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Closing the policy-practice gaps in Nigeria's desertification interventions: a qualitative document analysis of sustainable practice

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ABSTRACT

In Nigeria's frontline states, the southward dryland degradation continues due to the failure of interventions to address the human and natural causes. This study provides a theory-driven evaluation to ascertain the causes of desertification intervention's poor performance. It provides a conceptual model for scaling up interventions towards achieving the 2030 target 15:3 of the Sustainable Development Goals (SDGs). Guided by intervention theory, relevant policy documents on desertification control were analyzed via Qualitative Document Analysis and triangulated by a semi-structured interview, and secondary data with the aid of ATLAS.ti 8. Findings revealed that a weak integration of Sustainable Practice across the policy cycle is responsible for notable gaps in the areas of an absence of participation of Civil Society Organizations and the use of Indigenous Knowledge, non-involvement of local government, and poor community ownership. Others include monitoring lapses, and the non-inclusion of the Land Degradation Neutrality concept – leading to failure in the Sustainability of Policy Instrument. A pragmatic approach integrating multi-stakeholder participation, the establishment of grass-root structure, and situation awareness should be incorporated across the policy cycle. The need for the development of Key Performance Indicators for tracking the progress of the Pan-African Great Green Wall initiative is also required.

KEYWORDS

Desertification; sustainable practice; qualitative document analysis; intervention theory; sustainability of instrument; great green wall

1. Introduction

The failure of global interventions to rollback desertification and tackle its associated impacts has raised a growing concern on the success of similar regional and national level efforts to address the problem (Chasek et al., 2019; Safriel, 2017; Zdruli et al., 2017). Desertification, as declared by the Rio Earth Summit, is a significant obstacle to the attainment of the Sustainable Development Goals (SDGs) (Nkonya et al., 2015), and poses a threat to lives and livelihood in many regions of the world especially the Sahel (Schucknecht, 2016). Over the last two decades, the United Nations Convention to Combat Desertification (UNCCD) has promoted international cooperation among nations and facilitates the development of Regional and National Action Plan (RAP, NAP) for the implementation of intervention measures at regional and national levels (Briassoulis, 2019; UNCCD, 2018). Although, the synergy amongst the international community towards restoring degraded ecosystems is commendable, however, UNCCD is unable to produce desired results (Grainger, 2015) and desertification has continued to be a significant global environmental challenge to the contemporary world (Capozzi et al., 2018).

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World over, the health condition and yield of land are in declension (Briassoulis, 2019; Cowie et al., 2018). A quarter of the land is severely degraded, which affects one-fifth of the human population, and its deterioration is projected to be on the increase by the middle of the century if not abated (Jiang et al., 2019). About 200,000 km^2 of the world's land is lost annually, implying a loss of over 24 billion tons of productive topsoil (Christian et al., 2018). Besides, with the increase in population growth and urbanization, the demand for land increases, and that threatens the livelihood of over two billion people (Cowie et al., 2018). The increased demand resulted in the rise of the economic cost of direct, indirect, and economy-wide impacts of LDD over the decades, ranging from US$ 26 Billion in 1980 to US$ 490 Billion in 2015, and it increased to US$ 500 Billion per year in 2018. These impacts have led to socio-political instability, which worsens poverty, food insecurity, conflict, and migration, especially in the Sahel (Cowie et al., 2018; José et al., 2017). Further, as home to the world's poorest (Nkonya et al., 2015), the drought-ridden and famine fragile Sahel has four people in every five relying on farming-related means for survival, which makes nearly one out of three to face food insecurity. Similarly, its population of 150 million that is projected to hit 340 million people by 2050, will make the region a hotspot for resource scarcity; while the West African states of Chad, Niger, and Nigeria are marked to be at the 'Extreme Climate Risk' (UNOWAS, 2016).

In Nigeria, four out of every five households in the Desert Frontline States rely on fuelwood for domestic heating due to energy poverty (Ben-Iwo et al., 2016; Emodi et al., 2017; Ifegbesan et al., 2016). It has been estimated that with an average collection and cooking hours of 11.92 and 106.48 per month respectively, and a daily fuelwood consumption of 0.776 kg/person/day (translated into a daily loss of over 1.5 million trees), the Nigerian biomass resource is under alarming overexploitation (Kabir et al., 2018; Zaku et al., 2013). These degenerate the already high deforestation rate of 3.5% to a new height of 450,000 ha annually (implying a significant degradation of 2168 Km^2 of arable land). Thus, placing the country at the leading position globally (Daily Trust, 2019; Gujba et al., 2015). In response to these impacts on the environment, the country has seen the emergence of three phases of interventions that were not successful due to the paucity of funds and their reactive response (Connor & Ford, 2014; Gadzama & Ayuba, 2015). The Pre-Independence phase accorded emphasis on securing forest reserves, the Post-Independence phase where collaboration between the federal and other state governments initiated series of afforestation campaigns, monitoring vegetation changes and biodiversity loss in the 1970s and 1980s, and the contemporary phase in which collaborative efforts across multilevel governance's horizontal and vertical diffusion drive attenuation measures. At the horizontal strand, bilateral and regional agreements amongst countries like the Nigeria-Niger Transboundary Commission and the Nigeria-Japan Master plan for the Utilization of Solar Energy in Nigeria have emerged, intending to address specific effects of desertification. While on the vertical, Nigeria has equally channeled a handful of efforts through sectoral interventions, the synergy between central and states governments in restorative efforts, enhancement of legal and institutional framework in the areas of forestry, water resources, energy, agriculture and social development toward tackling desert sprawl (Medugu et al., 2011; Olagunju, 2015).

Despite these interventions, time series analysis shows that the southward movement of the Desert persists over the past decades with 0.6 km^2 per year rate in the 1990s to 0.924 km^2 by late 2018 (Abuza, 2017; Daily Trust, 2019; Gadzama & Ayuba, 2015). The study of desertification risk in the North-eastern part of the country revealed a southward expansion resulting in a drastic decrease in rangeland and water bodies, and an increase in the build-up of the dune (Joseph et al., 2018). These escalations gave rise to questions on what caused the poor performance of those interventions, and how long does the intervention programs last after execution? An inquiry into the Sustainability of Policy Instrument (SPI): the continuous benefit of a policy instrument in the long term (at least for three years or more after an intervention is executed) (Lee & Seo, 2019). The failure of environmental policies has been linked to gaps in the science-policy interface (Koetz et al., 2011; UNEP, 2017). Grainger (2015) highlights the need to strengthen scientific input to augment the missing knowledge to guide restoration practice for desertification. On the contrary, science has provided effective methods of halting deserts, fixing dunes, and restoring ecosystems in many parts of the world (Huang & Yim, 2014). In the Nigerian context, the use of scientific knowledge through Community Reconnaissance, Environmental Impacts Assessment, and Needs Assessment has aided in providing evidence-informed decision-making (EIDM) at the onset of many attenuation projects (Gadzama, 2017).

However, there is a paucity of knowledge regarding best practices for the implementation of interventions that require multi-stakeholder or multi-sectoral cooperation (Harries et al., 2014; Hutton et al., 2017), an indication of a policy-practice interface fault. Therefore, this paper provides a Theory-driven Evaluation (TDE) of Sustainability practice in Nigeria's Policy on Desertification to ascertain the causes of poor performance. More specifically, the article seeks to identify the major desertification interventions in the country, provides insight monitoring on the implementation process, and suggest a conceptual model for scaling up the multiphase intervention towards achieving the 2030 target 15:3 (End Desertification and Restore degraded Lands) of the SDGs.

1.1. Theoretical framework

The effects of an intervention policy can be measured by a sound theory underlying the program, stakeholders, scope, and target groups in describing the implementation cycle (Van Belle et al., 2010). The theory should be able to relate the characteristics of the target community to the overall objectives of the intervention. Driven by the need to enhance the performance of intervention policy in line with the notion of achieving SDG 15:3 target, and the need to promote Evidence-Based Policy-Making (EBPM) toward scaling up (Auriacombe, 2011), the study identifies Program theory or 'Intervention Theory'. The dual function of Intervention Theory is to ascertain the effectiveness of programs and to identify variables to acquire data for improving performance in the formative evaluation (Mickwitz, 2003).

