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## ISSUES AND CHALLENGES OF FORESTS PROTECTING IN SAHEL COUNTRIES

This article considers the main problems contributing to the reduction of forest resources in six Sahelian countries (Burkina Faso, Mali, Mauritania, Niger, Senegal and Chad) that threaten the achievement of their goals of regional stability and socio-economic development. The study finds its interest in the fact that it will make it possible to determine the climatic, energy and security constraints in the preservation of forest species in the Sahel. The methodology was based on carrying out documentary collections and analysis, cartographic analyzes, data processing and analysis. The study revealed that the issues and challenges of protecting forest areas are classified into three categories: climate change, energy issue due to the absence of new and renewable energies, poor coverage of electricity networks, high dependence of Sahelian communities on biomass and conflicts in the Sahel. It is estimated that today more than 65 million people in this region do not have access to electricity, and 90 million still depend on the traditional use of biomass for cooking food. Considering these constraints will make it possible to find solutions to the evils of the Sahel through joint action between States, States and their partners and with communities.

**Key words:** deforestation, Sahel, protection, threats, drought, charcoal production, energy consumption.

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### Сахел елдеріндегі орманды қорғау мәселелері мен қиындықтары

Бұл мақалада аймақтық тұрақтылық пен әлеуметтік-экономикалық даму мақсаттарына қол жеткізуге қауіп төндіретін алты Сахелия еліндегі (Буркина-Фасо, Мали, Мавритания, Нигер, Сенегал және Чад) орман ресурстарының қысқаруына ықпал ететін негізгі проблемалар қарастырылады. Зерттеу Сахелдегі орман түрлерін сақтаудағы климат, энергетика және қауіпсіздік шектеулерін анықтауға мүмкіндік беретіндігімен қызықты. Әдістеме құжаттық жинақтар мен талдауларды жүргізуге, картографиялық талдауларға, деректерді өңдеуге және талдауға негізделген. Зерттеу орман аумақтарын қорғау мәселелері мен қиындықтары үш санатқа жіктелгенін көрсетті: климаттың өзгеруі, жаңа және жаңартылатын энергиялардың болмауына байланысты энергетикалық мәселе, электр желілерінің нашар қамтылуы, Сахалиан қауымдастығының биомассаға жоғары тәуелділігі және аймақтағы қақтығыстар. Бүгінгі таңда бұл аймақта 65 миллионнан астам адамға электр қуаты қолжетімді емес, ал 90 миллион адам әлі күнге дейін тағам дайындау үшін биомассаны дәстүрлі түрде пайдалануға тәуелді. Осы шектеулерді ескеру мемлекеттер, мемлекеттер және олардың серіктестері және қауымдастықтармен бірлескен іс-қимыл арқылы Сахелдің зұлымдықтарын шешуге мүмкіндік береді. Осылайша, ормандарды қалпына келтіру бойынша бірлескен іс-шаралар – Ұлы жасыл қабырға құру, жаңартылатын энергия көздерін танымал ету, зерттеу және ілгерілету және т.б. осы апатты жағдайдан шығудың жалғыз жолы.

**Түйін сөздер:** орманды кесу, Сахел, қорғау, қауіп-қатер, құрғақшылық, көмір өндіру, энергия тұтыну.

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### Проблемы и задачи охраны лесов в странах Сахель

В данной статье рассматриваются основные проблемы, способствующие сокращению лесных ресурсов в шести странах Сахель (Буркина-Фасо, Мали, Мавритания, Нигер, Сенегал и Чад), угрожающие достижению региональной стабильности и целям социально-экономического развития. Исследование представляет интерес в том, что оно позволяет выявить климатические, энергетические и связанные с безопасностью ограничения на сохранение лесных видов в странах Сахель. Методология исследований базировалась на проведении сбора и анализа фондовых материалов, картографических анализов, обработке и анализе данных. Исследование показало, что основные проблемы защиты лесных массивов подразделяются на три категории: изменение климата, энергетические проблемы из-за отсутствия новых и возобновляемых источников энергии, плохое покрытие территорий сетями электроснабжения, высокая зависимость сахелианских сообществ от биомассы и конфликты в Сахель. По оценкам, сегодня более 65 миллионов человек в этом регионе не имеют доступа к электричеству, а 90 миллионов человек по-прежнему зависят от традиционного использования биомассы для приготовления пищи. Принятие во внимание этих ограничений позволит найти решение проблем Сахеля посредством совместных действий между странами, государствами и их партнерами, а также с общинами. Так, совместные действия по восстановлению лесов, созданию великой зеленой стены, популяризации, исследованию и продвижению возобновляемых источников энергии и т.д. являются единственным выходом из этой катастрофической ситуации.

