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The Kenyan perspective on adoption of green concept in biodiversity conservation: Case of Nairobi, Kenya

Mutembei Henry M'Ikiugu*, Bessy Eva Kathambi

Wangari Maathai Institute for Peace and Environmental Studies, University of Nairobi, Kenya

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Abstract

Biodiversity is disappearing at alarming rate due to human civilization. The paper documents the benefits of adopting green concept environment ecosystem to salvage biodiversity loss through protection, conservation and preservation. Data was collected by surveying 97 households and five key informants using semi-structured questionnaires, interviews and observations. The nonparametric *Data Envelopment Analysis (DEA)* was used to determine the degree of connectivity between the society/institutions and the existing biodiversity conservation trough green concept adoption. Fifty three (53.6%) of the female gender understood and adopted the green concept in biodiversity conservation when compared to the male gender (46.4%). Overall, 33% of the respondents understand the green concept compared those who did not understand the green concept (67%). The awareness level of the respondents on the existence of legal instruments (laws, policies and regulations) for the green concept was at high (56.7%, P≤0.05, n=97). On the contrast, 35.1% of respondents neither knew the implication of the legal instrument nor did they comply to the same (30.9%) when compared with those who knew the implication (64.9%) and complied with the same (69.1), respectively. Notably Kenyans had differences on levels of understanding of the green concept and its application in biodiversity conservation but were practicing the concept and also were willing to adopt the same in biodiversity conservation. This serves to providing evidence to inform policy decisions that support implementation of governance strategies for the adoption of green concept to sustain biodiversity conservation.

***Corresponding Author:** Mutembei Henry M'Ikiugu ✉ hmutembei@uonbi.ac.ke

Introduction

Biodiversity is the variety of all living organisms including ecosystems, plants, animals their habitats and genes (CBD, 2010; Agnes, 2011). Although rarely linked directly to the development index of human population, biodiversity directly and indirectly affect human development by contributing up to 40% of global market of goods and services (Thompson *et al.,* 2011). Tragically, today biodiversity is disappearing at alarming rate due to human civilization (UNEP Report, 2016). This threat is by due to any process or event, whether natural or human induced, which cause adverse effects upon the status or sustainable use of any component of biodiversity (Swanson, 1995). These processes or events are often stimulated by misguided economic and faulty institutions (Agnes, 2011).

The gross domestic product (GDP) for Kenya is heavily driven by sectors that depend on conserved biodiversity (Thornton, 2010; FAO, 2017). Thus, failure to conserve biodiversity would not only lead to biodiversity losses but also affect their economy (Fonderflick *et al.,* 1982). The biodiversity losses are more likely to be in urban and peri-urban ecosystems that host national park (UNEP report, 2016). The conservation of biodiversity is determined by decisions made individually by the residents and supporting institutions/policies (Lambin and Meyfroidt, 2010).

The global push for adoption of Green Concept is a sustainability measure of environmental biodiversity that integrates protection, conservation and preservation activities geared towards biodiversity conservation (UNEP Report, 2016). Conservation activities entail sustainable use of biodiversity resources by encompassing protection and restricted exploitation of biodiversity. Preservation is the aspect of conservation that maintains the existing biodiversity without altering or changing it (Spellerberg and Hardes, 1992). Kenya has embraced green concept for economic benefits from biodiversity resources and their associated processes (Swanson, 1995; MoE Report, 2000; EMU-GOK, 2010; Kenya Vision 2030 Report, 2010; Agnes, 2011).

However there exists scanty research that provide evidence-based support for legislations/policies on individual/institutional strategies for adoption of the green concept in Kenya. This work seeks to inform policy based on peoples' perceptions, knowledge, attitudes and practices on green concept in biodiversity conservation. The data generated would be useful in formulating national strategies and action plans for sustainable utilization of biodiversity resources. The data presented promotes a paradigm shift from perceptions to education for public awareness, community participation and policy implementation.

Materials and method

The theoretical framework of the research was based on institutional and resource based view where coercive push and resource benefits for societal utilitarian values of biodiversity conservation are deemed to influence the implementation of actions like adoption of Green Concept in biodiversity conservation (Florida and Davison, 2001). In applying this theory, the design was to conceptualize a framework (Fig 1) that considers engagement in protection, conservation and preservation of the environment as the inputs of green concept, and the societal values as regulated by institutions/policies considered as drivers that influence the adoption of concept in biodiversity conservation. Data collected in Nairobi County served to represent Kenyan perspective because Nairobi is host to key environmental organizations like UNEA, government ministry and other NGOs that formulate and implement policies on environmental management and conservation. In addition, Nairobi is the only city with a national park ecosystem.

