

The Human Impact on Desertification in the Western Sahel

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The Sahel region, a band of land stretching across Africa directly south of the Sahara, has always been a dry region, with the annual rainfall dispersing 100-200 millimeters of rain (approximately 4-8 inches) on the area between June and September. However, the sporadic fields of grasslands, small, dry-bush forests, and variety of palm trees throughout the region have provided adequate nutrients for the surrounding soils for people to raise livestock and grow crops on for thousands of years. The crop production, it should be noted, is largely dictated by seasonal flows of the river systems and this three to four month period of rainfall, which can be extremely varied from year to year (McMillan 148). In most recent times (mostly within the last 2,000 years), the land has become increasingly dry, arid, and unusable for agricultural purposes. While the forces of global warming and climate trends have been the main cause of this land's growing aridity, the majority of scientists and social scientists who have studied the region's desertification now believe the region has, in its most recent years, been further exhausted of its moisture through human misuse of the land's naturally-occurring nutrients.

The countries most heavily affected by the problems of desertification are those with the largest percentage of the Sahel, land-wise: Mauritania, Mali, Niger, Chad, Sudan, Ethiopia and Somalia. I have chosen to focus my research on Niger and Mauritania. These two countries have been chosen on the basis of investigating whether the resources available to a coastal country (Mauritania), such as extensive fishing and import and export abilities, versus a landlocked country (Niger), provide a large difference in how the country is affected and can combat the forces of a growing Sahara, despite both having similar amounts of land threatened to desertification.

Since the Sahel region has been experiencing great droughts throughout the last 2,000 years, scientists had until recently largely ignored the idea that these problems could be furthered by human misuse, and simply brushed off the lack of rainfall on climate changes (Turner). While climate change has been a factor, it was not until the mid-1980's that social scientists first began researching the possibility that humans may be partially at fault for the Sahel's dryness, which began seeing much more rapid rates of desertification in the last century than it had in the first 1900 years. These social scientists, after in-depth studies of the region, came to the conclusion that a direct correlation exists between the region's dryness and the variety of grazing species, along with species' productivity (Turner 238). Today, most agree that the problem of the growing northern Sahara desert into the once semi-arid regions of the Sahel is due in part to human-induced stress on the landscape through overgrazing, over-farming, and quick population growth. While these problems are human-induced, after researching the problems for myself, I have come to the conclusion that the human's effect on the desertification of the Sahelian region is in large part due to the lack of foresight; the problem appears to have been a terrible series of events in which the easiest and cheapest decisions (at the time) were used over those with the smallest environmental impact. This is largely due to the fact that these nations, historically as well as today, do not have the economic, monetary means to fully fix environmental problems when they arise.

The history of the Sahel region is one filled with heartache. Authors from the medieval times described the lands of the Moors, Maghreb and Kel Tamacheq people (who all live or lived within the Sahel region) as abundant with wildlife, noting the area's lands were fertile enough to

be capable of supporting a diverse population. Indeed, the Sahel is a semi-arid region with “low growing grass and tall, herbaceous perennials...[which] include shrubs and acacia and baobab trees” (“Climate”). The thorny scrub bushes form a woodland that is interspersed with wide pastoral areas. The Sahel is flooded annually by the Niger and Senegal rivers, and is (was) adequate for growing crops such as millet and peanuts. The literature also describes the people of this region as relying greatly on the area’s bush meat, but having little to “virtually no interest in cattle, sheep, or goats” (Gritzner 71). These tastes for wildfowl are documented as remaining the most popular for the area’s population until the 1950’s.