**Ключевые слова:** обезлесение, Сахель, защита, угрозы, засуха, производство древесного угля, энергопотребление.

### Introduction

The new United Nations report on the state of the world's forests describes an alarming situation [1]. Since 1990, the planet has lost 178 million hectares of forests (420 million hectares deforested, partially offset by afforestation and reforestation). Even if, globally, deforestation has slowed down over time, it still contributes to the land degradation, biodiversity loss, climate change, etc. The case of Africa is particularly worrying: over the period 2010-2020, it saw the disappearance each year, on average, of a net area of 3.94 million hectares of forests, a figure that has increased compared to previous decades and much higher than that of South America, 2.60 million hectares [2].

Located in the arid and semi-arid zones of West Africa, the Sahel has been the scene of profound changes for 50 years. Known for the prevalence of land degradation processes at work there, the Sahel suffers from the combined negative effects of population growth, human activities and climate variability resulting in the recurrence of droughts and the continued decline of natural resources and land productivity. While agriculture, livestock and forestry are sources of income and jobs for more than 80% of the population, the overexploitation of natural resources and unsustainable water and agro-sylvo land management practices [3]. Pastoral care threat-

ens the livelihoods and economic development of rural areas. This has direct and persistent impacts on food, water and energy security amplifying social inequalities, conflicts over access to land and resources and migration.

Periodically crossed by severe climatic and humanitarian crises, the Sahel is today seen as a region of poverty, conflict and human insecurity, in the broad sense. These crises have given the image of a problematic Sahel, and not of an area where natural resources are a major asset for inclusive and sustainable social and environmental transformation [4]. In the aftermath of the unprecedented droughts that hit the Sahel region and which led to the fragility of the ecosystem and the degradation of its environment, the States of the region mobilized around major structuring initiatives to deal with this problem situation, including the creation of CILSS in 1973. This is how, for more than 45 years, CILSS and its partners have been working to mitigate the effects of drought and desertification in West Africa and the Sahel [5].

Temperatures are projected to continue to rise faster than the global average. Even though the change in cumulative rainfall could vary from region to region and be uncertain, the Intergovernmental Panel on Climate Change notes that 80% of the models established in this area show that the western Sahel will experience longer periods of drought

over the next 50 years [6]. In addition, heavy precipitation events are expected to become more frequent. In regions plagued by deforestation, this phenomenon will lead to an acceleration of erosion and increase the risk of landslides and floods [7]. Climate change, which is also expected to exert a growing influence on the security of individuals, is to be seen in relation to the dynamics of conflicts in the Sahel. Competition over access to resources is a recurring factor of conflict across the region. In many places in the Sahel, many conflicts between farmers and herders arise from the competitive use of water points from damage caused by animals to crops and trees, especially during transhumance [8].

Aware of the harmful socio-economic impacts, local and regional initiatives have been undertaken to fight against deforestation through reforestation, forest restoration, the multiplication of the status of classified forests for their preservation, the creation of income-generating activities for communities rural and peri-urban, the fight against poaching etc. In addition, our analysis indicated to us that the safeguard of the Sahelian forests will only require a profound reform of the energy policy of the countries concerned, that is to say the promotion of energies other than those derived from wood. This reform can only be done with the help of the international

community. Otherwise, the forest could disappear completely in some countries, like Mauritania and Niger, in less than a generation, and with all the serious environmental consequences which ensue from it such as the acceleration of the processes of desertification and intensification of the process of “wind erosion” [9].

