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Research article

The equatorial rainforest of Central Africa between economic needs and sustainability requirements



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ABSTRACT

This article sets out to investigate the role played by the rainforest of Central Africa in providing environmental goods and services, regulating and stabilizing the global climate as well as participating in socio-economic development of the riparian countries. This complex role offers a double status, almost confrontational, to this rainforest: it stands as an economic resource and as a major global climate regulator. Hence, there is an urgent need to question certain aspects such as climate trends in this strategic region and the use of local forest resources for economic purpose in order to suggest ecological attitudes to be adopted by policymakers, stakeholders, forest professionals and users for a sustainable development. It is shown that: 1) this rainforest constitutes an economic resource and plays a major socio-cultural role in addition to its global climate regulatory role, 2) an overexploitation of the forest resources for economic purposes exposes the forest to an increased deterioration which can change the ecological and socio-economic balance, or destroy this forest, and by so doing, alter its global climate control power, 3) the climate of the region is experiencing serious variability. Thus, solutions that can satisfy socio-economic needs and give room for sustainable development are proposed.

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1. Introduction

Almost all policymakers, stakeholders, researchers, scientists and non-governmental organizations are unanimous that climate variability is one of the Millennium challenges (UN, 2015). The equatorial rainforest of Central Africa is also falling prey to this phenomenon. Arétouyap et al., 2014 showed climate variability has a toll on water resources in Central Africa. Conway (2009) investigated the climate variability in Africa in terms of impacts and adaptation. Hulme et al. (2005) worked on the warming rate in Africa. IPCC (2007; 2014) recapped the situation of climate variability in the world including the region under study. Justice et al. (2001) analysed the carbon budget in Central Africa and related climate variability. Almost all those investigations conclude that, within the rainforest of Central Africa, temperature is increasing while rainfall has a downward trend. But, no interaction between sustainability requirements, depending on this climate variability.

* Corresponding author. E-mail address: aretouyap@uy1.uninet.cm (Z. Arétouyap). and economic needs, depending on these forest resources, has not yet been investigated.

Such climate variability in Central Africa requires more international attention and interest because of the "regulator role" it plays in the global climate system. Indeed, through photosynthesis, trees produce sugars from carbon dioxide, light and water, and some of them are stored in the form of wood. Hence, rainforests act as atmospheric carbon sinks, helping to limit the impact of global warming. In fact, though primary forest cover sequesters just little atmospheric carbon, it does store a great deal. Hence, deforestation may lead to the release of an important amount of carbon. Consequently, when a tree is cut down, it releases a lot of carbon in the atmosphere. This may lead to the formation of carbon oxides and many other greenhouse gases, responsible for global warming. The equatorial rainforest of Central Africa provides a good range of economic and cultural advantages to many major industries and companies worldwide at the time. In rural areas, more than 30 million people largely rely on this natural resource for their livelihood. The uses they make of the resource have been classified into three major categories by Dkamela et al. (2013): supply service that



includes wood, vegetables and medicinal plants; natural regulation service for climate and water control; and cultural service that refers to spiritual and cultural identity.

It is observed that the equatorial rainforest of Central Africa plays two major roles that are almost conflicting and ambivalent: regulating global climate and satisfying economic needs. The main objective of this article is to show that Central Africa is witnessing climate change, bring to limelight the conflicting roles of the local rainforest listed above and then propose solution to this dilemma.

2. Conceptual framework

2.1. The rainforest of Central Africa as a "global climate regulator"

The equatorial region of Central Africa is a real pool of plant and animal species. This region is characterized by the immense virgin forest density expanded through five countries: Cameroon, Central African Republic, Equatorial Guinea, Gabon and Democratic Republic of Congo (Fig. 1). As such, it has a great ability to regulate global climate through photosynthesis as mentioned above. The rainforest capacity to trap atmospheric carbon makes it an essential means of global warming mitigation.

