

SYNOPTIC REVIEW OF FORESTRY AND FOREST PRODUCTS TRADE AND PRODUCTION IN AFRICA

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Abstract

Aims to value Africa's forestry and forest products, namely Wood Forest Products (WFPs) and Non-wood Forest Products (NWFPs) in the sixteen (16) West African countries. The study identified a systematic assessment of the most common forest products (wood and non-wood forest products) considering the available data on the national forest reserves of the selected countries in West Africa. The study also revealed the need for biodiversity conservation of the available forest reserves to help mitigate the impact of global warming targeting the United Nations Sustainable Development Goal 13- Climate Action. This is focused on integrating climate change mitigation, adaptation, impact reduction, and early warning signs into the national policies, improving forest planning and management education, awareness-raising, and institutional capacity within the sub-region.

Keywords: Forestry; Forest Management; Forest Products; Land-Use; West Africa.

Resumo / Resumen

REVISÃO SINÓPTICA DO COMÉRCIO E PRODUÇÃO FLORESTAL E DE PRODUTOS FLORESTAIS NA ÁFRICA

Objetiva avaliar os produtos florestais da África, nomeadamente Produtos Florestais Madeiros (PAMs) e Produtos Florestais Não-madeiros (PNMs) nos dezesseis (16) países da África Ocidental. O estudo identificou uma avaliação sistemática dos produtos florestais mais comuns (produtos florestais madeiros e não madeiros) considerando os dados disponíveis sobre as reservas florestais nacionais dos países selecionados da África Ocidental. O estudo também revelou a necessidade de conservação da biodiversidade das reservas florestais disponíveis para ajudar a mitigar o impacto do aquecimento global visando o Objetivo de Desenvolvimento Sustentável 13 das Nações Unidas - Ação Climática. Isso está focado na integração da mitigação das mudanças climáticas, adaptação, redução de impacto e sinais de alerta precoce nas políticas nacionais, melhorando o planejamento florestal e a educação em gestão, conscientização e capacidade institucional na sub-região.

Palavras-chave: Silvicultura; Gestão florestal; Produtos Florestais; Uso da terra; África Ocidental.

REVISIÓN SINÓPTICA DEL COMERCIO Y LA PRODUCCIÓN FORESTAL Y DE PRODUCTOS FORESTALES EN ÁFRICA

Tiene como objetivo valorar la silvicultura y los productos forestales de África, a saber, los productos forestales madereros (PMA) y los productos forestales no madereros (PFNM) en los dieciséis (16) países de África occidental. El estudio identificó una evaluación sistemática de los productos forestales más comunes (productos forestales madereros y no madereros) teniendo en cuenta los datos disponibles sobre las reservas forestales nacionales de los países seleccionados de África occidental. El estudio también reveló la necesidad de la conservación de la biodiversidad de las reservas forestales disponibles para ayudar a mitigar el impacto del calentamiento global como objetivo del Objetivo de Desarrollo Sostenible 13 de las Naciones Unidas: Acción climática. Esto se enfoca en integrar la mitigación del cambio climático, la adaptación, la reducción del impacto y las señales de alerta temprana en las políticas nacionales, mejorando la educación en planificación y manejo forestal, la capacitación y la capacidad institucional dentro de la subregión.

Palabras-clave: Silvicultura; Gestión de bosques; Productos extranjeros; Uso del suelo; África occidental.

INTRODUCTION

Forests in West Africa are being destroyed and forest products are being exploited at an alarming rate (CAILLAULT et al, 2020; LIU et al, 2021). Land degradation has ensued as a result of this, with the Food and Agricultural Organization (FAO) of the United Nations (KWAWUVI et al, 2021; FAO, 2006) stating that Africa's annual rate of deforestation exceeds 4.5 million hectares or 0.68% annually, despite the dire situation in certain regions. Between 2000 and 2005, the FAO observed a considerable reduction of the natural vegetation of 4.5% in Togo, 3.8% in Nigeria, and 2.7% in Ghana (FAO, 2006). Forest harvesting, unsustainable resource activities (e.g., removal or cocoa cultivation), wildfires, mining activities, and political upheaval have all contributed to a major reduction in the nature reserve. Forest destruction continues, resulting in biodiversity degradation of morphological and anatomical as well as floristic features, reducing vegetation and society – having to respond to worldwide forces of change; species diversity has amplified desertification, resulting in deteriorated farm yields and, as a result, deterioration of sparsely populated community livelihoods (PEÑUELAS et al, 2021; PÉREZ-IZQUIERDO et al, 2018). If the woods are not removed and converted to other land uses, the plant cover will be damaged or destroyed (FAIRHEAD, 2020). This analysis demonstrates that the cultivation of timber as well as non-wood forest resources has consumed almost 3 billion hectares of the land surface area throughout the world. Brazil, Canada, and the United States of America are some countries in the West while China, India, Malaysia, Russia, and the European Union are also noted for the production of round-wood forest products. Landscape degradation, evasive desertification mostly due to climate change are some of the environmental crisis that has subjected the rainforest of Africa to strong and diverse pressures.

