WORLD BANK GROUP

STRENGTHENING FINANCIAL RESILIENCE TO DROUGHT:

A Feasibility Study

For An Index-Based Drought Risk Financing Solution For Pastoralists In Niger

ILRI | INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

Global Index Insurance Facility
MANAGED BY WORLD BANK GROUP

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This report was edited by: Victor Mlambo

Cover design and layout: Cubedifference

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Acknowledgement

The study has been funded by the Global Index Insurance Facility (GIIF) and by the Financial Resilience Program, supported by USAID.

The Financial Resilience Program (FRP) is a World Bank partnership with the United States Agency for International Development (USAID) to enhance the capacity of policy makers for improved financial resilience of vulnerable rural households and businesses to climate shocks and natural disasters. The FRP provides technical assistance to governments in the development and implementation of policy to help rural populations and businesses prepare for—and recover more quickly from—the impacts of climate shocks, disasters, and crises; and develops and shares knowledge to inform practitioners and policymakers globally.

The Global Index Insurance Facility is a dedicated World Bank Group program that facilitates access to finance for smallholder farmers, micro-entrepreneurs and micro-finance institutions through the provisions of catastrophic risk transfer solutions and index-based insurance in developing countries. Funded by the European Union, the governments of Germany, Japan and the Netherlands, GIIF has facilitated approximately 9.6 million contracts, covering close to 48 million people, primarily in sub-Saharan Africa, Asia and Latin America and the Caribbean. The program is part of the International Finance Corporation's Financial Institutions Group.

The authors wish to thank all the government officials and representatives of the international development organizations, private companies, local associations and rural communities who agreed to be interviewed as key informants or stakeholders.

The authors are grateful to peer reviewers Shadreck Mapfumo, Ghada Elabed, Simon Hagemann and Qhelile Ndlovu for the constructive comments and suggestions.

The authors wish to thank Charles Stutley and Ramiro Iturrioz for reviewing the report and providing valuable comments.

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List of Acronyms

ACF	Action Contre la Faim
ACMAD	African Centre of Meteorological Application for Development
ADRiFi	Africa Disaster Risk Financing
AfDB	African Development Bank
AGRHYMET	Centre Régionale de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle
AGROMET	Agro-meteorological
ANADIA	Adaptation to climate change and disaster risk reduction in agriculture for food security
ANAM	National Meteorological Agency
ANSI	National Agency for the Information Society
ARC	African Risk Capacity
AREN	L'Association pour la Redynamisation de L'Elevage au Niger
ARV	Africa Risk View
ASAL	Arid and Semi-arid
BAGRI	Banque Agricole du Niger
CAREN	Compagnie d'Assurances et de Reassurances du Niger
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station data
CILSS	Satelligence and the Permanent Inter-State Committee for Drought Control in the Sahel
CNAAI	Comité National sur l'Assurance Agricole Indicielle
CIMA	Conference Interafricaine des Marchés d'Assurances
COVID	Coronavirus Disease
CRCA	Commission Regionale de Controle des Assurances
DIRISHA	Drought Index Insurance for Resilience in the Sahel and Horn of Africa
Dispositif	Dispositif National de Prévention et de Gestion des Catastrophes et des Crises Alimentaires
DMN	National Directorate for Meteorology
DFS	Digital Financial Services
DRF	Disaster Risk Financing
DRFI	Drought Risk Financing and Insurance
ECOUT	Espoir pour les Communautés de Ouallam, Tillabéri
ECOWAS	Economic Community of West African States
EM-DAT	Emergency Events Database
EO	Earth Observation
EOS	End of Season

EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FCD	Fonds Commun des Donateurs
FI	Fonds d'Intervention
FSA	Fonds de Sécurité Alimentaire
GDP	Gross Domestic Product
GeoSAS	Geospatial Analytical Services
GIIF	Global Index Insurance Facility
GoK	Government of Kenya
GoN	Government of Niger
GTPs	Groupes de Travail Pluridisciplinaires
HDI	Human Development Index
HOA	Horn of Africa
HSNP	Hunger Safety Net Program
IBDRFI	Index-based Drought Risk Financing and Insurance
IBLI	Index-based Livestock Insurance
IFC	International Finance Corporation
IGAD	Inter-governmental Authority on Development
ILRI	International Livestock Research Institute
INRAN	Institut National de la Recherche Agronomique du Niger
JRC	Joint Research Centre
KLIP	Kenya Livestock Insurance Program
MAP	Mean Annual precipitation
MCC	Millennium Challenge Corporation
MFI	Micro-finance institutions
MNO	Mobile Network Operator
MODIS	Moderate Resolution Imaging Spectroradiometer
MoU	Memorandum of Understanding
NAOAA	National Oceanic and Atmospheric Administration
NDVI	Normalized Difference Vegetation Index
NEPAD	New Partnership for Africa's Development
NGOs	Non-governmental Organizations
NGDI	World Bank Next Generation Drought Index
NGS	Number of Growing Seasons

NUSAF III	Northern Ugandan Social Action Fund
OFDA	Office of United States Foreign Disaster Assistance
OHADA	Organization pour l'Harmonisation du Droit des Affaires en Afrique
OPVN	Office des Produits Vivriers
OSIWA	Open Society Initiative for West Africa
PARM	Platform for Agricultural Risk Management
PGERAT	Protection and Fair Management of Agropastoral Resources in the Tillabéry Region
PPP	Public-private Partnership
PRAPS	Regional Sahel Pastoralism Support Project
PS	Programmatic Scenario
RBM	Réseau Billital Maroobè
RECA	Réseau National des Chambres d'Agriculture du Niger
SAP	Système d'Alerte Précoce
SI	Stock d'Intervention
SIIPE	Satellite Index Insurance for Pastoralists in Ethiopia
SNAR	Societe Nigerienne D'Assurances et de Reassurances
SMS	Short Message Service
SNS	Stock National de Sécurité
SOS	Start of Season
TLU	Tropical Livestock Unit
UAIs	Unit Areas of Insurance
UEMOA	West African Economic and Monetary Union
UN	United Nations
UNCDF	United Nations Capital Development Fund
UNDP	United Nations Development Program
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UN OCHA	United Nations Office for the Coordination of Humanitarian Assistance
USAID	United States Agency for International Development
USD	United States Dollar
WBG	World Bank Group
WFP	World Food Program
WHO	World Health Organization

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Executive Summary

Why financial protection from drought shocks for pastoralists?

Livestock is fundamental to national economies and households' welfare in Sahel countries. It is estimated that about 50 million people, the majority of whom are extremely poor, rely on pastoralism[1] for their livelihoods in the Sahel. Livestock is a key economic factor in most Sahel countries, as evidenced by its contributions to the national gross domestic product (GDP) in Burkina Faso (35%), Mali (39%), Niger (37%) and Senegal (31%).

The Sahel is very prone to droughts and shifting climatic patterns. Between 1950 and 1970, the Sahel experienced abnormally high rainfall, well above the long term 1898 to 1993 averages. However, between 1970 and 1990, there was a prolonged period of well below average rainfall, resulting in a series of major droughts, famines and huge livestock losses, due to insufficient drinking water, lack of forage and grazing resources and diseases. Even though average rainfall increased after 1990, the area is still affected by frequent drought shocks and climatic extremes.

The livestock sector is one of the most important economic sectors in Niger. It contributes around 37% of agricultural GDP and 13% of national GDP. An estimated 87% of households in Niger raise livestock, either as a primary or secondary Source of livelihood. About 4 million people (≈17% of the total population) are estimated to be pastoralists. Livestock contributes approximately 15% of rural households' income and 25% of food requirements at the national level.

Niger is severely exposed to droughts, floods and locust invasions. However, the impact of droughts has been the greatest, affecting more than 31 million people. Drought impacts on pastoral livelihoods have repeatedly been catastrophic, with large parts of the national herd perishing.

Consistent with other regions in the Sahel, the availability of pasture and grazing resources is decreasing. This has led to serious conflict over water and grazing resources within pastoral communities (clans) and between pastoralists and farmers. This has been further exacerbated by the deteriorating security situation and terrorism episodes, which have severely hampered the free migration of livestock herds between countries in search of seasonal grazing.

Index-based drought financing for pastoralists – how it works

Drought risk financing and insurance solutions have emerged as powerful tools to protect the vulnerable communities against drought impacts. The key idea is to link prearranged financing solutions to credible response plans. This has been shown to make funding available faster after disasters, strengthen predictability and improve cost-effectiveness compared to ex-post, ad hoc responses. Among the various solutions, index-based drought risk financing and insurance (IBDRFI) approaches are particularly suitable for smallholder farming and extensive pastoral systems. These instruments trigger payouts/financial responses based on an 'objective' index approximating the impact or loss. The majority of IBDRFI instruments targeting extensive rangelands currently operational in Africa are based on drought indices derived from satellite normalized difference vegetation indices (NDVI) data. Among these, the index-based livestock insurance (IBLI) and drought index-insurance products have been specifically designed to protect pastoralists in the face of drought and have been shown to improve households' welfare during and after shocks.

1. Throughout this report, the definition of 'pastoralists' includes all the herders that, i) mainly depend on livestock (i.e. ruminants) for their livelihood, ii) rely primarily on rangeland resources for feeding their livestock and iii) use some degree of mobility as herd management practice. As such, our definition includes nomadic, semi-nomadic and semi-sedentary pastoral communities, including those practice some cropping activities (i.e. agro-pastoralists).

Recent developments in earth observation (EO) missions, technologies and analytics are opening new opportunities for designing innovative indices for IBDRFI initiatives, including rangelands and extensive pastoral systems. Initiatives such as the World Bank Next Generation Drought Index (NGDI) aim to expand the range of options for designing IBDRFI solutions by developing a practical framework for a set of indices or indicators that will better monitor, anticipate and trigger financial responses to severe drought events.

IBDRFI initiatives specifically designed to protect pastoralists during drought shocks so far have been implemented in Africa with different modalities such as retail micro-insurance products, macro-level insurance schemes for protection of social livelihoods and scalability mechanisms of social safety net programs. All these initiatives rely on similar EO technologies and indices (i.e. based on NDVI data) and are generally designed following anticipatory response principles, e.g. early drought detection for early action and impact mitigation. Micro-level retail IBLI schemes have been implemented in northern Kenya and southern Ethiopia with private insurance companies involved in marketing, promoting and underwriting the scheme on a voluntary basis with individual pastoralists. Macro-level social livelihood protection insurance schemes are currently operational at a national level in Kenya through the Kenyan Livestock Insurance Program (KLIP), eastern Ethiopia and Zambia.Index-contingent scalability mechanisms for safety net programs have also been implemented in Kenya, under the Hunger Safety Net Program (HSNP) and in Uganda, under the Third Northern Ugandan Social Action Fund (NUSAF III). These social protection schemes can complement sovereign level products like the ones which the African Risk Capacity (ARC) has been implementing.

The initiatives implemented thus far have produced valuable lessons and robust evidence on the benefits and positive welfare impacts of IBDRFI solutions for pastoralists.

For pastoralists: Pastoralists receive financial support earlier compared to traditional insurance schemes or humanitarian aid to protect their livestock, thus avoiding catastrophic impacts. They can also effectively plan their herd management as they are less vulnerable to drought shocks.

For the private sector: IBDRFI initiatives can crowd-in investments in pastoral areas including complementary services, benefiting from the public/donors' investments in financial literacy and financial infrastructure, which are prerequisites of IBLI implementation.

For governments: IBDRFI initiatives can minimise governments' fiscal exposure to drought events through advance disaster planning. This enables early responses and more cost-effective utilisation of funds to mitigate the impacts of drought and reduce humanitarian aid needs.

Objective of the feasibility assessment

This feasibility study, conducted by the International Livestock Research Institute (ILRI) and the World Bank, aims to inform development and implementation of policies to increase the resilience of pastoralists in Niger and the Sahel against severe drought shocks. It provides the background knowledge required to make informed decisions on whether investing resources in the design and implementation of an IBDRFI program can achieve the desired public policy objectives.

The feasibility assessment considers technical (i.e. product design), socio-economic (potential demand and value) and operational (supply chain) factors for the design and implementation of IBDRFI solutions in Niger.

The socio-economic feasibility analysis aims to assess the presence of necessary pre-conditions to justify the launch of an IBDRFI scheme (i.e. vulnerability of livestock to drought) and the extent of the demand for the IBDRFI solutions from local institutions, pastoral and agro-pastoral households. It examines the relevance of the livestock sector and the impact of drought on the national economy in addition to the socio-economic environment of pastoralists.

The technical feasibility analysis aims to assess whether key conditions for the technical design of an accurate index and trigger mechanism for drought impacts on pastoral areas are met. The feasibility factors considered include, the coverage of rangeland, rangeland vegetation cover/density and the vegetation seasonality, which are critical, not only for the design of NDVI-based indices, but also for alternative EO drought indices. When conditions are not fully met, the assessment provides indications of the type of work needed to design appropriate technical solutions to refine the product design for the specific context.

The operational feasibility analysis aims to evaluate the conditions required for supplying IBDRFI solutions and for supporting the development of an enabling environment (institutional, regulatory and social) for its large-scale and sustainable provision. Thus, it seeks to assess the existing financial and insurance infrastructure and services, the policy and regulatory environment, the potential distribution channels and the existing private and public stakeholders (insurers and financial service providers, pastoral associations, intermediaries and non-governmental organizations (NGOs) etc.) and their capacity in the financial sector.

A scenario analysis finally determines the historical payouts and hypothetical costings of proposed IBDRFI structures. This analysis is purely illustrative and aims to show simple examples of how the technical product customization and the choices made on different programmatic options have fundamental cost-benefit implications. However, it should be noted that the proposed scenarios are not meant to be recommendations for specific options, nor do they cover an exhaustive range of IBDRFI solutions. Thus, detailed analyses of alternative programmatic options and product design customizations need to be planned with local stakeholders at the early implementation stages for future initiatives.

The feasibility study is largely built on technical solutions, experiences and programmatic options implemented in east African countries, which are used as benchmarks for the assessment. As such, the IBLI product design[2] is used for the technical assessments, while IBDRFI programmatic options are based on the main ones tested thus far. Therefore, micro-level retail and macro-level social livelihood protection schemes that provide direct payouts/cash transfers to policyholders or beneficiaries are presented in the scenarios.

However, the feasibility conditions should be considered as widely applicable to alternative IBDRFI options that can and should be evaluated and tailored for the specific context based on the country policy priorities in drought risk management and social protection. During the program design phase, alternative drought index product design approaches might be considered, given that the Sahel pastoral regions present significant ecological and socio-economic differences to those in east Africa. More importantly, while alternative programmatic options, such as meso-level or sovereign-level insurance are not discussed in detail in this report because of lack of direct implementation experiences in pastoral areas. Depending on the country's policy priorities and the local context, these models might need to be considered.

Key findings of the feasibility assessment

The feasibility assessment indicates that with targeted investments and supportive policies, an IBDRFI initiative targeting pastoralists (i.e. livestock owners) could be implemented in the extensive pastoral systems of Niger.

The socio-economic assessment (Table E.1, green) emphasizes the overwhelming importance of the livestock sector for the Nigerien economy, as it accounts for approximately 13% of the country's national GDP and more than 87% of the households in the country rear livestock. Most of the livestock-rearing households practice agro-pastoralism, with 66% of livestock being kept in sedentary systems. This would require careful consideration when identifying target communities, as one important assumption of the IBLI design is that livestock nutrition depends upon rangeland resources.

A related issue requiring consideration and accurate review is the reported uneven distribution of livestock ownership, with 10% wealthiest households reported to own 90% of all livestock. This has relevant policy implications for IBDRFI implementation modality and targeting.

Droughts are one of the biggest causes of vulnerability to food insecurity for pastoralists. Even though there is little data on drought shock costs and the impact of droughts on households and communities, the available evidence shows substantial livestock losses estimated at 10% of the GDP. The natural shocks' impacts have been exacerbated in the last few years by the increase in violence and insecurity, mainly in the areas bordering Mali thus negatively affecting market functioning and accessibility of pastoral resources. Given the many pressures on their livelihoods, many pastoralists are forced to become sedentary and eventually adopt agro-pastoralist lifestyles. While local stakeholders have shown interest in IBDRFI and there is some evidence of potential demand, the very low financial literacy among pastoralist communities might represent a barrier for adoption, indicating the need for significant investments in awareness creation.

The technical assessment (Table E.1, yellow and Figure E1, green) indicates that approximately 16% of Niger's land area, hosting 39% of the national livestock herd, can be categorized as feasible (green), or feasible but needing review (orange) for the implementation of an IBDRFI product tailored to extensive pastoral system covers. Areas in the south of the country (Figure E1, red) are not suitable because they are dominated by crops while rangelands in areas coded orange (Figure E1), where mixed arable farming and livestock production co-exist, require further review to evaluate the extent to which NDVI would be a reliable indicator of forage conditions. Finally, in the arid areas of northern Niger coded yellow in Figure E1, forage production is very low, thus the extent of use for grazing by pastoralists should be evaluated.

2. Henceforth for simplicity, IBLI is used as a generic term to indicate drought index-insurance products based on normalized difference vegetation indices (NDVI) satellite imagery designed specifically for pastoralists. Across different programs, the product design often changes, although the underlying technical design principles are largely similar.

The operational assessment (Table E.1, grey) shows a conducive regulatory environment, low presence of insurance providers, weak financial service infrastructure and a poorly developed agricultural insurance market.

- Even though an IBDRFI scheme for livestock has recently been introduced in the country with strong support from the ministry of livestock, the lack of agricultural insurance providers is a significant challenge. Nevertheless, there are a few institutions such as the ARC and IBISA that have entered the agriculture insurance space and are working with non-life insurance companies to underwrite index-based products.
- The launch in 2021 of the CNAAI represents a turning point to facilitate the introduction of agricultural index-insurance initiatives in Niger. CNAAI has the mandate to evaluate the possibility to create a national company for agricultural insurance, develop a commercial index-based insurance product and develop an implementation plan. Although not directly focusing on livestock, these steps would allow overcoming some of the key barriers for an insurance market to develop
- Institutional capacity on agro-meteorological data handling is limited. The active presence of regional organizations such as L'Association pour la Redynamisation de L'Elevage au Niger (AREN), Centre Régionale de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle (AGRHYMET) and Action Contre la Faim (ACF) can provide an entry point to support the implementation of IBDRFI initiatives.
- Low financial literacy in pastoral areas would be an adoption barrier and adequate investments in awareness creation are required. The overall institutional and private sector capacity is currently insufficient to support large commercial insurance or social livelihoods protection initiatives.
- The insecurity situation in some pastoral regions is a material risk factor for the operational implementation of IBDRFI programs and needs to be carefully considered during the planning phases. Several organizations have been working on conflict mitigation in Niger and should be consulted on the design of IBDRFI initiatives to evaluate effective conflict mitigation strategies.

Table E.1. summarizes the main critical areas that would require targeted investments for IBDRFI implementation (red dots). These include:

- The lack of financial literacy and exposure to financial services of pastoral communities would require significant effort to support awareness creation about financial protection mechanisms and insurance. This is a pre-requisite to stimulate informed demand and to support the establishment of a local market for insurance and related services. This goal can be achieved by sensitizations campaigns but also through capacity building of insurance or extension agents operating in pastoral regions.
- The limited experience of national institutions in handling datasets to support IBDRFI programs need to be addressed through capacity development and targeted investments on national infrastructures to manage large geospatial datasets. The involvement of AGHRYMET and other experienced international institutions would be fundamental to fill this major gap.
- The lack of a registration system at national level is a barrier toward effective IBDRFI design and beneficiary targeting. More localized initiatives by development organizations should be evaluated in their potential for scaling up and to support the initial design of a registration system based on implementation experiences. Pastoral associations should be also involved in the process as they have a dense network in the pastoral areas.
- The increasing insecurity and conflicts pose a challenge for investment and attracting private sector actors in some pastoral regions in the north of the country. Early implementation of IBDRFI is recommended in areas with higher security to allow optimal customization of the program for the local context and, subsequently, should be expanded to other areas.

The scenario analysis carried out under the study provides illustrative costing scenarios for two alternative 5-year IBDRFI programmatic options aimed at providing a safety net to vulnerable pastoralists during drought periods. Both scenarios have been designed by considering the experiences from Kenya and Ethiopia, where ongoing initiatives have demonstrated positive impacts on pastoralists' welfare and income, private sector development and governmental budgets and contingent liability.

- **The global cost of supporting a micro-level retail scheme with 50% subsidies targeting insurance cover for 25,000 pastoralists (from year 5) is estimated to be 5.1 million United States Dollars (USD), including USD 4.4 million subsidies and USD 0.75 million for program support activities.** This option should stimulate demand for the insurance product while simultaneously increasing incentives for insurance providers to enter the market and invest in marketing and support chains, leading to broader access and longer-term sustainability. At the same

time, this option can fail to meet its objectives if the private sector does not invest in either the product delivery or complementary activities such as marketing and awareness creation, which are critical to create a sustainable market and meet the target coverage.

- **The global cost of a social protection program that provides insurance for 5 cattle equivalent for 50,000 pastoralists (from year 5) is estimated to be USD 17.3 million, including USD 15.6 million premium subsidies and USD 1.75 million for program support activities.** This option ensures that target coverage levels are met but may not stimulate private investment in product marketing or awareness creation. In addition, it may not necessarily create access to insurance for those that do not receive the insurance transfer. The long-term fiscal sustainability is another important risk as this scheme requires considerable medium-term budget allocation commitments by the government.

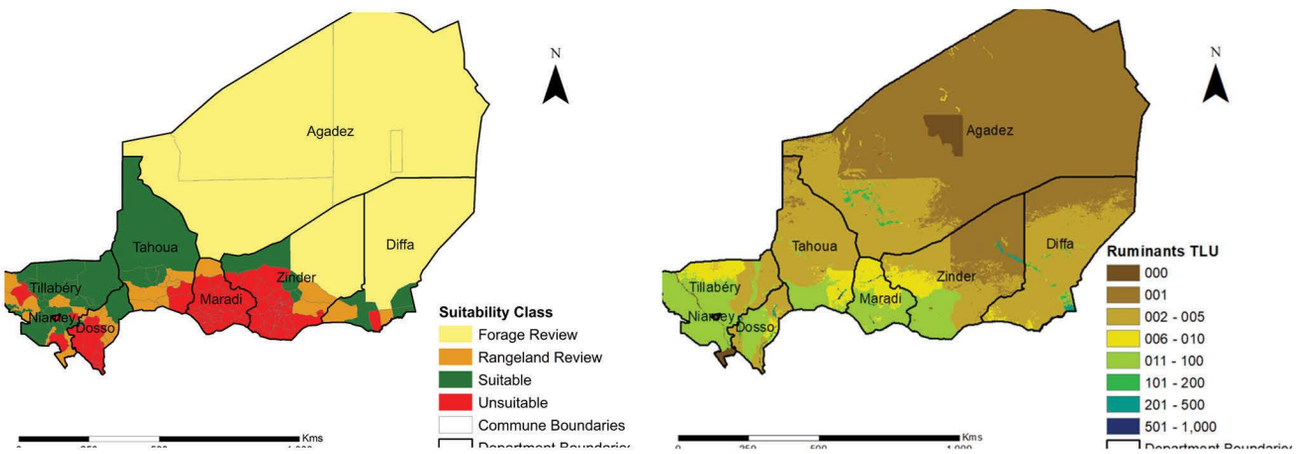
TABLE E.1 FEASIBILITY ASSESSMENT OF THE COUNTRY'S READINESS FOR IBDRFI PRODUCTS TARGETING PASTORALISTS

			Justification
Socio-economic Feasibility	Importance of pastoral livestock to the local economy	🟢	Livestock is of overwhelming importance to the Nigerien economy, contributing around 13% to the national GDP. Approximately 87% of households keep livestock.
	Impact of drought on the livestock sector	🟡	Drought impacts on pastoral livelihoods have repeatedly been catastrophic, with large parts of the national herd perishing. There is no reliable data on drought-related livestock losses and estimates vary, but they can be substantial, surpassing 10% of GDP during the 2009-10 drought.
	Vulnerability of pastoralists to drought	🟢	The vulnerability to droughts is highest among poor pastoralists. In addition, the pastoral areas are generally very dependent on functioning markets and grain prices as their diet consists of more grains than animal products.
	Production systems	🟡	Agro-pastoralism is by far the most practised production system by livestock producers and 66% of livestock is kept in sedentary systems. This would require careful consideration when identifying target clients/beneficiaries as the forage index design assumes that livestock rely largely on rangeland resources. Migrating pastoralists are concentrated mainly in the northern parts of the pastoral belts. Given the many pressures on their livelihoods, many pastoralists are forced to become sedentary and adopt agro-pastoralist lifestyles. Another related issue requiring consideration and accurate review is the reported uneven distribution of livestock ownership, with 10% wealthiest households reported to own 90% of all livestock. This has relevant policy implications for IBDRFI implementation modality and targeting
	Pastoralist demand for livestock insurance	🟡	There is general interest and potential demand for drought insurance products but given the poverty levels and inequality among pastoralists, different approaches and types of products might have to be considered. However, the information gathered in this study is not sufficient to allow accurate evaluation of potential demand.
	Pastoralist financial literacy	🔴	Pastoralist communities have very little understanding of insurance in general (crop, livestock and non–life) and their introduction would require significant investments in awareness creation.

			Justification
Technical Feasibility	Rangeland dominance	🟠	Rangelands extensively dominate the central part of the country and are most suitable for the implementation of an IBDFRI program for pastoralists. The level of forage production is the major factor limiting feasibility of an IBDRFI design in the northern regions. Smallholder cropping, or mixed crop/livestock systems are prevalent in southern Niger, making these areas inappropriate for IBDRFI design (Figure E1).
	Seasonality and signal intensity	🟢	Seasonality is well defined and relatively homogenous across the country's pastoral areas. The typical rangeland growing season runs from June to late October/November, thus seasonality is not a limiting factor for an IBDRFI design; except for the northern parts transitioning into the Sahara Desert that are characterised by scarce vegetation.
	Overall feasibility of product design	🟢	The IBDRFI suitable areas are in the central part of the country and are dominated by pastoralism. They cover about 16% of Niger's land area and carry about 25% of the national herd (Figure E1). About 74% of Niger is made up of areas that are potentially suitable but requiring further review and assessment during the early implementation stages with local stakeholders.
Operational Feasibility	Technical capacity on index calculation and quality assessment	🔴	There are multiple institutions supporting agro-meteorological and extension services (e.g. the National Meteorological Agency (ANAM) and Direction Nationale de la Météorologie (DMN)), but national-level institutional capacity in handling the data component of index-insurance initiatives seems limited. There is little or no available livestock data or information linking weather data to livestock production. Regional institutions such as AGHRYMET, ACF or ARC could support data management tasks and capacity building at a national level.
	Legal and regulatory insurance environment	🟢	Niger is a member of the Conférence Interafricaine des Marchés d'Assurances (CIMA), which already has IBDRFI regulations in place. CIMA recently introduced regulations for Sharia-compliant products which might be important for Niger.
	Insurance market development	🟠	Niger has a relatively weak insurance market compared to its neighbours like Mali, Senegal and Burkina Faso. The number of private general insurance companies is limited and there are very few insurance products other than motor vehicle and health insurance. There are no known crop or livestock insurance products. However, there is a private technology company (IBISA) that is exploring the launch of an index-based livestock insurance product with local insurers in collaboration with the livestock and breeders' association for the pastoral regions. The Ministry of Livestock and Fisheries has expressed interest in this initiative. The launch of CNAAI in 2021 may be a turning point to facilitate the development of an agricultural insurance market in the country
	Interest from insurers in IBDRFI	🟢	Except for SAHAM, no other insurance company has expressed interest. The ARC is also operating in the country and has signed a memorandum of understanding (MoU) with the government to extend their drought insurance cover to rangelands.
	Effective distribution channels	🟠	Insurers are limited or absent in pastoral areas. However, there are a few micro-finance institutions (MFIs) working with development organizations providing different credit and savings services. Moreover, the government launched a smart village program, a promising initiative which might offer opportunities to support effective distribution channels if targeted investments are made.
	Existing pastoralist beneficiary registries	🔴	Currently there is no registration system in place. So far, most registration processes have been done through international development organizations.
	Finance available for premiums		Not available (N/A). This study lacks sufficient evidence to assess this factor.
	Interest from government	🟠	The government of Niger expressed general interest in IBDRFI initiatives targeting pastoral systems, however despite a commercial product viability study, a realistic entry point would be through the social safety mechanisms that are in place to respond to emergencies and disasters. In addition, the mandate of the Dispositif National for the prevention and management of food crisis (Dispositif) could be leveraged when introducing IBDFRI products.
	Governance and security	🔴	Increasing insecurity and conflict poses challenges in attracting private sector actors. However, working with local civil society and peace building bodies could be an opportunity to explore possible mechanisms through which IBDRFI solutions could be introduced.

🔴 = low; 🟠 = medium; 🟢 = high. N/A = Not Available

FIGURE E.1 A) TECHNICAL FEASIBILITY OF IBDRFI PRODUCTS AND B) NIGER RUMINANT LIVESTOCK DISTRIBUTION (TROPICAL LIVESTOCK UNITS)



Source: Authors' own illustration

Recommendations

Considering the limited scope of a feasibility study, the next steps in implementing an IBDRFI initiative in Niger would require in-depth engagement with country stakeholders and the planning of analytical studies to address knowledge gaps identified in this assessment. The next steps are summarized here with more detail presented in Section 5 of the feasibility report.

Next steps

R1: To create an enabling environment for IBDRFI solutions, a policy forum should be established between the ministry of livestock and other relevant ministries such as economy, finance and infrastructure and communications technology, the Comite des Assureurs du Niger, private insurance companies and technical enterprises (SAHAM and IBISA), ARC and other development actors. The goal should be to establish a national taskforce to discuss the opportunities and modalities of introducing IBDRFI initiatives in pastoral areas. This initiative could be complementary to the ongoing work of CNAAI, which is focusing more broadly on agricultural insurance

R2: Considering the contradictory evidence on the vulnerability of pastoral and agro-pastoral communities and the role of livestock, in-depth engagements with pastoral and breeders' associations and development actors operating in the pastoral and agro-pastoral regions should be planned to generate reliable information on livestock ownership and the role of livestock in the livelihoods of these communities. This would enable better targeting and appropriate IBDRFI product designs.

R3: There is lack of data on drought-induced losses suffered by the pastoral communities and their impact on livelihoods. This could be rectified by requesting updated information on the impact of drought on the pastoral communities from governmental organizations or by conducting in-depth engagements with various stakeholders.

Recommendation – follow-up studies

R4: Product design

- Address specific product design challenges associated with the adaptation of IBLI to the pastoral production systems in central Niger, dominated by agro-pastoralism and limited seasonal mobility. This primarily entails better characterization of pastoral land use and mobility patterns especially in the regions that require rangeland reviews.
- Conduct stakeholder engagements to gain better understanding of IBLI feasibility over northern rangelands classified as forage review to understand the extent to which these regions are used as wet season grazing areas.

R5: Distribution and delivery

- Further investigation into premium financing options for both micro-level retail IBDRFI and meso/macro-level covers. The study should also evaluate alternative ways of aligning different drought risk financing insurance mechanisms and programs for pastoralists and include reviews of the product's value proposition alongside other financial services and products in the Niger context.
- Technical review of the existing distribution channels in the form of MFIs and assessment of alternative distribution models through telecommunication companies.
- Investigate the scope of the smart village initiative to potentially identify leverage points for distribution models and promote digital financial services (DFS) solutions for coupling with IBDRFI solutions.

R6: Conflict mitigation

- Identification of mechanisms of conflict mitigation/peacekeeping between farmers and nomadic pastoralists, with possible indemnities for scarce forage production at the end of the wet season (i.e. before migration), with the goal of contributing to social cohesion between farming and pastoral communities. Hence, it would be critical to carry out detailed engagements with stakeholders that have prior working experience and knowledge in these areas to understand the inter and intra-community dynamics to support the design of effective solutions.

R7: Capacity building and learning

- Conduct strategic studies to address the lack of knowledge in the design and implementation of agricultural insurance by private insurers and public sector stakeholders. The studies should evaluate the time and resources required to build capacity and create awareness among the private sector, insurance companies and public sector actors. In addition, capacity assessment and building would be required for institutions that are mandated to provide agro-meteorological, extension and emergency response services.

1. Introduction

1.1 Background

This report was prepared for the project entitled, 'Strengthening financial resilience to drought: A feasibility study for an index-based drought risk financing solution for pastoralists in the Sahel,' conducted by ILRI and the WBG.[3] The project's aim was to assess the feasibility of implementing financial protection solutions against drought in the pastoral regions of four Sahelian countries (Niger, Burkina Faso, Mali and Senegal) and to discuss the most effective implementation modalities (as part of wider drought risk management and pastoral development initiatives) with local private and public stakeholders.

Among the various DRFI solutions, index-based approaches are particularly suitable for smallholder farming and extensive pastoral systems. Index-based drought risk financing and insurance (IBDRFI) instruments trigger payouts/ financial response based on an objective index approximating the impact/loss. Indices can be based on ground network measurements, e.g. meteorological and crop yield data or EO satellite data, e.g. rainfall estimates, vegetation indices and soil moisture.

The study was conducted against the background of ongoing discussion to scale-up regional or national-level IBDRFI initiatives in the Sahel and Horn of Africa (HOA) as part of a comprehensive agenda to increase pastoralists' resilience to climatic shocks. In the last decade, IBDRFI solutions for pastoralists have been implemented and scaled-up in Kenya and Ethiopia using different modalities that included micro-insurance, macro-level social livelihoods protection, scalable safety nets and sovereign level insurance programs. The positive impacts and overall success of these initiatives have resulted in growing demand and interest from African governments and development organizations seeking to explore the possibility of introducing similar approaches across other pastoral regions on the continent. In addition to the countries targeted by this project, feasibility and pilot studies have been conducted or are ongoing in Djibouti, Somalia, Sudan, Uganda, South Africa and Zambia.

This report presents the main findings and recommendations of the study into the feasibility of implementing an IBDRFI solution for pastoralists in Niger conducted from March 2020 to February 2021 by a joint team of ILRI and WBG experts. This was accomplished through a combination of literature review, in-country data collection and interviews with key informants, local public and private sector stakeholders (Appendix 4) and dedicated technical analyses using satellite imagery and risk modelling approaches.

The feasibility assessment was designed to assess the potential of launching IBDRFI initiatives in the country, providing the government of Niger, private sector stakeholders and development institutions with sustainable solutions that cushion pastoral households against the impacts of severe drought shocks. The study also provides the background knowledge required to make informed decisions on whether investing resources in the design and implementation of an IBDRFI program can achieve the desired public policy objectives.

The feasibility study investigated the context, needs, challenges and potential solutions for implementing IBDRFI initiatives targeted at pastoralists in Niger. Therefore, the following three main areas are analysed:

1. **The socio-economic context and potential demand for IBDRFI products (socio-economic feasibility, Chapter 2).** From a national perspective, extensive livestock production systems are an important component of the rural economy, making IBDRFI solutions for pastoralists a worthwhile investment. From a development and demand perspective, livestock assets are important to rural households' livelihoods and welfare, such that their protection is critical for resilience building. These conditions are also critical to understanding the type of IBDRFI solutions that would be more relevant (i.e. commercial micro-insurance, social livelihoods protection coverage and social safety nets etc. (Section 2).
2. **The technical design of a satellite-based drought index for extensive rangeland systems (technical feasibility, Chapter 3).** A simple, robust, low-cost index design resulting in an accurate IBDRFI product is a critical pre-condition for implementation. Satellite-based indices have proven to be reliable indicators of the impact of droughts on forage resources. The assessment, therefore, evaluates the geographic extent of the area where the technical design of an accurate satellite IBDRFI index is possible. The feasibility factors considered included rangeland coverage, rangeland vegetation cover/density and vegetation seasonality, which are critical for the design of EO drought indices.

3. A pre-feasibility study carried out jointly by ILRI and Cornell University in 2018 complements the assessment made in this study.

3. **The operational conditions for an IBDRFI scheme (operational feasibility, Chapter 4).** Designing and implementing an efficient supply chain for IBDRFI solutions in extensive pastoral areas is challenging and often requires substantial initial investments. The assessment of existing infrastructure and networks for financial services delivery, institutional and private sector capacity and interest, existing legal and regulatory frameworks and technical and financial constraints is, therefore, essential to determine the level of investment required to launch the initiatives.

In addition, this study provides a simple scenario analysis to illustrate the historical payouts and hypothetical costings of typical IBDRFI structures (scenario analysis, Chapter 5). This analysis aims to provide the Nigerien government, private sector and development institutions with an overview of the costs and benefits of the proposed insurance scheme based on multiple scenarios. This is done for illustrative purposes only, with the aim of showing simple examples of the technical product customization and the choices made on different programmatic options and objectives have fundamental cost/benefit implications. As such, it should be noted that the proposed scenarios are not meant to be recommendations for a specific option, nor do they represent an exhaustive range of IBDRFI solutions. Thus, detailed analysis of alternative programmatic options and product design customizations needs to be planned for with local stakeholders at the early stages of implementation for future initiatives.

Findings from the different components of the study are summarized in a set of recommendations for the next stage of implementation (Chapter 6). It should be noted that the scope of this assessment is limited to the determination of whether important requirements for the development and introduction of an IBDRFI initiative for pastoralists are met and to provide recommendations for the subsequent planning and preparatory stages of implementation.

The feasibility study is largely built on technical solutions, experiences and programmatic options implemented in east African countries, which were used as benchmarks for the assessment. As such, the IBLI product design4 was used for the technical assessments, while the IBDRFI programmatic options were based on the main components tested so far, thus micro-level retail and macro-level social livelihoods protection schemes that provide direct payouts/cash transfers to policyholders or beneficiaries are presented in the scenarios.

However, the feasibility conditions should be considered as widely applicable to alternative IBDRFI options that can and should be evaluated and tailored for each specific context, according to the country's policy priorities in drought risk management and social protection. During the program design phase, alternative drought index design approaches might need to be considered, given that the Sahel pastoral regions present significant ecological and socio-economic differences to those prevailing in east Africa. While alternative programmatic options such as meso or sovereign level insurance are not discussed in detail in this report because of the lack of direct implementation experiences in pastoral areas based on the country's policy priorities and the local context, these models might need to be considered.