### Materials and methods

The Sahel designates a strip of Africa marking the transition, both floristic and climatic, between the Saharan domain in the north and the savannas of the Sudanese domain, where the rains are substantial, in the south. From west to east, it stretches from the Atlantic to the Red Sea. The definition of the area covered varies greatly according to the authors. Thus, for some, the Sahel includes all the territories bordering the Sahara: there is therefore a northern Sahel and a southern Sahel. The Sahel represented in brown on the map. This is the southern Sahel, that is to say the lands directly south of the Sahara, and including the Cape Verde Islands, between isohyets of 200 to 600 mm of precipitation per year (Figure 1). The methodology was based on carrying out documentary collections and analysis, cartographic analyzes, data processing and analysis.

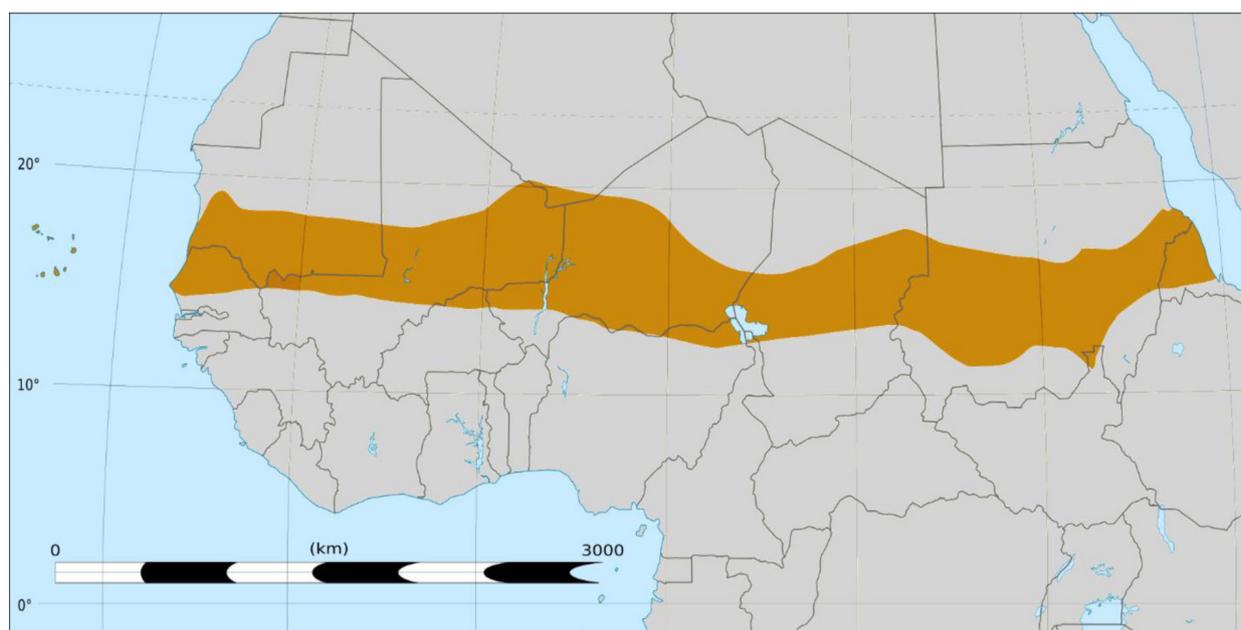


Figure 1 – Map of the location of the Sahel countries [10]

In order to have an overview of all the issues of Sahelian biodiversity, we proceeded with the documentary collection: books, articles, scientific reports, political speeches, press journals and especially reports from AGRHYMET [11], FAO [1], CILLS, etc. The analysis of these documents allowed us to understand the difficulties, issues, perspectives and activities carried out and in progress. The tool was the research work to know the dimensions of deforestation, and its corollary of the desertisation of communities and the impact on their livelihoods, desertification, conflicts around resources by the effects of climate change. We used the geographic maps of the Sahel to better understand the characteristics of this area, its position and the joint projects envisaged to have a common response to the challenges that threaten it. As for the processing, the data obtained were purified and entered into Microsoft Word, the tables and figures drawn up were then commented on.