Surveys were conducted using questionnaires, key informant interviews and observations. The attributes of the green concept in biodiversity (conservation, preservation and protection of biodiversity species) formed the focus of the survey. *Data Envelopment Analysis (DEA)* method was utilized to evaluate the determinants of human perceptions, decisions, activities and their related influence on biodiversity

conservation (Reinhard *et al.,* 2000; De Koeijer *et al.,* 2002; Sipiläinen *et al.,* 2008). In brief, DEA method compared various organizational units (individual and institutional) decisions and output activities they impacted on biodiversity conservation (Boussonfiane *et al.,* 1991).

The DEA constructs the determinant frontier (the most preferred combinations of decisions and takes into account the impacts of the decisions on people's knowledge, attitudes and practices on biodiversity conservation (De Koeijer *et al.,* 2002).

The surveys focused on the prevailing individual and institutional decisions that affected the green concept itself, and their influence on the biodiversity conservation (Solovyeva *et al.,* 2011).

The framework of the research tried to present the possible theories of statistical variety represented by the decisions of the randomly chosen respondents (Fare and Grosskopf, 2004). The green concept component, which was incorporated into the research model as an input, represented the main focus as the driver for the output, which in this case was biodiversity conservation.

The influence of human activity and in particular, as based on the uptake of the green concept (conservation/preservation/protection) (Kuemmerle *et al.,* 2008), on biodiversity conservation, became the pillar of the research. In the considered theoretical context, depending on which biodiversity parameters are chosen (MacDonald *et al.,* 2000; Tasser and Tappeiner 2002; Dullinger *et al.,* 2003), the aggregated biodiversity index was determined that combines the quantitative and qualitative evaluation of the following parameters as differently weighted: percentage of the people who were knowledgeable on the concept, those who adopted it, and the attitudes and practices of the respondents (Kuosmanen and Kortelainen, 2004 and 2005).

Ninety two (97) households were surveyed and five (5) key informant interviews were conducted.

The main prerequisite for choosing respondents for the survey was being a resident of Nairobi and/or being the head of the environmental department of the ministry or institution dealing with environment (key informant). Factors considered included the perceptions of the respondents on the green concept, knowledge on waste management, attitudes and practices on green concept in biodiversity conservation, and attitudes on technologies that promote the adoption green concept. In the survey open and closed questions as well as qualitative and quantitative questions were used (Jahnke and Jahnke, 1982; Fare and Grosskopf, 2004). The indicators were weighed according to their importance for the adoption of green concept in biodiversity through chi-square significance level ($P \leq 0.05$, $n=97$).

Bias likely to result from utilization questionnaire surveys (i.e. social desirability bias, leniency bias) were minimized by adapting methodological separation amongst the different measurements of the study in order to get temporal and psychological separation (Michelsen and de Boer, 2009).

In order to minimize the items ambiguity, ambiguous or unfamiliar terms were not used; vague concepts or complicated syntax were avoided; questions were simple, specific, and concise. To minimize socially desirable, lenient, acquiescent, and consistent bias, all respondents were guaranteed anonymity.

The data was further strengthened by information sought from key informant interviews. Here topics on the understanding of the Green Concept and its application, ability to assess uptake of green concept biodiversity conservation. Additionally, to test the validity of data provided by other respondents, similar questions were posed to key informants, although extra questions on the Green Concept and its uptake were included.

Results

Gender Demographic factor on adoption

From the data presented in figure 2, the gender of the respondents significantly (P≤0.05, n=97) affected the adoption rate of the green concept in Kenya. On average more women respondents understood and adopted the green concept in biodiversity conservation.

Table 1. Respondents knowledge, attitudes and practices on green concept and the governance (legal instruments) that promote adoption of green concept in biodiversity conservation (n=97).

