Harwood., and W. G. Van., Eucalypt Domestication and Breeding. (1994). Clarendon Press, Oxford, p.288.

⁵⁶ J. Simoes, N.B. Leite, and G. Brandi, Formação, manejo e exploracao de florestas com especies de rapido crescimento. (1981) IBDF, Brasilia, p.131.

activeness of Brazil as a member of UPOV that modified eucalyptus species seeds to fit well with their environment therefore not degrading their land and water tables. These tests were conducted in Brazilian soils and came up with genetic developments of eucalyptus seedlings and silviculture practices that have then impacted the field performance.⁵⁷ The guarantee of a low-risk plantation requires integrated models which must describe the relationship between physiological plant characteristics and their field performance in different environments.⁵⁸

In Portugal, *E. Globulus* is the main eucalypt species planted in an area of 530 000 ha.⁵⁹ Australia and particularly Tasmania, has a eucalyptus plantation of more than 41 million hectares.⁶⁰ In Africa, South Africa is the leading eucalyptus growers with an estimated 2.4 million acres. It is reported that South Africa's natural forests and grasslands were converted into eucalyptus plantations.⁶¹ In Ethiopia eucalyptus plantation has become a high priority covering more than 100 000 ha.⁶² Kenya on the other hand has a cover of 148,000 acres.

Eucalyptus globulus trees have had a distinct advantage as boundary planting in mixed farming system of the Ethiopian highlands. Although solid empirical evidence is scanty, there is a perception that this practice has a negative impact on the crop, to the

⁵⁷ R. Winterbottom and P.T. Hazlewood, Agroforestry and Sustainable Development. (1987) Allen Press, Vol. 16, No. 2/3, p.101.

⁵⁸ R.S. Folk, and S.C. Grossnickle, Determining field performance potential with the use of limiting environmental conditions. (1997). New For, pp.13: 121–138.

⁵⁹ H. Trindade, and M. S. Pais., Eucalyptus globulus Rooting Ability (1997). Society for In Vitro Biology, Vol. 33, No. 1, p.1.

⁶⁰ C. Teulieres and C. Marque., ed. E.C. Pua and M.R. Davey, Eucalyptus, (2007) Berlin Heidelberg Springer-Verlag , Vol. 60, p.387.

⁶¹ I. Esipisu (May 31 2009), Eucalyptus dilemma

⁶² V. Pohjonen and T. Pukkala., Eucalyptus globulus in Ethiopian Forestry. Forest Ecology and Management (1990). 36: 19–31.

detriment of food security and livelihood.⁶³ In a sub-humid, sub-tropical climate, Khybri et al. 1992 recorded a 41 to 61% reduction in wheat yield in a unilateral open alley system containing 100 trees of Eucalyptus hybrid.⁶⁴ Similarly, in a semiarid climate it has been reported that crop yield losses as high as 47-50% due to intense competition for water between Eucalyptus and agricultural crops.⁶⁵ Therefore, there is a need to determine the extent to which crop yields are influenced by eucalypt boundaries under the actual production environment.⁶⁶

Literature Gap

Throughout the literature review, some literature gap was evident. There was inadequate material that would link environmental diplomacy and national interests. This would be explained by the fact that every state has its own interests and they vary from one another. More so, there was almost none materials connecting eucalyptus trees and environmental diplomacy. These linkages however were explained using the different concepts that each area held to relate the two. There was also lack of enough sources to support the allegations that the imported eucalyptus tree species came from South Africa. The study relied mostly on media sources and not academic sources.

There has been contradictory information on the scientific and on the ground research findings from different sources in regards to the effects of eucalyptus trees to the

⁶³ S. Kidanu, T. Mamo and L. Stroosnijder, Biomass production of Eucalyptus boundary plantations and their effect on crop productivity on Ethiopian highland (2005) Vertisols, p281.

⁶⁴ M. L.Khybri., R. K..Gupta., R. Sewa and H.P.S. Tomar., Crop yields of rice and wheat grown in rotation as intercrops with tree species in the outer hills of Western Himalayas. (1992). Agroforestry Systems 17: 193-204.

⁶⁵ L.O.Z Onyewotu., M.A Ogigirigi. and C.J. Stigter, A study of the competitive effects between a Eucalyptus camaldulensis shelterbelt and adjacent millet. Pennisetum typhoides crop. Agriculture, Ecosystems and Environment (1994). 51: pp281-286.

⁶⁶ M. L.Khybri., R. K..Gupta., R. Sewa and H.P.S. Tomar., Crop yields of rice and wheat grown in rotation as intercrops with tree species in the outer hills of Western Himalayas. Op.cit, p.282.

environment therefore creating a literature gap. This is so because some of the effects observed in areas with eucalyptus plantation are said not to be scientifically approved which rises a question on which source to believe.

The study will test the following hypotheses;

1. There is a significant correlation between imported eucalyptus species and environmental security and threats.
2. There has been ignorance in plant importation procedures especially in the guidance for new types and species in the country.
3. There is a strong co-relation between environmental diplomacy and national interest.

Theoretical Framework

All over the universe environmental issues have become wanting and a subject to concentrate. Kaplan's 1994 Atlantic monthly article "The Coming Anarchy" popularized the idea that environmental pressures can contribute directly or indirectly to conflict therefore bringing about environmental insecurity.⁶⁷ During the Cold War, environmental concerns were rarely perceived as security problems. However, the environmental debate has gradually evolved since the 1950s, and since the 1970s global environmental change that has focused on "human-induced perturbations in the environment" that encompass "a full range of globally significant issues relating to both natural and human-induced changes in the Earth's environment, as well as their socio-economic drivers" as Mann indicates.⁶⁸

⁶⁷ D. Schwartz, A.Singh., Environmental Conditions, Resources and Conflicts (1999), Nairobi, UNEP, pp5-6.

⁶⁸ T. Munn Preface to the Encyclopedia of Global Environmental Change, in: Munn, T. (Ed.). Encyclopedia of Global Environmental Change, (2002). 5 volumes (Chichester, UK: John Wiley). xi-xv.

The Brundtland Commission argued that the security concept “must be expanded to include the growing impacts of environmental stress locally, nationally, regionally, and globally”⁶⁹. The Commission on Global Governance called for a broader concept of global security for states, people and the planet. It claimed a linkage between environmental deterioration, poverty and underdevelopment as causes of conflict.⁷⁰ Dabelko correctly noted: Environmental security has emerged as a transnational idea, the core of which holds that environmental degradation and depletion, largely human-induced, pose fundamental threats to the physical security of individuals, groups, societies, states, natural ecosystems and the international system⁷¹ just as cultivation of uninspected imported eucalyptus trees. Steffen et.al have argued “that the Earth is a single system within which the biosphere is an active, essential component; that human activities are now so pervasive and profound in their consequences that they affect the Earth at a global scale in complex, interactive and apparently accelerating ways”⁷².

The theoretical framework of this study will also be based on the analysis of global environmental change and human-nature relationship polarized between epistemological idealism and realism ⁷³or between social constructivism and neo-realism. The neo-idealist orientation has highlighted two aspects: the uncertainty of scientific

⁶⁹ See, Brundtland Report of 1987

⁷⁰ See, Commission on Global Governance (1995)

⁷¹ K Conca G.D. Dabelko (Eds., 2002). Environmental Peacemaking. (Eds., 2002). Baltimore: Johns Hopkins University Press – Woodrow Wilson Center Press. [The chapters in this book suggests a shift from environmental conflicts to environmental cooperation and peacemaking]

⁷² W Steffen,.; A Sanderson, P.D. Tyson, J. Jäger,.; P.A. Matson; B. Moore III,.; F. Oldfield; K. Richardson,.; H.J. Schellnhuber,.; B.L.; Turner II, R.J. Wasson, Global Change and the Earth System. A Planet under Pressure. The IGBP Series. (2004). Berlin-Heidelberg-New York: Springer-Verlag. [Major study of the International Geosphere-Biosphere Programme (IGBP) on global environmental change]

⁷³ H.G. Brauch, Four Phases of Research on Environment and Security. (2005), Otto-Suhr Institute for Political Science, Free University of Berlin, Germany. p 4.

knowledge and claims; and the attempt to explain the scientific and public recognition of environmental change influenced by political and historical forces. Global (environmental) change deals with changes in nature and society that have affected humankind as a whole and will increasingly affect human beings who are both a cause of this change and often also a victim.⁷⁴

Global change affects and combines the ecosphere and the anthroposphere. The ecosphere comprises the atmosphere (climate system), the hydrosphere (water), the lithosphere (earth crust, fossil fuels), the pedosphere (soil) and the biosphere (life), while the anthroposphere deals with populations, social organizations, knowledge, culture, economy and transport systems⁷⁵. The study will examine if the imported eucalyptus trees in Kenya affects the ecosphere and the anthroposphere and whether the rules and regulations are properly enacted according to the International Convention for the Protection of New Varieties of Plants and Plant Protection Act of Kenya.

Justification of the Study

The study will look at the environmental diplomacy and national interests in relation to eucalyptus trees. This is because the environmental threats brought by this species would be of great concern globally therefore involving states in the fight against them. These threats would be equated to the environmental problems that are being caused by the greenhouse gases and that which has gained the participation of the world. It will also be vital to assess the possibilities of allowing the imported eucalyptus trees in the country

⁷⁴ Ibid, p.4.

⁷⁵ See WBGU 1993: World in Transition. The Research Challenge. Annual Report 1996. Berlin: Springer. [This report by the Scientific Advisory Council on Global Environment Issues argues for an interdisciplinary syndrome based regional analysis of issues of global environmental change.]

despite their impacts. The study will evaluate the impacts and try to link them with the country's interest. After that identification, the study will create awareness to farmers, plant breeders and the government to enact and abide by the international or domestic legal regimes on importation of plants to assist in curbing environmental threats.

The study will also look at the environmental security debate that will help explain the ways on how environmental conflicts are ignited and ways to reduce conflicts. In this case some of the effects caused by the eucalyptus trees deplete natural resources especially water sources and soil degradation therefore causing a reduction in agricultural production. Inadequate of natural resources may lead to some competition and struggle for resources, people migrate from one area to another in search of resources that later ignites conflict.

In the final analysis the study will come up with strategies and tactics of ensuring environmental sustainable development to avoid all the environmental effects that may cause environmental insecurity.

Research Methodology

The study was based on peoples' experiences, opinions and observations from the time the imported eucalyptus species was introduced in Kenya. The design of the study was descriptive design while the primary data used was questionnaires with open and closed questions that were administered to sample individuals.⁷⁶ Fifty questions were distributed among individuals and only forty three questionnaires were answered and returned. The

⁷⁶ A.J. Orodho., Essentials of educational and social science research method (2003) Nairobi: Masola publishers.

study was largely carried out in Central Province, Murang'a County about 65 Km North East of Nairobi.⁷⁷ The study targeted the residents of the area that included leaders, government officials, farmers and the youth etc.

The data was analyzed qualitatively using SPSS software that simplified the findings making it easier to explain the data using graphs and pie charts. Books, journals and internet were used as secondary data. This data helped to find validity and evidence of the study.

There were some challenges encountered in this study. For example some of the questionnaires were not returned because of some unknown factors. There was misunderstanding of the questions in the questionnaires. This was indicated by how some of the respondents answered while others left the questions unanswered. This may have been caused by some language barrier.

Chapter Outline

The study is structured into five (5) chapters:-

1. Chapter One: Introduction to the Study
2. Chapter Two: Environmental Diplomacy and National Interest
3. Chapter Three: Environmental Diplomacy and National Interests: A Case Study of the Imported Eucalyptus Trees in Kenya
4. Chapter Four: Environmental Diplomacy and National Interest: A Critical Analysis
5. Chapter Five: Conclusions

⁷⁷Online Source; See, www.kakuzi.co.ke. Company profile.

CHAPTER TWO

ENVIRONMENTAL DIPLOMACY AND NATIONAL INTEREST

Introduction

The previous chapter introduced the study by looking at the background and some literature review on the issues that will be discussed intensively throughout the study. The chapter identified the research problem that will be resolved with focus on the objectives set aside for the study. The assumptions in the study were also revealed in the chapter while the theoretical framework was identified to be at the centre in making an argument on the emerging issues in the study. The research methodology and the chapter outline of the rest of the study were also introduced in the chapter.

The chapter will elaborate and offer an overview of environmental diplomacy on the global and regional developments that as well aid in safeguarding a state's national interests. Environmental diplomacy in many countries has been propelled by numerous negations that aspire to clean up the mess which affects the environment negatively by impelling environmental threats such as global warming and environmental degradation. In this regard, the chapter shall also look at the environmental security debate.

As the extent of peoples' actions on the ecological systems of the earth becomes visible, there is increased recognition of the friendly connections between these systems and animal health, the social justice, national safety, and economy.¹ The notion of what compromises of the environment are changing quickly as humans day by day becomes environmental savvy. Thus,

¹ R. Dorfman., Economics of the Environment. 1993, p.75.

imperative and unparalleled environmental and social changes challenges environmentalist to introduce a new social contract that will enable the future generation to stay peacefully, healthier and longer.² Therefore, this social contract stands for an obligation to environmentalist and states to dedicate their energies and resources to protect environment. However, with an increase in population everyday, new and unmet wants of societies that are vital to their progress have become an obstacle in the war against environmental hazards which requires robust environmental research, faster and more effective transmission of new and existing knowledge to the public to help in overcoming this challenge as we look forward to having economically feasible, ecologically sound, and socially just sustainable biosphere.³ Kenya for example hurriedly introduced different species of eucalyptus in its soil to foster fast economic growth. Nevertheless, majority of farmers did not adhere to plant protection act and importation rights required before importing any kind of plant to the country. This trend has in the recent past yielded regrettable result as farmers' complaint about the high level water consumption by this new species of eucalyptus that dries up the soil leaving it unproductive for other plants to survive on the same soil.

Background Information

Environmental diplomacy was first talked about after the end of Cold War, when everyone dreamt about shedding the peace dividend and addressing global change questions like the economic development of the South, population growth, the spread of democracy and human

² P. A. Njuguna & M. Odoyo. Environmental diplomacy and human security, The First joint workshop of the Foreign Service Institute, Ministry of Foreign Affairs, Kenya, and the ISS, South Africa, 2008.

³ R. E. Benedick, Diplomacy for the environment: the new generation of environmental dangers. Environmental Diplomacy Conference Report, American Institute for Contemporary German Studies, Washington DC (1999), pp 4-5.

rights and the looming global environmental crisis.⁴ Environment and development policy were put at the top of the international agenda in 1992 when the United Nations organized the Earth Summit in Rio.⁵ But the spirit of Rio did not prevail. The Rio paradigm of sustainable development was eclipsed by another global trend, the rapidly growing economies in Asia and Latin America and the economic crisis in Western Europe.⁶ Globalization has omitted the global environmental crisis from the agenda of the world's political leadership.

It was in 1992 at Rio de Janeiro that environmental diplomacy on an Earth Summit of United Nations Conference on Environment Development (UNCED) which was the most attend by plenipotentiaries on the ground of multilateral diplomacy became a vital concept.⁷ In this meeting which was participated by almost 180 nations,⁸ the function of the modern diplomat was restructured to include more responsibilities. The contemporary envoy was agreed to be versatile and shrewd with emerging concepts and practicalities of subjects that were molding international dynamics. They foresaw that wise and innovative diplomat would be of great values to international meeting where they would together streamline diplomacy that protects dynamic international public interest as well as a people who would be ready to challenge the status quo of the well being of mankind.