## Results and discussion

Climate change has its imprint on all resources by their scarcity and their vulnerability throughout the world and in the Sahel in particular by heat waves, floods, famine, diseases, lower flows of hydraulic resources, migration, the infection of all the livelihoods of the communities, the conflict between herders and farmers around water points leads to the destruction of forest resources.

The Sahel is one of the African areas most exposed to the effects of climate change even though it produces only 25 Mt of CO<sub>2</sub>, the equivalent of the city of Paris. Burkina Faso, Mali, Mauritania, Niger, Senegal and Chad form a vast region of 5 million km<sup>2</sup> very diverse geographically [12]. The climate varies from semi-arid to tropical, with average temperatures exceeding 20 °C in January and often above 40 °C in summer. Economic activity and population densities tend to be higher in the coastal regions of Senegal and Mauritania, as well as in major watersheds, especially those of the Senegal and Niger rivers. These geographic disparities are the source of an uneven demographic distribution for example, Mauritania, Mali, Niger and Chad, which

encompass large desert areas, have population densities of less than 20 inhabitants per km<sup>2</sup>. In contrast, Senegal and Burkina Faso, whose territories are relatively smaller, have population densities about four times higher.

The countries of the Sahel face a common problem of increased vulnerability to climate change, even though they are only responsible for a small share of global greenhouse gas emissions [13]. The consequences of climate change are already clearly noticeable and will further threaten the socio-economic development and political stability of the region in the decades to come [12]. In the region, a large part of the population depends on forest resources to supplement their main activity of agriculture, animal husbandry or fishing. While livelihoods based on forest products are not discussed in depth in this article, it is nevertheless important to underline the key role that forests play in the region under consideration.

Thus, firewood, including charcoal, is the main source of energy in the region. In West Africa, fuelwood is estimated to account for 85 percent of total energy consumption. By providing woody fodder with high water content, forests also contribute to the survival of livestock during the dry season [14]. In addition, non-timber forest products are also essential for subsistence and food security. According to FAO [1] this dependence on wood products generally increases when agricultural production is low, during droughts or other natural disasters. Food products such as fruits, roots, leaves and game are traded and consumed locally. Medicinal plants are another important category of non-timber forest products that are traded in rural and urban markets. Likewise, more than 80 percent of the population of Burkina Faso, Ghana, Niger and Nigeria depend on the use of medicinal plants. Finally, some non-wood forest products are increasingly traded internationally, notably shea butter, rattan and gum arabic [12]. The initiatives were taken two decades ago in the Sahel, where the famous project of the “Great Green Wall” was decided in Ndjamena in Chad in 2002 on the occasion of the world day to combat desertification and drought [15].