The Theory Driven Evaluation is designed to avail solutions to challenges confined to the pre–post and input-output evaluation concepts. The intervention theory provides a hypothesis that can be tested by analyzing the components of the program (Normative and Causal theories). The Normative theory (Action Model) explains the reason and the need for an intervention and reflects the target goal of policymakers and the objectives of the program. It reveals the trend of execution and the idea of whether policy failure is due to Project design or implementation traps (Van Belle et al., 2010). The Causal theory (Change model or theory of change) deals with the systematic manipulation of actors (stakeholders: agencies, staff, individuals, Civil Societies, policymakers), resources, policy structure, and the target group to achieve intervention goals (Chen, 2012; Mickwitz, 2003). It deals with the causes and effects and what triggers the cause of failure, and as well as the intervening variables that produce change (Van Belle et al., 2010). Intervention theory guides evaluators to understand the implicit supposition of a multifaceted Policy (Harman & Azzam, 2018). Thus, this study utilizes the theory to evaluate how relationships between the policy goal, inter-play of actors and resources, and the causes of change influence the performance of desertification control interventions in Nigeria.

2. Materials and methods

2.1. The desert frontline states

In Nigeria (Latitude 4° and 14° N and 3° and 15° E), the Desert affects an area 40% of the nation's landmass. It covers a cluster of eleven most vulnerable States within Latitude 10° to 14° N and °Longitude 3° and 14° E formally referred as 'the frontline states' (Gadzama & Ayuba, 2015; Ifegbesan et al., 2016). The southward advance of the dryland degradation has extended into four buffer States in the Central region over the past decades. Recently, renewed efforts to attenuate desertification and restore degraded ecosystems are going on across Nigeria's Sahel. Figure 1 presents the Desert frontline States and the ongoing interventions to mitigate desertification.

2.2. Qualitative document analysis

Qualitative Document Analysis (QDA) was adopted for this study to evaluate policy intervention documents related to Desertification in Nigeria. The QDA approach stringently and systematically analyzes relevant

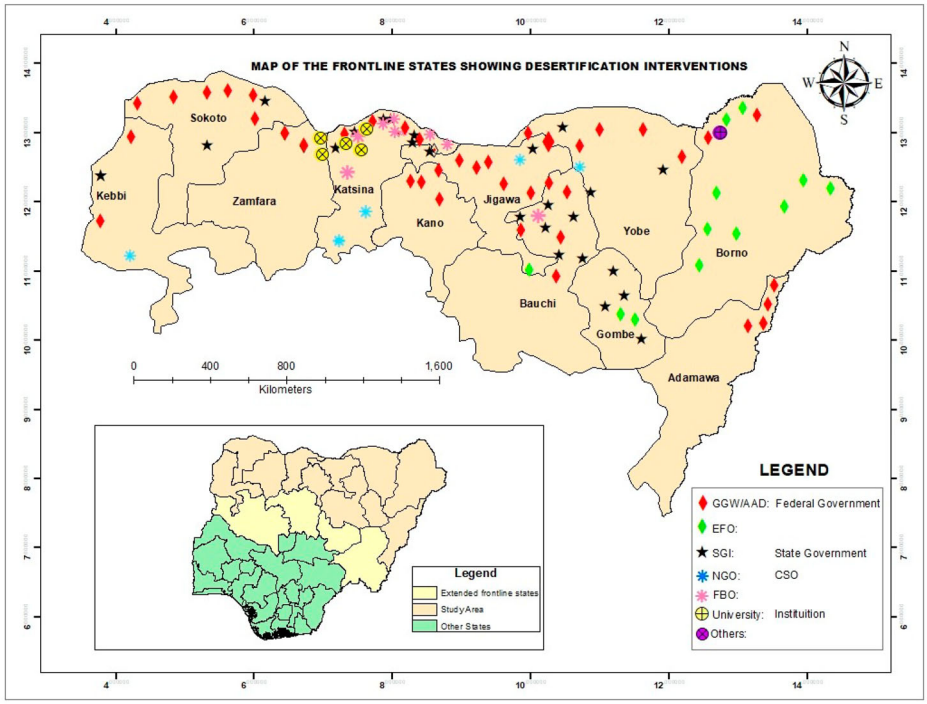

Figure 1. Map of the study area showing various on-going interventions to attenuate desertification. *GGW/AAD = Great Green Wall/Action Against Desertification. EFO = Ecological Fund Office. SGI = State Government Interventions. CSO = Civil Society Organizations. NGO = Non-Governmental Organizations. FBO = Faith-Based Organizations. For this study, we consider FBO and NGO under CSO.

documents based on the researcher's acquaintance (Altheide & Schneider, 2013; Wach, 2013). Unlike Content Analysis which entails the quantification of words, QDA deals with the contextual interpretation and description of words and how they are reflected in practice (Altheide, 2000; Wach, 2013; Warshaw & Upton, 2018). The QDA analyses different intervention policy documents using Sustainable Practice Themes to ascertain the relationships between intervention programs and stakeholders' interaction, and how one policy compliment or contradicts another (Nave & Franco, 2019; Okpara et al., 2018).

The QDA approach is employed in this paper to covers the steps presented by Wach (2013) and Ward and Wach (2015). The approach includes: [a] Setting inclusion criteria for the documents, [b] Collecting documents, [c] Assessing documents based on sustainable practice themes, [d] Coding of documents (themes and Sub-themes) and Pattern for Analysis, [e] Validating the process, and [f] Analysis.

2.2.1. Setting the inclusion criteria for the documents

The inclusion criteria for selecting related Ministries, Department and Agencies' (MDAs) policy documents through literature review, and studying the portals of the MDAs were conducted. Recent policy documents were collected and used for the analysis. The relevant policy documents related to desertification identified by Chinweze et al. (2017); Medugu et al. (2011) and Gadzama (2017) are:

- National Policy on Environment NAPE 2017
- Nigeria Agriculture Promotion Policy NAPP 2016
- National Forestry Policy NAFP 2006
- National Water Policy NAWP 2016
- National Gender Policy/Strategic Plan NAGP 2006
- National Renewable Energy and Energy Efficiency Policy NAEP 2015

- National Social Protection Policy NSPP 2016
- National Agency for the Great Green Wall Action Plan NGGW 2015

2.2.2. Assessing documents based on sustainable practice themes

The building block of the Sustainable Service at Scale (2011) was adapted as the framework for analysis in the study. In line with relevant literature, the building blocks were modified to reflect Sustainable Practice elements in the context of desertification attenuation. Each policy document was analyzed to determine its alignment with the themes of the modified building block. For impartial and consistent analysis, the methodology explains the main themes based on the alignment of the documents with the sub-themes (codes), see (appendix) Table A1.

2.2.3. Coding documents (themes and sub-themes) and pattern of analysis

A total of four sub-themes were generated based on seven themes in the framework for analysis. Overall, there is a total of seven themes with twenty-eight sub-themes depicting elements of sustainable practice across the policy cycle of the intervention policies. Text within the policy documents that highlight any of the codes were identified. Similar codes were grouped into themes, which were assessed for Sustainability of Policy Instrument and themes rated on a scale of 0–3 (from poor to very good). The rating criteria implies:

- Poor: Absent in the document and practice = 0
- Limited: only mentioned in policy documents = 1
- Good: Described in details for implementation = 2
- Very good: detailed in documents and reflected in practice = 3

2.2.4. Validating the process

Impartiality and dependability are the related principles guiding the QDA process. Dependability entails the ability of analysis to yield the same result when replicated under the same scenario. A notable shortcoming of the QDA is that the documents do not often reflect what is obtainable in practice, and at a time, the practice itself keeps improving. The shortfall in practice was addressed through triangulated informal interviews and other secondary data. Based on the principle of saturation (Guest et al., 2020; Moser & Korstjens, 2018), Key Informant Interview (El-Jardali et al., 2014) was conducted with the spokespersons who are conversant with the operations of their agencies and tasked with the duty of image-making and relating with the public. Prior notice of two weeks stating the objectives of the interview was issued to the agencies via their official e-mail and telephone contacts to enable them avail the right respondents. The Public Relations Officer or representative from each of the agencies was interviewed. Questions relating to sustainable practices in a semi-structured format was administered to the five interviewees (n=5) through telephone calls (Nave & Franco, 2019). The (interview) manuscript was sent via e-mail to the interviewees for respondent validation, and upon verifying and confirming their responses, the manuscripts form part of the documents for analysis. Table 1 presents the profile of the respondents.