1.2 Index-based drought risk financing solutions for pastoralists

Drought risk financing and insurance (DRFI) refers to mechanisms that aim to reduce adverse socio-economic impacts of potential crises. This can include early financing to prevent and reduce a risk or preparing for and responding to a shock. Drought risk financing and insurance is becoming an integral part of climate risk management frameworks as a key component of financial protection strategic planning for low and middle-income countries.

Multiple DRFI approaches exist, including market-based instruments (e.g. insurance schemes, catastrophe bonds and swaps), contingent financing (e.g. credit) and budgetary tools (i.e. dedicated reserve funds or contingency budgets). These approaches are all designed to increase financial resilience to climate-related shocks, linking the response actions to pre-defined mechanisms for timely release of financial resources. In this way, they aim to ensure rapid and cost effective preparation, assistance, recovery and/or reconstruction efforts.

Different IBDRFI solutions for pastoralists have been developed and implemented since 2010 in east Africa, including micro-level retail insurance products, macro-level social livelihoods protection coverages, scalable safety net programs and sovereign-level drought risk financing solutions (see Appendix 1.1 for differences between micro and macro-level products).

4. Henceforth, for simplicity, IBLI is used as a generic term to indicate drought index-insurance products based on Normalized Difference Vegetation Indices (NDVI) satellite imagery designed specifically for pastoralists. Across different programs, the product design often changes, although the underlying technical design principles are largely similar.

- A micro-level retail insurance product (IBLI), has been sold and scaled-up by local insurance companies across northern Kenya and southern Ethiopia since 2010 and 2012, respectively. Collectively, both countries have covered over 25,000 policyholders to date.
- Macro-level social livelihoods protection programs covering 18,000 households were implemented in Kenya from 2015 under the Kenya Livestock Insurance Program (KLIP), launched by the government of Kenya with technical support from WBG and ILRI. In Ethiopia, the program, covering around 28,000 beneficiaries, was implemented from 2018 under the Satellite Index Insurance for Pastoralists in Ethiopia (SIIPE) program implemented by the World Food Program (WFP) and the regional government of the Somali. In 2020, the WFP, International Fund for Agricultural Development and the Ministry of Fisheries and Livestock launched a similar scheme (currently at pilot stage) targeting 5,000 livestock keepers in Zambia.
- Scalability mechanisms of safety net programs have since been implemented in Kenya under the Hunger Safety Net Program (HSNP) and in Uganda under NUSAF III. In 2015, the government of Kenya (GoK) implemented a flexible scalability mechanism of the HSNP, an unconditional cash transfer program in the arid and semi-arid (ASAL) counties, which expands rapidly to cover additional households if droughts occur. Similarly, the NUSAF III program was launched in Uganda in 2016 as a social safety net that includes a scalable public works mechanism, allowing it to rapidly increase financial assistance to affected people when droughts occur.
- A sovereign-level drought risk financing solution for rangelands currently offered in east Africa and the Sahel has been piloted by the ARC in collaboration with ILRI in Kenya.

Besides the operational options just listed, alternative IBDRFI programmatic implementation schemes might also be promising in the pastoral context considering the lessons learnt from implementation in east Africa and the context-specific policy objectives (ILRI 2021). For example, while meso-level insurance has never been tested in extensive pastoral regions, it may hold the greatest promise. This entails selling policies to risk aggregators such as pastoralist cooperatives, rural finance institutions or livestock services organizations, e.g. veterinary, drugs and feed supplements suppliers. Meso-level distribution also offers the potential of de-risking lending to pastoralists thus boosting investments in pastoral value chain upgrades. Box 1.1 presents an overview of micro, meso and macro-level distribution approaches.

Box 1.1 Applications of index insurance at different levels of aggregation

Micro-level (direct): Policyholders are individuals, e.g. farmers, market vendors or fishers, who hold policies and receive payouts directly. These policies are often sold at the local level and retailed through a variety of channels, including micro-finance institutions, farmers' cooperatives, banks, NGOs and local insurance companies. Premiums are either paid in full by clients or subsidized (or both).

Meso-level (indirect): Policyholders are risk aggregators such as associations, cooperatives, mutuals, credit unions or NGOs, whereby a reinsurer makes payments to the risk aggregators that then provide services to individuals.

Macro-level (indirect): Policies are held by governments or other national agencies, within the international/ regional reinsurance market. Payouts can be used to manage liquidity gaps, maintain governmental services or finance post-disaster programs and relief efforts for pre-defined target groups. Beneficiaries of these programs can be individuals. These schemes can be operationalised through regional risk pools.

Source: Schaefer and Waters 2016

There are currently several major parallel initiatives in east Africa assessing the feasibility of regional scaling up of IBDRFI solutions for pastoral communities, which should provide useful insights into the design and planning of an IBDRFI program in Niger and the Sahel. In 2020-21, the Foreign, Commonwealth and Development Office of the government of the United Kingdom funded a study under the Drought Index Insurance for Resilience in the Sahel and Horn of Africa (DIRISHA), to scale up IBDRFI solutions for pastoralists in the eight Inter-governmental Authority on Development (IGAD) counties. This study was implemented by an ILRI research team and the findings were published in the second quarter of 2021. In addition, the African Development Bank (AfDB), WBG and the European Union intend to launch a major investment program (estimated at USD 15 billion) in the HOA.

The intended investment pillars include: (i) regional infrastructure networks, (ii) trade and economic integration, (iii) building resilience and (iv) strengthening human capital. Pillar 3 includes the development of a regional pastoralist livestock insurance scheme. Insurance would be the entry point to enhance the financial inclusion of pastoralists (through promotion of savings and access to credit) to strengthen their resilience to drought by protecting their

livestock assets and invariably their livelihoods. Ultimately, the delivery of insurance with complementary programs designed to improve pastoral production systems would increase productivity and incomes (WBG 2020). These two initiatives should provide useful insights relevant to the design and implementation of IBDRFI products and programs in Burkina Faso and other Sahel countries with large pastoral communities (ILRI 2021).

1.3 The IBLI product design

All IBDRFI solutions for pastoralists currently operational in Africa rely on similar EO technologies and general principles. Satellite indicators of forage condition (NDVI, Box 1.2) are defined so that an index of forage production in a given area can be derived and to calculate payouts using a pre-defined payout function and trigger mechanism. The NDVI is a low-cost, accessible and widely used satellite indicator of drought. There is well-documented evidence of a strong relationship between rangeland biomass and NDVI for arid and semi-arid rangelands. Indeed, NDVI has been successfully used to measure the effect of progressive drought conditions on forage and grazing availability over time (Fava and Vrieling 2021).

Box 1.2 Satellite NDVI – information box

The Normalized Difference Vegetation Index (NDVI) is a relative indicator of green vegetation cover or vigour obtained by measuring the difference between near infra-red and reflectance. Higher NDVI values indicate denser cover or healthier vegetation and vice versa. In the context of operational NDVI-based IBDRFI products for pastoralists, NDVI is used as a proxy for forage availability, since during a normal wet year/season, vegetation has higher NDVI than during a drought year/season.

While alternative satellite indices of drought exist such as satellite rainfall estimates and soil moisture products, NDVI is currently the most widely used operational systems indicator for drought early warning, monitoring and index insurance in African rangelands. This is because of the well-established relationship between NDVI and vegetation condition, which is in turn directly related to forage resources available for livestock.

Among those solutions, the IBLI index design used in this study for technical analysis, was developed for anticipatory action and livestock asset protection in times of severe droughts that lead to forage scarcity.[5] The forage deficit estimated by the satellite index was used as an early indicator of drought conditions that negatively impact forage availability, livestock health and ultimately pastoralists' livelihoods (Appendix 2). As the satellite data provide near real-time assessment, payouts are triggered at the end of the rainy period (i.e. the most critical period for pastoralists to plan herd management) in the event of a drought. These payouts can support pastoralists to make informed and financially supported tactical decisions to better protect their livestock assets and thus cope with the shock. Pastoralists can purchase fodder and animal feed supplements on time to keep core breeding animals alive, well before major livestock losses are incurred. Studies in east Africa suggest that an anticipatory response is significantly more cost-effective in protecting assets and livelihoods than humanitarian aid in later stages of the crises (USAID 2018).

The IBLI product design is specifically tailored for pastoralists in extensive pastoral systems where mobility is an important herd management practice and livestock depend on rangeland resources. The coverage is offered for relatively large geographical units. For insurance purposes these units are termed unit areas of insurance (UAIs) where the wet season grazing areas are located. This is designed to protect pastoralists in seasons when rains fail leading to inadequate pasture and grazing resources. The UAIs are designed in collaboration with local pastoral communities to reflect typical short-range livestock grazing and mobility patterns during the normal wet season. They are typically based on clusters of neighbouring wards or subdistricts or woredas. The product is currently not designed for transhumance corridors or long-distance dry season grazing areas.

Recent developments in EO missions and technologies are opening new opportunities for designing innovative indices for IBDRFI initiatives for rangelands and extensive pastoral systems (Fava and Vrieling 2021). Alternative EO-derived indicators, e.g. rainfall estimates, evapo-transpiration and soil moisture or drought indices provide a wide range of options to design new products (Fava and Vrieling 2021). Initiatives such as the NGDI aim to expand the range of options available for designing IBDRFI solutions by developing a practical framework for a set of indices or indicators that will better monitor, anticipate and trigger financial responses to severe drought events. Others, such as

5. It should be noted that satellite NDVI is sensitive to multiple factors affecting the vegetation, including some perils other than drought, such as floods, fires, pests etc. The IBLI index is, however, designed to specifically target drought effects on vegetation and minimize the impact of other factors, which might affect the NDVI signal. As such, while the NDVI might also be used to design multi-peril insurance coverage, this is not the case for the IBLI design in this study

the University of California, Davis/USAID Quality index insurance certification aim to establish effective approaches for IBDRFI product assessment and for defining minimum quality standards. These efforts are expected to permit development of innovative indices tailored to specific needs, co-generated with stakeholders and validated with high quality scientific standards.

1.4 Impacts and lessons learned from implementation

The IBDRFI initiatives implemented by ILRI in Kenya and Ethiopia thus far have produced valuable implementation lessons and evidence on the positive impacts for governments and pastoral communities. Key impacts are summarized in Figure 1.1. They have also provided proof of concept with different implementation schemes tailored to the specific country needs, ranging from commercial insurance programs with various premium subsidy levels to government funded macro-level social livelihoods protection programs targeting the most vulnerable pastoralists. This has created strong demand for IBDRFI instruments from several countries across the region and increased interest from development partners in response to this demand.

FIGURE 1.1 SUMMARY OF IMPACTS OF IBDRFI SOLUTIONS IMPLEMENTED UNDER KLIP

1. Protect Gov. budget		Risk-transfer to the private sector	◆ Premium Payment reduces public financial burden in case of drought ◆ PredicTable and budgeted expenditures allow better resource allocation and harmonization with complementary initiatives	10 million USD payouts since inception made by the private sector
2. Expand markets		Public investment on subsidies and infrastructure	◆ Public sector premiums guarantees regular profit. ◆ Investment in infrastructure facilities and crowds-in additional services. ◆ More awareness on the product increases the potential for retail sales.	IBLI coverage expanded from 3 to 8 countries Number of IBLI policies increased from 4k to over 20k
3. Protect vulnerable	**Good Seasons**	Reduced drought risk	Intensification: Increased investments in higher-returns production strategies. ◆ Strategic livestock sales when prices are high. 1 ◆ Increased investments in veterinary services. 1 ◆ Reduced precautionary savings. 1,2	Greater income 1,2
	Drought Seasons	Reduced income loss during drought	Less reliance on determental coping strategies during drought. ◆ Less distress selling of productive assets.[?] ◆ Less "skipping" meals during drought.[?] ◆ Maintained investments in human capital.	Improved post drought economic and welfare outcomes.
		Payments in anticipation of drought	Early action to manipulate the impact of drought ◆ Destroying in aniticipation of price and resource shocks. ◆ Early purchase of inputs to sustain remainig herd during the coming drought.[4]	

Source: [1]Jensen et al. 2017; [2]Matsuda et al. 2019; [3]Janzen and Carter 2019; [4]Taye et al. 2019 in Fava et al. 2021.

The IBDRFI solutions for pastoralists are still evolving in response to lessons learnt and growing demand from new countries. While there are consolidated operational implementation experiences in east Africa, new programs can utilise the vast knowledge capital accumulated over the last 10 years to further improve the existing solutions, tailoring them to the local context and pastoral systems and supporting their harmonization into broader risk management, resilience building and pastoral development policy frameworks.

Evidence from multi-year impact evaluation surveys on the retail micro-insurance IBLI programs in Kenya and Ethiopia show that these programs generated considerable social and welfare benefits for pastoralists who insured their livestock (Figure 1.1, block 3 - Protect vulnerable). During good years, insured households respond to their insurance coverage by increasing investments in livestock, veterinary and vaccination services, selling more livestock and reducing their herd size (Jensen et al. 2017; Matsuda et al. 2019). These changes in production strategies result in positive impacts on indicators of well-being such as increased household income per adult equivalent and reduced reliance on costly risk-reducing strategies like distress selling of livestock or skipping meals, even during drought seasons (Janzen and Carter 2018; Jensen et al. 2017; Matsuda et al. 2019).

Analyses of the use of payouts from pastoralists in Kenya and Ethiopia indicate that payouts influenced the decision-making of pastoralists on coping strategies. The payouts were used for both livelihood protection and purchase of livestock inputs. Using data from a survey of over 1000 KLIP beneficiaries in Marsabit and Isiolo after the 2016-17 drought, a study examined how beneficiaries changed their coping strategies in anticipation of payments and how they spent those funds once they were received. A large majority (70%) of respondents reported using part of the payout for human food consumption, while others used the payout for forage/fodder, water and veterinary service expenses for their livestock (Taye et al. 2019).

The experience of KLIP has provided evidence that the establishment of a public-private partnership (PPP) model for implementing IBDRFI is effective in transferring risk to the private sector while crowding-in private sector capacity and stimulating market expansion. The PPP model was preferred for KLIP because private sector-only implementation proved difficult to scale-up whilst maintaining private sector appetite for micro-level retail coverage due to the high costs of distribution and the relatively low uptake. The PPP helped in developing a new model for implementing IBDRFI solutions. Lessons learned from the implementation of KLIP (Fava et al. 2021) are summarized as follows:

- Government leadership and direct investment in IBDRFI initiatives are possible and can be effective if associated with a strong partnership with the private sector, with clearly defined roles and incentive structures. A mechanism for long-term public commitment needs to be established to guarantee the stability of the scheme.
- Premium subsidies for scaling up and consolidating the scheme are important and instrumental, but they also need to be associated with smart targeting mechanisms and private sector incentives for market development and expansion.
- Financial education, specifically insurance education, awareness creation and capacity strengthening at all levels are fundamental and require sufficient resources for such schemes to achieve sustainability.
- Impact assessments require investment, planning and preparation. It is, therefore, recommended that a rigorous impact study and cost-benefit analysis of the program be included during the design phase to ensure that lessons learnt are documented and evidence gathered.
- The introduction of an anticipatory logic in the IBLI and KLIP index design (for early drought detection and livestock-asset protection) has been a fundamental step in improving the value and cost-effectiveness of the scheme.
- Accurate insurance product design is critical to create trust and achieve desired impact but the data infrastructure for products quality assessment and comparison is weak, if not absent. There is therefore urgent need for establishment of robust, transparent, actionable strategies and methodologies for quality assessment of index insurance products.
- Establishing effective payout delivery channels to ensure guaranteed and timely payments is essential and requires dedicated strategies and mechanisms. Even though the product can be optimally designed to provide early payouts for asset protection, any operational inefficiencies in the disbursement of payments especially large payouts, might compromise the effectiveness of the insurance cover and damage the product's credibility from the client's perspective.
- Engaging with local and international stakeholders and tailoring the IBDRFI product to the specific agro-ecological and socio-economic contexts and evolving environmental conditions is necessary not only during the program design phases, but throughout the entire program implementation cycle.
- Effective implementation is just as important as the technical design. It is important to ensure that any premium collection design includes robust digital payment infrastructure such as the use of Mpesa in Kenya and Bel-Cash in Ethiopia before launching the schemes. Leveraging on existing financial service infrastructure is crucial to ensure that development impact is achieved, trust is built and the scheme is sustainable.

- Scaling up IBDRFI initiatives requires strong coordination efforts and harmonization of the different drought risk management instruments to optimize their finance mechanisms, targeting approaches and data and management infrastructure.

However, lessons learnt so far show that there are still significant challenges to be addressed in implementing IBDRFI in extensive pastoral regions, particularly in terms of financial sustainability and effective product distribution. The micro-level insurance retail schemes still have significant challenges such as low adoption rates and significantly high transactions costs for marketing and distribution. These challenges make the products nounattractive for private insurance companies unless they are significantly subsidized. On the other hand, the macro-level and safety net schemes for social livelihoods protection experience challenges related to the long-term commitment of government budgets and efficiency of the distribution model. The use of mixed approaches and smart subsidies might overcome some of the challenges evidenced so far.

A recent study conducted under the DIRISHA program clearly shows that there is need to identify new low-cost distribution channels for IBDRFI in east Africa (ILRI 2021) and that meso-level channels might represent a feasible option. This is likely to apply equally in Niger and other parts of the Sahel. Over the past decade, the micro-level IBLI programs in Kenya and Ethiopia have operated at a financial loss because of the very high administration and operating costs of implementing insurance with individual pastoralists who often reside in very remote areas. The unit costs of promotion, awareness and education, policy issuance and premium collection for individual pastoralists exceeded the premium generated from each micro-level policy sale. For micro-level IBLI programs to operate at a commercial profit, they will require new and more cost-effective ways of marketing and delivering cover to clients (Lung et al. 2021).

The experiences of IBLI and KLIP in Kenya and Ethiopia, respectively, also demonstrate the need for parallel investments in resilience building and market development for pastoral communities. Insurance by itself cannot build drought resilience and protect livelihoods. Insurance is only one of many essential elements of a comprehensive risk management framework. On one hand, building resilience requires broader investments in risk information (e.g. probabilistic drought risk assessments), risk reduction (e.g. improved natural resource management practices) and preparedness building (e.g. live animal offtake markets). On the other hand, index-insurance requires certain elements to function well. Not only is there a need for more concerted financial literacy and insurance training for pastoralists, but systems for targeting and registering pastoralists require improvement. Strengthening of public and private sector markets for fodder and feed supplements and provision of veterinary services are also required as without these, pastoralists receiving payouts are unable to use the money to sustain their livestock (ILRI 2021).

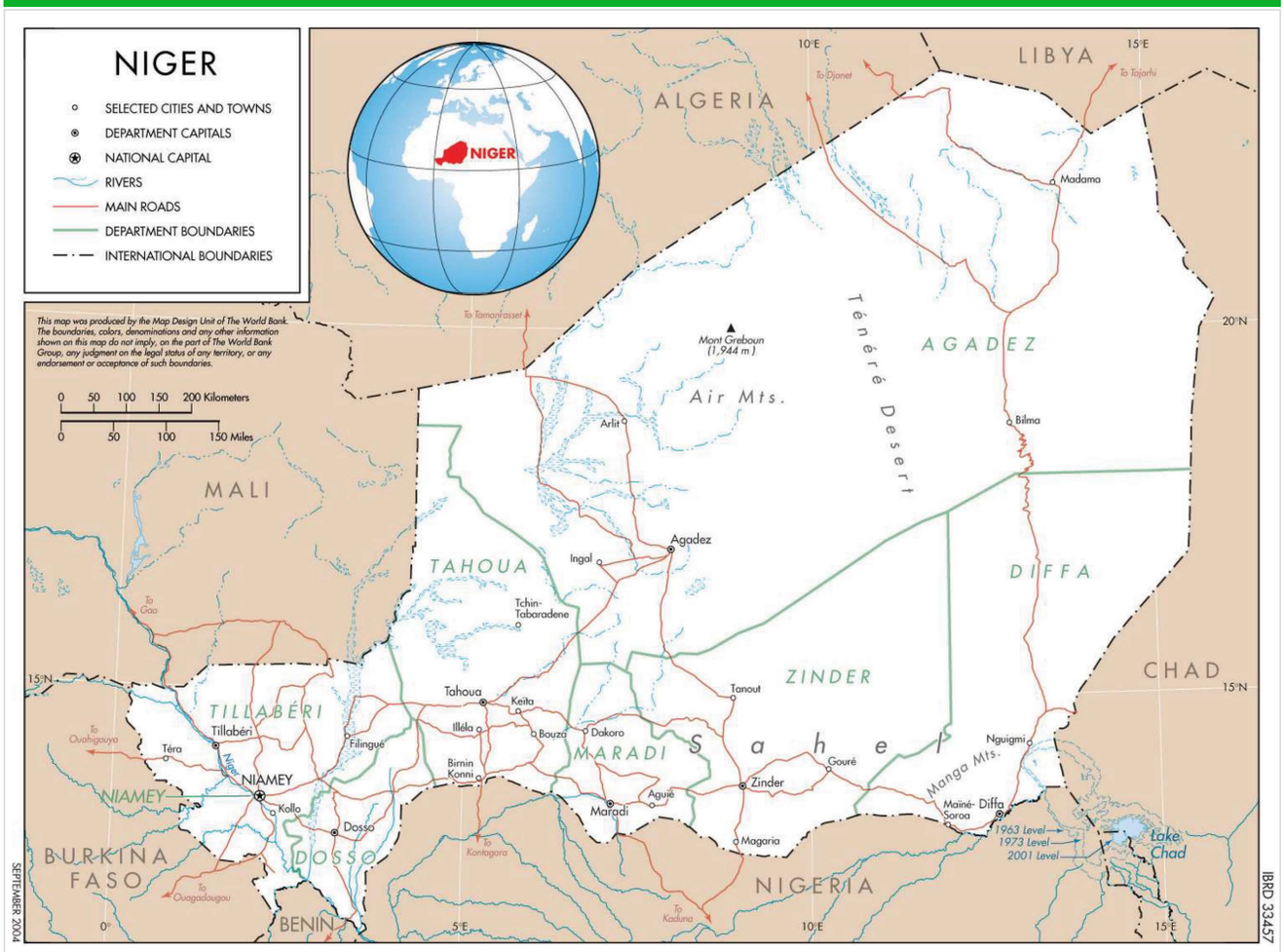
Overall, evidence from operational insurance programs suggests significant benefits from IBDRFI instruments, both in terms of establishing mutual benefits between the public and private sectors and delivering positive outcomes for the welfare and livelihoods of pastoralists during crisis and non-crisis periods. There is still need for better understanding of the short and long-term impacts of these programs on individual, community and environmental outcomes. Investments in robust learning, monitoring and evaluation, infrastructure and rigorous impact assessment studies are important to assess and increase the product value to ensure the delivery of tailor-made initiatives for resilience-building of pastoral communities.

2. Socio-economic assessment

2.1 General socio-economic context

Niger is a large agriculture-based country with an environment that is not conducive for economic development. It is a landlocked country occupying a landmass of 1267 000 km^2. The country has an estimated population of 23.3 million and an annual growth rate of about 3.9%, the fastest population growth in the world (WBG, 2019). About half of the population is below 15 years old and the total population is expected to triple by 2050. More than 80% of Nigeriens depend on agriculture for their livelihoods and live in rural areas. An estimated 84% of the population lives along the Niger river in the country's southwest region and along the border with Nigeria, where rainfall is higher and the most arable land is located. Through climate change, climatic conditions are expected to worsen (WBG 2017; 2019). In addition, Niger is caught in the middle of numerous security crises, ranging from political and religious violence in northern Nigeria and the Lake Chad basin to the emergence of non-state violent groups in Mali and Burkina Faso and state collapse in southern Libya. These crises have regularly spilled over into Nigerien territory leading to ongoing states of emergency in the south-eastern Diffa region, heavy casualties in the south-western Tillabéri region and large numbers of displaced refugees in recent years (WBG 2019).

FIGURE 2.1 MAP OF NIGER



Source: WBG 2019

Niger is an agriculture-based economy and one of the poorest countries in the world (Figure 2.1). Agriculture is the most important sector of the Nigerien economy, contributing up to 40% to the GDP compared to manufacturing, construction and public works and electricity and water generation sectors, which contribute 6, 3 and 1% respectively. More than 80% of the population depend on agriculture for their livelihoods and reside in the country's rural areas. Niger's GDP growth (5.9% per year between 2011-19) has been negatively affected by strong population growth. Poverty is very high, with more than 40% of the population living below the national poverty line (2018 estimate). The GDP per capita was estimated to be only USD 554 in 2019. Of all 189 countries ranked in the human development index (HDI), Niger ranked last in 2020. Poverty levels have declined over the past 15 years, however, progress has been faster in urban areas (poverty headcount declined from 29.6% in 2005 to 8.7% in 2014) compared to rural areas where the poverty headcount declined from 58.3 to 51.4% during the same period. Wealthier households benefited more from economic growth than poor households as inequality increased significantly from 2005 to 2014 (WBG 2017; 2019). Chronic food insecurity is high. As shown in Table 2.1, a 2018 analysis of selected economic and agricultural indicators estimated that around one third of all Nigerien households are moderately or severely chronically food insecure (FEWS NET 2019).

TABLE 2.1 SELECTED ECONOMIC AND AGRICULTURE INDICATORS IN NIGER

Indicator	Unit	Value	Period	Source
Population	million	23.3	2019	WBG 2021
Rural population	%	83.5	2019	WBG 2021
Annual GDP growth	%	5.9	2011-19	WBG 2021
GDP / capita	USD	554	2019	WBG 2021
National poverty	% of total	40.8	2018	WBG 2021
Agriculture GDP	% of total GDP	37.8	2019	WBG 2021
Agricultural employment	% of total	72.5	2019	WBG 2021
People moderately or severely food insecure	% of total	32	2018	FEWS NET 2019

2.2 Importance of livestock to the national economy

The livestock sector is one of the most important economic sectors in Niger contributing around 40% to agricultural GDP and 13% to national GDP (Table 2.2). An estimated 87% of households in Niger raise livestock, either as a primary or secondary Source of livelihood (WBG 2019). About 4 million people (≈17% of the total population) are estimated to be pastoralists (UNECA 2017). Livestock contributes approximately 15% to rural households' income and 25% of food requirements at the national level. An estimated 60% of the herd in Niger belongs to the agro-pastoralists living in the south of the country. After mining, livestock contributes the second largest exports from Niger, accounting for 21% of foreign exchange revenue generated (GoN 2013). About 95% of livestock products, valued at an estimated 2% of the Nigerien national GDP, are exported to Nigeria (WBG 2017). According to a World Bank report, the annual productivity rates from sedentary pastoralists, transhumance and the nomadic population are 61, 65 and 69%, respectively (La Banque Mondiale undated). Some authors point out, however, that the majority of export trade goes unrecorded and a large amount of animal products is exported west to Burkina Faso and beyond (USAID 2016).

TABLE 2.2 SELECTED ECONOMIC INDICATORS IN NIGER'S LIVESTOCK SECTOR

Indicator	Unit	Value	Period	Source
Contribution to GDP	% of total	13	2013	GoN 2013
Contribution to agriculture GDP	% of total	40	2013	GoN 2013
Contribution to export earnings	% of total	21	2013	GoN 2013
Households rearing livestock	% of total	87	2013	GoN 2013
Pastoralists (nomadic pastoralists and agro-pastoralists)	% of total population	17.0	2015	UNECA 2017

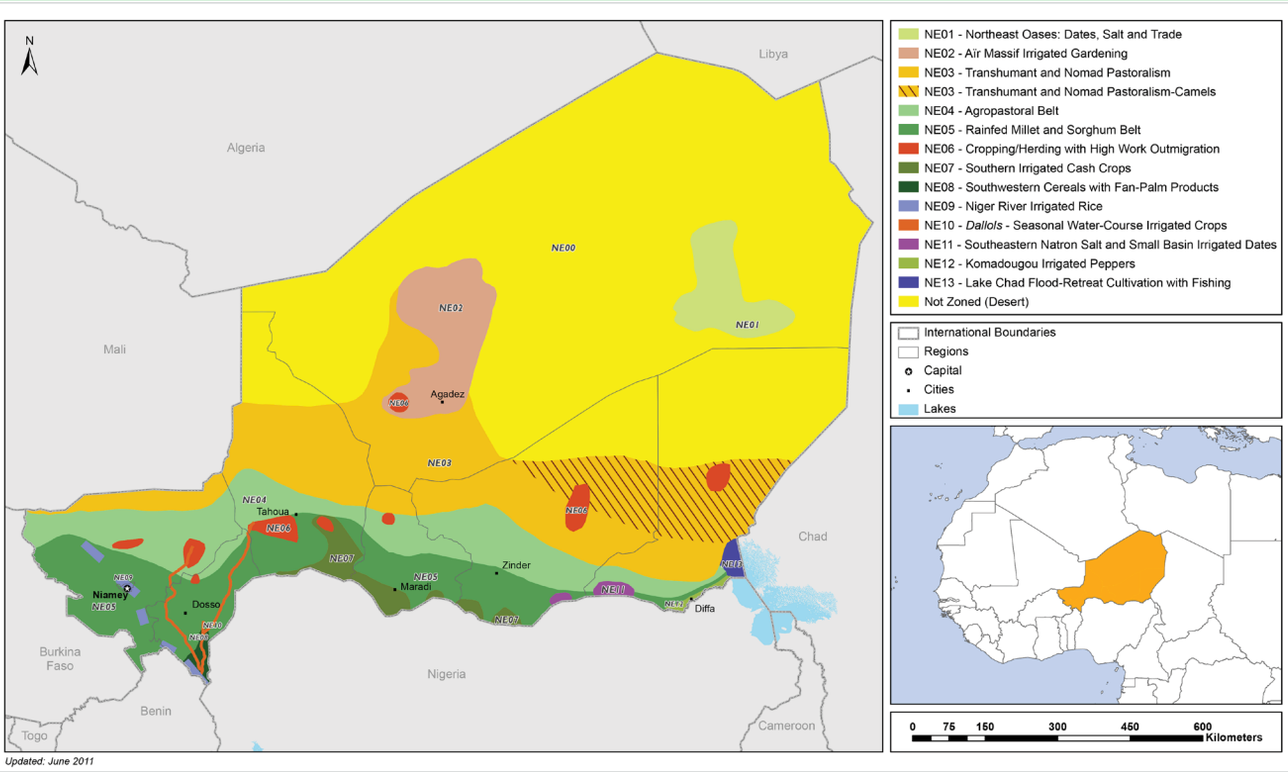
Like other countries in the Sahel, the following three broad livestock productions systems can be differentiated in Niger (WBG 2019):[6]

1. ***Pastoral systems*** characterized by extensive herding of cattle, goats, sheep and camels on communal grazing lands and migratory patterns. These systems are mainly practiced in the pastoral belt (Figure 2.2; FEWS NET Livelihood Zone NE03) where low rainfall (100-200 mm per year) limits productive use of the land to predominantly pastoral systems. Nomadic pastoral systems, where herders move in a seasonal circuit over great distances, are mainly practiced by Tuareg, Arabic speakers and Toubou people in the northern parts of the country. Some nomadic pastoralists especially in the eastern Diffa region have replaced cattle with camels because the latter require less water. Transhumant pastoral systems, where herders are based in fixed villages but take their animals away to seasonal grazing areas, are mostly practiced by the Fulani. This production system can extend further down south in the livelihood zone.

2. ***Sedentary agro-pastoral systems*** are characterized by producers who also maintain livestock but have fixed incomes, sedentary homes, cultivate crops and practice transhumance to a lesser extent. This is the livestock production system practiced by most livestock owners in Niger. Agro-pastoralists can be found throughout the country but are particularly concentrated in the agro-pastoral belt (Figure 2.2; FEWS NET livelihood zone NE04), where average rainfall ranges from 300 to 400 mm per year. Sixty per cent of all cattle in Niger are found in this zone (FEWS NET 2017). As a result of the strong population growth and other pressures on pastoralist lifestyles, many Nigerien agro-pastoralists today are located in close proximity of areas where crops can grow.

3. ***Semi-intensive and intensive livestock production systems*** are mainly found in peri-urban areas. They tend to focus on poultry farming and ruminant fattening (FEWS NET 2011).

FIGURE 2.2 LIVELIHOOD ZONES OF NIGER

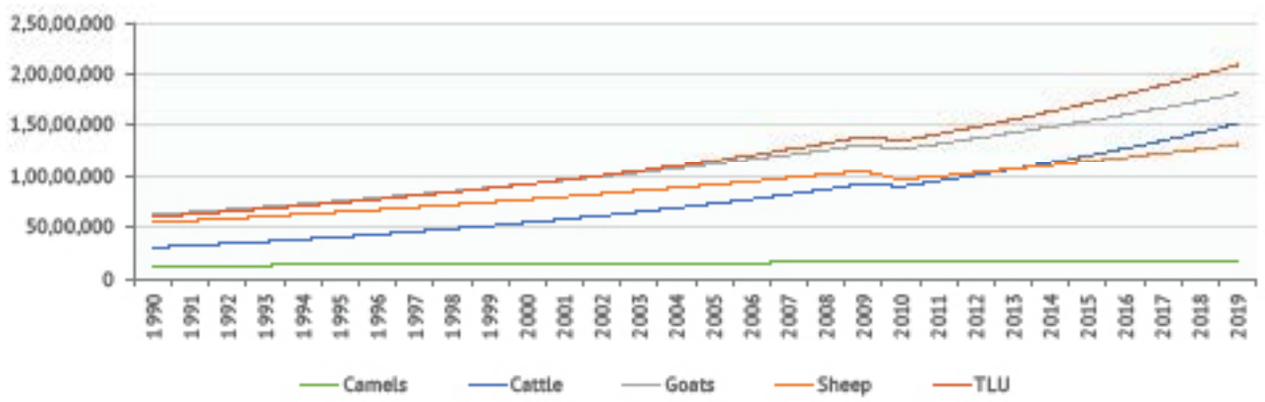


Source: FEWS NET 2011

6. Some scholars describe up to six different production systems in Niger (Rhissa 2010).

Niger has the second largest number of ruminant tropical livestock units (TLUs) in the Economic Community of west African States (ECOWAS) region after Nigeria.[7] There were an estimated 50.6 million head of livestock in Niger in 2019, excluding poultry (FAOSTAT 2021). This national herd is largely composed of goats (36%), cattle (30%), sheep (26%) and camels (4%), while horses, donkeys and pigs comprise the remaining 4% of the live animal population. The estimated national ruminant herd size in 2019 was thus equivalent to 20.9 million TLUs.[8] Livestock numbers have shown strong consistent growth over the years, with ruminant TLU growth averaging 4.4% per year over the period 1990 to 2019. Unlike other Sahel countries, the average annual growth of cattle (5.7%) has been stronger than that of goats (3.8%) and sheep (3.1%) (Figure 2.3). As a result, the composition of the national herd has changed over time with a larger share of cattle. Despite cattle making up 21% of the national herd in 1970, this proportion has grown to 30% in 2019. This could be attributed to government programs on cattle feeding, although there is no concrete evidence to support this claim (FEWSNET 2017).

FIGURE 2.3 TOTAL NUMBER OF SELECTED LIVESTOCK SPECIES



Source: FAOSTAT 2020

Almost all regions in Niger, except for Niamey and the desert Agadez regions, are characterized by substantial livestock holdings. Zinder, Tahoua and Maradi regions have the largest ruminant populations (Table 2.3; FEWS NET 2017). Data from the agricultural and livestock census conducted in 2007 show that 66% of the national livestock herd was kept in sedentary systems, 16% in transhumant systems and 18% in nomadic systems (GoN 2007a). The conflict in the Lake Chad basin has disrupted markets in the south-eastern Diffa region (FEWSNET 2017). Figure 2.4 below is a map that shows the effect of conflict on the presence of livestock and market activity in the same region.

7. As per FAOSTAT data for 2019, Mali has a larger herd than Niger in terms of head of livestock (60.1 versus 50.6 million). It should be noted, however, that given its higher share of cattle, Niger has a larger herd in terms of TLU (20.9 vs. 18.4 million TLU in Mali).

8. Tropical livestock units allow comparisons of nutritional requirements across livestock species. Using ILRI's classification, 1 adult cow weighing on average 250 kg is deemed to be equivalent to 1.0 TLU. In terms of nutritional requirements, a camel is equivalent to 1.4 TLUs and sheep and goats are equivalent to 0.1 TLUs. It is noted that different institutions use different TLU conversion factors. For example, Houerou and Hoste (1977) use the following conversion factors for pastoral/nomadic herds: 1 cow = 1 TLU; cattle in a herd = 0.7 TLU; sheep = 0.1 TLU; goats = 0.08 TLU and camels = 1.25 TLU.