Today, the rising demand for environmental assets as a consequence of human disruption impacts, and frequently interrupts Africa's renewal mechanism, resulting in the rapid spread of secondary forests in the forest zone of West Africa (FAO, 2006; PÉREZ-IZQUIERDO et al, 2018). FAO opined that secondary woodlands accounted for 98%, 96%, and 95% of total forest cover in Guinea, Liberia, and Benin, respectively, in 2005 Africa (FAO, 2006). Many countries, on the other hand, have implemented legislation prohibiting log export to stimulate domestic processing and value-adding. The wood trade in Western Africa is influenced by local, regional, and worldwide demand, with Europe being an important market for the region's top producers. However, due to log export bans, most West African countries have rendered the trade in timber resources illegal. Low-cost hectic and poor timber lumbering for building and joinery are in high demand in the region, with regional markets giving an additional incentive for unlawful axe harvesting. This research looks at African forestry and forest products in terms of both timber and non-wood forest resources in West Africa. Wood harvesting and processing in West Africa, wood as a primary source of energy in Africa, non-wood paper manufacturing trade in Africa, exportation and customs procedures in West Africa, and the role of natural vegetation decision-makers in a low-carbon economy transition in the sub-region are among the issues discussed.

THE REVIEW OF FOREST PRODUCTS IN AFRICA

Africa's forest and wooded land cover 680 million hectares, and almost 400 million hectares, respectively, accounting for approximately 45% of the region's total surface area (FAO, 2010; JOHNSON et al, 2010). Humid subtropical rainforests in West Africa, drought-prone forests in Sub-Saharan Africa, along with the Miombo woods of Tanzania and Mozambique, and Mediterranean forests and woodlands in North Africa are also included (BLACKIE et al, 2014; - PORTILLO-QUINTERO, et al, 2015).

FOREST PRODUCTS STRATEGIES

This review examines the different strategies which the Continent's reserves are presently used to aid prosperity. It evaluates future demand patterns for forest goods and services, as well as the implications for forest resources, to highlight the key threats to the protection and conservation basis upon which the green growth initiatives rely (BLACKIE et al, 2014).

HARVESTING AND PROCESSING OF WOOD

From substantial global firms to small and midsize enterprises and unofficial operations, Africa's wood harvesting and processing sectors have it all. The formal wood harvesting and processing industry generates around US\$17 billion per year and contributes to a little less than 2% of Africa's GDP (FAO, 2006). Forestry and logging activities have contributed to less than two-thirds of Africa's GDP through recent years, with timber processing – sawn wood, wood-based panels, and paper production – accounting for less than a third. Approximately 700 thousand people or 0.28% of the total work in the organized economy. While the value of the formal forest sector's production in Africa has grown from the 1990s, its relative monetary importance in African economies has fallen, owing to the growth of some of the other industries such as resource exploitation. In the 1990s, the official timber industry provided 2.0% of Africa's gross domestic product (2.5% in the region), but by 2006, it had dropped to 1.3%, and by 2011, it had dropped to 0.9% (SCHMIDT, 2020). Nonetheless, there is significant regional heterogeneity, with the contribution to GDP in Liberia reaching 15% (HASSELBERG et al, 2020, GUTTAL, 2021), and the formal forest industry in Cameroon contributing more to GDP and state income in 2008-2010 than the mining sector (RIGGS et al, 2021).

FOREST PRODUCTS AS THE MOSTLY UTILIZED SOURCE OF ENERGY

Rather than lumber, the majority of Africa's round-wood production and consumption (about 95%) is for wood fuel, such as fuel-wood and charcoal. In 2011, 65% of the African population, 82% of rural families, and 48% of city dwellers used wood or charcoal for cooking, according to FAO (FAO, 2006). However, there are concerns about the nature of labour in the wood-fuel business, particularly in the production of charcoal. Because charcoal manufacturing is illegal in many African countries, the majority of the activity occurs behind closed doors, rather than to ensure that those involved in the wood collection and charcoal production are abiding by the regulations.

Since charcoal manufacturing is illegal in many African countries, the majority of the business operates beneath the surface, rather than to verify that those involved in firewood collection and fuelwood are paid fairly and work in safe circumstances (ALFARO et al, 2018; SANTOS et al, 2012). Other social issues include the health implications of interior smoke emitted through the use of fuel-wood and wood chip burners, as well as the substantial measure of the hour's mothers and their kids spend collecting fuelwood (WORLD BANK, 2012; HANCOCK, 2015). Firewood refers to circular wood that is used for frying, warming, or electricity production, as well as wood that is used to make wood chips. The FAO supplied a percentage figure and a description of wood-fuelled vehicles (WORLD BANK, 2012). Wood-fuel figures must be interpreted carefully since several countries regularly report timber and coal output, hence most African countries rely on estimates (ALFARO et al, 2018]. The FAO's estimates of wood, fuel, and charcoal use are based on a statistical model that ties consumption to a variety of factors including demographics, revenue, natural vegetation, gas production, climate, and landmass (FAO, 2006; SULE et al, 2016).

