Overpopulation and Agricultural Land Degradation in The Republic of Niger

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Abstract

This paper aims to review and present relevant literature on the land degradation crisis in the Republic of Niger in order to recommend an appropriate policy objective. Unsustainable agricultural practices are responsible for the deforestation, desertification, and loss of soil fertility that constitute Niger’s land degradation crisis. The term “agricultural land degradation” is established to describe land degradation that is prompted almost entirely by agriculture. Overpopulation is the principal driving factor of agricultural land degradation in Niger. The strong presence of gender inequality in the nation contributes to this overpopulation crisis. Therefore, the author suggests increasing the time young women spend in school as a policy measure for combating agricultural land degradation in the Republic of Niger.

Keywords: agricultural land degradation, deforestation, desertification, soil fertility, Republic of Niger, overpopulation, gender inequality, female education

Overpopulation and Agricultural Land Degradation in The Republic of Niger

There is a dramatic and palpable environmental crisis taking place in the Republic of Niger. Between the years 1975 and 2013, cultivated land area increased by 94.2% (CILSS, 2016). This illustrates a heavy reliance on crops and livestock to support the failing economy and the burgeoning population of Niger. The expansion of agricultural land has led to rapid deforestation and soil degradation, causing an annual decrease in the already scarce amount of arable land and the expansion of the Sahara Desert (Stone, 1993). It is evident that land degradation in Niger is predominantly generated by agricultural activities. The term “agricultural land degradation” will be used henceforth when describing land degradation instigated almost entirely by agriculture.

Agricultural land degradation in Niger is resulting in the loss of economic exports, an increase in environmental migrants, and high levels of food scarcity (Afifi, 2011). Since the agricultural sector is the lifeblood of the country, land degradation comes at a great cost and is a factor in perpetuating the
poverty of Niger. Citizens are fleeing the poverty and food insecurity of rural areas and moving to the cities in the south of Niger. These migrants are primarily young men looking for work, while the women and children are often left behind (Afifi, 2011).

Experts have predicted that without further action being taken to combat overpopulation and land degradation, the rest of the arable land will disappear by 2100 (Potts et al., 2011). Even before then, hundreds of thousands could die from malnutrition, and violent conflicts could erupt around the country, causing mass migration. Therefore, overpopulation and land degradation in Niger not only pose devastating domestic consequences, but also international ones, as a mass exodus of climate refugees flee the violence and uninhabitable environmental situations that have taken over their country (Potts et al., 2011).

Niger and many other nations in the Sahel region of West Africa are plagued by agricultural land degradation and overpopulation. The United Nations Environment Programme notes that, in the past, policy has failed to adequately address Sahelian land degradation due to a lack of in-depth understanding of the complex issue (UNEP, 2012). While all Sahelian nations experience agricultural land degradation, many aspects of this crisis are especially pronounced in Niger. This study aims to review and present relevant literature on the issue of agricultural land degradation and overpopulation in the Republic of Niger in order to suggest appropriate policy measures for addressing this most pressing environmental issue.

**Background**

The Republic of Niger is a landlocked West African country with a total area of about 1.267 million sq. km. Roughly two-thirds of this land is situated in the Sahara Desert, with the southern area falling in the Sahel, a semi-arid transition zone that separates the desert and tropical lands. The southernmost region provides 98% of the arable land and is densely packed with the majority of Niger’s population (CILSS, 2016). The economy of Niger relies heavily on these scarce arable lands, as 40% of the nation’s GDP comes solely from agricultural exports (World Bank, 2020). With a GDP Per Capita of $1,200, Niger is one of the most impoverished countries in the world (CIA, 2020). The World Bank reported that in 2019, 41.4% of Niger’s citizens were living in extreme poverty (World Bank, 2020).

The nation’s agriculture-based economy has been struggling to meet the needs of its growing population. Niger has the highest total fertility rate of any country, with Nigerien women having an average of seven children (CIA, 2020). Additionally, Niger’s mean age for first-time mothers is among the youngest in the world, at 18.1 years old. With the second-highest annual population growth rate in the world, at 3.66%, and an estimated population of 22,772,361, overpopulation is an enduring struggle for Niger (CIA, 2020).