Photo credit: EAP Photo Collection/ World Bank

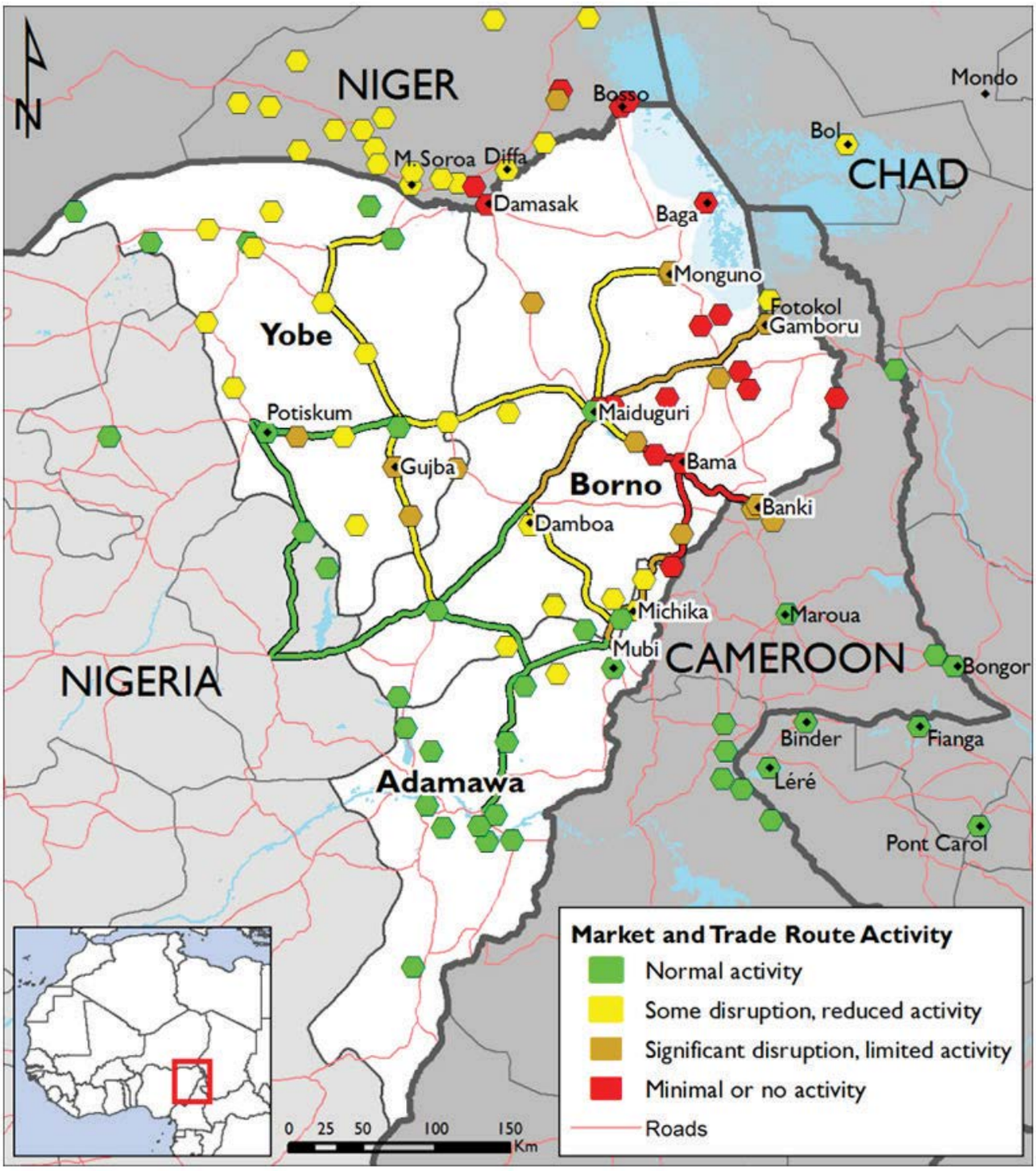
TABLE 2.3 RUMINANT LIVESTOCK HOLDINGS (AVERAGE NUMBER OF HEAD) BY REGION IN NIGER (2010-14)

Region	Sheep	Goat	Cattle
Agadez	480,794	744,100	36,782
Diffa	785,817	1,187,198	1,010,634
Dosso	813,929	1,081,879	1,051,312
Maradi	1,876,799	2,581,716	1,690,428
Niamey	176,753	99,242	55,184
Tahoua	2,299,941	2,586,886	2,053,529
Tillabéri	1,494,073	1,812,382	2,241,315
Zinder	2,702,702	3,878,570	2,182,085
Grand Total	10,630,809	13,971,973	10,321,269

Source: FEWS NET 2017, citing statistics by the ministry of livestock (2015)

Photo credit: EAP Photo Collection/ World Bank

FIGURE 2.4 MAP SHOWING THE EFFECTS OF CONFLICT ON PRESENCE OF LIVESTOCK AND MARKET ACTIVITY IN NIGER

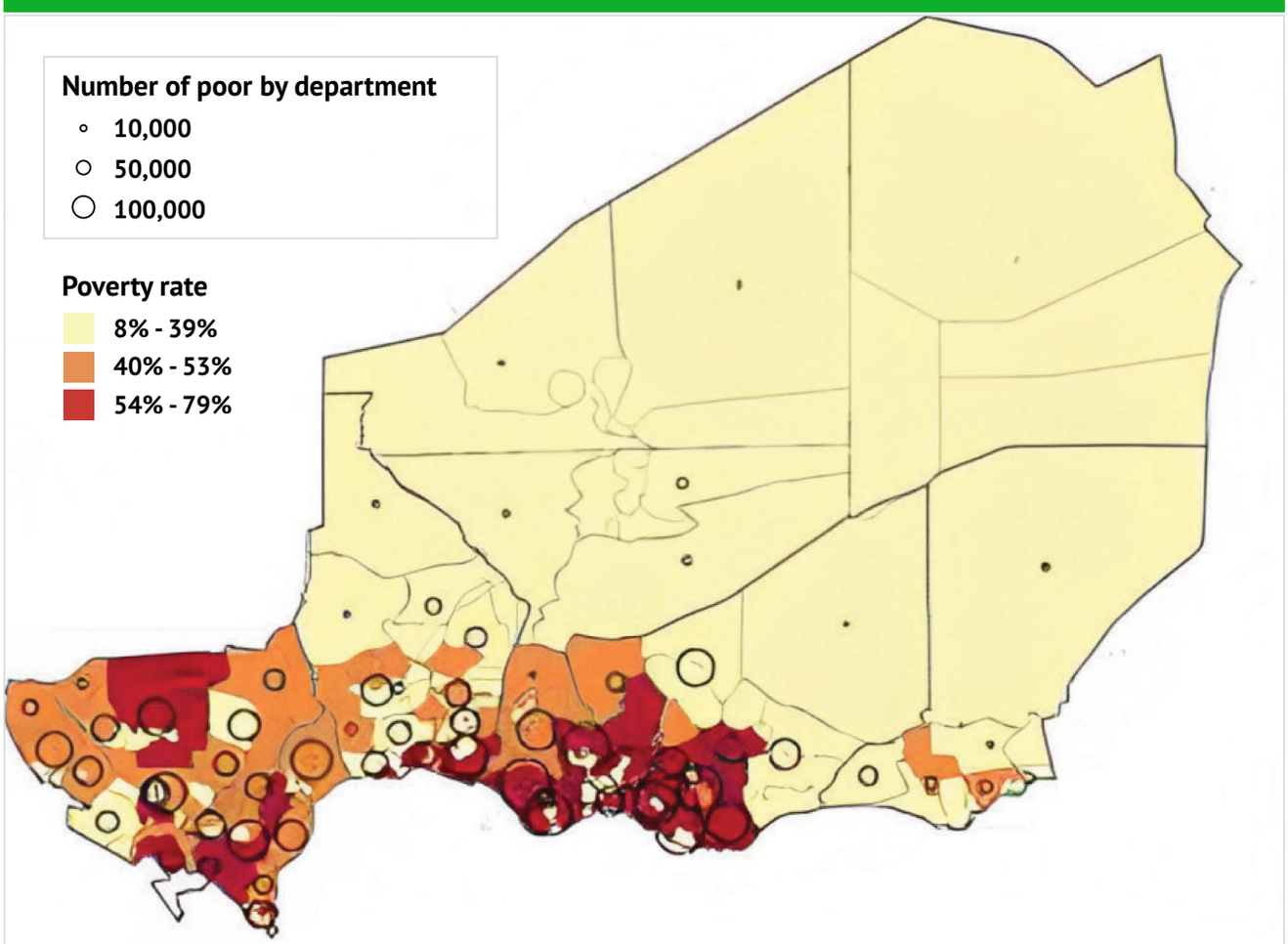


Source: FEWSNET 2017

2.3 Pastoral livelihoods, challenges and issues

Regions with higher livestock ownership are generally associated with greater wealth, while agricultural regions tend to be poorer. Poverty incidence is highest in the southern regions of Maradi, Zinder and Tillabéri where most agricultural activity occurs. Poverty may also be exacerbated by the continued conflicts in the border areas (Figure 2.5; WBG 2017).

FIGURE 2.5 NUMBER OF POOR PEOPLE AND POVERTY INCIDENCE BY DEPARTMENT IN NIGER

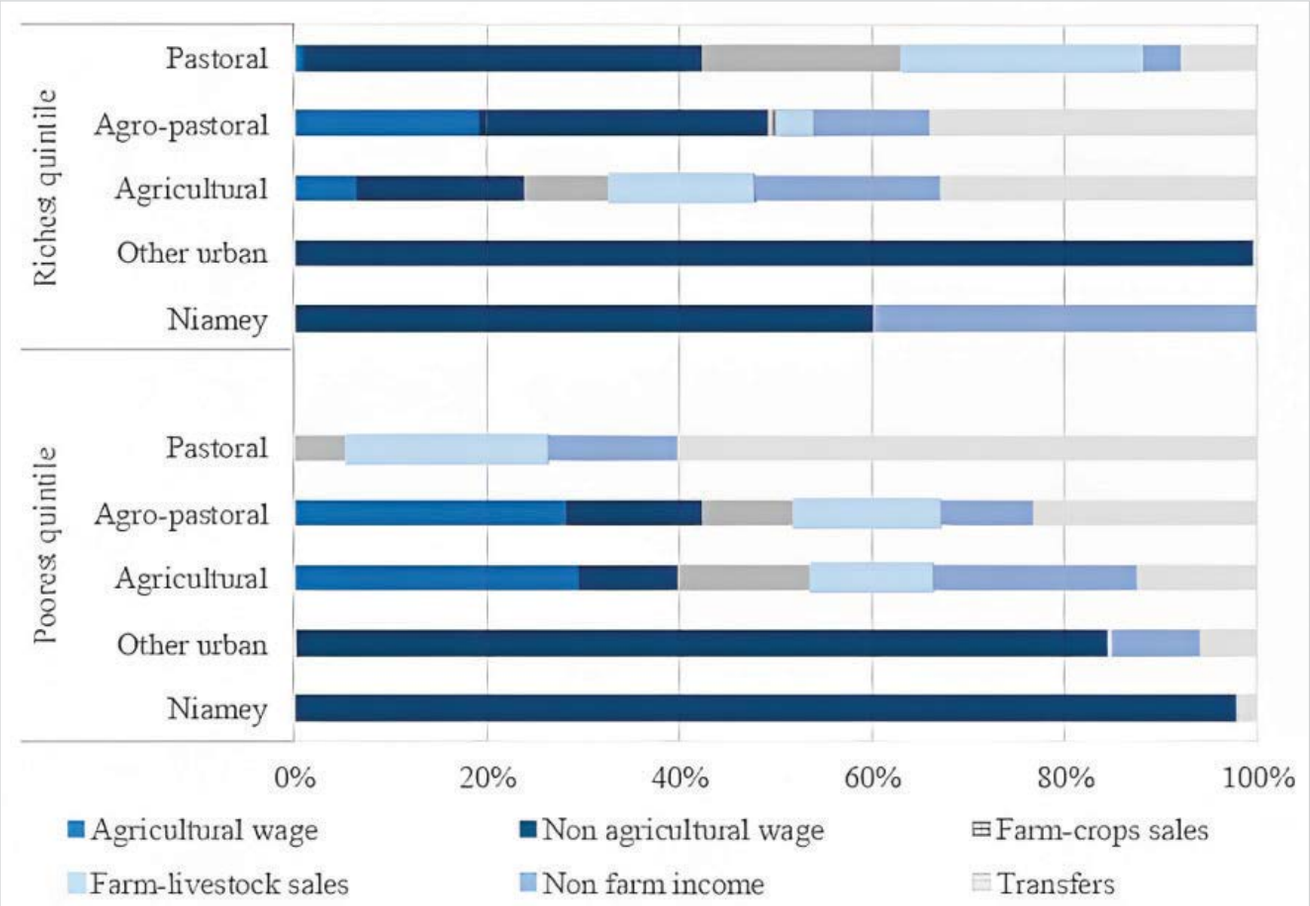


Source: WBG 2017

While the incidence of overall poverty is lower in pastoral than agricultural areas, inequality is much higher in the former and the poorest people in pastoral areas are among the poorest in the country. Survey data from 2014 shows that in pastoral zones, the poorest quintile of households receives a greater proportion of its cash income from aid transfers than in other zones, which may indicate lack of alternative Sources of income. Meanwhile, the richest quintile in the same pastoral zones receives significantly lower aid transfers than the richest quintile in the agro-pastoral and agricultural zones, demonstrating their relative wealth (WBG 2017, Figure 2.6). Livestock ownership distribution is extremely unequal as more than 70% of poor households in In the agricultural and agro-pastoral zones do not own any cattle. Even in the pastoral zones, 65% of poor households do not own cattle. The national Gini coefficient[9] for livestock ownership is estimated at 0.68, which is double that of consumption expenditure. It is also much higher than for ownership of agricultural land (Figure 2.7A and B). The 10% wealthiest households own a staggering 90% of all livestock (WBG 2017).

9. The Gini coefficient measures inequality from frequency distribution values (e.g. levels of income). A Gini coefficient of zero expresses perfect equality (e.g. where everyone has the same income). A higher Gini index indicates greater inequality, with high-income individuals receiving much larger percentages of the total population income.

FIGURE 2.6 CASH INCOME FOR POOREST AND RICHEST POPULATION QUINTILES BY AGRO-ECOLOGICAL ZONES IN NIGER (2014)



Source: WBG 2017

FIGURE 2.7 (PANEL A): LORENZ CURVE OF AGRICULTURAL LAND OWNERSHIP, NIGER (2014)

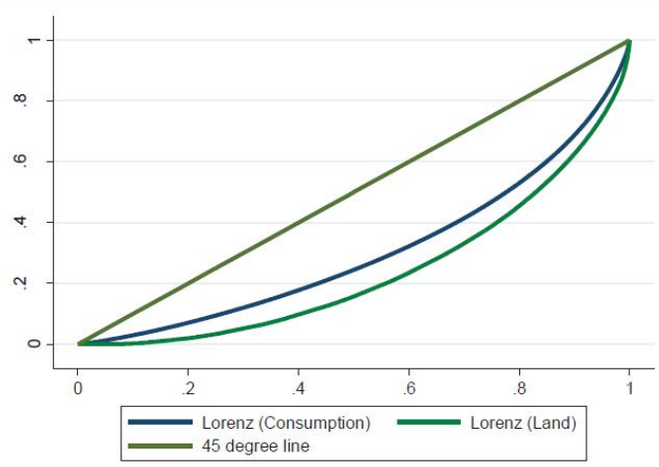
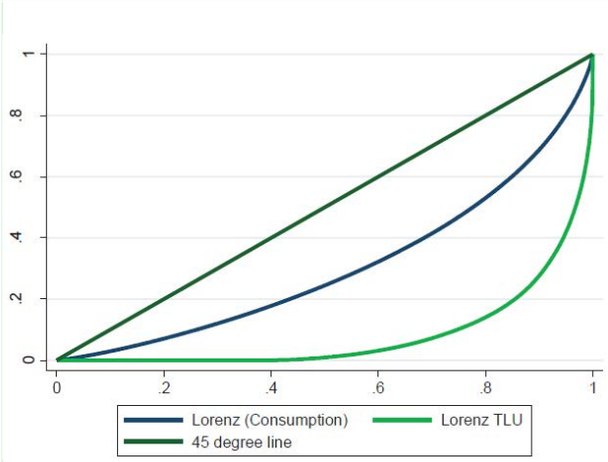


FIGURE 2.7 (PANEL B): LORENZ CURVE LIVESTOCK OWNERSHIP, NIGER (2014)



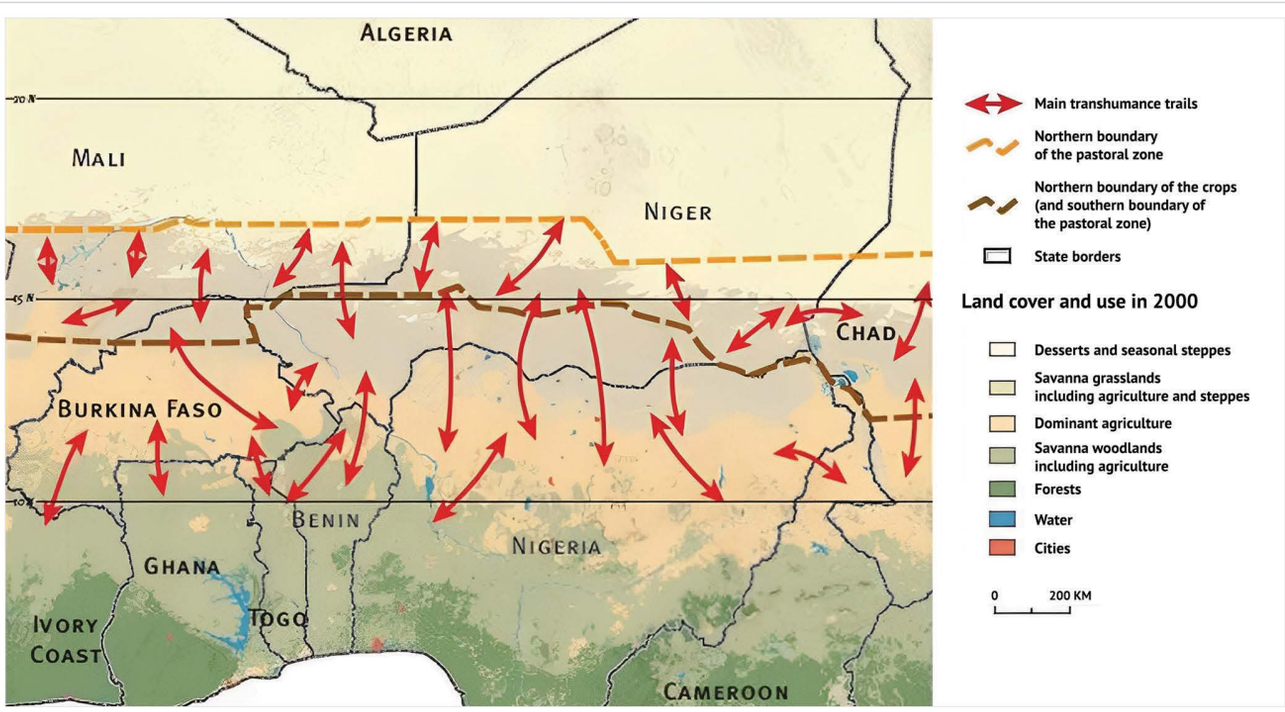
Source: WBG 2017

In the pastoral and agro-pastoral zones, poor households own little livestock and depend on other Sources of livelihood. In the pastoral zones, many poor pastoralists work as contract herders for wealthier livestock owners. In the regions of Agadez, Tahoua and Maradi, it is estimated that about 60% of livestock is not owned by those herding them (AGTER 2011). There is also some seasonal rural-urban migration of men seeking work in local towns or in some cases, neighbouring countries. In the agro-pastoral zones, given the large discrepancy of livestock ownership between poor and non-poor households, only relatively wealthy households are true agro-pastoralists, while poorer ones are more 'agro' than 'pastoral'. During drought years, poorer households may be forced to take on additional paid employment or even sell part of their land to wealthier neighbours (FEWS NET 2011).

In both pastoral and agro-pastoral zones functioning livestock markets are crucial. For most people in the pastoral zones, cereals form a larger part of their diet than animal products. As cereals do not grow in the pastoral regions except for some wheat grown in the Aïr mountain area and around certain oases, they are imported from the south. Grains are mainly purchased with money from animal sales. Most of the livestock sold are ultimately exported to Nigeria. Animals are sold through intermediary markets within the zone before being transported further south. However, some pastoralists in the north also sell their livestock to Algeria and Libya. To a lesser extent, the agro-pastoral zones are also net food importers during most years and therefore markets are critical for the people's existence (FEWS NET 2011).

Seasonal animal herd migrations over long distances are common in Niger. Similar to the rest of the Sahel, Niger pastoralists migrate with their animals depending on the availability of water and pasture. In Maradi and Zinder, migratory patterns can predominantly be observed along a north-south axis, with many pastoralists crossing into Nigeria. Almost 80% of Nigerien animals that are herded into other countries cross into Nigeria (Touré et al. 2012). Pastoralists stay with their animals in the northern home areas during the rainy season until October. Thereafter, they move south beginning in November/December and then return by the beginning of the rainy season in May/June (FEWS NET 2011). In Tillabéri and Diffa, movements can also be observed along an east-west axis, with crossings into Burkina Faso and Chad. Figure 2.8 shows the main transhumance corridors in Niger (Moutari and Giraut 2013; USAID 2016).

FIGURE 2.8 MIGRATORY MOVEMENTS OF PASTORAL HERDS IN NIGER

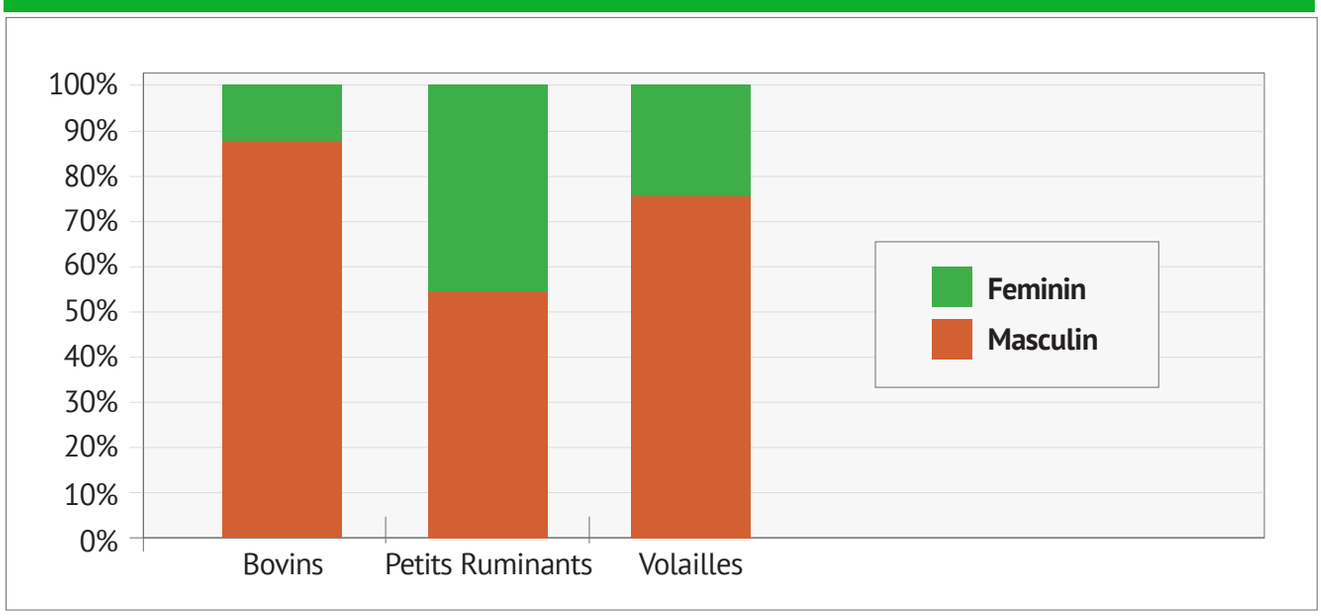


Source: Moutari and Giraut 2013

Livestock tend to be owned by men who are also responsible for the main animal husbandry activities while women and children mostly carry out supportive tasks. Generally, women remain marginalized in the economy. Based on the gender inequality index which approximates gender inequality based on reproductive health, empowerment and economic status, Niger ranked 154th out of 162 countries in 2020 (UNDP 2020). Survey data from 2011 shows that livestock ownership is heavily skewed towards men rather than women (Figure 2.9; WBG et al. 2012). In less than 10% of cases, men and women have equal ownership of assets and handle income, however, in most cases it is men that own assets and handle income.

According to the survey there is an imbalance in livestock ownership between male and female-headed households, with the former owning on average twice as many TLUs as the latter (WBG et al. 2012). Tasks that are considered to be important such as those that involve spending money, contacting veterinarians and the administration of medication to animals are done by men. Similarly, taking care of the more valuable cattle is also mainly considered to be a man's task. Meanwhile, caring for small ruminants, purchase of forage materials, animal feeding and providing assistance during parturition are considered tasks that can be done by men, women and children alike (USAID 2016).

FIGURE 2.9 LIVESTOCK OWNERSHIP BY GENDER IN NIGER (2011)



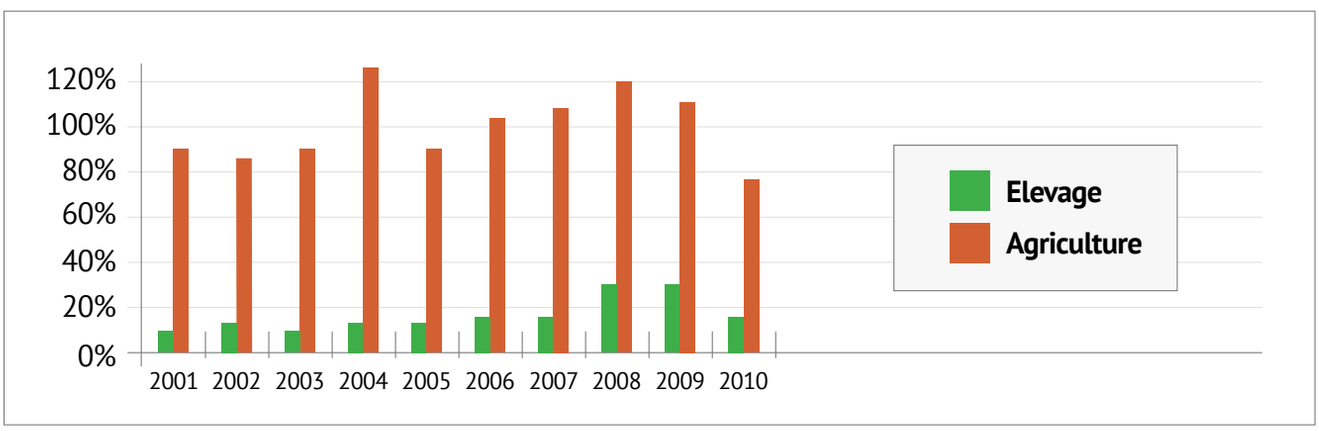
Source: WBG et al. 2012

Like other regions in the Sahel, pastoralists in Niger are confronted with many different challenges, including lack of access to the most basic services and growing land pressures. As the pastoral zones are very remote, pastoralists often lack access to basic social and sanitary services, means of transportation and financial services. Fewer animals tend to be vaccinated by pastoralists than by agro-pastoralists. The 2007 national data showed animal vaccination rates of 31 and 52% in pastoral and agro-pastoral zones, respectively. Only 11% of nomadic pastoralists vaccinated their animals (GoN 2007a; 2007b). Low vaccination rates are due to lack of access to veterinary services and reluctance among pastoralists to vaccinate their animals (WBG 2019). Other challenges faced by pastoralists include increasingly scarce communal grazing land due to expanding sedentary crop farming, the frequency and severity of droughts (see next section), strong population growth, continued growth of the livestock population, progressive land degradation, deforestation and local conflicts (WBG 2017; 2019).

Despite the economic importance of the livestock sector, it receives relatively little public support and pastoralists remain particularly marginalized. From 2001 to 2010, the livestock sector was only allocated about 2% of the total public budget and 15% of the agricultural budget (Figure 2.10; APESS 2014). This is low, considering the sector's much larger contributions both to national and agricultural GDP.

There are many longstanding laws in Niger regulating the pastoral sector, for example, the zone in the north is dedicated to pastoralism and the rural code prohibits crop farming in this area,[10] grants grazing rights to pastoralists in agricultural zones between December and January[11] and recognizes equal access by all to natural resources[12] (Davies et al. 2016). However, the existing rules have not often been effectively enforced (Hughes 2014; Zakara and Abarchi 2007). The USAID (2014) cites government officials and development specialists stating that, "most of the population does not know, ignores or disobeys the rural code." Reacting to resulting pressures from pastoralist groups, the government launched a highly inclusive consultation process on a pastoral code between 2000 and 2010, which resulted in Ordinance No. 2010-029 in 2010, a law that further institutionalized pastoral rights. Implementation has been sluggish and by 2017, only a few of the 14 decrees required to fully implement the ordinance had been passed (Leonhardt 2019).

FIGURE 2.10 PUBLIC EXPENSES (USD MILLION) DEDICATED TO CROP AND LIVESTOCK AGRICULTURE IN NIGER (2001-10)



Source: APESS 2014

As a result of these pressures, many pastoralists abandoned nomadic lifestyles and instead became sedentary, further increasing pressure on the land. Incidences of people moving southwards from the pastoral zone and becoming sedentary were recorded following the catastrophic droughts of the 1970s and 1980s (GoN 2007b; Touré et al. 2012; AGTER 2011). These great Sahelian droughts were transformative for the country, drying up water bodies and drastically reducing vegetation in vast stretches of land. In some areas, such as the department of Keita, forests disappeared completely (USAID 2014). However, as noted above, many other factors contribute to the immense challenges that pastoralists face in Niger. With climate change, the number of challenges is only expected to grow. An increasing number of pastoralists have been forced to move south and become sedentary, thereby further reducing the size of land available for communal grazing. Consequently, violent conflicts between migrating pastoralists and crop farmers have become commonplace (USAID 2014; FEWS NET 2014).

2.4 Impact of drought and other shocks on the livestock sector

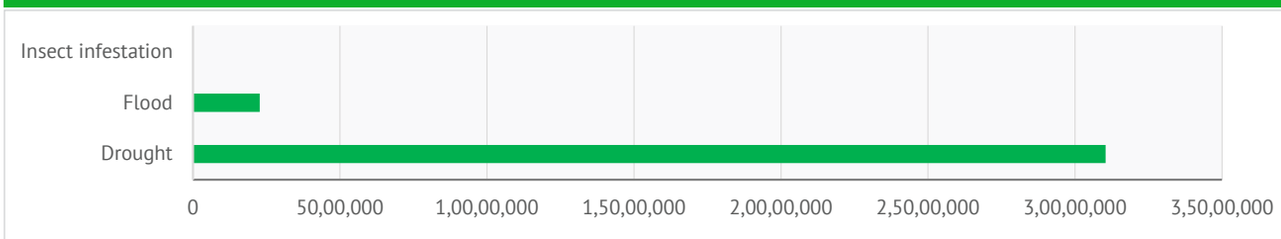
Niger is severely exposed to droughts, floods and locust invasions. Data from the emergency events database (EM-DAT) show that Niger experienced 46 major emergency events between 1970 and 2020 ranging from floods to locust infestations and droughts. Floods occurred 31 times while major droughts and locust invasions occurred 11 and 4 times, respectively. The impact of droughts has by far been the greatest, affecting more than 31 million people during that period (Figure 2.11). This is a very high Figure even by Sahel standards. It is more than twice the number of people affected in either Mali (13.7 million) or Burkina Faso (14.3 million) during the same period despite these countries having similar population numbers. Given that EM-DAT often underestimates the impact of droughts, the actual Figure is likely to be even higher. The most severe drought years were 1972-73, 1984-85, 2004-05, 2009-10 and 2011-12.

10. Loi 61-5 from 1961.

11. Decree No. 87-077 from 1987.

12. Ordinance No. 93-15 from 1993, referred to as the 'rural code'.

FIGURE 2.11 NUMBER OF PEOPLE AFFECTED BY DISASTERS BETWEEN 1970 AND 2020 IN NIGER



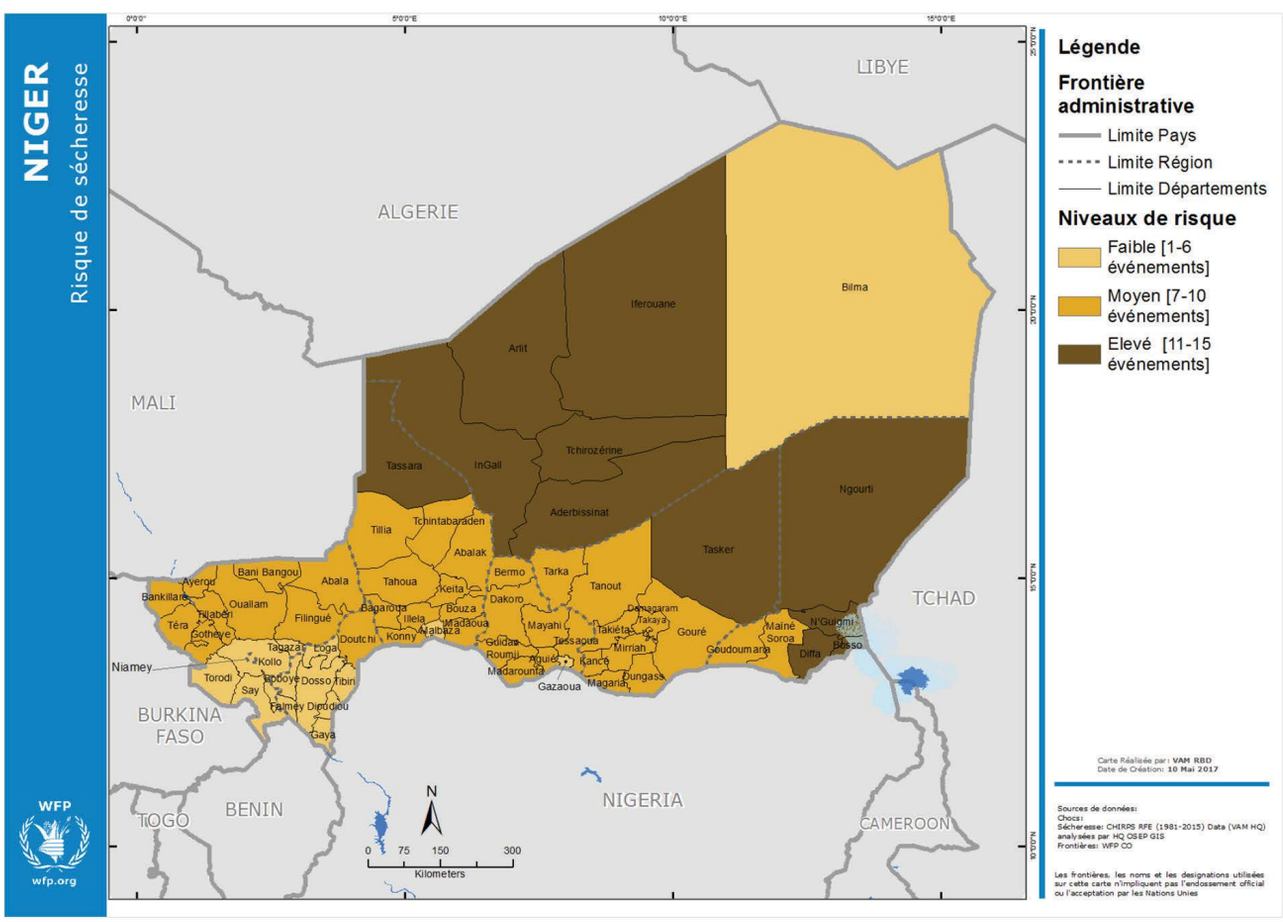
Source: EM-DAT database

From the several analyses conducted by various stakeholders on the frequency and severity of droughts in Niger, the consensus is that large-scale droughts occur on average every 3 to 5 years and over the last few decades, the most severe drought years leading to major food crises occurred in 1973-74, 1997-98, 2004-05, 2009-10 and 2011-12.

Below is an overview of the findings from the analyses:

- **World Food Programme (2018):** Analysis by the WFP showed that the northern parts of the country, i.e. the desertic areas and those inhabited by nomadic pastoralists are not only the driest but also experience the highest level of rainfall variability. In Figure 2.12, the areas indicated in brown experienced between 11 and 15 drought years during the period 1981 to 2015,[13] which equates to a drought approximately once every 2.3 - 3.5 years. In the centre of the country, which includes most of the pastoral and agro-pastoral zones, 7-10 drought years were recorded during the same period, i.e. one every 3.5 – 5 years (WFP 2018b).

FIGURE 2.12 NIGER, DROUGHT LOCATIONS (1981 TO 2015)

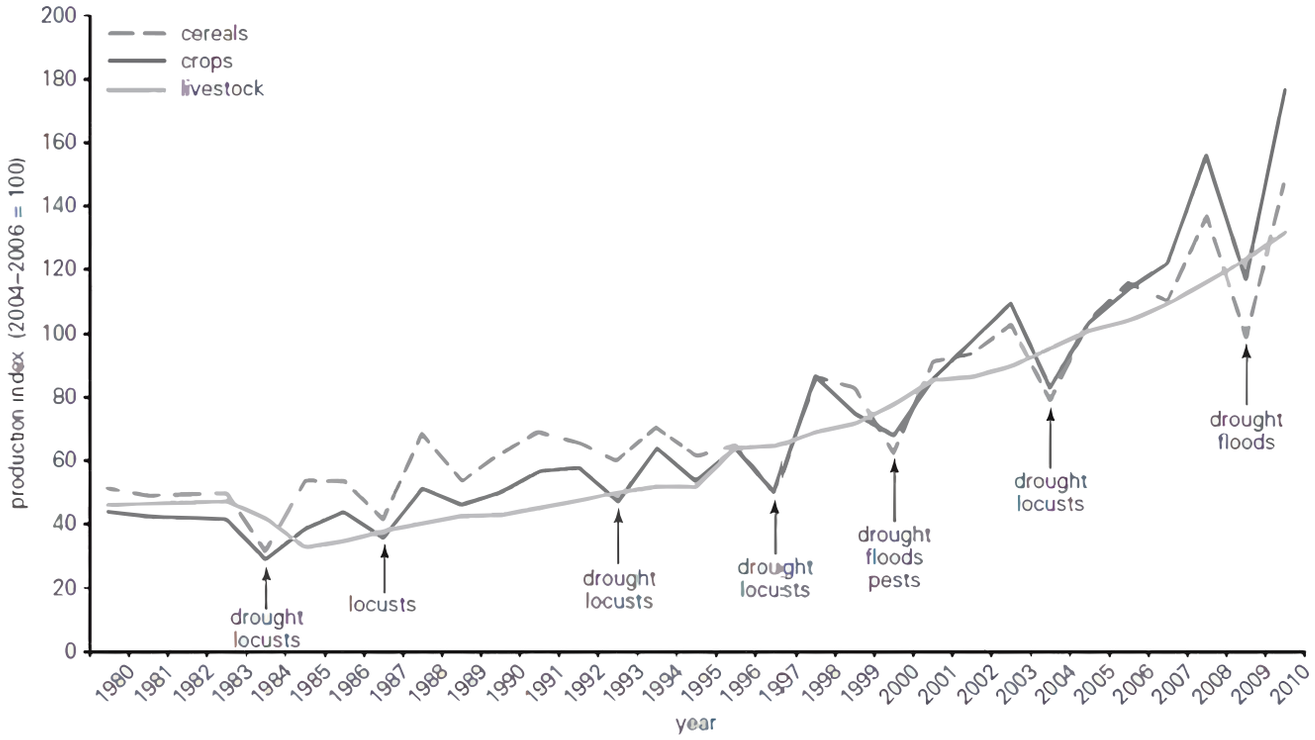


Source: WFP 2018b

13. Drought was defined as an agricultural season in which average rainfall, as measured by the Climate Hazards Group Infra-red Precipitation with Station data (CHIRPS) in the respective area was below 80% of the long-term mean. For a detailed description of the methodology, see WFP 2018b and WFP 2018.

