

THE IMPACTS OF UTILIZATION OF NATURAL RESOURCES AND CLIMATE CHANGE IN SUDAN

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ABSTRACT

This research aims to review impacts of the utilization of natural resources and climate change in Sudan. The utilization of natural resources brought power to the Sudanese State; however, produced patterns of disparate development that initiated social unrest, environmental degradation, and armed conflicts powered by the concept of center-periphery. They formed also, external threats to the Sudanese State whereby initiating foreign integrated strategies to weaken Sudan to benefit from its richness of natural resources. America's theory of creative chaos has been operating in Darfur since 2003, and before that the Israeli's role in secession of Southern Sudan. The Nile River became a source of political tensions between Sudan and its neighbors. Climate changes in Sudan caused deterioration of millions of hectares of arable land and fertile soils; loss of biodiversity; changes; scarcity of tree products; deterioration of Gum Arabic production; general deterioration in the natural production base and in the renewal of natural resources; deterioration in the irrigation systems; and the expansion of the desert's environment. Sudan needs national plans to suppress impacts of the utilization of natural resources and climate change through effective national plans and effective membership in the international action systems combating climate change.

KEYWORDS: *state power, natural resources, internal threats, external threats, climate change, environmental degradation*

1- INTRODUCTION

Sudan has a distinct and spatially diverse physical geography due to its geological history and wide geographical extension. This provides a wide range of natural resources, making it one of the richest countries in the world by natural resources, providing the power of the Sudanese State and a basis for utilization for spatial and human development. However, these natural resources brought about serious problems to the Sudanese State due to colonial and post-colonial utilization policies, and foreign powers who were eager enough to control and obtain them at the lowest prices.

Most of Sudan's territory is located within the arid and semi-arid regions of tropical Africa, where the humid part lost most of its area after the secession of South Sudan in 2011 AD. The global climate has witnessed clear climatic changes in recent decades as a result of many reasons related to industrial progress and population increase, which has had a negative impact on many parts of the world, including the areas in which Sudan is geographically located. Climate change brought about serious problems to the Sudanese State. This research aims to review Sudan's central problems related to the utilization of natural resources and the impacts of climate change.

2- THE IMPACTS OF THE UTILIZATION OF NATURAL RESOURCES

The sharp geographic variations of natural resources determined development efforts to emphasize where. The development efforts during the British colonial period (1898-1956), and subsequent national governments centered around central Sudan where there are abundant Nile waters and fertile soils. They have high potential in agricultural and livestock production in addition to water sustainability compared to the regions of western and eastern Sudan and the far north of Sudan. This resulted in a pattern of polarized type of development. Here, the Gezira scheme played a paradoxical role in the capitalist transformation of Sudan, as it worked to strengthen non-capitalist production relations and develop marginal capitalism (Tony et al., 1991).

The areas previously developed by colonialism continued to attract agricultural production, industries, and urban growth, which led to its continuation as the heartland region of Sudan. The mudflats of central Sudan were imposed as a core region, it created a state of organized dependence on its margins through the construction of institutions in the marginal regions governed by the authorities of the core region (Friedmann, 1966).

There were some axes of development efforts to the east and a few to the west and South Sudan where traditional rain-fed agriculture was widely practiced and depended solely on rainfall. The sector of traditional rain-fed for self-sufficiency did not receive as much as it did the modern agricultural sector. They formed margins that produced manpower for the core regions in central Sudan. These margins are exposed to strong negative forces aimed at countering the trickle-down effects of economic growth so that the balance of this group of forces increases the process of regional imbalance. Likewise, centrifugal forces and the failure of businesses to realize investment opportunities at the margins lead to negative effects of industrial development to expand the regional imbalance in Sudan.

The traditional agriculture sector suffered problems of poverty and food insecurity. The deterioration of traditional agriculture and income distribution is considered one of the most important causes of the food deficit in Kordofan and Darfur (World Bank, 1990). Despite the efforts made to reduce poverty in Sudan, it is still widespread (Abdelmawla, 2014), showing a pattern characterized by unidimensional and low multidimensional occurrences for both children and adults. This pattern indicates that Khartoum is the least poor, while North Darfur and Warab states are the poorest. While the level of poverty increased, its severity decreased in the period 1978-1980 compared to the period 1967-68 and it was predicted to increase (Farah et al., 1995).

