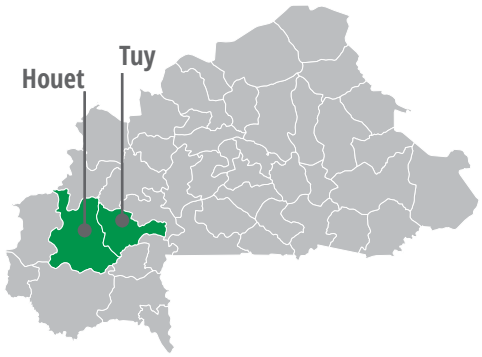
POLICY BRIEF: LAND DEGRADATION IN BURKINA FASO

Fred Kizito, Lulseged Tamene, Nicholas Koech, Brian Pondi and Kennedy Nganga (2018) in collaboration with TMG Think Tank:
Land Degradation Assessments Using Multiscale Hierarchical Approaches for Agroecosystem Restoration and Improved Food Security: The Case for Kenya and Burkina Faso. *CIAT publication, pp56*



This policy brief aims to give an overview of land degradation hotspots in Burkina Faso 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 modelling and field validation. Understanding the spatial locations helps identify hotspot areas and target them as priority intervention sites with relevant management options. This national level policy brief is complemented by two other detailed policy briefs focusing on the departments of Houet and Tuy. In addition, this policy brief is supported by a detailed comprehensive assessment report which can be accessed at this link: https://cgspace.cgiar.org/handle/10568/97165

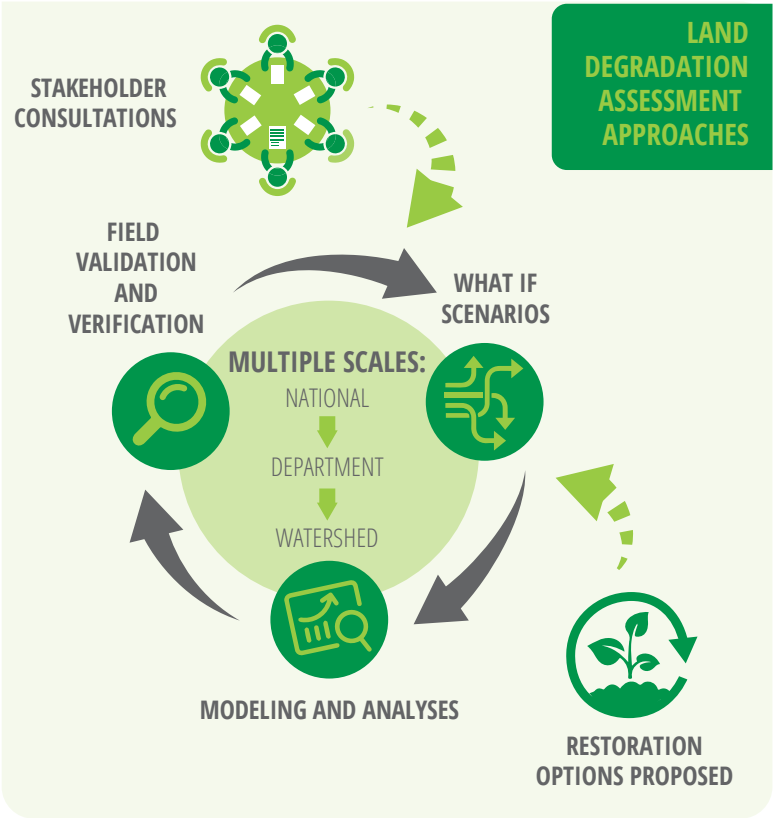


Figure 1: Land degradation assessment approaches

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

Figure 1 illustrates the process and methodology that was followed in the degradation assessment:

- The degradation was conducted at multiple scales from the national, department and watershed level.
- Relevant data was collected for areas of interest, and this was subjected to modeling and analyses.
- Results from the modeling were shared with expert groups of stakeholders and feedback from this process was then incorporated back into the assessments.
- This was followed by field validation and verification exercises.
- Using the results from the field validation and verification, "what if scenarios" were then conducted to provide a suite of restoration options.

