KENYA
Forest Service

Landscape Restoration in Kenya

Is it worth restoring degraded landscapes?

1. Background

Forest and land degradation is a serious problem particularly in developing countries with high population growth and unemployment rates. It is estimated that between 1 to over 6 billion ha of mosaic forest and agricultural landscapes are degraded worldwide. The monetary value of global ecosystem services loss due to land use change was estimated at USD 4.3 to 20.2 trillion yr^{-1} between 1997 and 2011[1]. The cost of land degradation in Kenya due to land use and land cover changes was estimated at 1.3 billion USD annually for 2001 and 2009 period[2]. Landscape degradation has resulted in declining flows of ecosystem services such as water, food, medicine, fuel wood, fodder, timber, biodiversity, watershed protection, soil protection, and mitigation of global change and thus increases the risks of natural calamities such as drought especially in dryland ecosystems. The impacts of forest and land degradation are substantial if indirect benefits are included. The immediate cost of the 2009 to2011 droughts in Kenya was estimated at over 12 billion USD, not including its subsequent destructive effects on the economy[3]. A rapid assessment of returns on rangeland management by rangeland users during 2014 indicated a possible return of 90:1 in the event of a drought and 24:1 under non-drought conditions[4].

There is concern that continued landscape degradation will have long term impacts on the overall human wellbeing and some initiatives have been mooted to address and minimize impacts of degradation. One of these initiatives at the global level is the "Bonn Challenge" where many countries have pledged their commitment to restore a total of 150 million ha by 2020 and 350 million ha by 2030[5]. As part of its contribution to the global effort to mitigate climate change, the Africa Continent through AFR100 pledged 100 million hectares. The Kenyan government has made a national target to restore a total of 5.1 million ha of its degraded landscapes by 2030 as a contribution to the global effort to mitigate climate change.

Forest landscape restoration (FLR) involves investments and the costs and benefits associated with these ventures are yet to be defined in monetary terms for Kenya's forests, croplands and rangelands[6]. This kind of information (on likely costs and benefits of restoration efforts) is crucial to inform all stakeholders (including the government, private sector, individual farmers, etc.) on the best bet for achieving restoration goals. The analysis in this briefing paper is derived from a study carried out on behalf of Kenya Forest Service to support the development of National Forest and Landscape Restoration Strategy process.

1 Gibbs, H.K and Salmon, J.M. Mapping the World's degraded lands. Applied Geography 57(2015):12-21(Http://dx.doi.org/10.1016/j.apgeog.2014.11.024)
2 Mulinge, W., Gicheru, P., Murithi, F., Maingi, P., Kihiu, E., Kirui, O. K., & Mirzabaev, A. (2016). Economics of land degradation and improvement in Kenya. In Economics of Land Degradation and Improvement–A Global Assessment for Sustainable Development (pp. 471-498). Springer, Cham.
3 PDNA 2012. Kenya Post-Disaster Needs Assessment (PDNA) for the 2008-2011 Drought. Republic of Kenya with technical support from the European Union, United Nations, and World Bank and financial support from the European Union and the Grand Duchy of Luxembourg.
4 King-Okumu (2015) Rapid assessment of investments in natural resource stewardship in comparison to the value of returns. Ada Working Paper http://www.adaconsortium.org/index.php/component/k2/item/316-rapid-assessment-of-returns-on-investments-in-natural-resource-stewardship TARI, D., KING-OKUMU, C. & JARSO, I. 2015. Strengthening Local Customary Institutions: A Case Study in Isiolo County, Northern Kenya Nairobi: Ada Consortiumj. TOULMIN, C., HESSE, C., TARI, D. & KING-OKUMU, C. 2015. Investing in institutional 'software' to build climate resilience. Angle Journal. KING-OKUMU, C. & TEPO, M. 2018 unpublished Assessing returns on locally determined investments in drought preparedness in Sub-Saharan Africa (draft under review).
5 www.bonnchallenge.org/content/challenge
6 See Kenya's national communication on water and ecosystems to the UNFCCC Nairobi Work Programme http://www4.unfccc.int/Submissions/Lists/OSPSubmissionUpload/257_267_131301063961586743-Kenya%20submission%20NWP_%20ecosystems%20and%20water%20resources.pdf and methodological guidance in King-Okumu and Elhadi (forthcoming) in Wasonga Ed. Healthy Rangelands Book, IUCN
also see: KING-OKUMU, C. 2015. A framework to assess returns on investments in the dryland systems of Northern Kenya. IIED. & KING-OKUMU, C., WASONGA, O. V., JARSO, I. & SALAH, Y. M. S. 2016. Direct use values of climate-dependent ecosystem services in Isiolo County, Kenya. IIED.

The key questions

1. What are the costs and benefits of landscape restoration?
2. What restoration interventions are more viable in Kenya?
3. Are landscape restoration interventions viable to individual farmers and society at large?