- **World Bank Group (2013):** The World Bank conducted an agricultural sector risk assessment in Niger in 2013. Analyses of departmental rainfall data from 1980 to 2009 showed that there was a total of nine years in which 10 or more departments suffered severe or catastrophic drought[14] (once every 4.4 years), with crop failure being recorded in seven of these years (Figure 2.13). The assessment also points out that conditions in the livestock sector are particularly difficult in years when droughts lead to poor animal conditions, low livestock prices and high prices of grain and other basic foodstuff, which researchers estimates can occur once every 10 years (WBG 2013).

FIGURE 2.13 MAJOR SHOCKS TO CROP AND LIVESTOCK PRODUCTION IN NIGER (1981 TO 2010)



Source: WBG 2013

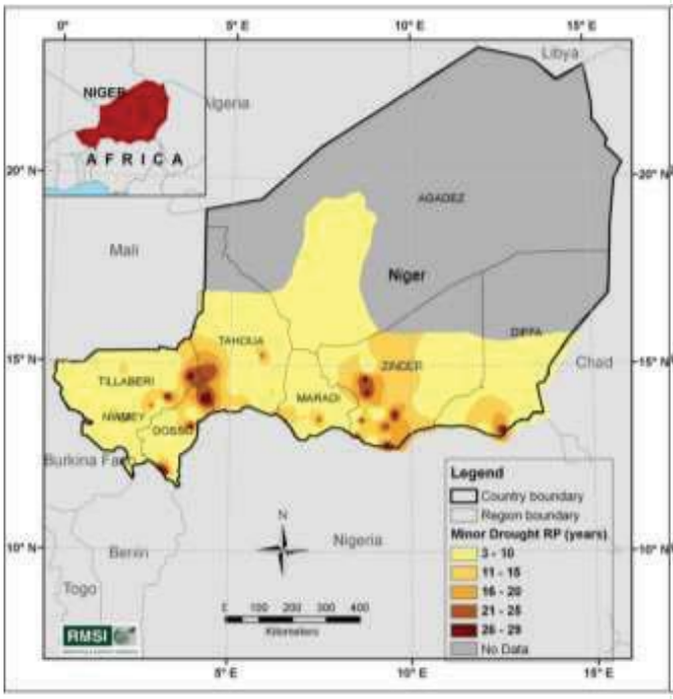
- **RMSI (2013):** In 2013, RMSI conducted a risk assessment for potential agricultural insurance solutions in Niger for the IFC, including analysis of the frequency and severity of droughts. Adopting a similar approach to WBG (2013), RMSI analysed local satellite rainfall data to estimate the frequency of minor, moderate, severe and extreme droughts. Notably, what RMSI considered a 'mild' drought was almost equivalent to what the World Bank considered a 'severe' drought and what RMSI considered a 'moderate' drought was worse than what the World Bank considered a 'catastrophic' drought[15] (RMSI 2013). Figure 2.14 below shows the distribution of RMSI's 'mild' and 'moderate' drought events, which were estimated to occur once every 3-10 and 6-10 years, respectively, throughout the country.

14. The researchers analysed monthly precipitation data from 40 weather stations. They defined a 'severe' drought to be at least 0.6 standard deviations below the long-term mean and a 'catastrophic' drought to be at least 0.9 standard deviations below the long-term mean. The assessment stresses that the analysis only looks at total precipitation and thus is subject to important caveats, including that it does not reflect factors such as late onset of rains, early cessation of rains, long dry spells between two rainy seasons or lack of rain during critical growth phases, all important factors for crop yields.

15. RMSI computed the standardized precipitation index based on seasonal cumulative rainfall values (June-October). A 'minor' drought was defined as at least 0.5 standard deviations below the long-term precipitation mean, a 'moderate' drought as at least 1.0 standard deviations below the long-term precipitation mean, a 'severe' drought as at least 1.5 standard deviations below the long-term precipitation mean, and an 'extreme' drought as at least 2.0 standard deviations below the long-term precipitation mean. Considering total precipitation only, the RMSI analysis is presumably subject to the same caveats as those of the World Bank as pointed out above.

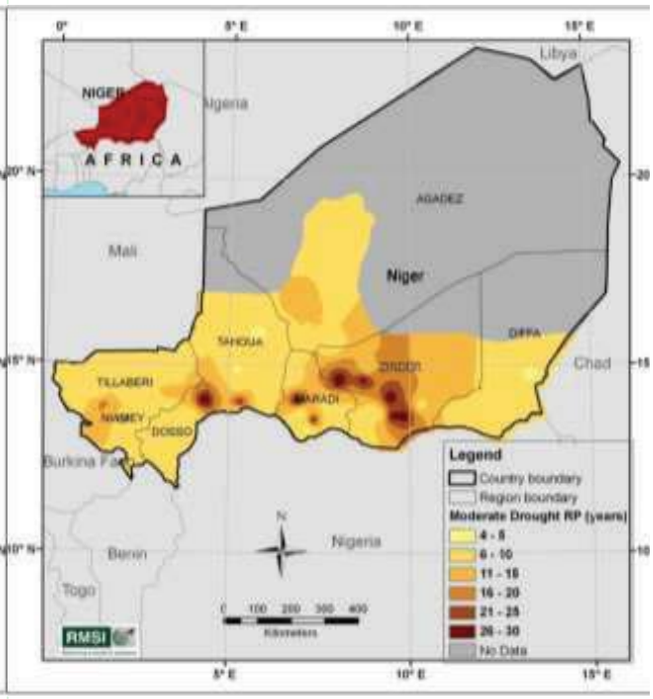
Photo credit: EAP Photo Collection/ World Bank

FIGURE 2.14 (PANEL A): SPATIAL DISTRIBUTION OF MINOR DROUGHT EVENTS PER RETURN PERIODS, BASED ON STANDARDIZED PRECIPITATION INDEX IN NIGER



Source: RMSI 2013

FIGURE 2.14 (PANEL B): SPATIAL DISTRIBUTION OF MODERATE DROUGHT EVENTS PER RETURN PERIODS, BASED ON STANDARDIZED PRECIPITATION INDEX IN NIGER



Source: RMSI 2013

- **Platform for Agricultural Risk Management (PARM) (2016):** PARM conducted an agricultural risk assessment for Niger in 2016 and their findings were that droughts affected crop production about once every 2.9 years and livestock production somewhat less frequently, about once every 10 years. It is unclear from the available documentation, however, which definitions and analytical standards PARM used to arrive at these conclusions (PARM 2016).
- **African Risk Capacity (2016):** Finally, the frequency and severity of drought impacts in terms of food insecurity have been estimated by ARC using the Africa Risk View (ARV), their proprietary drought, risk, food and security model. The ARV model estimated that between 1983 and 2016, more than 1 million people suffered from drought-induced food insecurity in 14 of the 36 years, with a frequency of 2.6 years. It also estimated that at least 2 million people, (around 10% of the current population), were affected in 11 years, a frequency of 3.3 years during the same period (Figure 2.15, ARC 2016).

Photo credit: EAP Photo Collection/ World Bank

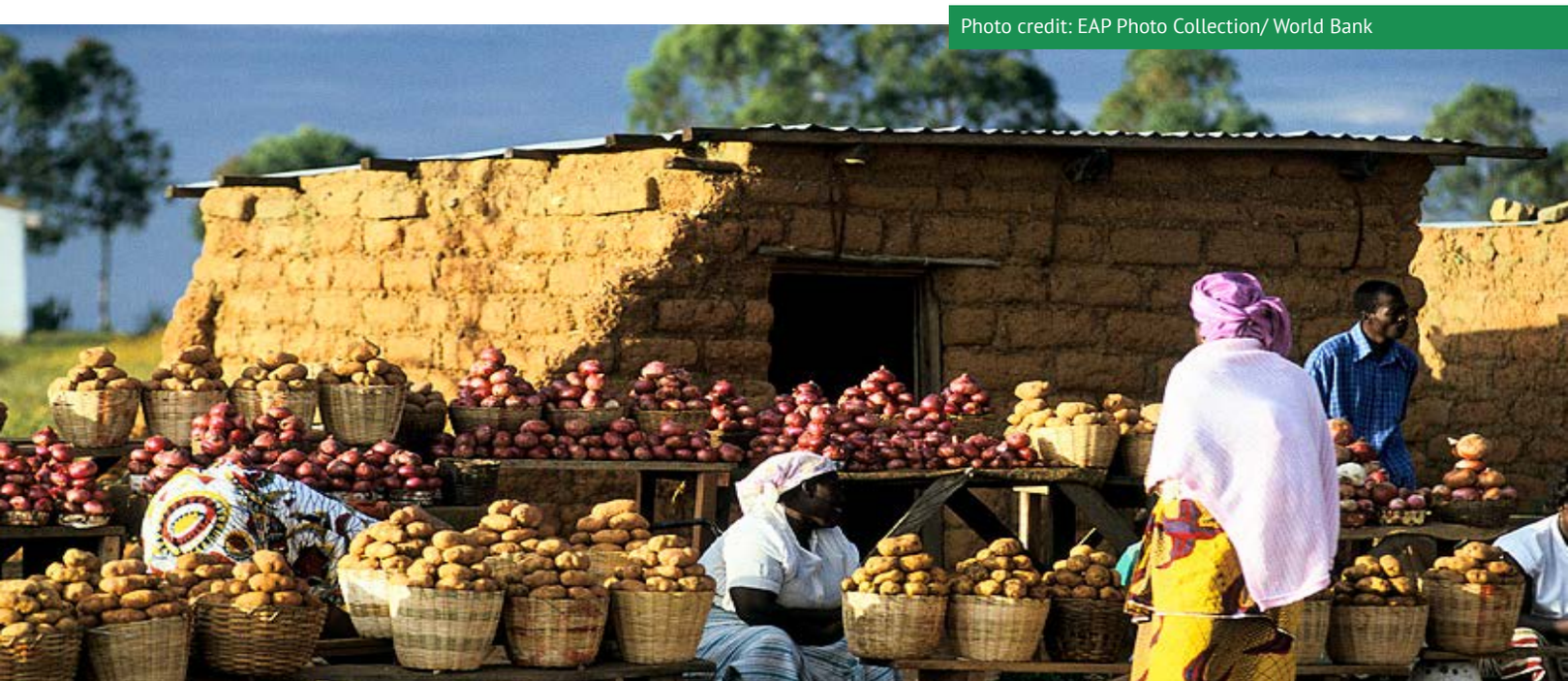
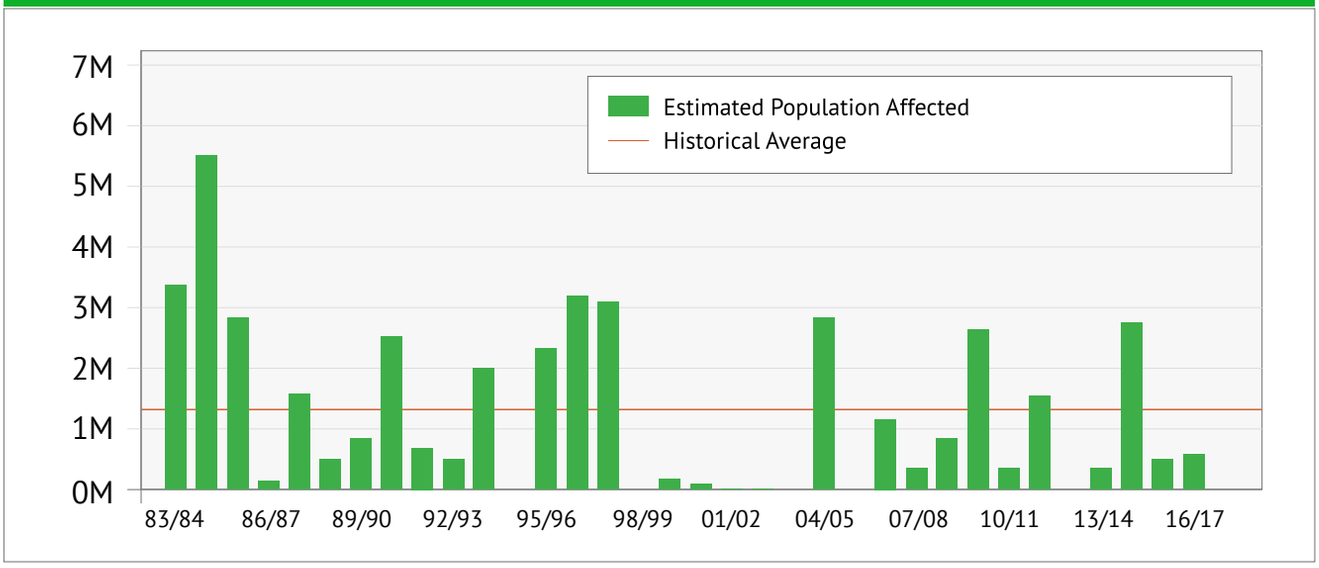


FIGURE 2.15 ESTIMATED NIGERIEN POPULATION (MILLIONS) AFFECTED BY DROUGHT BETWEEN 1983 AND 2016



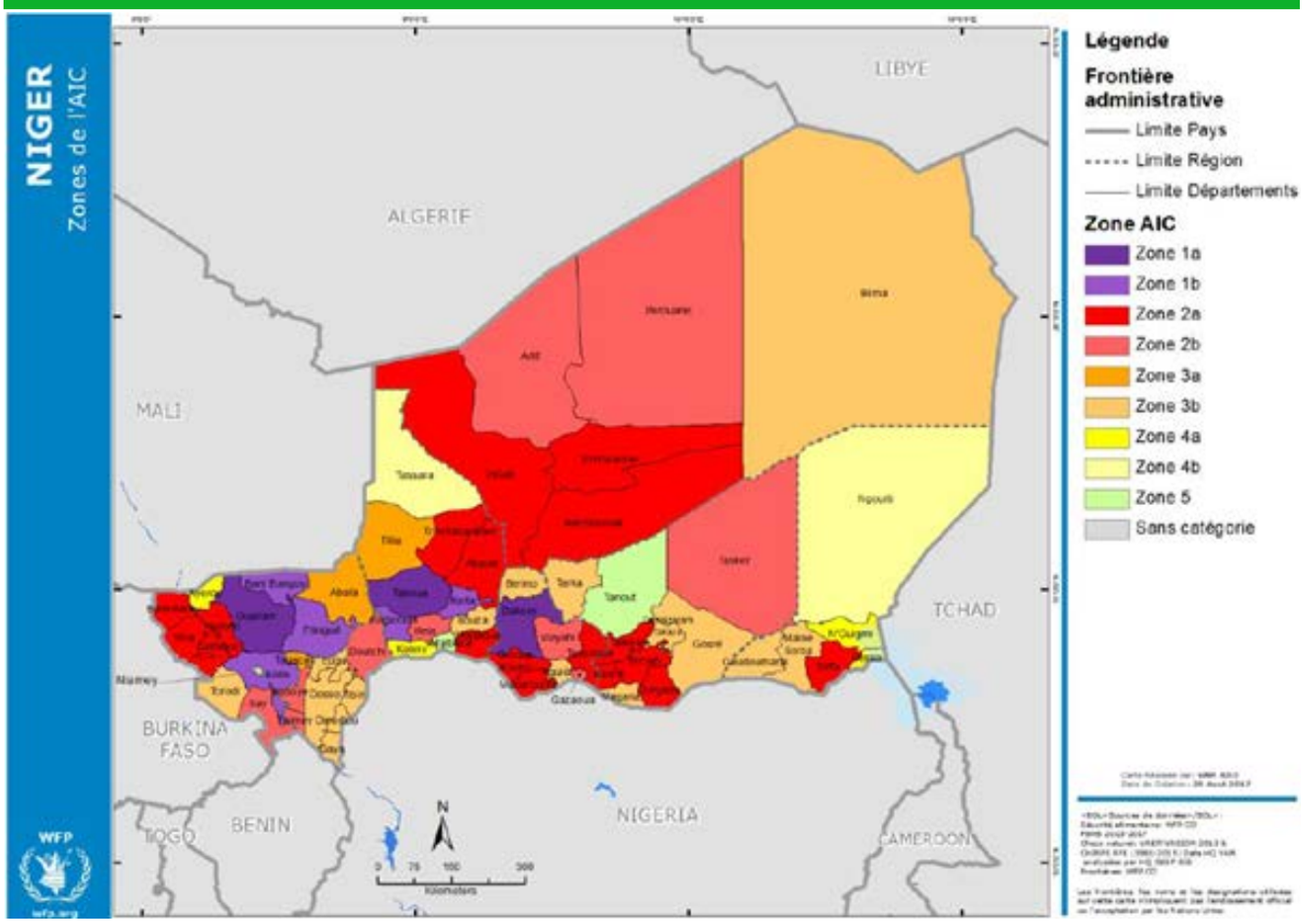
Source: ARC 2016

The frequency and severity of droughts is expected to increase significantly in Niger. Climate change projections for Niger are that mean and maximum temperatures will increase, as will the duration of heat spells. By 2060, the number of days with a minimum temperature greater than 20°C is likely to increase by 55 per year (WBG 2019). Indeed, the effects of climate change are already felt by large parts of the population. During the period 2009-14, households reported that they experienced less rainfall (52%), worse distribution of rainfall in the year (62%), more frequent droughts (59%), shorter rainy seasons (77%) and more delays in the start of rainy seasons (66%). These observations held across both livelihood zones and wealth groups (WBG 2017).

General vulnerability to drought is high in Niger but the evidence bases on the pastoralists' specific vulnerability is mixed. Given a nationwide high dependence on rainfed agricultural activities, high levels of poverty and chronic food insecurity, many people in Niger are extremely vulnerable to drought impacts.

- **On the one hand, pastoralists are particularly vulnerable to the effects of drought.** As discussed above, inequality among pastoralists is particularly high and some of the poorest and arguably most vulnerable parts of the population are in this population segment. This is also reflected in the historic drought impacts. During the great Sahelian droughts of the 1970s and 1980s, thousands of pastoralists searching for water and forage for their animals, were forced to migrate hundreds of kilometres southward into countries such as Burkina Faso, Côte d'Ivoire, Ghana and Nigeria. A vast number of animals died.
- **On the other hand, some reports suggest that the effects of drought are felt less in terms of food insecurity in pastoral areas than elsewhere in the country.** Households that own livestock may buffer some losses while those that do not own livestock may benefit from community-based balancing effects. Analysis from the WFP shows that drought-linked food insecurity seems to be most concentrated in some of the agro-pastoral and agricultural areas. Some pastoral areas in Tahoua and southern Agadez also show strong drought food insecurity linkages, while this can be observed less in pastoral areas in Maradi, Zinder and Diffa (Figure 2.16, WFP 2018b). Equally, analysis by the World Bank in 2013 showed that in Niger, drought risks are more frequent and have greater impacts in the crop than livestock sector (WBG 2013).

FIGURE 2.16 NIGERIEN ZONES AT RISK OF EXPERIENCING FOOD INSECURITY AND NATURAL HAZARDS[16]



Exposition aux Chocs Naturels	Recurrence de l'Insecurite Alimentaire au-dessus du seuil de 20%		
	FAIBLE	MOYENNE	ELEVEE
FAIBLE	Zone 5	Zone 3B	Zone 3A
MOYENNE	Zone 4 B	Zone 2 B	Zone 1 B
ELEVEE	Zone 4 A	Zone 2 A	Zone 1 A

Source: WFP 2018b

The cost and cumulative impact of drought for the Nigerien livestock sector is very high although data tends to be poorly reported. There is significant dearth of data on drought-related losses in the livestock sector (WBG 2013). No systematic historic analysis of drought-related costs and losses in the livestock sector could thus be identified for the purposes of this study. The available evidence on the impacts of past drought events, however, shows their enormous catastrophic potential with estimated losses of 50-80% between 1972 and 1974 of the national livestock herd and 33-40% animal species losses between 1983 and 1985 (Table 2.4.).[17]

16. To determine how exposed a zone is to natural hazard shocks, the frequency of drought and flood recurrence in that zone is determined and divided as per the Jenks' Natural Breaks method. For a detailed description of the methodology see WFP 2018b and WFP 2018a.

17. It should be noted, however that these losses are not reflected in the FAO livestock statistics reported for Niger in Figure 2.3.

TABLE 2.4 YEARS IN WHICH DROUGHT CAUSED MAJOR FOOD SECURITY CRISES AND OTHER IMPACTS IN NIGER

Drought year(s)	General description	Impacts on livestock sector	Humanitarian impacts
1972-74	◆ Generalized drought in Sahel countries ◆ "If any Sahelian country can be said to have suffered the worst of all in the drought, it was probably Niger. There was real famine there in 1974," (Derrick 1977). ◆ Depleted food stocks and very high food prices given repeated drought crises year on year (Derrick 1977)	◆ **Estimated animal losses were 45% for cattle, 27% for sheep and 15% for goats (WBG 2013).** ◆ **Other loss estimates are even higher, ranging from 50 to 80% of the total livestock herd (Derrick 1977; AGTER 2011)** ◆ "In the Sahel, the 1972-73 dry season will be for long remembered as the time when livestock died like flies."	◆ "The number of people who died of famine in Niger cannot be known but it could run into six Figures, with Tuareg and other herdsmen as the main victims," (Derrick 1977). ◆ Tuareg and Fulani worst hit, "refugee floods" from within Niger, many fleeing to Nigeria (Derrick 1977)
1983-85	◆ Generalized drought in Sahel countries	◆ **Estimated animal losses were 40% for cattle, 35% for sheep and 33% for goats (WBG 2013**)	◆ Niger relatively less affected than other Sahel countries, compared to 1973 (Derrick 1984)
1997-98	◆ Irregular rainfall patterns during 1997 agricultural season ◆ Some regions had above average surpluses (Maradi and Zinder) while others had above average deficits (Dosso, Tillabéri, Agadez, Diffa and Tahoua) ◆ National crop production deficit of 151,000 t, double the average ◆ Crisis aggravated by high cereal prices in Nigeria ◆ In addition, civil insecurity in pastoral zones of Agadez, Diffa, Tahoua and Tillabéri departments disrupting cereal flows and herd movements and halting tourism and development projects (FEWS NET 1998)	◆ **No data available on drought related livestock losses** ◆ Pasture conditions and water availability poor across much of the pastoral zone ◆ Livestock to cereal terms of trade the lowest since 1991 ◆ 83,000 pastoralists highly food insecure and another 40,000 moderately food insecure (FEWS NET 1998).	◆ 1.3 million people (13% of population) estimated to be food insecure, of which 0.7 million were classified as highly food insecure. ◆ Concentration of food insecurity in Diffa Region, Tchintabaraden Arrondissement (Tahoua Region), southern Agadez Region and Ouallarn Arrondissement (Tillabéri Region) (FEWS NET 1998).

Drought year(s)	General description	Impacts on livestock sector	Humanitarian impacts
2004-05	◆ 2004 agricultural season subjected both to lower than usual rainfall and a locust invasion (FEWS NET 2005) ◆ Rainy season of 2004 was average to good during the main rainy season in most areas, but conditions were poor during the last month of the season, hurting crops and pasture (FEWS NET 2005) ◆ Grain prices in July 2005 rose 75-80% above the last five-year average, which was in part driven by market dynamics in Nigeria and thus underlined Nigerien households' strong market vulnerability to purchased grains (FEWS NET 2005)	◆ **Estimated animal losses were 20% for cattle and 13% for small ruminants in sampled parts of the agro-pastoral zone (WBG 2013 citing Charasse and Gouteyron 2005)** ◆ Loss of about 40% of the country's forage supply due to drought in 2004 (USAID 2005) ◆ Fodder deficit in pastoral areas of 4.6 million t, the largest fodder deficit in Niger's history. A third of this deficit was caused by locusts and two thirds by drought (FEWS NET 2005) ◆ Large numbers of cattle moved much earlier than usual to dry season grazing in designated reserves in coastal west African countries (FEWS NET 2005) ◆ Large decline in sale prices for small animals as herders engaged in distress sales (FEWS NET 2005)	◆ 2.4 million people (20% of population) estimated to be food insecure, of which 0.8 million were classified as severely food insecure (USAID 2005; FEWS NET 2005) ◆ Most food insecure areas were in the agro-pastoral regions of Maradi, Tillabéri and the pastoral regions of Tahoua and Zinder (USAID 2005).
2009-10	◆ Drought conditions during the 2009 agricultural season (rainfall levels 70% below normal, with late onset and early cessation of rains) were compounded by a locust invasion. Subsequent heavy rains and flooding occurred in 2010 (FEWS NET 2014)	◆ **Estimated animal losses due to starvation were 8% for cattle,10% for sheep and 7% for goats . In addition, cattle (5%), sheep (4%) and goats (3%) were sold off through distress sales. Total economic livestock losses were estimated at about USD805 million or 10.2% of GDP (GoN 2011).** ◆ **A different study, estimated losses as 25.5% for cattle, 38.6% for sheep, 31.3% for goats and 2.6% for camels (WBG 2013), citing a study on impacts in a sampled area**	◆ 7.1 million people (43% of the population) estimated to be food insecure, of which 3.3 million were classified as severely food insecure (IFRC 2010) ◆ Most affected areas were located in millet producing areas of the agro-pastoral belt and Tahoua, Zinder and Maradi (FEWS NET 2014)
2011-12	◆ Drought during the agricultural season in 2011 ◆ Environmental degradation and high grain prices (WBG 2012)	◆ **Estimated loss of 8% of the national livestock herd (WBG 2017)**	◆ 6.4 million people (36% of population) estimated to be in food insecurity/IPC phase 2 or 3 (WBG 2012) ◆ Southern Tessaoua regions and agro-pastoral areas in the west most affected (WBG 2012).

Sources: Authors

2.5 Pastoralists' demand for livestock insurance

There is very limited information available on extent of demand for livestock insurance by pastoralists. In one study, agricultural producers were interviewed on their awareness of and interest in crop and livestock insurance in the pastoral and agro-pastoral zones of Tillabéri, Dosso, Tahoua, Maradi, Zinder and Diffa. There was much higher awareness of traditional insurance products by farmers in Maradi (66%) than in other regions. The level of awareness of weather index insurance was generally low everywhere, with Tahoua and Zinder recording 3 and 10%, respectively. Producers in all regions showed more interest in crop than livestock insurance (RMSI 2013). These results could be explained in part by the fact that in the study, producers were interviewed across FEWS NET livelihood zones 3, 4, 5 and 6 and thus respondents were invariably skewed towards crop farmers. The survey did not include the Agadez region. A larger focus on pastoral regions might have yielded stronger interest in livestock insurance.

Key takeaways from Chapter 2: Socio-economic assessment	
Economic importance	Livestock is of overwhelming importance for the Nigerien economy, contributing around 13% to national GDP. An estimated 87% of households keep livestock. Though livestock ownership is mainly male dominated, some studies show that women mostly own small ruminants. Women's relatively lower participation in leadership roles outside the households is considered a key factor that affects their productivity and resilience
Production systems	The two main livestock production systems are pastoralism (nomadic and transhumant) and agro-pastoralism. Semi-intensive livestock farming also exists but is concentrated in peri-urban areas only and relevant for very few people. Most livestock producers practice agro-pastoralism and 66% of livestock is kept in semi-sedentary systems. Migrating pastoralists are concentrated mainly in the northern parts of the pastoral belts. Both systems can be targeted by IBDRFI schemes for livestock as long as the livestock are primarily dependent on rangeland resources. Given the many pressures on their livelihoods, many pastoralists are forced to become sedentary and adopt agro-pastoralist lifestyles. Further information on the production systems and implications on IBDRFI product introduction in the country is required. A related issue requiring consideration and accurate review is the reported uneven distribution of livestock ownership, with 10% wealthiest households reported to own 90% of all livestock. This has relevant policy implications for IBDRFI implementation modality and targeting.
Vulnerability	Inequality among pastoralists is extremely high and poor pastoralists belong to the poorest population groups in Niger. They often do not own any livestock but work as salaried herders for richer pastoralists. The vulnerability to droughts is highest among those poorer pastoralists. In addition, the pastoral areas are generally very dependent on functioning markets and vulnerable to grain prices as their diet consists of more grains than animal products which they do not grow. Agro-pastoral areas, being net food importers in most years share this dependency on functional grain markets to a lesser extent.
Cost and impact of droughts on pastoral livelihoods	Drought impacts on pastoral livelihoods have repeatedly been catastrophic, with large parts of the national herd perishing. During long and severe droughts, herders migrate south earlier than usual in search of forage and water, often into neighbouring countries, particularly Nigeria. There is no reliable data on drought-related livestock losses and estimates vary, but they can be substantial with economic livestock losses surpassing 10% of national GDP during the drought of 2009-10. It should be noted that the impact of drought is not only on the current production season but also future production seasons. Should IBDRFI products be introduced, there would be need to design programs that consider timely payouts to avoid consequential impacts of drought events in the forthcoming seasons.
Governance and security situation	There has been an increase in violence and insecurity in Niger in recent years. Most incidents are concentrated in the Lake Chad basin and the south-west border region with Mali. The conflict in the Lake Chad region has led to protracted disruptions in the Diffa markets since 2019. Recent stability in the prices of livestock and food products such as cereals has occurred due to the presence of humanitarian organizations. The causes of conflict are attributed to competition for natural resources, limited state interventions and access to public services, amongst others. It should be borne in mind that the increasing insecurity and conflict in some of the target areas of implementation may pose challenges to the launch and implementation of IBDRFI solutions despite the strong presence and networks of NGOs and pastoral associations. However, there are opportunities to partner with civil society organizations and peace building advocacy groups (working with the government) to explore possible mechanisms through which IBDRFI solutions can be introduced and implemented in these areas.

3. Technical assessment

This section illustrates the results of the technical feasibility assessment, aimed at evaluating the possibility of designing an IBDRFI product for the extensive pastoral areas of Niger. An IBLI product design has been used for the assessment (Appendix 2). However, the feasibility analysis could also inform the development of alternative drought indices based on NDVI or other EO satellite indicators of drought. The datasets and methodology used are described in Appendix 2.

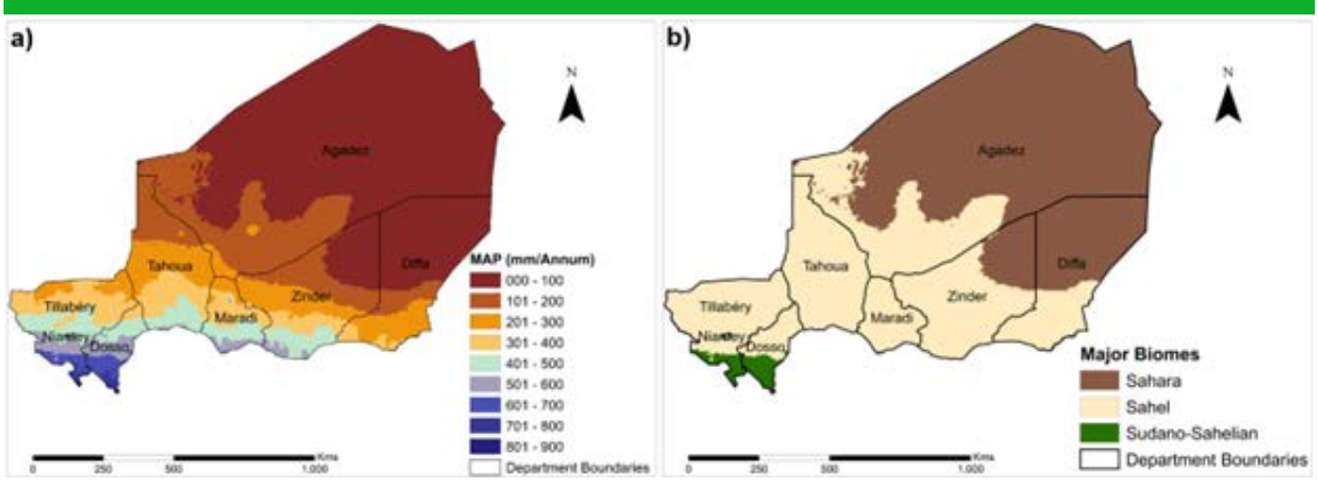
3.1 Agro-ecological characterization and rangeland distribution

Niger is characterized by a single rainfall season (unimodal) with a strong north to south gradient in temperature (decreasing) and precipitation (increasing). An extremely dry climate is observed in the northern part of the country towards the arid Sahara desert. The climate progressively gets wetter southwards (Figure 3.1a). The dry and wet seasons are well defined, with the wet season running from mid-June to mid-October in the northern region while the dry season runs from late October to late June. The south is wetter and has greater potential for vegetation productivity because the rainy season lasts longer (early June to November) (Figure 3.1).

Niger can be broadly classified into three major bioclimatic regions from north to south, namely: the Sahara, Sahel and Sudano-Sahelian regions (Figure 3.1b) (CILSS,2016). These regions show north-south transitions in climate and land use.

- ***The Sahara region*** covers over 65% of the country and has the hottest and driest climatic conditions, receiving < 100 mm of mean annual precipitation (MAP).
- ***The Sahel*** is the second largest bioclimatic region in the country. It is a semi-arid belt running west-east through central Niger, receiving between 200 and 700 mm MAP. There is minimal crop production and low agricultural potential due to the low precipitation levels and frequent droughts. The land cover is mostly steppes or short grass savannas with shrubs and sparsely scattered trees, therefore, this region is mainly used for extensive grazing by pastoralists.
- ***The Sudano-Sahelian*** region is in the southern part of the country and has the highest MAP ranging between 800 and 900 mm. Despite being the smallest region, it has approximately 98% of the country's total arable land.

FIGURE 3.1 CLIMATIC CONDITIONS AND VEGETATION PRODUCTIVITY CHARACTERISTICS FOR NIGER BASED ON MEAN ANNUAL PRECIPITATION FROM CHIRPS (A) AND AVERAGE NDVI (B), RESPECTIVELY

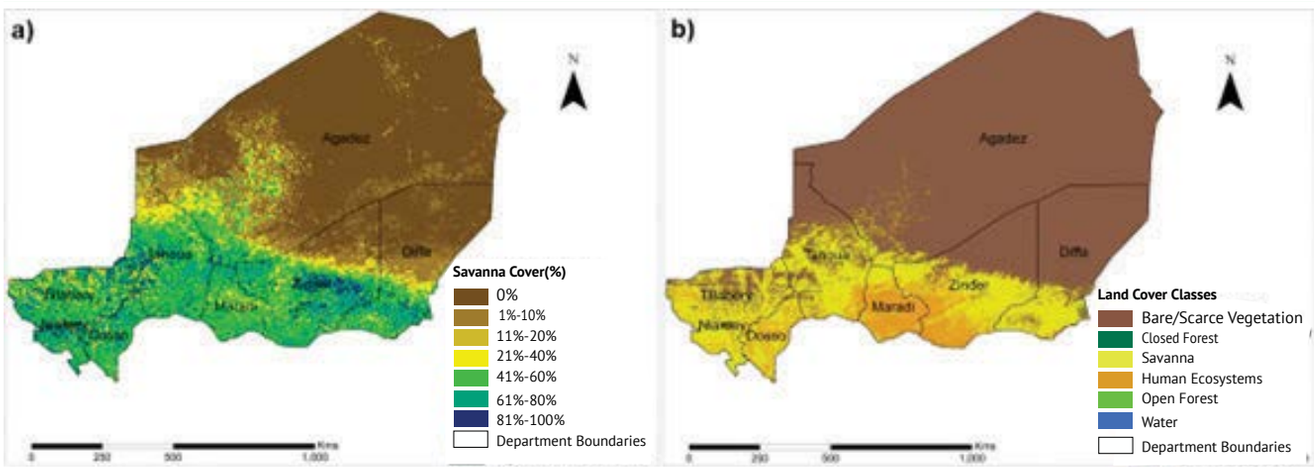


Source: Author's own illustration

Rangelands dominate the central and southern (in the semi-arid Sahelian region) parts of Niger while croplands are concentrated in a small southern margin of the country within the Sudano-Sahelian ecoregion, which comprises most of the country's arable land (Figure 3.2) (CILSS,2016). Rangeland dominance and forage availability are important parameters for designing an IBDRFI product, hence their extent/distribution and forage cover should be estimated with accuracy. However, current rangeland/cropland maps and land cover/use classification developed for Niger

show disparities and overlaps (FEWSNET, 2011; Pérez-Hoyos, 2018; Pérez-Hoyos, Rembold, Kerdiles, & Gallego, 2017), therefore, further refinement and validation with the local stakeholders is necessary for better mapping of the area before IBDRFI implementation (Figure 3.3).

FIGURE 3.3 LAND COVER CHARACTERISTICS, (A) RANGELAND COVER AND HUMAN LANDSCAPES COMBINING BUILT-UP AND CROPLANDS FRACTIONAL COVER ESTIMATES FOR NIGER.