NON-WOOD FOREST PRODUCTS IN AFRICA

Many instance research on various locations seems to have the usefulness of quasi-forest resources, also referred to as non-wood forest products (NWFPs) for people's lives in the region, both sold and unmarketed, including exotic edibles and animal feeds being perhaps the most important applications after fuelwood (SHACKLETON et al, 2010; CHIDUMAYO et al, 2010). NWFPs are commercially important, according to FAO (FAO, 2006), with a total production value of US\$5.3 billion in Africa in 2011, or 0.5% of GDP. These evaluations focused on medicinal plants, as well as a range of meat NWFPs (bush meat and beeswax/honey) and tree NWFPs (obtained from the fruit nuts, organic glue, and synthetic polymers). Regional employment data are rare in the NWFPs (MUIR, 2021; BOURDEAUX et al, 2003). On the other hand, case studies of individual products can shed light on the relevance of NWFPs (SULE et al, 2016).

A production process for *Prunus Africana*, whose bark is an essential commodity for pharmaceutical companies, exists in Cameroon, involved in at least 65,000 people in communities with

community forests, plus individuals with plantations, approximately five hundred harvesters, ten exploitation permit-holding small-scale enterprises, and approximately five exporting enterprises (INGRAM et al, 2007). Although commercialized NWFPs could provide money and jobs for the local population, they face the same difficulties as wood fuel in terms of exploitative labour conditions and low collector returns. In some cases, this is due to illegal and indiscriminate harvesting, misuse, and abuse, while in others, it is due to collectors' absence of expertise and bargaining ability (SHACKLETON et al, 2010; CHIDUMAYO et al, 2010) (see Figures 1; a-d).



Figure 1 - Figure 1. (a) Illegal harvest of wood products in South-west Nigeria. (b) Illegal harvest (sawn into regular sizes for easy carriage) of wood products in South-west Nigeria. (c) Trucks transporting illegally harvested wood products to the capital city of Bangui in the Central African Republic (CAR) (ALMOND et al, 2020). (d) The illegally harvested wood products are now ready to be taken to the carpenters for further action (SHAFFER, 2020; ALMOND et al, 2020).

THE SHIFT OF FOREST PRODUCTS THROUGHOUT THE SUB-REGION

Plywood via Ghana to Benin, Nigeria, and Togo, sawn-timber from the Ivory Coast through Ghana towards the Sahel, logs for plywood from Cameroon to northern Nigerian states, and logs and hardwood from Cameroon to northern Nigerian states. Timbers from Guinea Conakry and Liberia to Ivory Coast, sawn-timber from Sierra Leone to Guinea Conakry, sawn-timber from Ghana and Nigeria to Benin and Togo, sawn-timber from Nigeria and Ghana to Benin and Togo, sawn-timber from Nigeria and Ghana to Benin and Togo, hardwood from Nigeria and Ghana to Benin (JEKAYINFA et al, 2020; AIGBODION et al, 2018). European markets, the US, China, and India are all key destinations for wood exports, with buyers from the latter two countries becoming more active in the region. Customers from India are particularly interested in

Tectona grandis, sawn-timber and poles, while Chinese consumers are interested in a variety of trees, notably false-teak, as well as *Triplochiton scleroxylon*, or vene logs and sawn timber (AIGBODION et al, 2018; OWUSU et al, 2018).

TRENDS IN WOOD PRODUCTS PRODUCTION IN NIGERIA

In Nigeria, there are limited accurate estimates of output for wood and non-wood forest products (AJEWOLE, 2009). Popoola (2020), on the other hand, estimated that Nigeria's industrial round and woodfuel removals were worth US\$124 million and US\$456 million, respectively. This emphasizes the significance of wood fuel in the country's household cooking energy sources. It also raises concerns about the necessity to focus purposeful efforts at both the government and private sector levels on the creation of fuelwood species plantings. It enables public-private partnerships in forest management. Private woodlots for fuelwood production are already in place at companies like the British-America Tobacco Company (BAT). The government might work with such groups by offering them advantages such as easy access to land, tax breaks, and technical assistance (POPOOLA et al, 2020).

Fuel-wood use is anticipated to fall in absolute and per capita terms (POPOOLA et al, 2020). As living standards rise, this reflects a well-established and universal trend for more efficient and convenient fuels to replace fuelwood. With the decline in per capita GDP and the lack of alternative domestic fuels, this trend may not continue, and more people may be forced to rely on fuelwood in the future. This may be mitigated by Goal 8 of the SDGs, which focuses on cheap and sustainable energy. Poles, pilings, and posts are all used in construction. In terms of overall consumption, the continuous activities of low artisans trained in carpentry work have increased in the past two decades (see Figure 2), therefore the expected shift implies a minor rise by 2030 (FAO, 2006; SHAFFER, 2020].