However, the introduction of firearms to the area from the European (largely Portuguese) traders in the mid 1400’s proved to be greatly detrimental to the area’s diversity of wildlife. With guns and ammunition, the Moors and Kel Tamacheq tribes could now obtain the savory bushmeat they enjoyed in much greater quantities and more often. In fact, the European travelers’ reports have indicated that the wildlife population within the region was notably declining since the sixteenth century (Gritzner 71). The addax and oryx (both types of antelope) populations within present-day Mauritania were nearly extinct by the 1930’s. Animals, because of their constant movement while grazing and collecting food, are an important species within any region for their abilities to help pollinate plants and allow them to replenish and grow. With the declining rates of the wildlife, however, the lands of the Sahel could not naturally replenish themselves, and so the lands became more arid and dry.

The loss of wildlife presented a problem for both humans’ and animals’ vegetative and carnivorous food source supplies. Herding, a once largely unpopular lifestyle, became much more widely accepted and used because it provided a good source of nutrients and protein in larger quantities than the people were used to from the African wildlife. While the herding provided a quick fix to the area’s problem, grazing animals (goats, sheep, and especially cows) were a burden the Western African landscape could not endure. Studies show that Sahelian wildlife, on average, takes up much less space per kilogram than livestock does: land “carrying 19.6 to 28.0 kilograms of domesticated cattle per hectare could carry from 65.5 to 157.6 kilograms of wild ungulates [a family of hoofed animals which includes camels, antelopes and more] per hectare” (Gritzner 72). The water needs of these herded animals is also much greater, with cattle needing sometimes as much as four times as much water as their wildlife counterparts.

As the effects of desertification escalated, herders were forced to have their livestock graze on lands and forests within the areas that were originally left alone by herders to provide the remaining wildlife a habitat. The cattle ruined these lush thickets and dense forests by continually trampling over and eating new sprouts of trees and vegetation, further decreasing the wildlife population (both in quality—diversity—and quantity) and also the vegetation within the area (Turner 242).

The 1950’s saw a population increase of thirty percent in the area and consequently a doubling of livestock (“Climate”). This large population growth is in part due to the French colonization that took over the area (Mauritania, Mali, Niger) in the early 1900’s. To combat further hunger and loss, African Sahel nations began implementing advanced European technologies that slowly encroached upon the native Sahel populations. This caused the land further suffering, for many of these western technologies were not suited for the landscape and lifestyles of the Sahel tribes. For example, herders now had the technology to drill deep water wells, which “encouraged the herdsman not only to give up their nomadic way of life...but also to raise more livestock” (“Climate”). This also allowed Sahelian farmers (approximately 30

percent of the workforce), to become more prone to using the large amounts of water excessively for their plants. The lack of nomadic culture gave rise to the destruction of the region's most fertile soils, forcing the farmers and herders to move onto worse and worse land. As lands became especially scarce, Sahelian farmers were forced to rotate the use of their land every one to five years instead of allowing the lands to lay fallow for the traditional 15 to 20-year period, which is thought to be the adequate time period that land needs to replenish itself naturally ("Climate").

By the 1970's the region's resources had been vastly abused and misused. Then, in 1970, the worst climatic event within the century occurred: not a single drop of rain hit the area. In a region that annually receives between 100-200 millimeters (4-8 inches) of rain between June and September ("Climate"), this drought was devastating—especially since the Sahel region was nearly destroyed already due to economic stresses put upon the land. The vegetation that was left within the region—limited grasslands and some sparse forests—were eaten away by the large cattle herds. The rest was easily eroded away from the now-rootless top soils (Chernicoff 358). With no vegetation to stop the Sahara, which lies directly north of the Sahel, the desert easily encroached upon the region. The rainfall of 1971 (which was below the average 400-600 millimeters in most areas) was largely wasted—the land was too dry from the previous year's drought to fully permeate the lands, and the majority of the rainwater was runoff that caused the lands' fragile plant life and topsoil nutrients to erode even further. This drought lasted into the 1980's, causing hundreds of thousands of people to lose their lives due to starvation, malnutrition, and diseases that could not be avoided from the lack of water available (Chernicoff 358).

