



Original research article

Cocoa crops are destroying the forest reserves of the classified forest of Haut-Sassandra (Ivory Coast)



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ABSTRACT

The aim of this study is to determine landscape dynamics in the classified forest of Haut-Sassandra (CFHS) during the periods of conflict in Ivory Coast (or Côte d'Ivoire). To achieve this, the land cover of this protected area was determined by classifying satellite images obtained before, during and after the conflicts, and via ground surveys. Metrics of landscape ecology were calculated. A ground campaign for observing the CFHS's flora and damages incurred was carried out using a sampling of eighteen 500 m-long transects. The results show that forest fragmentation intensified during and after the period of conflicts. Forests covered over 93% of the CFHS's area before conflicts and under 28% in 2015. The main cause of this deforestation is cacao growing. Anthropogenic activities caused the loss of 40% of plant species, including some which are endemic in Ivory Coast.

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1. Introduction

The west-African region has been a source of conflicts in Africa for over two decades (Annan, 2014; Hall, 2015). These conflicts are generally not structured and involve multiple parties, each defending its own interests (Reno, 2001; Buhaug and Rod, 2006). Conflicts in Ivory Coast, or Côte d'Ivoire, went on for a decade after a failed coup in 2002. They led to the partition of the country in two: the North and the West fell under the control of rebel groups and the South remained under government control. In between, a buffer zone was controlled by UN forces and French soldiers (Fig. 1(A)). Despite the presence of these soldiers, military incursions were observed in both areas and reached their peak in 2011 as a result of the military conflict triggered by the presidential election.

These various political and military crises affected the population's social balance (Chauveau and Richards, 2008; Dabalén and Paul, 2014) and the environment. Indeed, war-related activities have direct or indirect negative impacts on all levels of biodiversity from genes to ecosystems (Nackoney et al., 2014). Direct impacts can be hunting or destruction of the habitat by armies; indirect impacts can be caused by the activities of refugees or other displaced persons, or the withdrawal of those in charge of forest conservation (Draulans and Van Krunkelsven, 2002). The indirect effects of conflicts often have

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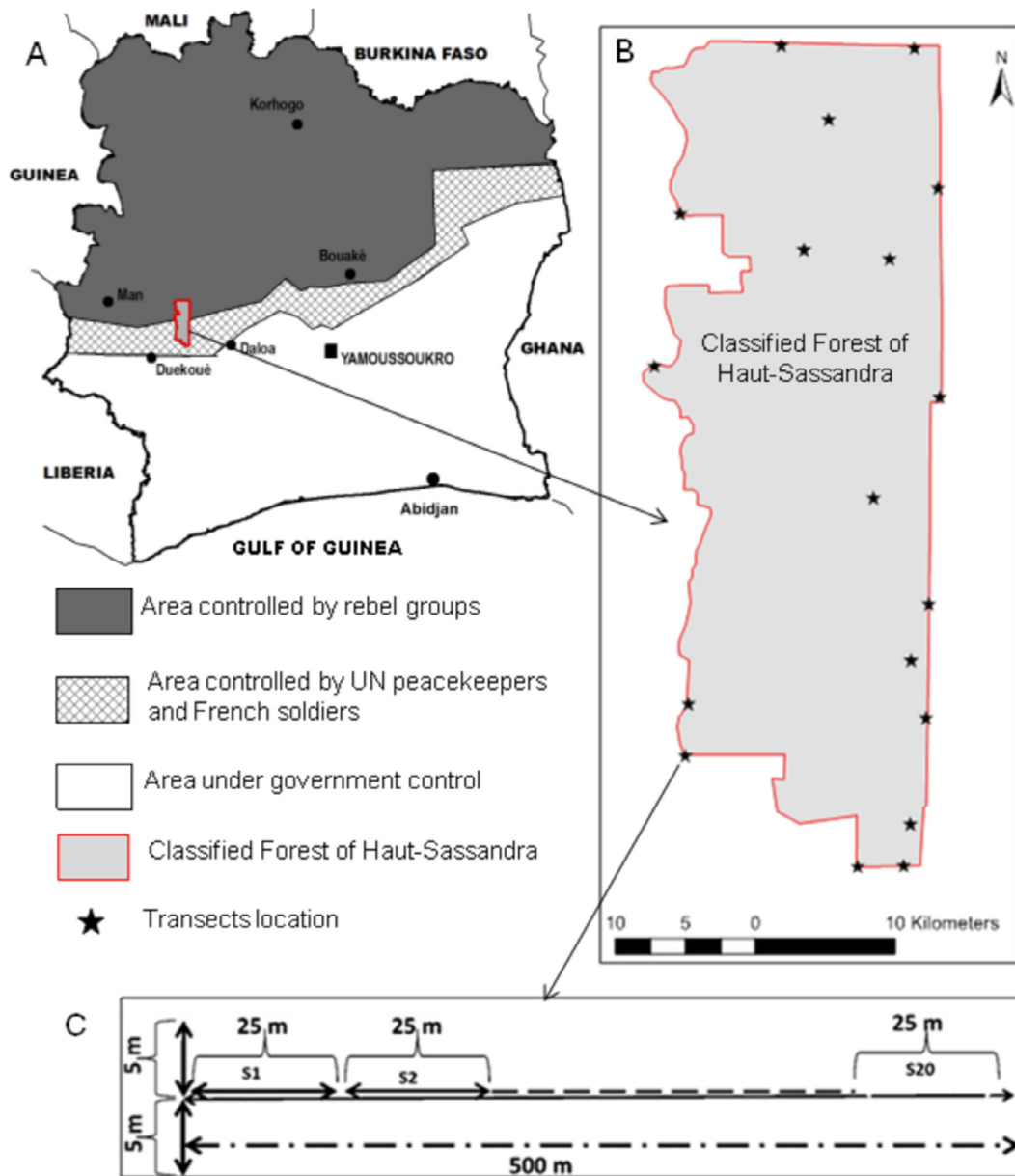


Fig. 1. Location of classified forest of Haut-Sassandra in Ivory Coast (A), site of floristic data sampling (stars, B) and illustration of segments on a transect (C).

more extensive repercussions than direct destruction on battle fields. Finally, military spending could be incurred to the detriment of other government programs, including the management of natural resources (Hanson et al., 2009).

Ivory Coast's Center-West region is by far the area most affected by the conflicts (Dabalen and Paul, 2014): massive transfers of people, lower income, farming losses, loss of cattle, numerous victims etc. The conflict situation in the region also highlighted problems linked to land resources in the area. The numerous population movements exacerbated land conflicts which were already recurrent in the region. Yet, the people in the Center-West of Ivory Coast are heavily dependent on the forest and its functions, not only for farming but also for the non-timber forest products it provides (FAO, 2007). At national level, the Center-West region has the second highest production of cocoa and coffee (Adou, 2012; MINIGRA, 2012; Koffie-Bipko and Kra, 2013). These crops are Ivory Coast's main financial resource, accounting for over 20% of its gross domestic product. The Center-West region also has one of the most important protected forests in Ivory Coast, namely the classified forest of Haut-Sassandra (CFHS). This protected area was created in 1974 and was, before the conflicts, one of the best protected forest reserves in Ivory Coast (Oswald, 2005). During the crises, the northern part of the CFHS was in the area controlled by rebel groups, and the southern part in the area controlled by UN forces and the French army. Due to its

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