At the Earth Summit in Rio de Janeiro, three regimes were launched: the United Nations Framework Convention on Climate Change (UNFCCC), the UN Biodiversity Convention, and in 1994 the United Nations Convention to Combat Desertification (UNCCD). At the World Summit

⁴ American Institute for Contemporary German Studies., Environmental Diplomacy. The John Hopkins University, Washington, DC, 18th November, 1998, p.11.

⁵ Ibid, p.11.

⁶ See, D. Jensen. Environmental Diplomacy. United Nations Environment Programme,2004

⁷ Ibid, 2004.

⁸ American Institute for Contemporary German Studies., Environmental Diplomacy. The John Hopkins University, Washington, DC, 18th November, 1998, P13.

on Sustainable Development (WSSD) in 2002, a political declaration and a plan for implementation were adopted.⁹ These environmental institutions, regimes and action plans were formulated to assist in solving the global environmental change caused by different factors.

With diverse matters determining world affairs due to globalization, international relations have taken immense normative leap. However, all is not lost as countries seem to have realized the importance of preserving the environment where this has been displayed by the diplomatic agenda at bilateral and multilateral levels and where proliferation of documentation that has its main agenda as environmental protection. This justifies the need for a trained organization in a country that will come of age within these realities to protect its environment. Nevertheless, strict measures must be put in place to guard against any loopholes on the environmental policies or treaties that may be utilized by offenders.

Diplomacy has grown tremendously and through its definition as the official conduct of relations between two or more states, or two or more groups of states. Usually carried out by government ministers and civil servants or diplomats, it entails negotiation, communication and the drawing up of treaties, agreements and the like. It can also include unofficial dimensions such as cultural exchanges;¹⁰ countries have come together to in support of environmental diplomacy.

Diplomacy has enable many states to co-exist peacefully and healthily as they mostly try to create a safer ground for all interested parties to prolong their life span through coming

⁹ H. G. Brauch., Four Phases of Research on Environment and Security. International Security, Peace, Development And Environment , Free University of Berlin, Germany, 1999, p.32.

¹⁰ O.Daddow, International Relations Theory. Sage Publications ltd, London, 2009, p.235.

together and charting the way forward to their economic and environmental wellbeing.¹¹ With the introduction of environmental diplomacy, environmental affairs seized to be scientists concern and became every countries interest to protect the environment as a shared global phenomenon and a variable that defines security. Therefore the two cannot work without the other. International environmental policy is incredibly multifaceted. It incorporates the key principles of state responsibility for transboundary environmental harm, the obligation not to harm the environment beyond national jurisdiction, environmental management, the precautionary principle, sustainable development and intergenerational equity.

Environmental diplomacy also deals with underlying domestic tensions. The most important is the underlying tension between the long-term common purpose of managing public goods such as oceans, atmosphere and biodiversity, and short-term sovereign concerns in protecting domestic interests of economic competitiveness and domestic productivity. Global multilateralism is vital for environmental diplomacy because without global vision individual states will tend to have limited domestic objectives. There is also the threat of non-signatory states free riding off states that have agreed and are taking action. Without global agreements and environmental governance there is just too much possibility of states avoiding their responsibilities and off shoring the environmental destruction to non-signatory states as well as mismanagement in the agreed actions.

International Environmental Diplomacy

The world can unite to solve challenging environmental problems. Environmental diplomacy has clearly emerged as an essential component of international relations in the post-Cold War era.

¹¹ Environmental Diplomacy. Washington, D.C.: AICGS, February 1999

More than 200 international environmental treaties now in place and numerous others under negotiations have generated a crowded schedule of international meetings that have kept diplomats and non-governmental observers active shuttling around the world.¹² If success were measured by the number of treaties or the volume of diplomatic activity, it would look as though environmental diplomacy over the past few decades had been a spectacular success. We face a disconnect between a growing number of legal instruments, but a deteriorating global environment.¹³

To reconcile the slow pace of international diplomacy with the growing urgency of global ecological decline, we will require grappling with the distinctive characteristics of environmental diplomacy and adapting attitudes and strategies accordingly. One major challenge is posed by the fact that the existing environmental conventions deal with interrelated issues, yet their work is poorly coordinated.¹⁴ This leads to a major question; what is the best way to organize this vital but increasingly complicated system of international environmental governance? Environmental governance can be defined or characterized as a multi-level interactions i.e. local, national, international/global, among, but not limited to three main actors i.e. state, market and civil society, which interact with one another, to environment-related demands and inputs from the society; bound by rules, procedures, processes, and widely-accepted behaviour; possessing characteristics of “good governance”; for the purpose of attaining environmental-sustainable development.¹⁵

¹² American Institute for Contemporary German Studies., Environmental Diplomacy. The John Hopkins University, Washington, DC, 18th November, 1998, p.22.

¹³ Ibid

¹⁴ Ibid

¹⁵ Internet Source, Definition of Environmental Governance. Adapted from www.unep.org/training/programmes

In this case, the governments should use their authority to establish and maintain the formal and informal framework of institutions that regulate social and economic interaction. They should also create the enabling environment for effective performance of economic functions, policy implementation as well as the distribution of benefits.¹⁶ The United Nations Environment Programme's (UNEP) primary work in the field of environmental governance is to support coherent international decision-making processes for environmental governance, to catalyze international efforts to pursue the implementation of internationally agreed objectives and finally to promote and support the environmental basis for sustainable development at the national level.¹⁷

The United Nations Environment Program (UNEP) has been trying to coordinate the work of the various environmental conventions particularly those for which it serves as the secretariat.¹⁸ In addition, the United Nations Development Program (UNDP) launched a "synergies" initiative that aims to ensure a cross-fertilization of information among the various efforts to implement environmental conventions within developing countries. The second major challenge results from the fact that environmental issues are increasingly intertwined with other traditional areas of foreign relations, including trade and investment policies, development and human rights and also military security.

Integrating environmental issues into these other spheres is often essential for solving the problems at hand. But this integration is often resisted by those who hold different world views, and who fear that environmental issues will overburden their agendas. Environmental issues

¹⁶ Dr. A.A. Hardallu., Environmental Governance. Review Report 10, University of Khartoum, P1.

¹⁷ Internet Source, Environmental governance, www.unep.org

¹⁸ MT. Chatterson, Gulick FA, Resch T., 1089. Desertification-rethinking forestry strategy in Africa: Experience drawn from USAID activities. In Role of Forestry in Combating desertification. FAO Conservation Guide No. 21:91-102.

break down along different political axes than those that predominated during the Cold War, posing further challenges for environmental diplomats. Environmental diplomacy is also characterized by complex linkages between foreign and domestic policy and politics.¹⁹

The connections between foreign and domestic policy inherent in environmental diplomacy bring new actors to the fore. The business community, for example, has become an active participant in international environmental negotiations. It has the power to rally domestic support when it becomes convinced of the need for international action, as eventually happened with the 1987 Montreal Protocol on ozone depletion and yet the business community also has the power to stall progress. The Global Climate Coalition (GCC), for example, a coalition of businesses opposed to the climate treaty, has undertaken an extensive and highly misleading television advertising campaign aimed at undercutting public support for the Kyoto Protocol. This ability of industry groups to shape public opinion is a relatively new phenomenon, and a frightening one. The business community commands can easily overwhelm the relatively modest efforts of non-governmental environmental groups. It is encouraging that environmental diplomacy is being conducted at higher levels and with far more intensity than it was typical a few years ago.

International civil society is also incredibly important in driving the momentum and focus of environmental diplomacy, as well as its use to coercive instrument to prevent treaty violation. However, this is where its influence stops even when it can drive the momentum of environmental diplomacy and not drive outcomes. While this is slowly changing with the greater inclusion of civil society into multilateral negotiations, the outcomes are still the sole sovereignty

¹⁹ D Schwartz & A Singh., Environmental Conditions. Resources and Conflicts. UNEP, Nairobi, 1999., p5-6.

of the state and will continue in this fashion into the future. Hence, a combination of committed states and a vibrant international civil society will be a robust remedy of halting environmental degradation.

Regional Environmental Diplomacy

African continent contributes only about 3.8% of total greenhouse gas emissions yet its states are among the most vulnerable to climate change in the globe.²⁰ It is at key crossroads in its history as it is facing multiple challenges from overcoming poverty and coping with climate change to rising water scarcity and food insecurity in part linked with sharp levels of desertification.²¹ The attention that environmental concerns have elicited and the extent of global interest have legitimized Africa's engagement in the international debate. Closer to home though, the environment, its degradation and political welfare are inextricably linked. Nowhere in the world has the contest for natural resources have had as negative influence on the environment as in Africa.²²

Guided by the work of the Foreign Service Institute (FSI), Kenya has had an effective diplomatic engagement in the region, whether as a negotiator, facilitator or economic integrator. The Institute for Security Studies (ISS) on the other hand, has had the comparative advantage of being one of Africa's few think tanks that seek to conceptualize the debates on international relations and human security in Africa. One of its goals is 'collaborative security' to enhance Africa's capacity to engage in human security debates, which incorporates environmental

²⁰ B. Bafana., Trade Carbon for Food Security. Climate Change-Africa, Inter Press Service News agency, Nairobi, 2008

²¹ Internet Source: Diplomat- Door to Region, Window on World East Africa, (2011). Environmental Diplomacy-A Green Economy for Africa. See also; <http://diplomateastafrica.com>

²² P.A. Njuguna, M. Oduyo. Environmental Diplomacy and Human Security. Institute for Security Studies and, Ministry of Foreign Affairs, Kenya, Nairobi, Kenya. 31 October 2008, p.10.

security. Through its Environmental Security Programme (ESP), ISS seeks to capacitate African governments so that they are in a position to engage constructively in international and regional environmental processes.²³

Natural resources are distributed unequally throughout the world. In some instances, scarcity of water or land, or an abundance of oil or diamonds, has contributed to violence within and between countries. For example, immigration of persons and animals induced by climate change such as floods, drought and other natural calamities is affecting diplomacy a lot. A good example of diplomacy influenced by the environment is when an Ethiopian diplomat was called upon by the government to arbitrate on grazing conflict or on issues affiliated to cattle banditry. This was the pastoralist community on the Northern Kenya who were ransacked their cattle by the neighboring Ethiopian pastoralist. The negative effects of global warming are being experienced in Africa especially on Kenyan soil.

Climate change can not be dealt with in isolation. Environmental refugees actually explain about environmental diplomacy between the states affected and other bilateral partners involved in assisting those affected. Experts predict that climate change will increase the severity of floods and droughts. This may lead to mass migration, undercut the capacities of states and exacerbate widespread poverty. This has major implications for national development policies and foreign policy.²⁴

The rising significance of environmental diplomacy is linked with a fundamental change in the scale and reach of humanity's footprint. Therefore, African environmental diplomacy must

²³ Ibid, p.4.

²⁴ R.G Feltham., The contemporary and changing roles of diplomats. 8th ed, Oxford University Press, London, 2002.

be geared to maintaining peace and economic integration. African representatives must have a full understanding of issues to be able to effectively contribute to the global debate and also grasp the issues at hand. Some of the poorest and most vulnerable including those on the African continent can become victims as a result of pollution generated not by them but by others, environmental diplomacy is about finding fair and equitable solutions to such realities.²⁵

In its routing of the international system, Kenya has applied a range of foreign policy strategies, among them the diplomacy of conflict management and economic diplomacy for example its engagement with regional economic regimes such as the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA). In addition it has employed other forms of diplomatic engagement, better understood as foreign policy's 'soft power' tools, which have been very effective tools. In the application of these various foreign policy instruments, 'the environment' has become a consistent standard.

As part of Kenya's engagement as a legitimate third party or mediator in protracted conflicts in countries such as Somalia and Southern Sudan, the mediation variables it contended, cut across contestation for natural resources by the different protagonists. Environmental conflict management has therefore become a major component of the country's diplomatic efforts.²⁶ Similarly, in Kenya's participation in trade rounds and regional economic blocs, such as the World Trade Organization (WTO), environmental issues ranging from sustainable development to Genetically Modified Organisms (GMO's) and bio-piracy have become topics for debate and negotiation. The same applies to the implications of climate change discussed at the Kyoto

²⁵ D Schwartz & A Singh., Environmental Conditions, Resources and Conflicts. UNEP, Nairobi, 1999, pp.5-6.

²⁶ O.H.W Ogendo., J.B, A Ojwang., Climate For Development: Climate Change Policy Options For Africa. (1995). Nairobi, Kenya, African Centre For Technology Studies, p.58.

Protocol rounds. In essence, the environmental diplomacy pillar is intertwined with all other pillars that define Kenya's foreign policy.²⁷

The Environmental National Interests

Scholars have tried to come up with a possible definition of national interest through the theory of international relations. According to the extreme Realists, they equate national interest with national power, and then measure power in terms of material strength, primarily military and economic strength. On the other hand, the extreme idealists identify national interest with some universal moral aspiration of mankind, such as eternal peace or human brotherhood and willing to sacrifice the material power of the nation for the moral uplift of mankind.²⁸

A state's foreign policy is as a means for the preservation and promotion of the national interest which is mostly concerned with tools such as defence, diplomacy and international communication. The question of who determines the national interests of a country depends on a number of things. i.e. the nature of the political system, the level of public opinion.²⁹ However, these determinants also depend on factors of what political regime is in a country for example whether it is democratic or dictatorial. National interests also differ from one state to another. The big powers states for example have diverse national interests compared to the states that are may be referred as small. Furthermore, in the equality factor of sovereignty states are not referred as bigger than the other since they are all equal in everything that touch the states according to the international law.

²⁷ P. A. Njuguna & M. Odoyo. Environmental diplomacy and human security, The First joint workshop of the Foreign Service Institute, Ministry of Foreign Affairs, Kenya, and the ISS, South Africa, 2008. p.4.

²⁸ J. Bandyopadhyaya., The Making of India's Foreign Policy. Allied Publishers, 2003, p.4.

²⁹ Ibid, 6.

The minimum essential components of the national interest of any state are security, national development and world order.³⁰ However, the national interests differ from one state to another; these components shall assist in explaining the linkages between national interests and environmental diplomacy. Meanwhile, it will be vital to discuss and have an understanding of the environmental national interests and efforts of the countries; Kenya and South Africa.

Kenya's National Interest

For a long time Kenya was considered to be the preeminent actor in the diplomacy in East Africa and Horn of Africa.³¹ As mentioned earlier in the discussion that foreign policy is as a means for the preservation and promotion of the national interest, it will be essential to look at Kenya's Foreign Policy to single out the national's interest. Second from Tanzania in the region, Kenya produced a written document containing the foreign policy of Kenya, or at least, the principles that will guide foreign policy and the directions it will take.³²

Among the divisions in the Kenya's written foreign policy are the foreign policy pillars that include; economic diplomacy pillar, peace pillar, environmental diplomacy pillar, cultural pillar and diaspora diplomacy.³³ With concentration on the environmental diplomacy pillar, Kenya has enormous stake in the management of its own resources, those of the region and the world. It is also designed to provide the link between the management of shared resources and issues of security, sustainability and prosperity especially within the Eastern African region.³⁴

³⁰ Ibid, p9.