2. The economic analysis of Forest Landscape Restoration (FLR) options in Kenya

Economic analysis was undertaken in the study by applying 'Restoration Economic Modelling and Valuation' analytical tool of the Restoration Opportunities Assessment Methodology (ROAM)[7]. The economic analysis relied on seven broad categories of forest landscape restoration opportunities identified in the National Assessment of Forest and Landscape Restoration Opportunities Technical Report[8] namely: Afforestation or reforestation of degraded natural forests, Rehabilitation of degraded natural forests, Agroforestry in cropland, Commercial tree and bamboo growing on potentially marginal cropland and un-stocked forest plantation forests, Tree-based buffer zones along water bodies and wetlands, Tree-based buffer zones along roads and restoration of degraded rangelands. Based on these broad categories of restoration opportunities twelve specific interventions/options were identified and subjected to economic analysis (Fig.1).

The costs and benefits for each restoration transitions were identified from expert discussions, activity restoration budgets and extensive review of various land use literature. The costs and benefits from each restoration transition were modelled using various assumptions over 30-year period. The benefits and costs were valued using market prices, avoided cost/replacement cost and benefit transfer approaches. The viability per hectare (ha) of these restoration transitions were assessed using: Net Present Value (NPV and Benefit Cost ratio (BCR). The result of the analysis is shown in the bar chart below (Fig. 1) and the highlights are summarized below.

7 IUCN, W. (2014). *A guide to the restoration opportunities assessment methodology (ROAM): assessing forest landscape restoration opportunities at the national or sub-national level*. Working paper (road-test edition), IUCN, Gland, Switzerland.
8 MENR (2016). *Assessment of Forest and Landscape Restoration Opportunities for Kenya Ministry of Environment and Natural Resources*, Nairobi, Kenya.

2.1. Highlights from the economic analysis of FLR[9] options in Kenya

1. All proposed restoration transitions have shown positive NPV (7%). The most viable restoration transition is achieved by integrating Melia trees in a traditional cowpeas farming in the drylands (NPV of KES 1.9 million). This is followed by transition from poorly managed woodlots to improved eucalyptus woodlots at KES 1.6 million and the Silvo-pastoral system at KES 1.2 million. The transition from treeless roads to roads with planted trees has the lowest NPV at about KES 100,000 over the 30-year period. The transition from degraded natural forest to improved natural forest through enrichment planting yielded the second lowest NPV (KES 320,000).
2. The benefit cost ratio (BCR) of the restoration transition ranged from as low as 2.35 (Degraded riparian zones to bamboo and grass strip grass buffer) to highest of 29.2 (Transition from degraded grasslands to reseeded grassland). In situation of resource scarcity, actions should be guided by BCR, and interventions with highest BCR are recommended. From this analysis, grass reseeding in degraded rangelands will yield higher benefits (29.2), followed by intensive agroforestry (Grevillea spp, Maize and Fruit trees) (25.64) in high potential areas, investing in commercial Gmelina arborea in marginal areas (24.99) and integrating Melia trees in traditional Cowpeas Farming (22.82). Since all, restoration transitions are viable, prioritization should be guided by the availability of financial resources.
3. The cost of forest restoration using the restoration options selected ranged from KES 30,000/ha to KES 600,000/ha (current values for 2018) depending on the restoration option adopted. Restoration of degraded landscapes (5.1 million hectares) will require KES 1.8 trillion for 30-year period.

9 Note: due to shortage of time and resources, these were not included in the present assessment, but methodological guidance for a comprehensive assessment to be conducted is available in: KING-OKUMU, C. 2015. A framework to assess returns on investments in the dryland systems of Northern Kenya. IIED. KING-OKUMU, C., MYINT, M., WESTERBERG, V., DIOP, D., COULIBALY, B., NDAO, M. T., NDIAYE, D. & TEAM, D. P. 2017. Évaluation économique des bénéfices tirés des investissements dans l'adaptation - Note méthodologique sur l'évaluation économique des retours sur les investissements dans l'adaptation aux extrêmes et aux catastrophes climatiques déterminés au niveau local dans la région de Kaffrine au Sénégal. Syracuse, New York, USA: Near East Foundation. KING-OKUMU, C. & TEPO, M. 2018 unpublished Assessing returns on locally determined investments in drought preparedness in Sub-Saharan Africa (draft under review). And Okumu and Elhadi (forthcoming) in Wasonga Ed. Healthy Rangelands Book, IUCN

