KENYA:
SIAYA COUNTY POLICY BRIEF ON LAND DEGRADATION

This policy brief aims to give an overview of land degradation hotspots in Siaya County and the policy options for land restoration. In this assessment, **land degradation** is referred to as the persistent loss of ecosystem function and productivity caused by disturbances from which the land cannot recover without human intervention (unaided). **Hotspots** are defined as places that experience high land degradation and if left unattended, will negatively affect both human wellbeing and the environment. The spatial location of hotspots was identified through a methodology combining modeling, participatory stakeholder consultations and field validation. Understanding the spatial locations helps identify hotspot areas and target them as priority intervention sites with relevant management options. This county policy brief is complemented by detailed National comprehensive assessment report which can be accessed at this link: https://cgspace.cgiar.org/handle/10568/97165

The methods conducted in this land degradation assessment were hierarchical (covering three different scales: national, province and watershed) and involved stakeholder consultations for field validation evidences (See Figure 1).
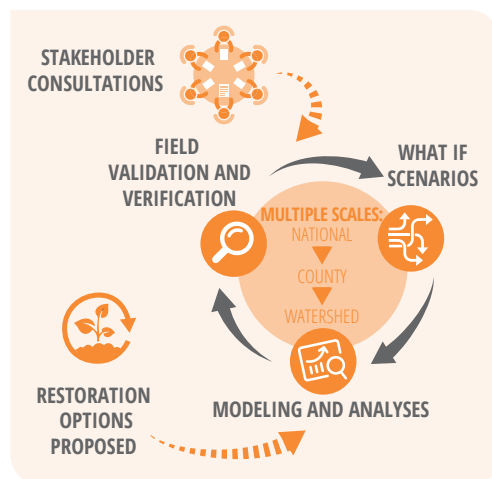

Figure 1: Land degradation assessment approaches

KEY MESSAGE 1: Soil erosion and land degradation risks are eminent in the North Eastern parts of Siaya County specifically around Ugunja, Ukwala, Ngiya and Yala and the areas affected deserve tailored management interventions to prevent a downward spiral

Siaya is characterized by high poverty levels (47.56%) and food insecurity. Agriculture is the main source of livelihood, contributing about 60% of the household income and providing almost 61% of all employment opportunities.In relation to the areas that are highly degraded, specifically in the North Eastern parts of Siaya County around Ugunja, Ukwala, Ngiya and Yala, the following assessments are pertinent:
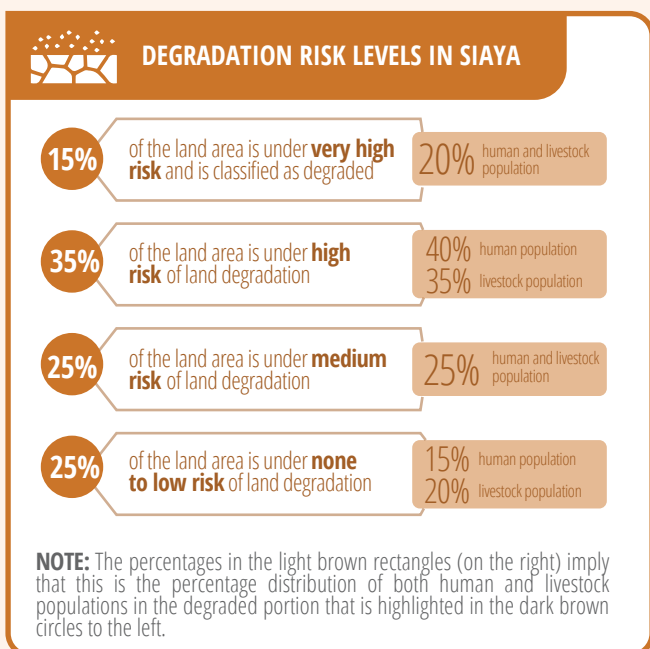
DEGRADATION LEVELS FOR SIAYA

The figure depicts an overall degradation risk map. The areas most affected by degradation (brown patches) are in the North Eastern parts of Siaya County specifically around Ugunja, Ukwala, Ngiya and Yala. The expert workshop and validation exercises were very useful in that some seemingly low risk areas as simulated by the modeling were highlighted as high risk areas during expert evaluation for Siaya county such as areas around Ngiya and Ukwala. These anomalies were associated with finer level scales where participants were pointing out zones or areas they were sure of but at a much smaller scale than the resolution precision of the model data.