Parameter	Yes (positive) (%)	No (negative)(%)
Understanding of concept	33.0±2.11[a]	67.0±2.17[b]
Awareness of existing legal instruments	56.7±1.62[a]	43.3±1.67[a]
Knowledge of the Implication of legal instruments	35.1±1.89[a]	64.9±1.90[b]
Compliance to the legal instruments	30.9±2.05[a]	69.1±2.11[b]

[a, b] Different letters in the same row differ statistically by Chi-square, P<0.01; Positive: respondents aware of existence of legal instruments, their implication on conservation and compliance on biodiversity conservation; Negative: respondents of the contrary views of the positive responses.

Knowledge, Attitudes and Practices on Adoption

It noted that significantly lower number of the respondents (Table 1; 33%, P≤0.05, n=97) understood the green concept and its application in biodiversity conservation. Again, it is evident that the respondents awareness level on existence of legal instruments for the green concept regulation was significantly high (Table 1; 56.7%, P≤0.05, n=97).

However, as shown on Table 1, significantly lower number of respondents neither knew the implication of the legal instrument (35.1%, P≤0.05, n=97) nor did they comply on the same (30.9%, P≤0.05, n=97).

Table 2. Respondents perceptions on green concept as applied in biodiversity conservation (n=97).

Parameter	No (Negative) (%)	Yes (Positive) (%)
Use of environmentally friendly sources of energy	34.7±1.81[a]	65.3±1.78[b]
Practice of the environment better practices	37.6±1.69[a]	64.4±1.59[b]
Adherence to environment laws and policies	32.1±2.45[a]	67.9±2.81[b]

[a, b] Different letters in the same row differ statistically by Chi-square, P<0.01;significant majority of respondents could attribute the practices to green concept.

Drivers of Change on Adoption

As indicated in Table 2 and Figure 3, the majority ofthe respondents significantly perceived that green concept could contribute to biodiversity conservation through use of environmentally friendly sources of energy (65.3%), practice of environmentally better practices (64.4%) and adherence to environmental laws and regulations (67.9%).

Majority of them (62.9%) also significantly practiced tree planting for protection of the biodiversity and alsosignificantly engaged in practices that they perceived protected the biodiversity (Table 3 and Figure 3; P≤0.05, n=97).

Significantly also the majority of respondents were willing to adopt the green concept to conserve biodiversity as they also perceive it as a means of create wealth creation (Fig. 3-4; P≤0.05, n=97).

Discussion

The results reported in this paper indicate differences in knowledge, attitudes and practices of the respondents for the green concept and its legal

regulation based on gender demographic, respondent's personal perceptions, knowledge, attitudes and practices. Similar observations on biodiversity conservation have been reported (Jahnke and Jahnke, 1982; Cooper *et al.,* 2002).

This find was not surprising based on the theoretical context of the DEA method of analysis, which allows the data to "speak for itself" (Cooper *et al.,* 2002; Kuosmanen and Kortelainen, 2004 and 2005).

Although the results indicate a low understanding of the green concept in Kenya the findings also indicate that Kenyans are willing to adopt the green concept in biodiversity conservation through utilitarian values as a means for wealth creation through biodiversity resources and their associated processes (Swanson, 1995; Agnes, 2011).

Table 3. Respondents practices of the green concept that promote attributes of biodiversity conservation (n=97).

Green concept parameter	Protection (%)	Conservation (%)	Preservation (%)
Planting trees	62.9±0.22[a]	20.6±0.48[b]	2.1 ±0.61[c]
Building gabions and restoring riparian	5.2±0.44[d]	1.0±0.49[e]	2 2.1±0.37[e]
Waste management	4.1±0.05[d]	1.0±0.50[e]	1 1.0±0.19[e]

[a, b, c, d, e] Different letters in the same row and column denotes significantly different statistically by Chi-square, P<0.01; differences in practices were noted for different purposes of biodiversity conservation.

This is in agreement with others, who reported, for instance, how individual decisions and practices affected natural environment (Reinhard *et al.,* 2000). The Kenyan majority were *also* practicing the planting of trees, building gabions, restoring riparian, and waste management, all of which contributed to green concept that lead to biodiversity conservation. This therefore shows that the practices of respondents influenced not only the environment but also the existing biodiversity.