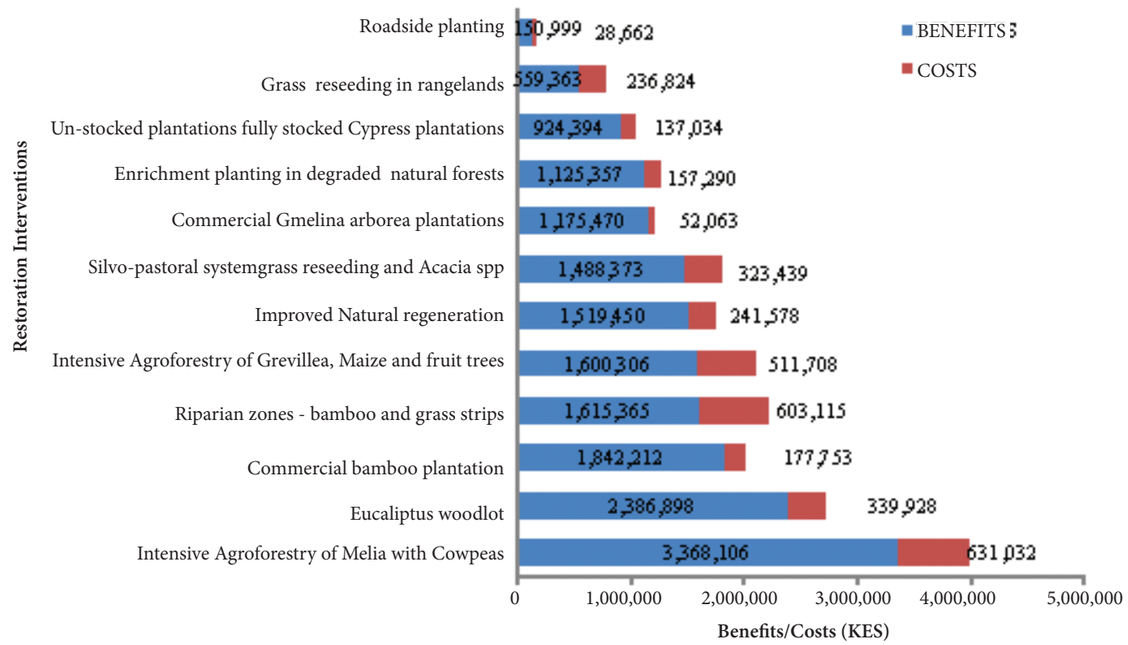

Figure 1: Discounted benefits and costs of restoration (KES)/ha at 7%

4. Restoration of 5.1million hectares of degraded landscapes will yield KES 7.6trillion in net material benefits to various stakeholders, providing, direct additional income opportunities for rural communities besides societal benefits over 30-year period. Every shilling invested will yield KES 4.00.
5. Restoration of degraded landscapes will increase the supply of water for domestic, industrial and irrigated agriculture, conserve biodiversity and minimize natural calamities7.
6. In addition to considering the financial viability for farmers, there is a need to consider the social returns on the investments and the relevance of some interventions to ending drought emergencies in Kenya.

Note: *All potential benefits from restoration activities were not estimated, and if all direct and indirect impacts are considered the overall benefits of restoration are massive.*

2.2 Recommendations from the economic analysis of FLR options in Kenya

1. Establish national coordinated strategy for FLR

The FLR is multi-agency, multi-stakeholder undertaking across different landscapes, tenures and likely to impact different land use sectors hence this requires coordination. In addition, the government in consultation with stakeholders should define priority areas where these interventions/options will be implemented at so as to maximize on environmental and social benefits and minimize conflicts with other land uses such as agriculture. This criterion should be based on maximum restoration benefits to society with the lowest costs. For this process to have higher societal benefits, all agencies (environment, agriculture and livestock) should harmonize their plans and minimize conflict. There is also a need to analyze which segments of society will benefit and whether or not the benefits will reach the most vulnerable people in drought-affected regions in order to build the resilience of the society as a whole.

2. Implement mechanisms that incentivize restoration by land owners

Restoration of degraded landscapes at private and public levels will yield many societal and global benefits, where beneficiaries do not incur costs of restoration directly. The government should motivate restoration activities by developing a mechanism for support e.g. through tax incentives or subsidize the costs of inputs, such as seeds and tree seedling production, and facilitation of cross-border dialogue between resource user groups. In large restoration efforts with high public benefits, it would be desirable to design and implement a payment scheme to motivate and incentivize the institutions or investors.

3. Build capacity for large scale restoration

It is important to recognize the critical role of good governance in the overall restoration strategy. There is need to have a coordinated approach that minimize institutional conflicts and risks. Another barrier which needs to be surmounted is the paucity of data for decision making. During the course of this study, we experienced challenges on data and there is need to develop both the rapid assessment approach[10] and also the long-term framework for collecting costs and benefits of restoration[11] so that we can predict outcomes with certainty. We also need to develop capacity in the use ecosystem modelling tools to support investments in forest landscape restoration.

10 E.g. as in King (2015) and other references above
11 Described in KING-OKUMU, C. 2015. A framework to assess returns on investments in the dryland systems of Northern Kenya. IIED. And King-Okumu and Elhadi (forthcoming) in Wasonga Ed. Healthy Rangelands Book, IUCN

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