This policy brief highlights key messages that are pertinent at the national level complemented with Departmental level policy briefs for Houet and Tuy departments. The results highlight key priorities that may be considered by policymakers to develop feasible restoration options that are scalable. This policy brief highlights 3 key messages: i) the multi-dimensional nature of land degradation highlighting the most vulnerable areas; ii) the added need for concerted effort because land degradation is further worsened by climate change and variability as well as land use changes; iii) the need to tailor intervention options from the grassroots and scale these further to wider areas. The 3 key messages are not independent of each other but have inter-related linkages. It is therefore envisaged that the knowledge co-produced in this assessment, as well as its policy recommendations, will contribute to the development and implementation of multi-dimensional strategies and plans towards relevant land restoration options.

KEY MESSAGE 1: Land degradation in Burkina Faso needs concerted action especially within the vulnerable zones. The areas experiencing significant land degradation are the western, southern and southeastern parts. These are at higher risk than the central and northern parts of the country. Understanding the spatial locations helps identify hotspot areas and target them as priority intervention sites with relevant management options.

The land degradation hotspot map was derived based on time series analysis of satellite (AVHRR NPP) and climate (CHIRPS) data in order to map the spatial distribution of land degradation risk for prioritizing intervention areas at national level. The map was classified into three trend levels: negative, neutral and positive trends. On the overall, the degradation trend, areas of significant trends and the trend map correlated with rainfall for Burkina Faso. Figure 2(a) shows the long-term trends of annual NDVI estimated using the linear slope method to represent annual accumulated NDVI over time. In the Figure, GREEN indicates positive trend while ORANGE and RED show transition to neutral and negative trend, respectively. Figure 2b is the trend after significant test was done while Fig. 2c shows the correlation between NDVI trend and rainfall supply over time. Based on Figure 2, the majority of the western, southern and southeastern part of Burkina Faso experiences significant land degradation compared to other parts of the country. Our work denotes that about 30% of the areas supporting about 27% of the population experience declining land productivity possibly due to human-related causes, which can be in the form of deforestation, soil surface crusting overgrazing and/or poor land management and gullies infringing on cropland areas as exemplified by Plate 1.

The major drivers of land degradation can be "climate induced" and/or "human-caused". The long-term response of green biomass to changes in annual rainfall was tested using Pearson's correlation coefficient for every pixel. The areas that are YELLOW indicated areas showing significant negative trend in NDVI and are not affected by annual changes in rainfall. This could be attributed to 'other' factors excluding climate or human. Regions in RED have negative correlation with rainfall and are decreasing in NDVI. This could be an indication of human impact. GREEN shows areas of improving trend and positive correlation with rainfall.

