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Indigenous and Local Communities-Led Initiatives for Climate Change Resilience Development in Niger

Ousseyni Kalilou[1,2]

(1. Converging Risks Lab of the Council on Strategic Risks, USA; 2. Gum Arabic Institute of Poverty Alleviation, USA)

Abstract: Covid-19 forewarns the urgency to protect our ecosystem for survival and to prepare nature for future generations. Moreover, the Intergovernmental Panel on Climate Change (IPCC) widely touches, in its new report, on the importance of the input of indigenous knowledge and practices in climate mitigation, adaptation, and resilience. Niger is at the frontline of climate change and environmental-related disasters, such as recurrent floods, severe droughts, diseases, protracted famines, and heat waves. Desertification is advancing downward at an alarming pace, but rural communities have recently begun earning carbon credit revenues through participatory action projects. Local community involvement has been a sine qua non to a local solution to this global issue of climate change. This research examines the local reality of Nature-Based Solutions to preserve and restore the planet. It explores how Community Based Adaptation helps reverse environmental degradation and invigorate livelihood coping strategies exhausted by climate change. Previous research finds that planting trees contributes to climate change mitigation, but other findings suggest a mix of natural and artificial approaches. This investigation examines whether planting specifically indigenous species and promoting Farmer-Managed Natural Regeneration will improve the environment and restore biodiversity. This inquiry is an intellectual interest in constructing knowledge about the plausibility that indigenous and local community initiatives align with the national and local solutions to the global issue of climate-related terrestrial biodiversity loss. Henceforth, to what extent does an extension of the existing environmental peacebuilding success stories in Niger regenerate nature and builds climate change resilience to mitigate the disaster risks? The findings from this fieldwork reveal that planting indigenous species and farmers' re-greening efforts using sustainable land management techniques improves soil fertility, land productivity, and forage, reversing climate change and environmental-related risks and attaining sustainable development goals. Notwithstanding, future research would provide more clues by including ways in which indigenous and local knowledge can smoothly converge with modern knowledge for a more transformative adaptation of climate resilience development.

Key words: climate change, natural resource management, sustainability, disaster risk, indigenous knowledge

JEL codes: Q5, Q2

Ousseyni Kalilou, MBA, MS, Converging Risks Lab of the Council on Strategic Risks; Gum Arabic Institute of Poverty Alleviation; research areas: climate change, environmental peacebuilding. E-mail: ousseynikalilou@gmail.com.

1. Introduction

Niger has 3 climatic zones: Sudan, Sahel, and Sahara. Niger geographic[1] situation denotes a landlocked and essentially desert country.