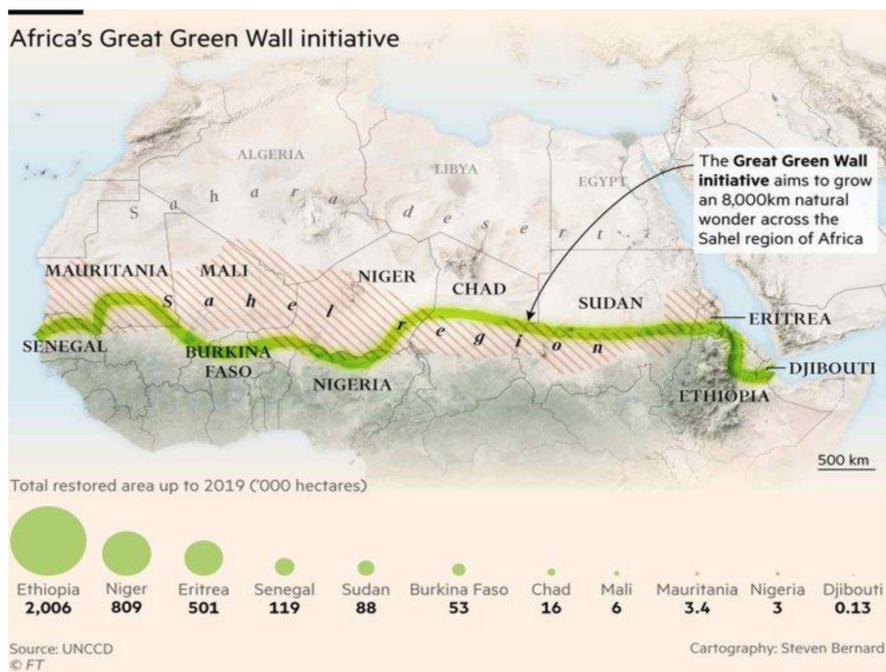
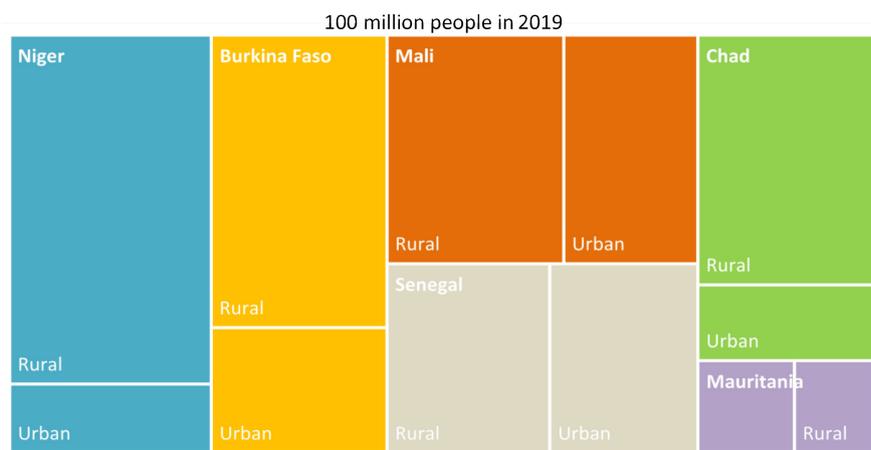


Figure 2 – The “Great Green Wall” project [16]

Burkina Faso, Mali, Mauritania, Niger, Senegal and Chad form a vast region of 5 million km<sup>2</sup> very diverse geographically (Figure 2).

In the Sahel, 90 million people depend on the traditional use of biomass to cook their food, or one-tenth of the 900 million African households without access to clean cooking [17]. In this region and globally, access to clean cooking solutions lags

behind access to electricity. Although all Sahelian countries have implemented programs to improve access to electricity and clean cooking methods and to reduce the traditional use of biomass, national targets have been undermined by demographic growth, which has been faster than providing clean cooking systems to low-income and irregular-income households (Figure 3).



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Source: United Nations, Department of Economic and Social Affairs, Population Division

Figure 3 – The Sahel Population in 2019 [18]

In 2019, the Sahel was home to 100 million people, a population that had doubled in the previous

two decades and now represents 9% of Sub-Saharan Africa's population (Table 1).