2.2.5. Analysis

The data collated from the documents were analyzed based on the generated codes to determine the sustainable practice trend with the assistance of ATLAS.ti 8 software. A scale of 0–3 (from poor to very good) was used to rate themes in terms of sustainability of policy instrument.

2.3. Triangulation

Documents relating to various policy mixes were analyzed to understand the policy trend. Contrary to examining the 'Instrument mix' only, which refers to a combination of tools within a single policy structure, this

Table 1. Demography of key respondents in the ongoing interventions in the study area.

Characteristics	NEWMAP	NAGGW	SMOE	CSOCP	Institutions
Gender	Male	Male	Male	Female	Male
Age (years)	41	53	58	32	61
Qualifications	M.Sc	Masters	B.Sc	Diploma	PhD
Occupation	Civil Servant	Civil Servant	Civil Servant	Volunteer	Civil Servant
Positions	PRO	Coordinator	Director	Agent	Professor
Experience (in years)	11	23	30	04	33

Note: NEWMAP: National Ecological and Watershed Management Program; NAGGW: National Agency for the Great Green Wall; SMOE: State Ministry of Environment; CSOCP: Civil Society Organization – Community Partners; Institutions: Universities Research Centers for dryland studies in the study area. $n = 5$.
Source: Researchers interview conducted between mid-November to early December 2019.

study analyzed 'Policy mix' – a combination of tools covering many policy frames (Mantino & Vanni, 2019) relating to desertification intervention. Also, to understand the practice trend, data from secondary sources and informal semi-structured interview were employed (Okpara et al., 2018).

3. Results

3.1. The emerging codes

The analysis allowed for the assessment of Sustainable Practice codes within the policy documents. Table 2 presents the result for each sub-theme under these policy documents, and practice based on the adopted rating criteria (3 = very good, 2 = good, 1 = limited, and 0 = complete absence).

3.2. Relationships among themes

Reading through the policy documents while coding, a total of 174 quotations relating to the 28 Sub-themes for sustainable practice were identified. Figure 2 shows the network of relationships of how one sub-theme affects the other.

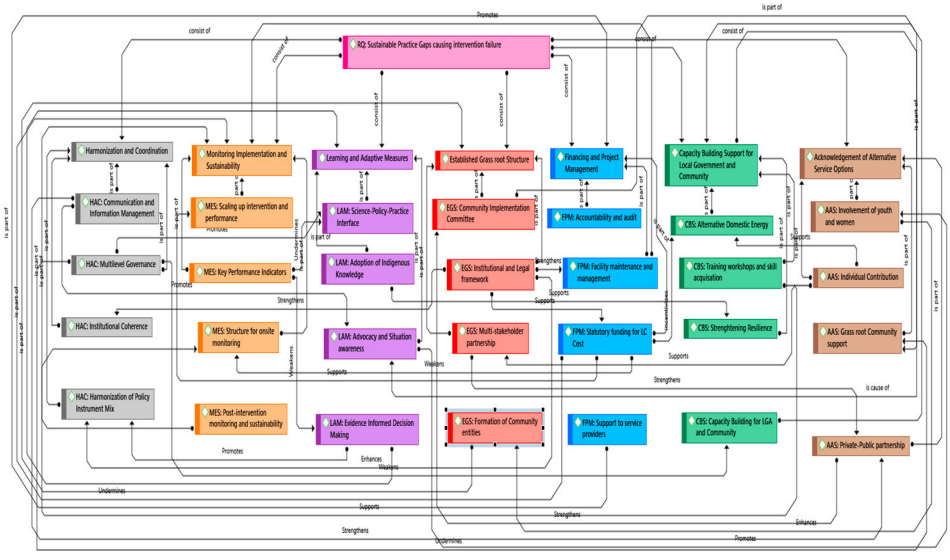

Figure 2. Diagram of the network showing the cause-effect relationships between sustainable practice sub-themes.

Table 2. Scoring of Sustainable practice sub-themes using the rating criteria.

Sub-themes	NAPE	NAEP	NAWP	NAGP	NAFP	NAPP	NGGW	NSPP	INTV
Themes 1: **Established grass-root structure**									
Formation of Community Management Entities	2	2	1	2	1	1	2	2	2
Community Implementation Committees (LIC, CIC)	2	1	1	1	1	2	2	1	2
Institutional framework/Legitimacy	2	1	1	2	3	3	2	3	2
Multi-stakeholder partnership	2	1	2	2	2	2	2	2	2
Themes 2: **Acknowledgement and integration of alternative service options**									
Individual contribution to intervention component	1	1	0	0	1	1	2	2	1
Presence of grass root volunteer support	1	0	1	1	1	1	2	1	1
Public private partnership and support	2	2	3	2	2	2	3	1	1
Involvement of Youth and Women groups	2	2	2	2	2	2	3	3	3
Themes 3: **Monitoring delivery of intervention Component and Sustainability**									
Key Performance Indicators	0	1	2	0	2	2	0	1	1
Onsite monitoring and feedback	2	2	2	2	2	3	2	2	2
Scaling up intervention and performance	2	2	2	2	2	2	2	2	1
Post-intervention monitoring and sustainability (of project's benefits)	1	1	1	1	1	1	1	1	1
Themes 4: **Harmonization and Coordination**									
Harmonization of policy instrument mix	1	1	1	2	2	1	2	1	1
Institutional coherence/ inter-agency coordination	2	1	2	1	2	2	2	1	1
Multilevel governance	2	2	1	2	2	2	3	2	2
Communication and information management	1	2	1	1	1	2	1	2	1
Themes 5: **Capacity Support for Local Government and Community**									
Capacity building	2	2	2	2	2	2	3	1	2
Resilience building	2	2	2	2	2	2	2	1	2
Training workshops and skills acquisition	2	2	2	2	2	2	3	3	3
Alternative (Domestic/efficient) energy	1	3	2	2	2	2	2	2	2
Themes 6: **Learning and adaptive measures**									
Adoption of indigenous knowledge	2	2	3	3	2	3	1	2	2
Advocacy/ Situation Awareness	1	2	1	1	2	1	1	1	2
Science-Policy-Practice interface	2	2	1	2	2	1	2	1	1
Evidence Informed Decision Making	2	2	3	2	3	2	3	1	1
Themes 7: **Financing and Project management**									
Statutory funding for intervention life cycle cost	2	2	2	2	2	2	2	2	2
Facility maintenance and management	2	1	2	1	2	2	1	2	2
Accountability/audit	2	2	2	2	2	2	2	1	1
Support to service providers	1	1	1	1	1	1	1	2	2

Notes: NAPE = National Policy on Environment. NAEP = National Energy Policy. NAWP = National Water Policy. NAGP = National Gender Policy. NAFP = National Forestry Policy. NAPP = National Agricultural Promotion Policy. NAGG = National Policy on the Great Green Wall. NSPP = National Social Protection Policy. INTV = Interview.