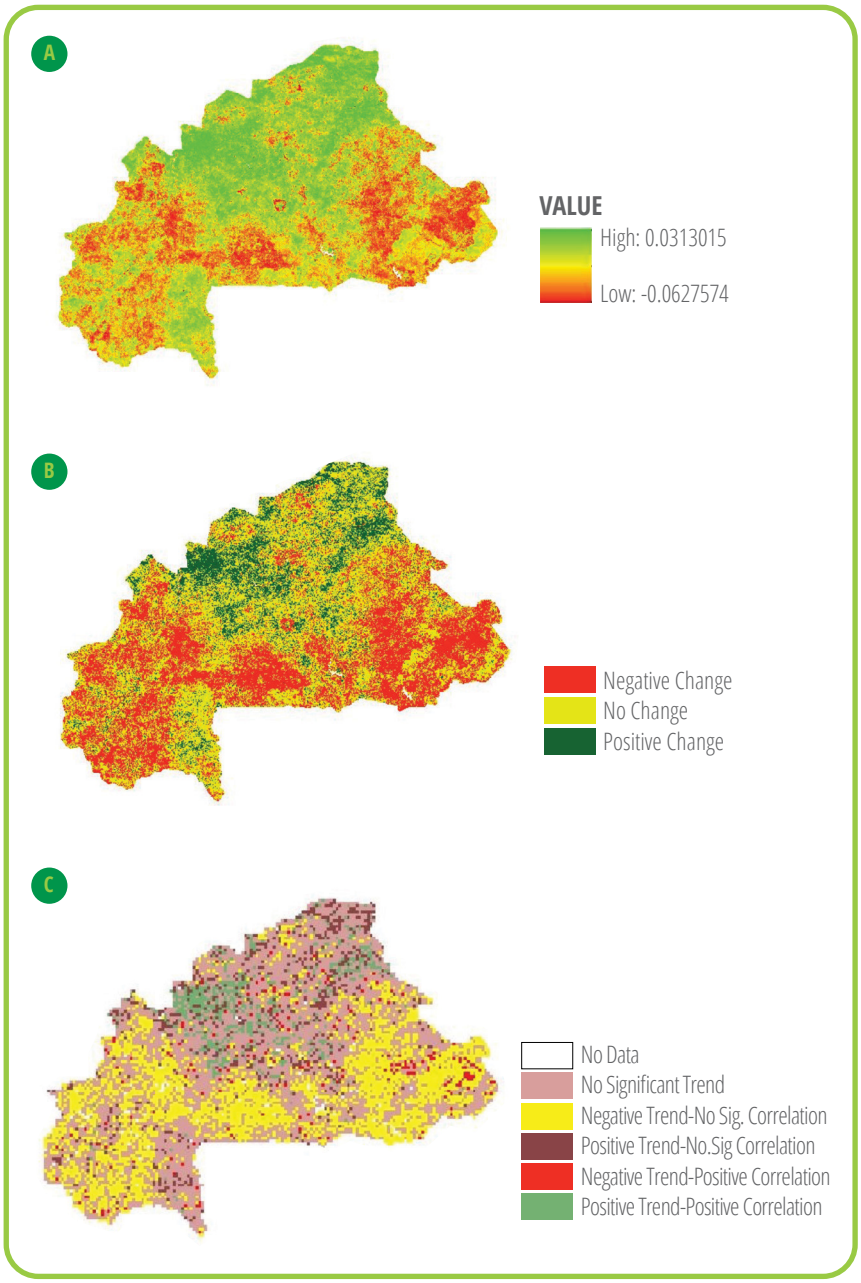


Figure 2: (a) Long-term trends of annual NDVI; (b) trend after significant test and (c) correlation between NDVI and rainfall in Burkina Faso.

Plate 1. Sample of field validated areas with prevalence of: A) Deforestation; B) Soil surface crusting C) Poor land management and D) Gullies infringing on croplands in south western Burkina Faso

INSIGHTS

Targeted restoration efforts should be made for the identified priority areas, in the western, southern and south eastern parts of Burkina Faso.

Efforts that use evidence-based approaches from these degradation assessments (supported by an enabling policy environment) will be needed to facilitate targeted strategies and interventions, in an inclusive manner with all the relevant stakeholders.

Substantial reform in the context of coordination across ministries as well as a high degree of political prioritization is needed as drivers have multiple sources and addressing them requires an integrated approach across the relevant sectors.

KEY MESSAGE 2: Land degradation is worsened because its consequences are further heightened by severity of climate change and variability as well as land use changes in Burkina Faso. On the overall, land degradation is particularly strong where rainfall is decreasing. Hence, tackling land degradation needs to go hand in hand with building resilience to climate change.

For the western, southern and south-eastern parts of Burkina Faso, there are higher levels of land degradation compared to the other parts with about 30% of the population residing in the areas characterized by land degradation). Despite this, attention needs to be focused on the non-degraded areas as well because this can generally be the case in many arid and semi-arid areas where climatic factors drive population to less risk and relatively high potential areas (Ouedraogo et al. 2009; Lenhardt et al., 2014; Etongo, 2016) but the population pressure in turn can then result to land degradation over time if specific measures such as land use change policies are not strongly enforced.