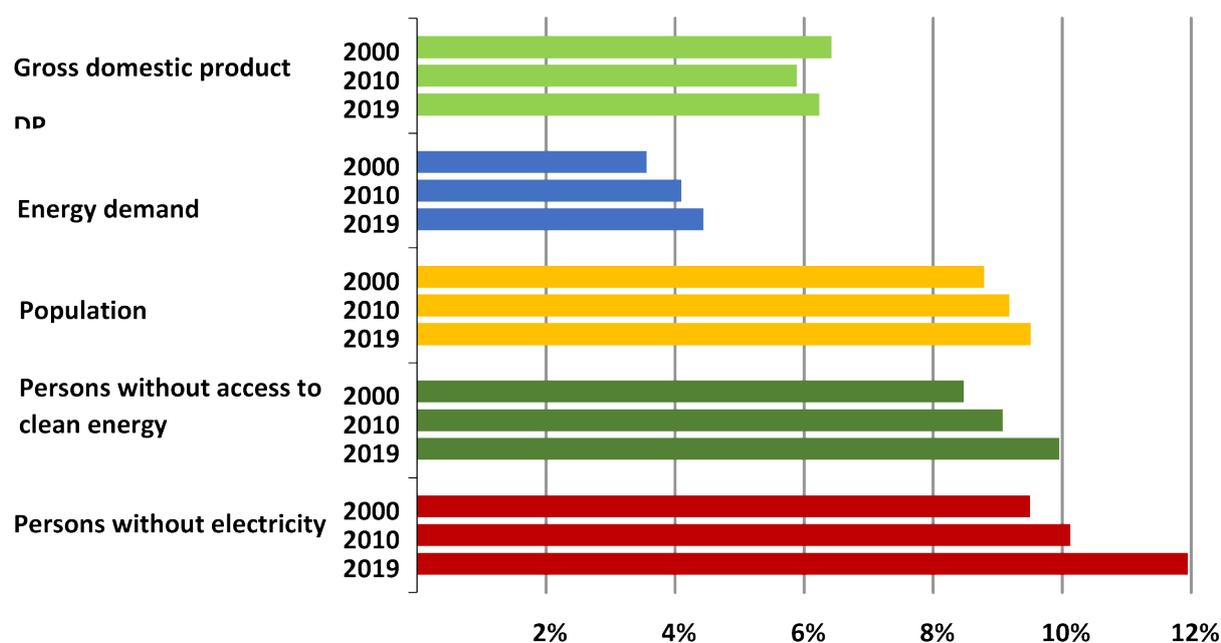
**Table 1.** Population assumptions in the Sahel countries [19]

Country	Total population (millions)			2019-2030	
	2000	2019	2030	Delta (million)	CAAGR, %
Burkina Faso	12	20	27	7	2,8
Chad	8	16	22	6	2,8
Mali	11	20	27	7	2,9
Mauritania	3	5	6	1	2,5
Niger	11	23	35	12	3,7
Senegal	10	16	22	5	2,6
SAHEL	55	100	138	38	3,0

Note: CAAGR is compound average annual growth rate

This demographic explosion has and always will have serious impacts on wood resources given that modern energy poverty coupled with monetary poverty crowned by the scarcity of forest resources is unequivocally an almost inextricable situation in the absence of new and renewable clean energies despite the abundance of fossil and natural energies in the Sahel. In the Sahel, the prosperity of tomorrow will depend on energy development. The six Sahe-

lian countries studied in this article (Burkina Faso, Mali, Mauritania, Niger, Senegal and Chad) face energy obstacles which compromise the achievement of their objectives of regional stability and socio-economic development. It is estimated that more than 65 million people in this region do not have access to electricity, and 90 million still depend on the traditional use of biomass for cooking food (Figure 4).



**Figure 4 –** Need for energy in the Sahel countries [12]

Here we see (Figure 4) that the Sahel countries lack electricity with more than 65/100 million people and those who do not have clean energy to face the challenges of the moment. Although the gross domestic product is quite large, demand for energy remains strong in the Sahel. While waiting to find a solution for the popularization of clean energies, the pressures on biomass remain very strong and certainly lead to deforestation.