Tribal unrest and ethnic and armed rebels developed in the neglected areas, fueled by the deeply rooted center-periphery concept. Over time, a systematic, gradual change in the nature of the conflict occurred from the traditional form of tribal and ethnic nature to one over resources. The role of resources increased with the worsening of the economic crisis, as it emerged as an influential force in the civil war in Sudan (Suliman, 1977). There are hidden dimensions to the issue of South Sudan, among which is intense conflict over diminishing resources among ethnic groups in different parts of Sudan (Kok, 1996).

The conflict in Darfur is considered an ecological conflict in origin, based on competition over natural resources. It is associated with environmental scarcity of renewable resources, particularly water resources, as elsewhere in the developing world (Suliman, et al., 2005). Generally, the conflict on water resources in Sudan took the forms of conflict around the transboundary waters of the Nile, around the connections between internal resource scarcity and civil conflict, and around the impacts of internal conflict on water abundance and development (Selby, 2014). There is only limited evidence to support the first two connections, but there is strong evidence confirming that the effects of water abundance, social economic development processes, and internal colonization related to state-directed water have violent repercussions (Selby, 2014).

In the issue of natural resources, the revolutionary government in Sudan in 1989, considered a vision of authoritarian modernization, where water and agriculture have become essential pillars of state-building projects (Verhoeven, 2015). The Sudanese economy benefited from the oil sector, but this was accompanied by a depletion of resources in a way that differs from what happened in previous periods of Sudan's history, within the framework of the opportunities that oil revenues provide to the ruling elite in Sudan (Large, 2007).

Sudan has been facing elaborated and integrated strategies to weaken it in preparation for the passage of foreign agendas and interests to benefit its richness of natural resources. These included inciting strife, unilateral sanctions, the debt trap, the political agenda of international institutions, and creating repeated crises (Abu Saleh, 2020).

The Nordic countries have increasingly engaged in the process of horizontal domination and sovereignty as they seek access to natural resources as the global economy grows and becomes more integrated (Carmody, 2009). They have projected their combined power onto the countries of the Global South to assert vertical control in the ongoing sharing and withdrawal of resources. This domination and control gave rise to a cruciform world structure, where the resulting uneven development was associated with poverty, competition for resources, and conflict (Carmody, 2009).

This is part of the new generation of colonial governments built through contemporary investment agreements that were opposed to the New Bandung Framework agreements based on a stable North-South order (Mann,2003). One of the results of this was widespread aggression and seizure of lands around the world by international institutions, the worst of which was on the continent of Africa. Between 2010-2011, an estimated 227 million hectares in the Third World were sold, licensed, or leased to foreign institutions. In 2009 alone, 50 million hectares were transferred from farmers to these institutions. Some of this land was purchased, and leased over a long period of time, ranging from 25 to 99 years, which usually had to be renewed (Broughton,2012).

Sudan, within these world trends, agreed to lease millions of acres to Saudi Arabia, Bahrain, Turkey, and China. The UAE is the largest destination for exports in Sudan, followed by China. This is a facet of the seizure of land and agricultural investments in Africa through Asian countries. Asian investments represent an attempt to meet the rising food demands of the new elite in emerging economies and class cooperation between them and the African elite, rather than a crisis of accumulation (Mann,2003). It bears the characteristics of core-centric models, such as accumulation through scarcity and dispossession. This failed to stop the collapse of accumulation strategies in the countries of the North by virtue of their connection to the new forces, policies, and movements in the countries of the South.

Sudan found increasing global attention when it became an exporter of oil, and more attention focused on oil as a source of wealth and power and as a subject of potential conflict (Obi,2007). In reality, oil alone will not lead to violence and corruption, because conflict only occurs as a result of the “politicization” of the oil factor in ways that make control over it and its distribution confined to the hands of a few who work to make it exclusive to others (Obi,2007). The dialogue on the relationship of oil to development in Africa is framed around the theme of the “resource curse,” as some believe that oil wealth fuels corruption in the state and creates social crises, and violent civil conflict.