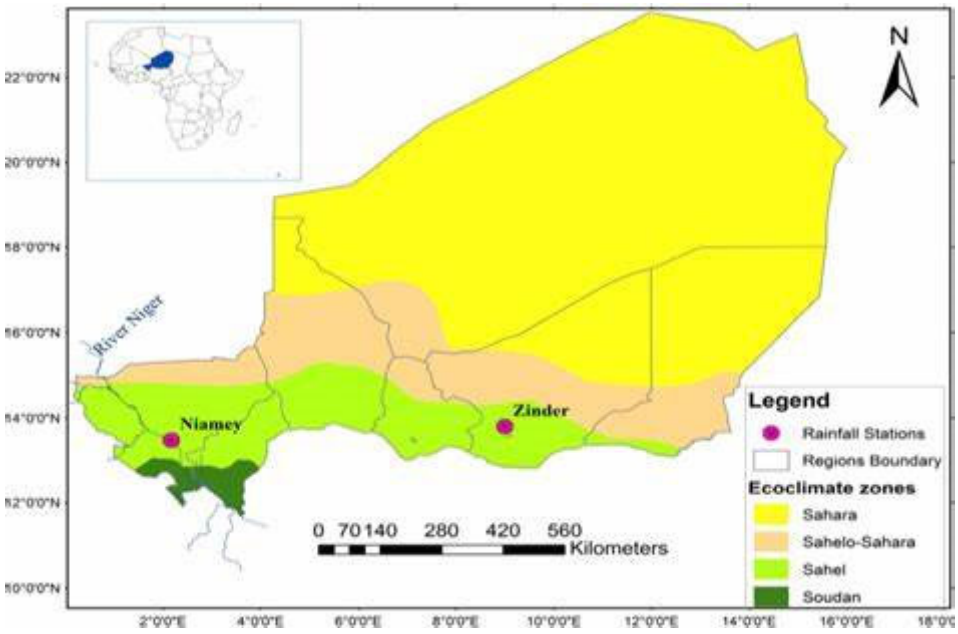

Figure 1 Map Describing Niger Climatic Zones

Desertification is winning downward, leaving behind barren and unproductive land (Sachs, 2015). This ecological disruption is alarming because more than 80% of the population depends on what nature provides (Kalilou, Ousseyni, 2021). Climate change and land degradation increase the recurrence of droughts, alternating with frequent floods. Excessive heatwaves and wind erosion are making the soil infertile. So, Niger's geographical position and climate make its agricultural sector very vulnerable. As a landlocked and essentially desert country, Niger is one of the countries of the world most severely threatened by food insecurity (The Economist, 2018). Niger is at the frontline of climate change and desertification — at least 100,000 hectares of agricultural land are lost yearly (Ministry of Interior, 2018b). There is a considerable effort to re-green the country. August the 3rd, Independence Day is celebrated as the national arbor day (Studio Kalangourou, 2016).

The literature has not, nonetheless, robustly linked natured based solutions to climate change with Indigenous and local communities-led initiatives *(ILCI*) in the particular case of Niger. The present research intends to help address the gap. As the *ILCI* have tremendous ecological benefits and is a booster of crop yield without fertilizer (Kalilou Ousseyni, 2020), this paper may help rethink the unpractical utilization of agrochemicals with the sustainable use of land and its nature-based carbon (Broad & Cavanaugh, 2006; Collier, 2008). The investigation will build around the following research question: How the *ILCI* may contribute to climate change resilience development in Niger? The investigation is a case study of the rural Sahel with fieldwork. This paper outlines the methodology used (in part 2), then it relates the findings (part 3), and the discussion (part 4).

[1] Three-quarters of Niger's 1.27 million km^2 is desert (see World Population Review-WPR 2021).

2. Methodology/Field Research

In this section, I will briefly explain the reasons for the research method, the rationale for the qualitative approach, the sample, and the data collection.

2.1 Overview of the Chosen Method

The field research relied on interviews with experts and specialists, data from the local government institutions and NGOs, and fieldnotes. With the one-on-one interview, the interaction with the participants permitted to gauge the information gathered. The fieldwork was a way to verify the findings from the literature with the reality on the ground based on the data from the experts' interviews, field observations, and documentation. The goal was not to accept or refute the status quo but to bring something new because there was a gap in the existing knowledge about the community-led nature-based solution to climate change. The study used a case study because the topic was about products, the indigenous species (IS), in a specific country, Niger, to categorically contribute to climate change resilience; therefore, the investigation was bounded, and the case was the rural Niger.

2.2 The rationale for the Qualitative Approach

In this context, the field research was to observe a reality on the ground (the socio-economic and ecological advantages of *the IS* for the rural Niger) and make meaning of the hypothesis of the research that planting more IS may be a valuable tool for the natured-based solution of climate change by the rural community in Niger. The collection of the qualitative data consisted of gathering opinions and knowledge through interviews. This study adopted structured person-to-person interviews to follow elaborated questionnaires for the sake of focusing on the topic. Those standardized interviews often became open-ended questions.

The reason for the field observation was to clarify some ambiguous explanations. Another reason was that the investigator (as an outsider) might depict findings that the respondent might find evident because of their experience and expertise. In the field, the observation was interested in the ecological effects of the IS on the degrading soils, the economic benefits, and the social aspects of the *IS*. The accessible documentation was public records, but they were worth consulting them because they gave insights (Kalilou, 2021).

2.3 Sampling

During the pre-departure preparation, the investigator conveniently emailed interview flyers and questionnaires. This study intended to proceed with a convenience sampling of 4 experts in agroforestry, 2 specialists in agrobusiness, 4 village leaders and elders. The field observations took place in the villages of Batogi and Illela. The biomass site of Tchida in the region of Balley Yara was also subject of observation. The field research covered NGOs and governmental institutions in Niamey.

