

AGU FALL MEETING

San Francisco | 15–19 December 2014

H31G-0694: Water and Productivity of Floodplain Grasslands: Exploring Linkages through Experimentations and Models in the Tana River Delta, Kenya

Wednesday, 17 December 2014
08:00 AM - 12:20 PM
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Floodplain grasslands have one of the highest productivities of non-cultivated ecosystems on Earth. They procure a wide variety of benefits to human beings. In Eastern Africa, grasslands of *Echinochloa stagnina* are primordial for pastoralists as highly productive dry-season grazing zones. Regular flooding is a critical property in maintaining their productivity and resulting services. Yet, construction of hydrologic infrastructure modifies the flooding regime of rivers and the consequences on downstream floodplain grasslands need to be assessed.

This presentation focuses on quantifying the productivity of the floodplain grasslands in the Tana River Delta, Kenya, in order to assess potential changes under varying flooding regimes. The interactions between growth and floods are explored firstly at an experimental site, then through the construction of a process-based plant growth model adapted to floodplain grasslands. The 15-month experiment consisted in quantifying daily growth rates under various rainfall, irrigation, cutting and flooding regimes. Floods increased growth rates three-folds, and high productivities were maintained after the floods. The cutting regime and contribution of non-flood water also influenced productivity. Modelling allowed exploring the underlying processes explaining such behaviour. In an exploratory endeavour, the productivity of the grassland at the ecosystem scale was assessed with the model for a variety of flood and non-flooded scenarios. Decreasing floods led to a drop in annual productivity that could have serious consequences for the livestock keeping activities of the zone.

This research highlights the importance of floods in the maintenance of high productivities for a floodplain grassland typical of East Africa, and maybe of the Sahelian band. The model, once further validated, could be used on other floodplain grasslands, such as those of the Niger delta. Results for the Tana River Delta would need to be discussed with the stakeholders so that proper action can be taken.

Authors

[Winfred Musila](#)
PAFRI

[Crystele Leauthaud *](#)
CNRS, Hydrosiences

[Laurent Kergoat](#)
GET Géosciences Environnement Toulouse

[Pierre Hiernaux](#)
GET Géosciences Environnement Toulouse

[Grippa Manuela](#)
GET Géosciences Environnement Toulouse

[Stéphanie Duvail](#)
IRD, PALOC

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