Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Combined Effects of Elephants and Climate Change Damages on Ecosystem Services in Pendjari Biosphere Reserve

Isidore Gnonlonfoun[1], Barthélémy Kassa[2], Fortuné Azihou[3], Achille Assogbadjo[4], Romain Glèlè Kakaï[5]

[1] *Laboratory of Biomathematics and Forest Estimations/university of Abomey-calavi, Department of Natural Resources Management, Benin*

[2] *Laboratory of Applied Ecology, Faculty of Agronomic Sciences, University of Abomey-calavi, Benin, Department of Natural Resources Management,*

[3] *Laboratory of Applied Ecology, Faculty of Agronomic Sciences, University of Abomey-calavi, Benin, Department of Natural Resources Management,*

[4] *University of Abomey-Calavi (FSA/UAC), Lab. of Applied Ecology (LEA), Benin*

[5] *Laboratory of Biomathematics and Forest Estimations/University of Abomey-Calavi, Department of natural resources management , Benin*

Abstract

Assessment of the state of ecosystem services (ES) is nowadays recommended for effective management and conservation of ecosystems. Natural drivers such as mega-mammals browsing and climate change are influencing the provision of ecosystem services. The combined effects of both factors remain undocumented in natural ecosystems. This study assessed the perception of Reserve managers and local people on the combined effects of elephants browsing and climate change on ecosystem services in the Pendjari Biosphere Reserve in Benin. A total of 112 people were surveyed through semi-structured interview. The diversity of ES, the impacts of elephants browsing and climate change on the ES are the main data collected. The index of importance of each category of ecosystem service followed by the index of potential impact of each factor on the categories of ES were computed and compared by the way of Kruskal-Wallis and Mann-Whitney tests, respectively. The effects of both factors on elephant diet trees dynamic were analysed using descriptive statistics and principal component analysis. The results revealed 26 important ecosystem services gathered into 3 categories, including provision services, the most important followed by regulation services and cultural and social services. The results of the Kruskal-Wallis test revealed that there is no significant difference between elephants' damages for the different ES categories. The effects of climate change vary significantly between different ecosystem service categories. A very significant difference is observed between the median of the two factors for cultural and social services. According to local people and Reserve managers, elephants have completely reduced the abundance of Balanites aegyptiaca, Acacia sieberiana, Borassus aethiopum, *Adansonia digitata*, Vitellaria paradoxa, Acacia hockii, Mytragina inermis, *Tamarindus indica*, Ximenia americana and *Parkia biglobosa*; very important non timber forest products. Climate change has caused the phonological shifts of Vitellaria paradoxa, *Parkia biglobosa*, *Adansonia digitata*, Annona senegalensis, Balanites aegyptiaca,

Contact Address: Isidore Gnonlonfoun, Laboratory of Biomathematics and Forest Estimations/university of Abomey-calavi, Department of Natural Resources Management, Rie1, 04 BP 1525 Abomey-calavi, Benin, e-mail: isidoregnonlonfoun@gmail.com

Lannea microcarpa, Vitex doniana, Anogeissus leiocarpus, *Diospyros mespiliformis* and *Tamarindus indica* and has led to more intense damages of *Adansonia digitata*. Borassus aethiopum and Lannea microcarpa by elephants. 8 hectares of cropping systems are destroyed each year by elephants in the farms of surrounding communities of the Biosphere Reserve.

Keywords: Benin, climate change, cropping systems, ecosystem services, elephant damages, Pendjari Biosphere Reserve