KENYA:
KAKAMEGA COUNTY POLICY BRIEF ON LAND DEGRADATION

This policy brief aims to give an overview of land degradation hotspots in Kakamega 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).
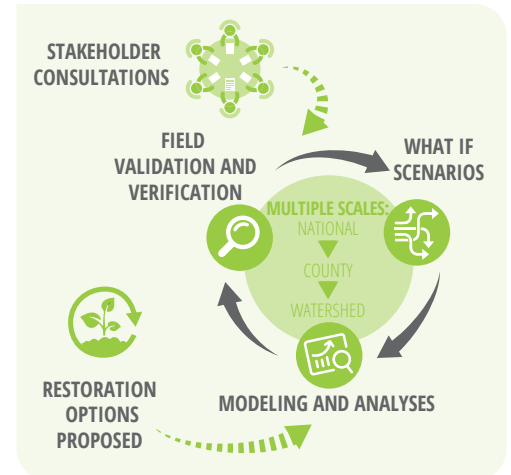

Figure 1: Land degradation assessment approaches

KEY MESSAGE 1: Soil erosion and land degradation risks are eminent in the southern, central and north western parts of Kakamega and the areas affected deserve targeted interventions to prevent a downward spiral

Kakamega is characterized by high poverty levels and food insecurity. In relation to the areas that are highly degraded, specifically in the southern, central and north western parts of Kakamega County around Koyonzo, Mumias, Lugari and Likuyani, the following assessments are pertinent:
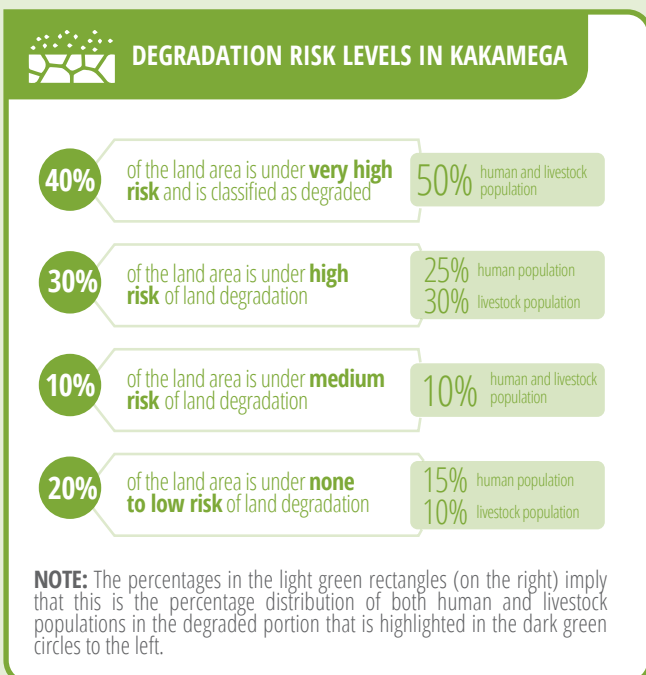
DEGRADATION LEVLES FOR KAKAMEGA

The figure depicts an overall degradation risk map. The areas most affected by degradation (brown patches) are in the southern, central and north western parts of Kakamega County specifically around Koyonzo, Mumias, Lugari and Likuyani. In comparison, Kakamega seems to be at much higher degradation risk than both Bungoma and Siaya counties. The participatory investigations indicated that Kakamega is more degraded (an aspect that is consistent with the biophysical land degradation assessment findings).

DEGRADATION RISK LEVELS IN KAKAMEGA

40% of the land area is under **very high risk** and is classified as degraded — **50%** human and livestock population

30% of the land area is under **high risk** of land degradation — **25%** human population **30%** livestock population

10% of the land area is under **medium risk** of land degradation — **10%** human and livestock population

20% of the land area is under **none to low risk** of land degradation — **15%** human population **10%** livestock population

NOTE: The percentages in the light green 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 green circles to the left.