**Development of Agricultural Land Degradation in Niger**

Mass deforestation took place from around 1950-1990 where 40-50% of the tree cover
was destroyed (Bado et al., 2017). From 1990-2010, it is estimated that a further 30% of the forests were lost. The remaining tree cover in 2016 represented only 0.89% of the total land area of Niger (World Bank, 2020). The levels of soil erosion and loss of soil fertility have also been steadily increasing (Stone, 1993). About 100 tons of topsoil per hectare are being lost annually, which, in combination with undernourished soil, is causing grain output to fall 6% annually (Potts et al., 2011).

The loss of trees and vegetation caused the Sahel to shrink which gave way to the expansion of the Sahara Desert. Droughts in the 1970s and 1980s served to expedite this process of desertification (Adam et al., 2006). Since 1975 these sandy areas have expanded by about 25%, which has diminished the percentage of arable land in Niger and exacerbated the agricultural land degradation crisis (CILSS, 2016). In 1989, arable land only represented 7.6% of the total land area, signifying a clear need for environmental restoration (World Bank, 2020).

Driving Factors Overpopulation

For the Republic of Niger, overpopulation is almost synonymous with agricultural land degradation. Agriculture in Niger serves both economic and subsistence purposes. Any surge in the population puts pressure on the land both as a source of food and economic exports (World Bank Group, 2017). These pressures are amplified by the many prominent agricultural practices in Niger that are unsuited to the unique environmental conditions the nation faces (Adam et al., 2006). To keep up with the growing population, farmlands are overworked and improperly maintained while herd sizes are increased on already overgrazed pastures (Sendzimir, Reij, & Magnuszewski, 2011) (Stone, 1993). Yields from these degraded lands fail to provide enough food or resources for the growing population, and deforestation consequently takes place to create more agricultural land (Afifi, 2011).

Overpopulation has long been considered a driving factor of land degradation in the Sahel (UNCCD, 2019). High rates of population growth are standard across the region, with the average annual population growth rate increasing from 1.5%, in the 1950s, to 3%, by the 1990s (Doso Jnr, 2014). As these populations grow, cultivated lands increase, and more stress is put on the land to support the overpopulated cities thus perpetuating agricultural land degradation in the Sahel (UNCCD, 2019).

Previous studies have aimed to assess this correlation between population pressures and agricultural land degradation in order to ensure they indeed form a causal relationship. One such study published in 2012 evaluated 50 case studies from 25 publications that pertained to cropland changes in eight Sahelian countries. After conducting a meta-analysis on the selected cases, the study concluded that population increase was the most common and

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1 Burkina Faso, Ghana, Mali, Niger, Nigeria, Senegal, Sudan, Ivory Coast
A compelling driver of land degradation, observed across all Sahelian nations (Van Vliet et al., 2013).

Gender Inequality

According to the OCED Social Institutions and Gender Index and the UN Gender Inequality index, Sahelian nations have some of the highest levels of gender inequality in the world (Bouchama et al., 2018) (UNDP, 2020). Women in the Sahel are systematically deprived of participation and representation in the government and are not given equitable access to education (Castillejo, 2015). They also lack agency when it comes to family planning and land management decisions as they are denied rights within their family and society (Bouchama et al., 2018).

For Niger, in particular, gender inequality is largely responsible for the traditional societal system that generates unsustainable population growth. The high fertility and population growth rates of the nation are due to the prominence of child marriage, the broad acceptance of polygamy, and the traditional ideals that equate children to wealth (Filipovic, 2017). While contraceptives have been provided for free in Niger since the early 2000s, a very small percentage of the population reports employing any method of birth control (Potts et al., 2011). This is likely because the desired family size in Niger is larger than the actual family size, with married men wanting an average of 12.4 children and married women wanting an average of 9.5 (INS, 2013). Nigerien women want far fewer children than men, however, they are unable to advocate for their own interests due to the gender inequality within their society (Potts et al., 2011).