Sudan has emerged as a cornerstone of developing economies, linking the oil-rich Arab countries with the rest of sub-Saharan Africa where its coastline on the Red Sea is an important sea route. It has received significant grants and loans from Arab countries to increase its agricultural productivity so that it becomes a food basket for the Arab world and to achieve regional food security so that it can avoid any economic boycott imposed on it by the Western world in the future. Until recently, Sudan was not an expected element linking the desires and interests of Arabs and sub-Saharan Africa. These countries see preparing Sudan as a showcase for agri-business in the Middle East. Whatever the promise of such development trends, they represent the most important economic and political changes in Sudan since the entry of British colonialism (Collins, 1976).

The American policy strived to grant independence to the Darfur region (Al-Muslim website, 1426 AH) as it is rich in uranium, gold, and petroleum. International oil companies are waiting for Darfur to secede from Sudan so that they can achieve the greatest possible gains. Therefore, the theory of creative chaos has been operating in Darfur since 2003, alongside an international game whose chapters have not yet been completed around the oil triangle located in the common area between western Sudan - Darfur in particular - Chad and Libya, which is essentially a French-American-Chinese conflict.

In contrast to Clinton's policy aimed at isolating Sudan, George Bush conducted a dialogue with Khartoum, followed by a constructive policy between the two parties. This is due to the influence of the American Church, and economic interests, especially the pressure group or the oil lobby (Huliaras,2006). This is in addition to the Israelis' ambitions in the Darfur region, whose area is equivalent to 20% of the area of Sudan, and is linked by international roads to Egypt and Libya, contains about 69 million tons of high-purity uranium ore, which is the third or fourth-largest uranium stockpile in the world (Al-Sahli, 2018).

China's rise is an urgent problem, not only for its neighbors or for the United States, but it is a strong geographical challenge for others. Its influence on land and over the seas is expanding, supported by its distinguished location on the map. China has shifted the balance of power in the Eastern Hemisphere by securing its economic needs (Kaplan,2010). What China is doing in Africa today is similar to what the British did 150 years ago. One of the factors that worked to strengthen the Chinese presence in Africa is the authoritarian countries. It can be considered a colonial power that exploits natural resources (Junho,2007).

China has played an influential role in Sudan and has become linked to internal instability and the ongoing external difficulties and risks that have characterized the policies of the central Sudanese state since 1989 AD (Large,2009). The principle of non-interference has been an essential element in Beijing's relations with various governments in Khartoum since 1959. Since 1990 AD, the Chinese role in Sudan has become more rooted and important (Large,2009), and Chinese behavior has been characterized by moderation (Carmody et al. 2010). China, in its relentless pursuit of energy sources, has established relations with "pariah states" that the United States seeks to marginalize such as Sudan, which has led to creating tensions with the new Chinese policy (Canning,2007).

The Chinese company has been granted agricultural lands within the framework of joint cooperation between Sudan and China in the field of agriculture, with the aim of moving from the stage of successful agricultural experiments to the stage of cash or commercial production, especially in the field of wheat and maize cultivation (Sudan Tribune, 2015). Chinese national petroleum companies have become new players in the global petroleum industry in the past two decades. Since it lacks sufficient experience in competing with other international companies in managing huge oil fields, with little experience in political risks and security, it has gained from its experience in Sudan a competitive role in global strategy and in developing its capabilities (Patey,2017).

This relationship was clearly demonstrated in Beijing's relationship with the ruling National Congress Party in Sudan by including China in domestic policy and foreign relations in the war in Darfur. Beijing responded to this through its political role. China also developed new relations with the state of South Sudan following the 2005 peace agreement, which was prompted by political requirements related to investment protection (Large,2009).