Figure 2 - Low skilled workers get trained in carpentry in a wood workshop in the WA Sub-region (FAO, 2006).

Over the next ten years, the demand for plywood will rise at both absolute and per capita levels. The cumulative rate of change in demand is expected to be as high as 217.45%. This is faster than the rate of change in sawn wood demand over time. This confirms previously observed trends in processed forest products. It also reflects the technological advantages of more highly processed materials due to predicted advancements in utilization technology across time. Plywood is predicted to be manufactured in greater numbers as a result of technological advancements and dwindling forest productivity. This

growth in the panel product sector will encroach on the sawn wood business (OWUSU et al, 2018; POPOOLA et al, 2020).

EXPORT AND CUSTOMS PROCEDURES IN WEST AFRICA

Several West African countries have serious implementation issues and large opportunities to defy standards and suggested practices. As a result of the aforementioned conditions, the national availability of cheap and reduced wood and particleboard has increased dramatically. A large portion of that kind of demand would be for West African construction industries, as well as Sahel countries that lack timber and processing firms. Deregulation of wood harvesting, transportation, trade, and industry is aided by the difficulty of implementing control and the popular perception that illegal behaviour is acceptable (KWAWUVI et al, 2021).

TIMBER PRODUCT TRADE AND REGIONAL NEEDS

Genuine domestic demand has gone unsatisfied due to a discrepancy in buying power between domestic and regional markets, as well as the concomitant overconcentration of effort on capitalizing on the export trade's potential. As a result, home markets in rapidly urbanizing countries such as Togo, Ghana, The Gambia, The Federal Republic of Nigeria, particularly civil war-ravaged Sierra Leone, and Liberia are virtually entirely purchased illegally (AIGBODION et al, 2018; SAMBE et al, 2018).

In Liberia, combining profitable foreign market possibilities with household consumption in a tiny economy with limited demand for goods and services remains a major challenge. A consistent strategy framework is essential to give appropriate information on local, national, and transboundary trade, as well as their effects on the subregion. As a consequence, the forestry sector will benefit from proper evaluation and accountability. To satisfy contemporary demands, the subregional forestry authorities' enforcement, negotiation, information generation, and sharing abilities must be upgraded.

Tight government regulations across the woodland, underpinned through its position as a critical national asset, must give way to opportunity techniques that promote a steady flow of wood, forest resources, and commodities while transferring responsibility to communities and landowners.

MANAGEMENT AND USE OF FORESTS IN WEST AFRICA

Merely three of the selected Sixteen West African countries provided information upon that nature reserve encompassed by a regular, formally recognized forest service and management program. Of these countries, Benin-Togo had the least percentage (2.1%) while Côte d'Ivoire seemed to have the most (19%). According to Nigerian statistics, the management plan covers approximately 850 000 hectares (approximately 10%) of the country's natural forest (lowland rain forests alone). Natural forest harvesting and management have a long history in the humid region of West Africa. Several alternative subtropical conservation agriculture systems (e.g., a tropical hardwood, altered sampling) have been investigated, mostly in the background to improve production (FAO, 2006).

For both ecological and management reasons, these silvicultural practices have not always been effective (FAO, 2006). Government forestry agencies oversee the right to utilize timber in all nations in the sub-region of tropical humid forests. Regulations outline the logging techniques and systems that are most suitable. The government grants private timber businesses or individual concessions and issues contracts outlining the restrictions and procedures to be followed, which may include restocking and postharvest activities in some situations. However, due to a lack of resources, official monitoring and control are frequently insufficient. Agreements and contracts are in place for forest plantations to control their utilization and avoid disputes (FAO, 2006; INGRAM et al, 2007).

The existing literature did not identify the peculiarity of each West African country as it affects their ecosystem services and rural/urban air quality. However, it is noteworthy in this study that each of the identified countries (RIGGS et al, 2021) grossly have diverse and unique ecosystem services predominantly and justifiably situated, which have been degraded and lost due to so many forest issues-soil erosion, desertification, scarcity of freshwater resources, forest encroachment, and degradation. This will help further scientific studies in the area of calculating the carbon storage and carbon sequestration

capabilities of the available forests in the WA region with emphasis on each of the 16 selected.

STUDY AREA: WEST AFRICA SUB-REGION

The word "West Africa" does not have a universal definition. As defined by the General Assembly of the United Nations, West Africa is the continent's westernmost region, consisting of 16 state countries and with a total area of little over 6 million km². It has boundaries with North Africa to the north and Central Africa to the southeast. West Africa runs through Mauritania throughout the northwest to Nigeria, mostly in the southeastern wing, like a belt. The nations along the Atlantic Ocean's shoreline are all lined with forest and trades infrastructure that allows for the exports and imports of forest products, timber, and commodity items both within Africa and to other continents of the world as shown in Figure 3 is the map of West Africa depicting forest product trades in and out of the sub-region.



