

Research Application Summary

**Drought recurrence in Africa's Sahel region: nature-based adaptive solutions and implications for smallholders' livelihoods**

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**Abstract**

The Sahel is a region of extreme climatic conditions and recurrent droughts which act as a stumbling block to socio-economic development, poverty reduction and food security in the region. It is a region prone to environmental crises, driven by a multitude of factors including the absence of coherent environmental policies, scanty and erratic rainfall, high population growth rates, poor landscape management practices which induce land degradation (overgrazing, deforestation and forest degradation, continuous cropping), misplaced development priorities and political instability (frequent coup d'états). Understanding the Sahel's environmental crises in general and drought recurrence in particular, is key to finding sustainable solutions to these hazards. It is against this background that this paper examines drought recurrence in the Sahel, laying emphasis on nature-based adaptive solutions and their influence on smallholders' livelihoods. Findings reveal that, droughts have become more recurrent in the Sahel in the past 50 years attributable largely to global warming and climate change as well as other factors such as land degradation. The most adopted nature-based adaptive solutions by smallholders in the Sahel are agroforestry, afforestation/reforestation, conservation agriculture, water harnessing, soil conservation, biodiversity management, pasture management, fallowing, watershed management, changes in tillage, mixed cropping, and farming. These nature-based adaptive solutions contribute positively towards the improvement of smallholders' livelihoods in the face of droughts through the provision of food, fuelwood, milk, meat, income and other products and services. Thus, policies that favour the adoption of nature-based adaptive solutions should be crafted and implemented by policy makers as this will go a long way to foster adaptation and improve smallholders' livelihoods in the face of drought recurrence in the Sahel.

**Key words:** Drought; livelihoods; nature-based adaptation; Sahel; smallholders

**Résumé**

Le Sahel est une région caractérisée par des conditions climatiques extrêmes et des sécheresses récurrentes qui constituent un obstacle au développement socio-économique, à la réduction de la pauvreté et à la sécurité alimentaire dans la région. C'est une région sujette à des crises environnementales, dues à une multitude de facteurs, notamment l'absence de politiques environnementales cohérentes, des précipitations rares et irrégulières, des taux de croissance démographique élevés, de mauvaises pratiques de gestion des paysages qui induisent une

dégradation des sols (surpâturage, déforestation et dégradation des forêts, cultures continues), des priorités de développement mal placées et une instabilité politique (coups d'État fréquents). Comprendre les crises environnementales du Sahel en général et la récurrence des sécheresses en particulier est essentiel pour trouver des solutions durables à ces risques. C'est dans ce contexte que ce document examine la récurrence de la sécheresse au Sahel, en mettant l'accent sur les solutions d'adaptation basées sur la nature et leur influence sur les moyens de subsistance des petits exploitants. Les résultats révèlent que les sécheresses sont devenues plus récurrentes au Sahel au cours des 50 dernières années, en grande partie à cause du réchauffement de la planète et du changement climatique, ainsi que d'autres facteurs tels que la dégradation des sols. Les solutions adaptatives basées sur la nature les plus couramment adoptées par les petits exploitants du Sahel sont l'agroforesterie, le boisement/reboisement, l'agriculture de conservation, la maîtrise de l'eau, la conservation des sols, la gestion de la biodiversité, la gestion des pâturages, la mise en jachère, la gestion des bassins versants, les changements dans le travail du sol, les cultures mixtes et l'agriculture. Ces solutions adaptatives basées sur la nature contribuent positivement à l'amélioration des moyens de subsistance des petits exploitants face aux sécheresses en leur fournissant de la nourriture, du bois de chauffage, du lait, de la viande, des revenus et d'autres produits et services. Ainsi, les politiques qui favorisent l'adoption de solutions adaptatives basées sur la nature devraient être élaborées et mises en œuvre par les décideurs politiques, car cela contribuera grandement à favoriser l'adaptation et à améliorer les moyens de subsistance des petits exploitants face à la récurrence des sécheresses dans le Sahel.

**Mots-clés:** Sécheresse; moyens de subsistance; adaptation fondée sur la nature; Sahel; petits exploitants

## Background

Droughts are a recurrent phenomenon in Africa's Sahel. The adverse impacts of droughts are devastating in the Sahel as drought episodes affect up to 50% of arable land and 80% of total land annually (Rojas *et al.*, 2011; Läderach *et al.*, 2022). In 2022, the Global Report on Food Crises (GRFC, 2022) reported that in the year 2021, scanty and erratic rainfall contributed to up 11% drop in crop production in Sahel countries during the growing season which affected food production and livelihoods in Chad, Mauritania, Niger and Mali. The adverse impacts of this climate change driven droughts have been exacerbated by non-climatic factors such as COVID-19 related shocks, insecurity, conflict and political instability caused by coup d'états which have contributed to an increase in the number of people suffering from severe food insecurity which has gone from 12.7 million persons in 2019 to 24.8 million persons in 2020 (GRFC, 2022).