Degradation levels
- No degradation risk
- Moderate degradation risk
- High degradation risk
- Very high degradation risk
- Unclassified data
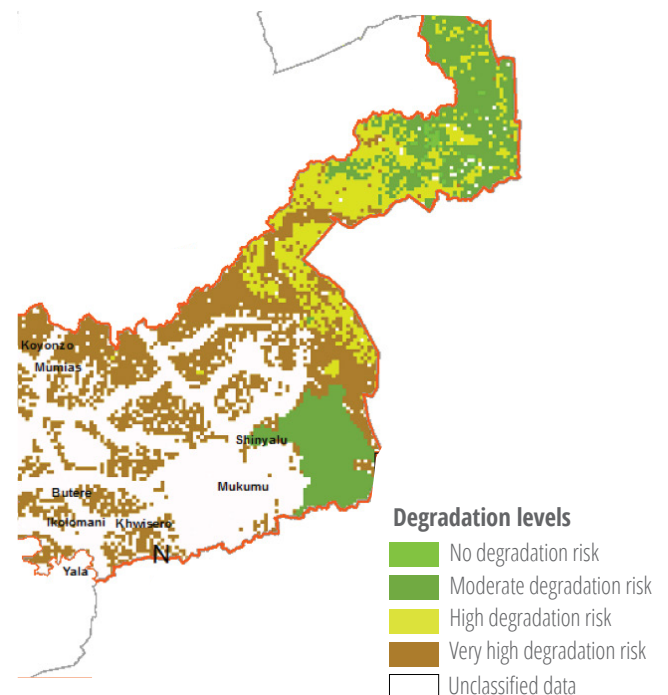
Figure 2: Degradation risk levels in Kakamega

Figure 3: Degradation levels for Kakamega

KEY MESSAGE 2: Food insecurity within Kakamega is specific to the central and north eastern parts of the county and has linkages to observed land degradation; both issues are critical and deserve concerted efforts to target and address the issues in hotspot areas.

Local knowledge (experts from Kakamega County and at national level) contributed in a participatory manner to identify hotspot areas of food insecurity and vulnerability. 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.

THE FOOD INSECURITY ZONES IN KAKAMEGA

ZONE	FOOD INSECURITY REASONS
Ikolomani, Shinyalu, Khwisero (tea)	Procuring loans for survival due to poverty and food insecurity, creating a vicious cycle.
Mumias zone (sugarcane)	Payment delays hence people do not have working capital to purchase improved maize varieties in a timely manner in order to optimize agricultural productivity which in turn leads to poverty and food insecurity.
Lugari, Likuyani (maize)	Short term food insecurity due to market challenges and low soil pH. Generally, this zone doesn't seem to have a poverty problem but rather marketing constraints where farmers sell the majority of their produce at once and face challenges during the main (lean) season.

Based on Figure 4, three distinct areas were identified as major food insecurity and vulnerability hotspots. This was through a participatory manner with County experts and national experts from a workshop that was organized in Kisumu, August 2017:

- A southern section that surrounds Kakamega including areas around the towns of Butere, Butsotso and Mukumu (termed as the tea zone),
- A northwestern section including areas around the towns of Mumias and Koyonzo (termed as the sugarcane zone) and
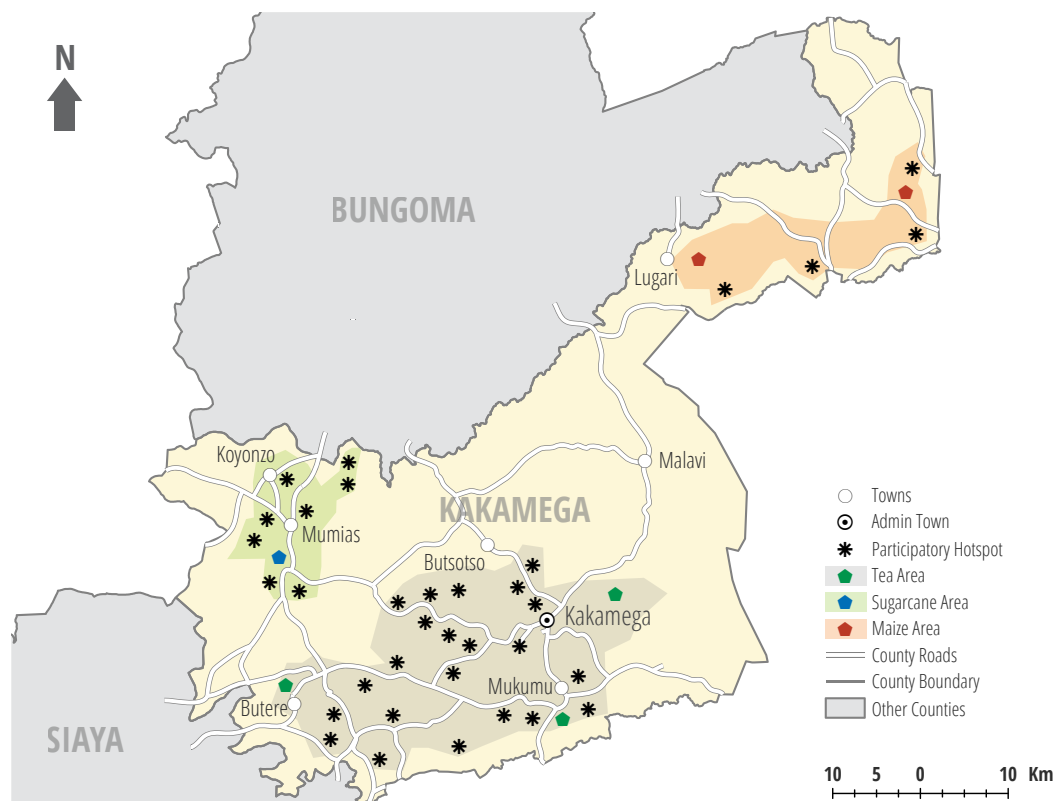- A northeastern section including areas around Lugari town (termed as the maize zone).

