

Biophysical and socio-economic factors driving changes in South-Kivu wetlands, eastern D.R. Congo

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1. Introduction

In eastern DRC, several factors endanger wetlands ecosystems and alter their ecological characteristics and ecosystem services they offer to communities. The extent of the use dynamics and its driving forces are poorly understood and documented. Losses have been recorded for decades but no complete inventory of such losses exists.

Research objectives:

Identify selected physical conditions and constraints that influence wetlands changes: (i) assessing LULC changes in south-Kivu wetlands, (ii) assessing main drivers (biophysical and socioeconomic) of these changes. (iii) evaluation of their effects on wetland biodiversity and services provided to local communities

2. Methodology

- Four wetlands selected as case studies (Muku, Hogola, Chisheke, and Mudaka), fieldworks, GIS-RS (remote sensing) and survey. RF, SVM and ANN for LULC and Ki, OA, TSS and AUC, de Long test. Soil and water sampling. CHAID test for determining factors

3. Preliminary findings

- Losses and reduction of some wetland areas mainly the one in the vicinity of cities. Anthropogenic pressure and biophysics factors including LULC, climate, soil fertility, farming systems, aquaculture, dwelling and settlement constructions, and brick making. Socioeconomic factors are the main forces influencing the wetland changes (**economic** > **technological**>**demographic**>**institutional** and >**cultural factors**); Losses has exacerbated by rural poverty, overgrazing and farming intensification;
- Gradual drop in water level

4. Future plans

- **Wetland preservation vs agricultural development?**
- Our Ph.D. research aims to respond to the need for wetlands identification, loss quantification, and assessment of negative effects on ecosystem services they provide. Quantifiable indicators will be selected and developed to assess the sustainability of wetland use.

3.1 Socioeconomic factors



Fig 1. Rice (a) and vegetable (b) production, water extraction for domestic use (c), and Settlement and dwelling development in wetlands (d)