³¹ M. Mwangi, The Fletcher Forum of World Affairs: Issues, Problems, and Prospects in Managing the Diplomatic Services in Small State, Winter, Vol.30:1, 2006, p193.

³² Ibid, p.196.

³³ See, Republic of Kenya Foreign Policy Framework. Ministry of Foreign Affairs, Nairobi, 2009, pp8-9.

³⁴ Ibid, p.9.

Embarking on the environmental security concern, Kenya has recognized the global impact of contemporary environmental problems or threats such as global climate change, ozone depletion, ocean and air pollution and resource degradation-compounded by increasing world population.³⁵ Therefore, Kenya's environmental diplomacy pursue five objectives namely: promote compliance with the relevant national, regional and international environmental legislation, regulations, standards, and other appropriate operational procedures and guidelines; promote the integration of environmental management into national and regional economic activities, including agriculture and tourism to minimize negative impact n the environment; train through the foreign service institute (FSI) a cadre of diplomats with skills and responsibilities to promote understanding and awareness of and commitment to reducing environmental impact; promote science and technology as mechanisms to encourage innovation to reduce environmental impacts; encourage public dialogue, awareness and knowledge creation on environmental matters through national, regional and international forums; and finally, maintain robust and open communication channels and promote research on environmental issues.³⁶

Kenya has since come up with bodies and institutions to pursue the country's environmental goals. The Kenyan government formulated a new long term development blueprint for the country-the Kenya vision 2030.³⁷ The motivation for Vision 2030 is to have a development strategy to transform Kenya into a newly industrialized, middle-income country providing a high quality of life to all its citizens in a clean and secure environment by the year

³⁵ Ibid, p.19.

³⁶ Ibid, p.19.

³⁷ C.S. Adam, P.Collier & N. Ndung'u., Kenya Policies for Prosperity, Oxford University Press, New York, 2010. pp39-40.

2030 in the aim of meeting the Millennium Development Goals (MDG's).³⁸ The overarching vision of vision 2030 is anchored on three pillars, namely economic, social and political pillars. Each pillar has defined objectives to be achieved by 2030.³⁹ Under the social pillar, falls the classification of environment, MGD priorities which include water and sanitation.

Kenya has also been advantaged to be the operating and headquarter of international environmental bodies such as United Nations Environmental Programmes (UNEP) and United Nations –Habitat (UN-Habitat) established in 1972 and 1978 respectively.⁴⁰

South Africa's National Interest

South Africa, the wealthiest nation in Southern Africa, has the most to lose by the transnational mass flow of regional problems. Its vital national interests are therefore irrevocably intertwined with those of the region.⁴¹ Some of the South Africa's vital national interests include, preservation of natural resources, especially water and forest; the socio-economic advancement of its people; Sustainable global economic competitiveness; the progression and consolidation of democracy and effective political leadership; and the preservation of the environment to halt destruction of ozone layers.

In Southern Africa, severe prevalent tribulations will coerce countries to remain in a far robust regional interdependence than in the case of the developed world, as the internal troubles of one country mostly are experienced by others. Chief international manifestations of Southern

³⁸ Ibid, p.40.

³⁹ Ibid, p.43.

⁴⁰ Ibid, p.29.

⁴¹ F. Koetje. 'South African National Security Policy: An International Relations Perspective' The Asrudian Centre international Politics, IR Theory, Economics, Philosophy. *African Security Review*, Vol. 8 no. 6, 1999.

African regional problems are as a result of large numbers of illegal immigrants in pursuit of green pasture hence, ever dwindling resources, especially water, serious socio-economic problems and pressure on the environment.⁴²

Linkages between Environmental Diplomacy and Nationals' Interest

In the earlier discussion, we mentioned the essential components of the national interest of any state such as security, national development and world order that would be linked with environmental diplomacy. Having also looked at the definition of environmental diplomacy and national interest, we shall now define the most important element of national interest 'security'. The most popular definition of security is the preservation of the territorial integrity⁴³ and according to the definition in contemporary international relations; security means the preservation of the territorial integrity, sovereignty and finally life and property of the people. However, the priorities vary from state to state and from time to time.⁴⁴

The relationship between security and environment involves looking at the environmental threats and problems that require urgent resolution therefore increasing security. In this concept, security is defined as the security of individuals as human beings and not only as citizens of a particular state.⁴⁵ Any cause or change in the environmental e.g. environmental degradation may lead to conflict and hence the need to preserve security and the entire human environment to resolve environmental problems and ensure a sustainable future.⁴⁶

⁴² F. Koetje. 'South African National Security Policy: An International Relations Perspective' The Asrudian Centre international Politics, IR Theory, Economics, Philosophy. African Security Review, Vol. 8 no. 6, 1999

⁴³ J. Bandyopadhyaya., The Making of India's Foreign Policy. Allied Publishers, 2003, p.10.

⁴⁴ Ibid, p.15.

⁴⁵ N.Greger., Environmental Security. International Peace Research Institute, Oslo, vol 33, no 1, 1996, p.109.

⁴⁶ Ibid, p.109.

The three components of national interests are all interrelated to a certain extent. However, it is important to note that national development cannot and does not mean the same thing for all states.⁴⁷ For example if a state lacks security in this case environmental security, it means that the national development shall lag behind. In the case of Sudan, the devastated civil war between the north and south that engulfed the nation from 1966 to 1972 and later from 1983 propelled some environmental threats producing a scarcity in the amount of available agricultural land in Northern Sudan through soil degradation, deforestation and reduced rainfall.⁴⁸ In other cases, environmental threats and lack of security leads to poverty of nations which only reduce the development of the nation and not building it.

A just world order constitutes an integral part of the national interest of any state in relation to the security of any state in this nuclear age. Some of the environmental threats like environmental pollution and degradation and adverse climatic conditions over a large part of the globe can cause negative features of contemporary international relations that seem to threaten the stability and viability of the international system⁴⁹ resulting to un-peaceful and un-just world order. In this case, a world order is expected to safeguard the security and national development of all states, particularly the weak states.⁵⁰

Conclusions

Environmental diplomacy has clearly emerged as an essential component of international relations. This has given rise to a number of international and regional treaties and conventions

⁴⁷ J.Bandyopadhyaya., The Making of India's Foreign Policy. Allied Publishers, 2003, p.16.

⁴⁸ D. Schwartz., A. Singh., Environmental Conditions. Resources and Conflicts. UNEP, Nairobi, 1999, pp.23-24.

⁴⁹ J.Bandyopadhyaya., The Making of India's Foreign Policy. Opcit. p.18.

⁵⁰ Ibid, p.20.

that have been put in place to deal with the growing urgency of environmental decline. In many cases, the state members who are signatories of such treaties or conventions get into it with influence of its national interests. It is every state's mandate to get involved in issues that concerns it and brings national development. In this chapter however, the state defines its national interests in line with its environmental interests to ensure a safe and secure environment for all.

CHAPTER THREE

ENVIRONMENTAL DIPLOMACY AND NATIONAL INTEREST: A CASE STUDY OF THE IMPORTED EUCALYPTUS TREES IN KENYA

Introduction

Chapter two elaborated environmental diplomacy in both international and regional levels. This disclosed the measures put forward in efforts to solve environmental problems through certain conventions, treaties and the institutions established for the same purposes and governance in the environmental sector. The chapter also explained the national interests in regards to the environment and the linkages between environmental diplomacy and national interest.

This chapter will delve in the historical background of eucalyptus trees, the impacts of the trees to the environment. The chapter will also examine the legal regimes and policies put in place to resolve the environmental threats probably caused by eucalyptus trees and connect with the environmental security debate. Later, the chapter will discuss the measures of solving the threats in future by looking at the sustainable development.

History of Eucalyptus Trees

The Eucalyptus tree is a diverse genus of trees. It originated mainly in Australia and Indonesia but was first introduced in Brazil, in the state of Rio Grande do Sul by Frederico de Albuquerque in 1868.¹ There are more than 700 species of Eucalyptus

¹ P.T.Z Antas., A.C. Almeida. Bird community of Eucalyptus plantation and adjacent Atlantic Forest Reserve, Espírito Santo State, South Eastern Brazil. 1998, p69: 417.

mostly native to Australia.² Eucalyptus is one of the fastest growing trees in the world with an ability of reaching heights of between 300 – 480 feet.³

Eucalyptus pulps are preferred due to their lower production cost and their excellent bulk, softness, flexibility, formation, opacity, and porosity, which make them particularly suitable for tissue, printing, and writing grades of paper.⁴ Eucalyptus oil was in huge demand during World War 1, as it was used to control a meningitis outbreak, diabetes and the influenza of 1919.⁵ Eucalyptus oil has been used to treat arthritis, boils, sore and wounds. The species also mature faster than all indigenous trees, they grow uniformly and straight, and they are hardwood.⁶

Due to the species economic factor, Brazil has 3.5 million ha of Eucalyptus plantations that support many domestic and industrial activities. This large area was achieved initially through a government incentive policy (1965–1985) and after this period by direct private investments.⁷ In Portugal *E. globulus* is the main eucalypt species planted in an area of 530 000 ha.⁸ Australia and particularly Tasmania, has a eucalyptus plantation of more than 41 million hectares.⁹ Some of the other major eucalyptus producing countries includes China, Spain, South Africa, Russia and Chile.

² C. Teulieres and C. Marque, ed. E.C. Pua and M.R. Davey., Eucalyptus. Berlin Heidelberg Springer-Verlag , Vol. 60, 2007, p.387.

³ S.E. Williams,, E.E. Bolitho and S. Fox., Climate change in Australian tropical rainforests: an impending environmental catastrophe 1887-1892. 2003, p.270.

⁴ R. Sidaway., Outdoor Recreation and Nature Conservation: Conflicts and their Solution. PhD Dissertation, University of Edinburgh, UK, 1996

⁵ S. Sidaway, The availability and use of Eucalyptus pulps. Tappi, 1988, pp71:47-54.

⁶ I. Esipisu., Eucalyptus dilemma: Is the tree worth growing commercially? 'Horizons' pullout, May 31 2009.

⁷ J. L. Stape., J. L. M. Gonçalves and A. N. Gonçalves., Relationships between nursery practices and field performance for Eucalyptus plantations in Brazil.. Kluwer Academic Publishers, Netherlands, 2001, p20.

⁸ H. Trindade and M. S. Pais., Eucalyptus globulus Rooting Ability. Society for In Vitro Biology, Vol. 33, 1997, No. 1, p.1.

⁹ C. Teulieres and C. Marque, ed. E.C. Pua and M.R. Davey., Eucalyptus., Berlin Heidelberg Springer-Verlag , Vol. 60, 2007, p.387.

Eucalyptus Plantation in Kenya

In Kenya, eucalyptus species were introduced as early as 1902 by the colonial government with intention of providing energy to the locomotives. Since then about 100 species have been introduced for plantation¹⁰ but due to an extensive research which was conducted for the 100 species less than 20 species have been approved for large scale plantation.

The Government of Kenya (GOK) promoted and supported extensive growing of eucalyptus species which culminated in the introduction of high yielding, short-rotation varieties through biotechnology between 1997 and 2003 leading to about 100,000 hectares of eucalyptus plantation in the country, 15,000 hectares in gazetted forests, about 35,000 hectares by private companies and 50,000 hectares by farmers.¹¹ These findings prove the allegations of South Africa supplying countries like Kenya and Australia, the motherland of eucalyptus with the product. South Africa is known to technologically engineer the species enhancing their faster, straight and uniform growth making them ideal for products needed in the market.¹² Some of these species found in Kenya include *E. grandis*, *E. saligna*, *E. globulus*, *E. regnans*, *E. paniculata*, *E. Maculata*, *E. camaldulensis*, *E. citriodora*, *E. tereticornis*, *E. urophylla* and *E. hybrids*.¹³

Eucalyptus trees in the country have a market niche which gives them a competitive edge over other species because of its contribution to the growth of national

¹⁰ See, A Guide to On-Farm Eucalyptus Growing in Kenya. Kenya Forest Service, December, 2009, p.9.

¹¹ *Ibid*, p.9.

¹² Internet Source: See Eucalyptus dilemma: Is the tree worth growing commercially. www.nation.co.ke

¹³ See, A Guide to On-Farm Eucalyptus Growing in Kenya. *Op.cit.* p.8.

economy.¹⁴ Studies show that a hectare of firewood and poles from eucalyptus trees could generate a net surplus of Ksh. 540,000 and Ksh. 1,000,000 respectively over a period of 8 years and an estimated value exceeding Ksh. 1.6 billion excluding non-traded domestic and small scale enterprises.¹⁵

Eucalyptus grandis and eucalyptus camaldulensis are known to have been introduced in the country from South Africa.¹⁶ They not only have been a benefit to the economy of the country but also proved to be a threat to the environment by causing land degradation and depletion of water sources in areas grown.¹⁷ These threats brought the Government of Kenya to put orders to farmers of eucalyptus to cut them down.¹⁸

However, some farmers and companies did not obey the orders from the government. In Murang'a for example, Kakuzi which has forestry operations continue to plant the trees between 10 and 20 Ha per year on commercially high yielding sites. They have 1,150 Ha of mainly eucalyptus i.e. Grandis, Saligna and Caldulenses plantings, 695 Ha are good commercial plantations and about 455 Ha are non-commercial plantations. Planting started in 1992 and gained momentum by 1995/96 when much larger areas of forestry were planted.¹⁹

Farmers whose purpose is to get rich quickly have easily uprooted indigenous plants and planted exotic species of new plants that are deemed to be the quickest means

¹⁴ Ibid, p.9.

¹⁵ Ibid, pp8-13.

¹⁶ J.Karuga., Eucalyptus Tree Courts Controversy as Demand for Power Poles Grows. Business Daily Nairobi, 24 May 2010.

¹⁷ J. L. Stape., J. L. M. Gonçalves and A. N. Gonçalves., Relationships between nursery practices and field performance for Eucalyptus plantations in Brazil., Kluwer Academic Publishers, Netherlands. 2001, p.31.

¹⁸ M.Karanja., Deforestation Order-How eucalyptus became focus of strife. Saturday Nation, May 22, 2010

¹⁹ Online Source, www.kakuzi.co.ke. Products, Forestry operations

of income within a span of five to seven years. However, these projects were implemented without proper scientific studies hence, brought detrimental effect on lands and other plantation planted after the failed ones.

Eucalyptus Plantation in South Africa

South Africa is the leading eucalyptus growers in Africa with an estimated 2.4 million acres. It is reported that South Africa's natural forests and grasslands were converted into eucalyptus plantations. Most of the eucalyptus trees grown in the country are technologically engineered to make them environment-friendly, to enhance fast growth, and to make them grow straight and uniform, making them ideal for products needed in the market.²⁰

Numerous public and private research institutes are focusing their efforts on eucalyptus genomics for species and traits of commercial interest relevant to the geographic zone.²¹ The South Africa government teamed up with the private sector to conduct ecological zoning aimed at determining particular areas fit for growing eucalyptus without affecting water flow.

