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Grace Villamor
gvillamor@uidaho.edu

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Understanding the gender dimension of food-energy-land security nexus in rural Ethiopia: an agent-based model approach

Grace B. Villamor
Center for Resilient Communities, University of Idaho, Moscow, USA
Emails: gvillamor@uidaho.edu

Abstract: This research focused on the development of a gendered agent-based model to investigate gender dimensions of the food-energy-land nexus in the rural highlands of Ethiopia. This includes the specific roles of men and women that may reduce or enhance synergies among food-energy-land nexus resources, and their specific responses to modern bioenergy interventions to address energy crises. Furthermore, the model was applied to explore whether the introduction of modern bioenergy would improve quality of life for both men and women. The modelling process included the calibration of existing sub-models, such as forest yields, to highlight the dependency of rural households on traditional energy sources. The study results suggest that increasing access to modern bioenergy such as biogas and bioethanol produced in biomass digester for rural farm households, particularly women farmers can increase crop production and enhance food security. However, increased available labour to women resulting from the adoption of biogas digesters will not necessarily enhance quality of life.

***Keywords**:* bioenergy; food-energy-land nexus; fuelwood; gender roles; labour allocation; dynamics