2.4 Data Collection

The data collection consisted of narratives interviews with informants (specialists) in agroforestry, experts in agrobusiness, community leaders, and elders in the villages. The questionnaire for the respondents included 11 questions. The questions consisted of asking the stakeholders' role, how much and how the service became involved in the IS, the impacts of the agroforestry on the crop yield, hunger, desertification, and pluvial season. The questions were also about conflicts, terrorism, livelihood, unemployment, and migration. The questions were as follows:

- What is the role of this entity?
- How much has this entity become involved in IS?
- What is the impact of IS farming on the other crops' yield?
- Do IS have productivity without agrochemicals? How?
- Do ICLI help lower hunger?
- How are the ICLI favorable to land restoration by using IS?
- How can the IS be used in the fight against desertification?
- Can IS help sustain the pluvial season? Then, can IS help lower conflicts between farmers and herders?
- Can IS improve the purchasing power of the village farmers? How?
- Does the self-sufficiency of villagers reduce the recruitment of terrorist groups?
- In which ways will IS trade contribute to improving the livelihood of village farmers by connecting them to global business?

3. Results

In this section, I will lay out the most relevant indigenous and community-led initiatives; then, I will enumerate some indigenous species which may help attain the sustainable development goals in Niger.

3.1 Current Initiatives and Their Implications

A good number of initiatives aim to reverse the underlying effects of climate security in Niger. A carbon credit revenue earned through participatory action projects via Community Action Program (Moustapha, Safia, 2011). using the acacia gum tree illustrates an environmental peacebuilding success story (Kalilou, 2021). The benefits from the afforestation with the Acacia gum tree are twofold. First, communities can now intercrop/dual crop their trees with food crops like groundnut, sesame, green beans, and millet (the local staple food). Second, the local communities can sell carbon credits generated from agroforestry plantations. Twenty-six rural communities accepted the first carbon credit payment to Niger for reducing emissions last year. These communities stretched over six regions of the country. They earned a combined $450,000 for the greenhouse gas sequestrated by 7,200 hectares of Acacia Senegal trees (Serkovic, Mirko, 2020) (The average Nigerien lives on less than $2 a day, according to the World bank recent report) (Serkovic, 2020). This carbon sequestration project spanned 14 years as part of an afforestation/agroforestry project — part of the World Bank's Community Action Program (known as PAC) (Kalilou, 2020).

One of the most famous success stories is the carbon sequestration site of Tchida, which uses the Sustainable Land Management (SLM) technique and the acacia gum trees to help regreen the village and restore the lost biodiversity (Moustapha, 2011; Kalilou, 2021). Projects like this fall squarely within the scope of the environmental peacebuilding field (Kalilou, 2021). The stakeholders involved are: 1) The Niger's Ministry of Agriculture and Livestock (local government); 2) the Franco-Nigerien agri-business, which is called Achat Service International (ASI) (private sector); 3) the World Bank and BioCarbon Fund (external partners); and 4) over 100,000 men, women, and youth of 26 participating communities (Moustapha, Safia, 2011) using the indigenous species, the acacia gum arabic tree, along with the indigenous knowledge, which is the sustainable land management technique of half-moons (the Tondi Garou) (Kalilou, 2020, Kalilou, 2021).

Other initiatives at the community levels are improving climate resilience via Farmers Re-greening Galma, Niger, 1975 & 2003; Batodi region of Niger using SLM practices to improve water access and drought resilience

(UNCCD, 2014); and FMNR (Farmer Managed Natural Regeneration) (UNDESA, 2020). In 1975, during the worst drought that hit Niger, the Galma region had no trees. However, the Galma region in 2003 had a higher tree density (based on satellite imagery reviews) (UNCCD, 2014). These were trees planted by local communities to fight desertification and mitigate drought effects. In some parts of the Batodi region of Niger, water access and drought resilience were improved dramatically by using SLM practices along with the indigenous species. Water levels in depleted underground water rose by up to 14 meters (UNCCD, 2014). Their households have become less vulnerable to drought, and migrants have returned (UNCCD, 2014).