DEGRADATION RISK LEVELS IN SIAYA

15% of the land area is under **very high risk** and is classified as degraded — **20%** human and livestock population

35% of the land area is under **high risk** of land degradation — **40%** human population, **35%** livestock population

25% of the land area is under **medium risk** of land degradation — **25%** human and livestock population

25% of the land area is under **none to low risk** of land degradation — **15%** human population, **20%** livestock population

NOTE: The percentages in the light brown rectangles (on the right) imply that this is the percentage distribution of both human and livestock populations in the degraded portion that is highlighted in the dark brown circles to the left.

Figure 2: Degradation risk levels in Siaya

Degradation levels
No degradation risk
Moderate degradation risk
High degradation risk
Very high degradation risk
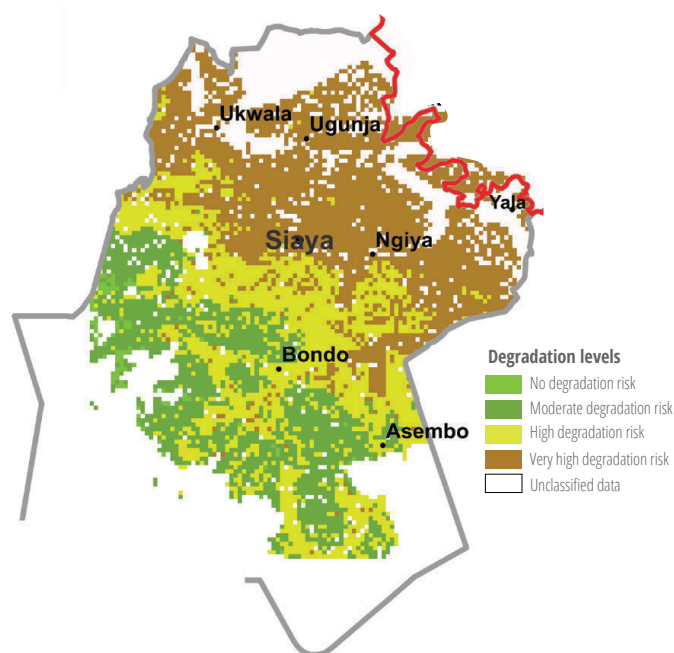Unclassified data

Figure 3: Degradation levels for Siaya

KEY MESSAGE 2: Food insecurity is specific to certain areas and has linkages to observed land degradation; both issues deserve tailored management interventions. Land and water management constraints and climate-related challenges were the dominant drivers of land degradation in Siaya county