4. Discussion

4.1. Ongoing interventions

Figure 1 presents the typology of various ongoing intervention efforts to rollback desertification in the study area. The four types are: [1] the Federal Government's Ecological Fund Office (2009–2014) and the National Agency for the Great Green Wall. The NAGGW takes effect in 2015 and has since become the agency implementing intervention policies on desertification, thereby making other policies play a complementary role to the GGW intervention. Apart from the Social Intervention Policy (that is designed to strengthen the capacity of the youth and the vulnerable) which does not spell out any provision for attenuating desertification or restoring degraded ecosystems, other policies have highlighted sectoral roles in providing enabling grounds for addressing either one cause or impact of desertification. [2] State Governments Interventions: many states in the frontline have evolved afforestation measures in many communities ravaged by LDD (Abdulrashid, 2017). At the State level, the ministries of environment and forestry divisions are mandated to handle the interventions. [3] Contributions from the Civil Society Organizations (CSOs): including Non- Governmental Organizations and Faith-Based Organizations such as the Jama'atul Nasril Islam and the Catholic Caritas are actively assisting in the areas of afforestation especially in Jigawa and Katsina States respectively, though on a

standalone basis. [4] Institutions: Universities and other Tertiary institutions across the frontline state are also involved in the restorative task. Many of them have either a center or research division on dryland or desert monitoring and control. Although most of their activities are yet to get to the affected communities. For instance, the Center for Biotechnology, University of Maiduguri, and Center for Renewable Energy, Usman Dan Fodio University, and the Forestry Research Institute are noticeable. Table A2 presents a summary of the interventions and their category by the respective stakeholders.

4.2. Associations between codes

In overall, the result (Figure 3) reveals that four themes among the seven sustainable practice themes were 'good' whereas, three themes were limited in practice. The 'good' includes learning and adaptive measures, capacity building support for local government and community, harmonization and coordination, and established grass-root structures. While financial and project management, monitoring and delivery of intervention components and sustainability as well as the integration of alternative service options were limited.

4.2.1. Established grass root (community) structure for implementation

The result in Figure 2 identified four sub-themes: Community implementation committee (with 14 quotations within the policy-practice documents), Institutional and legal framework (14), Formation of community entities (7) and Multi-stakeholder partnership (5) as part of this theme. Community implementation Committee (at local grass-root) is missing in the shelterbelt states, except for the three States (Table A2) where the Action Against Desertification (AAD) component is taking place (Sacande et al., 2018). This affects the professionalization of community entities and the coordination of stakeholder partnerships. The legal and institutional framework with a 'good' score in Table 1 for its structural and non-structural provisions, lags for its old ineffective laws at the federal and state levels that do not provide adequate punitive measures to indiscriminate/unsustainable felling of trees (Abuza, 2017), and the lack of staff structure by the National Great Green Wall agency within the region.

4.2.2. Acknowledgement and integration of alternative service option

The codes Individual contributions to intervention component (having 3 quotations from the policy-practice), Involvement of youth and women (5), Public-private partnership (11), and Grass-root community support (5) form this theme. Table 2 shows that individual contributions and grass-root support received a lower average score across the policies. However, since there is no provision for land acquisition, some people have donated

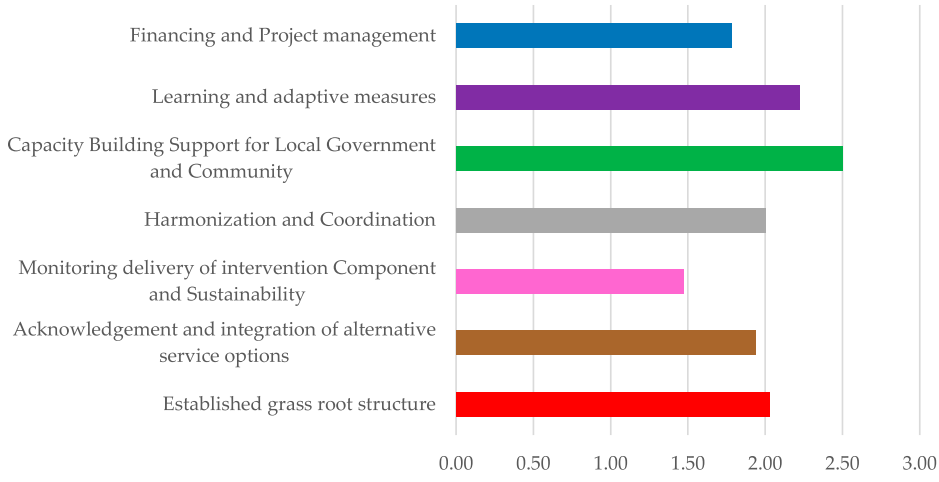

Figure 3. The overall rating for Sustainable practice themes.

land for implementing project components across the frontline states to support the GGW restoration efforts which require every available stakeholder. Public-private partnerships equally scored low due to lack of situation awareness, participation, and community ownership. There is the absence of the Civil Society Organization in the GGW intervention, and even where they operate, their participation is independent or in partnership with the state government. Individual contribution enhances multi-stakeholder partnership, while grass-root community support was found to compliments activities of community implementation committee at the grass-root level.

4.2.3. Harmonization and coordination

Figure 2 illustrates the association between Harmonization of Policy mix (with 2 quotations), Multilevel Governance (10), Institutional coherence (10), and Communication and information management (2). All subthemes under Harmonization and coordination received a lower rating because of conflicting objectives, duplication of functions amongst agencies, and unclear specification of medium for inter-agency collaboration. Though it's now clear that the mandate for Desertification control rests with the NAGGW based on regional cooperation, the transition period is yet to be completed by some of the agencies such as the supply of the energy-saving stoves under the Ecological Fund Office. More so, a week multilevel governance within the vertical strand (that is the collaboration between Federal, State, and Local Government) has affected the establishment of the Local Government Implementation Committee. The absence of Local government autonomy has rendered the closest tier of government responsible for immediate response to environmental stress at the grass root to be ineffectual (Abdulrashid, 2017; Kim et al., 2020) in coordinating Communities and engaging volunteers. There is a well-designed means for information flow, but the weak structure at the grass-root level has undermined the information dissemination.

4.2.4. Monitoring implementation and sustainability

Under this theme, structure for onsite monitoring (having 15 quotations), Key Performance Indicators (5), Post-intervention monitoring and Sustainability (6), and Scaling up intervention and performance scored a low rating. Absence of the implementing agencies in the frontline states due to centralization (with only the head office for the GGW in Abuja) and a human resources shortage has left monitoring on the hands of local authority staff who often live outside the communities where interventions are sited. The side-lining of the state focal/desk officers has weakened multilevel governance in practice. As presented in Figure 3, the structure for monitoring in the overall rating of sustainable practice themes score a very low (1.43).

4.2.5. Capacity building support for local government and community

Figure 2 illustrates that Training workshop and skill acquisition (with 4 quotations), Capacity building support for local government (9), strengthening resilience (4), and Alternative domestic energy sources (6) formed the theme 'Capacity Building support for Local Government and community'. Figure 3 revealed the highest score of 2.50 for the theme, indicating a rating above 'good'. However, with the majority of the populace depending largely on fuelwood for domestic energy, much needs to be done to strengthen resilience especially in the area of providing efficient and affordable sources of domestic energy to shift pressure from biomass exploitation which has been a cause and also a consequence of desertification.

4.2.6. Learning and adaptive measures

Sub-themes under this theme include Evidence-informed decision-making (with 5 quotations), Adoption of indigenous knowledge (6), Science-policy-practice interface (6) and Advocacy, and situation awareness (11). Overall, the theme is the second-rated amongst all with a score of 2.22, indicating above 'good' in practice. Figure 2 shows that the adoption of indigenous knowledge supports resilience building, while advocacy and situation awareness strengthens public-private partnerships, individual contribution, and grass-root community support.

4.2.7. Financing and project management

Financing and management of projects consist of Facility maintenance and management (2), Support to service providers (5), Statutory funding to cover the life-cycle cost of projects (7) and accountability, and audit (4). The theme scores 1.79, a rating near good. Statutory funding was found to support capacity building and scaling up and can incentivize domestic energy sources (for example, energy-saving stoves). On the contrary, it weakens onsite monitoring, advocacy, and awareness.

4.3. Gaps in the policy-practice interface

All other intervention policies focused on addressing a single cause or consequence of desertification except the GGW that is mandated to tackle both. As a coordinated policy with packs of activities in an array of the policy mix, it repealed other sectoral policies in the fight against desertification. However, the slow pace of progress in the implementation of the GGW intervention in Nigeria is attributed to some policy-practice gaps that hinder sustainability (Adanikin, 2019).