As the Sahara continues to grow into the northern region of the Sahel, the people of the region are forced to move further and further south, causing the land to become even more densely populated, the soils to more quickly deplete in nutrients, and hunger, malnutrition, and disease to spread more rapidly. While the rains within the region have largely gone back to their old annual levels of 4-8 inches per year, lack of management of the desertification problem during the drought years within the 1970's and 1980's has made the damage within the region grow to such an extent that it is nearly irreversible.

Mauritania, a northwestern African country, is bordered by the Western Sahara and Algeria to the north, Mali to the east, Senegal and Gambia to the south, and the Atlantic Ocean to the West. More than half of the country's land is occupied by the Sahara desert, leaving only the most southern lands of the 398,000 square-mile nation arable. However, unlike the rest of the Sahel-region nations, Mauritania has the resource of the Atlantic Ocean (approximately 468 miles of coastline), giving it the added natural resource of fishing (fishing and agriculture together make up approximately one-third of the Gross National Product). The coastal fishing off of Mauritania is some of the richest fishing available in the world, although powerful foreign fisheries have extracted much of the overall power that this resources could have offered Mauritania in the past ("Mauritania," CIA). The importing and exporting opportunity for great foreign trade endeavors exists through Mauritania's ports. The port in the coastal town of Nouakchott, known as "The Port of Friendship," receives nearly 90 percent of the country's \$1.2 billion worth of annual imported goods. Other large harbors for the country include the Bogue, Kaedi, and Rosso harbors. However, the first deepwater port, the "Port of Friendship," was only opened 20 years ago, and the high level of debt and poverty within the country have left this resource for trade greatly underdeveloped, with only \$784 million in annual exports. However, in early 2006 the prospect of upwards to 1 billion barrels of oil have been found off the Mauritania

coast, which could prove to be an excellent resource for the country, if it has the means to develop it before foreigners begin to take its wealth (“Mauritania,” CIA).

The Sahel region, located in the southwestern tip of the country, is where the vast majority of the Mauritanian citizens live, concentrated mainly near the Senegal River in the cities of Nouakchott and Nouadhibou. Over two-thirds of the nation’s three million citizens are Moors, who mainly inhabit the southern Sahel region. The Moors are avid herders and agriculturalists, as marked by their large villages often surrounded by fields of millet. The fertile Sudanic savanna area in which they make their home is a land inhabited by palm and baobab trees, along with acacias and euphorbia bushes (“Mauritania,” *Encyclopedia*). Being a third-world country, over 75 percent of Mauritanian citizens still make their living in the traditional activities of livestock rearing, agriculture, and fishing, with livestock rearing considered the most important. This is in part because the traditional herder’s lifestyle, a nomadic one, is exactly what Mauritania’s landscape is suited for. The small, sporadic pieces of grasslands and small bush forests that make up Mauritania’s landscape are big enough only for short periods (one to two weeks) of grazing before they will become depleted of their nutrients and available vegetation, and the herders must move on in search of the next bit of arable land. The herders would generally move from the south’s most arable land in the dry months to the north during the wet, summer season.

However, as the technology of wells and the two dams along the Senegal have infiltrated into Mauritania’s herding, the nomadic lifestyle of the livestock herders has largely become semi-nomadic; the herders now remain longer in the south during the wetter months, simply because they do not have to move north to receive as good of crops; the floodwaters from the dam provide enough liquid to sustain them. The great number of nomadic herders adopting this ideal, however, has caused the southern lands to become exhausted from overuse, and during the dry months of the year (between October and May) the herders are having an increasingly difficult time finding sustenance (“Mauritania,” *Encyclopedia*).

The “new resource” of dam water has made agriculturalists (whose produce still makes up about one fifth of the GNP, despite crop production having fallen almost two-thirds since the early 1980’s) easily careless with their water usage, as the dams make the water supply appear falsely plentiful (“Mauritania,” *Encyclopedia*). Despite the superfluous use of water supplies, acute malnutrition rates for the country’s population (largely caused through lack of water) are at 12 percent, the vast majority of those suffering being children under five years old (World Food Programme).