The severest impacts of droughts in the Sahel affect greatly key staple crops like sorghum and millet which could further worsen the already precarious situation of food insecurity in the region (IPCC, 2014; CIAT, ICRISAT and BFS/USAID, 2020; CIAT *et al.*, 2021). Knox *et al.* (2012) project that by 2050, recurrent droughts in the Sahel will reduce crop yields by 11.3%.

The high dependence on rain-fed food production by over 95% of smallholders makes the Sahel region particularly vulnerable to climate change induced drought episodes (Moorhead, 2009; Läderach *et al.*, 2022). The adverse impacts of droughts on the population in the Sahel was made manifest during the prolonged drought that hit the

region between 1968 and 1993, destabilizing livelihoods, inducing humanitarian crises of epic proportions and precipitating the 1990s Tuareg uprisings (Benjaminsen, 2008; Läderach *et al.*, 2022).

Adapting to these drought episodes is crucial to ensuring food security and sustain the livelihoods of smallholders who are the main producers of food in the Sahel region. Nature-based adaptation is the right path to take to enhance the sustainability of livelihoods and ensure food security. According to the World Bank (2023), there is absolute need to accelerate nature-based adaptation approaches across the Sahel in order to ensure sustainable development in the region. To do this, the world bank recommends investments in grey infrastructures and green interventions such ecosystem restoration, river restoration and wetlands rehabilitation. Other studies conducted in the Sahel such as those of Epule *et al.* (2014), UN REDD+ (2015), UN Paris Agreement (2015), African Climate Change Fund (2016), Mbow *et al.* (2019), Epule *et al.* (2021), and IPCC (2022) have recommended adaptation as a way out of the drought induced food insecurity. Although there have been different studies in the Sahel discussing different adaptation options to drought, few have laid emphasis on nature-based adaptive measures which is the right path to take in the present dispensation of climate change induced droughts and desertification in the Sahel. This study therefore seeks to fill this gap by assessing what has been done so far, as far as nature-based adaptive solutions to droughts in the Sahel is concerned and charting new empirical research paradigms on nature-based adaptive solutions for the Sahel region.

**Study description.** The study was conducted on the Sahel region of Africa which is one of the most drought prone regions in the world. The Sahel (as defined by the United Nations Strategy – UNISS) is made up of the G5 Sahel countries (Burkina Faso, Mauritania, Niger, Mali and Chad) as well as other countries such as Nigeria, Senegal, Gambia, Cameroon and Guinea. With a surface area of 3,053,200 km<sup>2</sup>, a population of over 150 million people and an annual rainfall varying between 100-200 mm and 700-1000 mm in the northern and southern parts of the Sahel respectively, the region is an epicentre of environmental crises notably droughts which adversely impacts smallholders' livelihoods. This study is based on an in-depth review of empirical literature published in the Sahel region. The papers used for the review were sourced from google scholar, Scopus and the Web of Science databases. Word combinations including drought+livelihoods+nature-based adaptation+Sahel+smallholders were used to elicit the most relevant papers for this study.

## Results and Discussion

Droughts have become more recurrent in the Sahel in the past 50 years attributable largely to global warming and climate change as well as other factors such as land degradation. The most adopted nature-based adaptive solutions by smallholders in the Sahel are agroforestry, afforestation/reforestation, conservation agriculture, water harnessing, soil conservation, biodiversity management, pasture management, fallowing, watershed management, changes in tillage, mixed cropping, and farming. These nature-based adaptive solutions contribute positively towards the improvement of smallholders' livelihoods in the face of droughts through the provision of food, fuelwood, milk, meat, income and other products and services.

The UN REDD+ (2015) in different projects in the Sahel, has actively promoted afforestation and reforestation

which is a nature-based adaptive measure fostering adaptation and enhancing mitigation of climate change induced droughts in the Sahel region.

## Conclusion

The Sahel is an epicenter of environmental hazards which calls for better adaptive measures to tackle the different adversities. Nature-based adaptive measures have been recognized as the best option to enhance the adaptive capacity of smallholders while ensuring livelihood sustainability in the Sahel region. From the findings of this study, nature-based adaptation is key to driving livelihood sustainability in the Sahel owing to its diverse products and services which aids smallholders' adaptive capacity. Thus, policies that favour the adoption of nature-based adaptive solutions should be crafted and implemented by policy makers as this will go a long way to foster adaptation and improve smallholders' livelihoods in the face of drought recurrence in the Sahel.

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