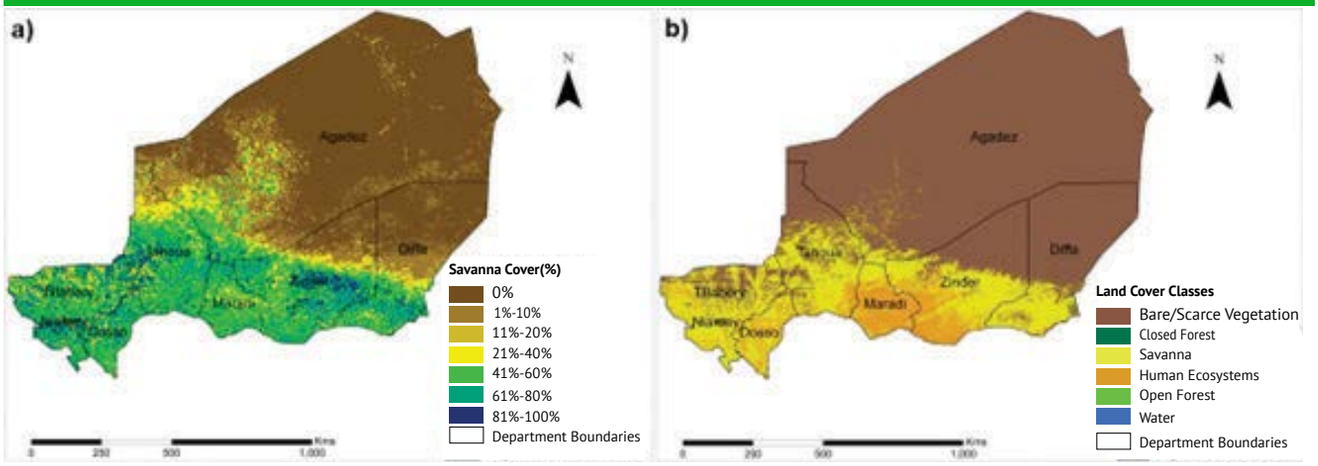


Source: Derived from Copernicus Global Land Service: Land Cover and Fractional Covers collection 3 for the Epoch (2019).

Pastoralism and agro-pastoralism are the main livelihoods in the Sahelian region, which is dominated by savannah ecosystems (Figure 3.1). The vegetation is broadly characterized as mostly steppes or short grass savannas with shrubs and relatively low woody plants. The southern parts of Niger are dominated by savannahs and form part of the trans-boundary conservation area, the W-Arly-Pendjari complex. This area is found within the southwestern part of the country and extends to the neighbouring countries of Burkina Faso and Benin.

Land use/cover change has been a major challenge in Niger leading to loss of natural vegetation within the pastoral areas (Figure 3.3). Since the bulk of the country's land mass falls within the hyper-arid Sahara desert, land available for livestock rearing and arable farming is small. This area is under immense pressure to support the large population, particularly the country's rural population, estimated at 83.6% (The World Bank, 2018). As a result, significant land use changes and degradation of already vulnerable ecosystems have occurred (CILSS,2016). The most dramatic changes in the country were driven by increasing demand for land to produce food and settlements to support the country's large population (Mortimore et al., 2005; Nutini, Boschetti, Brivio, Bocchi, & Antoninetti, 2013), estimated to be 24 million people in 2019 with an annual growth rate of ≈ 4%, one of the highest in the world (UN DESA, 2019). In about four decades, croplands acreage has increased from 12.6 to 24.5% between 1975 and 2013, respectively. Major changes occurred on the productive sandy soils in the Tillabéri region decimating the traditional pastoral lands. Meanwhile the Zinder and Maradi regions, which were already heavily cultivated in the 1970s have been completely transformed into a homogeneous agricultural landscape that is expanding further eastwards into the Sahelian short grass savannas in the Zinder and Diffa regions (CILSS,2016). The biologically diverse and densely vegetated areas, mostly gallery forests along valleys, which have always been relatively small in size, have been reduced by more than 60% in the epoch 1975 to 2013 due to cultivation, while irrigated croplands along the Niger river have increased by ≈ 50% (CILSS,2016).

FIGURE 3.3 LAND COVER/USE CHANGES IN NIGER[18]



Source: CILSS 2016

The increase in land use/cover change has led to the loss and fragmentation of rangelands (savannas and woodlands), replacing these major natural ecosystems with cultivated and natural habitat mosaics. These changes have also led to other adverse impacts such as degradation and desertification, exacerbated by frequent droughts and human conflict. However, some positive impacts have been observed, such as the regreening of agricultural lands and agroforestry activities (CILSS,2016).

Recurrent droughts in Niger have also contributed to changes in vegetation characteristics and composition. Niger experiences recurrent droughts due to low, erratic and variable rainfall. Over the years, drought events coupled with overgrazing and tree felling for fuelwood have led to land cover modification, land degradation and loss of productive lands (CILSS,2016).

3.2 Assessment of feasible areas for IBDRF product design

Extensive rangelands, where IBLI design is suitable, dominate the central portion of Niger (Figure 3.4). The area where IBLI products are suitable in the south is limited by the increase in croplands and built-up areas, while in the north and northeast the constraint is low vegetation productivity (Figure 3.2). Cropland dominated areas are considered unsuitable, while savannahs with high woody cover need to be reviewed with local stakeholders to confirm if they are effectively used for extensive grazing.

18. N.B. The northern part of the country, which is mainly covered by desert, is not mapped in this analysis.

Photo credit: EAP Photo Collection/ World Bank

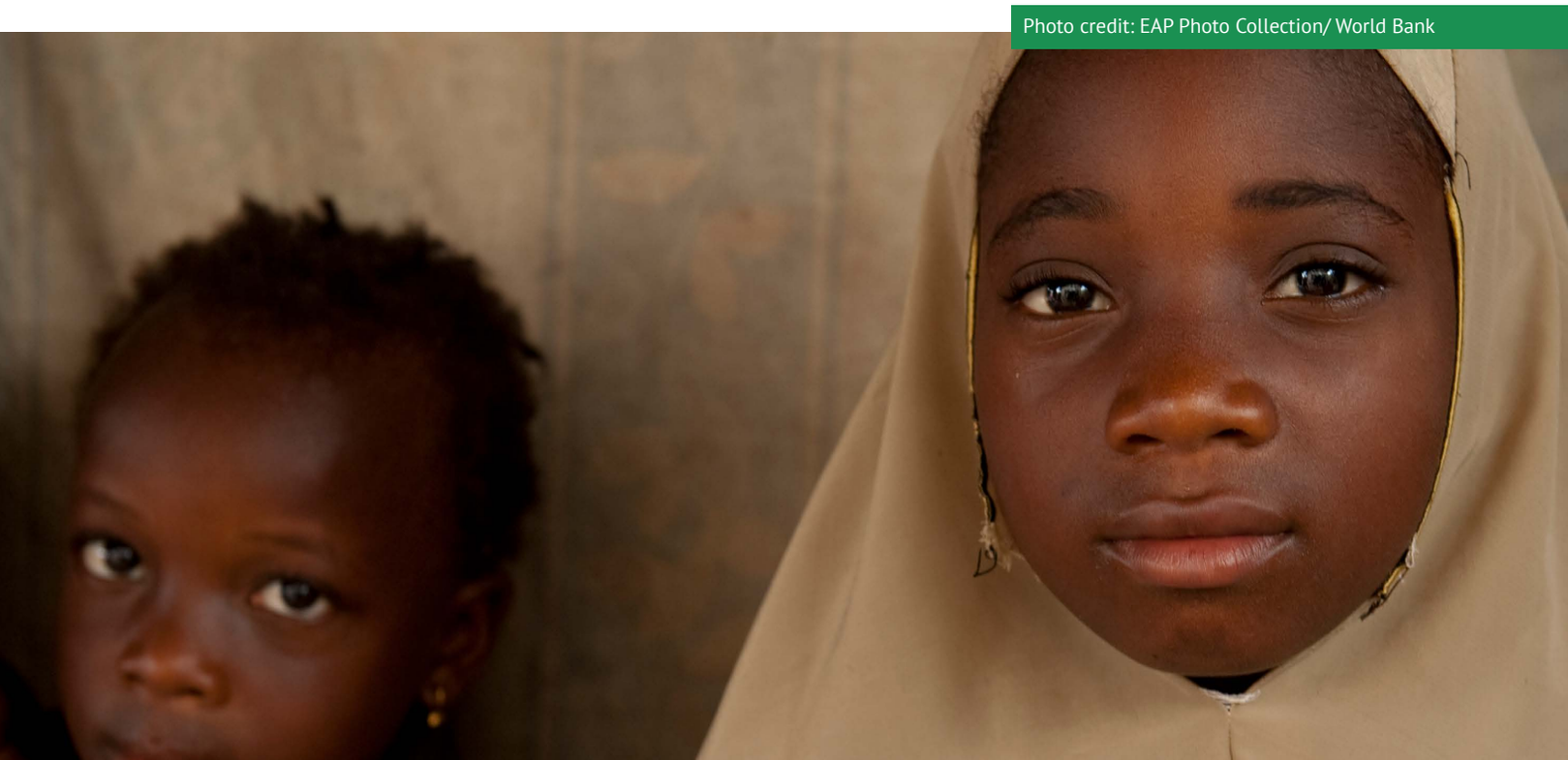
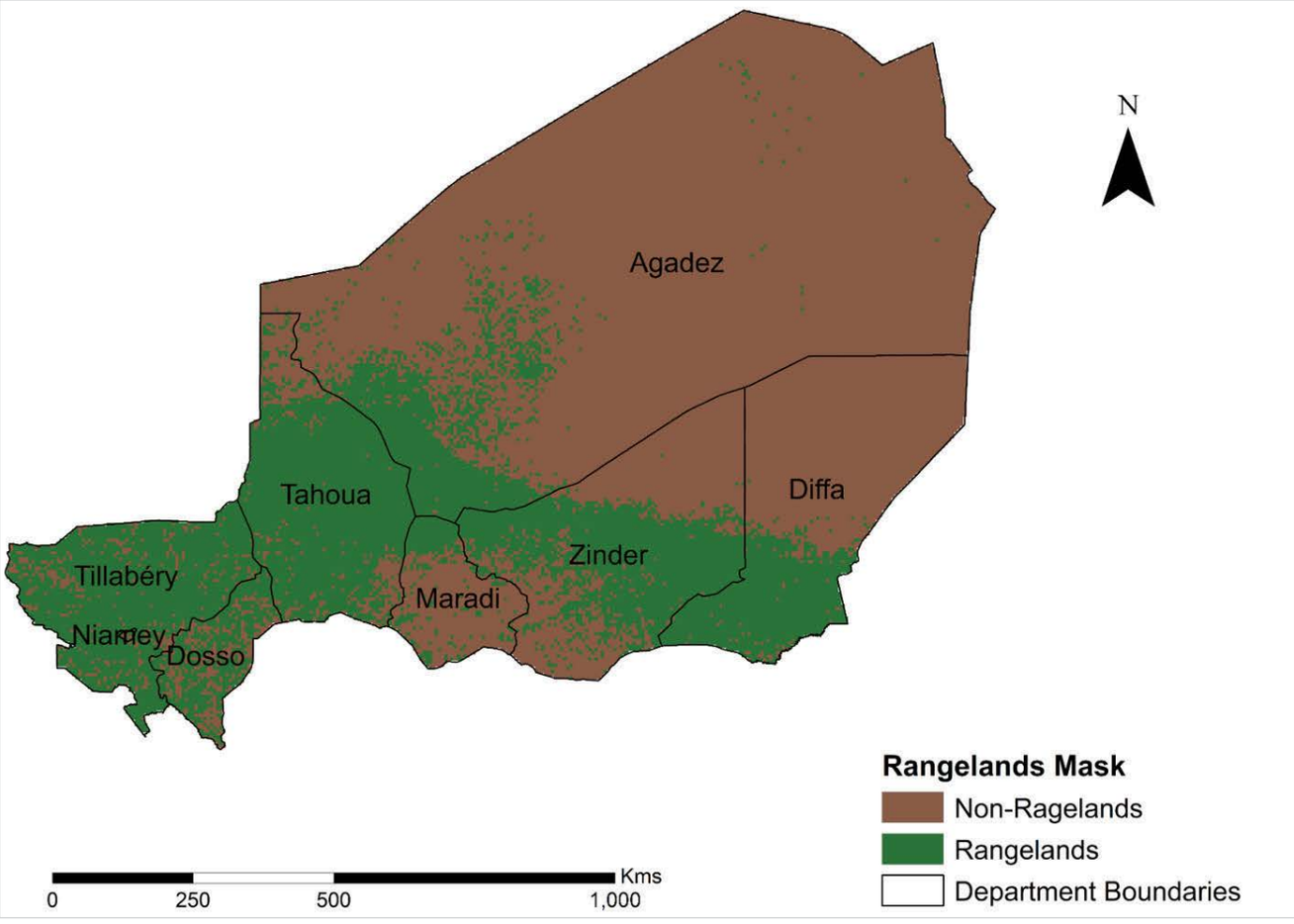


FIGURE 3.4 RANGELANDS MASK GENERATED FOR NIGER

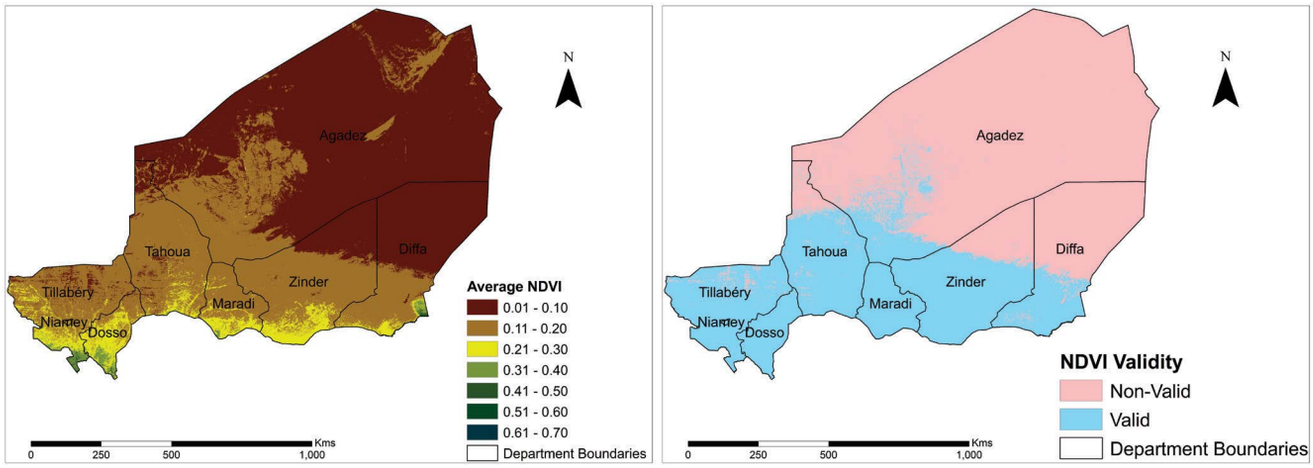


Source: Copernicus GLS (Appendix 3)

The NDVI is sufficiently clear and strong for most of the rangeland dominated ecosystems in Niger. The average NDVI varies across the country increasing southwards (Figure 3.5a) as rainfall increases(Figure 3.1a). Relatively higher NDVI as an indicator of forage availability is observed from central Niger moving southwards, while low NDVI characterizes the hyper-arid northern and northeastern parts of the country, indicating limited forage availability. Overall, the NDVI values are sufficiently high in the central and southern parts of the country, while in the northern areas NDVI values are often too low (low/very scarce vegetation cover) to design the IBLI product (Figure 3.5b). Even though the southern parts of Dosso, Maradi and Zinder have high NDVI, they are dominated by crop production.

Photo credit: EAP Photo Collection/ World Bank

FIGURE 3.5 NDVI INTENSITY MAPS FOR NIGER (A) AND AREAS WITH SUFFICIENTLY STRONG NDVI SIGNAL (B)

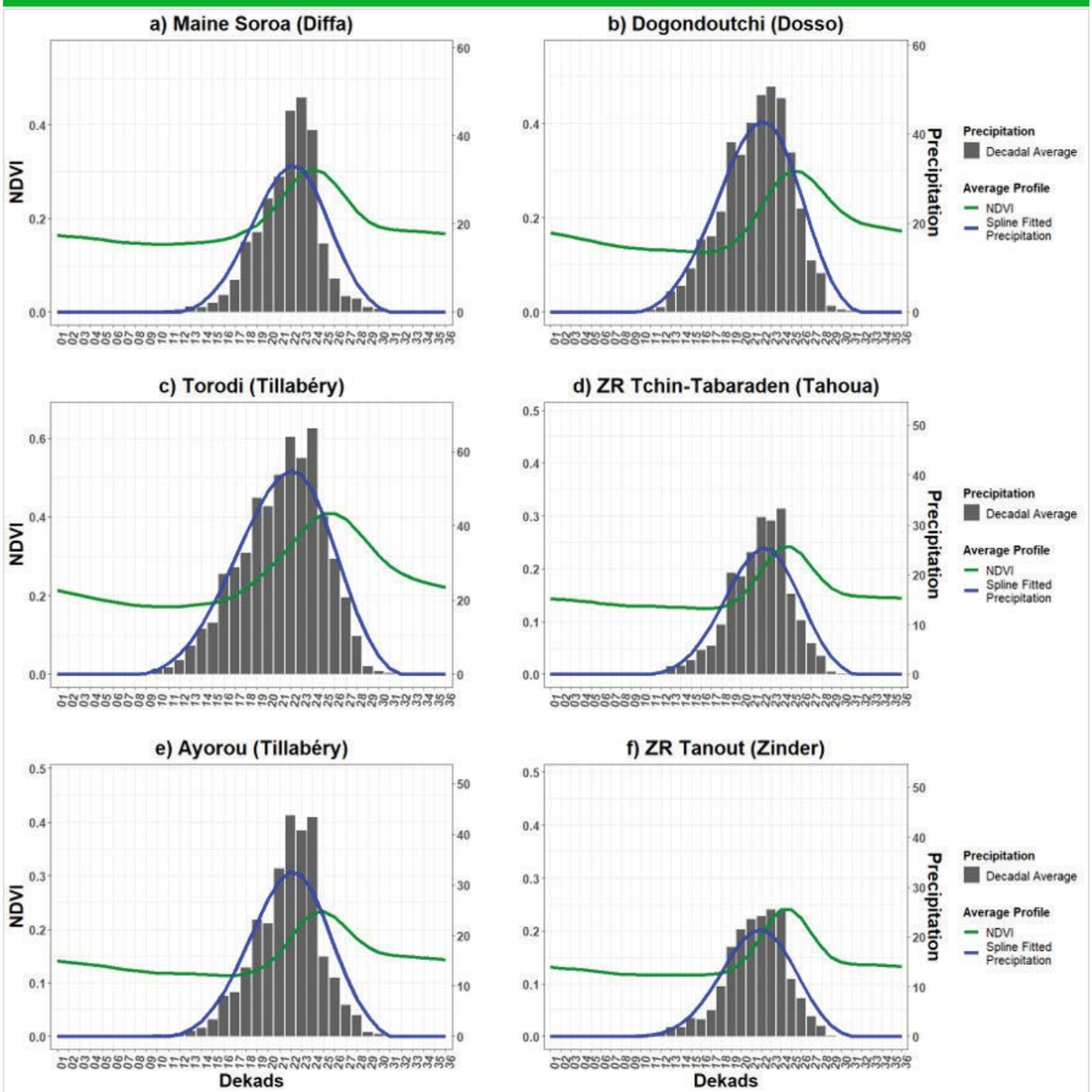


Source: Authors' own illustrations

The rainfall and vegetation growth patterns in the rangeland-dominated regions in Niger show well defined seasonality allowing for clear definition of one distinct drought risk period. The pasture and rangeland vegetation growing season has a month-long lag time to the onset of rains and runs from June to October/November, showing clear and geographically consistent patterns across the various pastoral regions as shown in Figure 3.6. This allows forage availability risk period definition for the period June to November (5-6 months) within the pastoral areas in Niger. The NDVI decadal averages indicate the vegetation growth over the season and are quite consistent across central Niger, despite some variability in the intensity of the NDVI.

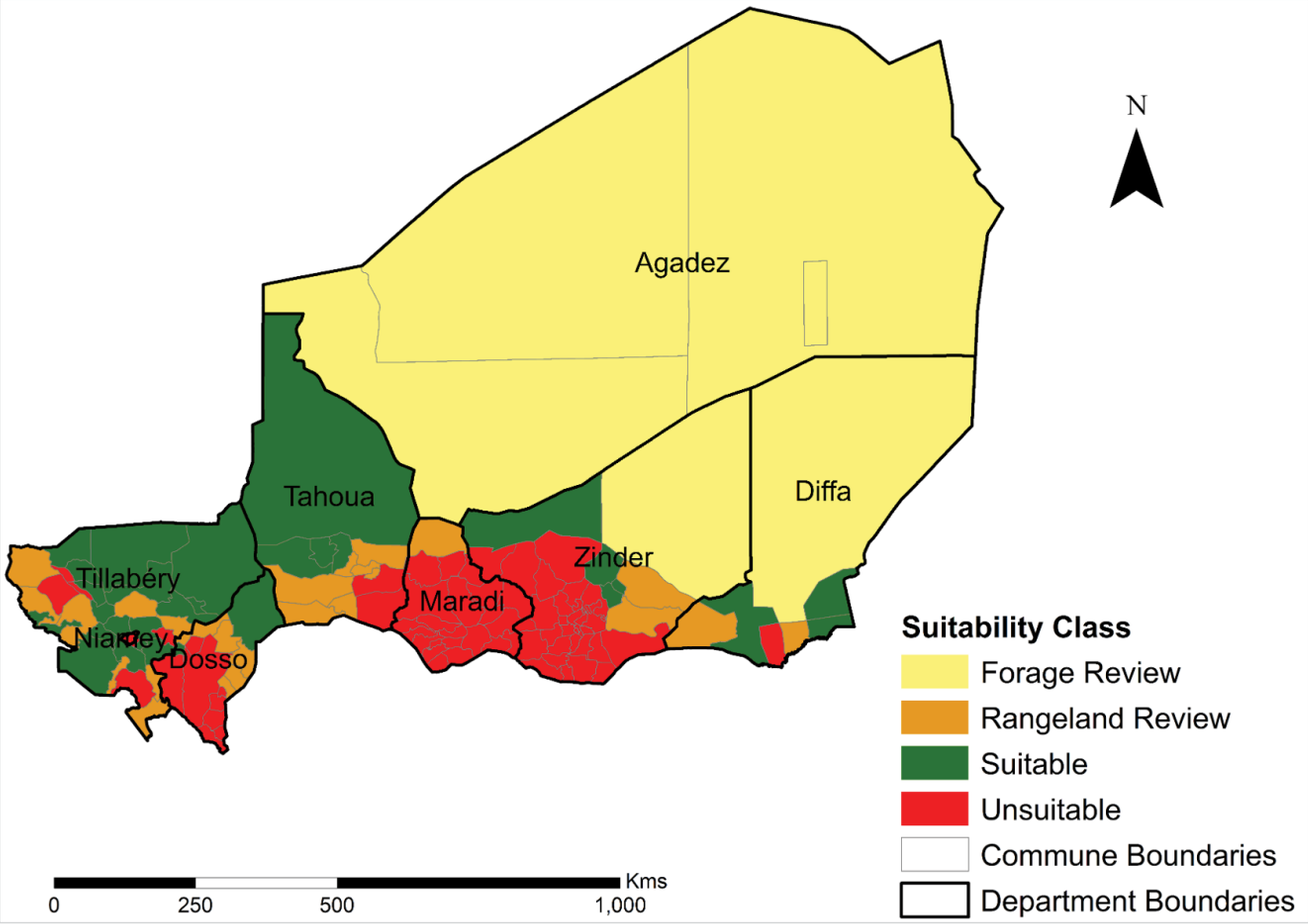
Photo credit: EAP Photo Collection/ World Bank

FIGURE 3.6 ANNUAL AVERAGE VEGETATION AND PRECIPITATION CLIMATOLOGY OF SELECT PASTORAL UNITS IN NIGER



The final classification of Nigerien administrative units into feasibility classes indicates that about 16.2% of Niger's land area (marked in green in Figure 3.7) would be feasible/suitable for IBDRFI IBLI design and implementation. A further 5.8% of the area (marked in orange in Figure 3.7) can be considered suitable but requires more work to ascertain rangeland extents. While 68.5% of the area (marked in yellow in Figure 3.7) may also contain suitable areas, it requires forage review since forage production is low in most administrative units. The suitable areas include the central areas of Niger dominated by pastoralism as well as part of the region characterized by agro-pastoralism. Select communes in Diffa, Dosso, Tahoua, Tillabéri and Zinder are fully feasible, while the southern communes in these regions are classified as requiring rangeland review. A significant number of communes in the northern regions of Agadez, Diffa and Zinder departments fall instead under the forage review class due to the low NDVI intensity. They require further in-depth analysis and review with stakeholders to confirm the extent, relevance and use of these pastoral areas before implementation. Unsuitable units covering ≈ 9.4% of the national land area dominate the southern parts of the country where crop production, conservation, human settlements and other economic activities are practiced.

FIGURE 3.7 TECHNICAL FEASIBILITY OF IBLI DESIGN IN NIGER



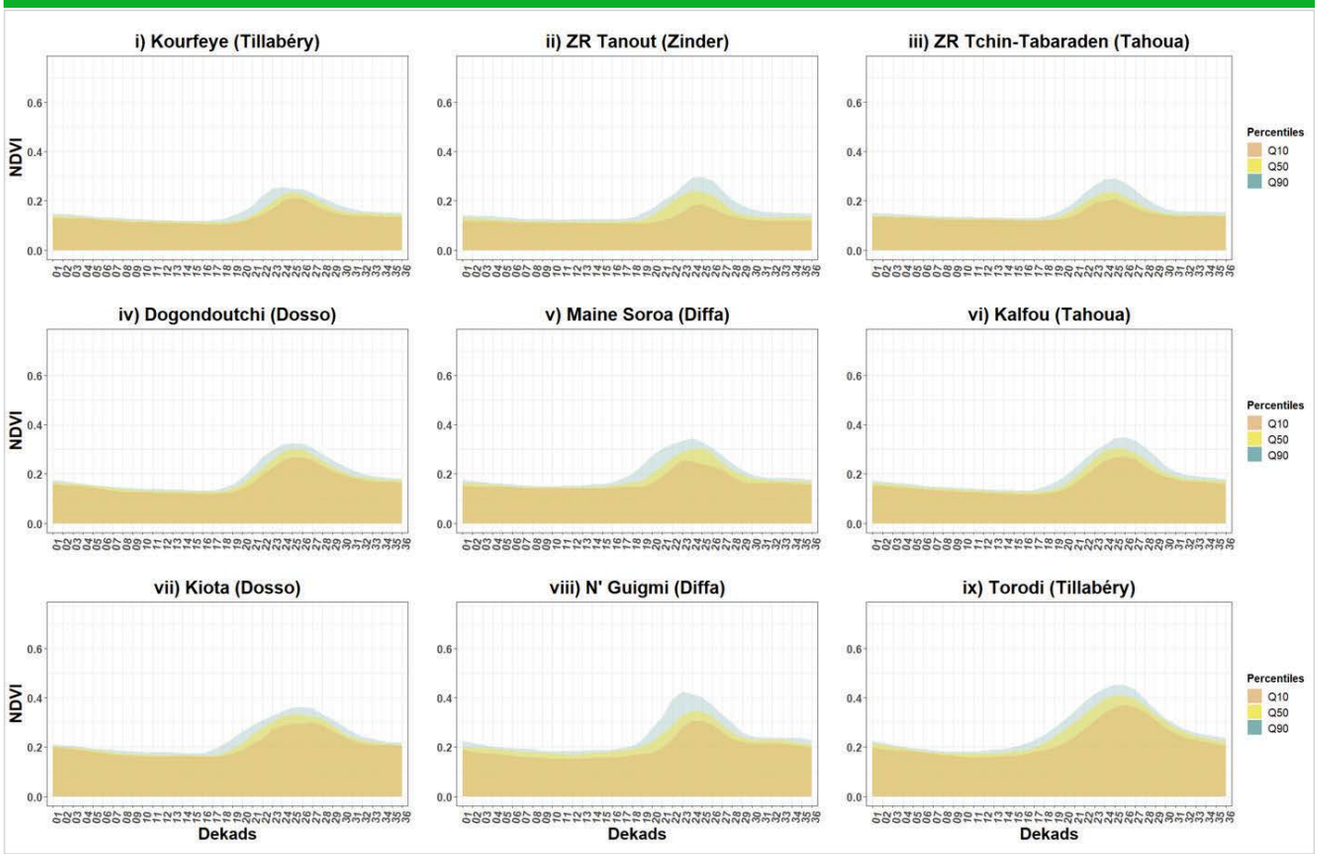
Source: Authors' illustration.

3.3 Characterization of the feasible units

The average vegetation growing season in the suitable units is relatively homogeneous despite a small variation in NDVI values in response to the increase in precipitation from north to south (Figure 3.8). The NDVI increases southwards due to increases in precipitation (Figure 3.5a). The inter-annual variability, however, is quite significant, with tendencies toward significant delays in season onset during drought years.

Photo credit: EAP Photo Collection/ World Bank

FIGURE 3.8 VARIABILITY IN NDVI OVER THE FEASIBLE PASTORAL AREAS IN NIGER, SHOWN USING THE 10TH 50TH AND 90TH PERCENTILE RANGES.

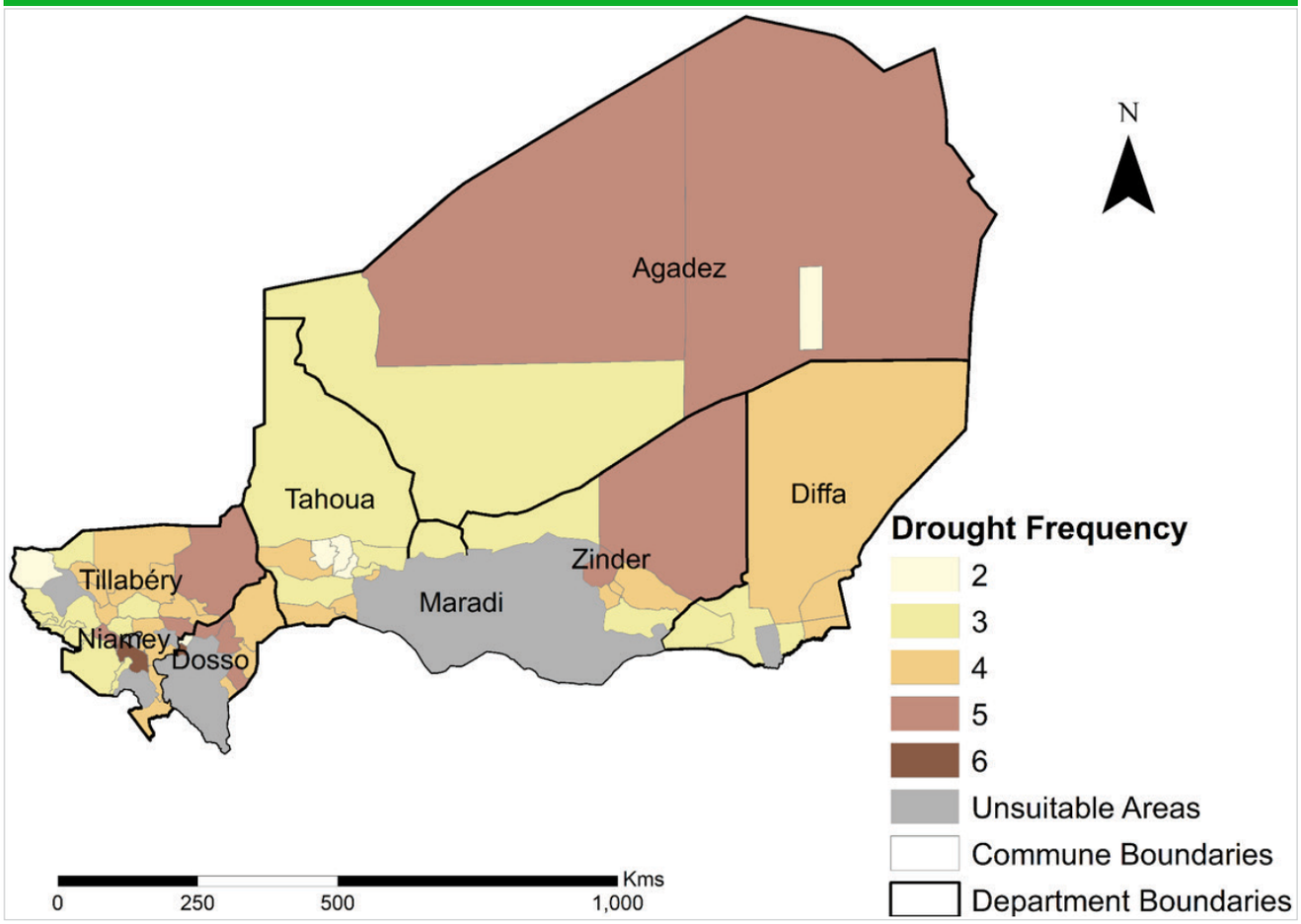


In the 18 years considered (2003-20) the units where IBLI would be suitable in Niger have experienced 2-6 relevant drought episodes[19] (Figure 3.9). A certain degree of geographic variability in drought frequency seems to characterize the country, with no consistent pattern across the regions from north to south. It is noteworthy that this assessment is based on subjective thresholds of the index value (Appendix 3 methods) and while it can provide a general overview of drought frequency, cautious interpretation is necessary.

19. A 'relevant' drought episode is defined here using a fixed threshold of the seasonal IBLI index of -0.84 (standard score). This is a subjective threshold, therefore, it should only be used as an indicative estimate.

Photo credit: EAP Photo Collection/ World Bank

FIGURE 3.9 DROUGHT FREQUENCY IN NIGER PASTORAL AREAS FOR THE PERIOD 2003–20



Forage deficit conditions do not occur regularly and may persist for more than two consecutive rainy seasons/years (Figures 3.10 and 3.11). During some years, the drought is more pronounced across the country, while in others, the affected areas are patchy, a situation that might worsen with climatic change.

