Project Update: December 2022

The present project sought to propagate and reintroduce *Euphorbia friesiorum* (A. Hassl.) S. Carter, *Pavetta teitana* K. Schum and *Thunbergia napperae* Mwachala, Malombe & Vollesen within Ngutwa-Nzaui area, Makueni county (Kenya). Similarly, the project endeavoured to enhance and create awareness on the importance of conserving natural vegetation, particularly the above target threatened plant species as well as their habitat. Further, the project sought to strengthen and develop local capacity in biodiversity conservation by training them on propagation protocols, handling and sustainable harvesting of natural resources.

1. Mass propagation of the target threatened plant species

Propagation through seeds is comparatively easy but sometimes challenging due to certain prerequisites for seed germination such as breaking seed dormancy. *P. teitana* presented such a challenge during trials necessitating pre-sowing treatments after which seeds from the three target species were sown in a non-mist propagation system made of polytunnels as below. This created an ideal atmosphere within the tunnel which optimised germination as compared to when it was sown in open air.

Figure 1: Established non-mist propagation system using poly-tunnels.

The tunnels were made of locally available materials such as the *Lantana camara* and covered in a single layer of polythene. Also, weeding was routinely done by hand while application of chemicals (fungicides and pesticides) was carried out as per the instruction of an agronomist. The tunnels were opened after every 3 days to increase aeration and facilitate watering.

One of the greatest advantages realized by the use of polytunnels in propagation was the fast emergence of the sown seeds and the reduction in water loss. The non-mist propagation system using polytunnels proved an appropriate technology since the area suffers water shortage and does not have electricity (power) connectivity.

Figure 2: *Pavetta teitana* seedlings sprouting in the established tunnel.

Figure 3: Raised seedlings for the target threatened plant species; A and B, potted *T. napperae* and *E. friesiorum* respectively ready to be transplanted. C, healthy *P. teitana* seedlings raised in a used plastic container.

2. Restoration Efforts

Figure 4: Locals posing for a group photo during restoration exercise within Ngutwa-Nzaui area.

Figure 5: Members of the local community transplanting seedlings in Nzaui forest.

3. Training and Awareness Creation Among the locals.

Several awareness meetings were organized within Ngutwa, Kavingo, Kithiani, Matooi, Kathuma, Mutulani and Yiuma villages, which all fall within the Ngutwa-Nzaui landscape. Previous study (1st Rufford Small Grant) established a low level of awareness on the importance of the natural vegetation and particularly the target threatened plant species within the area.

Figure 6: Training and awareness creation sessions with members of the local community.

According to Munywoki *et al.,* (2021), the study area lost approximately 20,000 acres of natural vegetation in the last three decades. Within the same period, about 15,000 acres were created to pave way for agricultural activities.

Figure 7: (A) Principal Investigator (In yellow), Nicholas Nzioka (middle), the Makueni County Executive Committee Member for Gender, Children, Youth, Sports & Social Services and the Makueni County Assembly Speaker, Hon. Douglas Mbilu, discussing land use/land cover changes within Ngutwa-Nzaui landscape between 1987-2020. (B) Donated fruit trees (among them, *Tamarindus indica*) by the Makueni County Government in their effort to restore degraded landscapes and mitigate climate change. The Makueni government was the first sub-national government in Africa to develop an Environmental Action Plan. This county environmental action plan (CEAP) was a flagship initiative towards devolved, community-based adaptation.

Habitat loss was discussed as one of the fundamental threats to the conservation of the target threatened species in the area. This has been majorly attributed to increased aridity fueled by climate change and anthropogenic activities like overgrazing, firewood collection, charcoal burning, and clearance of bush for agriculture.

Common plant species such as *Searsia natalensis*, *Acacia tortilis* and *Acacia nilotica* are experiencing an increased pressure for fuelwood or timber in the area. Several mitigation measures were profiled during the workshops and seminars and one of the short-term interventions included pollarding which is a practical approach in agrosilvopastoral systems. Therefore, during our training, we encouraged sustainable ways of selecting species for firewood (e.g., pollarding of *Searsia natalensis* instead of cutting the whole tree). This has been complemented by *Grevillea robusta* which has

proved to be a good multipurpose tree species in the maize-*G. robusta* agroforestry farming system within the area. The locals expressed their preferences for *Grevillea robusta* because of its high utility in provision of timber, poles, firewood as well as fodder for their animals during times of scarcity. Further, regenerative agriculture, as a way of increasing agricultural productivity without endangering biodiversity, was emphasised. Local farmers were also encouraged to plant other multiple-purpose plant species such as *Melia volkensii* for agroforestry so as to reduce pressures on forest.