Failed Remediation

The colonial legacy of Niger greatly hindered the government’s many attempts to regulate land degradation. After taking control of Niger in the 1890s, the French colonial government dismantled many customary private property rights, leaving large swaths of land available for common use (Stickler, 2012). This created a “tragedy of the commons” situation (Hardin, 1968) where all farmers and herdsmen were overworking the land, as the shared consequence of this over-exploitation was outweighed by the individual benefits. In the 1920s, the colonial government continued to issue policies nationalizing resources and clearing land in order to multiply agricultural exports (Sendzimir, Reij, & Magnuszewski, 2011). These actions represented an unrelenting departure from traditional systems of land management and served to propagate the land degradation crisis. Having gained independence in 1960, the new Nigerien government struggled to step out from the shadow of colonialism. Consequently, the 1974 Rural Code upheld many of the French colonial rules and policies, retaining many natural resources under government control and emphasizing state involvement in the regulation process (Stickler, 2012).

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2 Measured in the form of crop land increase
In the late 1970s and early 1980s, the government set up costly reforestation programs and planted around 60 million nonnative trees in an attempt to combat deforestation (Stickler, 2012). While the intentions of the government were commendable, the same cannot be said about the execution of the program. Local communities were rarely consulted on the project and rural landowners had their property commandeered for the creation of these tree plantations. As a result, the majority of the trees perished because local communities had no vested interest in the program, and the exotic trees planted were largely unsuited to the environment (Stickler, 2012). This program particularly exemplifies the issue with the Nigerien government policymaking prior to 1990. The policymakers demonstrated a lack of knowledge about the local communities and a lack of interest in involving these communities in environmental restoration decisions. Therefore, the policies and programs implemented during this time failed to create sustainable lasting change and inevitably damaged the environment further. By the late 1980s, the severity of the agricultural land degradation in Niger initiated discussions about how to properly manage the crisis.

Cycles of Agricultural Land Degradation and Overpopulation

After analyzing the situation in Niger, there appears to be strong evidence of a cycle that links the socio-economic hardships to the environmental crisis. Overpopulation in Niger promulgates the poverty and food insecurity that necessitates the use of unsustainable farming practices and the expansion of agricultural lands. In most cases, this expansion leads to deforestation and desertification, which allows minerals, nutrients, and moisture to escape from the soil. These degraded lands with low levels of soil fertility produce progressively lower crop yields that are mismatched with the growing population's needs for food and financial resources. These socio-economic pressures prompt further deforestation for agricultural purposes and the cycle of land degradation continues.

With land degradation contributing to the dwindling of resources and the proliferation of poverty in Niger, it becomes difficult to fund investments and maintenance of the education system needed to manage overpopulation. As the educational needs of the nation fall by the wayside, the existing gender inequality in Niger is able to persevere, causing the fertility rate to rise. This higher fertility rate spikes Niger’s population growth rate, initiating further overpopulation that goes on to feed the cycle of land degradation. It is important to recognize this vicious cycle of socio-economic and environmental interdependence that is pervasive in Niger. Doing so allows for an enhanced understanding of the actual policy implications that may emerge when addressing the land degradation crisis in Niger.
The Development of Land and Agricultural Institutions: Policies and Programs

Over time, there has been a variety of programs and policies that attempt to combat agricultural land degradation in Niger. Specific programs and initiatives were developed to address the deforestation and lack of soil fertility caused by progressive land degradation. In addition to restoring the land, policies have been put in place to correct land tenure issues, promote conservation, and encourage environmental rehabilitation. The Nigerian government and communities have taken active roles in establishing these valuable policies and programs.

Government

The 1990s were marked by political turmoil that facilitated the decentralization of power in Niger which inevitably prompted the government to shift its approach to land restoration (Sendzimir, Reij, & Magnuszewski, 2011). In 1992, the government released the Guiding Principles of Rural Development Policy in Niger. This legal framework outlined the government’s commitment to promoting natural resource management techniques while enhancing local involvement in conservation decisions. These “Guiding Principles,” along with the decentralization of government power, allowed the 1993 Rural Code to reflect a more traditional system of land tenure and resource conservation (Elbow, 1996). Additionally, the 2004 Forest Code further solidified the re-establishment of traditional property rights, which gave farmers the incentive to protect trees and not overwork the pastures (Stickler, 2012).

