Managing Water to Improve Livelihoods in Arid Kenya: A Case Study

Daniel Cunningham
Daniel.Cunningham@ag.TAMU.edu
972.952.9223 @TNativePlantGuy

The People

Although willing to adapt, most formally nomadic pastoralists are finding the transition into smallholder production to be difficult. The Turkana people do not have farming or gardening as part of their cultural experience; thus, basic agricultural concepts are almost entirely new. This problem is exacerbated by severe prolonged drought which has raised their food security status to emergency levels (Fig. 4). Their main sources of food are milk and meat from their livestock, wild foods and food aid (OXFAM/SCUK, 2013). During periods of drought these sources of foods are highly compromised leading to increases in the levels of malnutrition especially in children under-5 years (Kenya Food Security Outlook Update, 2013).

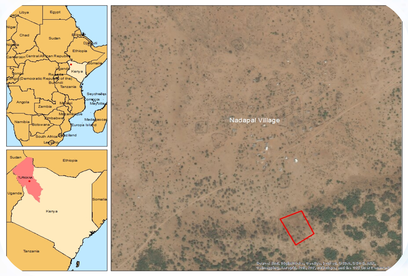


Fig. 2. Location of Turkana, Kenya

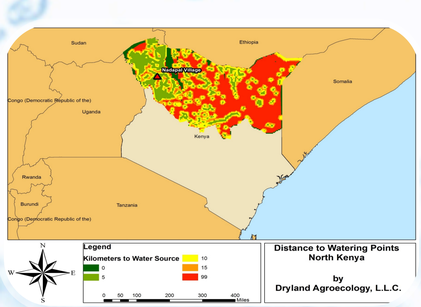


Fig. 3. Distances that must be traveled for water.

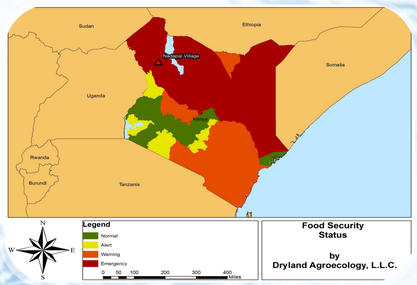


Fig. 4. Food security levels for Kenya.

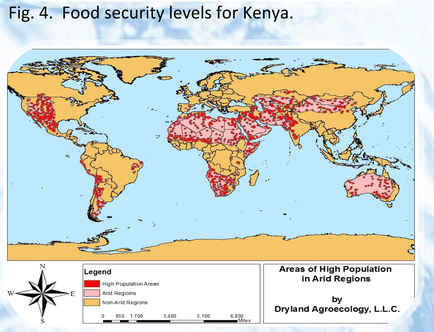
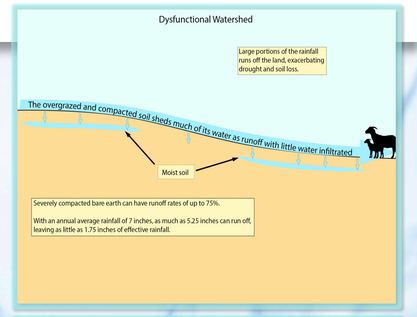
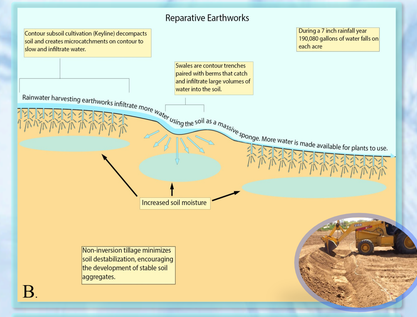


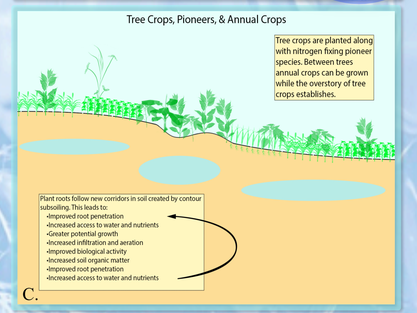
Fig. 5. Location of population centers in arid regions.

The Project

This master's thesis project required working with NGOs desiring to address water security and food safety issues in arid to semiarid regions where malnutrition and childhood mortality rates are high. Given these issues are not independent, a whole systems approach was followed to facilitate resiliency (Fig. 1). A real world example may be visualized through our efforts in Turkana, Kenya with Share International (NGO) (Fig. 2). The Turkana region of Northwest Kenya receives an erratic 7" (177 mm) of average annual rainfall. It is the poorest county in Kenya with 94% of the population living in absolute poverty and traveling great distances for water (Fig.3) (Arimond & Ruel, 2004).







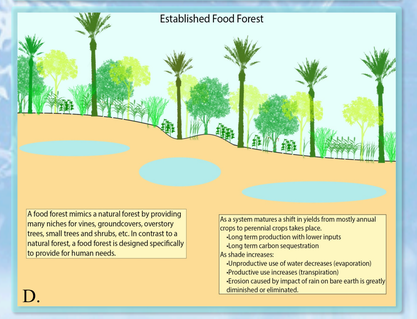


Figure 8 A-D. Layered whole system design steps for developing a food forest.