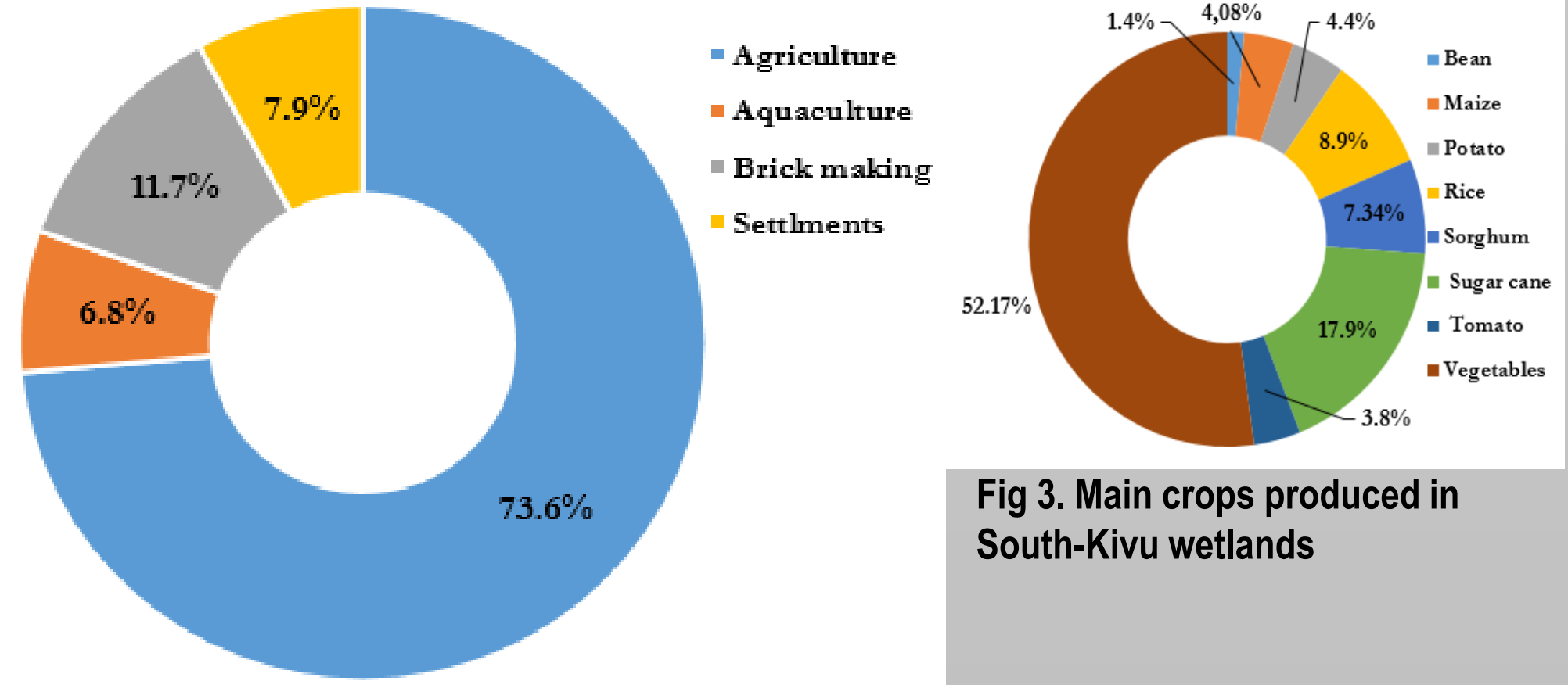


Fig 2. Wetland use patterns in South-Kivu

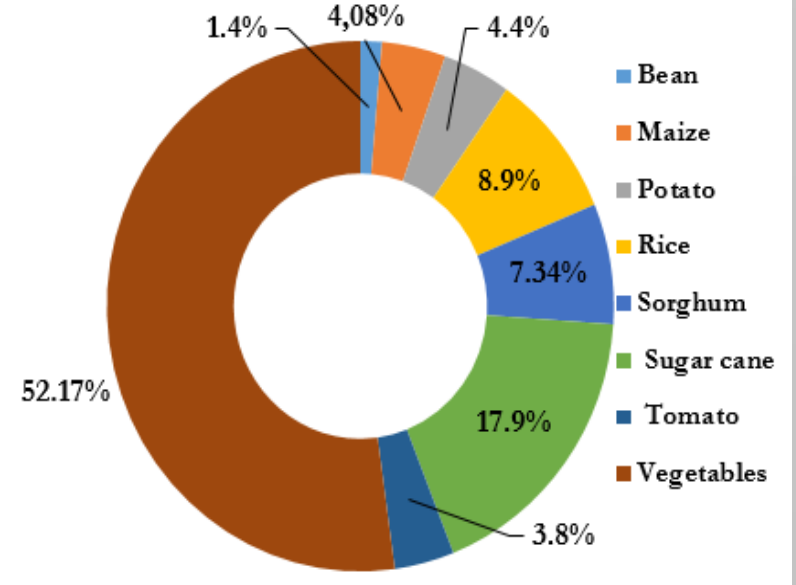


Fig 3. Main crops produced in South-Kivu wetlands



Fig 4. Wetland water pollution (a), aquaculture development (b), brick making (c), clay and forrage harvesting (d)