Various Eucalyptus species have been introduced into South Africa, mainly for timber and firewood and also for ornamental purposes. Nonetheless, they are considered invasive with their high water-sucking means that threatens water supplies. Furthermore, these diverse eucalyptus species in South Africa have been noted to release chemical into the nearby soil which kills indigenous competitors hence making themselves as the only

²⁰ Esipisu I., Eucalyptus dilemma: Is the tree worth growing commercially? 'Horizons' pullout, May 31 2009. Also See: <http://www.nation.co.ke>

²¹ C. Teulieres and C. Marque, ed. E.C. Pua and M.R. Davey, Eucalyptus. Berlin Heidelberg Springer-Verlag, Vol. 60, 2007, p.387.

plant that can exist in that surrounding. Therefore, to safeguard South Africa national interests, the country has naturalized the following types of eucalyptus species; E. Camaldulensis, E. grandis, E. cladocalyx, E. lehmannii, and E. diversicolor, which are not harmful to its environment.

Impacts of Imported Eucalyptus Trees

Eucalyptus tree is considered to have economic, environment and social impacts upon planting in different countries in the world. The market of eucalyptus has witnessed a rapid growth and developments of many provinces national wide which have engaged in planting of eucalyptus. Many organizations, enterprises and households have become better off as they have engaged in eucalypt business mainly in timber export. In some countries there has been a fast growth in the economic sector. Kenya for example has a ready market for the eucalyptus products domestically and internationally i.e. Uganda and South Sudan. This has led to the growth and improvement in infrastructure and other vital developments in the country.

During the Stockholm conference, the central message advised that we ‘must come to terms with the reality of resource limitation and the carrying capacity of ecosystems and must take account of the needs of future generations.’ It is also the central message of modern conservation.²² Unfortunately, human beings focus more on their economic development and improvement of their living standards. This is one of the main reasons why majority of people and governments have ignored some environmental threat factors putting the future at stake.

²² K.T. Mostafa., Evolving Environmental perceptions from Stockholm to Nairobi, London, Butterworth, 1988, p.434.

Eucalyptus tree is most significant on soil fertility contribution just like any other tree, the evidence indicates that the added nutrients and organic matter from the presence of trees lead to favorable effects on soil fertility.²³ The trees keep the soil protected from rain and sunlight by leaving a vegetable blanket formed by the leaves, branches, roots, and bark residue from harvested trees. This also has been reported to improve soil fertility.²⁴ When eucalyptus is grown as a short rotation crop for high biomass production and removal, soil nutrients are depleted rapidly however; long term planting of eucalyptus has shown improved soil fertility. The species is also known to exudates allelopathic chemicals that inhibit undergrowth regeneration mostly in dry regions. This has particularly inhibited the efforts of agricultural production in these regions.

Decreased agricultural production is often mentioned as potentially the most worrisome consequences of environmental change.²⁵ This is one of the sectors that deserve a much closer attention than any other. Agriculture is part of the environment and that which can not be ignored. This sector remains a key pillar especially in the Kenyan economy contributing about 25 per cent of Gross Domestic Product (GDP).²⁶ The sector possesses additional opportunities to unlock the potential of Kenyan land with a strong need for legal and institutional reforms after its productivity went two to three times lower than in international benchmark countries.²⁷ To avoid more of this, it is our

²³ V. Pohjonen and T. Pukkala. Eucalyptus globulus in Ethiopian Forestry. Forest Ecology and Management, 1990, p103.

²⁴ See, A Guide to On-Farm Eucalyptus Growing in Kenya p.12.

²⁵ See, L.Brown., Reexamining the World Food Prospect. State of the World 1989. Worldwatch Institute, Newyork, Norton, pp41-58.

²⁶ C.S. Adam, P.Collier & N. Ndung'u., Kenya Policies for Prosperity. Oxford University Press, New York, 2010, p.44.

²⁷ Ibid

mandate to deal with the environmental threats causing land degradation and decrease of available good agricultural land such as eucalyptus species.

For plants to grow faster and larger to increase the agricultural production, they often use water more efficiently. However, eucalyptus trees have been identified to be capable of soil moisture and ground water depletion due to the continued water uptake especially during the dry season²⁸ especially in wetlands and marshy areas, riparian areas i.e. along rivers and around lakes, ponds, swamps and any other body standing water and irrigated farm lands.²⁹ It is noted that, growing eucalyptus in low rainfall areas with less than 400mm³⁰ may cause adverse environmental impacts due to competition for water with other species.³¹ The growth and viability of deep roots in such areas allows the plant to reach deep water tables³² therefore reducing the water capacity. Fears that the tree will deplete water have caused many countries in the region to discourage farmers from planting this exotic plant.³³ A conservative estimate for the year 2050 places at least 60 countries with nearly half the world's population into the water-scarce and water stress categories.³⁴ Water scarcity promises to pose an especially acute concern in the agricultural sector and also natural resource conflicts.

²⁸ RG. Florence., Ecology and silviculture of eucalypt forests. CSIRO Publishing. Australia, 1996; D.A.White, N.C.Turner and J.H. Galbraith., Leaf water relations and stomatal behavior of four allopatric Eucalyptus species planted in Mediterranean southwestern Australia. Tree Physiology. 2000, 20: pp1157-1165.

²⁹ See, A Guide to On-Farm Eucalyptus Growing in Kenya p.18.

³⁰ Ibid, p.18.

³¹ Ibid, p.11.

³² S.S.O. Burgess., M.A Adams., N.C Turner and C.K Ong., The re-distribution of soil water by tree root systems. Oecologia, 1998, 115: 306–311.

³³ K. Shem., C. Muthuri., C. Ong., Gas exchange responses of Eucalyptus, C. Africana and G. robusta to varying soil moisture content in semi-arid (Thika) Kenya. 2008, p.239.

³⁴ V.Smil., Global Catastrophes and Trends: The Next Fifty Years, Cambridge, MIT Press, 2008, p.199.

The negative results in the economic and environmental factors caused by the eucalyptus trees may cause some social effects. A drop in agricultural output for example may weaken rural communities by causing malnutrition, disease, and poverty, lead to an economic decline that may corrode confidence in the national purpose, weaken the tax base and undermine financial, legal and political institutions. Mass migrations of people into a region may disrupt labour markets, shift class relations and upset the traditional balance of economic and political authority between ethnic groups.³⁵

The Environmental Security Debate

While no one can see the future, it is at least possible to indicate a few of the directions that change is likely to take.³⁶ Environmental diplomacy has developed its own concerns which sometimes differ from those of general diplomacy. It has developed a world view which is a very different set of assumptions about international society and its own frameworks for collaboration. For example according to Dr. Abongo, the security threats emanating from environmental issues present humanity with a number of political quandaries. The threats are usually less clear cut and direct than other types of threats.³⁷ Global environmental politics is also a comparably new dimension of international relations and politics in general, but that is not to say that challenges of environmental change are in any way new. Thus calls for a speedy action towards environmental

³⁵ T.F. Homer-Dixon., On the Threshold: Environmental changes as Causes of Acute Conflict. Trudeau Centre for Peace and Conflict Studies, University of Toronto International Security, vol.16, no.2, 1991, p.6.

³⁶ M.V. Creveld, The Transformation of war. The Free Press, Newyork, 1991, p.198.

³⁷ P.A. Njuguna, M. Oduyo. Environmental Diplomacy and Human Security. Institute for Security Studies and, Ministry of Foreign Aff airs, Kenya, Nairobi, Kenya. 31 October 2008, p.15.

security if international environmental policies were to boost non-human, human and security in a feasible manner.

Old familiar “rules of the road” have faded; new ones are beginning to emerge...³⁸ In 1977, Lester Brown launched the query of environmental security by redefining security on what he and his colleagues perceived to be the pre-eminent threat to future human welfare.³⁹ Proponents of the redefinition of security claim that focusing on only the military security we would be risking the threats caused by the non-military threats for example in economic decline and deteriorating human health conditions both induced in part by demographic and environmental pressures such as population growth, pollution and resource scarcity.⁴⁰ Opponents on the other hand argue that by including non-military threats, the definition of security becomes so broad that it loses all practical utility and therefore support the continuation of a strict demarcation between what they consider “low” (economic and environment) and “high” (military) politics.⁴¹

Lack of or inadequate security of the non-military threats slowly brings about conflicts which go beyond intra-national conflict; conflict over access to resources within national boundaries to international conflicts; which is escalating tensions that eventually may foment international episodes.⁴² Among the different types of conflicts, they are further divided into two i.e. direct and in-direct. There has been a notion that disputes and violence can erupt over access to resources. Since biblical times, some of the

³⁸ P.J.Gizewski., The Global Security Environment: Emerging Trends and Potential Challenges. Carleton University, Ottawa, Canada, 27th May, 2009, p.1

³⁹ B. Lester., “Redefining Security”. Worldwatch paper no.14, Washington D.C., Worldwatch Institute, 1977

⁴⁰ D. Schwartz., A. Singh., Environmental Conditions, Resources and Conflicts. UNEP, Nairobi, 1999, p.6.

⁴¹ G. Dabelko., P.J. Simmons, Environmental Security: Core ideas and policy initiatives. Unpublished paper, May, 1996

⁴² D. Schwartz., Environmental Conditions, Resources and Conflicts. Op.cit p.8.

international wars have been fought over access to land and water. It is recognized that some of the factors that would bring about environmental conflicts are population growth and distinction between non-renewable and renewable resources.⁴³

Scarcities of both renewable and non-renewable resources will magnify problems.⁴⁴ Renewable resources such as water or river water have been identified to produce international competition that would later rise to international conflicts. A good example is that of Kenya and Uganda over the Migingo Island. It is important to note that what has led to the disagreements over the island is water and fish which are both categorized in the renewable resources. In the intra-national conflict the international system is characterized by relatively impotent legal/institutionalized mechanisms for resolving nation-nation conflicts however, countries contain legal or institutionalized mechanisms for resolving direct conflicts occurring within the national boundaries. An example is that of Ethiopia during the 1980's famine which saw the pastoralists migrate to the settled agricultural areas. This led to clashes between the two groups i.e. agriculturists and pastoralist groups and later there was increased competition for already scarce resources.⁴⁵

As a result of the above discussion, the responses to the future environmental security threats and challenges must be based on an acknowledgment and understanding of the reality, appreciation that the world is becoming an ever-more complex and tightly coupled system.⁴⁶ These basically mean that problems should be viewed in a larger,

⁴³ Ibid, p7.

⁴⁴ P.J.Gizewski., The Global Security Environment: Emerging Trends and Potential Challenges. Carleton University, Ottawa, Canada, 27th May, 2009, p6.

⁴⁵ D. Schwartz., Environmental Conditions, Resources and Conflicts. Opcit. p.18.

⁴⁶ P.J.Gizewski., The Global Security Environment: Emerging Trends and Potential Challenges. Carleton University, Ottawa, Canada, 27th May, 2009, p.15.

wider context and have variety approaches to problem solving. There are predictions that the developing nations in Sub-Saharan Africa, the Middle East and South Asia will be hard hit with societies in each region facing crucial deficits in renewable resources.⁴⁷ With such threats and catastrophes as this, there is need for security organizations, institutions and capabilities that are constructed to cope with the reality of rapid change and its consequences.

It is very vital for this policy to move beyond knee-jerk reactions to catastrophes or imminent adversities. It is noted that only through the holistic management of environmental threats could countries liberate themselves to act in the real interest of their populace, rather than being forced by familial political constraints to the continued pursuit of harmful practices to humans.⁴⁸ This is so because with the environmental threats and later conflicts, have social effects to not only the human security but also the animals in the bionetwork. The world is facing a global environmental crisis, and, inseparable from this, a crisis of growing global inequality and poverty. These unprecedented environmental and social changes pose huge challenges, and all the signs indicate a need for society's cross-sectoral attention to the environment as an underlying security issue.⁴⁹

For instance, eucalyptus species allegedly imported into the country have severe effects to the environment in not only the dry regions but also in wetlands, irrigated lands and along water sources due to its root capacity. This has caused environmental threats

⁴⁷ V.Smil., Global Catastrophes and Trends: The Next Fifty Years. MIT Press, Cambridge, 2008, p199.

⁴⁸ P.A. Njuguna, M. Odoyo. Environmental Diplomacy and Human Security. Institute for Security Studies and, Ministry of Foreign Affairs, Kenya, Nairobi, Kenya. 31 October 2008, p.15.

⁴⁹ J.Clover., Human-Centred Environmental Security in Africa. Institute for Security Studies, African Security review 14(2), 2005, p.103.

that have risen to the need of environmental security. Nevertheless, it has been observed that the species are imported and planted in line with the national's interest in particular areas while not considering others like environment.

Imported Eucalyptus Trees and Conflict

Conflict in this case will mean any substantial probability of violence ignited by environmental changes caused by the eucalyptus trees. Environmental degradation and the demand for resources for example can lead to conflict.⁵⁰ On the other hand, environmental change may shift the balance of power between states either regionally or globally, producing instabilities that could lead to war.⁵¹

Homer -Dixon hypothesizes three principal types of conflicts produced by severe environmental degradation; simple scarcity conflicts, group-identity conflicts and relative-deprivation conflicts.⁵² Among the types of conflicts simple scarcity conflicts will explain well the impacts of environmental threats that eucalyptus trees cause. This conflict expects state actors to rationally calculate their interests in a zero-sum or negative-sum situation such as might arise from resource scarcity in particular water and agriculturally productive land.⁵³ These resources spark conflict because their scarcity is increasing rapidly in some regions that are often essential for human survival.

These factors causing conflicts are a chain in a way that if there is water depletion, decreased agricultural production is experienced, the economy decline, there is

⁵⁰ K.T. Mostafa., Evolving Environmental perceptions from Stockholm to Nairobi, pg 439.

⁵¹ See, D. Wirth., Climate Chaos. Foreign Policy, No.74.1989, p.10.

⁵² T.F. Homer-Dixon., On the Threshold: Environmental changes as Causes of Acute Conflict. Trudeau Centre for Peace and Conflict Studies, University of Toronto International Security, vol.16, no.2, 1991, p.5.

⁵³ Ibid, p.5.

population displacement (environmental refugees) and disruption of legitimized and authoritative institutions and social relations. For example rural incomes would be expected to drop and rural unemployment to increase, drought, other forms of environmental stress linked to climate change like rural to urban migration, concentration of people in certain locations in rural areas that would lead to greater pressure on inadequate water and food supplies and may also increase the risk of epidemics.⁵⁴

Forecasting the future population, the results informs us that population growth, economic development, and technological revolutionize will increase the demand for natural resources, while environmental degradation and previous exploitation of these resources will reduce the supply. In addition, climate change will act as a threat multiplier, exacerbating current vulnerabilities and adding to levels of uncertainty. These trends enhance the potential for natural resources to contribute to conflict in the future and highlight the growing importance of environmental diplomacy as an integrated part of conflict prevention, mediation and peace building. Countries must come together and commit themselves to be coherent and consistence through the word and deed of protecting internal and external environment factors that if not guarded, may result to environmental degradation.

Environmental International Legal Regime

International legal regime came to establish some of the objective principles, rules and criteria to regulate the rights, responsibilities and conduct of individuals. This is used to

⁵⁴ T.F. Homer-Dixon., On the Threshold: Environmental changes as Causes of Acute Conflict. Op.cit, p.179.

implement policy objectives approved at international, regional, national or sub national level and operate fairly and consistently to promote legal certainty.