Photo credit: EAP Photo Collection/ World Bank

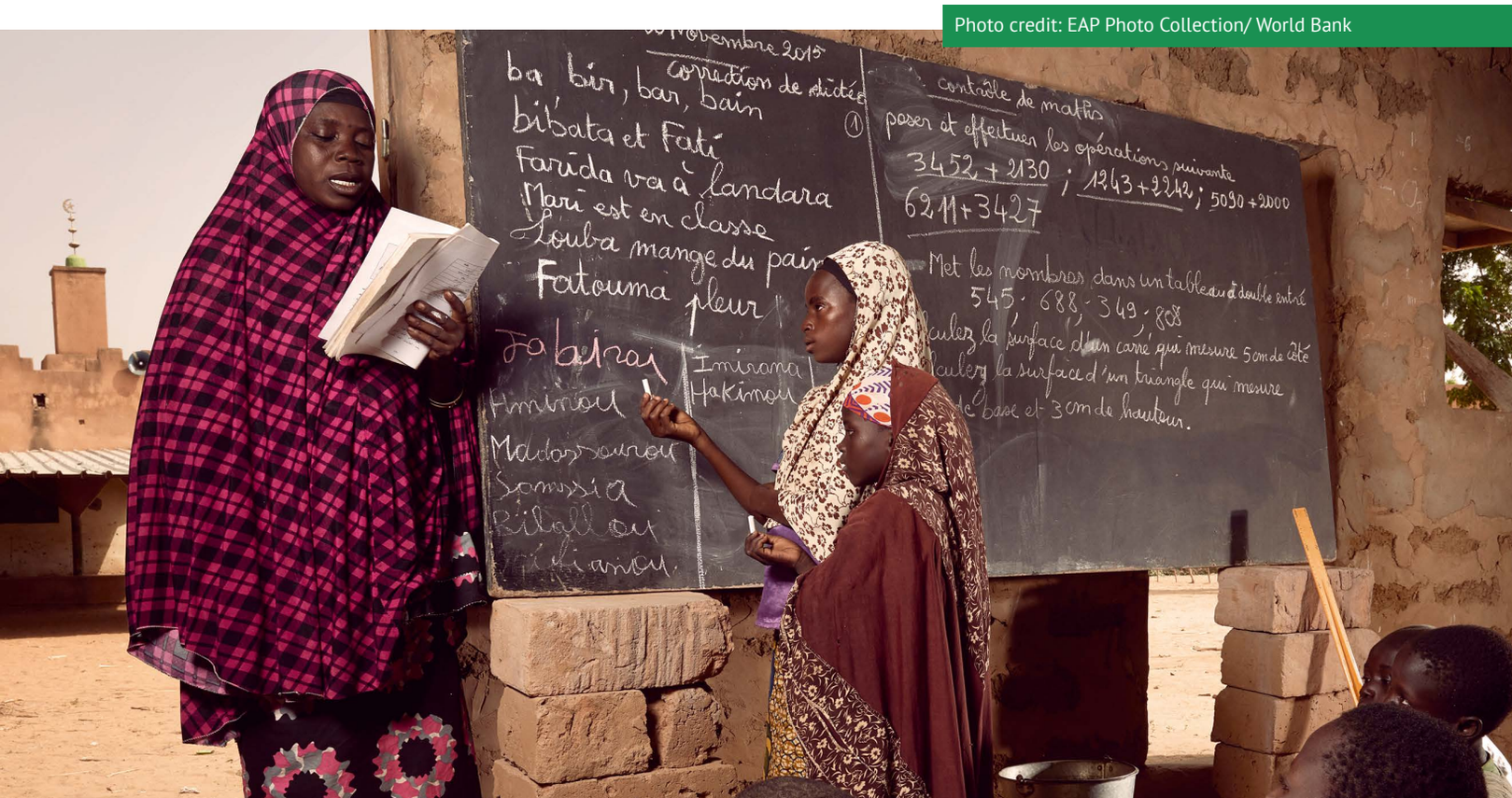
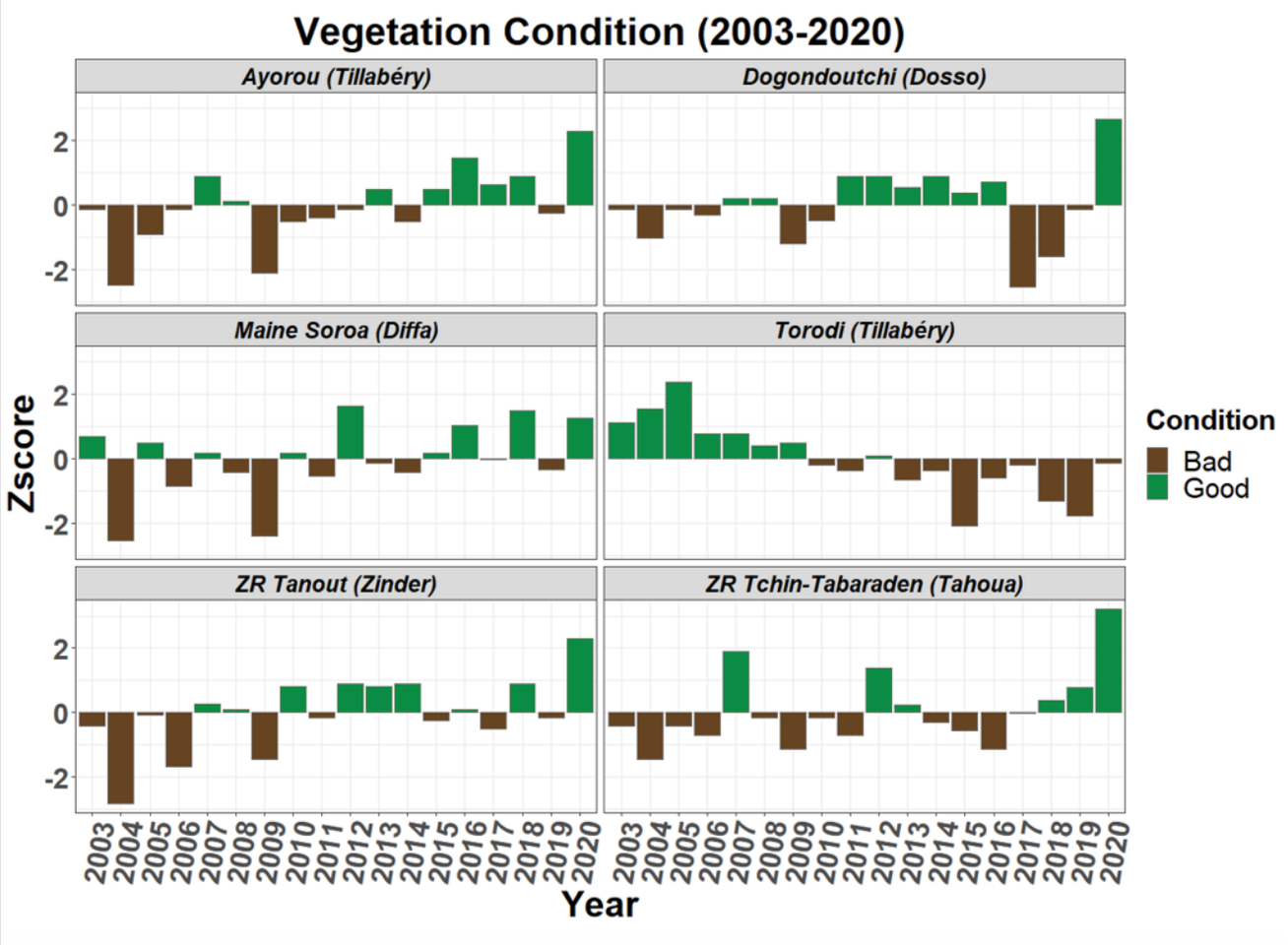


FIGURE 3.10 VEGETATION PERFORMANCE ACROSS SIX PASTORAL REGIONS IN NIGER BASED ON 18-YEAR EMODIS NDVI OBSERVATIONS (2003–20)[20]

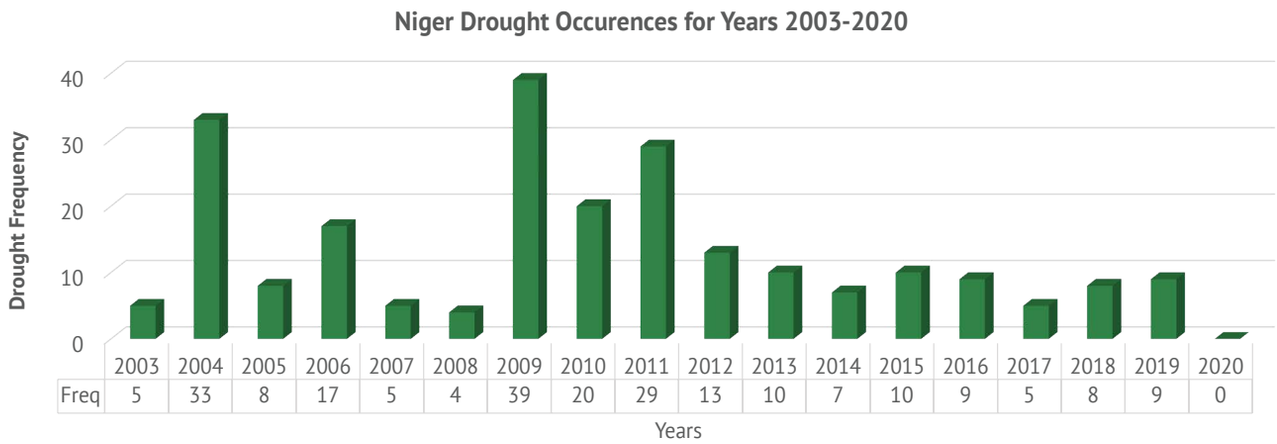


In most cases, the deficit persists at least until the following season, as evidenced in some areas by cyclical rainfall patterns. This pattern suggests that rangeland systems have limited resilience and ability to recover after major droughts. Widespread below average forage performance was observed in the years 2004 and 2009-11 in Niger while good forage years were evident for the years 2003, 2007-08, 2017 and 2020, when the forage deficit was observed in < 10% of the administrative units (Figure 3.11).

20. Green and brown bars indicate above and below average vegetation production, respectively.

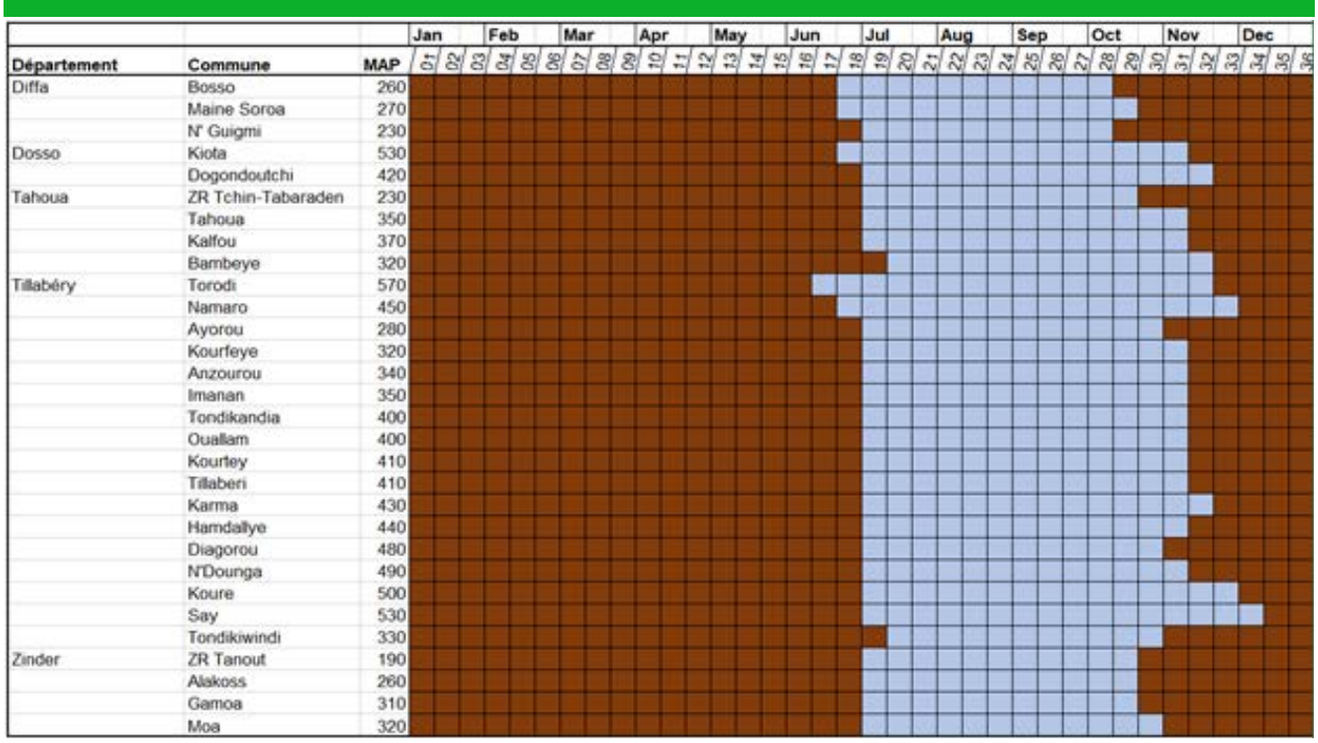
Photo credit: EAP Photo Collection/ World Bank

FIGURE 3.11 DROUGHT[21] FREQUENCY[22] IN NIGER'S PASTORAL REGIONS BASED ON 18-YEAR EMODIS NDVI OBSERVATIONS (2003–20)



Based on the typical forage growing season spanning from mid-June to October/November (Figures 3.6 and 3.12) within the suitable areas in Niger, a single risk period can be defined. The risk period for the coverage is typically defined by the length of the vegetation growing season, as the forage index is built to estimate seasonal deficits in forage production due to limited rainfall.

FIGURE 3.12 FORAGE GROWING SEASONS FOR THE SUITABLE UNITS[23]



Département	Commune	MAP
Diffa	Bosso	260
	Maine Soroa	270
	N' Guigmi	230
Dosso	Kiota	530
	Dogondoutchi	420
Tahoua	ZR Tchin-Tabaraden	230
	Tahoua	350
	Kalfou	370
	Bambeye	320
Tillabéry	Torodi	570
	Namaro	450
	Ayorou	280
	Kourfeye	320
	Anzourou	340
	Imanan	350
	Tondikandia	400
	Ouallam	400
	Kourfey	410
	Tillaberi	410
	Karma	430
	Hamdallye	440
	Diagorou	480
	N'Dounga	490
	Koure	500
	Say	530
	Tondikiwindi	330
Zinder	ZR Tanout	190
	Alakoss	260
	Gamoa	310
	Moa	320

Note: MAP = mean annual precipitation

21. Here a drought event is defined using a fixed threshold of the seasonal IBLI index of -0.842, assuming a standard z-score within a normal distribution. This is a subjective threshold and should, therefore, be used cautiously as an indicative estimate.

22. The frequency is based on number of IBLI suitable/review departments with index values (NDVI z-score) ⩽-0.842.

23. Shaded in light blue.

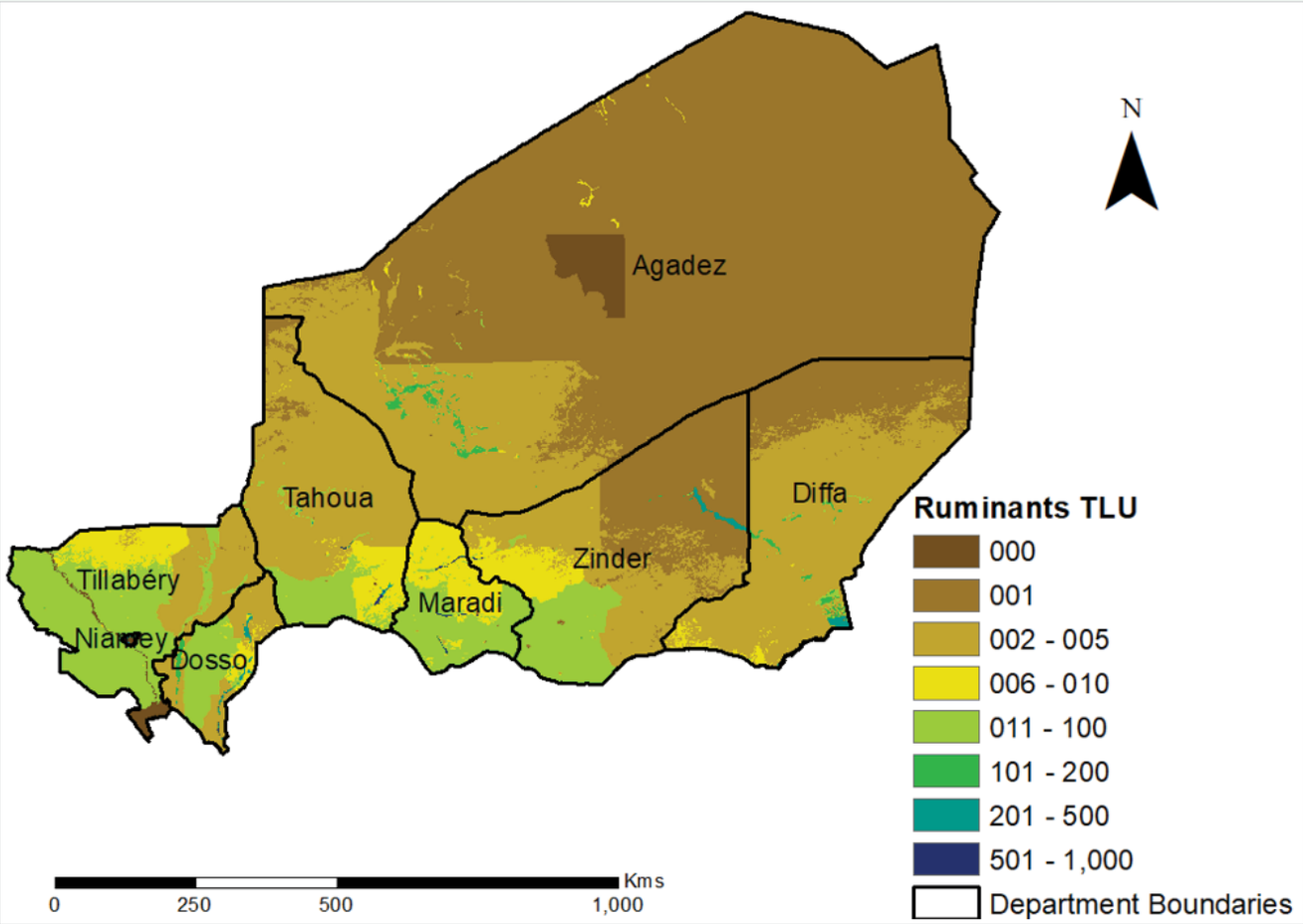
Suitable pastoral regions host a significant number of the country's livestock population (Figure 3.13 and Table 3.1). Based on 2010 gridded ruminant distribution data (Robinson et al., 2018), the administrative units considered feasible rangeland areas host about 25% of the national ruminant livestock population, while 39% is located in administrative units that need further review. The departments of Tahoua and Tillabéri have the most suitable land areas and host a significant proportion of the national ruminant herd (Table 3.1). While these data are used to show the geographical distribution of livestock in areas suitable for IBLI implementation, the herd numbers may have changed. However, these areas still remain significant livestock rearing zones (FEWSNET, 2017) as supported by statistics on regional livestock distribution in Niger (Table 2.3, Section 2.2).

TABLE 3.1 LIVESTOCK POPULATION IN 2015 AND 2020

Animal Numbers			TLUs		TLU Conversation Factors
Animal	2015	2020	2015	2020	
Asses	1,766,080	1,949,894	1,236,256	1,364,926	0.7
Camels	1,742,548	1,858,796	2,091,058	2,230,555	1.2
Cattle	12,059,951	16,138,934	12,059,951	16,138,934	1
Chickens	1,822,000	20,696,000	18,220	206,960	0.01
Goats	15,478,902	18,832,450	1,547,890	1,883,245	0.1
Horses	245,743	258,278	270,317	284,106	1.1
Pigs	42,469	43,351	8,494	8,670	0.2
Sheep	11,496,872	13,654,677	1,149,687	1,365,468	0.1
Total	44,654,565	73,432,380	18,381,873	23,482,864	

Photo credit: EAP Photo Collection/ World Bank

FIGURE 3.13 RUMINANT LIVESTOCK POPULATION DENSITY DISTRIBUTION (TLU/KM²) WITHIN PASTORAL AREAS THAT COULD BE CONSIDERED FOR DROUGHT INDEX IMPLEMENTATION IN NIGER[24]



Source: Modified from FAO 2015 ruminant TLUs data (Gilbert et al., 2018)

Implementation of an IBDRFI should consider suitability classes under review such as Agadez carefully since many of them have significant livestock numbers (Table 3.1 and Figure 3.13) although they are classified as hyper-arid or mixed agro-pastoral regions. Other areas that need careful consideration are conservation areas such as Parc W commune, classified as 'suitable but needing rangeland extent review'.

24. The percentage in the Table is relative to the total livestock population.

TABLE 3.2 DISTRIBUTION OF RUMINANT LIVESTOCK TLUS ACROSS VARIOUS SUITABILITY CLASSES IN NIGER[25] TLUS

Department	Suitable	Forage Review	Rangeland Review	Unsuitable	IBLISuitable Percentage
Agadez	-	885,830	-	-	11%
Diffa	494,816	278,906	52,841	58,849	10%
Dosso	139,790	-	185,763	349,178	4%
Maradi	-	-	55 050	1,113,594	1%
Niamey	-	-	-	41,834	0%
Tahoua	334,237	-	532,074	257,400	11%
Tillabery	884,707	-	496,854	194,515	17%
Zinder	114,733	597,925	19,627	903,046	9%
Totals	**1,968,283**	**1,762,661**	**1,342,209**	**2,918,416**	**7,991,569**
Percentage	**25%**	**22%**	**17%**	**37%**	**100%**

Key takeaways from Chapter 3: Technical assessment

Rangeland dominance	◆ Extensive natural rangelands dominate the central part of the country and would be suitable for the implementation of IBDRFI initiatives (IBLI design). The extent of rangelands and low forage production are the major factors limiting the feasibility of an IBLI design in the northern part of Niger. Smallholder cropping or mixed crop-livestock systems are prevalent in southern Niger, making these areas less optimal for IBDRFI design.
Seasonality and signal intensity	◆ Rangeland seasonality is well defined and relatively homogenous across the country's pastoral areas. The typical rangeland growing season runs from June to late October/November, thus seasonality is not a limiting factor for IBLI design. In contrast low NDVI values are a major limiting factor for northern parts of Niger, where the country is characterized by scarce vegetation or bare lands transitioning into the Sahara desert, making these areas less optimal for IBLI design.
Overall feasibility	◆ IBLI is feasible/suitable in areas that are located in the central part of the country with pastoralism as the dominant livestock production system. These areas cover about 16% of Niger's total land area and carry about 25% of the national herd. About 74% of Niger includes areas that are potentially suitable but require both forage and rangeland reviews with the aid of local stakeholders during the early stages of implementation. These areas host about 39% of the national herd. In several central and southern areas, a review of rangeland size and pastoral production systems should be considered to evaluate their suitability for coverage, while in northern regions, forage production and extent of use by pastoralists should be determined to assess if these areas have wet season pastures and if they are suitable for IBLI design.
Factors requiring further analysis	◆ Significant land cover changes have been reported in the last 30 years, with conversion of rangelands into croplands. In addition, ongoing rangeland degradation is reported in the pastoral regions. The potential impact of these factors on the index design and risk profiling should be carefully evaluated in the early implementation stages. In addition, further investigations should be conducted on the persistence of poor vegetation conditions for multiple consecutive seasons as this is a potential cause of poor performance of IBLI (i.e. the index is not designed to capture the impact of multiple consecutive seasons with limited forage availability as each season is treated as independent from the previous one).

25. Highlighted in green are the departments with high livestock populations where an IBLI product could be considered. The percentages are proportions of total TLUs in each suitability class to the grand total TLUs (7,991,569).

4. Operational assessment

4.1 Drought risk management and financing institutional policies

4.1.1 Drought response mechanisms for the livestock sector

Given the lengthy experience with droughts impacting livelihoods of the Nigerien population, there is a well-established national disaster response system in place. The Dispositif National de Prévention et de Gestion des Catastrophes et des Crises Alimentaires (Dispositif), located in the prime minister's office, is the key government institution coordinating disaster prevention and response in Niger. Annually, after the harvest in October, food security assessments are conducted by various government agencies and technical partners including the regional Cadre Harmonisé and the national Enquête Conjointe sur la Vulnérabilité à l'Insécurité Alimentaire des Ménages au Niger. Based on these assessments, the Dispositif adopts a Plan de Soutien in the first quarter of the following year, outlining the key food security and drought related response activities to be undertaken over the course of the year as well as generating a budget for the activities. The budget is then funded from various Sources, including donors. The plan of activities is implemented over the course of the year, with modifications as needed (Achirou 2017).

Typical disaster and food security response activities in Niger relevant to the livestock sector include:

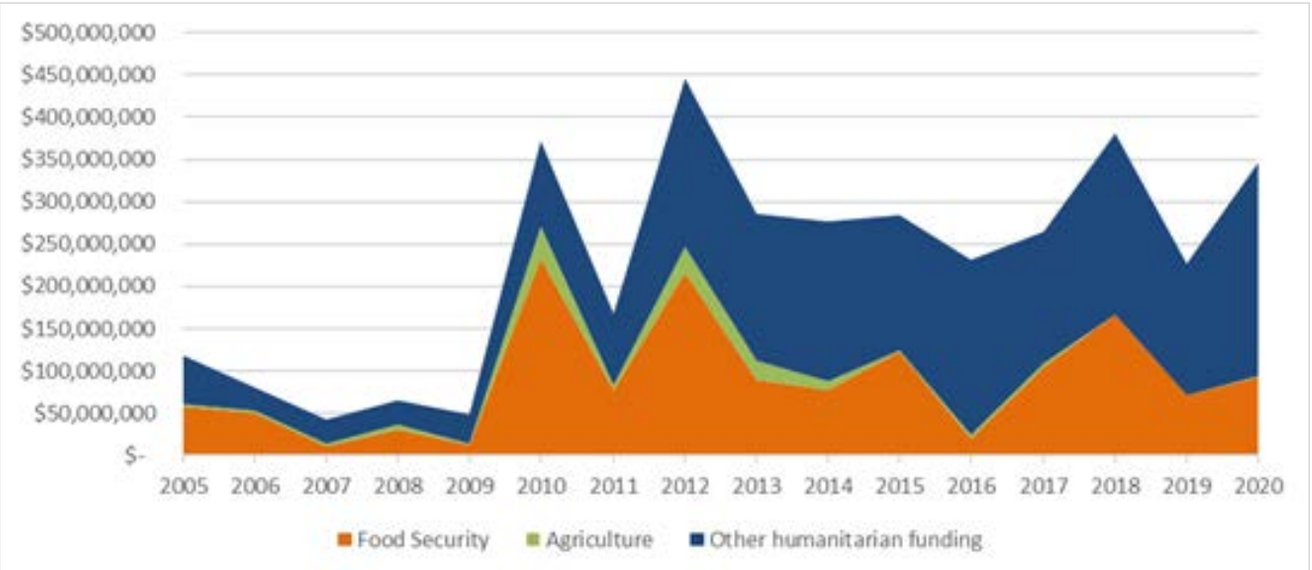
- **Cash transfers:** The government and international partners such as the WFP and other NGOs, regularly implement emergency conditional and unconditional cash transfer programs to help populations affected by food insecurity. A frequently used modality for this is cash for work (GoN 2019).
- **Scalable safety nets:** In 2011, the government of Niger, with financial support from the WBG, launched the Niger Safety Net Project, which marked the start of a core safety net in the country. The project provides unconditional cash transfers to poor and chronically food insecure households in poor areas across the country and short-term income support to individuals through a cash for work system in areas experiencing severe but temporary food insecurity (WBG 2018). In 2016, new components were added to the project to promote an adaptive social protection system in Niger, including a shock response mechanism that can rapidly add shock-affected households to the beneficiary roster (scale- out). The safety net has thus scaled out in response to shocks that occurred several times by including additional households to the roster of regular cash transfer beneficiaries. The most recent scaling out was done in response to the COVID-19 pandemic. The government is working on institutionalizing the scalability of the safety net by establishing a rules-based approach using satellite data (Bowen et al. 2020).
- **Livestock feed support:** To support drought affected livestock owners, the ministry of livestock regularly organizes livestock fodder sales at subsidised prices. Sometimes, fodder is even distributed to affected households for free. For example, after the 2011 drought year, the 2012 Plan de Soutien contained a livestock feed activity, which aimed to provide 20,000 t of livestock feed to drought-affected livestock owners across the country to help them keep their animals alive through the dry conditions (GoN 2012).
- **Emergency destocking:** Pastoral households try to cope with the impacts large-scale droughts by selling their animals causing the livestock market price to collapse. To prevent this, the ministry responsible for livestock manages emergency destocking programs where animals are purchased above their market prices to assist drought-affected pastoral households. For example, after the severe 2009 drought, the 2010 Plan de Soutien included a state-led destocking of 5% of the national herd at above market prices. The purchased animals were slaughtered onsite and the meat provided to humanitarian organizations for free distribution to food-insecure households (GoN 2010).

4.1.2 Disaster risk financing framework

Niger relies heavily on humanitarian assistance to fund its response measures to natural disasters, especially drought. The country received a total of USD 3.6 billion between 2005 and 2020, which works out to an average USD 227 million per year in humanitarian assistance. A significant proportion (43% on average over the same period) of the funding is allocated to agriculture and food security, which shows the importance of humanitarian aid to tackle immediate food crises caused by natural disasters. Figure 4.1 shows the inflows of international humanitarian aid recorded by the United Nations Office for the Coordination of Humanitarian Assistance (UN OCHA) financial tracking services. The spikes in 2010 and 2012 can be attributed to the droughts that occurred in 2009 and 2011. Rising humanitarian inflows in recent years are likely a reflection of the deteriorating security situation in Niger and the region.

Food aid distribution is the most important activity undertaken by the government to respond to food crises. The distribution of food from the national food reserve is managed mainly by the Dispositif together with the Office des Produits Vivriers du Niger (OPVN). Temporal and spatial targeting is provided by the early warning system unit Système d'Alerte Précoce (SAP) within the Dispositif. The food aid response is often complemented by similar responses from humanitarian and donor partners such as the WFP.

FIGURE 4.1 TOTAL INTERNATIONAL HUMANITARIAN FUNDING RECEIVED IN NIGER (2005-20)



Source: UN OCHA financial tracking Service (https://fts.unocha.org/)

The government of Niger uses different funding mechanisms to finance its response measures to natural disasters. These include:

- **National disaster fund:** Under Dispositif, Niger has a donor funded Fonds d'Intervention (FI), which finances food insecurity prevention and response activities. Within the FI, the Fonds Commun des Donateurs (FCD) receives annual contributions and serves as the central instrument for donors to channel and coordinate their humanitarian food relief funding. Some contributions are made in advance in anticipation of potential future crises,[26] while others are short-term support contributions tied to specific ongoing crises. Over the period 2008-17, donors provided on average USD 14.8 million to the FI per year. The Dispositif is also provided with other bilateral counterpart funds, which are governed by bilateral financial management arrangements, however, technical oversight remains with the Dispositif (Achirou 2017).
- **National food reserves:** Like in other Sahelian countries, the government operates two food reserves, (i) the Stock National de Sécurité (SNS), which is managed jointly by the OPVN and international partners, requires all partners' signatures to disburse food aid. It is composed of, (a) an in-kind reserve holding 50,000 t of cereals (millet and sorghum) in the OPVN shops and (b) a financial reserve, the Fonds de Sécurité Alimentaire (FSA). The FSA aims to hold the financial equivalent of 60,000 t of cereals. The SNS is mobilized in cases of severe food security crises at a national or regional scale. In addition to the SNS, the government has founded, (ii) a Stock d'Intervention (SI), which is solely managed by the OPVN. Information on the target stock size of the SI could not be obtained, but in March 2011, it was about 30,000 t (Galtier 2019).

26. For the purposes of this study, the proportion of FCD funds made in anticipation of abstract future crises (and are thus to be categorized as 'ex-ante pre-arranged response funding') and those made in response to concrete ongoing or upcoming crises (and are thus to be categorized as 'ad hoc response funding') could not be determined. For the purposes of the indicative funding gap analysis conducted in Section 5.4, all FCD funds were assumed to be provided as ex-ante funding.

4.2. Insurance market and regulations overview

The insurance sector in Niger operates under the jurisdiction and rules of the regional body, the Inter-African Conference on Insurance Markets (CIMA). In 2019, CIMA passed a resolution introducing a framework for sharia-compliant insurance products. New CIMA regulations on electronic commerce and insurance that will hopefully boost insurance penetration in the CIMA zones are anticipated. At the local level, there are two bodies responsible for the supervision of insurers in Niger, the Commission Regionale de Controle des Assurances (CRCA), an offshoot of CIMA based in Libreville, Gabon, and the insurance department under the Ministry of Economy and Finance in Niger, called the Direction des Assurances, managed by a director at the national level (AXCO, 2020).

The Direction des Assurances makes decisions on data usage and actuarial support related to insurance products. As part of creating a favourable environment for agricultural insurance, the Ministry of Agriculture and Livestock is working with the directorate of insurance control to formulate an inclusive approach to development to address challenges facing Niger's pastoral regions (Fava et al. 2018).

Niger has the designated association of insurers known as the Committee of Nigerien Insurers/ Comite des Assureurs du Niger. The objectives of the association are to, (i) maintain good relations between members, (ii) represent members in common dealings with the government or any other national groups as appropriate, (iii) discuss and resolve any questions or disputes that may arise among members and (iv) promote and encourage insurance in general. There are no reinsurance companies based in Niger, however, the regional reinsurer CICA-Re, set up under CIMA and Africa-Re is considered as a local reinsurer (AXCO 2020). In addition, Niger like most countries in the region is a member of the Organization pour l'Harmonisation du Droit des Affaires en Afrique (OHADA), which adopted the International Financial Reporting Standards in January 2019 (AXCO 2020).

Unlike most of its neighbouring countries, the non-life insurance penetration in Niger is very low at only 0.34% in 2018. The insurance market share is dominated by motor (51%), health (27%) and property insurance (11%). The largest non-life insurer in Niger is the Compagnie d'Assurances et de Reassurances du Niger (CAREN) with a market share of 25% in 2018, based on written premiums. Compagnie d'Assurances et de Reassurances du Niger is followed by the SNAR Societe Nigerienne D' Assurances et de Reassurances (SNAR) and SUNU with 19.3 and 18.9% market share, respectively. One of the insurance companies, SAHAM started with a very small market share of 1% in 2013, but has grown this over the years to 14.3% in 2018. SAHAM is part of the Moroccan owned SAHAM Group, formerly known as Colina (AXCO, 2020).

Insurance companies are present in six of the eight regions but their presence in rural areas is low. Most of the companies have presence in the big cities of Niger, with four of them represented in the main cities of Niamey, Zinder and Maradi. These main cities contribute over 70% to the companies' turnover (IFC; World Bank 2013).

Micro-insurance initiatives for some of the non-life (mostly health) insurance products (e.g. hospital cash cover) have included the utilisation of mobile phones for premium collection and payouts. The claim is settled by transferring the fixed benefit to the user's phone account in partnership with Airtel. Compagnie d'Assurances et de Reassurances du Niger, also in collaboration with Airtel, has introduced motor vehicle insurance with premiums renewed or paid through mobile phones. However, such examples are few and going forward, there would be need for improved insurance and connectivity in the country (AXCO 2020). The main distribution channels for the non-life insurance are direct company sales, agents on commission and brokers. Brokers handle the majority of the corporate business while the agents mostly focus on motor business in the provinces. Insurance sales through banks or via telephone are not yet on offer (AXCO 2020).

4.3 Agriculture insurance and services

Since geographical spread of the population in Niger depends on agriculture more than in neighbouring countries, it has been a challenge for traditional insurance to cover agricultural production. There have been few experiences with agricultural insurance in Niger. These include the preliminary development of a crop weather index insurance product by the International Research Institute for Climate and Society at Columbia University as part of the program Africain d'Adaptation of the United Nations Development Programme (UNDP). However, this has not yet been translated into an insurance program (IRI 2015).

In April 2021, the Government of Niger has established the Comité National sur l'Assurance Agricole Indicielle (CNAAI) with the overall goal of facilitating the introduction of agricultural index-insurance schemes in Niger. The mandate of CNAAI includes the evaluation of the possibility to establish a national agricultural insurance company in Niger, the

development of a commercial index-insurance product and the design of an implementation plan for the launch the product. The first phase of CNAAI implementation, is expected to be finalized by end of 2022. Key support stakeholders for the committee are UNDP, WFP and WBG.

Overriding the non-admitted insurance clause, the ARC offers a sovereign risk drought insurance product for crops that combines early warning and contingency planning with an insurance mechanism, enabling member states to access funding in the immediate aftermath of an extreme weather event (Hess and Hazell 2016). The ARC's insurance pool was launched in Niger and four other countries in 2014. Niger was one of the recipients of payouts together with three other west African countries during the 2015 drought. The Niger government received USD 3.5 million for conditional cash transfer and food distribution to vulnerable households in the drought affected areas, which assisted about 157, 000 people. The government purchased drought risk insurance from the ARC in 2016-17 and in 2019-20 (PWC 2020).

Given the high severity and frequency of droughts, an MoU was signed between the ARC and the government of Niger for a 5-year return period[27] for USD 30 million maximum coverage. Under the agreement the money would be part of the government donor system pooled fund that bankrolls the general government drought response. Therefore, the ARC activities integrate with the overarching relief framework of the country. Some of the primary channels where it is anticipated that the ARC activities would be integrated are, (i) cash and food for work, (ii) unconditional cash transfer, (iii) food coupons, (iv) supplementary and school feeding and (v) livestock relief. Niger is a pilot country for the ARC's newly developed rangeland drought product, which specifically targets the pastoral areas of the country (ARC 2020). Niger is also participating in the AfDB's Africa Disaster Risk Financing (ADRiFi) program and will receive AfDB premium co-financing from 2020 to 2023 (AfDB 2020).

Since late 2019, there have been some attempts by international private sector companies to address the lack of insurance schemes in smallscale agriculture and livestock production in Niger. One such start-up company, called IBISA, has designed and launched an insurance product for the Niger pastoral areas in collaboration with Réseau Billital Maroobè (RBM) and AREN.

The product is a drought insurance product and is based on the concept of mutual insurance. Vegetation is monitored using EO techniques similar to IBLI and if depletion of vegetation occurs, payouts are triggered at the end of the wet season. The product is targeted at breeders and herders who undertake transhumance during the dry season across the regions. The coverage is based on fodder availability along the routes they use most of the time. The objective of the payout is to enable the nomadic and transhumance pastoralists to purchase fodder during dry seasons.

According to IBISA there are 10, 000 interested and already signed up pastoralists, mainly in southern Niger areas who are seemingly willing to pay premiums. There have been no conversations around subsidies, therefore, the assumption is that the premiums might be around 10 - 15%. The product is expected to go live as soon as an insurer willing to take up the fronting of this insurance product becomes available. There are talks in progress with SAHAM insurance as the underwriter and SwissRe as the reinsurer. The payout from this product can only be used to procure feed, fodder and crop residues. A pilot launch of this product was done in 2019 in two agro-pastoral locations close to Niamey.

Through a risk-sharing platform, IBISA provides digital driven services in underwriting along with onboarding and management of clients (Luxembourg Space Agency 2020). IBISA is working with mobile phone operators to integrate mobile money payments into their platform to automate the payout system. Since most of the management and technical support of the product would be coordinated by the IBISA platform, interested insurance companies would have to pay an agreed fee to use the platform.

According to IBISA, the Niger ministry of livestock has been supportive of a livestock insurance initiative as providing such solutions would minimize cross - country movement by the pastoralists and transhumance, thus reducing conflict and border tensions.

Besides the formal insurance initiatives, the Fulani community in Niger follow traditional insurance practices known as the Habbanayé, which helps the most vulnerable households increase their assets after drought events if they incur losses. A wealthier household loans some livestock such as a cow, sheep or goats to a poorer household/ individual/ extended family member who keeps the offspring of the borrowed animals as a way to build his/her/their own stock. This practice has now been adapted and institutionalized by several international development organizations such as Lutheran World Relief, Oxfam, CIRÉ, Caritas and CARE International, after a series of droughts and other crises in the pastoral and agro-pastoral regions (Manvell and Abdoularimou 2005; Bevins 2016). Solutions such as IBDRFI compliment such existing mechanisms to effectively deal with systemic shocks such as severe droughts. Below is a summary of the different, though limited, insurance providers and their distribution channels.

27. The estimated frequency of a catastrophic event reccurring is usually expressed as the 'return period'. This refers to the average amount of time that passes between events of a similar magnitude in a given location. It can also be defined as the expected time or average time between two events of low probability.

TABLE 4.1 INSURANCE PROVIDERS AND THEIR DISTRIBUTION CHANNELS IN NIGER

Insurance Provider	Type	Insurance Product	Partners	Distribution Channels	Interest in IBDRF
CAREN	Private entity	• Motor	• Airtel	• Brokers • Agents	• Not feasible since only offers non-life insurance
SNAR	Private entity	• Health	• Not mentioned	• Brokers • Direct company sales	• Not feasible since only offers non-life insurance
SAHAM	Private entity	• Motor • Health	• Not mentioned	• Brokers • Direct company sales	• There is potential as entity is currently in talks with IBISA for livestock product underwriting
IRI	International research	• Weather index	• UNDP	• Not applicable	• Not feasible • Not translated into an insurance program
ARC	International Public -private entity	• Sovereign level • Crop and livestock	• Government of Niger	• Not mentioned	• Feasible link
IBISA	Private service provider	• Livestock	• RBM • AREN • SAHAM (potential)	• Livestock Breeders' Association	• Feasible link

4.4 Agromet services

Niger has a combination of public, development and private sector actors that have been working to provide agro-meteorological (agromet) services. Several new initiatives have been launched including a pastoral surveillance tool. However, assessments during both 2017 and 2020 pointed to the need for capacity development especially from an insurance design point of view.