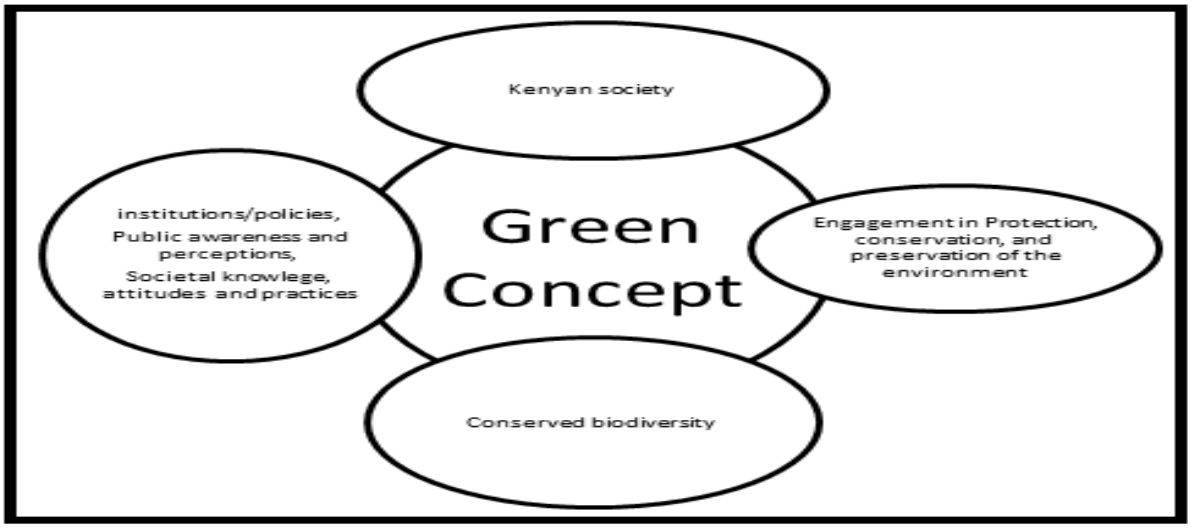

Fig. 1. Conceptual framework of adopting green concept in biodiversity conservation.

Thus, as reported previously, the adoption of the green concept in Kenya is dynamically causing changes in the biodiversity towards conservation (Van Huylenbroeck and Whitby, 1999; Schader, 2009). Of great value in conservation is the noted perception by the respondents that respondents view that adoption of the green concept could be a means for wealth creation.

Thus, sustainable biodiversity interest in Kenya can be driven though utilitarian value as means for wealth (Van Huelenbroeck and Whitby, 1999; Kleijn *et al.,* 2009; Fonderflick *et al.,* 2010; Singer, 2011).

Thus, the adoption of the green concept through the driver of societal utilitarianism, as reported by Singer (2010) could be the practical way to conserve biodiversity in Kenya (positive environmental externality).

This is already agrees with the noticed willingness by the respondents to adopt the green concept as means for wealth creation.

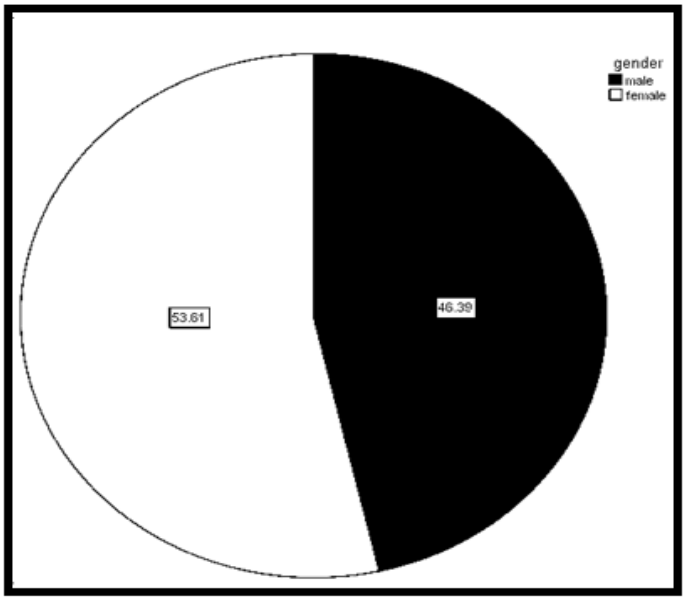

Fig. 2. Role of gender in adoption of green concept in biodiversity conservation; black=men adopting the concept (46.4%[a]), white=women adopting the concept (53.6%[b]). [a,b] indicates significant difference in chi-square, $p \leq 0.05$, n=97.