The FMNR was born in Niger in the Maradi region but was extended farmer to farmer via word-of-mouth to the rest of Niger (World Vision. 2018). FMNR is cheaper and works better than tree planting. FMNR, started in 1983 and pioneered by Tony Rinaudo from World Vision, is built on local indigenous knowledge and practices (World Vision, 2018). The FMNR technique is very adaptive to the drastic ecosystem of Niger and the Sahel. As Tony put it, it is about recovering the "forest underground", which is faster, more cost-efficient, and more achievable than afforestation (UNDEA 2020). A typical FMNR project costs $40-$50/hectare; tree planting costs $18,000/hectare." (UNDEA 2020). Nevertheless, the regreening of the lands with IS either via planting or FMNR aligns with the SDGS in many ways.

3.2 Indigenous Species and Sustainable Development

The production of IS can offer options to improve people's livelihoods while conserving forest resources. The natural habitat for indigenous fruit trees has been valuable source for food, income, medicine, fodder, materials for construction and agropastoral (Omotayo & Aremu, 2021). In Niger, the cultivated indigenous species have provided economic benefits, environmental sustainability, and opportunity for social cohesion (Kalilou, 2021).

Moringa (Moringa oleifra): The production potential is developing everywhere in Niger, where climatic conditions are favorable. Production is 93,000 tons; the turnover for the production sold amounted to 3.924 billion FCFA (FAO, 2005). Moringa has an essential internal market and is also the subject of external demand. Moringa is also very commonly used in the treatment of diabetes (Hassoumi, 2005).

Baobab (Adansonia digitata): The rural populations participate in its regeneration by planting in the fields, in villages, and even in the form of small baobab parks (food banks). The baobab provides two main food products, leaves, and fruits, used for consumption and trade. Prices vary from 750 to 1000 FCFA per bag of 100 Kg during the production period and from 6,000 to 7,000 FCFA in the dry season (FAO, 2005). As for the fruits, they are consumed as is or transformed into juice.

Doum palm (Hyphaene thebaica): The doum palm is a species to be developed because of its socio-economic interest in populations. The doum palm is quite widespread in several regions in Niger, covering an area of 281,376 hectares, and opportunities for regeneration exist through agroforestry. Doum leaves are used in crafts (making mats, valves, ropes, etc.), and the fruits are transformed into cakes, biscuits, and jam. The Natural Forest Management Project (2000-2006) has put 31,500 ha of Doum farms with the creation of five (5) counters for doum leaf counters (FAO, 2005).

Gao (Faidherbia albida). Gao is also found in the Sahelian strip and increasingly in the Sahelo-Sudanian strip of Niger. The species is famous for improving soil fertility for crops. The great value given to Gao is due to its leaves and fruits used in livestock feed. This economic function is growing so large that the very existence of the species will eventually be threatened by overexploitation.

Nere (Parkia biglobosa). In Niger, Nere is found in the extreme south of the country in the border areas with Benin and Burkina Faso, more precisely in the departments of Gaya, Falmey, Dosso, Say, and Torodi (FAO, 2005). Beyond domestic demand, seeds and pulp powder are the subjects of significant trade in the sub-region. Women are massively involved in regenerating the species through agroforestry and reforestation.

Shea (Vitellaria paradoxa): In Niger, Shea is found in the country's extreme south in the border areas with Benin and Burkina Faso, more precisely in the departments of Gaya, Falmey, Dosso, Say, and Torodi (FAO, 2005). The demand for shea is strong and comes from domestic, sub-regional, and even international markets (Europe, Asia). Demand for shea is also vital from the confectionery, cosmetics, and pharmacology industries.

Jujube (Ziziphus mauritiana): It is a species distributed in the Sahelo-Sudanian strip of the country and is the most useful plant species. The fruits of the jujube tree are eaten in their raw state and processed into cakes and juices. There are opportunities for regeneration through agroforestry.

Tamarind (Tamarindus indica). Once in abundance in gallery forests in the southern strip of Niger, the tamarind tree is in decline. This regression is due to human action and climate change. It is still found in the south of the regions of Dosso and Tillabéri.