After successfully attending to the land tenure issues and restoring power to local communities, the government moved forward with the 2006 President’s Program, a rural land restoration initiative. Due to the migration and urbanization prompted by land degradation, generally, the only people left in rural areas are women, children, and the elderly. Women in these regions work to revive the environment by digging demi-lunes to conserve rainwater, planting trees, fixing dunes, and using stones to combat water pollution from silt (Afifi, 2011). The physical nature of this work makes it difficult for these women to complete by themselves. The President’s Program sought to address this problem by bringing the young men back to the rural areas. After initially creating 35,000 jobs in environmental restoration, 6,950 acres of degraded land were successfully restored by 2011 (Afifi, 2011).

Community and Non-Governmental Organizations (NGOs)

With farmers having a renewed stake in the prosperity of their land, they partnered with international organizations to develop specific initiatives for combating deforestation and the lack of soil fertility (Stickler, 2012). Natural resource management (NRM) programs have had a profound impact on the way communities

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3 Half-moon shaped depressions in the soil
approach land restoration and sustainable agriculture. These initiatives focus on appropriately utilizing the resources available to revitalize the land. International organizations like Regreening Africa are working with local farmers to dig demi-dunes and create planting basins that conserve water and soil (Winowiecki, Sinclair, & Ndavi, 2020). Other NRM initiatives focus on finding or creating sustainable natural fertilizer sources such as manure or dead leaves in order to rebuild soil fertility. The Tahoua Rural Development Project is developing ways to effectively promote the coexistence of livestock herds and agricultural fields to prevent further expansion of agricultural land (Adam et al., 2006). These natural resource management programs are successfully restoring the previously degraded croplands and pastures, while also facilitating the diffusion of sustainable agricultural methods.

Agroforestry is an advantageous form of NRM that encourages the incorporation of trees into croplands and pastures. These trees create windbreaks, prevent soil erosion, and slow the loss of soil fertility. The new root systems replenish the natural ecosystem, stabilize the land, and enhance the water absorption of soil (Winowiecki, Sinclair, & Ndavi, 2020). The benefits of agroforestry are apparent, however, planting new trees can be costly and high risk as the trees consume considerable amounts of scarce recourses and often fail to establish themselves permanently (Stickler, 2012) (Adam et al., 2006). To combat this issue, many communities have adopted Farmer Managed Natural Regeneration, or FMNR, as an accessible way to integrate agroforestry into their agricultural restoration efforts. Developed in the late 1980s by Nigerien farmers and the Maradi Integrated Development Project, FMNR is a sustainable, low-cost, technique that facilitates rapid agricultural land rehabilitation. Instead of planting new trees, farmers tend to the stumps, roots, and seeds of trees in an “underground forest” (World Vision Australia, 2018). By re-growing a variety of native tree species and properly managing them, biodiverse forests are quickly regenerated. Along with all the other advantages of agroforestry, FMNR has the benefit of being easy to scale up, meaning it can aid in the efforts to re-green the Sahel (Adam et al., 2006).

**Impact of Programs and Policies**

So far, the results of these natural land restoration and management programs have been highly encouraging. Comparisons of satellite images taken twenty years apart show successful restoration of native vegetation on croplands and a marked increase in tree cover in villages. Farmers are reporting improvements in soil fertility and decreases in topsoil loss as a result of these NRM programs (Adam et al., 2006). It is estimated that FMNR is responsible for 5 million hectares of reforested land, a twofold increase in crop yields, and $900 million of Niger’s annual gross income (World Vision Australia, 2018). In the 1990s, the percentage of arable land began to climb rapidly, as power was given back to local communities and previously degraded lands were successfully restored. By 2016,
13.3% of the total land in Niger was arable, representing a 75% increase from 1989 (World Bank, 2020). The holistic impact of these programs cannot be overlooked. Environmental restoration contributes positively to a cycle of socio-political improvement and economic advancement on local and national levels (Sendzimir, Reij, & Magnuszewski, 2011).