Apart from the organized training sessions, much of the learning and sensitisation occurred outside the organised formal training workshops and seminars. For example, we participated in various community games (in attendance representatives of the Makueni County Government and over 3000 locals) where tree planting was emphasized as one of the measures of addressing deforestation and habitat loss within Ngutwa-Nzaui landscape. Tree planting using appropriate species especially indigenous ones was highlighted as an important method of averting total habitat loss and extinction of the threatened plant species. In support of our conservation efforts, the Makueni County government donated fruit trees such as *Tamarindus indica*, to the locals of Ngutwa-Nzaui area. The exercise supported the county's strategy to increase forest cover, restore degraded landscapes, protect various habitats, and build climate change adaptation and resilience.

Figure 8: Sensitization on planting trees as viable intervention for adapting to and mitigating adverse effects of climate change during community games. (A) Makueni County Government Deputy Governor, Her Excellency, Lucy Mulili and the Principal Investigator planting *Euphorbia friesiorum* (see C above), a threatened target plant species endemic to the region and that is locally known as '*Musilia.*' (B) Makueni County Executive Committee Member for Gender, Children, Youth, Sports & Social Services, Nicholas Nzioka, preparing to plant a tree. (D) Hon. Elizabeth Mutinda, Area Member of County Assembly (Muvau/Kikumini ward) planting *Tamarindus indica*. (E) Hon. Douglas Mbilu, the Speaker Makueni County assembly digging a hole in preparation for planting a tree. The Makueni county government is very committed to 'greening' the county through planting trees in schools and other public places.

4. Promotion of nature-based solutions as alternative sources of livelihood

Deforestation and land degradation within Ngutwa-Nzaui is largely caused by clearance of land for agricultural expansion, illegal logging, overstocking, human settlement among others. However, there are root causes behind these destructive activities which are often overlooked in restorative initiatives. Poverty is one of the most significant indirect reasons fueling deforestation and land degradation in Sub-Saharan Africa, including the study area. Most local farmers use inefficient farming technologies which lead to inadequate food supplies. As a way of securing their food security while lifting themselves from poverty, they clear large tracts of forest to create room for agriculture. Further, as the soil becomes exhausted and lack of adequate farm inputs such as fertilisers compel them to clear more vegetation for cultivation. All these threats are, in part, linked to poverty and poor agronomic practices among the locals.

Therefore, we were cognizant that planting tree seedlings may not address this in the long-term, necessitating introduction of short-term solutions to these challenges. We therefore included within our training component, dissemination of good agricultural practices (GAPs) as a way of fostering behavioural change. Further, awareness of win-win practices aimed at increasing yields while at the same time ensuring environmental sustainability was emphasised during our training sessions. Before introducing/promoting the nature-based micro-enterprise, we ensured that the locals were adequately informed, technically prepared, and organised in groups to enjoy collective efforts to overcome shared challenges, and benefit from pooled creativity in developing new products and services.

The locals were trained on how to propagate seedlings under improvised propagation system made of locally available materials that are inexpensive for them (see figure 9 below).

Figure 9: Propagation of suitable grass ecotypes within Ngutwa-Nzaui area. (A) Some of the established tunnels for the study. (A) a close photo of *Brachiaria decumbens* cv. *Basilisk* growing in a tunnel. (C) Locals removing weeds by hand in one of the established tunnels.

For the short-term, we sought to strengthen existing alternative livelihoods opportunities with promises of being added value among the locals. The growing popularity of fodder production within Ngutwa-Nzaui was found a promising entry point to address habitat loss and degradation (including overgrazing and erosion)

and improve the locals' income through the sale of hay, short-term lease of grazing fields and sale of grass splits to other farmers. We promoted usage of suitable grass ecotypes that has shown great potential in the region especially Brachiaria varieties, *Eragrostis superba*, *Enteropogon macrostachyus* and *Cenchrus ciliaris* because of their drought-tolerance, nutrition, and potential to control run-off.

Figure 10: Members of the local community drawn from Ngutwa-Nzaui landscape benefit from Brachiaria varieties.

Some of the Brachiaria varieties that were distributed to the local farmers include cultivars Toledo, Piata, and Basilisk.

Media coverage

https://drive.google.com/file/d/1ENYOzJa1lz4m4ZFUTSWsvMVxQhORykpb/view

https://tvlnews.co.ke/ngutwa-nzaui-residents-trained-on-conservation-of-threatened-plant-species/