Local knowledge (experts from Siaya County and at national level) contributed in a participatory manner to identify hotspot areas of food insecurity and vulnerability (Figure 4). To accomplish the task, consensus was reached with the stakeholders during the workshop on indicators of food security and vulnerability so that evaluation by each county team would be consistent across the board where the stakeholders discussed and mapped their ideas. To facilitate this exercise, Google earth images complemented formation of detailed maps for each county by the stakeholders. Complementary land degradation risk maps based on modeling approaches were also provided to each team.
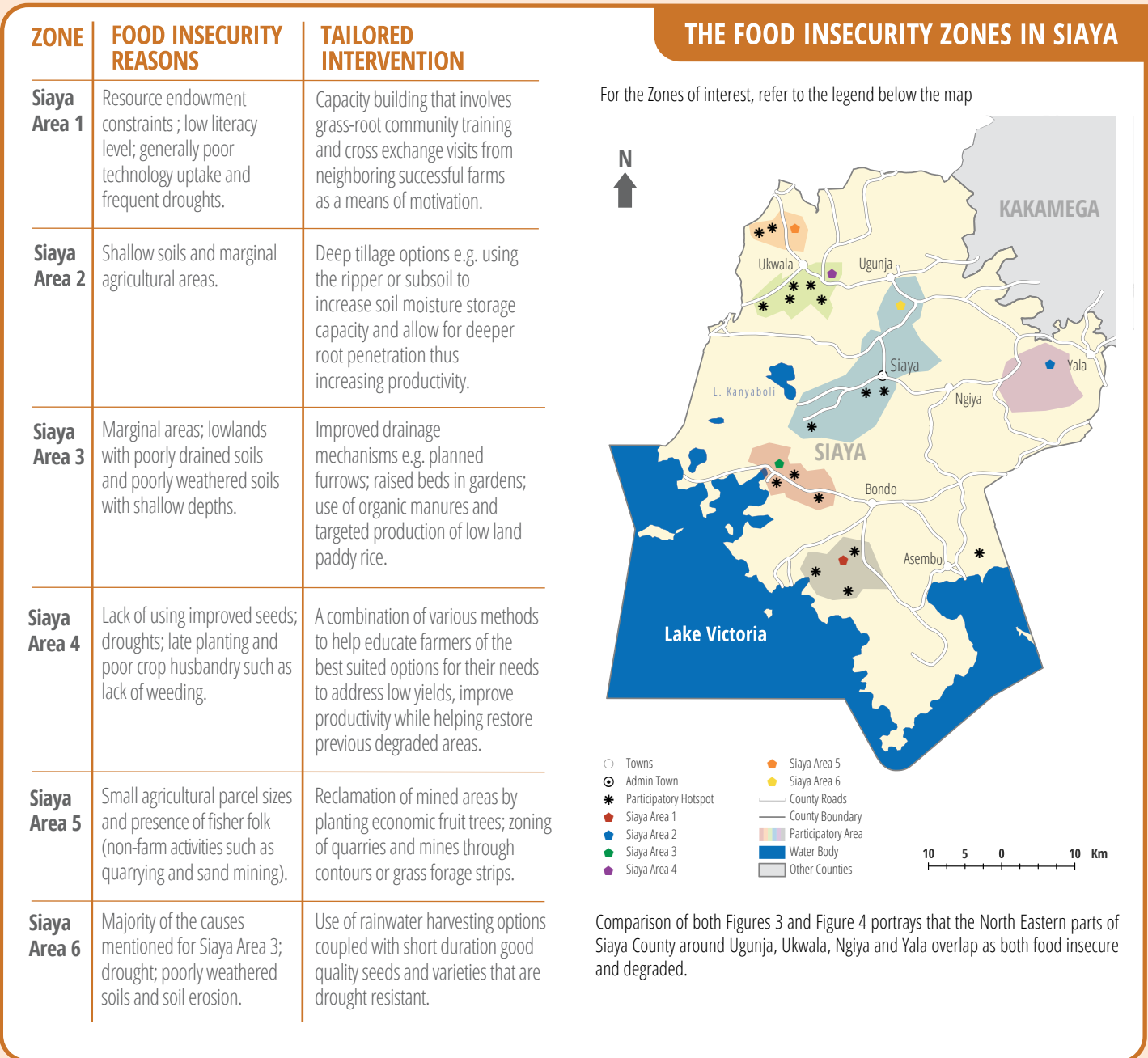
ZONE	FOOD INSECURITY REASONS	TAILORED INTERVENTION
Siaya Area 1	Resource endowment constraints ; low literacy level; generally poor technology uptake and frequent droughts.	Capacity building that involves grass-root community training and cross exchange visits from neighboring successful farms as a means of motivation.
Siaya Area 2	Shallow soils and marginal agricultural areas.	Deep tillage options e.g. using the ripper or subsoil to increase soil moisture storage capacity and allow for deeper root penetration thus increasing productivity.
Siaya Area 3	Marginal areas; lowlands with poorly drained soils and poorly weathered soils with shallow depths.	Improved drainage mechanisms e.g. planned furrows; raised beds in gardens; use of organic manures and targeted production of low land paddy rice.
Siaya Area 4	Lack of using improved seeds; droughts; late planting and poor crop husbandry such as lack of weeding.	A combination of various methods to help educate farmers of the best suited options for their needs to address low yields, improve productivity while helping restore previous degraded areas.
Siaya Area 5	Small agricultural parcel sizes and presence of fisher folk (non-farm activities such as quarrying and sand mining).	Reclamation of mined areas by planting economic fruit trees; zoning of quarries and mines through contours or grass forage strips.
Siaya Area 6	Majority of the causes mentioned for Siaya Area 3; drought; poorly weathered soils and soil erosion.	Use of rainwater harvesting options coupled with short duration good quality seeds and varieties that are drought resistant.

Figure 4: Participatory representation of food insecurity zones in Siaya County

THE FOOD INSECURITY ZONES IN SIAYA

For the Zones of interest, refer to the legend below the map

Legend:
- ○ Towns
- ⊙ Admin Town
- ✳ Participatory Hotspot
- ⬟ Siaya Area 1
- ⬟ Siaya Area 2
- ⬟ Siaya Area 3
- ⬟ Siaya Area 4
- ⬟ Siaya Area 5
- ⬟ Siaya Area 6
- County Roads
- County Boundary
- Participatory Area
- Water Body
- Other Counties

Comparison of both Figures 3 and Figure 4 portrays that the North Eastern parts of Siaya County around Ugunja, Ukwala, Ngiya and Yala overlap as both food insecure and degraded.