The thresholds of the research were based on a conceptual framework (Fig. 1), which predicted utilization of the green concept to promote biodiversity conservation.

Adoption of the concept through practices of tree planting, restoration of riparian etc. impacted on biodiversity conservation through gain of unique local natural biodiversity, presence advocacy services, mass re-appearance of the threatened biodiversity, and resurgence of support institutional structures for the activities that promote biodiversity conservation.

This has been demonstrated elsewhere through promotion of utilitarian values of conservation for job creation that led to increase in diversification of household income and restoration of affected biodiversity (Solovyeva *et al.,* 2011).

The differences in individual respondent knowledge, attitudes and practices decisions on the adoption of the green concept in biodiversity conservation in Kenya were inherently connected to society-specific expectation like gender, upbringing status and economic stability.

Therefore, such demographic characteristics, as they influence local situations, need to be considered as evidence for effective governance strategy that enhance natural adaptive characteristics of the people of Kenya as a solution for sustainable biodiversity conservation. This is in line with the UNEP report (2016) which recommends countries to embrace gains perceived by the society relation to the adoption of the green concept in biodiversity conservation; residents need to see this as avenue for job creation and economic empowerment.

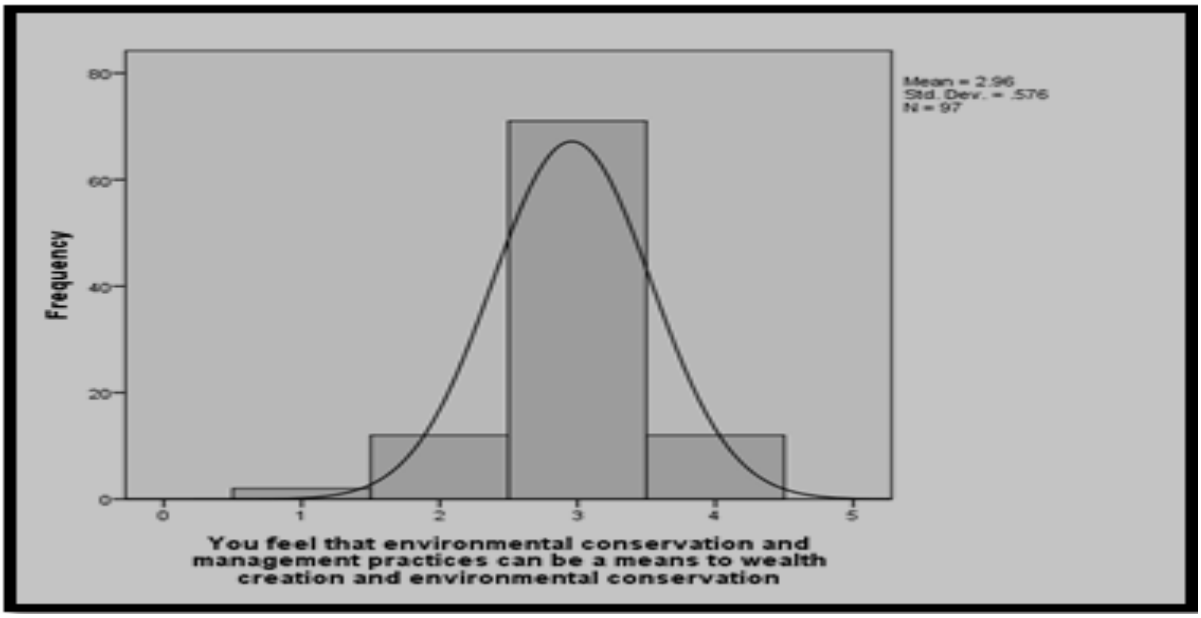

Fig. 3. Perception of respondents on adoption of green concept in biodiversity conservation; utilization of environmental conservation practices as means to wealth creation and innovations like brisket production. Majority of respondents significantly perceived green concept could conserve biodiversity in environment and help create jobs; P≤0.05, n=97.

Conclusion and recommendations

The reported data indicate that despite the low understanding of green concept in biodiversity conservation, residents of Nairobi in Kenya practice and are *al*so willing to adopt the green concept for biodiversity conservation. However a gap is noted in awareness level and lack of an implementation strategy for effective governance that promote green concept in biodiversity conservation.