4.3.1. Key performance indicators

Under the theme 'established grass-roots community structure' Table 2, there is an absence of Key Performance Indicators (KPI) in the sub-theme to track the progress of the intervention towards attaining the goals of the GGW in the policy documents and triangulated sources (interview). KPI provides an enabling framework for acquiring data and guiding monitoring and evaluation for evidence-informed decision-making (Howlett & Cuenca, 2017; Perveen et al., 2017). Every intervention with a stipulated time frame for meeting its target should have tracking indicators at the onset to enable monitoring progress and performance evaluation that will guide scaling up and onward decisions. Monitoring and evaluation have been identified as an integral component to the success of the GGW, but the KPI for monitoring is yet to be developed (PAGGW, 2018; Schucknecht, 2016). Therefore, the National Agency for the Great Green Wall is currently monitoring the implementation of intervention components (project execution) rather than progress towards achieving the overall goals of the time-bound intervention.

4.3.2. Indigenous knowledge

Indigenous knowledge plays a significant role in strengthening the resilience of grass-root communities (Bruchac, 2014). It is the set of traditional beliefs, knowledge, and total experiences of the local people in preserving their culture and landscape over time. Results have shown (Table 2) that in the 'learning and adaptive measures' theme, the sub-theme 'indigenous knowledge' (IK) is absent in sustainable practice in the frontline states. Globally, IK such as the Zai (Burkina Faso) and Half-moon (Niger) have proved to be an effective means for building capacity and strengthening the resilience of communities towards adapting to climate change (UNCCD, 2016). In the frontline states, adoption of IK in agriculture has assisted in boosting the local economy, cutting government cost for capacity building, provide basic scientific insight and methods for land restoration and adaptation to climate variability, and provided an avenue for individual and community participation (Ajani, 2013). Though there is a handful of IK practiced by communities in the area of agriculture in the region, it is evident that none has been utilized for land restoration by the GGW intervention.

4.3.3. Multi-stakeholder participation

With the GGW initiative aligned with the 2030 target of the SDG, there is the need for participation at all levels to facilitate the implementation of the intervention. An all-inclusive bottom–top partnership building approach that provides ground for the participation of relevant stakeholders is urgently required. This will enable the involvement of individuals and organizations in achieving the broad targets of the GGW. Result Table 2 shows that under the theme 'established grass-roots community structure', though there is a framework for multi-stakeholder participation in the document, currently, there is the complete absence (a gap) in the involvement of Civil Society Organizations (CSOs) and limited input from individual contributions (IUCN, 2019).

The CSOs that were involved in the restoration efforts in the frontline states are either operating standalone or in collaboration with the state governments. More so, individual contribution is also rare. Across the world, recognition of individual contributions has been known to encourage local people to partake in restoration efforts, and key contributors from China, Brazil, and Burkina Faso have won awards in recognition for their contributions.

4.3.4. Funding to cover the life-cycle cost of intervention components

The results have shown no provision for statutory funding of the intervention components in the documents as well as in practice over the years. Since the take-off grant for the agency, funding for the GGW is erratic and depends on the allocation of the Ministry of environment. Recently in December 2019, the bill for the statutory funding of the GGW which set aside 15% of the Ecological fund for the Agency was assented by the president.

4.3.5. Advocacy and situation awareness

Table 2 revealed the presence of a channel for advocacy and public enlightenment. The plan is designed to cover the school curriculum and outreach to grass-root communities. Despite the presence of community radio stations across the frontline states, there are no collaborative sensitization programs to inform and enlightened communities on the need to participate in advancing the cause of the intervention. Only a few media outlets are giving attention to the coverage of the GGW activities. This makes the intervention less popular to attract people's participation, especially at the frontline rural communities with severe desertification impacts.

4.3.6. Land degradation neutrality (LDN)

LDN is 'the state whereby the amount of land resources necessary to support ecosystem functions and services and enhance food security remains stable or increase within a specified temporal and spatial scales and ecosystems' (Chasek et al., 2019). Though targets have been set in this regard in Nigeria, findings from this study have shown the dearth of the conceptual framework for the implementation of LDN at the national level in both documents and triangulated sources.

4.4. Bridging the policy-practice gaps

Policy-practice gaps in an ongoing intervention can be bridged through a framework (Conole, 2010) that articulates measures for covering the legal, institutional, financial and technical lapses in a model for scaling up since a feedback loop exists between performance and practice, and practice and policy (Pradhan et al., 2017). A model is a system that provides a basis for inference to those who conceptualize policy or projects (Cuéllar-Gálvez et al., 2018). Scaling-up in this context refers to the process by which action is taken to improve the scope, size, importance, and coverage of an intervention policy, program, or project to reach a larger number of people or community (Frake & Messina, 2018).

To scale up the GGW to meet up with the 2030 targets of SDGs, the law establishing the National Agency for the Great Green Wall (NAGGW) has already provided an avenue. The law stated:

> … Notwithstanding the meaning of frontline States under section 29 of this act, the council shall, with the approval of the National Assembly, from time to time, by Order published in the Gazette, alter, add, delete or amend the provision of the First Schedule to this Act to include more States of the Federation of Nigeria that may be affected with drought and desertification.
>
> - Quote from the Act establishing the NAGGW, 2015.

Therefore, with the poor overall rating of the GGW in terms of Sustainability of Policy Instrument due to a weak integration of Sustainable practice across the policy cycle, and with the continuous expansion of the dryland degradation southward engulfing four more states (Taraba, Plateau, Niger, and Kaduna) herein referred to as the 'extended frontline States' (Figure 1), a conceptual model is proposed for scaling up the intervention in terms of performance and coverage (Figure 4).

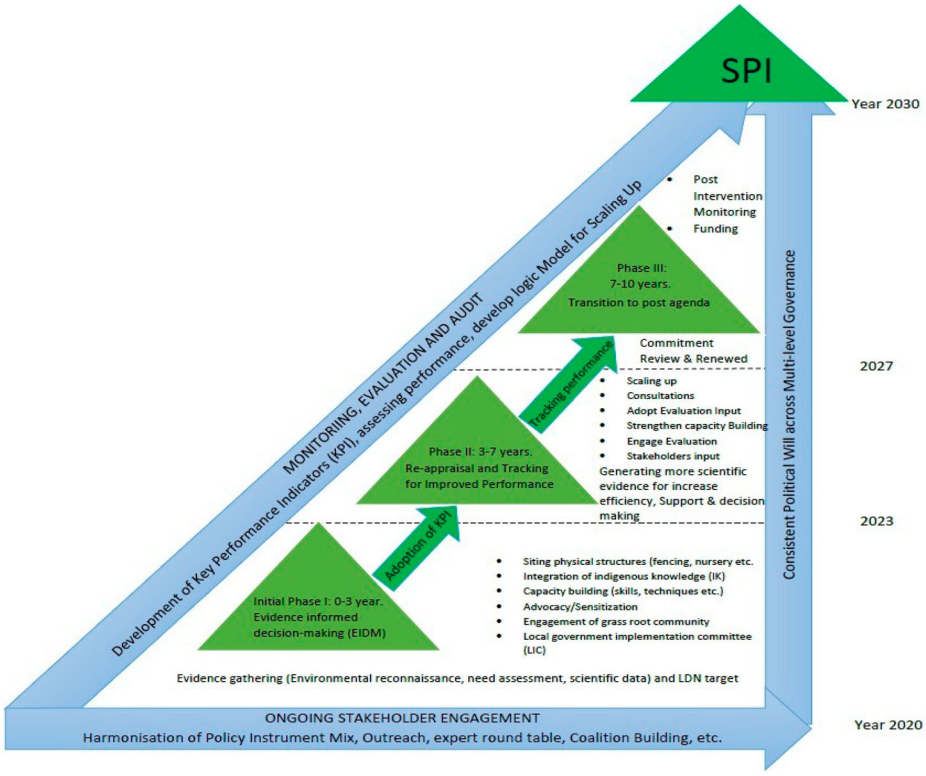

Figure 4. A conceptual model for scaling up the Great Green Wall intervention in Nigeria. SPI = Sustainability of Policy Instrument.