The Problems

- Malnutrition
- Sanitation
- Geopolitical pressure for cultural shift
- No ancestral knowledge of plant cultivation
- Limited water resources
- Increasingly unpredictable weather events
- Degradation of soil health and fertility

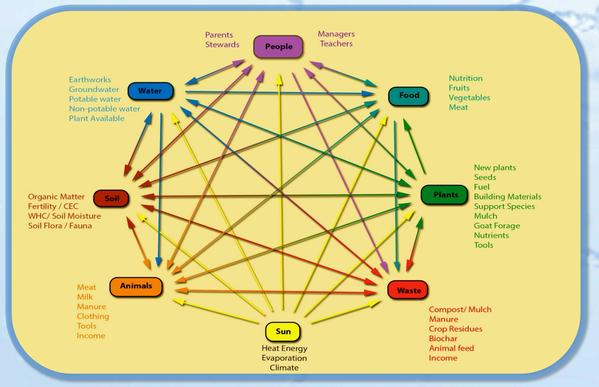


Fig. 1. Resiliency web.

The Solution

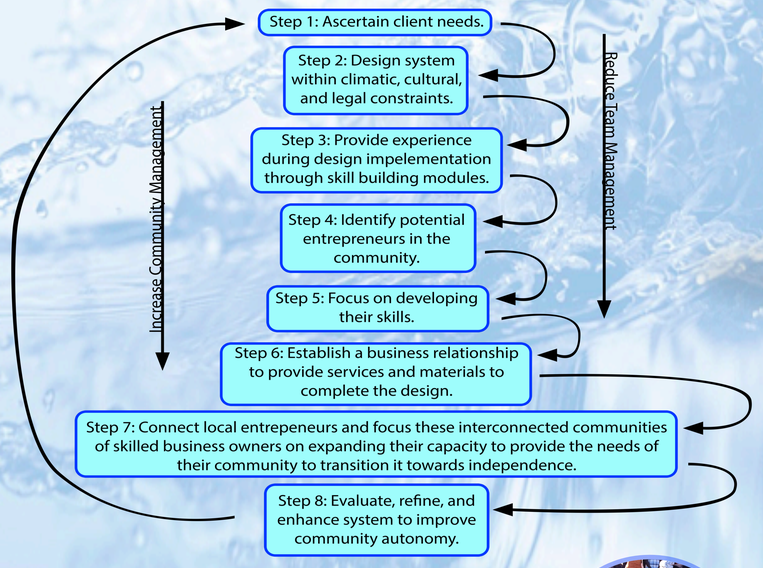


Fig. 6. Holistic food system design model.

Fig. 7 Rainwater catchment

The Vision

Our vision was to merge ecological principles and agricultural sciences in order to facilitate the resiliency of food production systems and potentiate community nutrition. It is critical these design model steps are implemented so they are within the reach of the people culturally, ecologically, and financially (Fig. 6). The prototype farm facilitates the collection of baseline soil health and community nutrition data as well as provides practical knowledge of sustainable food production, indelible water security, and the preparation and preservation of food. Thereafter our design will continue to be refined and expanded throughout the local community and beyond (Fig. 5).

References:

Arimond, M. and M.G. Ruel. 2004. Dietary diversity is associated with child nutritional status: evidence from 11 demographic and health surveys. Journal of Nutrition. 134:2579-2585.

Kenya Food Security Outlook Update: Wednesday, 2013-11-27. Famine Early Warning Systems Network. Accessed 4/19/2014, http://www.fews.net/east-africa/kenya/food-security-outlook-update/wed-2003-11-27

OXFAM/SCUK. 2012. Six Livelihood Zones in Turkana Count, Kenya. Food Economy Group. Accessed April 19, 2014. http://www.feg-consulting.com/search?SearchableText=turkana&searchterm=turkana

Design Methodology

We designed a resilient farming system that incorporated best practices from agricultural education, nutrition science, horticulture, and whole systems design, consisting of multiple interconnected facets (Figs. 7-10). Our designs incorporate innovative technologies, but are based on complexly integrated and enduring regenerative agriculture practices. Rainwater harvesting, agroforestry, food production, preparation, and preservation are all part of the system, but it is the integration of these elements that is innovative. Nutritional education and food demonstrations are integral to this system to empower women and reduce malnutrition through a stronger knowledge base.

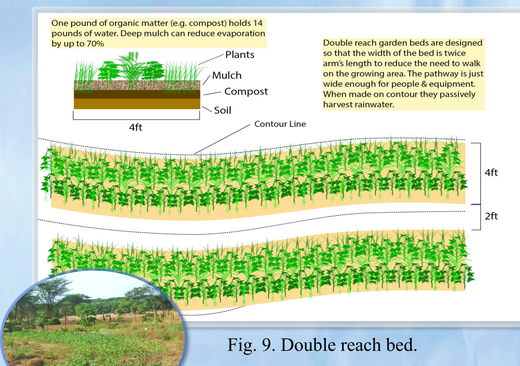


Fig. 9. Double reach bed.