Palm tree (Borassus aethiopum): In Niger, the Palm tree has been used for habitat construction, ripe fruits, hypocotyl ("Miritchi" as indigenous name), immature fruits (kolchini), and petiole used in handicrafts and flowers for livestock feed. These products are sold in domestic and neighboring foreign markets, particularly Nigeria and Benin. This valuable species is much more localized in the south of the Dosso Region, especially in the departments of Gaya, Dioundiou, and Dosso; it plays an essential socio-economic role in the local economy; Thus, a total area of 32,000 hectares has been the protected since 1978 (FAO, 2005) through interventions of some development and conservation projects.

Gum Arabic (GA): The study found that the GA could benefit the region's economic, social, and environmental improvement (Abtew et al., 2014; UNCTAD, 2018). However, while the wild GA is a direct and short-term source of household income for the poor, investing in the farming of the GA will require time to benefit the rural Sahel fully. The gum Arabic tree (GAT) helps fight land degradation and desertification, decreasing food insecurity by increasing land productivity. The participants confirmed the literature findings that *Acacia* is a fixer of the nitrogen in the soil (Heuze et al., 2016) and a creator of the microclimate (Pearce, 1988). Agronomists have proceeded to the afforestation (planting many *Acacia* trees in farms and wild fields) and building *carbon sequestration* sites to add nitrogen to the soil (Kalilou, 2021). Thus, the IS are valuable tools for ILCI to advance in the localized sustainable development agenda.

4. Discussions

Before proposing some recommendations for future opportunities, I will explain how local communities' use of the indigenous species may have broader implications for sustainable development in Niger.

4.1 Wider Implications

Women are the primary collectors and workers in the processing of the IS (SDG 5 and SDG 10). The product derivatives from the IS are indispensable for the multinational companies (MNCs) that utilize them as in cosmetics, pharmaceutics, and food. Therefore, promoting the production (collection, farming, and commercialization of the IS) would benefit the communities. Hence, massive afforestation with IS may improve food security or food sovereignty, economic security at the national level, and source of income for the most

vulnerable (SDG1 and 2). In this vein, promoting the ILCI may generate significant income and employment (SDG 8), particularly for women, the youth, and animal herders (SDG 10). This afforestation with IS may help reduce the rural exodus currently experienced in Niger as a Household livelihood coping strategy and resilience. Specifically, afforestation with the IS may help grow more animal fodder to feed local herds (SDG 15). Furthermore, that may lower violence between Farmer-herder, herder-fisher; fisher-farmer; farmer-government agent (SDG 16).

4.2 Recommendations and Future Opportunities

There is an indispensable need for robust climate finance in such projects to use IS for soil restoration properties (SDG 13). By doing so, that will embrace the opportunity to improve the food security or food sovereignty, economic security at the national level, and source of income for the most vulnerable, and to grow animal fodder to feed local herds. The GAT, for instance, is a Nitrogen Fixing Tree (NFT), which is a natural fertilizer for the poor (Collier, 2008). At the same time, however, the product GA is very sought by MNCs, as an additive in the food industry, cosmetics, pharmaceutical industry, and so on. The Niger government's 3N (Nigeriens Nourish Nigeriens) initiative (Liz Ford, 2012) needs to focus more on the afforestation with the IS (Acacia gum tree, the Baobab, the Palm doom, or the Moringa) in the agenda.

Further research would contribute more to the literature by looking at the individual levels of literacy in nature-based climate change mitigation and the potential implications of the indigenous approaches to climate security practices.

References

Abtew A. A., Pretzsch J., Secco L. and Mohamod T. E. (2014). "Contribution of small-scale gum and resin commercialization to local livelihood and rural economic development in the Drylands of Eastern Africa", *Forests*, Vol. 5, No. 9, p. 952, doi: 10.3390/f5050952.

Abiodun Olusola Omotayo and Adeyemi Oladapo Aremu (2021). "Africa indigenous fruit trees offer major benefits: But they're being ignored", *CBA*, available online at: http://www.cannabisbusinessafrica.com).

Broad R. and Cavanaugh J. (2006). "The hijacking of the development debate: How Friedman and Sachs got it wrong", *World Policy Journal*, Vol. 23, No. 2, doi: https://doi.org/10.1162/wopj.2006.23.2.21.

Collier P. (2008). "The politics of hunger: How illusion and greed fan the food crisis", *Foreign Policy*, November/December.