The distribution of freshwater resources is characterized by unevenness and irregularity, as there are regions in the world that are scarce in freshwater. This is critical since water and its supplies are likely to become targets for military action and tools of war with the increase in population, improvement in living standards, increased demand for freshwater, and global climate change (Gleick,1993). Several questions are raised about the relationship of conflict over water to other types of conflict, such as ethnic conflicts, and the existence of important differences between conflicts over resources and conflicts arising from the deterioration and pollution of freshwater sources, and that conflict over scarce water sources is the source of global conflict as it contributes to the intensification of conflicts that emerge from other sources (Haftendorn,2000). The problem of international conflicts over water is not due to war, but rather due to unsustainable development resulting from the absence of joint cooperation, which is followed by poverty, migration, and internal national conflicts (Mason,2004).

The Nile River Basin is considered the most unique among the international river basins and represents the most challenges due to its remoteness and its display of a level of unbalanced development across its basin. In addition to that, there is a complete absence of meaningful cooperation and a comprehensive agreement between its countries. This negative phenomenon, which is limited to the Nile, has become an obstacle that has led to the lack of the desired cooperation, development with joint projects, and investment in the basin. The final result is that the river does not contribute to the well-being of about 300 million people living along it, as they are considered the poorest in the world, in addition to the fact that five of the ten least developed countries in the world are located here (Oloo,2007).

In colonial times, the Nile's waters were regulated by agreements drawn up and supported by British rule, which suited the Egyptians, and to a small extent the Sudanese, by giving them the presidency in controlling the great river. This situation began to change in the 1960s with the end of colonial rule in the region, and these challenges have begun to emerge again in the present years with the awakening of the East African community. Kenya, Uganda, and Tanzania (members of the EAC all have a common interest in facilitating the economic development of the Lake Victoria Basin, and expanding this could give them an incentive to bring long-awaited issues to the regulators governing the use of the Nile's waters. Despite the passage of a century of water regulation projects in the Nile Basin, Egypt faces a real water supply crisis due to the combination of drought and overuse by the people of the basin countries (Smith et al. 1990).

The Nile River has been a source of life and conflict in the Nile Basin for centuries (Berry,1995). The deterioration of its waters has shed light on the issues of water scarcity and tensions between the countries of its basin that depend on sharing their share of its total waters (Wiebe,2001). It is possible that Egypt will search for new sources of water or

reposition existing supplies and reduce demand at the same time. It is unlikely that these actions will be completed without internal and external conflict (Smith et al. 1990).

The 1959 agreement governed the distribution of Nile water between Egypt and Sudan and left the remaining countries without determining their shares. Sudan has been caught between the 1959 agreement with Egypt and economically beneficial cooperation with Ethiopia, the source of most of the Nile's water, which seeks to increase its share of the water to secure food and facilitate economic development. The people of the Upper River are looking to escape from the restrictions on water development placed on them by the current regime, but they all fear Egyptian retaliation. The rapid population growth in the region often controls the continuous search for food security and thus water to meet the growing demand of the population.

National policies in the Nile Basin consistently ignore the fact that the people of the Nile Basin are bound together by their sharing of environmental resources. Water resources for irrigation and hydroelectric power are limited, and erosion upriver affects the percolation of dams downriver, where drought and floods know no political boundaries. For most of the twentieth century, the Nile River was viewed as a source of political tensions and low-intensity conflicts between three of the basin countries: Ethiopia, Sudan, and Egypt.

The emergence of China, moreover, as a major player in the Nile Basin's power politics has facilitated several unilateral initiatives for large development projects (Swain, 2011). Countries of the Middle East, in their endless battle to match population growth with food and energy production, have developed ways to develop water resources, including international rivers and groundwater, without considering neighbors' needs, which has caused bitter and recurring conflicts. At the same time, the peace process with Israel collapsed and the Soviet Union collapsed, suggesting that the Middle East was entering a new era (Soffer et al. 1999).

3- THE IMPACTS OF CLIMATE CHANGE

Climate change world widely caused severe impacts on different life forms (Nadeau, et al. 2007; Ye, et al. 2018); and on different regions and social groups (Watson, et al. 1996), and has led to a decrease in natural vegetation, accelerating desertification, environmental degradation and loss of biodiversity (Wang, et al. 2017); changes in vegetation structure and land cover (Klein, et al. 2007), especially in the dry regions (Ye, et al. 2018, Xie, et al. 2016), and potentially leading to widespread loss of biodiversity (IPCC, 1996).