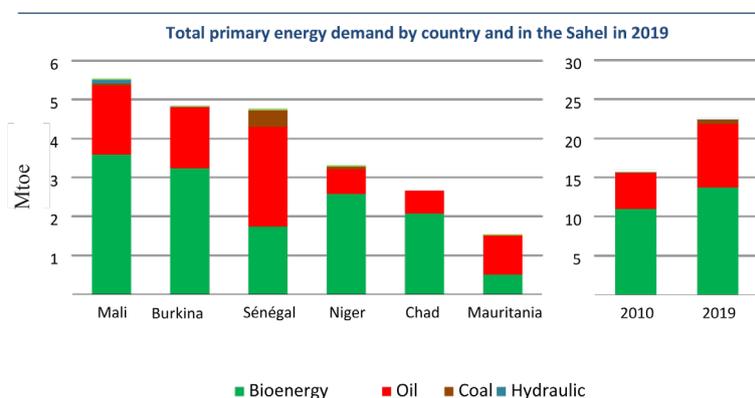
The demand for coal and natural gas is only beginning to emerge but has doubled in less than ten years. This population explosion with the highest birth rate in the world and the strong demand for energy is exploding especially among women. Women tend to be hit hardest by lack of access to electricity and clean cooking systems, and often pay the price in their health, well-being and the time they have available. Women and children are in charge of collecting firewood on a daily basis, a task that can take up to 10 hours per week [12]. Increasingly long distances must often be traveled due to deforestation and the lack of wood. In countries in conflict, women who leave their localities or refugee camps to collect fuel are also at risk of physical assault. According to surveys carried out in Chad by the UNHCR of households with refugee status, almost two-thirds of gender-based attacks were committed during the collection of firewood [20]. Gender mainstreaming in energy access issues is essential for the achievement of SDG 7. Women play a major role in improving access to electricity and to clean cooking in their homes and communities. They occupy a central place in the value chain, from the manufacture and distribution of products to entrepreneurial and leadership roles. Women are responsible for providing their families with firewood. With the degradation

of the vegetation, they had to travel several kilometers on foot or on donkeys and thus devote several hours to this chore.

In Burkina Faso, given that less than 10% of the population has access to energy sources other than fuelwood, nearly 250 000 hectares of forests are cleared annually to meet fuelwood needs and 75 000 additional hectares are converted into new fields [21]. This trend is still increasing at the same time, only 1000 hectares are reforested. For several years now, in Burkina Faso, forest restoration projects have been funded by partners [22].

In Niger, wood resources constitute the main energy resource of the country (at least 90% of the national energy need). Natural forest formations provide about 87% of the population's energy needs. Energy biomass (wood and charcoal) also plays a major role (around 60%) in the consumption of Senegalese households to the detriment of increasingly scarce wood resources. It is estimated that more than 60% of mangroves and alluvial forests have thus disappeared since 1970 [23].

Today, wood and its derivative, charcoal, still meet between 60% (Senegal) and at least 80% (Niger, Mali) of the energy needs of the rural and urban population. The use of gas, electricity and renewable energies such as solar and wind power is still too expensive today [24]. Wood, within easy reach, therefore remains the main source of energy. The consumption of wood for cooking or lumber for construction is considered a major cause of deforestation in the Sahel and is seen by some authors as the most worrying and alarming of anthropogenic causes [25]. The demand for coal and natural gas is only beginning to emerge but has doubled in less than ten years.



Note: Mtoemillion tonnes of oil equivalent

Figure 5 – Total primary energy demand by country and in the Sahel in 2019 [12]

Based on this diagram (Figure 5), it can be said that the demand for green energy, which also includes the use of wood, has significantly increased from 2010 to 2019 in the countries of the Sahel. In the Sahel, the use of gas, electricity and renewable energies such as solar and wind power is very expensive. It's a luxury for the Sahelians. Over the last two decades, primary energy demand in the six Sahelian countries has grown by more than 4%, and stands at 950 PJ (Petajoule).

## Conclusion

The Sahel States which are experiencing a series of multifaceted crimes, given the precariousness of these States, monetary poverty and their dependence on external aid are unable to cope with the challenges of deforestation. The dependence of rural

and urban communities on biomass, the low coverage of electricity, the absence of new and renewable energies coupled with the demographic explosion presage the strong pressure of forest resources in the decades to come. The scarcity of hydraulic and forestry resources is causing conflicts between communities (pastoralists, agriculture) to appear around scarce resources, due in large part to the effects of climate change. Hence the urgent need to respond with adaptation and mitigation measures, also taking into account traditional knowledge against this scourge. Beyond joint actions for reforestation, the creation of the great green wall, defense actions against armed groups in the forests of the Sahel, popularization, research and the promotion of renewable energies and the creation of creative activities income is in part the only way out of this calamitous situation.

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