The use of controlled grazing zones as well as sub catchment water management options for soil erosion control are pertinent in the in the North Eastern parts of Siaya County around Ugunja, Ukwala, Ngiya and Yala.

For the lake zones around Lake Victoria in Asemba, Usenge, Ndigwa, Meari and Port Southby sustainable land and water management to ensure that both terrestrial and fresh water ecosystems are protected.

INSIGHTS

For all areas in Siaya, diversification of the farm enterprise can be a viable option for most farming communities.

KEY MESSAGE 3: Land use changes have greatly contributed to land degradation in the North Eastern parts of Siaya County highlighting the need for policy reform in land use decisions that slow down the rate of land degradation while offering sustainable restoration options.

To account for the role of differences in land use/cover on land degradation, we used land use/cover data generated from Landsat satellite image analysis. This figure exemplifies the land use and land cover changes in Siaya County. Since agriculture is most predominant, the figure portrays values above zero which are areas in square kilometers converting into agriculture in relation to other classes. Values below zero are areas in square kilometers for agriculture converting into another land use class.
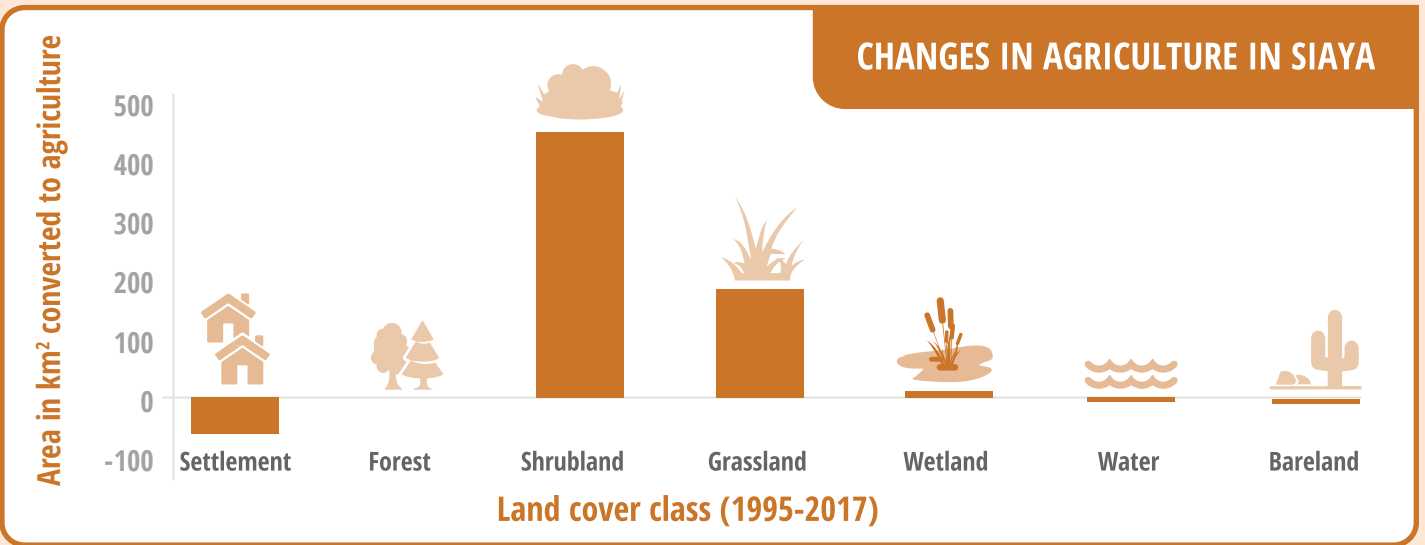
CHANGES IN AGRICULTURE IN SIAYA

Figure 5: Changes in Agriculture in Siaya

In order to offer restoration recommendations and options, this study further analyzed both sediment and runoff load reductions obtained from simulated scenarios for current (business as usual) and proposed best management practices within a selected watershed of Siaya. This served as a means to explore possible intervention options that can be promoted by decision makers for implementation by local communities. We describe the identification of dominant sediment and runoff delivery mechanisms in the watershed with readily available tools consisting of SWAT and Agricultural Policy and Environmental Extender (SWAT-APEX) models for conducting the "What-if" scenarios. These tools also developed multiple regression equations to estimate the sediment and runoff ratios for the subwatershed areas of interest. The models used 35 years of weather data from 1981 to 2016. The "What if" scenarios that were conducted in the SWAT-APEX interface were selected based on Kisumu workshop participants inputs and from quantitative data on the current status quo or business as usual in case no interventions were done. The applicable interventions are presented in the "What if scenarios" section.