Conversely, deforestation and forest degradation would lead to the release of huge amounts of greenhouse gases into the atmosphere. Indeed, during photosynthesis, trees absorb carbon dioxide molecules and transform them into carbon stored in the biome. Biomes are huge carbon sinks. According to Dkamela et al. (2013), deforestation is responsible for 15–20% of greenhouse gas emissions. Deforestation has to do with felling trees and using land for other purposes such as agriculture.

Forests play an important role on the environment patterns. This includes purifying air, preserving watersheds, improving water quality and quantity, stabilizing soil, providing people with natural resources such as timber products and medicinal plants, and helping to protect the planet from climate change by absorbing carbon dioxide, the main greenhouse gas (https//www.assets.pe nda.org/downloads/intro_factsheet_27nov07_lr.pdf). Increasing concentrations of carbon dioxide are driving rise in air temperature.



Fig. 1. Study area.

Hence, forests play a critical role in protecting the planet from climate change and regulating climate patterns. In fact, tree trunks, branches and roots absorb and store carbon dioxide, providing a natural reservoir for this greenhouse gas. According to a World Wide Fund report, Earth's vegetation and soils currently contain the equivalent of approximately 7.5 \times 10¹² kg of carbon oxide (FAO, 2011: Moutinho and Schwartzman, 2005). As a result, when forests are destroyed, they release large quantities of carbon oxide. and become a significant source of carbon oxide and other greenhouse gases emissions. Those emissions contribute widely to climate change (Lawrence and Vandecar, 2015). Indeed, the contribution of deforestation to carbon emissions is estimated at \sim 19% of global emissions. This amount is greater than those emissions produced by the whole of the global transport sector. Yet, deforestation is continuing at an alarming rate. UN Food and Agriculture Organization (FAO, 2006) indicates that the rate of natural tropical forest loss is about 13 million hectares each year.

2.2. Related economic role of the rainforest and livelihood of inhabitants

The equatorial rainforest of Central Africa constitutes both the natural shelter and subsistence conditions for millions of people. More than 40 million of them depend directly on the forest resources (FAO, 2006; FAO et al., 2015). This symbolizes the socioeconomic role played by this ecosystem. And these socioeconomic needs are increasing by day. For example, bioenergy, made up of wood for 95%, is becoming a major source of global energy supply. While its traditional use still prevails in developing countries, developed countries have witnessed the expansion of new applications. Cushion et al. (2010) demonstrated that by 2030, almost 2.7 billion of people around the world will be using fire wood for cooking. Bioenergy is the main source of energy in Africa and accounts for 65% of total primary energy source. This energy source is also used elsewhere in the world. Kolovos et al. (2011) highlight specific woodfuel types that are more cultivated in the Northern Greece. Taking into consideration such factors as 'high heating values', densities, annual total production, and annual proportional allocation of the available woodfuels, those researchers evaluated the adequate environmental, economic and socio-economic conditions of relevant projects. Their findings seem to set the scene for a solution to the requirement of environmentfriendly and economical fuels to the everyday energy-consumption imposed by the European Legislation on human activities (Chalikias et al., 2010).

Okali (2011) highlighted that the socio-economic conditions and the production system of local population are strongly linked to the tropical rainforest. Indeed, he stated that the rainforest supplies residents with wood for furniture and building, firewood, medicine and drugs, foodstuffs, stock for drought periods. Furthermore, the transformation and exploitation of some forest resources like wood, fruits, nuts and gums generate important revenue for the region. The exportation of wooden products contributes for more than 60% to the gross domestic product of the local countries (FAO, 2006).

2.3. Sustainability requirements

A significant reduction of the phenomenon of climate variability requires a sustainable forest management. This would produce long-term goods and services while maintaining at an acceptable level environmental benefits from forests and without diminishing the upcoming integrity of those forests. It is an approach capable of optimizing carbon storage while providing economic and environmental benefits (Dkamela et al., 2013). It is imperative to Download English Version:

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