**Addressing Overpopulation: Evidence and Recommendations**

To ensure sustained environmental restoration, it is necessary to address the main cause of agricultural land degradation in Niger, which is overpopulation. Regrettably, due to social frameworks and cultural norms, many previous attempts to regulate the population growth in Niger have had only marginal success (Potts et al., 2011). Gender inequality is the driving force behind overpopulation in Niger, with men having almost complete control of family planning decisions (Stone, 1993). Consequently, increasing access to birth control methods and expanding family planning education rarely impact the fertility rate in a meaningful way (Potts et al., 2011). A promising alternative population control method lies in the improvement of women’s social capital through education.

Many studies have established that the general education of women forms a causal relationship with family size and gender equality (Kim, 2016; Pradhan, 2015). Every year of education a woman receives reduces the number of children she is likely to have and increases her social standing (Kim, 2016). In the neighboring nation of Nigeria, improving the education system and increasing Nigerian women’s education by one year proved to reduce the average number of children by .26 (Kim, 2016). Another study observed that in Ethiopia increasing the education of a woman by one year decreased the probability of teenage pregnancy by 7% and decreased the probability of teenage marriage by 6% (Pradhan & Canning, 2015).

While there is generally a lack of education in Niger, this is indisputably the case for Nigerien girls, of which only 17% are literate (UNESCO, 2016). Interestingly, the education level of women has a greater impact on fertility rates than the education level of men (Pradhan, 2015). This means for Niger, investing specifically in women’s education would be a strategic move, as educated women better understand the benefits of smaller families and enjoy more power in family planning decisions (UNESCO, 2016). These developments in female education can facilitate a departure from traditionally ideal large families which lowers the total fertility rate.

Improving female education positively influences both overpopulation and land degradation. In lowering the fertility rate, educated women slow the population growth rate and significantly reduce the agricultural pressure instigating land degradation. Lessening the burden on the land enables further environmental restoration and the promotion of sustainable economic growth. In turn, this improves political and economic stability, facilitating additional investments in female education and land restoration.
The cycle illustrated here would continue indefinitely and offers a realistic solution to overpopulation and agricultural land degradation in the Republic of Niger.

Efforts have been made to reform the general education system in Niger, such as the Sector Program for Education and Training, or PSEF (République du Niger, 2013). This legal framework for bettering education in Niger caused primary school enrollment rates for girls to rise to 65% in 2014. That being said, the gender disparity in education persists across all school levels with girls being severely underrepresented past primary school. In that same year of 2014, only 15.6% of girls were enrolled in secondary school and 0.9% enrolled in tertiary school (UNESCO, 2016). Niger must continually renew its commitment to specifically enhancing female education in order to see improvements in the land degradation crisis.

**Barriers to Female Education**

There are several aspects of Nigerien society that act as barriers to improving female education. In many communities, there is a stigma towards girls going to school instead of falling into traditional societal roles (Filipovic, 2017). These communities also lack knowledge about the long-term socio-economic benefits of female education. Since many families rely on their daughters as a source of labor and income, there is a high opportunity cost associated with sending girls away to school. While there are no school fees in Niger, this opportunity cost can act as a financial barrier for many families. This cost, coupled with the community’s perception of female education, means many girls are taken out of school and kept at home (UNESCO, 2016).

With teenage marriages and pregnancies being commonplace in Nigerien society, it can be very difficult for girls to continue their education past primary school (Filipovic, 2017). In other cases, it is the lack of access to adequate educational infrastructure, such as schools close to home or school buildings with latrines, that prohibit Nigerien girls, especially those in rural areas, from attending school. There is also a shortage of teachers that will be supportive of their academic pursuits and understand their unique struggles (UNESCO, 2016). Fortunately, the education of women in and of itself has been shown to overcome many of these barriers to female education by raising marriage ages, lowering teen pregnancy rates, and reducing gender inequality (UNESCO, 2016). These educated women also help diminish the stigma surrounding female education by diffusing their knowledge about its benefits to their children and communities (Kim, 2016).