Figure 3 - Map of Africa showing the wood products trade within the West Africa Sub-region. Note the directional signs- the blue arrows show the interregional trade mostly going up from the down below in an upward direction, while the red arrows show the intercontinental trade through the Atlantic Ocean-Gulf of Guinea and the green dots shows the dominance of forest products in the WA Sub-region.

The West Africa subregion also enjoys both the export and import trades of forest and non-forest products. The map (Figure 3 above) reveals the trade of forest products within West Africa and other countries as shown by the directional signs showing forest products leaving the borders of the selected countries into other countries (the blue arrows showing the interregional trade mostly going up to the Northern and Central Africa Sub-regions from the down below in an upward direction, while the red arrows showing the intercontinental trades through the Atlantic Ocean-Gulf of Guinea and the green dots shows the dominance of forest products in the WA sub-region). In certain FAO publications, the Sahelian nations of Burkina Faso, Mali, Mauretania, and Niger are classified as North Africa rather than West Africa in the Global Forest Resources Assessment (FAO, 2006; FAO, 2010). West Africa is made up of 16 countries that stretch first from the West Sahel-savannah zone to the Guinea-Congolese zone in the southeast, divided by a climatic gradient. The WA sub-region tropical wet forests, dry forests, and

savannah support a huge and broad range of natural flora and rich forest biodiversity.

Tropical rain forests form a swath from Sierra Leone's eastern border to Ghana's. They span from eastern Benin to southern Nigeria as they scatter progressively along the River Volta. Woodlands may also be found in arid climates (tree and shrub savannah, parklands, and bush fallows). The Sahel's transition zones, as well as the regional centre of Sudanese endemism, correspond to the dry portions of West Africa (BELLEFONTAINE, 2000; LARIVIÈRE et al, 1996). The humid zones of the Guinea-Congolese endemism core are included (LARIVIÈRE et al, 1996). Two notable countries, namely; The Gambia and Guinea-Bissau, on the other hand, are West Africa's smallest, however, most densely forested countries (MOLINA-FLORES et al, 2020).

METHODS

This review study did an exploratory literature review of the Forestry and Forest Products Trade and Production considering the sixteen (16) countries West African sub-region in Africa (Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo). Within the worldview of the other subregions like; Northern Africa (Algeria, Egypt, Libyan Arab Jamahiriya, Morocco, Sudan, Tunisia), Eastern Africa (Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, Uganda), Central Africa (Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Sao Tomé and Príncipe), Southern Africa (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, United Republic of Tanzania, Cairo, Zambia, Zimbabwe) and The Western Indian Ocean Islands (Comoros, Madagascar, Mauritius, Seychelles). While emphasizing on the Forestry and Forest Products in Africa- the Case of Wood and Non-wood Forest Products in West Africa. This review affirms considering some of the basic objective analysis (Table 1) and the importance of wood in our homes, offices, shopping malls, and many other public facilities use cannot be ignored or put aside.

S- Strengths
1. Sustainable job creation for the youth and energetic young adults. 2. Large international trade. 3. Existence of policies for forest planning and management. 4. Users' dependence on forest products and forest resources' daily use. 5. Adequate natural forests and non-forest products within the subregion.
W- Weaknesses
1. Highly reduced production capacity of the natural reserves. 2. The state government owns the land and the forest. 3. Infant saw-millers are most common around. 4. The technology deployed in most cases is very low. 5. The government and individuals also invest very low into it. 6. Extant National Forest Policy has yet to be backed by any law.
O- Opportunities
1. Constant improvement in the production of forest products. 2. Source of income for the host communities. 3. Strengthening of forest laws in favour of better forest management policies and laws is promoted.
T- Threats
1. Threatened and low level of forest infrastructure. 2. The limited number of industries around. 3. The lack of synergy between many sectors in the industry. 4. The lack of healthy production competition of the products. 5. Corruption and poverty are major setbacks for nations around the subregion.

Table 1- Table showing the SWOT Analysis of the Wood Products and Non-wood Products in the West-Africa Sub-region.

Table 1 explains the SWOT Assessment (Strengths, Weakness, Opportunities, and Threats) of the Sub-region as it relates to the Forestry and Forest Products Trade in Africa.

THE VARIANCE OF FOREST RESOURCES IN WEST AFRICA

The quality of forest resource knowledge and information differs by nation, according to this evaluation, which looks at a lot of literature. In most West African countries, data and statistics on forest resources and regions are obsolete, inaccurate, or incomplete. Some countries performed national evaluations of their natural forests in the 1990s (countries like Nigeria, Ghana, Benin, Burkina Faso, Guinea-Bissau, and The Gambia). Other West African countries had already completed national forest assessments (Senegal, 1985; Sierra Leone, 1986; Chad, 1988; Togo, 1975; Liberia, 1981). As a result, the forest areas presented (in Table 2) for numerous West African countries are based on literature-based national expert estimates.