The model suggests the adoption of strategic planning in implementation as against the current design in use. Strategic planning enables the execution of projects in phases based on available resources and ensures efficient and sustainable implementation of initial components before proceeding to the subsequent stage. The study equally suggests the incorporation of the Sustainable Practices identified in the paper to enhance the performance of the intervention. This could be achieved by granting autonomy and involving local governments to strengthen grass-root participation and community ownership; provision of adequate funding to cover the life cycle of intended projects; the use of existing community radio stations, community leaders and CSOs to raise situational awareness and sensitization; and the utilization Indigenous Knowledge, Individual Contributions and modern technology of desertification control (such as photovoltaic agriculture, seedling greenhouse, etc.). Other suggestions include repealing old biomass conservation laws and strengthening the enforcement of new ones; development of KPI to track the progress of interventions and a logic model (theory of change) for upgrading objectives and coverage of the intervention in terms of area (local governments) and population (capacity building and empowerment).

5. Conclusion

This study presented a theory-driven evaluation of Nigeria's intervention policies on desertification and contributed to the establishment of Sustainable (Best) practices for the restoration of desertified land. It outlined the effects of (not) integrating these practices on the performance of Nigeria's efforts on desertification control'. The results have shown that lack of emphasis on sustainable practices across the stages of the policy cycle triggered some policy-practice gaps in the areas of stakeholder participation, policy coherence and poor multi-level governance (at the formulation stage); while lean budgetary allocation, poor situational awareness and

sensitization, and the non-integration of the LDN concept (at the planning stage); as well as the absence of indigenous knowledge, individual contributions and a weak public-private partnership (at the implementation stage). These gaps combined to undermine the sustainability of the policy instrument in most cases a few months after the project has been executed.

Although the study has revealed a good presence of most of the sustainable practice elements in the policy sphere, it substantiates that the failure of interventions within the Nigerian context is as a result of the inability to reflect policy content into practice. The policy design in Nigeria is generally seen as good with few shortfalls in important areas such as staffing and centralization of the agency structure far away from the implementation sites.

The implications of the findings especially for the cause–effect relationships among sustainable practice sub-themes are that the lack of statutory funding has affected the implementation of key intervention component such as dune fixation; the absence of Key Performance Indicators (KPI) has hindered the smooth conduct of monitoring and evaluation of performance; lack of incentives on alternative domestic energy sources and lack of enforcement of law and clear punitive measures to indiscriminate tree fellers infringed on resilience-building efforts of the communities. Also, the absence of local government autonomy affects harmonization and coordination as well as a public-private partnership at the grass root.

The Qualitative Document Analysis methodology used in this study relied on documents and was complemented by an interview with relevant stakeholders involved in the implementation processes. However, a notable limitation of the research was that it does not seek out the perception of the community regarding the performance of the intervention due to the absence of Key Performance Indicators. Thus the study recommends further work to develop KPI for tracking progress, evaluation, and guide decision-making. The Social Protection Policy needs to engage youth as 'environmental vanguards' similar to the N-Education and N-Agriculture supporting communities in these sectors. And the need to encourage local production of energy-efficient stoves as well as incentives to reduce the pressure on biomass.

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References

Abdulrashid, L. (2017). Farmers' perceptions of drivers of desertification and their impact on food security in Northern Katsina State. *International Journal of Innovative Environmental Studies Research*, *5*(2), 17–27.

Abuza, A. (2017). The law and policy on curbing desertification in Nigeria : A contemporary discourse. *Journal of Juridical Science*, *42*(2), 65–103. https://doi.org/10.18820/24150517/JJS42.v2.3

Adanikin, O. (2019). *Investigation: Failed contracts, lack of community ownership mar multi-billion Naira great green wall project*. https://www.icirnigeria.org/investigation-failed-contracts-lack-of-community-ownership-mars-multi-billion-naira-great-green-wall-project/

Ahmed, M. Y., & Oruonye, E. D. (2017). Challenges of enforcement of Forestry Legislation in Taraba State, Nigeria. *International Journal of Geography and Geology*, *6*(3), 48–57. https://doi.org/10.18488/journal.10/2017.6.3/10.3.48.57

Ajani, E. (2013). Use of indigenous knowledge as a Strategy for climate change adaptation among farmers in sub-Saharan Africa: Implications for policy. *Asian Journal of Agricultural Extension, Economics & Sociology*, *2*(1), 23–40. https://doi.org/10.9734/ajaees/2013/1856

Altheide, D. L. (2000). Tracking discourse and qualitative document analysis. *Poetics*, *27*(4), 287–299. https://doi.org/10.1016/S0304-422X(00)00005-X

Altheide, D. L., & Schneider, C. J. (2013). Process of qualitative document analysis. *Qualitative Media Analysis*. https://doi.org/10.4135/9781452270043.n3

Auriacombe, C. J. (2011). Role of theories of change and programme logic models in policy evaluation. *African Journal of Public Affairs*, *4*(2), 36–53. https://repository.up.ac.za/bitstream/handle/2263/57708/Aurlacombe_Role_2011.pdf?sequence=1

Ben-Iwo, J., Manovic, V., & Longhurst, P. (2016). Biomass resources and biofuels potential for the production of transportation fuels in Nigeria. *Renewable and Sustainable Energy Reviews*, *63*, 172–192. https://doi.org/10.1016/j.rser.2016.05.050

Briassoulis, H. (2019). Combating land degradation and desertification: The land-use planning quandary. *Land*, *8*(2), 27. https://doi.org/10.3390/land8020027

Bruchac, M. M. (2014). Indigenous knowledge and traditional knowledge. *Encyclopedia of Global Archaeology*, 3814–3824. https://doi.org/10.1007/978-1-4419-0465-2_10

Capozzi, F., Di Palma, A., De Paola, F., Giugni, M., Iavazzo, P., Topa, M. E., Adamo, P., & Giordano, S. (2018). Assessing desertification in sub-Saharan peri-urban areas: Case study applications in Burkina Faso and Senegal. *Journal of Geochemical Exploration*, *190*(March), 281–291. https://doi.org/10.1016/j.gexplo.2018.03.012

Chasek, P., Akhtar-Schuster, M., Orr, B. J., Luise, A., Rakoto Ratsimba, H., & Safriel, U. (2019). Land degradation neutrality: The science-policy interface from the UNCCD to national implementation. *Environmental Science and Policy*, *92*(May 2018), 182–190. https://doi.org/10.1016/j.envsci.2018.11.017

Chen, H. T. (2012). Theory-driven evaluation: Conceptual framework, application and advancement. In *Evaluation von Programmen Und Projekten Für Eine Demokratische Kultur* (pp. 17–27). https://doi.org/10.1007/978-3-531-19009-9

Chinweze, C., Alonge, J., Suleman, A., & Hassan, B. (2017, April). *Climate change, desertification, and land degradation in Nigeria : The role of impact assessment*. https://conferences.iaia.org/2017/uploads/presentations/IAIA17 DLDD_Chizoba.pdf

Christian, B. A., Dhinwa, P. S., & Ajai. (2018). Long term monitoring and assessment of desertification processes using medium & high-resolution satellite data. *Applied Geography*, *97*(August 2017), 10–24. https://doi.org/10.1016/j.apgeog.2018.04.010

Connor, D. O., & Ford, J. (2014). Increasing the effectiveness of the "Great Green Wall" as an adaptation to the effects of climate change and desertification in the Sahel. *Sustainability*, *6*, 7142–7154. https://doi.org/10.3390/su6107142

Conole, G. (2010). Bridging the gap between policy and practice: A framework for technological intervention. *Journal of E-Learning and Knowledge Society*, *6*(1), 13–27. https://doi.org/10.20368/1971-8829/384

Cowie, A. L., Orr, B. J., Castillo Sanchez, V. M., Chasek, P., Crossman, N. D., Erlewein, A., Louwagie, G., Maron, M., Metternicht, G. I., Minelli, S., Tengberg, A. E., Walter, S., & Welton, S. (2018). Land in balance : The scientific conceptual framework for land degradation neutrality. *Environmental Science and Policy*, *79*(August 2017), 25–35. https://doi.org/10.1016/j.envsci.2017.10.011