Drought areas in East Africa including Sudan, are expected to increase by 16%, 36%, and 54% under Representative Concentration Pathways (RCPs) and by 2.6, 4.5, and 8.5, respectively by the end of the twenty-first century (Gebremedhin et al. 2020). Also, since the end of the 1960s, the West African Sahel region (10-18 degrees north) has witnessed a continuous and often severe drought, and it is considered among the most extensive climate changes on a regional level and unquestioned over the last half-century (Bell et al 2006). Sudan as part of both these two regions is not exceptional, and is considered the most vulnerable (Gebremedhin et al. 2020) as the observed climate change in Sudan has exacerbated drought conditions (Elagib et al. 2000).

The interaction of endemic poverty, environmental systems deterioration, complex disasters, conflicts, and the limited availability of capital, markets, infrastructure, and technology are essential to exacerbate climate change impacts in Sudan (Zakieldeen, 2009). Also, the key aspects of the vulnerability of Sudan's savanna range to drought including environmental fragility, institutional weakness, high levels of poverty and food insecurity, and economic and political instability, all of which have been exacerbated by climate change (Callo-Concha et al. 2013). Rapid population growth and the expansion of agriculture and nomadism under a changing climate budget could dramatically increase the number of "at-risk" citizens in Sudan in the next 20 years (Funk et al. 2011).

Various early studies predicted the decline of vegetation in most areas of Sudan (Stebbing, 1972). In western Sudan, Acacia "Hashab" trees grow as part of the agro-pastoral system, which has been able to resist for hundreds of years in Kordofan Governorate, where 70% of gum Arabic is produced. Gum Arabic production in Sudan deteriorated sharply after the long drought that extended between 1979-1985, as many trees were lost due to drought and pests. Farmers report that the deterioration in gum Arabic production is largely due to the "unfavorable" nature of social-economic

relations, the role of which drought exacerbated and led to the deterioration of the production of the agricultural-forestry system. The inability to obtain a fair price at the local level and an overemphasis on cash economics to ignore the components of the “tree” have resulted in a system in which Gum Arabic gardens have flourished with intensive orchard cultivation by small farmers. The “Hashab” tree disappeared as soon as farmers were no longer able to care for it (Huntinger, 1993). Financial and business risks can have serious impacts on farmers' decisions and farm income. Farmers can also be more risk-efficient and obtain higher incomes by adopting more diversified agricultural systems and applying the proposed improved practices (Mustafa, 2006).

The Kordofan region contains diverse forest species (more than 180 species of trees and shrubs), both local and exotic. Threats to these forests include drought, soil factors, use of fire, grazing, expanding agriculture, illegal logging, lack of awareness about the problems of deforestation, and insufficient forest awareness. Genetic erosion has occurred in most parts of the natural forests in Kordofan. The central region of North Kordofan provides the necessary natural resources for “nomadic” agricultural and pastoral activities. The unjustified use of these resources has led to their degradation and destruction. Desertification also excluded much of the land from production at a time when the population and demand for land were increasing. Environmental damage also included water shortages and the change in the pattern and timing of seasonal rainfall, as collective grazing increased, which led to overgrazing, and increased logging for the purposes of making charcoal and building homes, where women are considered the most affected (Badri et al. 2000).

The decrease in the abundance of herbs in the Port Sudan area in 2020 AD can be attributed to the very high temperatures after 1998 AD (Loh et al. 2020). Similarly, more areas were affected by desertification and desert encroachment in the Abu Zabad locality in western Sudan (Abbas et al., 2018). Despite this, long-term desertification/the return of the growth of natural vegetation cover over time and space in the center of North Kordofan State was estimated and found that desertification during the last 21 years has helped the return of natural vegetation growth in the areas around rural villages (Dawelbait et al. 2012).