The global environment is complex and specialists have attempted to formulate international environmental law to deal with a limited range of problems. The laws shaped require delicate negotiations and skillful diplomacy to find compromise solutions that satisfy the different political and economic motives of the states they represent. What results from this is the environmental treaties that are the first step towards a final solution that may be years away.

However, the environmental law is known to have a slow development that slows the attainment of environmental goals. Nevertheless, it is considered the most valuable tool in policy implementation and government sponsored legal experts still meet with those from other disciplines to seek legal solutions to environmental problems.⁵⁵ There has been a growing number of agreements attempting to lay down norms and to offer incentives for other states to sign on, or at least commit themselves to a similar course of action.

With over 200 international environmental treaties in place and numerous others under negotiations,⁵⁶ there has been a disconnect between a growing number of legal instruments and a deteriorating global environment. It is vital to note that not all international environmental treaties have been negotiated under the auspices of the United Nations or its specialized agencies, but ever since the United Nations Conference

⁵⁵ K.T. Mostafa., Global Environmental Diplomacy-Negotiating Environmental Agreements for the World 1973-1992. MIT Press, Massachusetts Institute of Technology, London, 1998, p14.

⁵⁶ P. Chasek., Earth Negotiations: Analyzing Thirty Years of Environmental Diplomacy, United Nations University Press, New York, 2001, p.1.

on the Human Security in Stockholm, the United Nations has been increasingly recognized as the habitat for addressing environmental issues too large to be handled by any state, or even by a group of states.⁵⁷

A once made complain by a diplomat that “... getting action in the United Nations is like the mating of elephants. It takes place at a very high level, with an enormous amount of huffing and puffing, raises a tremendous amount of dust and nothing happens for at least 23 months.” This acknowledged the slow process of negotiating international agreements that are complex and time consuming. Despite all, there has been an achievement in the environmental treaties.

Some of these environmental treaties or conventions may govern some of the environmental problems and threats i.e. environmental/land degradation and depletion of water sources and impacts brought by the imported eucalyptus trees and also rules governing the importation of plants from one country to another for the safety and future conservation of the environment.

During the United Nations Conference on the Human Environment also known as the Stockholm Declaration of 1972, considered the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment. Some of the principles address to the threats caused by eucalyptus trees. For example principle two states that; the natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future

⁵⁷ Ibid, p.1.

generations through careful planning or management, as appropriate. Principle five states; the non renewable resources of the earth must be employed in such a way as to guard against the danger of their future exhaustion and to ensure that benefits from such employment are shared by all mankind. It is therefore the government's or state's responsibility to ensure the principles are followed to the last.⁵⁸

In the 1982 Nairobi International Union for Conservation of Nature and Natural Resources, came up with the world conservation strategy, a document which presents a clear statement of conservation priorities and a broad plan for achieving them. Specifically it defines the major conservation goals i.e. maintenance of essential natural processes and life support systems; assurance that the utilization of species and ecosystems is sustainable and maintenance of genetic diversity. It identifies the major obstacles to achievement of these goals. It also defines policy decisions and other actions to achieve the goals, at worldwide, regional and national level, by governments, international organizations and the private sector.⁵⁹

There also have been some regional efforts i.e. African Union (AU) States and Government in ensuring the environment is well conserved for the present and future welfare of mankind. This is evident with coming to force of the African Convention on the Conservation of Nature and Natural Resources (ACCNNR) in 1969.⁶⁰ In this convention, it has stipulated well in article six (VI) on land and soil that, the parties shall take effective measures to prevent land degradation, and to that effect shall develop long-

⁵⁸ K.T. Mostafa., Evolving Environmental perceptions from Stockholm to Nairobi, Butterworth, London, 1988, pp 3-5.

⁵⁹ Ibid, p.435.

⁶⁰ Internet Source: African Convention. www.unep.org

term integrated strategies for the conservation and sustainable management of land resources, including soil, vegetation and related hydrological processes. It also mentions that the parties shall establish land-use plans based on scientific investigations as well as local knowledge and experience and, in particular, classification and land-use capability. This is in contrary to what may be in practice in this age where plants especially imported ones like eucalyptus species find their way to the land without proper investigations on what species fit where and in what condition or type of soil.

In regards to plant importation e.g. the eucalyptus species which is known to have been imported from South Africa, there are international legal frameworks that oversee the rules for plant importation that should be adhered to. The International Plant Protection Convention (IPPC) is one of the international instruments that provide a legal framework for international cooperation in order to secure common and effective action to prevent the spread and introduction of plant products, pests of plants and to promote appropriate measures for their controls. Some of the IPPC objectives include taking into account internationally approved principles governing the protection of plant, human and animal health and the environment⁶¹

Parties allied to the IPPC are required to adopt legislative, technical and administrative procedures and standards to prohibit the introduction of certain plants or other commodities, prescribe restrictions on the imports of plants, plant products or other regulated articles. In this case, each party is required to establish a national plant protection organization with responsibility for inspecting and disinfecting commercial consignments of plants and plant products and other regulated articles moving in

⁶¹ J.J. McCarthy., Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change, 2001

international traffic; Issuing of phytosanitary certificates for exports of plants, plant products and other regulated articles in a form that can be accepted in importing countries. These standards are used by many countries as the basis for developing import legislation and administrative procedures.⁶²

International Union for the Protection of New Varieties of Plant (UPOV) is another convention that came up with a general introduction to the examination of distinctness, uniformity and stability and the development of harmonized descriptions of new varieties of Plants to take care of the importation of plants, plant products and regulated articles between or among states.⁶³ However, nations, concerned authorities and plant breeders seem not to comply with the rules and regulations hence illegal importation. Just like IPPC, UPOV has allowed the member states to develop national acts to be followed in regards to plant importation.

Kenya's Legal Regime

In Kenya, there are many bodies and organizations that deal with environmental issues. Some of these organizations assist in policy making in the environmental sector, others assist in research as well as others being the think tanks in the lines of environment. Some of these are Kenya Plant Health and Inspectorate Service (KEPHIS), Kenya Forestry Research Institute (KEFRI), National Environmental Management Authority (NEMA), United Nations Environment Programmes (UNEP), Ministry of Environment and Natural Resources, Ministry of Forestry and Wildlife, Ministry of Agriculture among others.

⁶² R. T. Watson, I. R. Noble, B. Bolin, N. H. Ravindranath, D. J. Verardo and D. J. Dokken, Eds., Land-Use Change and Forestry. Cambridge University Press, Cambridge, 2000, p.375.

⁶³ See, Plant Protection Act (2009), Kenya, Cap 324

Being a member of UPOV, Kenya developed the Plant Protection Act that would deal with importation rules of plants, plant products and regulated articles in Cap 324.⁶⁴ Kenya Plant Health Inspectorate Services (KEPHIS) owned by the state was established to offer inspectorate services on all matters related to plant health and quality control of agricultural inputs and produce as well as issuing plant import permit (PIP) renewable every year, plant export permit (PEP) renewable on yearly basis and phytosanitary certificate every time imports or exports are made at the ports of entry and exit.

Among other activities are testing and monitoring the presence of harmful residue agrochemicals on agricultural produce, soil and water systems; development and implementation of standards on both imported and locally produced seeds; approval of all import and export permits for plants and seed; implementation of the national policy on the introduction and use of genetically modified plant species, insects and micro-organisms in Kenya⁶⁵

To advance and protect Kenya from environmental degradation, the National Environment Management Authority (NEMA) was established under the Environmental Management and Coordination Act (EMCA) No. 8 of 1999⁶⁶ as the principal instrument of government in the implementation of all policies relating to the environment. In order to boost environmental law study and increase proficiency in litigation of environmental matters, NEMA partnered with the Kenya National Council for Law Reporting (KNCLR)

⁶⁴ See, The Plant Protection Act, 2009

⁶⁵ Internet Source: Kenya Plant Health Inspectorate Service (KEPHIS) website, Plant importation procedures 1996.

⁶⁶ See Environmental Management and Coordination Act. 1999

and the National Environmental Tribunal (NET) to avail the legal precedents on environmental law in soft.⁶⁷

This has strengthened the stakeholder capacity and competence as environmental practitioners' access environmental information easily. The Environment and Land Law Reports (ELLR) is an initiative aimed at establishment of a perpetual and self-running system of monitoring and reporting case law on environmental and land issues.⁶⁸ Kenya has taken great strides to fully comply with international protocols that are inline with its national interest.

These regulations are aimed at protecting Kenya's agriculture the mainstay of the economy, from environmental threats and in this case those caused by the imported eucalyptus trees. In Kenya, importation of genetically modified plants or plant products requires authorization by the National Biosafety Committee (NBC) before an import permit is issued. The conditions for the import are stipulated by the NBC and Kenya has to adhere to them since it is a signatory to the Cartagena Protocol on Biosafety.⁶⁹ The Plant Import Regulations are kept under constant review and are revised or amended according to the latest international scientific information available on all aspects.

South Africa's Legal Regime

South Africa has an International Union for Conservation of Nature and Natural Resources (IUCN) under the World Conservation Union which was founded in 1948. its objective is to influence, encourage and assist throughout the world to conserve the

⁶⁷ Online Source, Environmental law, www.nema.go.ke

⁶⁸ Online Source, Environment and Land Law Reports, www.kenyalaw.org

⁶⁹ See UPOV Gazette, (2002 June) No. 93.

integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. The World Conservation Union builds on the strengths on its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.

In all plants and plant products importation, the National Plant Protection Organisation (NPPO) of South Africa deals with the sanitary and phytosanitary measures which controls the importation of goods in South Africa focusing primarily on import and exports regimes and provide quarantine periods to ascertain safety as well as for the destruction of specimens. With these guidelines, the Government of South Africa has steps or procedures to be followed before importations of any plants or plant products into the soil of South Africa.

The living modified organisms (LMO's) have a great impact on the laws concerning importation of goods within the country. LMO's will have an impact on biodiversity, ecosystems and human health, livelihood system and development opportunities. South Africa is allegedly known to export Genetically Modified eucalyptus trees in Kenya i.e. *E. Grandis* and *E. Camaldulensis* that has implications to the environment. The country's participation and first African Country to join in UPOV in 1977⁷⁰ gave rise to genetically modified organisms (GMO's) act in 1997 for implementation.⁷¹ The Act provide for measures to promote responsible development, production, use and application of GMO's. Among them is to ensure that all activities involving the use of GMO's (including importation, production, release and distribution)

⁷⁰ See UPOV Convention (1961), Members of the International Union for the Protection of New Varieties of Plants, as revised at Geneva (1972, 78, 91)

⁷¹ See UPOV Gazette, (2002 June) No. 93

shall be carried out in such a way as to limit possible harmful consequences to the environment, to ensure that GMO's are appropriate and do not present a hazard to the environment.

With all these rules and regulations it is still a puzzle how the species got its way to Kenya and out of South Africa. Nevertheless, there are reasons that would cause the mishap for example poor governance, corruption etc. some of these factors have been the origin for the environmental threats caused by the imported eucalyptus tree species.

Imported Eucalyptus Trees: Sustainable Development

The report by the United Nation's Brundtland Commission (UNBC) of 1987 marked the beginning of the sustainable development concept that has generated all the literature and recent commentary.⁷² Sustainable means that as a resource is used, it is replaced by growing additional amounts of the resource while the word development in the phrase sustainable development means that the Third World's economies will become equal to the developed world's economies. This in turn will alleviate poverty and suffering in poor countries and make the world more equitable for all human beings.⁷³

The Brundtland Commission presented and defined the phrase, sustainable development as one that "requires meeting the major needs of all and extending to all the opportunity to satisfy their aspirations for a better life." However, "living standards that

⁷² T. Davis., Sustaining the Forest, the People, and the Spirit: What is Sustainable Development. Suny Press, 2000, p2.

⁷³ Ibid, pp1-2.

go beyond the basic minimum are sustainable only if consumption standards everywhere have regard for long-term sustainability.”⁷⁴

The Stockholm Conference on the other hand clarified the link between development and the environment and suggested an approach that would recognize the socioeconomic factors behind many environmental problems and cure the effects by treating the causes. The conference redefined the aims of development making a high quality of life, rather than the endless acquisition of material possessions, the main criterion of success.⁷⁵

The Commission identified a number of “common challenges” facing the earth: population and human resources, food security, species and ecosystems, energy, industrial development and urbanization. In regards to the earlier discussed impacts of the imported eucalyptus trees in Kenya to the environment, has caused the above mentioned challenges due to its chain of effects/impacts from poor agriculture production to the environmental induced conflicts. These challenges trigger us to respond to them with a long time solution for the sake of the future and that is with sustainable development.

Sustainable development integrates social, environmental and economic sustainability and uses these three to start making development sustainable.⁷⁶ For sustainable development to be successful there is need for combined efforts from an individual level to a nation’s level. For instance, the nation can only achieve and maintain

⁷⁴ See, World Commission on Environment and Development, pp 43-44.

⁷⁵ K.T. Mostafa., Global Environmental Diplomacy-Negotiating Environmental Agreements for the World 1973-1992. MIT Press, Massachusetts Institute of Technology, London, 1998, pp 2-3.

⁷⁶ R. Winterbottom and P.T. Hazlewood, Agroforestry and Sustainable Development. Allen Press, 1987 Vol. 16, No. 2/3, p.101.

sustainable development when its citizens understand the concept and embrace it as a national priority.⁷⁷

Despite, eucalyptus species being a sustainable development on its own for the development and growth of the national economy due to its competitive edge over other tree species and its wide and ready market, environmental sustainability is crucial for the future. For this to occur there is need for technology development especially the tree biotechnology to identify the suitable hybrid and areas for planting. This will replace the unsuitable hybrid for the planted regions and still be advantageous with the same benefits of the tree species. On the other hand, the indigenous trees can be recommended to replace the eucalyptus near or along the rivers to save the water sources.

Clear instituted management and governance structures have been assumed to be a global significance in sustainable development and management of the environment and natural resources.⁷⁸ This includes national policy framework where nations come up with policy documents to govern the principles of sustainable development. For example, in Kenya's Environmental Management and Coordination Act (EMCA) of 1999 provides a comprehensive legislative framework for the management of the environment in the country. This has provided for the creation of National Environmental Management Authority (NEMA) mandated to safeguard and enhance environmental quality through coordination, research, facilitation and enforcement.⁷⁹ There is also the Survey Act Cap 299 of the laws of Kenya that stipulates reservation of not less than 30 meters along the

⁷⁷ P.R.Shukla., M. Kapshe and A. Garg, Global Forum on Sustainable Development: Development and Climate Change. Organisation for Economic Co-operation and Development, Paris, 2005, p 38.

⁷⁸ See, Millennium Development Goal. Status Report for Kenya-2009. Ministry of State for Planning, National Development and vision 2030, p.37.

⁷⁹ Ibid, p.37.

water sources when planting trees. To sustain our water sources an extra 20 meters should be added to ensure that the trees do not adversely interfere with the water sources.⁸⁰

In this case, the legal framework should be adhered to especially those that deal with importation of plants like the Plant Protection Act (PPA). The mismanagement of this act especially by either individuals or the political regimes in place has cost the environment so much in terms of the imported eucalyptus trees. However, the acts should also be amended and tightened to avoid loopholes. For instance the penalties and offences if a person fails to adhere to the rules and regulations set aside to govern the importation of plant in the land of Kenya includes: If any person contravenes any of the provision of these rule shall be guilty of an offence and shall be liable to a fine of two thousand shillings or imprisonment for a term not exceeding six months or both.