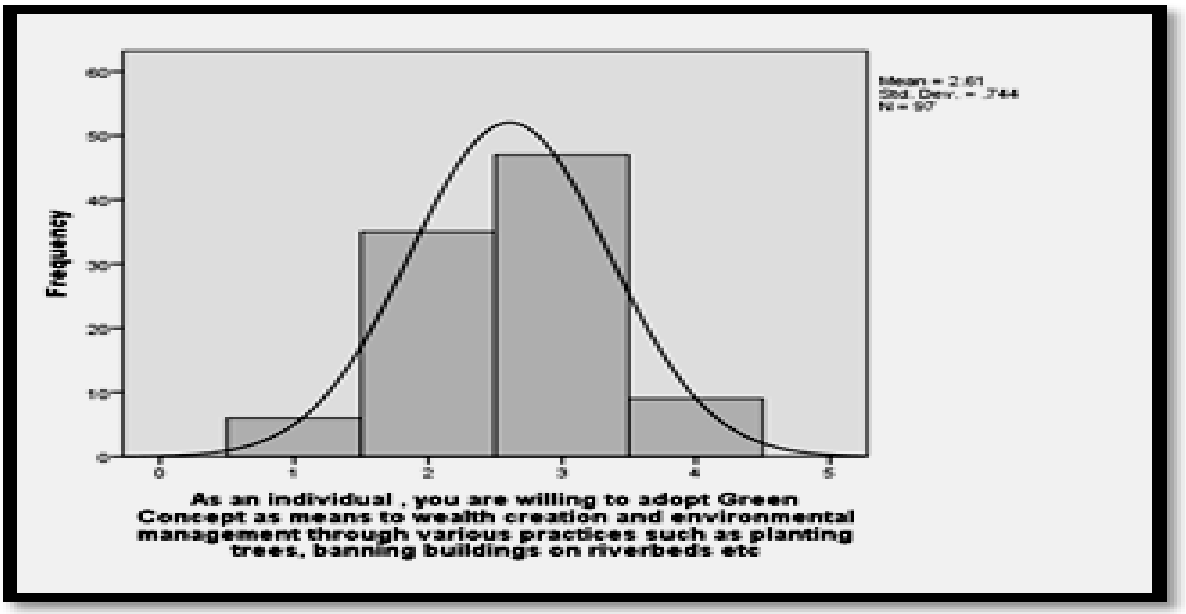

Fig. 4. Respondents willingness to adopt green concept in biodiversity conservation; utilization of environmental management through various practices (planting trees, advocating for ban on protection of riparian). Majority of respondents significantly willing to adopt green concept in biodiversity conservation; P≤0.05, n=97.

The results of this research can contribute to the adoption of the green concept through formulation of evidence-based policies for sustainable biodiversity conservation.

References

Agnes ML. 2011. Biodiversity Conservation in Kenya. Institute of Economic Affairs **32,** 1-8. www.ieakenya.or.ke/downloads.php?page=ISSUE-32-2011.pdf

Bebe BO, Udo HM, Rowlands GJ, Thorpe W. 2003. Smallholder dairy systems in the Kenya highlands: breed preferences and breeding practices. Livestock Production Science **82(2),** 117-127.

Boussofiane A, Dyson RG, Thanassoulis E. 1991. Applied Data Envelopment Analysis. European Journal of Operational Research **52,** 1 – 15.

Cooper WW, Seiford LM, Tone K. 2002. Data Envelopment Analysis: A comprehensive text with models, applications, references and DEA-solver software. Kluwer Academic Publishers, Dordrecht. 1-213. www.springer.com/gp/book/9780387452814

De Koeijer TJ, Wossink GAA, Struik PC, Renkema JA. 2002. Measuring agricultural sustainability in terms of efficiency: the case of Dutch sugar beet growers. Journal of Environmental Management **66,** 9 – 17.

Dullinger S, Dirnböck T, Greimler J, Grabherr G. 2003. A resampling approach of evaluating effects of pasture abandonment on subalpine plant species diversity. Journal of Vegetation Science **14,** 243– 252.