Figure 4: Food insecurity zones in Kakamega

KEY MESSAGE 3: Land use changes in the central and north western zones have greatly contributed to land degradation highlighting the need for policy reforms in land use decisions
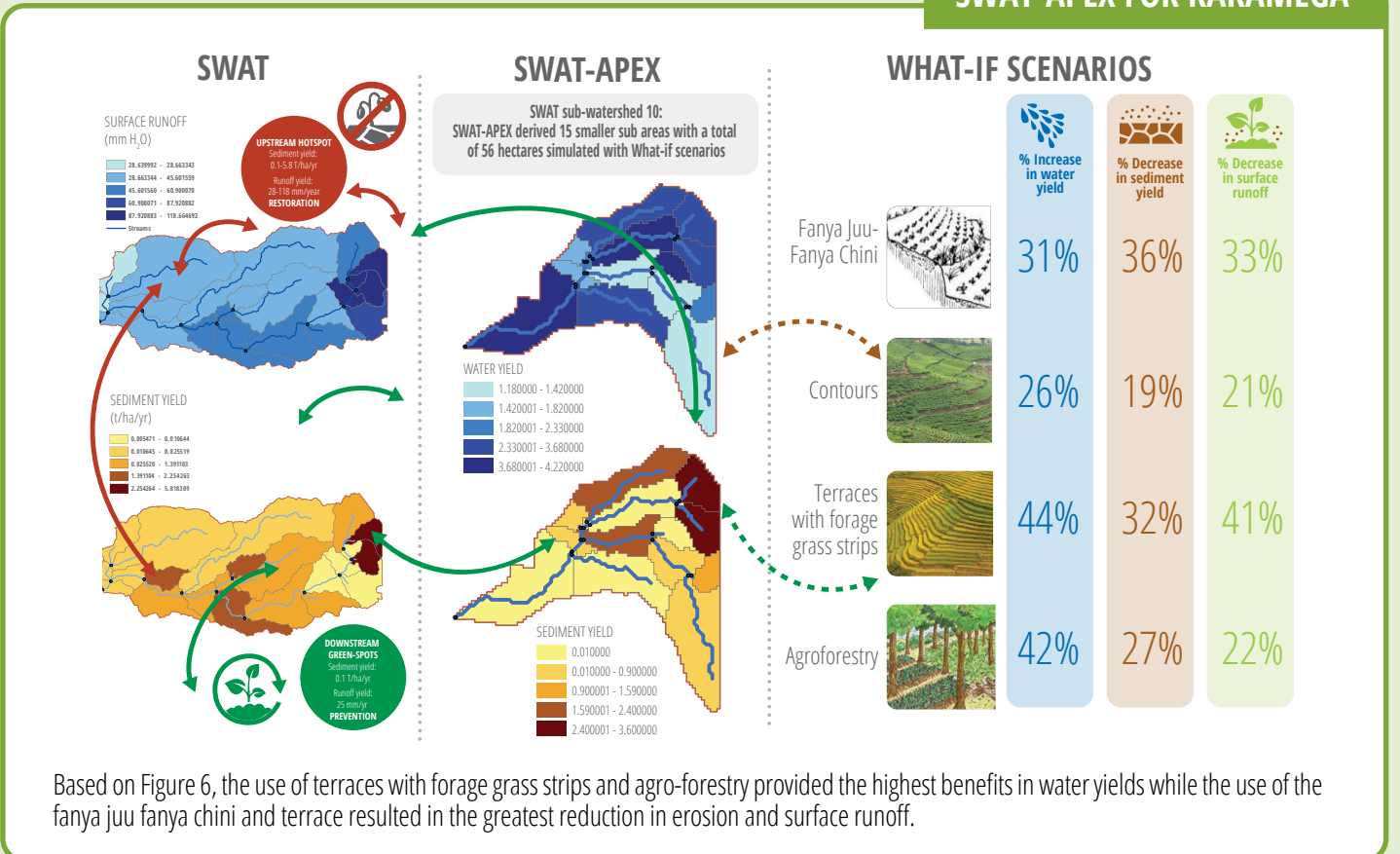
To account for the role of differences in land use/cover on land degradation, we used land use/cover data generated from Landsat satellite image analysis. This figure exemplifies the land use and land cover changes in Kakamega County. Since agriculture is most predominant, the figure portrays values 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.

Expansive agriculture with cash crops in the central and north western parts of the county e.g. in Mumias is a major driver of land degradation and the agricultural methods at the county level need extensive capacity building for farmers to allow for committed production without compromising local ecosystem integrity; and county officials to allow for interpretation of existing land use and land cover maps for regional planning to counter degradation vulnerability while addressing the key drivers.

Sustainable land management techniques for interventions should include but are not limited to physical structures and should be tailored for specific zones around Lugari and in the northwestern areas.

Maintaining strong national connections to the Central government could help the county and can be realized through promotion of market integration, strategic partnerships with the private sector, labor friendly innovations with mechanization in agriculture, etc. This will permit information sharing between the county and the central government while sharing information on hotspot areas that deserve attention for land restoration and food security.

CHANGES IN AGRICULTURE IN KAKAMEGA

Area in km² converted to agriculture / Land cover class (1995-2017): Settlement, Forest, Shrubland, Grassland, Wetland, Water, Bareland

Figure 5: Changes in agriculture in Kakamega

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 Kakamega. 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 KAKAMEGA

	% Increase in water yield	% Decrease in sediment yield	% Decrease in surface runoff
Fanya Juu-Fanya Chini	31%	36%	33%
Contours	26%	19%	21%
Terraces with forage grass strips	44%	32%	41%
Agroforestry	42%	27%	22%

Based on Figure 6, the use of terraces with forage grass strips and agro-forestry provided the highest benefits in water yields while the use of the fanya juu fanya chini and terrace resulted in the greatest reduction in erosion and surface runoff.

Figure 6: Restoration options for Kakamega