3.2 Biophysical changes

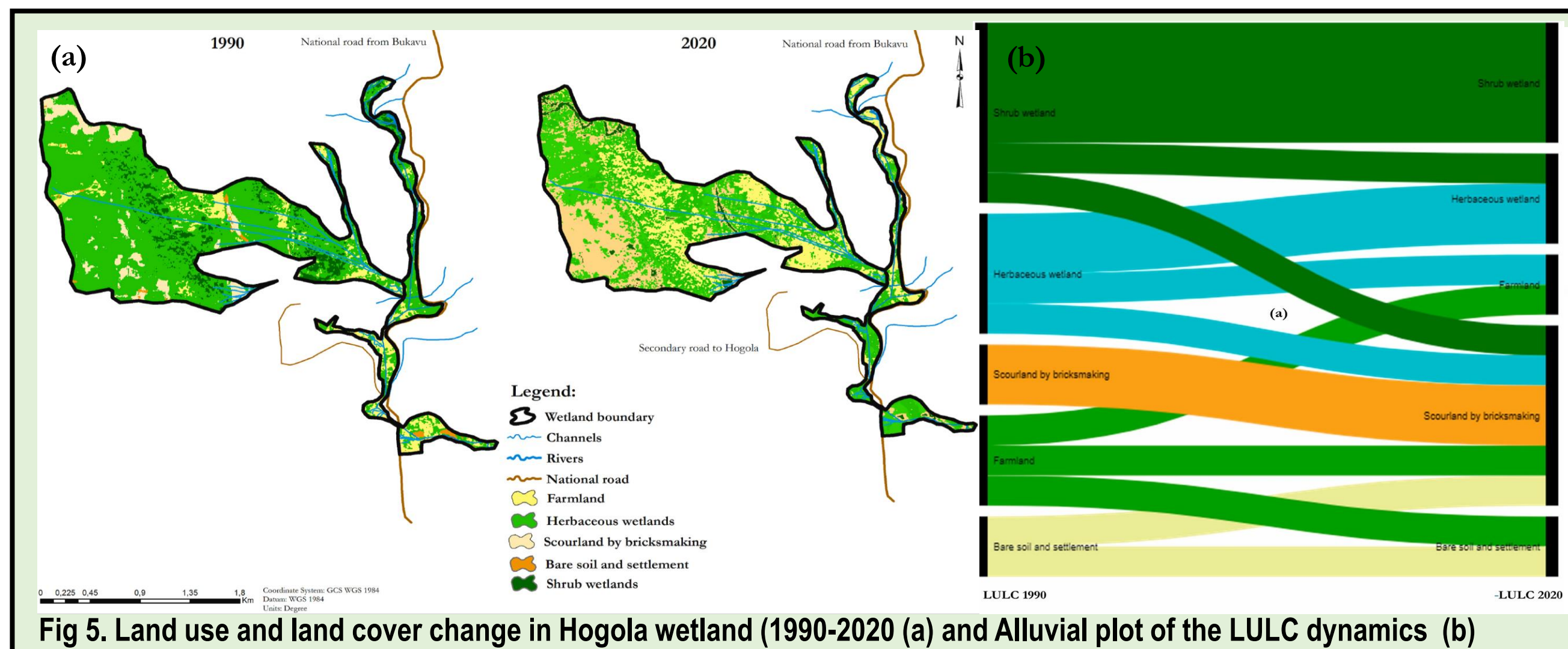


Fig 5. Land use and land cover change in Hogola wetland (1990-2020) (a) and Alluvial plot of the LULC dynamics (b)