FAO. 2017. Livestock and the Environment. Retrieved from Food and Agricultural Organization of the United Nations Website: www.fao.org/livestock-environment/en/

Färe R, Grosskopf S. 2004. New Directions: Efficiency and Productivity, Kluwer Academic Publishers. www.springer.com/la/book/9781402076619

Färe R, Grosskopf S, Lovell CAK. 1994. Production frontiers. Cambridge University Press. www.citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.197.873&rep=rep1...pdf

Florida R, Davison D. 2001. Gaining from green management. California Management Review, **43(3),** 63-84.

Fonderflick J, Lepart J, Caplat P, Debussche M, Marty P. 2010. Managing agricultural change for biodiversity. Biological Conservation **143,** 737–746.

Government of Kenya, Efficiency Monitoring Unit. 2010. Management Audit Report for the National Environmental Management Agency. www.ppoa.go.ke/images/downloads/reviewreports/nema_procurement_review.pdf

Ian D. Thompson Kimiko Okabe Jason M. Tylianakis Pushpam Kumar E, ckehard G. Brockerh off Nancy A. Schellhorn John A. Parrotta Robert Nasi Bio Science, (December 2011) Volume 61, Issue **12(1),** Pages 972–981. https://doi.org/10.1525/bio.2011.61.127

Jahnke HE, Jahnke HE. 1982. Livestock production systems and livestock development in tropical Africa, **35.**

Kenya Vision. 2030 Report. 2007. www.vision2030.go.ke/

Kleijn D, Kohler F, Báldi A, Batáry P, Concepción ED, Clough Y, Díaz M, Gabriel D, Holzschuh A, Knop E, Kovács A, Marshall EJ. P, Tscharntke T, Verhulst J. 2009. On the relationship between farmland biodiversity and land-use intensity in Europe. Proceedings of the Royal Society **276,** 903 – 909.

Kuemmerle T, Hostert P, Radeloff VC, Van der Linden S, Perzanowski K, Kruhlov I. (2008). Cross-border comparison of post-socialist farmland abandonment in the Carpathians. Ecosystems **11,** 614 – 628.

Kuosmanen T, Kortelainen M. 2004. Data Envelopment Analysis in environmental valuation: environmental performance, eco-efficiency and cost-benefit analysis. Working paper, ISBN 952-458- 528-6. http://epublications.uef.fi/pub/urn_isbn_952-458-528-6/urn_isbn_952-458-528-6.pdf

Kuosmanen T, Kortelainen M. 2005. Measuring Eco- efficiency of Production with Data Envelopment Analysis. Journal of Industrial Ecology **9(4),** 59– 72.

Lambin EF, Meyfroidt P. 2010. Land use transitions: Socio-ecological feedback versus socioeconomic change. Land Use Policy **27,** 108–118.

Lauwers LH, Van Huylenbroeck G. 2003. Materials balance based modelling of environmental efficiency. Paper at the 25th International Conference of Agricultural Economists, August 16-22, 2003, Durban, South Africa.

Lesschen JP, Stoorvogel JJ, Smaling EMA. 2004. Scaling soil nutrient balances. Enabling mesolevel applications for African realities. Food and Agriculture Organization of the United Nations (Fertilizer and Plant Nutrition Bulletin 15)
ISBN: 9251052379 – 132 p.
http://library.wur.nl/WebQuery/wurpubs/338476

Mac Donald D, Crabtree JR, Wiesinger G, Dax, T, Stamou N, Fleury P, Gutierrez Lazpita J, Gibon A. 2000. Agricultural abandonment in mountain areas of Europe: Environmental Consequences and policy response. Journal of Environmental Management **59,** 47–69.

McDermott JJ, Staal SJ, Freeman HA, Herrero M, Van de Steeg JA. 2010. Sustaining intensification of smallholder livestock systems in the tropics. Livestock science **130(1),** 95-109.

Michelsen O, de Boer L. 2009. Green procurement in Norway; a survey of practices at the municipal and county level. Journal of Environmental Management **91,** 160–167.

Mulwa RM. 2006. Economic and Environmental performance of Sugarcane Production in Kenya: Non-Parametric Frontier Approaches. Margraf Publishers. Nuppenau, E. A., Waldhardt, R., Solovyeva, I. (2011). Biodiversity and Traditional Pathways to Sustainable Agriculture: Implications for Interdisciplinary Research in the Carpathian Mountains. In: Knowles, Barbara (Ed.), Conference proceedings "Mountain hay meadows - hotspots of biodiversity and traditional culture", Gyimesközéplok, Romania 7-9 Juni 2010, Society of Biology, London, 2011
ISBN: 978-0-900490-40-8.