Mauritania has politically-charged water problems as well. The country has been in a bitter dispute with neighboring Senegal for water since Senegal first announced its plans to implement the “Fossil Valley Rehabilitation Project” in 1989 along the Senegal River. This project threatened to diminish the Mauritanian water supply by taking up the great resources of the Senegal River, the main water supplier to the dense populations that inhabit the area for both Mauritania and Senegal. Over 400 people died between the two countries before Senegal finally dropped the program, only to re-institute the idea ten years later. The battle between the two countries ravages on even today, using up more of each country’s precious reserves of water (Kneib).

In recent years, though, each country’s efforts have been, in large part, more cooperative than confrontational with each other: Mauritania, Mali, and Senegal peacefully coexist together on the Senegal River’s banks. Mauritania has begun using new methods to enhance their dying agricultural industry, with farmers planting many palm trees throughout the area surrounding the Senegal River to “encourage the cultivation of vegetables” and other produce and increase the

amount of irrigated land in the valley (“Mauritania,” *Encyclopedia*). The once-floundering fishing industry, which stopped issuing fishing licenses in 1979, formed joint companies with Portugal, Iraq, and South Korea in 1980; it also signed fishery agreements with the European Communities in 1987, increasing the industry’s stability. Mauritanian government has begun efforts to better cultivate the country’s mining industry for exports and to increase in sustainability. The copper deposits of Akjoujt are “extensive, with a copper content of more than two percent” (“Mauritania,” *Encyclopedia*). Gypsum deposits near Nouakchoott are also substantial. Iron ore within the country accounts for 11 percent of the GNP (Gross National Product) and over 40 percent of Mauritania’s exports, making it a key resource for the country’s economic stability. The Zouirat mines, located in the north-central region, have drastically altered the main population centers of the country in recent years because of the number of jobs that mining provides (Michalski).

Changes in government have also helped the country to become more unified in its goals and, therefore, better able to cooperatively fight the problems of desertification. A new constitution in 1991 established a “bicameral legislative structure,” giving power to both a military and civilian-led portion of the government. The country has established 12 administrative regions, each with a governor, which have redrawn traditional regional boundaries of tribes in hopes that the country will be more open to national ideas and efforts when the powers of their separate tribes (which, to this day, still hold much clout within the Mauritanian communities) has dissipated, at least in part (“Mauritania,” *Encyclopedia*).

Relief efforts from outside organizations have also begun to aid the country. To combat hunger, the World Food Programme (a United Nations organization headquartered out of Rome) has helped Mauritania in creating over 650 community feeding centers throughout the country, helping to feed over 32,000 children through fortified nutrition (World Food Programme). Despite the progress, this aid to the country is in large part creating a hand to mouth lifestyle; the next year still needs over 12.5 million U.S. dollars to ensure that food will be delivered. “Malnutrition does not simply disappear with the arrival of the new harvest and return the next lean season. WFP and our partners are fighting a battle that cannot be won over a few weeks or months. It will take years, and require the sustained support of the international community,” says WFP Senior Deputy Executive Director Jean-Jacques Graisse (World Food Programme).

Niger is a country equally as devastated by drought and desertification of the Sahel. Located centrally within the Sahel region, the country of over 11,000,000 people is landlocked, being bordered by Algeria and Libya to the north, Chad to the East, Nigeria and Benin to the south and Burkina Faso and Mali to the West. With approximately 1.27 million square miles, the country is roughly twice the size of Texas.

The nation can be divided into three distinct sections: the dry, Sahara-ridden north, the intermediate zone, which gets some rainfall and is populated by “nomadic pastoralists,” and the cultivated south. The vast majority of the population lives within the southern region, with the capitol, Niamey, located in the southwest sector of the nation, being the most heavily populated area. The southern region, where the Sahel is located, is characterized by “extensive dunes or uplands with basins or depressions” (“Niger,” *Encyclopedia*). These soils are rich with nutrients, and most are arable for crops, although they are in large part used for grazing.