Cuéllar-Gálvez, D., Aranda-Camacho, Y., & Mosquera-Vásquez, T. (2018). A model to promote sustainable social change based on the scaling up of a high-impact technical innovation. *Sustainability*, *10*(12), 1–21. https://doi.org/10.3390/su10124532

Daily Trust. (2019). Saving our land from degradation. *Daily Trust Newspaper*. https://www.dailytrust.com.ng/saving-our-land-from-degradation.html

El-Jardali, F., Bou-Karroum, L., Ataya, N., El-Ghali, H. A., & Hammoud, R. (2014). A retrospective health policy analysis of the development and implementation of the voluntary health insurance system in Lebanon: Learning from failure. *Social Science and Medicine*, *123*(2014), 45–54. https://doi.org/10.1016/j.socscimed.2014.10.044

Emodi, N. V., Emodi, C. C., Murthy, G. P., & Emodi, A. S. A. (2017). Energy policy for low carbon development in Nigeria: A LEAP model application. *Renewable and Sustainable Energy Reviews*, *68*(October 2016), 247–261. https://doi.org/10.1016/j.rser.2016.09.118

Frake, A. N., & Messina, J. P. (2018). Toward a common ontology of scaling up in development. *Sustainability (Switzerland)*, *10*(3), https://doi.org/10.3390/su10030835

Gadzama, N. M. (2017). Attenuation of the effects of desertification through the sustainable development of Great Green Wall in the Sahel of Africa. *World Journal of Science, Technology, and Sustainable Development*. https://doi.org/10.1108/ WJSTSD-02-2016-0021

Gadzama, N. M., & Ayuba, H. (2015). Efforts in desertification control in the Sahel of Nigeria. *World Association of Sustainable Development*, 33–46. https://www.sudanknowledge.org/download/efforts-in-desertification-control-in-the-sahel-of-nigeria/

Grainger, A. (2015). Is land degradation neutrality feasible in dry areas? *Journal of Arid Environments*, *112*(PA), 14–24. https://doi.org/10.1016/j.jaridenv.2014.05.014

Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. *PLoS ONE*, *15*(5), 1–17. https://doi.org/10.1371/journal.pone.0232076

Gujba, H., Mulugetta, Y., & Azapagic, A. (2015). The household cooking sector in Nigeria: Environmental and economic sustainability assessment. *Resources*, *4*(2), 412–433. https://doi.org/10.3390/resources4020412

Harman, E., & Azzam, T. (2018). Towards program theory validation: Crowdsourcing the qualitative analysis of participant experiences. *Evaluation and Program Planning*, *66*, 183–194. https://doi.org/10.1016/j.evalprogplan.2017.08.008

Harries, C., Koprak, J., Young, C., Weiss, S., Parker, K. M., & Karpyn, A. (2014). Moving from policy to implementation. *Journal of Public Health Management and Practice*, *20*(5), 498–505. https://doi.org/10.1097/PHH.0000000000000061

Howlett, M. P., & Cuenca, J. S. (2017). The use of indicators in environmental policy appraisal: Lessons from the design and evolution of water security policy measures. *Journal of Environmental Policy and Planning*, *19*(2), 229–243. https://doi.org/10.1080/1523908X.2016.1207507

Huang, W. P., & Yim, J. Z. (2014). Sand dune restoration experiments at Bei-Men Coast, Taiwan. *Ecological Engineering*, *73*, 409–420. https://doi.org/10.1016/j.ecoleng.2014.09.038

Hutton, J., Ryan, M., Montana, J., & Gallagher, L. (2017). *The Science, policy, and practice interface SYNTHESIS PAPER*. https://luchoffmanninstitute.org/wp-content/uploads/2017/11/Science-policy-practice-interface.pdf

Ifegbesan, A. P., Rampedi, I. T., & Annegarn, H. J. (2016). Nigerian households' cooking energy use, determinants of choice, and some implications for human health and environmental sustainability. *Habitat International*, *55*, 17–24. https://doi.org/10.1016/j.habitatint.2016.02.001

IUCN. (2019). CSOs' participation needed to achieve Great Green Wall vision. Retrieved March 9, 2020, from FAAPA FR website: http://www.faapa.info/blog/csos-participation-needed-to-achieve-great-green-wall-vision-iucn/

Jiang, L., Jiapaer, G., Bao, A., Kurban, A., Guo, H., Zheng, G., & De Maeyer, P. (2019). Monitoring the long-term desertification process and assessing the relative roles of its drivers in Central Asia. *Ecological Indicators*, *104*(February), 195–208. https://doi.org/10.1016/j.ecolind.2019.04.067

José, S. M., Joris, de V., Chotte, J.-L., Bernoux, M., German, K., Ruiz, I., Almagro, M., Alloza, J. A., Vallejo, R., Castillo, V., Hebel, A., & Akhtar-Schuster, M. (2017). *Sustainable land management contribution to successful land-based climate change adaptation and mitigation A Report of the Science-Policy Interface*. https://www.unccd.int/sites/default/files/documents/2017-09/UNCCD_Report_SLM_web_v2.pdf

Joseph, O., Gbenga, A. E., & Langyit, D. G. (2018). Desertification risk analysis and assessment in Northern Nigeria. *Remote Sensing Applications: Society and Environment*, *11*(February), 70–82. https://doi.org/10.1016/j.rsase.2018.04.012

Kabir, I., Yacob, M. R., Ariffin, M., Emang, D., & Adamu, A. (2018). Assessing the extent of traditional biomass cookstove usage and related cooking practices : Evidence from rural households in Northern Nigeria. *IOSR Journal Of Humanities and Social Science (IOSR-JHSS)*, *23*(3), 39–46. https://doi.org/10.9790/0837-2303013946

Kim, H., Yoo, J. H., & Cho, S. (2020). The role of local governments before and during chemical accidents, focusing on changes in hazardous chemical management systems. *Journal of Environmental Policy and Planning*, *0*(0), 1–15. https://doi.org/10.1080/1523908X.2020.1721275

Koetz, T., Farrell, K. N., & Bridgewater, P. (2011). *Building better science-policy interfaces for international environmental governance : assessing potential within the Intergovernmental Platform for Biodiversity and Ecosystem Services Convention on Biological Diversity*. https://doi.org/10.1007/s10784-011-9152-z

Lee, Y., & Seo, I. (2019). Sustainability of a policy instrument: Rethinking the renewable portfolio standard in South Korea. *Sustainability (Switzerland)*, *11*(11). https://doi.org/10.3390/su11113082

Mantino, F., & Vanni, F. (2019). Policy mixes as a strategy to provide more effective social and environmental benefits: Evidence from six rural areas in Europe. *Sustainability*, *11*(23). https://doi.org/10.3390/su11236632

Medugu, N. I., Majid, M. R., & Johar, F. (2011). Drought and desertification management in arid and semi-arid zones of Northern Nigeria. *Management of Environmental Quality: An International Journal*, *22*(5), 595–611. https://doi.org/10.1108/14777831111159725

Mickwitz, P. (2003). A framework for evaluating environmental policy instrument. *Sage (Atlanta, Ga)*, *9*(4), 415–436. https://doi.org/1356–3890 (200310)9:4; 415–436; 040428

Moser, A., & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection, and analysis. *European Journal of General Practice*, *24*(1), 9–18. https://doi.org/10.1080/13814788.2017.1375091

Nave, A., & Franco, M. (2019). University-Firm cooperation as a way to promote sustainability practices: A sustainable entrepreneurship perspective. *Journal of Cleaner Production*, *230*, 1188–1196. https://doi.org/10.1016/j.jclepro.2019.05.195

Nkonya, E., Mirzabaev, A., & Von Braun Editors, J. (2015). *Economics of land degradation and improvement-a global assessment for sustainable development*. Springer.