Looking at this critically the fine of two thousand shillings would be like a “drop in an ocean” for any person importing plants. This leaves a loop hole for importers to take advantage and sneak in the imported plants. A low living standard would prompt an individual to be involved in corruption hence allowing the imported plants in the country without proper inspections. These obstacles challenge the efforts of sustainable development in a nation and the world at large.

Conclusions

From the above comprehensive discussion it is clear that eucalyptus planting poses an environmental threat as much as it is fit for both ecological and socio-economic terms.

⁸⁰ See, A Guide to On-Farm Eucalyptus Growing in Kenya p.18.

There also has been a challenge in governance and management in the legal frameworks that would be vital in improving the environment by placing some rules and regulations. To overcome the challenges and to ensure safety in the environmental, social and economic sectors, there is need for putting in place objectives and solutions through sustainable development.

CHAPTER FOUR ENVIRONMENTAL DIPLOMACY AND NATIONAL INTEREST: A CRITICAL ANALYSIS

Introduction

The previous chapter has expounded extensively on the case study i.e. the history of the eucalyptus trees from a broader picture then narrowed down to Kenya and slightly on the eucalyptus tree planting in South Africa. This chapter has also looked at the impacts of the tree and the need to concentrate on environmental security to ensure we curb all the environmental threats through the legal frameworks put in place both internationally and domestically.¹

Chapter four will analyze the findings of the case study by looking at the emerging issues in the study that will include the effects of the introduction of imported eucalyptus trees on the national interest, an assessment of security debate, legal regimes and other issues. Finally the chapter will conclude on the discussions of the findings of the study.

Emerging Issues

Effects of the Introduction of Imported Eucalyptus Trees on the National Interest

As earlier discussed, there is no definite meaning of national interest. However some scholars in the schools of realism and idealism tried to come up with a meaning. These meanings were influenced by their school of thoughts.² Bandyopadhyaya attempted to

¹ See Chapter 3

² See Chapter 2

explain or to make us understand the meaning of national interest by saying that a state's foreign policy is as a means for the preservation and promotion of the national interest.³ This later brought in an understanding that national interests differ from state to state according to the state's priorities.

Like any other state, Kenya came up with written guiding principles for its Foreign Policy which helps us pinpoint the country's national interests. Despite the country's foreign policy framework, it has a dynamic character which has enabled it to respond to changing developments in the diplomatic arena. It also provides a paradigm shift in Kenya's world view and the imperative to have a robust foreign policy in order to successfully pursue Kenya's national interests, objectives and priorities.⁴ However, there have been some priorities and strategies in the Kenya's foreign policy despite the dynamic character for example to promote economic development and prosperity by increasing market access, capital in flows and enhance technological advancement.⁵

This one priority in the Kenya's foreign policy may be the cause of introduction of the imported eucalyptus trees. This species allegedly known to have been imported from South Africa are known to have been technologically advanced different from the species that were first introduced in 1902⁶ when there was a technology know how. It was earlier discussed that South Africa is known to focus its efforts on eucalyptus genomics for species and traits of commercial interest relevant to the geographic zone.⁷

³ J.Bandyopadhyaya., The Making of India's Foreign Policy. Allied Publishers, 2003, p.4.

⁴ See, Republic of Kenya Foreign Policy Framework. Ministry of Foreign Affairs, Nairobi, 2009, pp9-10

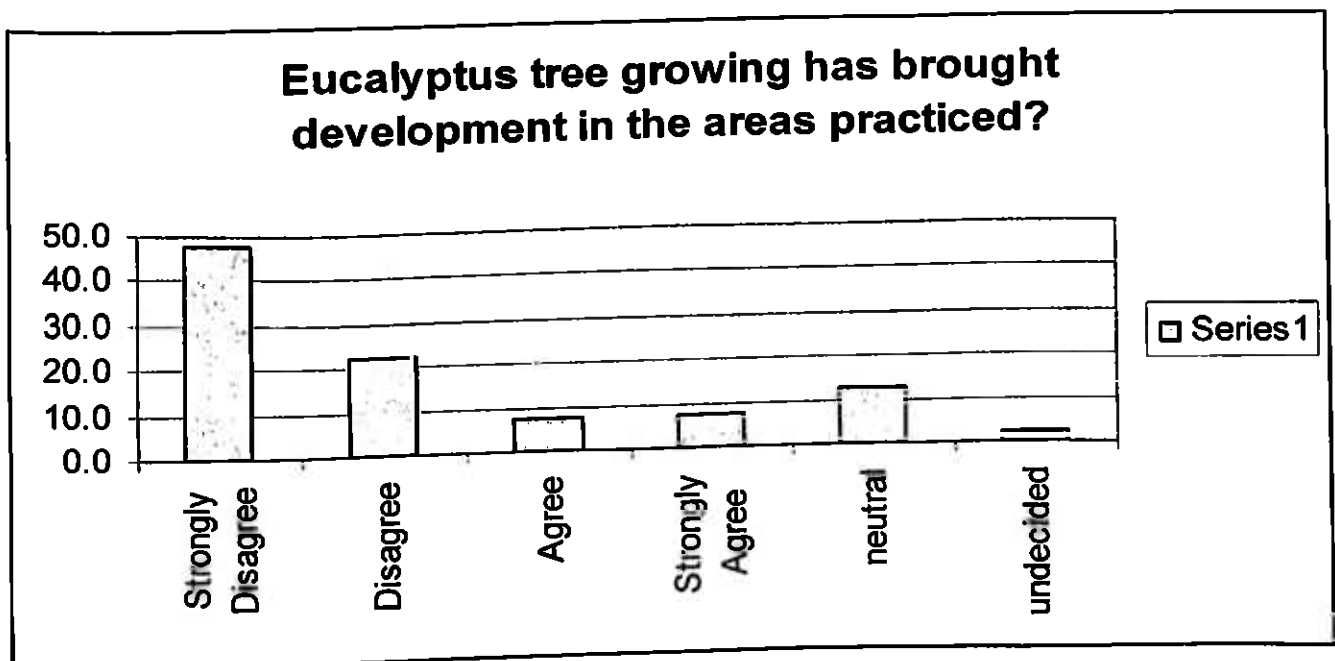
⁵ Ibid, p.9.

⁶ See, Kenya Forest Service A Guide to On-Farm Eucalyptus Growing in Kenya.. December, 2009, p.8.

⁷ See. Chapter 3.

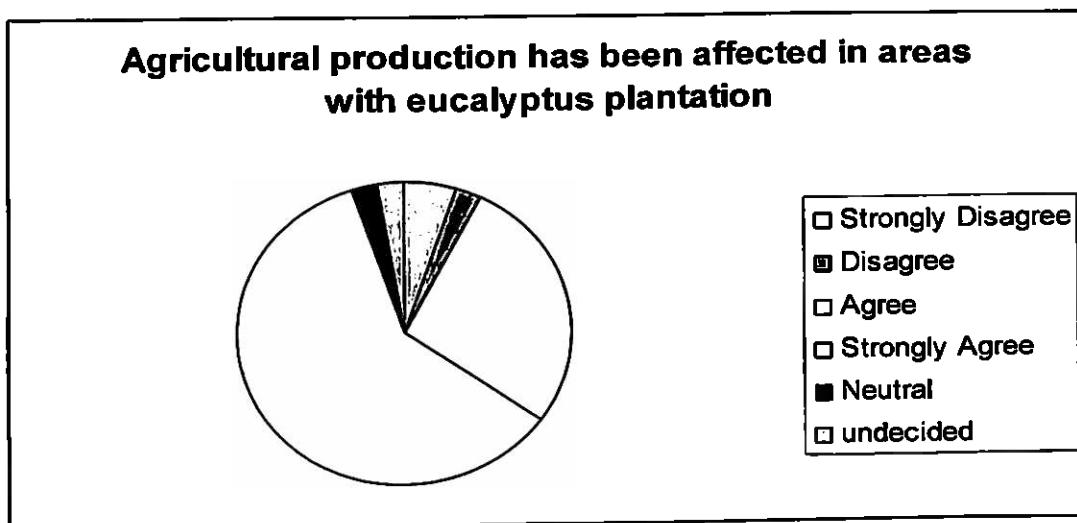
The success of eucalyptus trees in South Africa may have led to the introduction of the species to the country assuming that it would have the same impacts and environmental behaviour. The introduced species are known to produce good timber and poles that have seen Kenya's economy rise to an estimated value of Ksh. 1.6 billion.⁸

Kenya has been in a position to increase its market access to Uganda and South Sudan in the exportation of poles from the introduced species. With this kind of economy rise from the eucalyptus products, we would expect some development in the areas where these plantations are. According to the findings from the research conducted, it came out clearly that there is no development in these areas. This would however prompt a question; where does the amount go to if not to develop the areas with the plantation?



⁸ Kenya Forest Service A Guide to On-Farm Eucalyptus Growing in Kenya Opcit, p.8.

In the earlier discussion on the impacts of eucalyptus trees⁹, it was discussed that these species have been found to have certain effects to the environment in some parts of Kenya. These specific eucalyptus trees from South Africa are known to develop deep roots which continue to uptake water during dry seasons, causing soil and ground depletion and the long term effect is fatal.¹⁰ The deep penetrating roots grow rapidly in extremely dry environments, since it would facilitate root growth through dry subsoil allowing the plant to reach deep water tables.¹¹ Such opportunistic uptake is likely to increase the plant's success as a competitor for water. This has led to the decrease or no water in water sources and water tables¹² causing an increase of drying land that with time has led to deteriorating agricultural production therefore causing threats of food security. The finding of the research showed that the agricultural production was affected in areas with the eucalyptus plantation.



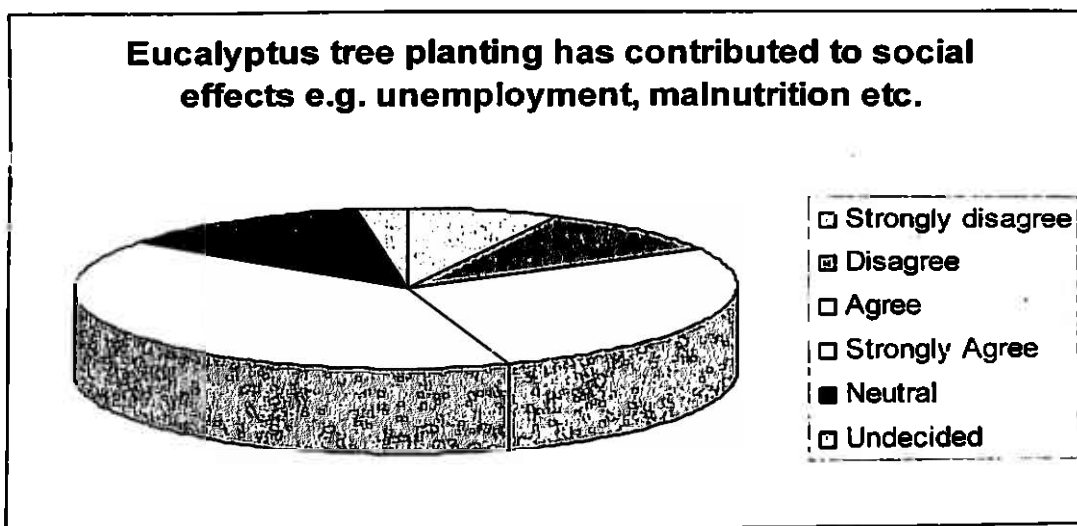
⁹ See Chapter 3.

¹⁰ R.G Florence., Ecology and silviculture of eucalypt forests. (1996) CSIRO Publishing. Australia.

¹¹ S.S.O. Burgess, M.A Adams, N.C Turner and C.K Ong., The redistribution of soil water by tree root systems. (1998) Oecologia 115: 306–311.

¹² Ibid

The agricultural sector has for many years been an important component of national development efforts due to its linkages with other sectors of the economy.¹³ As part of the national development in line with high agricultural productivity is creation of employment and eradication of poverty and hunger. On the contrary, the introduction of eucalyptus trees has not only caused threats to the food security but has also contributed to some social effects including unemployment, malnutrition. The research which was largely collected from Central Province where this plantation has intensely been practiced has recorded that due to the introduction of these species in our farms has contributed to the above mentioned social effects.



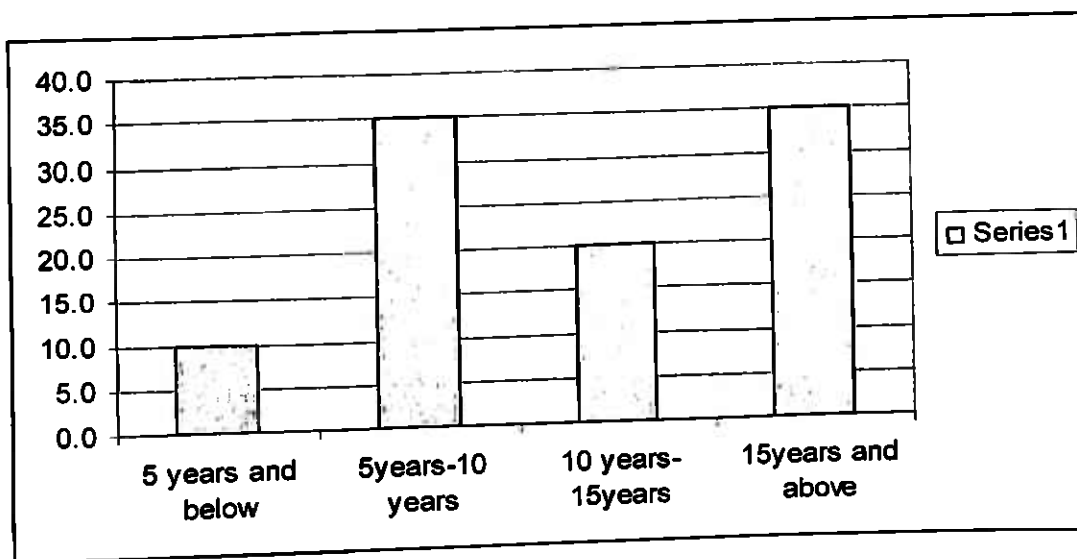
It is argued that the eucalyptus trees do not have a long term management therefore reducing the rate of employment in the farms or plantation. Some of the correspondents' findings further explained that unemployment had been caused due to a

¹³ See, Millennium Development Goal. Status Report for Kenya-2009. Ministry of State for Planning, National Development and vision 2030, p.5.

large farm or plantation in the area cutting down the coffee plantation and replacing it with eucalyptus trees.