CRAD and RECA (2012). "Combien pourrait rapporter une plantation de gommiers dans la région de Diffa? (How much would a GA farm would bring to the region of Diffa?)", Chambre Regionale D'Agriculture de Diffa (Regional Chamber of Agriculture of Diffa).

FAO (2005). "Non-timber forest products in Niger: Current knowledge and trends", available online at: http://www.fao.org.

Heuze V., Thiollet H., Tran G., Hassoun P., Bastianelli D. and Lebas F. (2016). "Gum Arabic tree (Acacia Senegal)", Feedipedia, a programme by INRA, CIRAD, AFZ and FAO, available online at: https://www.feedipedia.org/node/342.

Ibrah Hassoumi (2005). "Produits Forestiers Non ligneux ET Gestion Locale des Ressources Locales: Cas du Department de Filingue au Niger (Non-timber forest products and local management of natural resources: The case of the department of Filingue", available online at: http://www.usenghor-francophonie.org.

Kalilou Ousseyni (2020). "How Gum Acacia trees could help build peace in the Sahel", accessed 14 September 2022, available online at: http://www.newsecuritybeat.org.

Kalilou Ousseyni (2021). "Climate change and conflict in the Sahel: The acacia gum tree as a tool for environmental peacebuilding", *International Affairs*, Vol. 97, No. 1, pp. 201–218, doi: https://doi.org/10.1093/ia/iiaa178.

Liz Ford (2012). "Niger seeks funds for Nigeriens Nourish Nigeriens agriculture initiative", *The Guardian*, 13 Nov..

Moustapha Safia (2011). "Projet de plantation d'Acacia senegal. Etude de cas pour la validation du standard climat communautés biodiversité (volet communauté) (Acacia Senegal farming project: Case-study for the validation of the standard climate community's biodiversity — community component", available online at:

https://s3.amazonaws.com/CCBA/Projects/Niger_Acacia_Senegal_Plantation_Project/Ni.

Ministry of Interior (2018b). "Projet de Document de la Politique Nationale des Frontières 2019-2035 (Draft document of the national policy on border 2019-2035)", Niamey Niger: Ministry of Interior and Decentralisation, November.

Niang I., Ruppel O. C., Abdrabo M. A., Essel A., Lennard C., Padgham J. and Urquhart P. (2014). "Africa", in: Barros V. R., Field C. B., Dokken D. J., *Climate Change 2014: Impacts, Adaptation, and Vulnerability, Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.

Pearce D. (1988). "Natural resource management and anti-desertification policy in the Sahel-Sudan Zone: A case study of Gum Arabic", *Geojournal*, No. 3, p. 349.

Roberts W. (2008). *The No-Nonsense Guide to World Food*, Oxford, UK: New Internationalist.

Sachs J. D. (2015). *The Age of the Sustainable Development*, Columbia Press. New York: Sussex.

Serkovic Mirko (2020). "In Niger, a 'crazy idea' to restore degraded land pays off", available onlineat: http://www.worldbank.org.

Studio Kalangourou (2016). "Fête de l'indépendance et urgence écologique (National holiday and ecologial urgency)", Fondation Hirondelle, August, 4, available online at: https://www.studiokalangou.org/index.php/articles/7944-fete-de-l-independance-et-urgence-ecologique.

The Economist (2018). "Hunger in Africa: Famines are becoming more frequent in the Sahel", *The Economist*, 27 Oct..

UNCCD (2014). "Desertification: The invisible frontline", United Nations Convention to Combat Desertification (UNCCD) Report Release, available online at: https://www.unccd.int.

UNCTAD (2018). "Gum Arabic: Growing demand means new opportunities for African producers", *United Nations Conference on Trade and Development*, available online at: https://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1736.

UNDESA (2020). "Farmer Managed Natural Regeneration (FMNR): A technique to effectively combat poverty and hunger through land and vegetation restoration", United Nations, Department of Economic and Social Affairs Sustainable Development (UNDESA), available online at: https://sustainabledevelopment.un.org/partnership/?p=30735.

WPR (2021). "World population review: Niger", accessed on 21 October 2021, available online at: https://worldpopulationreview.com/countries/niger-population.

World Vision (2018). "World vision's 'forest-maker' wins prestigious international award", *World Vision*, September 24.