SWAT-APEX FOR SIAYA
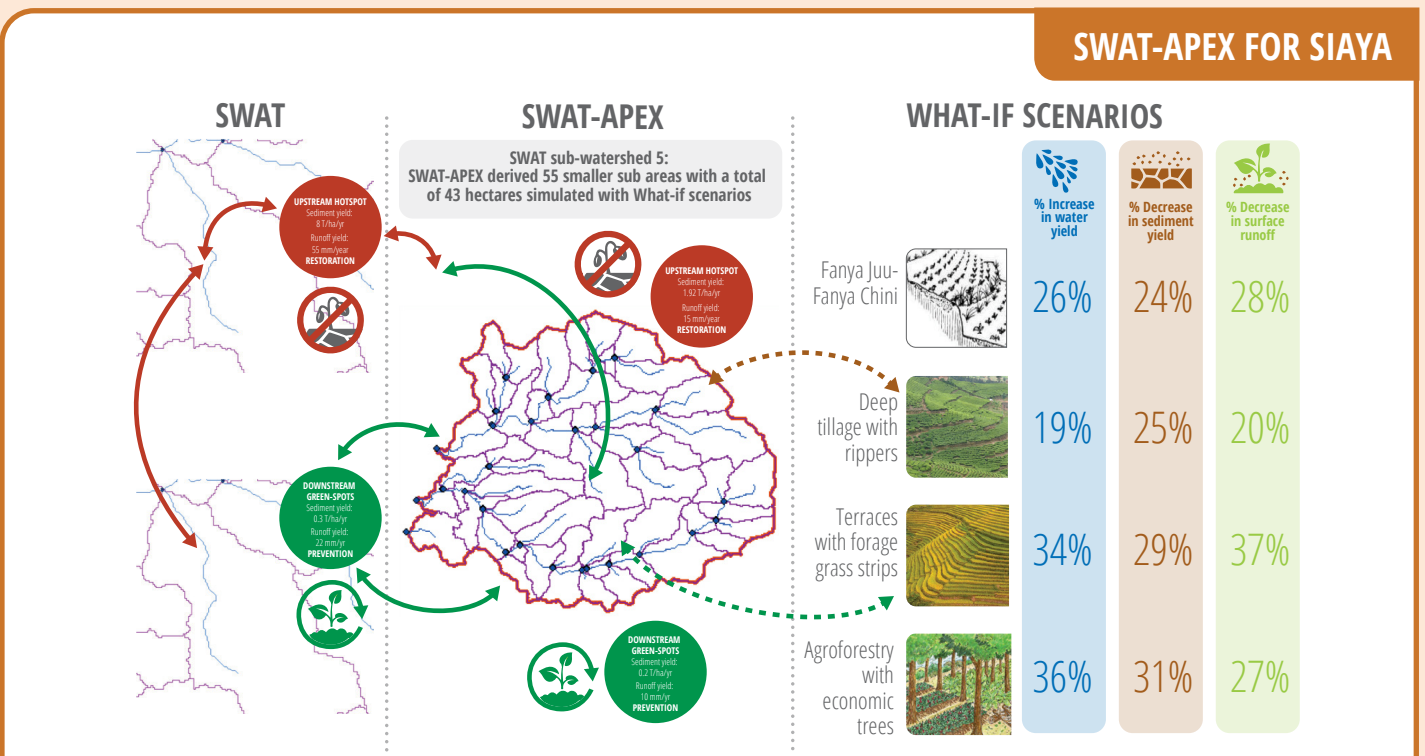
The restoration options presented here are for the ugunja area. Results from the modeling study indicate that agroforestry and terraces with forage grass strips had the highest water yields and provided the greatest reduction on sediment and surface runoff. Other options such as Fanya Juu-Fanya Chini as well as deep tillage can offer promising options in different areas of the watershed.

Figure 6: Restoration options for Siaya County