Water for the country was always scarce, with the west’s water sources coming from the Niger River (which only travels through Niger’s national lines for 350 miles) and the east’s water coming from Lake Chad. Because of the geologic change of the river’s flow, the only time that Niamey can expect to have it flow past them is during the months of January and February,

when it floods. Of the over 9,000 square miles of Lake Chad, Niger has possession of about 1,100 of them, and these square miles are significantly reduced within the dry season.

The natural resources, especially geologic deposits, are exceptionally important for the country's revenue. Having little revenue now drawn in through their limited agricultural abilities (especially after the extreme droughts of the 1970's), the Uranium deposits found within the country rank as one of the most important such deposits in the world. However, as Uranium's use as an energy resource has become less widely used due to its adverse health and environmental effects, the impoverished nation's economy has suffered greatly. Smaller resources include copper, lignite, and titanium ("Niger," *Encyclopedia*). A small industry for salt occurs near the "border" between the nation's northern and intermediate zones in the Air and Kaouar regions. The plant and animal industries, while an increasingly smaller portion of the country's revenue, continue to help support the country's economy, just on a much smaller, more local scale. The doum and palmyra palms are used for construction projects, while other palms are used to produce sweet, edible dates. A modest amount of acacia gum is exported, as well as handicrafts created from the exotic skins of ostriches, snakes, and crocodiles.

Despite all attempts to increase revenue and profits for the country's GNP, the country's lack of governmental services has not allowed it to fully develop its resources. Since the inception of the multiparty system in 1991, political unrest has been a constant within Niger, with periods of democratic government being overshadowed by the military leader Colonel Ibrahim Bare, who ruled from 1996-1999. However, democracy has largely been upheld in the country since the re-election of Mamadou Tandja in 2004. In recent years, the country's financial system has also become increasingly developed; Niger now has an economy with three established main objectives: "maintenance of national unity, the elevation of the living standards of the population, and the attainment of economic independence" ("Niger," CIA). The country has invested in numerous first-world business endeavors through grants given to the people through the Development Bank of the Republic of Niger and also through foreign aid, including real estate, air and road transportation systems, and large agricultural processing enterprises. Niger is also beginning efforts to network itself with other countries, joining such things as the African Union (originally the Organization of African Unity) and the Conseil de l'Entente, a French West African organization created to promote economic development.

Relief for Niger, until recently, has been slow and drawn out. In addition to having suffered major droughts throughout the 1970's and 1980's and its political unrest, the country, while making economic progress in many sectors, had still been greatly affected by high rates of malnutrition and starvation. 2000 marked the year Niger qualified for debt relief under the International Monetary Fund program for Highly Indebted Poor Countries (HIPC). The debt relief from this program is promising, providing free funds for the country for health care, AIDS prevention, education, and rural infrastructure. In 2004, however, the nation's limited amount of food became even worse: a locust plague hit the already drought-laden nation, destroying masses of trees, vegetation, and the country's crops, putting food shortages on over 2.5 million Niger citizens, and also further limiting the funds provided to the country to pay for the deficit of food supplies ("Niger," CIA). With both people and animals left with nothing, Niger was faced with a massive food emergency. Despite the dire conditions, the rest of the world largely was unaware of the problem's extent until the May of 2005 when over 2,000 protestors marched through Niamey to demonstrate their disapproval of the Niger government's lack of response to the situation. The protestors demanded the lowering of prices of such commodities as rice and millet, which had increased to over four times the normal price in the last year. It was not until the

middle of August that the United Nations finally realized the size of the problem and sent the World Food Programme to bring food relief (“Niger,” CIA).

