



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes
with planetary health”

Trends in land use in the face of parthenium invasion in Kenya

DAISY MUTUKU¹, HELLEN KAMIRI², KAI BEHN³, MESCHACK NDIKUMWENAYO⁴, MATHIAS BECKER⁵

¹University of Bonn, Plant Nutrition, Germany

²Karatina University, Dept. of Agricultural Sciences, School of Agriculture and Biotechnology, Kenya

³University of Bonn, Inst. Crop Sci. and Res. Conserv. (INRES) - Plant Nutrition, Germany

⁴University of Bonn, Inst. Crop Sci. and Res. Conserv. (INRES) - Plant Nutrition, Germany

⁵University of Bonn, Inst. Crop Sci. and Res. Conserv. (INRES) - Plant Nutrition, Germany

Abstract

In the Kenyan Rift Valley pasture lands diminish, and more land users are transitioning from semi-nomadic pastoralism to sedentary crop cultivation. These land system changes are influenced by external factors and system immanent characteristics such as farmers' aspirations and adaptive capacity. In Baringo County, the rise of new land systems and associated management practices is additionally linked to the presence of invasive alien plant species. One prominent example is *Parthenium hysterophorus*, which was inadvertently introduced into Kenya and since recently invades agricultural areas.

To better understand land system dynamics and their interactions with *Parthenium* invasion, we conducted household surveys alongside biomass and vegetation assessments aimed at i) documenting current agricultural land uses, ii) determining recent changes in agronomic practices, and iii) exploring the interactions between land system transitions and the dynamics of *Parthenium* invasion. We differentiated five dominating land systems, comprising irrigated croplands, seasonal rainfed croplands, seasonal fallow land, grazed rangelands, and forage seed production systems.

Parthenium emerged in Baringo in 2016, and today it is present in all land use systems except for the forage grass seed production. In this latter system, *Parthenium* appears to be contained by allelopathic effects and the absence of regular disturbance. In seasonal rainfed croplands, *Parthenium* produces large quantities of seeds during the dry season fallow period. Its presence in irrigated systems is associated with year-round seed dispersal through irrigation canals, mechanised tillage, and machine harvesting.

New market opportunities and changing farmers' aspirations, but also increasing awareness about the negative effects of *Parthenium* and other invasive species (i.e. Prosopis) drive the ongoing land use intensification with investments in irrigation and year-round crop cultivation. Consequently, irrigated croplands take up increasing shares of the land use in Baringo and show highest rates of adopting intensification-related agronomic practices. This is evidenced by increased rates in mechanised tillage (50 %), use of modern genotypes (42 %) and herbicide use (75 %), and mineral fertiliser application (42 %) during the past 5 years. While some of these such practices may contain *Parthenium* (herbicide use), others may accelerate its spread (irrigation canals, farm machinery), likely leading to further changes in future land systems.

Keywords: Baringo, invasive species, land systems, parthenium hysterophorus, rift valley

Contact Address: Daisy Mutuku, University of Bonn, Plant Nutrition, Karlrobert-Kreiten-Str. 13 53115, 53123 Bonn, Germany, e-mail: d.mutuku@uni-bonn.de