A national early warning system (SAP) operates within the Dispositif. The SAP gathers information provided by various Sources and agencies, e.g. ministries of interior, transportation, water resources and agriculture. Overall SAP capacity is relatively low given the infrastructural challenges and lack of human and financial resources. Various international partners such as the World Bank, the African Development Bank and the European Union have ongoing projects to strengthen the SAP capacity (CREWS 2017).

The climate services in Niger are coordinated by the National Directorate for Meteorology (DMN). They provide daily weather information and climate predictions, in association with other actors such as technical partners from the ministries of agriculture, livestock, water, civil protection, disaster management, health, energy, transport and infrastructure, that are co-producers of content and information (Labo et al 2019). A few pilot projects have been implemented to demonstrate the importance of climate services in three rural communities in Niger, namely Bonkoukou, Birni and Ngaoure. A project based on early warning systems on climate information was implemented using short messaging services (sms) for four months in 2018. Undertaken by the DMN in collaboration with the Directorate of Surveillance and Response to the Epidemics, early warnings were issued through sms regarding crop cultivation and meningitis in the community. This resulted in strengthening of the collaboration between DMN and the department of agriculture. Currently the department of agriculture is assisting about 255 communes in rural areas to increase agricultural production by providing appropriate climate information (Labo et al. 2019).

The Adaptation to Climate Change and Disaster Risk Reduction in Agriculture for Food Security (ANADIA) project in Niger, funded by the Italian Agency for Development Cooperation, provides technical support to DMN to improve its capacity to reduce climate risk at a local level. The project covers eight municipalities in Tillabéri and Dosso regions. A case study was established to, (i) fill the gap in agro-meteorological medium-range forecasting at DMN, (ii) improve the usability of such information by the local communities and (iii) tailor information dissemination at the municipality level. The process of dissemination of information has been done through direct messaging via sms and WhatsApp

and initial results show positive feedback from the communities being targeted. In addition, rural radio stations are used for dissemination of content developed jointly by DMN, extension officers and local journalists (Bacci et al. 2020).

The National Framework for Climate Services was officially launched in Niamey in 2017 as a way of improving coordination between the users and providers of climate services for effective delivery. Representatives (127 participants) from government institutions, national parliamentarians, cooperation and UN agencies, civil society, the private sector and farmers' organizations, defined the contextual user interface platforms to begin the operational delivery of user tailored climate services in Niger in the form of expanded Groupes de Travail Pluridisciplinaires (GTPs), under five thematic groups (agriculture, disaster risk reduction, water, health and transportation) for each climate sensitive sector in the country (WAMIS undated).

The GTP-Niger produces a 10-day agro-hydrometeorological bulletin, which provides summaries on the agro-meteorological, hydrological and agricultural (crops, livestock and insects) status. The Niger DMN , which comprises representatives from the office of the prime minister and ministries of transports and tourism, agricultural development, animal resources, hydrology and environment and the Fight Against Desertification, is the lead coordinator of the GTP-Niger (WAMIS undated).

Niger receives 70% of its meteorological services financing from non-government Sources. Up to 2017, Niger had received close to USD 38 million from donor funding for enhancing the capacities of the agro-meteorological services. Some of the prominent donors are the Norwegian Refugee Council, USAID the Office of United States Foreign Disaster Assistance, the African Centre of Meteorological Application for Development (ACMAD), FAO and the National Oceanic and Atmospheric Administration. The projects supported by these organizations aim to develop and incorporate science-based climate information and prediction into planning, policy and practice (Labo et al. 2019).

At the regional level, the AGHRYMET regional centre, based at the Institut National de la Recherche Agronomique du Niger (INRAN), has the required infrastructure and capacity for delivering agro-meteorological services. In collaboration with the Ministry of Agriculture and Livestock, AGHRYMET has been collecting rangeland biomass data since 1988, linking it with remote-sensing imagery to generate rangeland biomass production maps (Fava et al. 2018). There are also ongoing efforts to use digital platforms to collect data on rangeland conditions. Being part of the Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS), AGRHYMET is mandated to provide regular early warning information to support governments in managing drought situations. This is done by leveraging INRAN's dense network of offices in rural Niger, which provide extension services and support capacity development activities in both crop and livestock sectors.

The NGO ACF has established a pastoral surveillance system in the region, which combines satellite data and ground surveys to monitor pasture biomass and surface water resources. The information is integrated to generate early warning and food security bulletins (currently adapted to track the ongoing COVID – 19 pandemic). This provides a useful dataset and network to facilitate the design and risk assessment of insurance solutions.

There are also some private sector entities that have been involved in improving the climate services delivery in Niger. One such entity has been the Geospatial Analytical Services (GeoSAS), an Ethiopian private consulting company established in 2007 specializing in acquisition, processing, analysis and synthesis of geospatial data for various applications using geographical information systems and remote sensing. It has been working with national, regional, continental and international agencies in climate change adaptation and mitigation strategies, agriculture and natural resources management, early warning systems and disaster risk management, among others. In Niger, GeoSAS collaborated with the African Union's New Partnership for Africa's Development Agency (NEPAD) in 2017 to undertake a needs assessment and subsequent development of a program document for climate related services (Usher et al. 2018). A summary of the agro-meteorological services is provided below:

TABLE 4.2 AGROMET INSTITUTIONS AND SERVICES PROVIDED

Agromet Institution	Service	Activities	Partners
SAP	◆ Rainfall and temperature database on cropping season	◆ Early warning	◆ World Bank ◆ AfDB and ◆ EU
DMN	◆ Weather information ◆ Climate predictions	◆ Early warnings through sms	◆ Ministries of agriculture, livestock, water, civil protection and disaster management and ◆ ANADIA
ANADIA	◆ Medium-range forecasting	◆ Capacity development in information dissemination	◆ DMN
GTP-Niger	◆ Temperature ◆ Rainfall ◆ Humidity ◆ Vegetation and ◆ Water availability	◆ Capacity development	◆ DMN ◆ Office of Prime Minister ◆ Ministries of agricultural development, animal resources hydrology, environment and the fight against desertification
AGHRYMET	◆ Rainfall ◆ Temperature ◆ Water Sources ◆ Pasture availability ◆ Biomass	◆ Rangeland production maps ◆ Early warning for drought management ◆ Extension	◆ INRAN ◆ Ministry of agriculture
ACF	◆ Pasture ◆ Biomass ◆ Surface water	◆ Pastoral surveillance system	◆ DNM ◆ ANAM ◆ Private companies
GeoSAS	◆ Geospatial data	◆ Early warning	◆ NEPAD

4.5 Telecommunications digital and financial service infrastructure

4.5.1. Telecommunications and mobile services

Despite hosting four telecommunication operators, penetration is relatively low throughout the country with users concentrated in the urban areas. According to Deloitte, 81% of Niger's population live in rural areas. Even though mobile money services have been offered by the mobile operators since 2010, only around 3% of adults use their mobile phones to pay bills or transfer money. This can be attributed to the absence of universal mobile network coverage and mobile networks being restricted to the use of 2G in most areas, creating a barrier to digital inclusion in the use of mobile services (GSMA and Deloitte 2017).

The decline in investments by the telecommunication companies since 2015 has been attributed to the economic uncertainty and climate. Between 2015 and 2019 there was a 7.5% fall in market revenue. As a result, Orange Niger exited the market in 2019 and transferred its stake to ZamaniCom SAS (Extensia 2019), citing regulatory pressure stemming from socio–economic and political uncertainty.

In 2017, Niger recorded a mobile user rate of 41%, with over 8 million people subscribing to different mobile operators (Extensia 2019). Until 2017, there were four telecommunication operators in Niger, with Airtel commanding the largest market share, followed by Orange, MOOV and Niger Telecom. Niger Telecom was formed from the merger of the state owned SoniTel and SahelCom with the aim of harnessing efficiency and greater penetration through shared resources and infrastructure. The telecommunication sector is regulated by the Postal and Telecommunication Regulatory Authority, which is responsible for ensuring regulatory compliance by telecommunication companies (Extensia 2019). Some initiatives that have been undertaken show that mobile services can be drivers of social inclusion and economic growth in Niger.

In 2013, Maroc Telecom partnered with a humanitarian organization to provide aid using mobile money to over 300 refugee households with each household receiving a mobile phone and SIM card. In addition, it partnered with the WFP to distribute cash in the urban areas using mobile money (GSMA and Deloitte 2017).

In 2015, Airtel in partnership with both MTN Benin and Côte d'Ivoire, launched a service that facilitated money transfers between Niger, Benin and Côte d'Ivoire accounting for almost 40% of Niger's total annual inward remittances (CGAP 2017; GSMA and Deloitte 2017). In addition, another multi-national organization, in collaboration with development organizations and NGOs for awareness raising and financial education, has plans to introduce digital micro-credit and savings products based on product suites available in other African countries (CGAP 2017).

Orange introduced the Labaroun-Kassoua mobile service in 2011 to provide access to market information on agricultural commodities and cattle prices in over 70 markets in Niger via sms. This initiative was launched in collaboration with RECA and SIMB. By 2012, there were over 8 000 subscribers for this service (Orange 2015). Furthermore in 2012, Orange and Altobridge, a social enterprise, deployed mobile services to over 50 remote village communities using solar energy and advanced satellite technology, connecting around 60,000 people (GSMA and Deloitte 2017).

Orange also partnered with Viamo, a social enterprise, to provide weather, emergency preparedness and agriculture information services. This was a free, on-demand voice and text based service. Viamo manages the content although it creates it in collaboration with NGOs and relevant government ministries (Usher et al. 2018). As part of increasing their rural footprint, Orange also has an MOU with one of the largest micro-finance entities in Niger, ASUSU S.A., related to the introduction of agricultural insurance in the near future, further strengthening its commitment to provide extension services and rural financial literacy (Fava et al. 2018).

4.5.2. Banking and digital financial services

Access to traditional banking services in Niger remains a major challenge, with only 1% of the population having access to finance from a formal institution and most of them relying on family and friends for short-term loans. 'Tontine',[28] the informal funding system, remains popular as almost 43% of households utilise it compared to only 10% that use formal banking systems (Jolicoeur and Kabore 2017). There is only one known bank, the state-owned Banque Agricole du Niger (BAGRI), that is focused on the agricultural sector. Though other banks have some agricultural financial products, they mainly focus on financing large companies, state activities and major traders as previous agricultural interventions did not yield the desired results. As part of attempts to mitigate the effect of the COVID-19 pandemic, the Central Bank of Niger, the government and the development finance institutions are working towards a resilient domestic financial sector by committing investments worth USD 10 million in small and medium enterprises and USD 250 million in large enterprises (MFWA 2020).

Banque Agricole du Niger is the only public bank that offers agriculture-related loans at 12-13% interest rates. Created in 2011, it finances all sectors of the economy and has an extensive agency network covering the main locations in the pastoral areas, namely Dakoro, Tahoua, Tillabéri, Diffa and Agadez. Besides providing credit, BAGRI, has participated in financial literacy development projects in the abovementioned pastoral areas (Fava et al. 2018). Banque Agricole du Niger has been involved in supporting pastoral field schools and some extension work in Diffa and Agadez. Though they showed interest in IBDRFI products, they did not clarify their possible role. It will be necessary to engage them further to gain clarity on the nature of their possible involvement in IBDRFI products.

Besides the formal banks in Niger, there are about 37 registered micro-finance structures, which include cooperatives and several unregistered ones such as the village level savings associations. These unlicensed and unregulated structures were not assessed as part of this analysis. Informal mechanisms are usually small and often function mainly to serve the short-term liquidity needs of clients, which makes them less ideal as potential activity partners given their inability to handle larger amounts of funding and seasonal financing needs (USAID 2018).

Micro-finance institutions have been used as channels for cash transfers to reduce risks and vulnerability to droughts and malnutrition, such as during the 2010 food crisis. The FAO, through its cooperating partners, carried out cash for work activities and unconditional cash transfers during the pre-lean season and planting period, respectively. Micro-finance institutions were identified through relevant performance criteria and employed to ensure that the beneficiaries received intended cash payments directly, cutting out brokers or traders (Tall 2015).

28. The 'tontine' system enables subscribers to share the risk of living a long life by combining features of a group annuity with a 'mortality lottery'. Each subscriber pays an agreed sum into the fund and thereafter receives a periodical payout. As members die, their payout entitlements devolve to the other participants, therefore, the value of each continuing payout increases. On the death of the last member, the scheme is wound up.

Most of the registered MFIs have about 5,000 clients collectively and are considered operationally weak due to significant defaults. The defaults occur due to repayment difficulties experienced by clients caused by trade limitations. A study by USAID showed defaults of between 5 - 30% of the MFIs' portfolio consisted of loans overdue for more than 30 days. In addition, issues of weak management, challenges in client assessment capabilities and lack of operational capabilities are some of the difficulties faced by the MFIs.

However, of all the MFIs registered in Niger, ASUSU S.A., which was originally founded by the government-funded Poverty Reduction Project in 2011, is the largest. It has a wide network of branches and small service points and mostly targets rural micro and small enterprises. Its products include savings and smart card services, loans and non-financial services. ASUSU is working with a few international development organizations to provide credit schemes to smallholder farmers in Niger (USAID 2018). Some of these loans are credit for restocking livestock, including fattening of large and small ruminants and credit financing for value chains, among others (Wattel and van Asseldonk 2018).

Since 2014, ASUSU S.A. has set up Islamic financing funded by the Islamic Development Bank, through the Niger Special Food Security Program. The program reached 17,833 customers in 229 villages in Niger. Islamic finance is available in six out of the eight regions focusing mainly on agriculture, livestock and trade. Since its inception, it has funded 3,580 registered groups, of which 45% have been women groups.

As part of furthering the agriculture credit portfolio, Mercy Corps in partnership with ASUSU S.A. piloted the warrantage model in the lean season of 2015. Under this model, farmers were allowed to use their harvest as collateral to obtain credit from the MFI, instead of immediately selling it. Loans amounting to over USD 6,300 were approved and dispersed at an interest rate of 1.7%. Against the credit, the farmers could store their produce in the warehouse leased by the MFI. The credit is extended to farmers based on the amount of produce they store. The farmers were encouraged to bundle their harvest to get significant credit at better interest rates for their combined storage. This credit was intended to help farmers invest in other income generating activities, to meet household needs or to store the harvest in warehouses for longer periods of time. The farmers can store their produce in the warehouses for up to a year based on the prices of the commodity in the market, which also enables them to repay the loans to the MFIs (Jolicoeur and Kabore 2017). The warrantage model was also adopted by the USAID funded Espoir pour les Communautés de Ouallam, Tillabéri program, whose main goals are the improvement of food security among the most vulnerable households and increasing the capacities of the agro-pastoralists to respond to recurring droughts (Jolicoeur and Kabore 2017).

ASUSU S.A. is planning to partner with Mercy Corps to develop and roll out digital financial services to the already existing traditional village savings group in Niger (CGAP 2017). In addition to providing credit and savings services, ASUSU S.A. also acts as a mobile money agent and has signed a contract with the Ministry of Education to pay salaries of staff members who have MFI accounts with ASUSU S.A. This links members to mobile wallets, which can then be withdrawn through any of the multi-national organizations' mobile money service points (CGAP 2017).

Digital financial inclusion is being recognized as an important pillar for Niger's development strategies. With the support of UNCDF and the EU, the government of Niger developed and adopted a National Strategy for Financial Inclusion in 2015. Furthermore in 2017, the government adopted the second Economic and Social Development Plan, which has two objectives, (i) to promote the competitiveness of the economy, unlock its potential and foster job creation and (ii) to promote the development of resilient agriculture for highly sustainable and inclusive growth. This was further supported by the AfDB's 2018-22 framework on achieving sustainable and inclusive economic growth (AfDB 2018).

Moreover, the finance and information and communication technology (ICT) ministries, in collaboration with the World Bank initiated a project in 2019 called the smart villages for rural growth and digital and financial inclusion. With commitment from the National Agency for the Information Society (ANSI), the project aims to improve people's lives using ICT solutions and applications in areas of health, education, agriculture, commerce and others. It is anticipated that this will be done through increased access to cellphone and broadband services in rural areas and provision of digital financial services to select underserved areas (Eskandar 2019).

With a budget of about USD 50 million, it is envisioned that all the 15,000 administrative villages in Niger would be digitally connected, with the government providing access to digital services for the population in these areas. A multi-stakeholder consultation was held in 2019, which included ministries of health, education, agriculture and ICT, telecommunication regulators and UN agencies such as the WHO, FAO, UNESCO, among others, to collaborate and deploy 15 digital services as proof of concept, while leveraging the existing structures on the ground (Eskandar 2019). Table 4.3 below presents an overview of the main digital and financial service providers.

TABLE 4.3 DIGITAL AND FINANCIAL SERVICES OFFERED BY PROVIDERS IN NIGER

Institution	Service provider	Service	Activities	Partners	Interest in IBDRF
Maroc Tel	Mobile money	• Mobile money	• Mobile phones and sim cards to refugees • Cash transfer	• NGOs • Development organizations • WFP	• Feasible link as currently used by NGOs for cash transfers
Airtel	Mobile Money	• Mobile money • Remittance	• National and international remittances • Insurance premiums	• MTN Benin • MTN Côte d'Ivoire • CAREN	• Not a feasible link since it deals mainly with remittances and motor insurance
Niger Telecom	Mobile money	• Mobile money	• Basic savings and credit	• Not specified	• More information required
Orange	Orange Money	• Information services • Mobile money	• Market information on crops and livestock • Weather information	• Market information on crops and livestock • Weather information RECA • SIMB • Viamo • NGOs • ASUSU S.A.	• Not feasible as it exited the market in 2019
BAGRI	Financial	• Agricultural financing	• Credit and savings financial literacy in pastoral areas	• Farmers' associations • Livestock breeder associations	• Feasible link for potential bundling of services
ASUSU S.A.	MFI	• Credit and savings extension	• Islamic financing • Warrantage program • Mobile money agent	• Islamic Development Bank • Mercy Corps • Ministry of Education	• Feasible link for potential bundling of services and extension services
Ministry of ICT	Smart Villages for rural growth	• Digital and financial inclusion	• Digital connections and service provision	• Ministere des Finances • ANSI • World Bank • International development agencies • UN agencies	• Feasible link for possible provision of livestock insurance

4.6 Non-governmental organizations and pastoral association networks

Niger hosts several international organizations that have partnered with local associations, MFIs and government bodies with interests in food security and creating resilient livelihoods. Some of the international organizations have a specific focus on pastoral areas. These organizations could either be potential stakeholders in an IBDRFI initiative or allow leveraging of some of their services as part of a comprehensive IBDRFI initiative.

The Regional Sahel Pastoralism Support Project (PRAPS), funded by the World Bank over a six-year term covers Niger, Chad, Mali, Burkina Faso, Mauritania and Senegal. The program aims to, (i) improve pastoral development in the Sahel region by tackling challenges related to drought, animal diseases, climate change, conflicts and dwindling access to land and water resources, (ii) improve access to resources, production services and markets for pastoralists and agro-pastoralists along the transhumance routes and border areas of the above-mentioned six countries and (iii) improve the countries' emergency response capacity (FAO 2016; World Bank 2020). The Regional Sahel Pastoralism Support Project is jointly managed and coordinated by CILSS, Community of West African States (ECOWAS) and the West African Economic and Monetary Union (UEMOA) (De Haan et al 2016; World Bank 2020).

As part of achieving its objectives, the Millennium Challenge Corporation (MCC) is working on the Climate Resilient Communities Project, which aims to increase incomes for smallscale agriculture and livestock dependent families in rural Niger municipalities. Through community driven investments in climate resilient public works, the project intends to improve crop and livestock productivity, sustain natural resources and increase market access to targeted commodities. The project is being implemented in Tillabéri , Dosso, Tahoua and Maradi, in coordination with the World Bank (MCC, 2020). The USAID sponsored Millennium Challenge Fund also supports an expanding network of private veterinary service providers, which the government of Niger commissions from time to time to conduct vaccination drives and provide animal health services to communities. Each of these service providers has a network of 20-30 auxiliaries who are trained to provide vaccinations and treat and report disease outbreaks in the targeted communities (Fava et al. 2018).

One of the most significant community represented organizations in pastoral areas is AREN. This association works to improve the lives of farmers and is also known as the voice of the pastoral community regarding land, conflict management and development in the drylands of Niger (Peace Insight undated). It has an active membership of 120,000 pastoralists and has worked with private radio stations as part of its efforts to provide extension services and education to pastoralists. Together with the Réseau National des Chambres d'Agriculture du Niger (RECA), AREN provides information on market prices, water availability and pasture conditions to the pastoral community (Fava et al. 2018).

Mercy Corps has been working with AREN to promote local fodder production so that local breeders/herders do not have to procure it from urban areas such as Niamey. The initiative is premised on the fact that fodder producers and procurers often incur high costs transporting it. Through a small pilot of 200 farmers, Mercy Corps is working with AREN to stimulate the sale of fodder produced in local farm lands to nearby breeders. IBISA has also approached Mercy Corps to assess the potential of bundling fodder and feed services as part of the livestock insurance product, given the elevated feed and fodder prices during the dry season or drought periods.

With the support of CARE International and the Open Society Initiative for West Africa (OSIWA), AREN has been implementing capacity building projects for the pastoralists in three communes in the Tillabéri region. This has involved, (i) training of pastoral populations as part of the regional pastoral education and training program, PREPP-AREN Niger on the transhumant routes running from Benin to Chad, (ii) training on conflict management as part of the Protection and Fair Management of Agropastoral Resources in the Tillabéri region project and (iii) a series of training workshops on land conflict management targeted at peaceful coexistence between pastoralists and farmers by establishing effective mechanisms for sharing the available natural resources in their daily activities (IWGIA 2019).

Since 2009, the NGO SNV has been working in Tillia, a large pastoral region, which hosts herds from neighbouring countries of Niger for grazing. SNV has organized several consultations between water users' associations, customary authorities, decentralized management committees and regional state authorities on, (i) reinvestment and rehabilitation of water equipment and (ii) incentives for the population to pay for the services, which can then be used for maintenance of the water points (SNV 2012).

Moreover, RBM has been involved in efforts to create an MoU within the border regions of Niger and Mali, e.g. Tillabéri, to agree on a set number of breeders who can take their livestock for residue grazing into the fields as they continue on their transhumance. The MoU process is part of the RBM advocacy to build consensus between farmers and breeders, as the issue of livestock grazing in their fields during transhumance is a Source of conflict (Stakeholder engagement 2020)

The Agriculture and Food Security Network utilised a participatory approach in their work with the local communities to develop a land use plan in the Dosso region. This region is an agro-pastoral area, often used during transhumance for herding and grazing. The continuous use and threat of land overuse has led to conflicts. The Rural Code of 1993, which allows for registration of customary land rights across the country (Jamart 2011) was used with the support

of the University of Niamey for the land use planning process. The main activities under this project were, (i) the establishment of a numerical register and syntheses of all documents on land and natural resources in the region, (ii) development of comprehensive inventories of all land transactions at municipal level by the different structures of the rural code and (iii) the drafting of land use maps, location of agro-silvopastoral resources and water infrastructure and (iv) recommendations for the establishment of databases facilitating archiving, consultation, document management and a repository of land transaction instruments (Boureuma and Flury 2016).

To further build capacities of the rural communities and enable access to services, a multi-stakeholder public-private partnership designed and piloted an interactive voice response platform called E-KOKARI in 2017. The stakeholders were the CIPMEN Incubator, World Bank Niger, the ministry of agriculture, Niger ICT High Commissary, NOVATECH, AgriBusiness Consulting and Sahel Bio. The E-KOKARI platform enables farmers, breeders and buyers to access information, advice, warnings and market prices for crops and livestock in their local languages - (French, Hausa and Zarma). The user dials a short specified number to access the menu, from which he/she gets guidance. This platform can be accessed from many phone models. The information available on this platform is validated by the ministry of agriculture. The pilot was conducted over a 10-month period. The World Bank has shown interest in rolling this out to 60 more villages to reach 8,000 producers (Hamadour 2018). A summary of the main activities by development organization is provided in Table 4.4 below.

TABLE 4.4 INITIATIVES BY LOCAL AND INTERNATIONAL DEVELOPMENT ORGANIZATIONS

Organization	Type	Initiative	Partners	Activity
World Bank	International development	◆ PRAPS	◆ CLISS ◆ ECOWAS ◆ UEMOA	◆ Market access ◆ Production services ◆ Improving emergency response
MMC	International development	◆ Climate resilient communities	◆ World Bank ◆ Private veterinarians	◆ Improving crop and livestock productivity ◆ Increasing market access ◆ Natural resource management ◆ Training veterinary service providers
Mercy Corps	International development	◆ Increasing food security	◆ ASUS S. A. ◆ AREN	◆ Warrantage program ◆ Fodder production
CARE	International development	◆ Capacity development	◆ AREN ◆ OSIWA	◆ Natural resource management ◆ VLSA ◆ Conflict management
SNV	International development	◆ No named initiative	◆ RBM ◆ AREN	◆ Reinvestment and rehabilitation of watering holes ◆ Maintenance of water points
WFP	International development	◆ No named initiative	◆ Ministries ◆ Local associations ◆ Telecommunication companies	◆ Beneficiary and transfer management of Insurance Development Programs ◆ Cash transfers
AREN	Local livestock breeders' association	◆ No named initiative	◆ RECA ◆ Mercy Corps ◆ CARE ◆ IBISA	◆ Information on market prices ◆ Water availability ◆ Pasture conditions ◆ Fodder production ◆ Capacity development ◆ Conflict management

Organization	Type	Initiative	Partners	Activity
RBM	Local network	◆ No named initiative	◆ International development organizations ◆ Local NGOs ◆ SNV ◆ IBISA	◆ Conflict management between transhumance and crop growers ◆ Potential extension and distribution channel for livestock insurance

Key takeaways from Chapter 4: Operational assessment	
Government response measures to droughts	◆ The country relies heavy on humanitarian aid to fund its response to natural disasters, especially droughts. Food distribution is the main response measure. The government uses different mechanisms to finance its responses, such as the national disaster funds and food reserves. From an IBDRFI perspective, the schemes could be a potential fit for social protection products.
Insurance market and regulations	◆ The market in general is underdeveloped, with very few non-life insurance providers, mainly in health and motor insurance. The insurance market is overseen by CIMA, while the country level regulation is managed by the Direction des Assurances under the Ministry of Economy and Finance. Due to the geographical spread and dependence of most of the population on agriculture, private insurance companies have found it difficult to create a significant market for themselves due to low penetration rates. So far ARC and a private start-up named IBISA are the only players in the agriculture insurance market, with IBISA being the only entity in the process of designing a product for livestock index insurance targeting the pastoral areas. However, there are attempts to get some of the non-life insurers to underwrite the proposed product. Even though this may seem like an opportunity, unfortunately, the entire process from prelaunch to implementation of IBDRFI solutions might be resource intensive. The establishment of the CNAAI could be a turning point to overcome this challenge. CNAAI is a a national committee with the mandate of evaluating the possibility to introduce a national insurance company, develop a commercial agricultural index-insurance product and develop an implementation plan.
Agromet services	◆ The climate services that include the provision of daily weather information and climate predictions are coordinated by the National Directorate for Meteorology (DMN) in association with other actors such as technical partners from the ministries of agriculture, livestock, water, civil protection, disaster management, health, energy, transport and infrastructure that co-produce content and information. There is a lot of donor support, which has been provided to enhance the capacity of agromet services in Niger. There is capacity available in the meteorological systems, which if tapped and identified could potentially serve as calculating agents should an IBDRFI product be implemented, e.g. DMN in collaboration with INRAN.
Telecommunications and digital financial services	◆ The penetration of both telecommunication services, e.g. mobile money, and the availability of credit/savings or agricultural financing has been very low. Due to the socio-economic environment, some telecommunication companies such as Orange, which collaborated with NGOs and development organizations in the past have exited the market. Similarly, apart from the financial services provided by a handful of MFIs such as ASUSU S.A and BAGRI, access to formal finance is very limited in Niger. This could, therefore, present distribution and product provision challenges for IBDRFI solution implementation.
NGOs and pastoral association networks	◆ Organizations such as SNV, Mercy Corps, CARE and WDP are working with multiple stakeholders like the World Bank and local organizations such as AREN and RBM, in the pastoral and agro-pastoral regions to implement projects that improve livestock productivity, encourage local fodder production, natural resource management and conflict management. These organizations could be considered potential partners through leveraging their networks for distribution of IBDRFI products and linking financial protection with their resilience building interventions.

5. Scenario analysis

5.1 Background and objectives of the scenario analysis

This scenario analysis aims to provide a broad overview of how a product might work and an illustration of indicative costings for two alternative IBDRFI programmatic options, (i) a micro-level retail insurance scheme and (ii) a fully funded macro-level social livelihood protection program. This is not a product or program design study, thus the analysis is simplified and based only on previous implementation experiences in east Africa. It should be noted that the proposed scenarios neither provide option specific recommendations, nor do they pretend to cover an exhaustive range of IBDRFI solutions. Thus, a detailed analysis of alternative programmatic options and product design customizations needs to be planned with local stakeholders in the early implementation stages of future initiatives.

The two programmatic alternatives, built upon experience from existing programs in Kenya and Ethiopia (see Sections 1.2 and 1.3) should be seen as two illustrative examples of a broader range of potential IBDRFI programs that could be designed based on Niger's priorities. They could also be seen as complementary (not alternative) approaches in a harmonized IBDRFI framework at country level. Both options rely on the private sector for product distribution and management, provide payouts directly to pastoralists and are based on the same index-based model. The two options fundamentally differ in the targeting approach and the level of participation of public sector actors regarding subsidies and direct support to complementary activities, e.g. registration systems and awareness creation. Table 5.1 summarizes key similarities and differences. Appendix 6 provides an overview of key lessons learned from the operational implementation of both options.

The micro-level retail insurance scheme aims to not only protect pastoral households from sliding into poverty during drought periods due to livestock losses, but also to improve access to inputs and credits and stimulate investments in the value chain to improve livestock production and marketing. Clients of the scheme are expected to pay a premium. The level of public sector participation, mainly through partial subsidies needs to be modulated to facilitate uptake and financial viability for the private sector and to create incentives for additional private sector investments.

The macro-level social livelihood protection program aims to provide a social safety net to the most vulnerable pastoral households and to complement humanitarian responses in protecting pastoralists' key assets and livelihoods in the early stages of drought crises. The program targets beneficiaries that own a small number of livestock assets but are unable to pay premiums. Targeting and registration, therefore, become critical steps. The level of public sector support required for full or high subsidies and awareness creation is high. In addition to social protection, subsidies could be linked to good practices to improve the resilience of pastoral households, e.g. rangeland management.

TABLE 5.1 SUMMARY OF THE SIMILARITIES AND DIFFERENCES BETWEEN THE TWO IBDRFI PROGRAMMATIC SCENARIOS

Item	Micro-Level Commercial Retail Insurance	Macro-level social livelihood protection
Main goal	◆ Improve access to inputs and credit to pastoral households. ◆ Protect households from sliding into the poverty trap.	◆ Provide a social safety net to the most vulnerable pastoral households and complement humanitarian responses.
Insurable interest	◆ Herders' interests to protect their livestock assets during extended periods of deficit of forage resources.	◆ Public interest in anticipatory response to drought and reduction of humanitarian support needs.
Satellite data Source	◆ Same, e.g. NDVI.	◆ Same, e.g. NDVI
Index design	◆ Same, proxy of forage availability	◆ Same, proxy of forage availability
Sum insured	◆ Same but could increase for larger commercial herders. ◆ It is based on estimated additional costs of livestock maintenance during seasons with forage deficit.	◆ Same. ◆ It is based on estimated additional costs of livestock maintenance during seasons with forage deficit.

Item	Micro-Level Commercial Retail Insurance	Macro-level social livelihood protection
Commercial Premium Rates	◆ Same underlying pure loss costs, but commercial premium rates may need to be considerably higher to reflect much higher operational costs associated with voluntary sales to individual pastoralists (insured policyholders).	◆ Same underlying pure loss costs, but potential to minimise operational loadings as automatic cover for a large number of beneficiaries.
Payouts	◆ Same assuming same sum insured and triggers are adopted (direct to policyholder insured).	◆ Same assuming same sum insured and triggers adopted (direct to beneficiary).
Target Audience	◆ More affluent small/medium and large pastoralists who can afford to pay either the full commercial premium rate or a partly subsidized premium rate.	◆ Vulnerable pastoralists who depend largely on livestock herding for their livelihoods but who cannot afford to pay commercial premium rates. ◆ These pastoralists should have a minimum herd size.
Distribution approach	◆ Voluntary purchase by the individual pastoralist or group.	◆ Automatic enrolment of selected pastoralists by government entity/agency. Automatic enrolment of selected pastoralists by government entity/agency. Automatic enrolment of selected pastoralists by government entity/agency.
Policy Holder (Insured)	◆ The individual pastoralist is the policyholder and insured as named in the policy certificate.	◆ The insured policyholder is the government entity/agency on behalf of the pre-selected pastoralists (beneficiaries) listed in the policy issued to the government entity/agency.
Insurance Awareness Creation and Sensitisation	◆ Not essential if marketing, promotion and sales functions are correctly performed by the insurer or its appointed agents/ distribution channels.	◆ Essential as pastoral communities and their members must be made aware of the scheme and why some pastoralists are being identified as beneficiaries and will be automatically enrolled while others will not be selected.
Targeting (and sales) and Selection	◆ Insurers will be responsible for their own marketing, promotion and sales programs including: ◆ Own sales agents ◆ Other distributers.	◆ The government entity/agency will need to work closely with country level authorities, community and pastoral leaders to identify the selection criteria and beneficiaries of the program in each insured unit (IU)
Registration	◆ All insured pastoralists must be electronically registered.	◆ All beneficiaries must be electronically registered.
Premium subsidies	◆ Variable. ◆ It could also change in time depending on the product uptake.	◆ Full subsidy (100%) or close to. ◆ Options could be considered in kind for pastoralists' contributions, e.g. a token for labour or work.

Source: Authors

While the two proposed options have been implemented in east Africa, there are no examples to date for the pastoral areas of the Sahel region. A detailed review of the lessons learned in Kenya and Ethiopia is provided in Lung et al. (2021). In general, the micro-level commercial retail scheme is more suitable when the country's insurance market is relatively well developed and pastoralists have already been exposed to some form of financial protection mechanisms and expressed demand for insurance. In such a situation, the private sector will be ready to engage in the commercialization and marketing of the drought insurance product. However, slow uptake has been proven for this scheme and in the absence of public support through long term subsidies and incentives, the private sector has encountered difficulties in maintaining the scheme. Conversely, the social livelihood protection scheme is more suitable when there is a large number of vulnerable pastoralists requiring humanitarian assistance during drought shocks and the financial service infrastructure and literacy in pastoral areas are limited. The main drawbacks of this scheme are the availability and continuity of government funding and the difficulty in effectively incentivising the private sector in co-investing in the scheme to complement public sector investments. The two options can be also seen as complementary and not alternative to each other.

The scenario analysis takes into consideration an IBLI product type, which has been designed, customized and widely tested in Kenya and Ethiopia (Appendix 2). As already described in Section 1.2, the IBLI product design adopted in existing programs relies on, (i) an index calculated from time series data of NDVI imagery acquired from satellite sensors and (ii) a payout function to convert the index values into payouts for policyholders/beneficiaries. The analysis is limited to the areas that are considered suitable or partially suitable (i.e. forage review) for the IBLI product implementation (Chapter 4, Figure 4.6)

It should be noted that the index calculation and the payout function of the IBLI product should be customized during the early implementation stages of any initiative aimed at launching IBDRFI solutions, in close collaboration with local stakeholders. The cost of any IBDRFI product is largely determined by calculating historical payouts (i.e. pure loss rates) according to the chosen set of parameters and customization options of the IBLI product. This allows tailoring the IBDRFI solution to the local context and to the specific goal of the IBDRFI initiative.

The scenario analysis is divided in two steps, firstly, a simulation analysis on historical data is conducted to illustrate the product performance (i.e. independently by the implementation modality) and secondly, a financial analysis is conducted to illustrate hypothetical costings of implementing an IBDRFI program in the country. The costings are generated for the two programmatic options illustrated above, a micro-level purely retail insurance program and a macro-level fully subsidized social protection initiative.

5.2 Simulation of historical payouts in Niger

Three historical payout scenarios are presented to illustrate how an IBLI product would have worked in Niger's pastoral areas over the last two decades. The reference scenario is an IBLI product with a trigger attachment threshold[29] set to one payout in 5 years (S2). The two alternative scenarios are built to illustrate the implications of changing the attachment threshold to increase the frequency of payouts (i.e. one in 2.5 years) (S1) or decrease it (i.e. 1 in 7.5 years) (S3). All the other parameters are constant across the scenarios. All scenarios are built on reasonable parameters assessed through early engagement with local stakeholders or where this is not possible, using ongoing programs in east Africa as a reference. Table A5.1 provides a summary of the parameters and their Sources.

In each of these scenarios, six main payouts would have been triggered in Niger, mainly associated with two periods of consecutive droughts, 2003-05 and 2009-11 (Figure 5.1). Other less significant events occurred in 2015 and 2017. The scenario S1 also captures mild drought events, which are clearly not captured by S2 and S3. It is worth noting that even during the main droughts, total payouts do not exceed 46% of the total sum insured. This is because the payouts shown in Figure 5.1 are averaged across all units in the country, thus some units may have payouts close to the maximum while others might have much lower payouts.

The observed temporal patterns of drought in pastoral areas are, in general, well aligned to the main drought events in the region. The severe multi-year droughts in 2004-05 and 2009-12 are well documented and caused severe impacts (see Table 2.4).