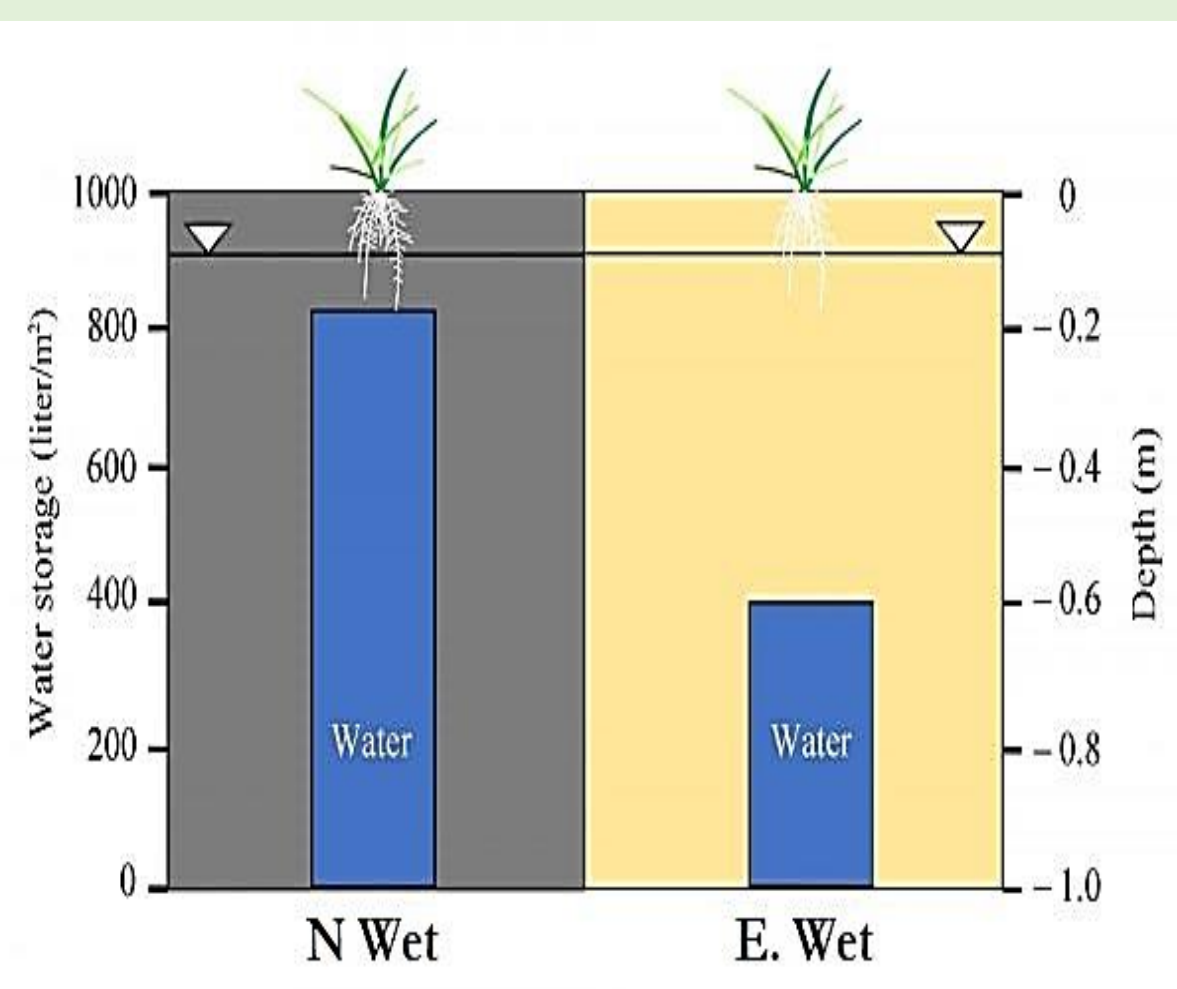


Fig 6. Gradual drop in water level in Chisheke wetland

References:

1. Chuma B.G., Mondo M.J., Sonwa D., Mushagalusa N.G., and Schmitz S., 2022. Socio-economic determinants of land use and land cover change in South-Kivu wetlands, eastern D.R. Congo: Case study of Hogola and Chisheke wetlands. *Environmental Development*. 43, 100711. <https://doi.org/10.1016/j.envdev.2022.100711>
2. Nabahungu, N.L., Visser, S.M., 2011. Contribution of wetland agriculture to farmers' livelihood in Rwanda. *Ecol. Econ.* 71, 4-12. <https://doi.org/10.1016/j.ecolecon.2011.07.028>
3. Chuma, G.B., Mondo, J.M., Karume, K., Mushagalusa, G.N., Schmitz, S., 2021a. Factors Driving Utilization Patterns of Marshlands in the Vicinity of South-Kivu Urban Agglomerations Based on Rapid Assessment of Wetland Ecosystem Services (RAWES). *Environmental Challenges*, p. 100297.
4. Msume, A. P., Mwale, F. D., & Castelli, G. (2022). Inventory and drivers of the adoption of flood-based farming systems in South-Eastern Africa: Insights from Malawi. *Irrigation and Drainage*, 71(2), 521-533.
5. Kaneko, M. (2013). Pratiques potières dans la Corne de l'Afrique. *Techniques & Culture. Revue semestrielle d'anthropologie des techniques*, (60), 202-221.