Climate change in Sudan has led to the deterioration of the environmental ranges in the period between 1985 - 2020 (Figure 1), as for example, the desert range expanded by more than +11.0%, from 177,308 km² in 1958 to 314,076 km² in 2020 (Figure 1), and similarly the rest of the ecological ranges (+6.8% for semi-desert), except for the ranges of upland and wetland plants (Nadir et al. 2016). Various studies indicate the deterioration of about 120 million hectares of land, including 64 million hectares of different soil types to varying degrees (Ayoub, 1998).

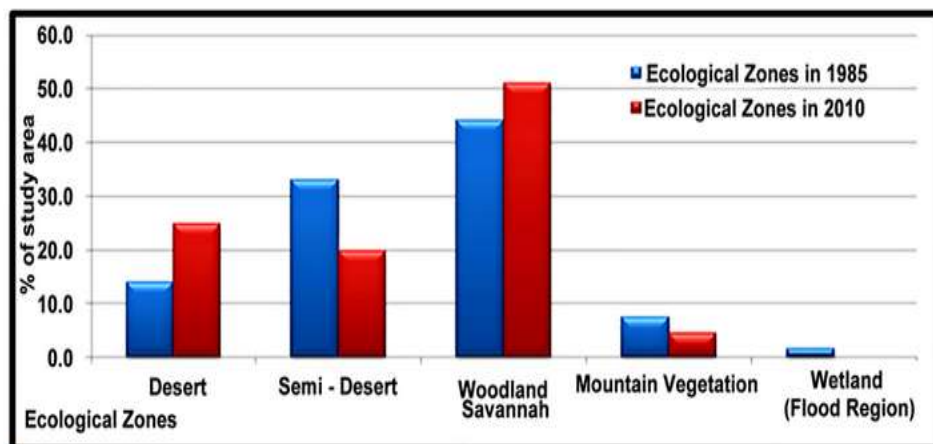


Figure 1: Environmental ranges in 1985 and 2010

Source: Nadir et al. 2016

There are many applied studies that help explain this deterioration as a result of climate change. In Dar es Salaam locality, North Darfur state, the percentage of crawling sand increased successively by 29% (868 km²), then to 36%

(1035 km²), then to 39% (1132 km²) during the period from 1970-2018 (Al-Zubier et al. 2019). In North Kordofan State, the NDVI index for the degree of greenness of vegetation and its relationship to rainfall showed low values in three of the eight seasons under study (Eltom et al. 2019), and the results confirmed that the sand on Khor Abu Habil advanced by 4% in 2000 and 13% in 2020. (Ahmed et al. 2022), and the Blue Nile forests deteriorated in the quality of trees, as many of the species that were prevalent in the past decreased and others disappeared, such as *A. seyalvor fistula*, and the area of these forests decreased from 14.7% in 1973 to 3.1% in In 2016 out of the total area of the region (Al-Zubier et al. 2019), and in the Ashaad and Setrab regions of the Red Sea State in Sudan, the vegetation area decreased from 192.38 square kilometers to 187.39 square kilometers and then to 148.59 square kilometers between the years 1987, 1999, and 2013, respectively (Al-Zubier et al. 2020), similarly, the Halba region in White Nile State lost 91% of its tree and forest cover, which represented 41% of its area, and the area of natural pastures decreased by 16.55% in the period between 1973-2014 (Wadi et al. 2017).

A peak of natural vegetation was found in the year 1850 AD In the Butana area, which had the ability to carry the natural vegetation. Environmental imbalance began in 1970 AD, and the changes occurred during four successive stages, evident in the dynamic deterioration of the vegetation cover, the decrease in rainfall rates, and the decrease in the carrying capacity (Alredaisy et al. 2011), and it became clear that the deterioration of acacia trees (*Acacia*) in the West Butana region is due to a decrease in annual rainfall rates, among other factors, including agricultural expansion, which contributed by 40% to it (Alredaisy et al. 2011). The instability of climate factors and the change in biological factors have led to the deterioration of soil resources and thus the scarcity of tree products in the Qadmabila area in Gedarief State (Idris et al. 2015).