No	Country	Total Surface Area (Ha)	Natural Forest	Forest issues
1	The Federal Republic of Nigeria	91, 077 ha	12, 824 ha	Deforestation, desertification, Second largest swamp forest on the Continent (after Congolian swamp forest).
2	Islamic Republic of Mauritania	102, 522 ha	293 ha	Soil erosion, desertification, scarcity of freshwater resources, forest degradation.
3	Republic of Benin	11,063 ha	2,538 ha	Rainforest destruction. In the north, it is prone to drought. Degradation of the environment protected regions' long-term viability, biodiversity is abundant.
4	Burkina Faso	27,360 ha	7,023 ha	Deforestation due to agricultural . Expansion, loss of natural habitats
5	Republic of Cabo Verde	433 ha	85 ha	Continuous soil erosion, desertification in some parts of the island, government effort on afforestation.
6	Republic of Côte d'Ivoire	31,800 ha	6,933 ha	Habitat destruction, soil degradation, and the largest global intact natural forest land area
7	Republic of Ghana	22,754 ha	6,259 ha	Deforestation due to farming, urbanization, and mining activities.
8	Republic of Guinea	24,572 ha	6,904 ha	Deforestation due to farming, urbanization, and mining activities.
9	Republic of Guinea-Bissau	3,612 ha	2,186 ha	Deforestation due to farming, urbanization, and mining activities.
10	Republic of Liberia	11,137 ha	3,363 ha	Has the largest forest reserve in West Africa, with high deforestation, poaching and mining activities. Bush burning due to farm activities.
11	Republic of Mali	122,019 ha	13,172 ha	Deforestation due to farming, urbanization, and mining activities.
12	Republic of Niger	126,670 ha	1,256 ha	Desertification, Land degradation, afforestation of agricultural land.
13	Republic of Senegal	19,252 ha	5,942 ha	Large forest areas, High Deforestation, and continuous Desertification.
14	Republic of Sierra Leone	7,162 ha	1,049 ha	Large forest areas, High Deforestation, and continuous Desertification.
15	Republic of The Gambia	1,290 ha	479 ha	Desertification, Land degradation, afforestation of agricultural land.
16	Togolese Republic	5,439 ha	472 ha	High rate of human farm activities, Desertification, soil degradation, afforestation of agricultural land.
	Total	733,359 ha	83,369 ha	

Table 2 - Table showing the total surface area and natural surface distribution of the Sixteen Countries in West Africa. Source: Partly adapted and modified from Landscapes of West Africa – A Window to a Changing World. U.S. Geological Survey (SHAFFER, 2020).

Table 2 shows that the total volume of West African forests is expected to be roughly 5.2 billion cubic meters overtime or around 12% of the total volume of African forests. The bulk of countries' estimates of volume and biomass is based on recent forestry surveys.

The wood and non-wood products production capacity and consumption rate of the countries in the sub-region varies accordingly as illustrated using the matrix in Tables 3 and 4. Depending on rainfall and plant species, the natural landscape in Western Africa is expected to yield between 0.2 and 3.0 m³ per hectare per year. (BELLEFONTAINE, 2000).

Timber and Wood Products	Production Capacity	Producers	Largest producer
Wood Raw Material	*****	Nigeria, Côte d'Ivoire, Ghana, Senegal, Guinea, Cameroon	Nigeria- Country holds a species with a range size >12, 000ha
Sawn Softwood	*	Côte d'Ivoire, Nigeria, Ghana, Liberia	Côte d'Ivoire- Country holds a species with a range size >6,000ha
Sawn Hardwood	*****	Nigeria, Côte d'Ivoire, Ghana, Senegal, Guinea	All
Wood-based Panels	*****	Nigeria, Côte d'Ivoire, Ghana, Liberia	All
Paper, Paperboard, and Wood Pulp	*****	Mali, Ghana, Nigeria	Mali- Country holds a species with a range size >13,000 ha
Rattan, Cane, and Raphia	**	All 16 WA Countries	All
Fuelwood	*****	All 16 WA Countries	Nigeria
Bamboo	***	Nigeria, Côte d'Ivoire, Ghana, Liberia	All
Fibres	***	Nigeria, Côte d'Ivoire, Ghana, Senegal, Guinea	All

Table 3 -Table showing the production capacity evaluation of the Wood Forest Products. Note the matrix used to assign priority scores to species-site combinations 4*(Most Adequate), 3*(Adequate), 2*(Fairly Adequate), 1*(Inadequate), 0 (Not Available).WA- West Africa. > Greater than, < Less than.