For a fact, Kenya has actively promoted multilateralism within the context of the United Nations to increase its global influence and secure its national interest. In this regard, Kenya pledged to achieve the eight Millennium development Goals (MGD's) by 2015 in order to create "a more prosperous and just world". These commitments will see the country expand opportunities for wealth creation, employment and service delivery.¹⁴

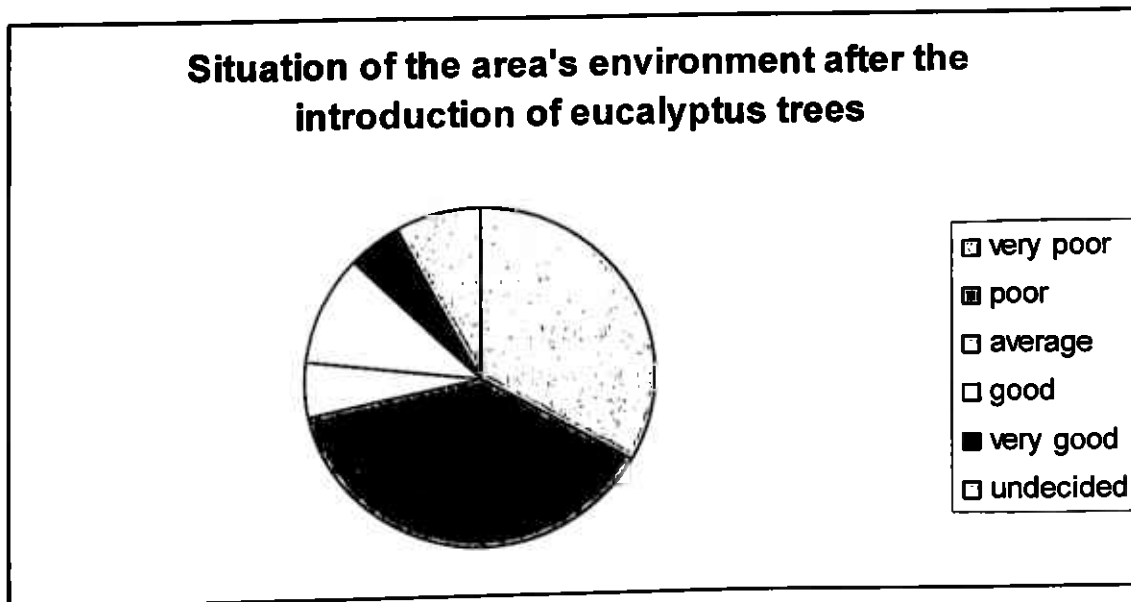
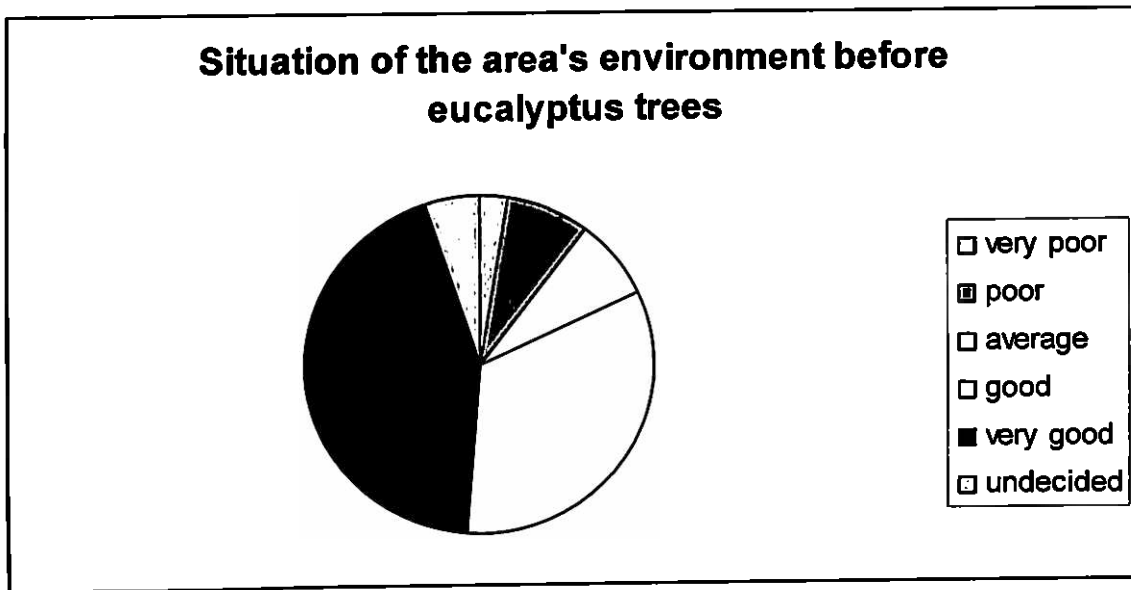
Most of the correspondents in the sample population know the introduced eucalyptus tree for 5 years to 10 years and 15 years and above.



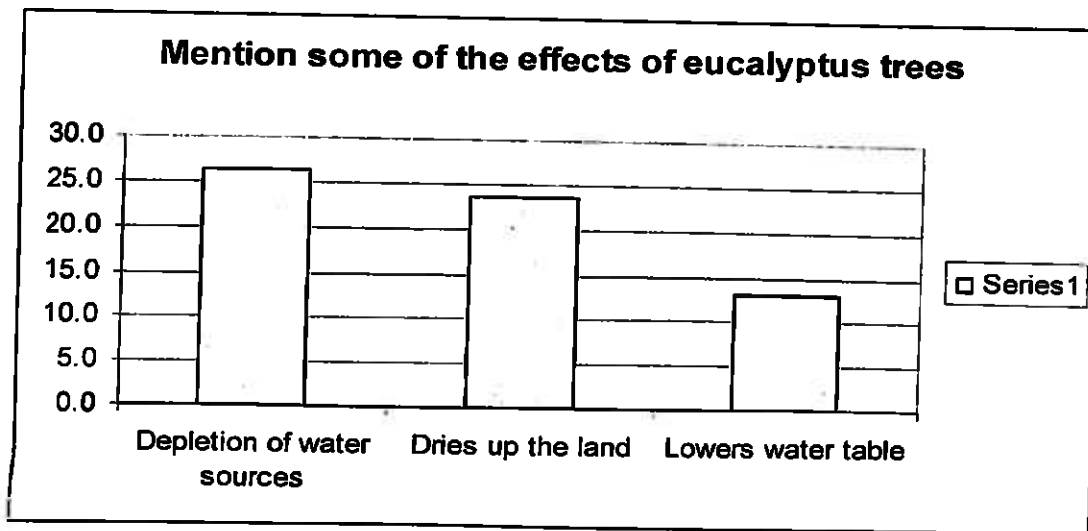
This population will be best suited to provide the study with the environmental changes before the introduction of the imported eucalyptus trees to the region to date. The study clearly showed that before the introduction of eucalyptus trees the environment was good but not until after the introduction where the results were poor. This

¹⁴ See, Republic of Kenya Foreign Policy Framework. Ministry of Foreign Affairs, Nairobi, 2009, pp28-29.

compromises the situation of a healthy environment that is also vital in the Kenya's national interest.



Some of the highly recorded findings in the study on the effects of eucalyptus trees were



Depletion of water sources, land dryness and thirdly lowering the water table. Fears that the tree will deplete water have caused many countries in the region to discourage farmers from planting this exotic plant¹⁵ to protect its national interest on the up keep of the environment. A conservative estimate for the year 2050 places at least 60 countries with nearly half the world's population into the water-scarce and water stress categories. Water scarcity promises to pose an especially acute concern in the agricultural sector and also natural resource conflicts.¹⁶

An Assessment of the Security Debate

The theoretical framework used for this study is Security Debate. Revisiting the discussion on the security debate,¹⁷ it redefines the term security not only to include the military based security but also the environmental security. Inadequate security in either

¹⁵ K. Shem., C. Muthuri., C. Ong., Gas exchange responses of Eucalyptus, C. Africana and G. robusta to varying soil moisture content in semi-arid (Thika) Kenya. 2008. p239.

¹⁶ See Chapter 3.

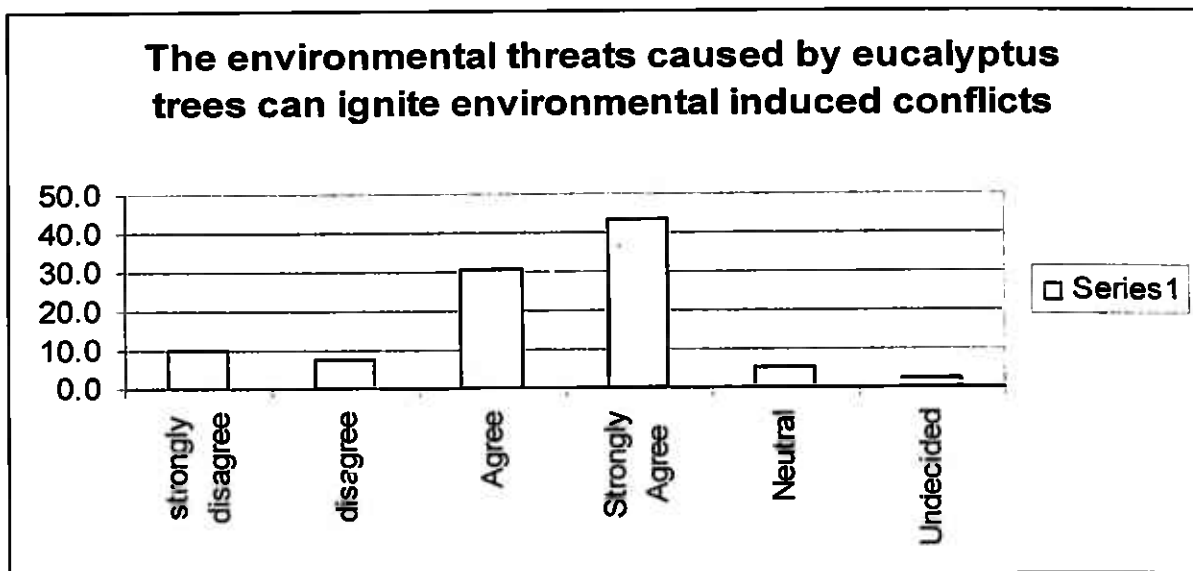
¹⁷ Ibid.

way may cause conflicts. For example there have been conflicts ignited by the competition of natural resources which are renewable for example water. Environmental pressures can also contribute to either direct or indirect conflict causing environmental insecurity.¹⁸ Some of these changes are human induced. The Brundtland Commission argued that the security concept “must be expanded to include the growing impacts of environmental stress locally, nationally, regionally, and globally”¹⁹.

In the Kenya’s core priorities in the foreign policy framework, only mentions to enhance peace and security by combating international terrorism, and organized transnational crime like laundering, trafficking in drugs, human, small arms and light weapons etc. This section has not mentioned the need for environmental security that is brought about by the environmental threats. From the above discussed section on the effects of the introduction of eucalyptus trees on the national interest, we have noticed that the species is capable to cause conflicts in future if its concerns are not looked at seriously especially in the depletion of water sources.

¹⁸ D. Schwartz, A.Singh., Environmental Conditions, Resources and Conflicts (1999), Nairobi, UNEP, pp5-6.

¹⁹ See, Brundtland Report of 1987



The findings concluded with 43.6% that the environmental threats caused by the introduced species can ignite environmental induced conflicts.

However, more has to be done in the Kenya’s guiding principles of foreign policy and redefining the term security to include in the environmental pillar. It has hence clearly mentioned that degradation of shared environment and resources threaten the prosperity, employment and health of all Kenyans. Further, lack of proper management of trans-border resources such as water resources and bio-diversity including wildlife and forests, is a potential source of conflicts within and between countries.²⁰

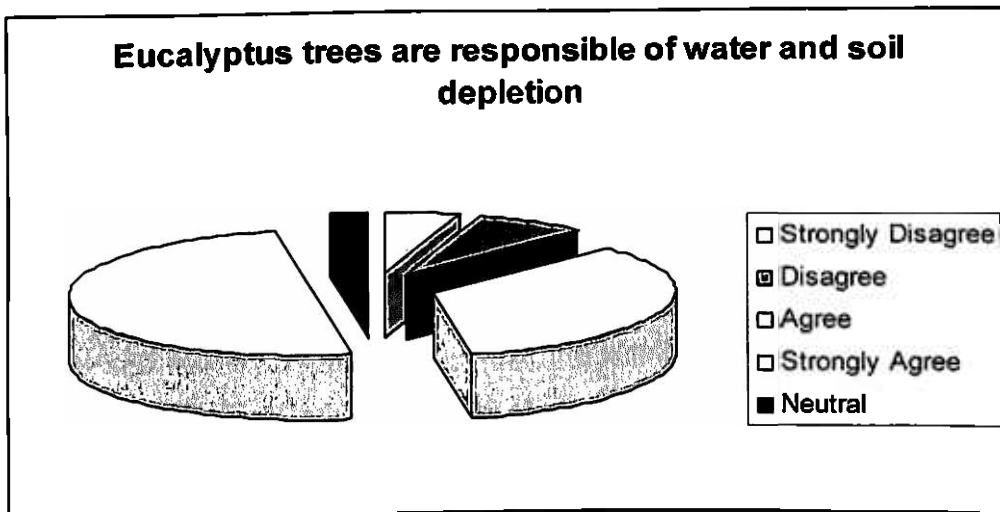
All apart from rainfall attraction have been found out to be environmental threats caused by eucalyptus trees according to the findings of the study. (See below table);

²⁰ See. Republic of Kenya Foreign Policy Framework. Ministry of Foreign Affairs, Nairobi, 2009, p19.

Mention some of the effects of eucalyptus trees in your region or the areas known to you

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Depletion of water sources	10	23.3	26.3	26.3
Dries up the land	9	20.9	23.7	50.0
Rainfall attraction	2	4.7	5.3	55.3
Lowers water table	5	11.6	13.2	68.4
Swamp draining	1	2.3	2.6	71.1
brings famine in areas once fertile	1	2.3	2.6	73.7
Unemployment	3	7.0	7.9	81.6
Low productivity in food plants	2	4.7	5.3	86.8
Causing drought/famine	1	2.3	2.6	89.5
Soil degradation	1	2.3	2.6	92.1
Leads to immigration in search of water	1	2.3	2.6	94.7
Acute scarcity of water	2	4.7	5.3	100.0
Total	38	88.4	100.0	

All these threats can be a reason to redefine security in environmental terms. These threats are inter-linked to each other in a way that if one resource is lacking, it leads up to another level of inducing conflict. Population growth which plays a role in fomenting conflicts can be caused by the above mentioned factors. When there is an acute scarcity of water, depletion of water sources and water tables it may give rise to dry lands with soil degradation that will produce low productivity in food plants which will later cause famine and drought. The population affected may lead up migrating from one area to another in search of food or/and water.



It is by understanding the nature and causes of conflicts that we will enable the fabrication of solutions and also by placing the focal points for environmental conditions and resources for conflict resolution and conflict prevention at the international and national levels.²¹

²¹ D. Schwartz., A. Singh., Environmental Conditions, Resources and Conflicts, UNEP, Nairobi, 1999, p34.

Legal Regimes

These are laws or rules that deal with a limited range of problems. These legal regimes are also put in place to regulate the rights, responsibilities and conduct of individuals. They implement policy objectives approved at international, regional, national or sub national level. In this study, the legal regimes to concentrate with are the environmental laws that seek legal solutions to environmental problems²² to attain environmental goals. This is achieved by having environmental treaties or conventions that govern some of the environmental problems and threats i.e. environmental/land degradation and depletion of water sources and impacts brought by the imported eucalyptus trees and also rules governing the importation of plants from one country to another for the safety and future conservation of the environment.