30% of the population reside in areas characterized by land degradation

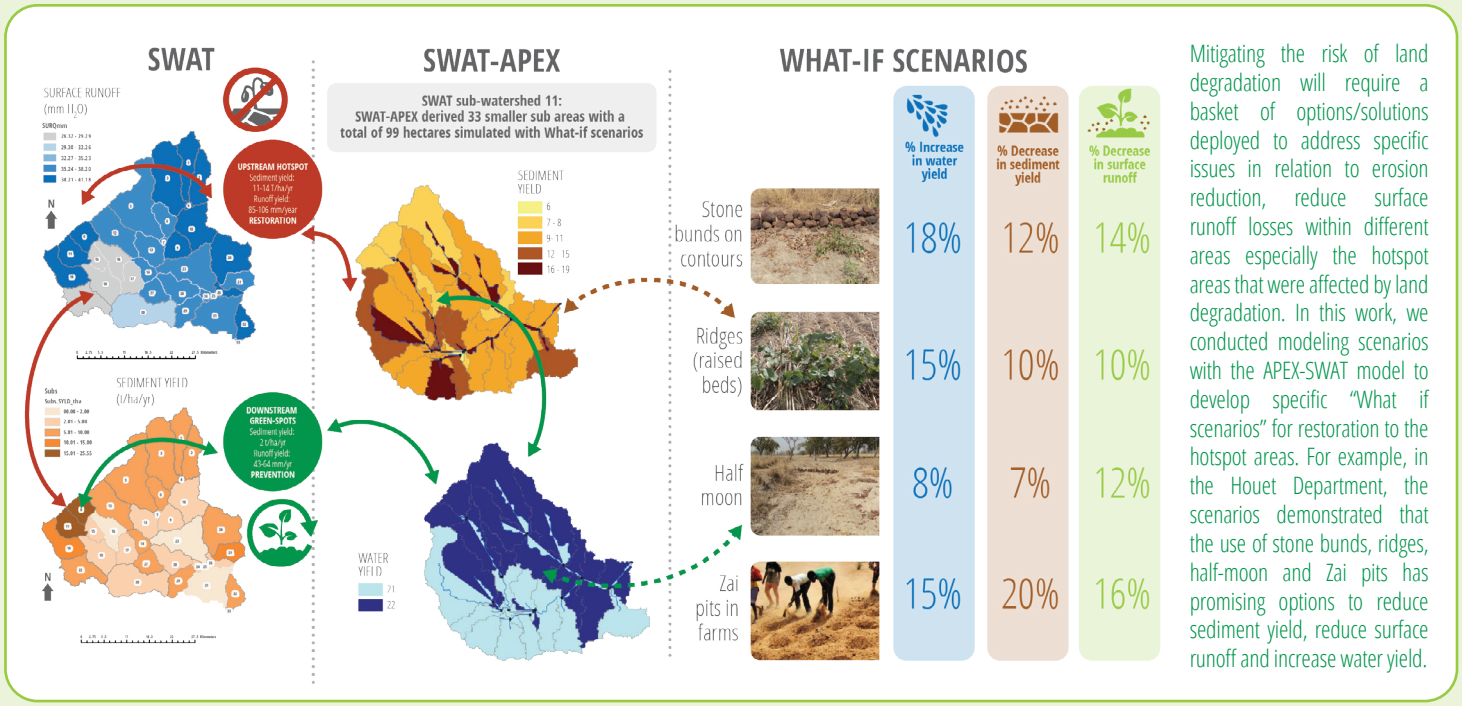
51% of the population reside in areas with no significant change in land condition

INSIGHTS

- Land use policy changes need to consider the key classes of land cover where the most rapid and pronounced changes are taking place namely agriculture gaining land from grasslands and shrub lands.
- Additional preventive measures need to be taken for non-degraded areas since the costs of restoration will outweigh the preventive measures and will never attain its original state.

KEY MESSAGE 3: Integration of proven practices and scaling up of best management practices tailored for Burkina Faso coupled with innovative farming options promises to transform and restore the vulnerable and degraded areas.

We used a suite of models SWAT and SWAT-APEX to explore potential feasible interventions for the hotspot areas e.g. around Poni. For Burkina Faso, sub-watersheds that were "hotspots" with high sediment loads, surface runoff and low water yields were used to demonstrate remediation or restoration options while the green-spots were used to demonstrate the need for preventive measures to avoid degradation even in places that are seemingly unaffected. For example, for Houet department, sub-watershed 11 was selected as a hotspot then processed through APEX to yield 33 additional smaller sub-areas. Thereafter, the 4 interventions for restoration or remediation were deployed within the sub-areas to assess their impact on sediment yield, surface runoff and water yield.



Mitigating the risk of land degradation will require a basket of options/solutions deployed to address specific issues in relation to erosion reduction, reduce surface runoff losses within different areas especially the hotspot areas that were affected by land degradation. In this work, we conducted modeling scenarios with the APEX-SWAT model to develop specific "What if scenarios" for restoration to the hotspot areas. For example, in the Houet Department, the scenarios demonstrated that the use of stone bunds, ridges, half-moon and Zai pits has promising options to reduce sediment yield, reduce surface runoff and increase water yield.

Figure 3: Impact of restoration options on sediment yield, surface runoff and water yield in Houet Department

INSIGHTS

- Use of promising pilot areas to scale and leverage what is already working needs to be promoted and replicated elsewhere to restore ecosystem services in the areas around Poni, Lena, Bobo-Dioulassou and Karangasso-Vigue.
- In order for interventions to have impact, farmer centered capacity building needs to be emphasized using feasible interventions such as those proposed in the "what-if" scenarios for the hotspot areas.
- Innovative landscape mechanisms proposed in the "what-if" scenarios modeling need to be complemented with demand driven economic options in order to promote uptake, sustainability, and scalability.

References:

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