Indeed, the dispersed forest cover of most West African countries helps make such resources incredibly useful, especially in arid zones where a significant share of fuelwood is obtained outside the forest. The number of dry zones and scattered forests across farm areas contributes to roughly 35% of Burkina Faso's forest products and 20% of The Gambia's. Several non-governmental groups are trying to guarantee that biodiversity in protected areas is preserved for a longer period [8]. West Africa includes roughly 130 officially preserved places, according to the opinion of the World Conservation Monitoring Centre in 1997 (FAO, 2010; MOLINA-FLORES et al, 2020).

Plant Products			
Plant Products	Production Capacity	Producers	Largest producers
Food products	****	All 16 WA Countries	All
Fodders	****	All 16 WA Countries	All
Fruits	****	All 16 WA Countries	All
Ornamental flowers	****	All 16 WA Countries	Nigeria
Utensils	****	All 16 WA Countries	The Gambia
Handicrafts,	****	All 16 WA Countries	Ghana
Construction materials (Thatch)	****	All 16 WA Countries	Nigeria (Northern Nigeria in particular)
Dying and tanning	***	Nigeria, Ghana	Nigeria
Perfumes, cosmetics	**	All 16 WA Countries	All
Mushroom	****	All 16 WA Countries	All
Palm Wine	****	All 16 WA Countries	Nigeria
Palm Oil	****	All 16 WA Countries	Nigeria
Medicinal plants	****	All 16 WA Countries	Ghana & Nigeria
Cola Nuts	***	All 16 WA Countries	Nigeria
Animal Products			
Living animals	****	All 16 WA Countries	All
Honey	****	All 16 WA Countries	Nigeria
Beeswax	**	All 16 WA Countries	Cameroun
Bushmeat	****	All 16 WA Countries	All
Hides and Skins	****	All 16 WA Countries	All
Medicines	****	All 16 WA Countries	All
Colourants	****	All 16 WA Countries	Nigeria

Table 4 - Table showing the production capacity evaluation of Non-wood Forest Products. Note the matrix used to assign priority scores to species- site combinations 4*(Most Adequate), 3*(Adequate), 2*(Fairly Adequate), 1*(Inadequate), 0 (Not Available).WA- West Africa. > Greater than, < Less than.

Countries ^{xx}	Wood forest products	Non-wood forest products (Plant products)	Non-wood forest products (Animal products)	Remarks (on the forest rating of 2,000 ha)
Federal Republic of Nigeria	****	****	****	Wood Forest products > 2000 ha. <i>Mostly adequate</i>
Islamic Republic of Mauritania	***	***	***	Wood Forest products < 2000 ha. <i>Generally adequate</i>
Republic of Benin	***	***	***	Wood Forest products > 2000 ha. <i>Generally adequate</i>
Burkina Faso	*	*	*	Wood Forest products > 2000 ha. <i>Generally inadequate</i>
Republic of Cabo Verde	*	*	*	Wood Forest products < 2000 ha. <i>Generally inadequate</i>
Republic of Côte d'Ivoire	**	**	**	Wood Forest products > 2000 ha. <i>Fairly adequate</i>
Republic of Ghana	***	***	***	Wood Forest products > 2000 ha. <i>Generally adequate</i>
Republic of Guinea	***	***	***	Wood Forest products > 2000 ha. <i>Generally adequate</i>
Republic of Guinea-Bissau	**	**	**	Wood Forest products > 2000 ha. <i>Fairly adequate</i>
Republic of Liberia	***	***	***	Wood Forest products > 2000 ha. <i>Generally adequate</i>
Republic of Mali	****	****	****	Wood Forest products > 2000 ha. <i>Mostly adequate</i>
Republic of Niger	**	**	**	Wood Forest products < 2000 ha. <i>Fairly inadequate</i>
Republic of Senegal	***	***	***	Wood Forest products > 2000 ha. <i>Generally adequate</i>
Republic of Sierra Leone	***	***	***	Wood Forest products < 2000 ha. <i>Generally adequate</i>
Republic of The Gambia	***	***	***	Wood Forest products < 2000 ha. <i>Generally adequate</i>
Togolese Republic	***	***	***	Wood Forest products < 2000 ha. <i>Generally adequate.</i>

Table 5 - Table showing the checklist of Forest Products in West Africa. Note: 4*(Most Adequate), 3*(Adequate), 2*(Fairly Adequate), 1*(Inadequate), 0 (Not Available). > Greater than, < Less than.

Table 5 reveals the forest rating of the forest products produced (including non-wood forest products- plant and animal products) on an average of 2,000ha within the total land surface area of each of the selected sixteen countries.

The Republic of Mali and the Federal Republic of Nigeria both have the highest production capacity of forest products that are generally adequate for both local use (consumption) and export purposes (for foreign exchange and other commercial purposes).