Since the United Nations’ intervention with the problem of food scarcity, the progress for the country’s fight against hunger in the past year has been astounding. Through outside partnerships, the country has been able to treat almost 300,000 children for malnutrition at over 900 feeding centers. Malnutrition rates have dropped by over five percent, from 17.3 percent in 2000 to 11.8 today (World Food Programme). In the spring of 2005, the government also agreed to drop the tax on the essential goods of flour and milk, making food more affordable to the masses, and they also reduced the taxes paid for water and electricity. Niger also continues to benefit from its funds provided by the International Monetary Fund (IMF) as well, who announced in December of 2005 that Niger will receive 100 percent multilateral debt relief from the organization, which monetarily means the country has been relieved of approximately \$86 million in debt. With less debt, the country is now in a better position to expand its resources in health care and nutrition and to exploit its resources of oil, gold, and coal as well (“Niger,” CIA). The wildlife, including antelope, lions, and hippopotamuses, as well as the native savannah plants of doum palms and acacia trees, have slowly been increasing in numbers, in part by the preserved grassland and forests found within the W National Park, located near Niamey (the park was created in 1954). While the crisis remains, Niger citizens’ strong protests and the aid received from outside organizations are helping the country get closer to sustainability (“Niger,” CIA).

While desertification is one of the most difficult environmental disasters to reverse, similar efforts to stop encroaching sand land could possibly be adopted throughout the Sahel region. To make more room for agriculture, a group of Chinese farmers planted an entire forest (300 by 500 miles) of poplars, a fast-growing tree whose roots grow deep and bind onto sand, within the dunes. The dunes were then leveled, by hand, and covered with topsoil (Chernicoff 358). The Sahel region’s neighbor, the Middle East, has developed a system of wells, channels, and collecting pools to store storm runoff underground, so that the high intensity heat and sun will not cause any of the water to evaporate. Israel extensively uses drip agricultural methods; using punctured hoses, they literally feed their crops water, drop by drop. Countries surrounding the Mediterranean Sea use the methods of desalinization to feed their crops—this is a method that Mauritania has recently developed as well, thanks to its large area of access to the ocean’s waters.

While many of these methods could physically work on the landscapes of the Sahel region, these drought-saving processes come at a high price and are not readily monetarily available to the vastly impoverished nations such as Mauritania and Niger; with foreign aid not completely dependable (time-wise), it becomes difficult to enact these types of policies without knowing whether the countries will be able to afford these techniques within a few years’ time. However, this does not mean that Mauritania and Niger’s citizens cannot use sustainability techniques to help their countries become more stable from the inside. One such technique could be simplifying their way of life. While the prospects of a “Westernized” first-world lifestyle are appealing to the inhabitants of the Sahel area, this way of life is simply not suited for the landscape of the region. Many of effects humans had on the desertification of the Sahel region originated from, or were caused by, the effects of assimilating their culture to that of Western Europe and the developed world—through things such as firearms, water wells, and wasteful irrigation techniques. While the countries of the Sahel will never completely go back in masses to their herding lifestyles, it may help if the governments of countries such as Mauritania and

Niger would create subsidies for those who are willing to join the cattle, sheep, and livestock herding industries, so as to make these careers more monetarily attractive.

In recent years, it has been suggested by scientists that much of the air pollution produced by North America and Europe, because of global wind patterns, has in part helped to create a less regular and shorter rainy season for the area, causing even further desertification. While our own environmental issues at home provide more than enough problems for thought and effort, when we are at fault, even if only partially, for the problems of those less fortunate, it seems only right that we should also help these countries find more sustainable means, both through physical and monetary assistance. From a social justice standpoint, when a country with one billion barrels of oil and an extensive coastline, such as Mauritania, is not able to use these resources because they are too impoverished to develop these industries, it is both morally and economically unjust and wrong. As Esther Guluma, the UN Children's Fund Regional Director for West and Central Africa, so eloquently put it, "The international community must mobilize both politically and financially, to fight against poverty and child malnutrition in the region of the Sahel" (United Nations). As a planet, our environments are all interconnected, so it only seems right that our aid and policies for fighting environmental issues should be approached from the global scale as well.

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