Murithi FM. 1998. Economic evaluation of the role of livestock in mixed smallholder farms of the central highlands of Kenya. PhD thesis, Department of Agriculture, University of Reading, UK.

Muriuki HG. 2011. Dairy development in Kenya. Food and Agricultural Organization, Rome. www.fao.org/3/a-al745e.pdf

Mutembei HM, Tsuma VT, Muasa BT, Mraya, J, Mutiga ER. 2015. Bovine Invitro Embryo Production and its Contribution Towards Improved Food Security in Kenya. African Journal of Food, Agriculture, Nutrition and Development **15(1),** 9722-9743.

Reinhard S, Lovell CAK, Thijssen G. 1999. Econometric estimation of technical and environmental efficiency: An application to Dutch dairy farms. American Journal of Agricultural Economics **81,** 44-60.

Reinhard S, Lovell CAK, Thijssen G. 2000. Environmental efficiency with multiple environmentally detrimental variables; estimated with SFA and DEA. European Journal of Operational Research **121,** 287-303.

Schader C. 2009. Cost-effectiveness of organic farming for achieving environmental policy targets in Switzerland. PhD Thesis. Institute of Biological, Environmental and Rural Sciences, Aberystwyth University, Wales. Research Institute of Organic Agriculture, (FiBL), Frick, Switzerland.

Singer P. 2011. Practical Ethics, Third Edition. Cambridge University Press. 202–03p.
ISBN 978-0521707688.

Sipiläinen T, Marklund PO, Huhtala A. 2008. Efficiency in agricultural production of biodiversity: Organic vs. conventional practices. Paper prepared for presentation at the 107th EAAE Seminar "Modeling of Agricultural and Rural Development Policies". Sevilla, Spain, January 29th - February 1st, 2008.

Solovyeva I, Nuppenau EA. 2012. Improving Measures for Targeting Agri-Environmental Payments: The Case of High Nature Value Farming. European Association of Agricultural Economists, 126th Seminar, Capri, Italy, 27-29 June 2012. Ag Econ Search.

Solovyeva I, Nuppenau EA, Biro R, Larkham K. 2011. Traditional Farming Systems and Transition Pathways to Sustainable Agriculture: A Comparative Analysis of Institutions and Cooperation in Romanian and Ukrainian Rural Areas of the Carpathian Mountains. IASC Conference proceedings 'Shared Resources in a Rapidly Changing World, European Regional Conference of the International Association for the Study of the Commons', Plovdiv, Bulgaria 14-17 September 2011, Digital Library of the Commons.

Tasser E, Tappeiner U. 2002. Impact of land use changes on mountain vegetation. Applied Vegetation Science **5,** 173–184.

The Kenya National Biodiversity Strategy. And Action Plan. 2000. Ministry of Environment & IMP 00015.

Thornton PK. 2010. Livestock production: recent trends, future prospects. Philosophical Transactions of the Royal Society B: Biological Sciences **365(1554),** 2853–2867.
http://doi.org/10.1098/rstb.2010.0134

Thorpe W, Muriuki HG, Omore AO, Owango, MO, Staal SJ. 2000. Dairy development in Kenya: the past, the present and the future. Paper presented at the Annual Symposium of the Animal Production Society of Kenya (APSK). Theme: Challenges to Animal Production in this Millennium, KARI Headquarters, Nairobi, March 22-23, 2000. Nairobi (Kenya). https://cgspace.cgiar.org/handle/10568/1723

UNEP. 2016. UNEP Frontiers 2016 Report: Emerging Issues of Environmental Concern. United Nations Environment Programme, Nairobi.

UNEP-WCMC. 2016. The State of Biodiversity in Africa: A mid-term review of progress towards the Aichi Biodiversity Targets. UNEP-WCMC, Cambridge, UK.

Van Huylenbroeck G, Whitby M. 1999. Countryside Stewardship: Farmers, Policies and Markets. Pergamon, Amsterdam, 232 p.
https://biblio.ugent.be/publication/119806