THE WEST AFRICAN SUB-REGION WOOD PRODUCTION AND TRADE

Africa's agriculture is mostly focused on domestic markets. Africa is also connected to global markets. A few nations have created cash crops (tropical goods) to export outside of Africa, mostly to the European Union, which gives them preferential trade treatment. African nations have been net importers of food and agricultural raw resources over the past two decades. Agriculture commerce in the region: complementarities and integration of Intra-African trade in agricultural and food items are low: about 17% of African nations' overall international commerce was handled at the intra-regional level by the end of the 2000s. These products are also traded locally for home usage and consumption. Cross-border commerce consists of local product flows as well as import/export flows aided by techniques used to get over some nations' prohibitive restrictions on imports from the international market.

GOVERNMENT LEGISLATION, POLICY, AND MARKET FAILURES

Other than wood fuel, non-wood forest resources provide a substantial portion towards the economy, accounting for around half of the total generated by wood and fibre production, as well as meeting critical basic requirements in hunger, healthcare, and society. Forests are rarely handled effectively, and deforestation and forest degradation are common occurrences. Forests provide regulatory, sustaining, and sociocultural environmental impacts that are essential for healthy well-being and lie at the heart of a range of development industries, however, they are underreported and hence receive less attention. Given Africa's likely population expansion and projected robust growth, the need for woodland products and services is expected to soar. It is possible that by 2050, wood items will be two to three times what they are now. Collection rates considerably beyond sustainable yield will be necessary to meet such demands from the present natural forest allocated for production, putting more pressure on the forest protection and conservation core, which is often threatened by intensive agriculture.

This might be worsened by localized wood fuel constraints. Even though the planted forest output is likely to continue to rise, this will not be enough to close the supply gap. Meeting demand without considerably increasing import reliance will become increasingly difficult if the forest area's economic base advances to decline as a result of degradation and exploitation. This will almost certainly result in a significantly reduced forest sector, with less employment, a greater reliance on imports, and the replacement of wood with potentially more environmentally damaging items. As harvesting intensity hits critical levels, the result of such an excessive quantity demanded, as well as demands from other sectors, such as agriculture, would jeopardize forests' capacity to provide essential ecological services: the burning of fossil fuels will increase, and diversity will indeed be threatened.

GREEN ECONOMY

Some have been tried in different parts of the sub-region, and they demonstrate how trees may contribute to a green economy revolution. Significant ecological standards of forest conservation that are sustainable (like the sustainable forest management strategies- SFM) may be satisfied both in indigenous and cultivated rainforests, according to interventions targeted at preserving, enhancing, and restoring natural resources. It may be more difficult to manage social relations and provide long-term advantages for local communities. Thus far, the results of interventions have been uneven. It is vital to take classes and make adjustments along the way. New technologies, improved handling and storage methods, and supply chain structure, according to another set of interventions, can considerably increase resource productivity in the plant, wood processing, and coal manufacture, including kitchen ovens. Although this has the potential to reduce pressure on forest resources, achieving high levels of adoption and overcoming budgetary constraints will be difficult.

CONCLUSIONS

Most West African countries have adopted comprehensive forest management strategies that embrace the overall concept of sustainable forest management, or are in the process of doing so. Despite this, some nations lack sufficient technical means to carry out these projects effectively. In general, forestry initiatives are underfunded. As a result, most forestry institutions in West African countries are ill-equipped to carry out their duties. Most of these countries' forest resource data is erroneous, outdated, and in need of updating. Many countries have the administrative and technical capacity to carry out forest planting initiatives. Plantation upkeep and commercialization, on the other hand, are influenced by a lack of financial resources. Forest resources in West Africa are under stress due to a variety of factors, including rapid population growth, economic development, poverty, and regulatory frameworks, and lack of equal enforcement distribution at all administration levels in some countries, lack of adequate information on forests, poor project execution, etc. Failure to recognize native populations' and other local societies' legal rights to their lands can also result in deforestation and continuous exploitation and degradation. This, along with a lack of land protection, often leads to an open access situation where no one or institution is liable for such assets.

Forest degradation and refugee settlement in forested areas have occurred from violence in various West African nations (Nigeria, Liberia, and Sierra Leone). As a result of urban population growth, timber harvesting as forest products, building supplies, and farmland for habitation sometimes leads to deforestation in the immediate area. Deforestation is mostly caused by agribusiness and inefficient agricultural methods (crop rotation and agricultural goods), lumbering (poor extraction practices, weak leasing contracts, etc.), as well as other land-use activities such as urbanization and mineral extraction. Forests in the sub-region have been overharvested for timber.

The replacement of cash crops with tree plantations is one of the leading causes of deforestation in humid forests. Vast areas of rainforests have already been cleared in locations like Côte d'Ivoire for producing cash crops like coffee, sugar trees, and latex. Wildfires are among the most significant challenges to long-term forest planning, preservation, restoration, and management.

Domestic furniture is only one of the items derived from trees that make life on Earth considerably more bearable, according to the conclusion of this article. Abuse of deforestation and forest product exploitation, on the other hand, is highly destructive to the ecosystem while also diminishing the rich biodiversity of West Africa's forests. Regulation, as well as the execution of regulations on the use of forest products, must be tightened and monitored.

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