**Suggestions to Improve Female Education in Niger**

Many techniques for overcoming these barriers to female education could be implemented in Niger. For example, future investments in female education can be focused on more than raising enrollment rates. This would mean upgrading educational infrastructure and creating
programs that inform educators about gender-specific teaching approaches (UNESCO, 2016). In other African nations such as Kenya and Ethiopia lowering or eliminating the informal price associated with attending school, such as the cost of uniforms or school lunches, has also been shown to improve the education of girls (Pradhan & Canning, 2015) (Evans, Kremer & Ngatia, 2009). For Niger, this could be accomplished by allocating funds to the families of girls attending school, in addition to the scholarships that pay for girl’s school supplies and meals. This would provide an incentive for families to educate their daughters, while also reducing the opportunity cost of sending girls to school. Furthermore, expanding outreach programs that educate families and communities about the socio-economic benefits of educated women could be a mechanism for improving the current perceptions of female education (UNESCO, 2016). Additionally, it has been shown that girls with female teachers are likely to attend school more often. Therefore, programs to recruit female teachers, specifically in rural areas, provide another way to enhance the quality of education for girls in Niger (République du Niger, 2013).

Fortunately, the Sector Program for Education and Training (PSEF) currently incorporates a few of these methods which demonstrates that the policymakers are knowledgeable about what will improve female education. Namely, the PSEF includes provisions for incentive programs that recruit female teachers, and training for educations about gender-specific issues (République du Niger, 2013). Despite the gender disparity in education persisting with these policies in place, it is important for Niger to continue these efforts. They could, however, expand their focus and implement other policies that provide financial support to girls and their families, improve current school infrastructure, and conduct community outreach to reduce misconceptions and emphasize the benefits of female education. Strengthening the focus and investments into these specific techniques and strategies will have a positive effect on female education and the land degradation crisis. As educated women efficiently facilitate the increased education of future generations, exponential improvements in female education can be expected with time.

Conclusion

This study was able to note the international implications of agricultural land degradation in Niger, based on the impacts identified by Potts et al. (2011) and the documentation of environmental migration in Niger by Dr. Tamer Afifi (2011). If the overpopulation and agricultural land degradation crisis in Niger is not expeditiously addressed, a diaspora of climate refugees will be forced out of Niger and inevitably overwhelm the international system. It is necessary to understand these often-unforeseen global consequences of what appear to be isolated environmental crises. In an ever-globalizing world, addressing these issues with decisive action is necessary to avoid what could be debilitating international repercussions.
It is vital to highlight the importance of environmental restoration programs that incorporate community leadership in decisions and attend to local needs. The situation in Niger illustrated how aid from non-local parties can be anywhere from unhelpful to outright damaging. While the policymakers and officials creating these policies generally meant well, they lacked knowledge about the local way of life. The programs that listened to local communities and involved them in decisions enjoyed a high rate of success at a much lower cost than their counterparts. This is understandably the case, as the people living the realities of the agricultural life in these rural areas often know what is best for their land and their people. Organizations and groups who develop programs and policies aimed at addressing environmental issues abroad must be wary of this issue. To avoid inflicting harm, these organizations must make a concerted effort to truly understand the country and community they will be operating in, before developing or implementing programs.

Identifying the cycle of socio-economic and environmental interdependence is a useful and important finding. As this cycle is ubiquitous in Niger, it would be a waste of resources to develop or implement land restoration policies that are not accompanied by policies addressing overpopulation as a cause of land degradation. Pointing this out is not to undermine these land restoration efforts, but to amplify the importance of fully understanding the eccentricities of a situation before developing policy. The parallels between Niger and other nations in the Sahel make it possible to hypothesize that a similar cycle exists throughout this region. More research should be done to explore this hypothesis, while further studies could aim to discover how prevalent this cycle of land degradation is on the African continent and around the world.

Finally, the relationship established between gender inequality and agricultural land degradation in Niger must not be overlooked. This was another important finding, as gender inequality is not traditionally a factor linked to land degradation or environmental issues. In the case of Niger, it proved invaluable and provided the basis for attainable and sustainable environmental improvement. Studies could be done to explore the possibility that gender inequality is perpetuating land degradation and other environmental issues outside of Niger. Furthering this line of inquiry could significantly contribute to sustainable environmental restoration on an international scale.

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