Okpara, U. T., Stringer, L. C., & Dougill, A. J. (2018). Integrating climate adaptation, water governance, and conflict management policies in lake riparian zones: Insights from African drylands. *Environmental Science and Policy*, *79*(January 2017), 36–44. https://doi.org/10.1016/j.envsci.2017.10.002

Olagunju, T. E. (2015). Drought, desertification, and the Nigerian environment: A review. *Journal of Ecology and the Natural Environment*, *7*(7), 196–209. https://doi.org/10.5897/JENE2015

PAGGW. (2018). The Great Green Wall initiative: 2011 - 2017 achievements and challenges to 2030 path. In *Echos de la GMV*. https://doi.org/10.1017/CBO9781107415324.004

Perveen, S., Kamruzzaman, M., & Yigitcanlar, T. (2017). Developing policy scenarios for sustainable urban growth management: A Delphi approach. *Sustainability*, *9*(10). https://doi.org/10.3390/su9101787

Pradhan, N. S., Su, Y., Fu, Y., Zhang, L., & Yang, Y. (2017). Analyzing the effectiveness of policy implementation at the local level: A Case study of management of the 2009–2010 drought in Yunnan Province, China. *International Journal of Disaster Risk Science*, *8*(1), 64–77. https://doi.org/10.1007/s13753-017-0118-9

Sacande, M., Parfondry, M., & Martucci, A. (2018). *Biophysical and socio-economic baselines: the starting point for Action Against Desertification* (FAO, Ed.).

Safriel, U. (2017). Land degradation neutrality (LDN) in drylands and beyond – where has it come from and where does it go. *Silva Fennica*, *51*(1), 1–19. https://doi.org/10.14214/sf.1650

Schucknecht, A. (2016). *Monitoring project impact on biomass increase in the context of the Great Green Wall for the Sahara and Sahel Initiative in Senegal*. https://doi.org/10.2788/639268

UNCCD. (2016). *Hope for the Sahara Sahara and the Sahel the Great Green*. https://www.unccd.int/publications/great-green-wall-hope-sahara-and-sahel

UNCCD. (2018). *UNCCD History: The Convention*. https://www.unccd.int/convention/about-convention/unccd-history

UNEP. (2017). *Strengthening the science-policy interface: A gap analysis*. http://www.un.org/Depts/Cartographic/english/htmain.htm

UNOWAS. (2016). Briefing on the Sahel: Impact of climate change and desertification. In *Security Council Report*. http://www.whatsinblue.org/2016/05/briefing-on-the-sahel-impact-of-climate-change-and-desertification.php

Van Belle, S. B., Marchal, B., Dubourg, D., & Kegels, G. (2010). How to develop a theory-driven evaluation design? Lessons learned from an adolescent sexual and reproductive health programme in West Africa. *BMC Public Health*, *10*(1), 741. https://doi.org/10.1186/1471-2458-10-741

Wach, E. (2013). Learning about qualitative document analysis. *IDS Practical Paper, Brief*, *13*(October). https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/2989/PPInBrief1%093 QDA FINAL2.pdf?sequence=4

Ward, R., & Wach, E. (2015). Qualitative Document Analysis - A Review of International WASH Policy. The Hague. International Water and Sanitation Centre. Retrieved from https://www.ircwash.org/resources/qualitative-analysis-document-review-international-wash-policy

Warshaw, J. B., & Upton, S. (2018). Capturing hybrid institutional logics in higher education: A qualitative document analysis as a methodological approach. In *Theory and method in higher education research* (p. iii). https://doi.org/10.1108/S2056-375220180000004006

Zaku, S. G., Kabir, A., Tukur, A. A., & Jimento, I. (2013). Wood fuel consumption in Nigeria and the energy ladder: A review of fuelwood use in Kaduna State. *Academic Journals*, *4*(5), 119–114. https://doi.org/10.5897/JPTAF 12.023

Zdruli, P., Cherlet, M., & Zucca, C. (2017, November). Desertification: Mapping constraints and challenges. In *Encyclopedia of soil Science* (3rd ed., pp. 633–641). https://doi.org/10.1081/e-ess3-120052917

Appendix.

Table A1. The framework for analysis showing Sustainable practice (sub-themes) under their respective themes

S/No	Themes	Sub-themes
1	Established grass-root (Community) structure for implementation	Formation of Community management entities (Up-lifting Community Development Committees from unguided volunteer to professional service promoters); Presence of Community Implementation Committees (functional Local government and Community Implementation Committees, (LIC, CIC)); Multi-Stakeholders partnership (for program execution); Institutional and Legal framework
2	Acknowledgment and integration of alternative Service provider option	Individual contributors to intervention components; the presence of grass-roots volunteer groups that provide support to programs (CSOs, NGOs, FBOs); Existence of Public-Private partnership (to promote voluntary services); Involvement of youth and women groups
3	Monitoring implementation and Sustainability	Key Performance Indicators for tracking progress; Existing structure for onsite monitoring and feedback; Scaling up intervention and performance; Post-intervention monitoring (Sustainability of project's benefits)
4	Harmonization and Coordination	Harmonization of Policy instrument mix (Contextual differences and goals mainstreaming); Institutional coherence (Inter-Agency Coordination); Sound Multilevel governance (across the three vertical tiers of government); Communications and Information management
5	Capacity Support to Local Government and Community	Capacity building Support; Resilience; Training workshops and Skills acquisition; Alternative means of (domestic) Energy
6	Learning and Adaptive Measures	Adoption of Indigenous Knowledge; Advocacy (creating situation awareness and sensitizing/influencing the community to act); Science-Policy-Practice Interaction; Evidence-Informed Decision Making
7		Statutory funding for lice cycle cost/implementation; Maintenance of projects/facilities; Accountability; audit

Table A2. Details of ongoing interventions to attenuate desertification in the frontline States.

Typology	Category	Year active	Activity	Coverage	Operational coverage	Area restored/ persons	Funding/Units (USD) Millions
Ecological Fund Office	Federal Government	2009–2013	NEWMAP	Nigeria	7 states	5million ha	508
			Energy-saving stove				24.66
			Planning and watershed structure				
			Soil Conservation and erosion control				
			Poverty alleviation activities				
			Strengthening of institutions				
Great Green Wall	Federal	2014 – date	Afforestation	11 States	44 LGAs in 11 States		
			Nurseries			92 communities	
			shelterbelts			241 km	
			Wood lots			120 ha	
			Orchard			250 ha	
			Gardens				
			Training			500 farmers	
			boreholes			92 solar/wind powered	
			Jobs			Agricultural and Non-	
			26 million trees				

(*Continued*)

Table A2. Continued.

Typology	Category	Year active	Activity	Coverage	Operational coverage	Area restored/ persons	Funding/Units (USD) Millions
						agricultural across 11 States – starting with five	
Action Against Desertification	International partners (EU – FAO)	2016–2020	Afforestation	Bauchi Jigawa Sokoto	3 LGAs in 3 States	65,776 ha	41 million Euro
			Capacity Development			338 people	
			Supporting village enterprise			35 villages	
			Conserving indigenous species			6 indigenous, 4 native species	
			Fodder production			Micro gardens	
FAO	International partners	2018-date	Energy-efficient stoves	Borno	10 Communities	77,000 families	11,000 stoves
Jama'atul Nasril Islam	Faith-Based Organizations	2016–2019	Tree planting	Jigawa State	3 LGAs	Assorted trees	50,000 seedlings
Catholic Caritas	Faith-Based Organizations	2012 – date	Food Security	6 States	25,000 persons	2,500	–
Savanah Institute for Sustainable Development	Non-Governmental Organization	2018 – date	Afforestation, capacity building	Bauchi State	4 LGAs	Indigenous plants	50,000 seedlings
Jewel Environmental Initiative and Others	Non-Governmental Organization	2019–2023	State Government Tree planting	Gombe State	11 LGAs	Indigenous trees	4 Million trees
University of Maiduguri	Institution	2005 – date	Afforestation/Research	Borno	3 LGAs	Assorted trees	–
Usman Dan Fodio University	Institution	2014	Energy-saving stove	Sokoto	Danjawa	biogas digesters wood saving stoves	Hundreds of households
Forestry Research Institute	Institution	2012	Tree Planting	Borno	Damasak	assorted trees	200, 000 seedlings
Center for Renewable Energy Research UMY University	Institution	2016	Tree planting	Katsina	Katsina, Rimi, Batsari, Jibiya, Kaita, Batagarawa	Strengthening private nurseries, training of farmers	Communities across 5 local governments areas