Land degradation and desertification processes have increased in the arid and semi-arid environments of Sudan in the last four decades (Salih et al. 2017). Land degradation can lead to climate change, as high temperatures, low rainfall, long periods of sunshine, cosmic radiation, and high rates of evaporation-transpiration, especially during the wet season, have been observed(Elagib et al. 2000).

Mechanized agriculture projects in the Gedarief region are considered a major cause of environmental degradation and land loss, in addition to environmental complications such as drought. Forests have turned into agricultural lands, accompanied by unorganized cutting, which is considered the main factor contributing to land degradation in the Gedarief region. In addition, contradictory sectoral policies affect land ownership (Glover et al. 2012). In light of such factors, there is evidence that confirms the consequences of dry farming of lands in the Gedarief region for decades, which led to rapid changes in land use and land cover due to agricultural expansion, government policies, and drought. The agricultural sector suffers from climate fluctuations.

This situation worsened further after the discovery of oil and the focus on investment and petroleum-related industries (Mahgoub, 2014). The negative impact of the potential climate change falls on food availability and connectivity in Sudan. The most affected are the poor families along with the deterioration in the country's economic performance (Sassi et al. 2013).

Climatic change significantly led to changes in the pattern of land use, land cover, and soil physical and chemical properties. These changes contributed to land degradation and low soil productivity (Biro et al. 2013). In Sudan, deep plowing and leveling of the surface soil in rain-fed agricultural areas increased its exposure to wind erosion. This has caused a decline in soil fertility and the formation of sand dunes in some places. The impacts of these practices on the natural resource base have included environmental degradation, food insecurity, and a sharp increase in income inequality among Sudanese producers (Abadi et al. 2013).

There are important changes in climate conditions, soil characteristics, and natural vegetation in the Butana region, as the size distribution of soil particles changed to a high degree, especially in the silt layer, and a slight change occurred in alkalinity - acidity (Meheissi, et al. 2010). The Butana region was affected by the fluctuation of Climate change in renewing its natural resources, including the soil resource, as it is characterized by a "soft" balance between climate and ecosystem, which is what characterizes the Sudanese Sahel region, of which it is a part (Elhag et al. 2009). Likewise, the Gash Delta scheme has been affected by climate fluctuations, on which a large number of ethnic groups rely to live and be self-sufficient, and have different production strategies, some more successful than others. Since

the 1980s, a clear deterioration in the irrigation system in this scheme began with a decrease in the areas available for agriculture and a general deterioration in the natural production base, which affected these ethnic groups (Kirby, 2001). Climate change in Sudan has also caused a shortage of drinking water in its arid and semi-arid parts. It began to take a critical situation in the 1940s of the last 20th when population density increased around water sources. Consequently, there were increased concentrations of humans and animals, environmental deterioration, and removal of vegetation. The government adopted a number of ambitious projects to improve rural water sources in Sudan, which differ from one region to another. In dry areas, improving these sources may mean increasing the amount of water, and in less dry areas it means more than just water quality. The imbalance between the amount of water required for healthy living and real consumption is considered the central problem of rural water supply in Sudan (Mohamed et al. 1985).

4- CONCLUSIONS

This research worked to review impacts of the utilization of natural resources and climate change in Sudan. Natural determinism governed the spatial distribution and utilization of Sudan's natural resources. The utilization of natural resources brought power to the Sudanese State; however, produced patterns of disparate development that initiated social unrest, environmental degradation, and armed conflicts powered by the concept of center-periphery. They formed also, external threats to the Sudanese State.

The impacts of climate change in Sudan are quite varied. They included, not exclusively, the deterioration of arable lands and fertile soils and renewal of natural resources; expansion of the desert area, semi-desert, and dry savannah; deterioration of the Gum Arabic production and grain production; the tree scarcity and their products. Importantly, there is environmental conflict over resources (Verhoeven, 2011).

Sudan needs to put national plans to suppress internal conflict over natural resources which will automatically hinder external interventions. Also, Sudan needs an effective membership in the international action systems combating climate change. There is also a need for regional cooperation to keep pace with developments in climate change information, and a local line of combating programs.

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