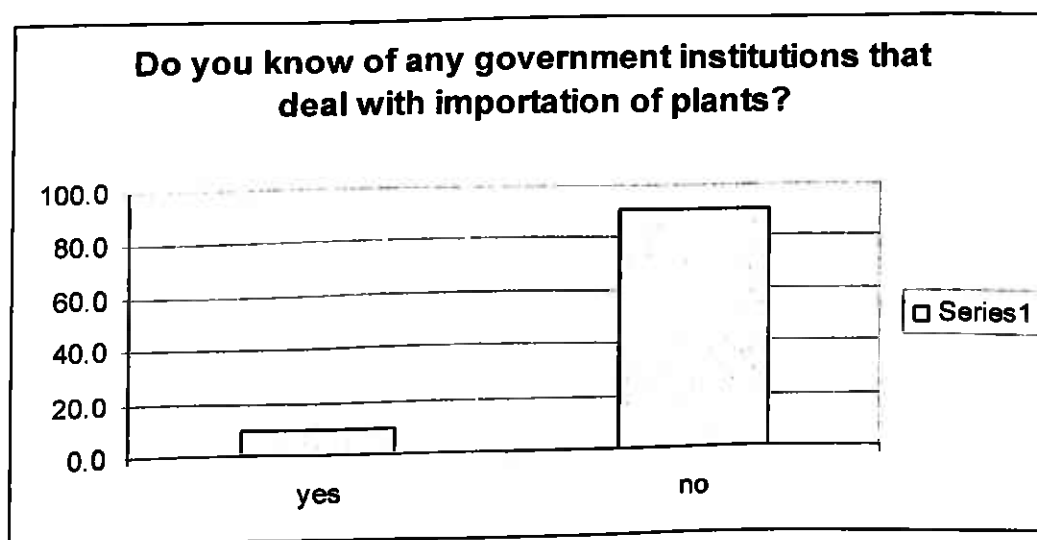
In regards to the imported eucalyptus trees from one country to another, there are several international regimes as well as the national laws or Acts that give guidelines in the process of importation. As discussed earlier in the previous chapter,²³ the International Plant Protection Convention (IPPC) is one of the international instruments that provide a legal framework for international cooperation in order to secure common and effective action to prevent the spread and introduction of plant products, pests of plants and to promote appropriate measures for their controls. Countries that are signatories of this convention are obliged to adhere to the rules. South Africa where the species are known to come from is a member of IPPC and ratified in 1956 while Kenya

²² K. T. Mostafa., Global Environmental Diplomacy-Negotiating Environmental Agreements for the World, 1973-1992. MIT Press, Massachusetts Institute of Technology, London, 1998, p.14.

²³ See Chapter 3.

adherence to the IPPC was made in 1974.²⁴ These two parties are required to adopt legislative, technical and administrative procedures and standards to prohibit the introduction of certain plants or other commodities, prescribe restrictions on the imports of plants, plant products or other regulated articles.

In Kenya for example under the membership of International Union for the Protection of New Varieties of Plant (UPOV) has allowed its members to formulate national acts providing guidelines on the importation procedures in the country. Under Cap 324 of the Plant Protection Act has come up with procedures and guidelines on how to deal with new varieties of plants or products in the country. This mandate has been given to a state owned institution Kenya Plant Health Inspectorate Services (KEPHIS) to offer inspectorate services on all matters related to plant health and quality control of agricultural inputs. From the research findings, it has been revealed that 90% of the sampled population are not aware of any government institutions that deal with importation of plants.



²⁴ Online Source, See IPPC Website, www.ippc.int

This puts the population at stake since they are not in a position to ask queries when purchasing the eucalyptus trees seedlings. This calls for the Government to come up with programs that will aim at educating the people involved. When the population was asked if the Government has offered education about the trees, 95% responded NO. This would raise concerns of ignorance in issues that will later put the environment and human security in danger in the future. Some of the institutions of the Government should come up with initiatives aimed at educating and researching thoroughly on the issues that pose environmental threats. With training to the parties involved may lead to a large number of population aware and know the sources of their products.

However, challenges are encountered because some of the Acts that are place were formulated way back and have since not been amended according to global changes that are happening day in day out. This has allowed some loopholes in the Acts that people have taken advantage of. For example the discussion in the previous chapter looked at the penalties for anyone who goes against the stipulated procedures and laws and if any person shall be guilty of an offence, shall be liable to a fine of two thousand shillings or imprisonment for a term not exceeding six months or both. These penalties poses an obstacle because for anyone importing plants can easily afford two thousand shillings therefore putting our environment in danger.

Just like the chain effect of eucalyptus trees, countries should also be involved in a chain of legal regimes that governs every aspect of the environment. For example with the depletion of natural resources, there is a convention that specifies on that only making

a country be answerable to many conventions or treaties to ensure a just and safe world in the future. The legal regimes should be clearly revised and come up with viable policies that would see the protection of the environment in every angle.

Other Issues

The study has clearly shown that the imported eucalyptus trees have brought about environmental threats as analyzed in the previous chapters in areas where they exist thereby raising concerns of environmental security. The legal regimes either international or domestic have stipulated very well the procedures to be followed in importing any new plant into the country. These rules and regulations have however been broken thereby having illegal products for example an individual's own interest and corruption.

The discussion in this study has revealed that natural resources i.e. renewable resources such as water are easily to cause conflicts. This is so because it brings about competition of resources against a certain population. This study has shown that the introduction of eucalyptus trees in Kenya has reduced and depleted natural resources and degraded the environment.

Conclusions

The introduction of eucalyptus trees in the country has caused environmental threats that have affected not only the environmental factor but also the economic and social factors. The three factors are interlinked and difficult to separate. If the threats are not properly handled, they may later affect the future. Institutions and individual's ignorance and ineffectiveness in their work are the origin of the problems caused by the eucalyptus

trees. This is because the procedures and rules put in place are not followed to later. However, this may not be fully blamed to them but also the loopholes in that acts and rules that govern importation of plants.

CHAPTER FIVE CONCLUSIONS

Summary

A healthy environment equals a healthy people. Planting trees is a good thing as it helps keep a healthy environment. The concept of sustainable environment is noble and should be taken seriously by all. After this research paper, it is apparent that, most African countries are fighting against environmental insecurity factors and have embraced on achieving effective sustainable development.

Different species of trees have been introduced and planted. However, research has shown that not all plant species are good for the environment or the people. Some of these trees are observed to be friendly and unfriendly co-currently to the ecosystem. Most have proved to be of human benefit economically, providing energy source and food. These tree species especially in Kenya e.g. eucalyptus species are imported from South Africa and planted without further research on the survival and effects to the ecological unit.

Kenya has been known to import eucalyptus species i.e. eucalyptus grandis and eucalyptus camaldulensis from South Africa.¹ These species have been found to cause certain effects to the environment in some parts of Kenya. They not only have been a benefit to the country's economy but also proved to be a threat to the environment by causing land degradation and depletion of water sources in areas grown. Due to such threats, the world has united to solve

¹ J.Karuga., Eucalyptus Tree Courts Controversy as Demand for Power Poles Grows. Business Daily Nairobi, 24 May 2010

the challenging environmental problems through intense participation in environmental diplomacy that has given rise to a number of treaties and conventions that states are signatories.

Global multilateralism is vital for environmental diplomacy because without global vision individual states will tend to have limited domestic objectives. Without global agreements and environmental governance there is just too much possibility of states avoiding their responsibilities and off shoring the environmental destruction as well as mismanagement in the agreed actions. Despite the national interests differing from one state to another, there is a linkage with environmental diplomacy. This has led to establishment of international and regional legal regimes that seek legal solutions to environmental problems.²

Due to the security threats emanating from environmental issues, there have been some efforts directed to the need of sustainable development in the world. Sustainable development integrates social, environmental and economic sustainability and uses these three to start making development sustainable.³ This in turn will alleviate poverty and suffering in poor countries and make the world more equitable for all human beings.⁴

Key Findings

Having come to the conclusion above, it is notable that Kenya has suffered from the planting of eucalyptus trees that have adverse effects on our environment. The trees have been identified to be capable of soil moisture and ground water depletion due to the continued water uptake

² K.T. Mostafa., Global Environmental Diplomacy-Negotiating Environmental Agreements for the World, 1973-1992. MIT Press, Massachusetts Institute of Technology, London, 1998, p14.

³ R. Winterbottom and P.T. Hazlewood, Agroforestry and Sustainable Development. Allen Press, 1987 Vol. 16, No. 2/3, p.101.

⁴ T. Davis., Sustaining the Forest, the People, and the Spirit: What is Sustainable Development. Suny Press, 2000, pp1-2.

especially during the dry season.⁵ This has caused adverse environmental impacts due to competition for water with other species⁶ decreasing the agricultural production that is often mentioned as potentially the most worrisome consequences of environmental change.⁷ These trends enhance potential possibilities to contribute to conflict in the future while highlighting the growing importance of environmental diplomacy as an integrated part of conflict prevention.

Kenya has been involved in many environmental diplomacy that would see fight against any threats to the environment. Environmental diplomacy has clearly emerged as an essential component of international relations with more than 200 international environmental treaties now in place and numerous others under negotiations. The major problem is the implementation of the policies and treaties that have been concluded. The planting of eucalyptus species have somehow gone unnoticed by the Kenyan government in a long time. The governments and organizations have not engaged in educating the citizens on the effects of the species or even advices on the suitable regions for the plantation as well as ensuring the rules of the government on environment have been observed to the latter.

The study has shown that despite the environmental threats caused by the eucalyptus tree species it is of economic value to the country. With this advantage from the tree, one would imagine that the lifestyle of the people in the area would be improved and so is the development in the region. On the contrary, no such developments have been happening as the study reveals and this raises questions on how the government allocates its finances to areas practicing

⁵ R.G. Florence., Ecology and silviculture of eucalypt forests. CSIRO Publishing. Australia, 1996; D.A.White, N.C.Turner and J.H. Galbraith., Leaf water relations and stomatal behavior of four allopatric Eucalyptus species planted in Mediterranean southwestern Australia. Tree Physiology. 2000, 20: pp1157-1165.

⁶ See, A Guide to On-Farm Eucalyptus Growing in Kenya. p.11.

⁷ See, L.Brown., Reexamining the World Food Prospect. State of the World 1989. Worldwatch Institute, Newyork, Norton, pp41-58.

eucalyptus trees plantation. This therefore causes double trouble to the residents i.e. environmental problems and lack of development.

Recommendations

The study has observed that legal frameworks that deal with importation of new varieties of plants into the country e.g. Acts, have visible loopholes. It is upon the government to tighten up the rules, regulations and penalties for the offenders to curb environmental degradation. Policy makers should also come up with policies that will govern the future for the environment and update them with time and changes in the world. If this is not seriously looked at, it would in turn threaten the ecological integrity of native forests and natural resources.

An introduction of environmental policy instruments tools would be recommended for easing environmental policies implementation. Serious government committed to end harmful effects of environmental degradation can craft ways of encouraging compliance with ecological guiding principle like introducing economic incentives of tax exemptions and tradable permits. Since environmental matters often have many diverse aspects, numerous policy instruments may be needed to adequately address each one. Therefore, countries should gladly comply with environmental treaties that will help us live in an environmental friendly ecosystem.⁸

The administration arm should trickle down the information on new policies to the grassroots. Loopholes have been visible in some acts and it's upon the government to tighten up the rules, regulations and penalties for the offenders. Policy makers should also come up with policies that will govern the future for the environment and update them with time due to the global changes. The government has a major role in coordinating environmental sustainability

⁸ See, D. Jensen. Environmental Diplomacy. United Nations Environment Programme, 2004

actions, keeping an eye on both its citizens, non-governmental organizations and the foreign investors.

Kenya aims to develop its nation and has since come up with bodies and institutions to pursue the country's environmental goals. This is the reason the Kenyan government has even formulated a new long term development blueprint for the country-the Kenya vision 2030⁹ to have a development strategy to transform Kenya into a newly industrialized, middle-income country providing a high quality of life to all its citizens in a clean and secure environment by the year 2030. To meet such visions it's vital to amend the policies in place or come up with other news ones.

It is of paramount importance that all countries be included in the fight against environmental unfriendly practices carried by humans. States should be persuaded to allow the formation of international civil society that will be the world's public watchdog on matters concerning environment as well as to maintain check and balances on government commitment to safeguarding natural resources.

The Kenyan guiding principles for its foreign policy lacks an exhaustive discussion on environmental security. This brings to task the revision on the environmental responsibilities for the country and redefinition of security. This would enable the country to concentrate more on not only the military security issues but also the environmental threats and insecurity. There is need to realize that without a well kept and safe environment there is no future because our lives are dependent to the environment.

⁹ C.S. Adam, P. Collier & N. Ndung'u., Kenya Policies for Prosperity, Oxford University Press, New York, 2010. pp39-40.

Apart from the amendments in the legal framework, well equipped scientific research institutes should be established to identify and investigate on the tree species brought in the country as well as coming up with viable species fit for a certain climatic conditions. This way it would be easier to avoid circumstances where plant species find their way to the farms without further research. Environmental diplomacy is not very old in the field of diplomacy and it would be vital to focus on other issues that can affect the environment like the harmful plant species.

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10. Do you know of any Government institutions that deal with importation of plants?

Yes [] No []

a. If Yes, indicate.

- i.
- ii.
- iii.
- iv.

11. Are you aware of any Government's procedures in importation of plants e.g.

Eucalyptus trees?

Yes [] No []

12. Do you know the origin of your eucalyptus seedlings?

Yes [] No []

13. Mention some of the effects of eucalyptus trees in your region or the areas known to you.

- 1.
- 2.
- 3.

14. Please indicate whether you rate it as Very Poor (VP), Poor (P), Average (A), Good (G), Very Good (VG) and Undecided (U) in the below questions.

(Tick where appropriate)

a. How would you describe the situation of the area's environment before eucalyptus tree planting?

VP	P	A	G	VG	U
[]	[]	[]	[]	[]	[]

b. Evaluate the situation after eucalyptus tree planting.

VP	P	A	G	VG	U
[]	[]	[]	[]	[]	[]

15. Please indicate whether you Strongly Disagree (SD), Disagree (D), Agree (A), Strongly Agree (SA), Neutral (N), Undecided (U) in the below questions.

(Tick where appropriate)

a. The Government has done enough education on eucalyptus trees.

SD	D	A	SA	N	U
[]	[]	[]	[]	[]	[]

b. Eucalyptus tree business has benefited the farmers economically.

SD	D	A	SA	N	U
[]	[]	[]	[]	[]	[]

c. Eucalyptus trees are responsible of water and soil depletion.

SD	D	A	SA	N	U
[]	[]	[]	[]	[]	[]

d. Agricultural production has been affected in areas with eucalyptus plantation.

SD	D	A	SA	N	U
[]	[]	[]	[]	[]	[]

e. Plantation of eucalyptus trees has contributed to social effects e.g. unemployment, population immigration, malnutrition, land competition etc.

SD	D	A	SA	N	U
[]	[]	[]	[]	[]	[]

f. The environmental threats caused by eucalyptus trees can ignite environmental induced conflicts.

SD	D	A	SA	N	U
[]	[]	[]	[]	[]	[]

g. Eucalyptus tree growing has brought development in the areas practiced.

SD	D	A	SA	N	U
[]	[]	[]	[]	[]	[]