29. The index threshold below which a payout is made

Photo credit: EAP Photo Collection/ World Bank

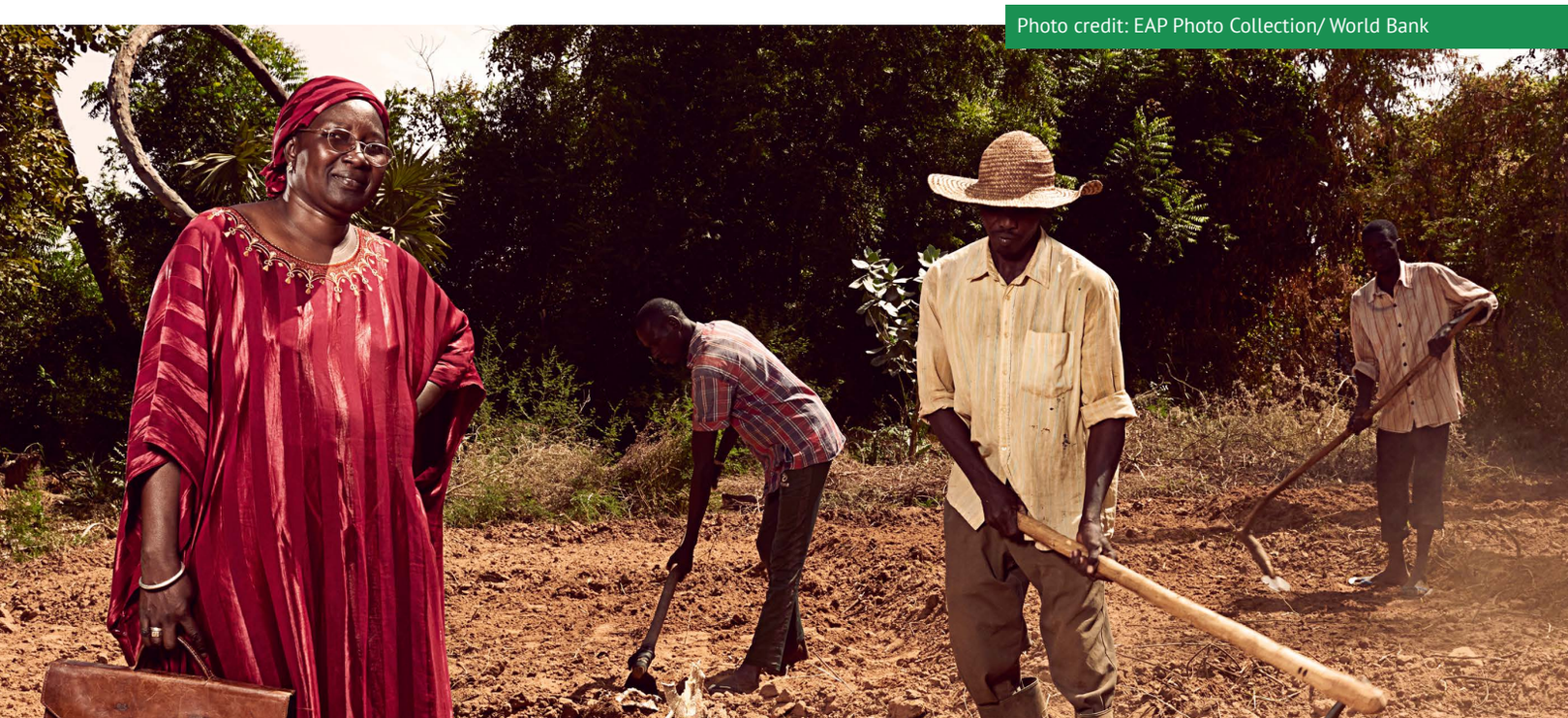
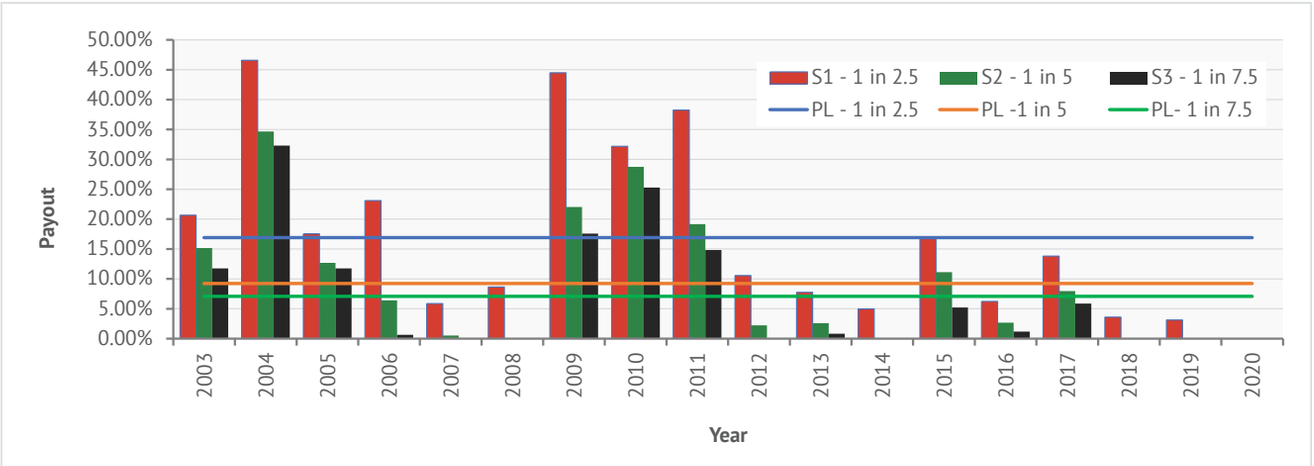


FIGURE 5.1 HISTORICAL ANNUAL PAYOUTS AS A PERCENTAGE OF TOTAL LIABILITY IN ADMINISTRATIVE UNITS WHERE IBLI IS SUITABLE (2003-20), ASSUMING A JUNE TO NOVEMBER INSURANCE COVER PERIOD[30]



The average payout (pure loss cost rate or pure risk premium rate) would be 16.9, 9.2 and 7.1% for payout scenarios S1, S2 and S3, respectively, illustrating how more frequent payouts would result in significantly higher payouts and, therefore, premium rates for the IBDRFI product. This demonstrates how decisions made during product customization with local stakeholders on their desired frequency of payouts have important implications on the premium cost (of which the pure loss rate is a key component) and that the product can be tailored to suit the objectives of the IBDRFI program and the ability and willingness of pastoralists and/or government to pay the premium.

5.3 Costing scenarios for future initiatives in Niger

Indicative costings for the two programmatic scenario (PS) options described in Section 5.2 are presented to illustrate the financial implications of implementing an IBDRFI solution in Niger for the government or donors. The two PS costings are built from the implementation experiences in Kenya and Ethiopia (see Sections 5.2 and 5.4 and Appendix 6) and include a micro-level commercial insurance implementation scenario (PS1) and a macro-level social livelihood protection coverage implementation scenario (PS2). Both scenarios are built using an IBLI product and the trigger attachment threshold of 1 in 5 years (S2 in Section 5.2). The scenarios are developed for a 5-year program.

The two programmatic scenarios differ fundamentally on the expected contribution from the government or donors, as PS1 assumes a partial 50% premium subsidy to make cover more affordable to individual pastoralists, while the PS2 livelihoods protection for vulnerable pastoralists assumes 100% premium financing by government and/or donors. Another important difference is in the level of contribution of the public sector to complementary investments such as the registration infrastructure, awareness creation and monitoring and evaluation. Finally, the two programmatic scenarios differ in the level of expected uptake, as it is assumed from previous experiences that commercial insurance uptake rates are generally slow. A detailed summary of assumptions is provided in Appendix 5.

The assumptions made for this analysis are based on oversimplification of the reality and should be seen as illustrative. They should be refined after a comprehensive exercise evaluating the costs and benefits of alternative programmatic options. The commercial loadings are fixed to indicative medium insurance and reinsurance markets. However, loadings are highly context specific and could also be significantly higher. No economies of scale have been considered even though they might be expected with the scaling of the programs.

Indicative costs of complementary activities including registration, awareness creation and monitoring and evaluation are provided to illustrate the importance of including these components at the design stage of any IBDRFI initiative. However, the costs are estimated based on a per insured (beneficiary) flat rate, which is an oversimplification. In a more realistic scenario, these components would require an initial larger investment for setting up the infrastructure. The costs would then increase proportionally commensurate with the level of program expansion until a certain critical level, when increased cost efficiency and economies of scale should, at least in principle, reduce costs.

30. S1, S2 and S3 are the three scenarios illustrated. PL stands for pure loss cost.

PS1: Micro-level commercial implementation with partial subsidies

The PS1 micro-level commercial insurance implementation scenario indicates the cost of supporting a relatively large 5-year implementation program for an IBDRFI micro-insurance product with partial subsidies (i.e. 50 % of the premium) in the pastoral areas of Niger. Under commercial implementation, the uptake is expected to be gradual and in 5-years' time the program could target to reach 25,000 pastoral households and approximately 125,000 TLUs.

TABLE 5.2 CUMULATIVE COSTS FOR IMPLEMENTING PS1 OVER 5 YEARS[31]

Item	Total (Cumulative over 5 years)
Policyholders	75,000
TLUs covered	375,000 $US
Total sum insured (USD)	56,250,000 $US
Indicative premium (total) (USD)	8,816,939 $US
Premium subsidy (50%) (USD)	4,408,470 $US
1. Electronic registration of livestock producers (USD/Livestock unit)	0
2. Herder awareness, education and training (USD)	375,000 $US
3. Monitoring and evaluation (USD)	375,000 $US
Total cost	5,158,470

The global fiscal cost of supporting a micro-level insurance program with 50% premium subsidies is estimated to be USD 5.1 million over 5 years of implementation, including USD 4.4 million subsidies and USD 0.75 million for program support activities (Table 5.3). At year 5, the fiscal cost of the program would be USD 1.8 million per year and a decision could be made on a more appropriate modality to support further expansion.

The insurance premium to be paid by a pastoral household would be approximately USD 11.8/TLU per year with a maximum payout of USD 150/TLU. However, the lack of information on the willingness to pay in Niger does not permit an assessment of the premium cost per TLU that would be generally accepTable/affordable to a pastoralist with a median-sized herd. In addition, it should be noted that it is possible to customize the policy parameters including the frequency of payouts, the rate of payout with increasing drought intensity and the sum insured per TLU by either reducing or increasing the premium rates, depending on the ability of pastoralists to fund cover and the level of premium subsidy support from the government.

In this scenario, there is greater uncertainty on the uptake Figures and level of actual private sector investment in complementary activities. The uptake of agricultural micro-insurance solutions has often been below expectations for a variety of factors that include poor product design, poor investment in marketing and awareness creation and high transaction costs for implementation, leading to unsTable private sector commitment. Partial subsidies are deemed important to support the initial market uptake. Therefore, a smart use of subsidies needs to be planned to incentivize the private sector sufficiently to invest in critical financial and knowledge infrastructures. In this scenario, a fixed 50% premium subsidy in used, but a gradual reduction of subsidy could be also planned over the medium term.

PS2: Macro-level social livelihood protection coverage implementation

The PS2 macro-level social livelihood protection coverage scenario indicates the cost of supporting a relatively large IBDRF social protection coverage implementation program targeting the most vulnerable pastoralists who cannot afford to pay insurance premiums (i.e. 100% of the premium is covered) in the pastoral areas of Niger. Under social protection implementation, the expansion of the program is expected to be more rapid and in 5-years' time, the could target 50,000 pastoral households and approximately 250,000 TLUs per year.

31. Yearly costs are presented in Appendix 5 (Table A5.2).

TABLE 5.3 COSTS FOR PS2 FOR THE WHOLE PERIOD (5 YEARS)[32]

Item	Total (5 years)
Beneficiaries	150,000
TLUs covered	750,000
Total sum insured (USD)	1,12,500,000
Indicative premium (total) (USD)	15,559,304
Premium subsidy (100%) (USD)	15 559 304
1. Electronic registration of livestock producers (USD/Livestock unit)	250,000
2. Herder awareness, education and training (USD)	750,000
3. Monitoring and evaluation (USD)	750,000
Total cost	17,309,304

The global fiscal cost of fully supporting the program is estimated to be USD 17.3 million over 5 years of implementation, including USD 15.6 million premium subsidies and USD 1.75 million for program support activities (Table 5.4). A total of 150,000 pastoralists and 750,000 TLUs would be covered over the 5 years of program implementation. At the end of the 5-year program, 250,000 TLUs per year would be protected against drought at an annual cost of USD 5.2 million for premiums and a further USD 0.55 million for program support, bringing the total to USD 5.7 million (Table A.5.3).

The premium cost per TLU to be covered through 100% premium financing would be USD 20.7/TLU. No premium is expected to be paid by the vulnerable pastoral households. However, a token contribution is recommended to support awareness of the product. This is an important lesson learnt from ongoing initiatives in Kenya and Ethiopia.

In this scenario, the main Source of uncertainty is associated with the long-term fiscal sustainability of the initiative, as medium-term budget allocation commitments need to be guaranteed. Depending on the social protection goals of the IBDRFI program, a gradual exit strategy should be planned from the beginning. For example, a system incentivizing graduation of pastoral households to partially subsidized commercial coverage could be implemented, allowing for a gradual reduction of fiscal costs over the medium to long term.

Hybrid approach: combining commercial micro-insurance with a social protection program

Experience from operational programs in Kenya and Ethiopia suggest that a hybrid approach could be adopted to address sustainability issues in the two programmatic options illustrated. A macro-level social livelihood protection program could target the most vulnerable up to a certain number of TLUs (e.g. 5) with a highly subsidized product. At the same time, partially subsidized commercial insurance could be sold to those that are not beneficiaries of the social protection program and/or to top-up the coverage with additional TLUs. Subsidies could be modulated over time between the two programs and used as incentives to the private sector and clients to promote uptake and financial sustainability.

This could bring multiple potential benefits including:

- Cost sharing for financial service infrastructure development and complementary activities, as the public sector/ donors could support the initial investments under the social livelihood protection scheme, while the private sector guarantees maintenance and invests mainly in market expansion.
- The macro-level coverage could be planned to scale up relatively rapidly in the medium term and create confidence in the private sector on the short-term profitability of the scheme.
- In the meanwhile, subsidies can be used as incentives to the private sector to invest in the commercial scheme and expand the retail market.
- Bringing the initiative rapidly to scale by adopting a hybrid approach could also promote economies of scales, reducing premium loadings (e.g. the higher the number of policies, the higher the risk mutualization and the lower the loading) and making complementary activities more cost-effective (e.g. reduced per person cost of monitoring and evaluation or registration).

32. Yearly costs are presented in Appendix 5 (Table A5.3).

6. Summary of findings and recommendations

The feasibility assessment indicates that Niger has a moderate level of readiness for the implementation of an IBDRFI initiative targeting livestock keepers in extensive pastoral systems in terms of socio-economic, technical and operational conditions. Table 6.1 illustrates the key findings of this study with respect to the feasibility criteria considered.

The socio-economic assessment (Table 6.1, green) emphasizes the overwhelming importance of the livestock sector to the Nigerien economy, as it accounts for approximately 13% of the country's national GDP. More than 87% of the households in the country rear livestock, since most of the livestock rearing households practice agro-pastoralism, 66% are kept in sedentary systems, it is critical to carefully review the extent of IBDRFI approaches in protecting those households and their effectiveness compared to alternative approaches. A related issue requiring consideration and accurate review is the reported uneven distribution of livestock ownership, with 10% wealthiest households reported to own 90% of all livestock. Most of the migrating pastoralists are concentrated in the northern parts of the pastoral belt. Droughts are one of the biggest causes of food security vulnerability for pastoralists. Though there is little data available on the impact of droughts on households and the community, it can be assumed to be substantial, with livestock losses estimated at 10% of the agricultural GDP. Brief discussions conducted with the pastoral communities and associations suggest that there is general interest and potential demand for drought insurance products but given the poverty levels and the inequality among pastoralists, social protection systems may be the most feasible option for the most vulnerable.

The technical assessment (Table 6.1, yellow) indicates that the areas where IBLI is fully feasible are in the central part of the country, which is dominated by pastoralism. This constitutes 16% of Niger's land area and hosts about 25% of the national herd. Approximately 74% of Niger includes areas that are potentially suitable for IBLI but also require a review during early implementation stages, with the aid of local stakeholders. In the central and southern regions, a review of the pastoral production systems should be considered to evaluate how extensively mobility is practiced and the extent of reliance on natural forage production, as these are essential IBLI prerequisites. In northern regions, rangeland use by pastoralists should be characterized to evaluate the role of pastures in animal nutrition and pastoralists' livelihoods. These assessments will also be critical for the delineation of the unit areas of insurance. This activity would require engagement with relevant stakeholders familiar with the area, including ecological/rangeland experts, NGOs and government institutions responsible for agricultural and livestock extension services and research.

The operational assessment (Table 6.1, grey) shows a conducive regulatory environment, juxtaposed against limited presence of non-life insurance companies and absence of any active agriculture insurance market. As much as there is a pilot being designed for a livestock index insurance product with interest and enthusiasm from the ministry of livestock, the lack of insurance providers in the country is a significant challenge. Moreover, the exit of a major telecommunication company like Orange Telecom from the market suggests a weak environment to support large commercial insurance initiatives. In general, the pastoral regions have experienced marginal investments in financial resilience. However, the launch of CNAAI might allow overcoming some of the existing institutional and market-related gaps for the establishment of IBDRFI initiatives. The strong interest shown by pastoral associations such as RBM and AREN for livestock index insurance products suggest potential for a group-based commercial insurance product with partial subsidies.

There is minimal financial literacy in Niger and this could be a significant barrier to insurance demand, therefore, local institutions such as AREN and affiliated NGOs can be leveraged to conduct capacity development initiatives and financial literacy campaigns. This may require significant investments in time and resources.

Finally, the insecurity situation in vast portions of the pastoral region could be another operational constraint factor. To overcome some of these challenges, an IBDRFI intervention for pastoral areas may be linked to the social safety net scalability mechanism, which is one of the biggest disaster response mechanisms in the country. Moreover, working with the local and humanitarian organizations in the conflict areas presents an opportunity to design IBDRFI products that can mitigate the conflict situation. However, this will require in-depth understanding of the nature of the conflict and causes thereof.

TABLE 6.1 FEASIBILITY ASSESSMENT OF THE COUNTRY'S READINESS FOR IBDRFI PRODUCTS TARGETING PASTORALISTS

			Justification
Socio-economic Feasibility	Importance of pastoral livestock to the local economy	🟢	Livestock is of overwhelming importance for the Nigerien economy, contributing around 13% of national GDP. Approximately 87% of households keep livestock.
	Impact of drought on the livestock sector	🟡	Drought impacts on pastoral livelihoods have repeatedly been catastrophic, with large parts of the national herd perishing. There are no reliable data on drought-related livestock losses and estimates vary but they can be substantial, with economic livestock losses surpassing 10% of GDP during the drought of 2009-10.
	Vulnerability of pastoralists to drought	🟢	The vulnerability to droughts is highest among the poorer pastoralists. In addition, the pastoral areas are generally very dependent on functioning markets and grain prices as their diet consists of more grains than animal products.
	Production systems	🟡	Agro-pastoralism is by far the most practiced production system by livestock producers with 66% of livestock being kept in sedentary systems. This requires careful consideration to correctly identify target clients/beneficiaries, as the forage index design assumes that livestock relies largely on rangeland resources. Migrating pastoralists are concentrated mainly in the northern parts of the pastoral belts. Given the many pressures on their livelihoods, many pastoralists are forced to become sedentary and adopt agro-pastoralist lifestyles. A related issue requiring consideration and accurate review is the reported uneven distribution of livestock ownership, with 10% wealthiest households reported to own 90% of all livestock. This has relevant policy implications for IBDRFI implementation modality and targeting
	Pastoralist demand for livestock insurance	🟡	There is general interest and potential demand for drought insurance products but given the poverty levels and the inequality among pastoralists, different approaches might have to be considered when designing livestock insurance products. However, the information gathered in this study is not sufficient for accurate evaluation of potential demand.
	Pastoralist financial literacy	🔴	Pastoralist communities have very little understanding of the insurance market in general (crop, livestock and non–life) and their introduction would require significant investments in awareness creation.
Technical Feasibility	Rangeland dominance	🟡	Rangelands extensively dominate the central part of the country and are most suitable for the implementation of IBDFRI programs for pastoralists. The level of forage production is the major factor limiting feasibility of an IBDRFI design in the northern regions. Small-holder cropping or mixed crop-livestock systems are prevalent in southern Niger, making these areas inappropriate for IBDRFI design.
	Seasonality and signal intensity	🟢	Seasonality is well defined and relatively homogenous across the country's pastoral areas. The typical rangeland growing season lasts from June to late October/ November, thus seasonality is not a limiting factor for an IBDRFI design, except for the northern parts transitioning into the Sahara desert that are characterised by scarce vegetation.
	Overall feasibility of product design	🟡	The IBDRFI suitable areas that are dominated by pastoralism are located in the central part of the country. They cover about 16% of Niger's land area and host 25% of the national herd and.. Approximately 74% of Niger includes areas that are potentially suitable but requiring reviews during early implementation stages, with the aid of local stakeholders.
	Technical capacity on index calculation and quality assessment	🔴	There are multiple institutions supporting agro-meteorological and extension services (e.g. ANAM and DMN), but national-level institutional capacity in handling the data component of index-insurance initiative seems limited. There is little or no livestock data or information for linking weather data in to livestock production. Regional institutions such as AGHRYMET, ACF or ARC could support data management tasks, during capacity building at the national level.
	Legal and regulatory insurance environment	🟢	Niger is a member of CIMA, which already has regulations in place for IBDRFI. CIMA recently introduced regulations for Sharia-compliant products, which might be important for Niger.

			Justification
Operational Feasibility	Insurance market development		Niger has a relatively weak insurance market compared to its neighbours Mali, Senegal and Burkina Faso. The number of private general insurance companies is limited and there are very few insurance products other than motor vehicle and health insurance. There are no known existing insurance products on crops or livestock. However, a private technology company (IBISA) is currently working with local insurers to launch index-based livestock insurance products in collaboration with livestock and breeders' associations for the pastoral regions, with interest from the Ministry of Livestock and Fisheries. The launch of CNAAI in 2021 may be a turning point to facilitate the development of an agricultural insurance market in the country
	Interest from insurers in IBDRFI		Except for SAHAM, there is no other insurance company that has expressed interest. ARC is also operating in the country and has signed an MoU with the government to include drought cover for rangelands.
	Effective distribution channels		The insurers' presence in pastoral areas is limited or absent. However, there are few MFIs working with development organizations for different credit and savings services. Moreover, the government-launched smart village program is a promising initiative, which might offer the opportunity to support effective distribution channels if targeted investments are made.
	Existing pastoralist beneficiary registries		Currently there is no registration system in place. So far, most of the registration processes have been done through international development organizations.
	Finance available for premiums		Not available (N/A). This study lacks sufficient evidence to assess this factor.
	Interest from government		The government of Niger indicated general interest in IBDRFI initiatives targeting pastoral systems, however, despite a commercial product viability assessment underway, a realistic entry point would be through the social safety mechanisms in place to respond to emergencies and disasters. In addition, the mandate of the Dispositif National for the prevention and management of food crisis could be leveraged to introduce IBDFRI products.
	Governance and security		Increasing insecurity and conflict poses a challenge for investment and attracting private sector actors, however, working with local civil society and peace building bodies could be an opportunity to explore possible mechanisms by which IBDRFI solutions could be introduced.

Recommendations

Considering the limited scope of a feasibility study, the next steps towards implementing an IBDRFI initiative in Niger would require in-depth engagement with country stakeholders and planning for analytical studies to address knowledge gaps identified in this assessment. Furthermore, it would be useful to commission a formal IBDRFI demand study, which could include 'willingness to pay' components. Next steps are summarized below while Section 5 of the report provides an expanded description.

Next steps

R1: To create an enabling environment for IBDRFI solutions, it would be important to create a forum coordinated by the ministry of livestock to engage various stakeholders such as other relevant ministries (economy and finance and ICT), the Comite des Assureurs du Niger, private insurance companies and technical enterprises (SAHAM and IBISA), the African Risk Capacity and other development actors. The goal should be to establish a national taskforce to discuss opportunities and modalities of introducing IBDRFI initiatives in pastoral areas. This initiative could be complementary to the ongoing work of CNAAI, which is focusing more broadly on agricultural insurance.

R2: Some of the findings suggest that livestock ownership has changed over time and there has been diversification of income. An in-depth understanding of livestock ownership and the role that livestock play in the livelihoods of the pastoral community is important for better targeting and customization of the IBDRFI product design.

Next steps

R3: There is lack of data on drought-induced losses suffered by the pastoral community and their impact on livelihoods. This could be rectified by requesting updated information on the impact of drought on the pastoral community from government organizations or by conducting in-depth engagements with various stakeholders.

Recommendation – follow up studies

R2: Product Design

- Address specific product design challenges associated with the adaptation of IBLI to the pastoral production systems in central Niger that are dominated by agro-pastoralism. This primarily entails better characterization of pastoral land use and mobility patterns especially in the regions classified as requiring rangeland review.
- Conduct stakeholder engagements to get a better understanding of IBLI feasibility over northern rangelands (classified as requiring forage review) to understand the extent to which these regions are used as wet season grazing areas.

R3: Distribution and delivery

- Further investigation into premium financing options for both micro-level retail IBDRFI and meso/macro-level covers is required. In addition, ways of aligning different drought risk financing insurance mechanisms and programs for pastoralists should be identified. A review of the product's value proposition compared to other financial services and products should be done.
- Review of the existing MFIs' distribution channels and assessment of alternative distribution models through existing digital platforms of telecommunication companies that have worked with general insurance companies that distribute micro-insurance products in motor and health. The distribution models can also be utilised to maximize social cohesion and inclusiveness.
- It would be worthwhile to have a better understanding of the scope of the smart village initiative to identify leverage points for distribution models and to promote DFS solutions, which could be coupled with IBDRFI solutions. The actors involved in the smart village initiative could also facilitate the registration process.
- Furthermore, it is recommended that investigations be done on the warrantage program and the local fodder production pilot in some of the agro-pastoral areas to identify how they can be linked either with premiums or payouts for a livestock index insurance product.

R4: Conflict mitigation

- Like its neighbouring countries, the insecurity situation in Niger often arises from ethnic conflicts, extremist violence and clashes between farmers and pastoralists over land resources. These conflicts have major implications for IBDFI product implementation. Even though both ethnic and extremist violence present operational challenges, the clashes between the farmers and pastoralists can be potentially mitigated with IBDRFI initiatives such as indemnities for scarce forage production at the end of the wet season (i.e. before migration). This could, therefore, contribute to social cohesion between farming and pastoral communities through a carefully designed indemnity distribution modality. Hence, it would be critical to conduct detailed engagements with stakeholders with working knowledge of these areas to better understand the inter and intra-community dynamics useful in designing effective solutions.

Recommendation – follow up studies

R5: Capacity building and learning

- Given the limited experience of insurance companies in both crop and livestock insurance, considerable investments would be required to build capacity and create awareness among both the private and public sector. In addition, capacity assessment and building would be required for institutions that are mandated to provide agro-meteorological, extension and emergency response services.
- As levels of financial literacy are very low in the pastoral regions, investments in awareness creation would be required. Since organizations such as RBM and AREN have a strong presence and are already working with development actors in the pastoral areas, they could support awareness creation and financial literacy for micro and meso-level or social protection products.
- Since there is little capacity to handle data components related to index insurance, institutions such as AGHRYMET, ACF and ARC should be engaged to build local institutions' capacity, especially on collection and management of livestock-related data.
- It is recommended that a monitoring and evaluation program be designed as part of the broader learning framework to ensure quality assurance and impact evaluation. This will enable a better understanding of relationships between drought and food habits or consumption patterns of households, for example. Information on impact of IBDRFI solutions on households' nutrition status will also be generated. This is because Niger's disaster response is mostly through food distribution. Moreover, it would be essential to setup a framework for effective monitoring mechanisms that ensure, not only the verification of the project implementation, but also the actual engagement with the communities. This allows communities to play an active role in the review of the product by providing feedback and recommendations on its effectiveness. This framework should also consider ways of demonstrating the welfare and/or other impacts (e.g. on conflict mitigation) for the proposed initiative.

Photo credit: EAP Photo Collection/ World Bank

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APPENDICES

Appendix 1. Key differences between micro-level retail IBLI and modified macro-level social livelihoods protection programs

TABLE A1.1 DIFFERENCES BETWEEN MICRO-AND MACRO-LEVEL PROGRAMS IN KENYA AND ETHIOPIA

Item	IBLI micro-level commercial retail insurace	KLIP social livelihoods protection program
Product design and rating		
Index: Satellite NDVI (MODIS)	◆ Same	◆ Same
Contract design (triggers) and payouts (loss cost rates)	◆ Same	◆ Same
Sum insured	◆ Same (but could increase for larger commercial herders according to the feed requirements of their herds)	◆ Same (but as livelihoods protection, based on minimum nutritional requirements of livestock)
Commercial premium rates	◆ Same underlying pure loss costs, but commercial premium rates may need to be considerably higher to reflect much higher operational costs associated with sales to individual pastoralists (insured policyholders)	◆ Same underlying pure loss costs, but with potential to minimize operational loadings as there is automatic cover for large numbers of beneficiaries and thus providing economies of scale opportunities in operational costs
Payouts	◆ Same, assuming same sum insured, and triggers adopted (direct to policyholder/ insured)	◆ Same, assuming same sum insured and triggers adopted (direct to beneficiary)
Target audience	◆ More affluent small/medium and large pastoralists who can afford to pay either the full commercial premium or a partly subsidised premium rate	◆ Vulnerable pastoralists who depend largely on livestock herding for their livelihoods, but who cannot afford to pay commercial premium rates. ◆ These pastoralists should have a minimum herd size of 5 TLUs
Compulsion of IBLI insurance	◆ Purely voluntary decision by the individual pastoralist or group	◆ Automatic enrolment of selected pastoralists by project management/government entity
Policyholder (insured)	◆ The individual pastoralist is the policyholder and insured as named in the policy certificate	◆ The insured policyholder is the government entity/agency on behalf of the pre-selected pastoralists who will be listed in the schedule (or annexure) attached to the policy issued to the government entity/agency
Pre-conditions of insurability	Insured pastoralist household must: 1. Be able to pay their share of premium 2. Have a smartphone to receive sms messages 3. Have a bank account (fixed or mobile money) into which payouts can be directly made	Beneficiary pastoralist household must: 1. Own a minimum of 5 TLUs and be a livestock herder 2. Have a smart phone to receive sms messages 3. Have a bank account (fixed or mobile money) into which payouts can be directly made
IBLI insurance awareness creation and sensitization	◆ Not essential if marketing, promotion and sales functions are correctly performed by the insurer or its appointed agents/distribution channels	◆ Essential as pastoral communities and their members must be made aware of the government livelihoods protection program and why some pastoralists are being identified as beneficiaries and will be automatically enrolled, while others will not be selected.

Item	IBLI micro-level commercial retail insurace	KLIP social livelihoods protection program
Targeting (and sales) and selection:	◆ Insurers will be responsible for their own marketing and promotion and sales programs including: 1. Own sales agents 2. Other distributers	◆ The government agency will need to work closely with country level authorities, community and pastoral leaders to identify the selection criteria and beneficiaries of the program in each insured unit (IU)
Registration	◆ All insured pastoralists must be electronically registered along with their livestock holdings, address, phone number, bank/mobile money account details and name of the insured unit in which their livestock are normally grazed and which they have selected to be their trigger IU ◆ IBLI details must also be recorded including number of Insured TLU, sum insured, premium rate for that IU and premium paid by the pastoralist	◆ All beneficiaries must be electronically registered along with their livestock holdings, address, phone number, bank/mobile money account details and name of the insured unit in which their livestock are normally grazed and which they have selected to be their trigger IU ◆ IBLI details must also be recorded including number of insured TLU, sum insured, premium rate for that IU and premium paid by the government
Premium payment and policy issuance	◆ On the payment of their share of premium, each insured policyholder should receive a unique numbered certificate of insurance (local language), policy wording and schedule of cover (as necessary)	◆ Beneficiaries do not pay any premium (at least in initial year(s) A single master policy will be issued to the government entity that purchases cover. Each beneficiary must receive a certificate detailing the protection they are receiving (number of TLU, sum insured and maximum payouts per season and IU)
End of season notification (and settlement of payouts)	◆ Ideally sms will be used to advise each beneficiary during the coverage period whether drought conditions are developing in their IU. At end of the cover period beneficiary will also be advised whether a drought payout has been triggered and the size of the payout due ◆ Electronic money transfers should be carefully tracked to each insured's bank or mobile money account	◆ Ideally sms will be used to advise each beneficiary during the coverage period whether drought conditions are developing in their IU. At end of the cover period beneficiary will also be advised whether a drought payout has been triggered and the size of payout due ◆ Electronic money transfers should be carefully tracked to each beneficiary's bank or mobile money account
Government support: Premium subsidies	◆ Currently none under IBLI micro-level programs in Kenya and Ethiopia	◆ Kenya: 100% subsidised and financed by the Kenyan government (out of SDL-MALF budget) ◆ Ethiopia: WFP finances 100% but pastoralists are expected to contribute towards premium costs through Insurance for Assets by providing labour on Productive SNP public works programs
Costs of implementing program to insurers	◆ The administration and operating requirements and expenses for insurers to market micro-level IBLI policies to individual pastoralists in the ASAL regions are extremely high. Main costs include awareness creation and policy promotion/sales, policy issuance, premium collection and claims payouts (see Table 4.7 for further details)	◆ The administration and operating requirements and expenses for insurers to underwrite a single modified macro-level policy with government are much lower than for a micro-level IBLI program ◆ Main costs include registering pastoralists (beneficiaries) and insurance awareness creation
IGAD country experience to date	◆ IBLI ASAL counties of Kenya since 2010-11 ◆ IBLI Borena, Oromia Region, Ethiopia since 2012-13	◆ KLIP, ASAL counties of Kenya since 2015-16 ◆ SIIPE, Somali region ◆ Ethiopia since 2017-18

Source: ILRI 2021

Appendix 2. IBLI product design and overview of customization options

This section describes the standard IBLI product used in the scenario analysis for this study while providing a brief, non-exhaustive overview of alternative customization options that can be considered during the product design in the early stages of implementation**.**

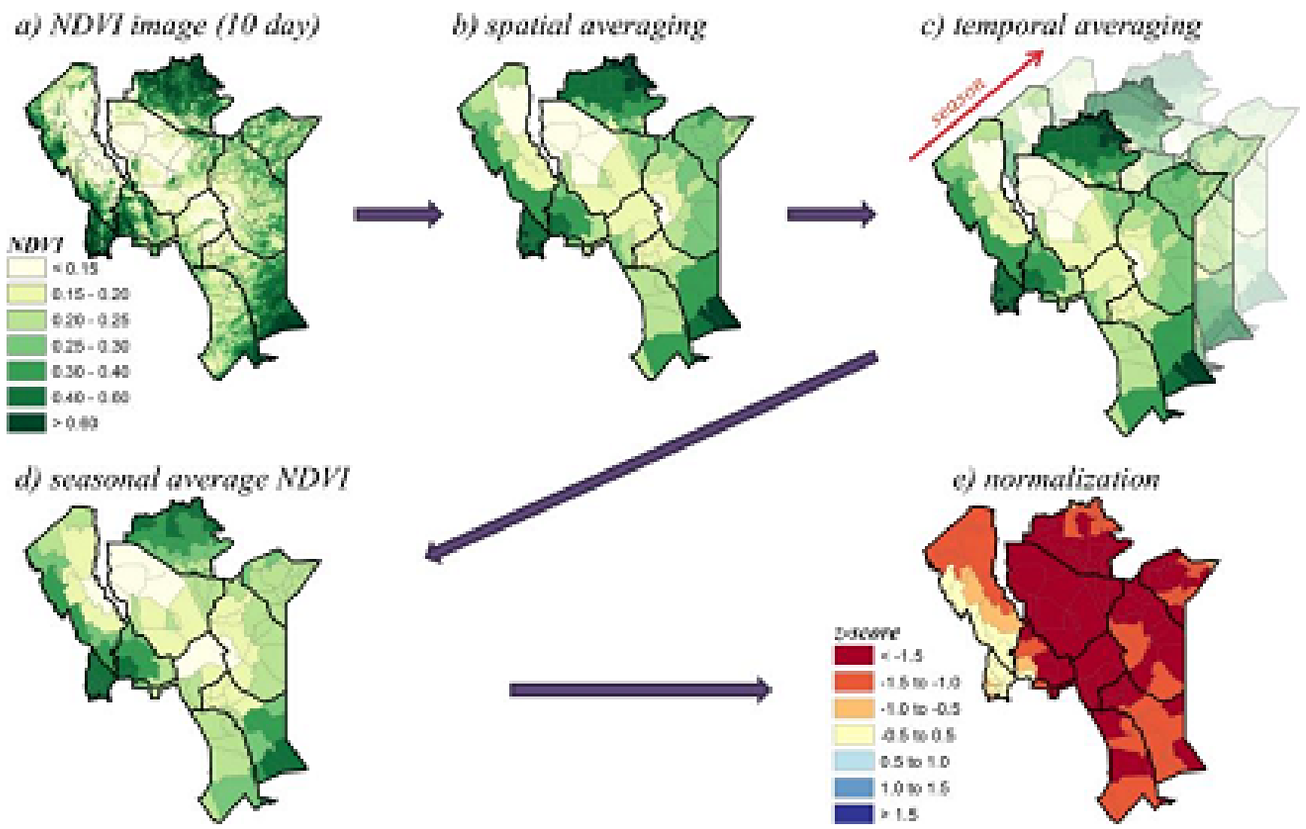
Index design

The IBLI product relies on NDVI time series data acquired from the MODIS satellite sensors (eMODIS product). The use of alternative satellite indicators, such as rainfall estimates or soil moisture has not been considered in this study as currently there are no products designed for African pastoral regions based on these alternative indicators (Fava and Vrieling 2021). While in principle they could offer a valuable alternative, rigorous research and quality assessment would need to be performed before considering their use.

To transform NDVI into a useful index for pastoral IBDRFI schemes, three steps are required:

1. **Spatial aggregation:** Geographic units are normally larger than grid cells, both for operational reasons and to reflect that herds move. Aggregation within units generally incorporates a mask of where rangelands occur.
2. **Temporal aggregation:** Most schemes aim to assess seasonal forage scarcity, requiring expert or EO-derived (Vrieling et al., 2016) knowledge on rainfall/vegetation seasonality.
3. **Normalization** to compare the current index value against historic index realizations in past years.

FIGURE A2.1 IBLI PRODUCT DESIGN



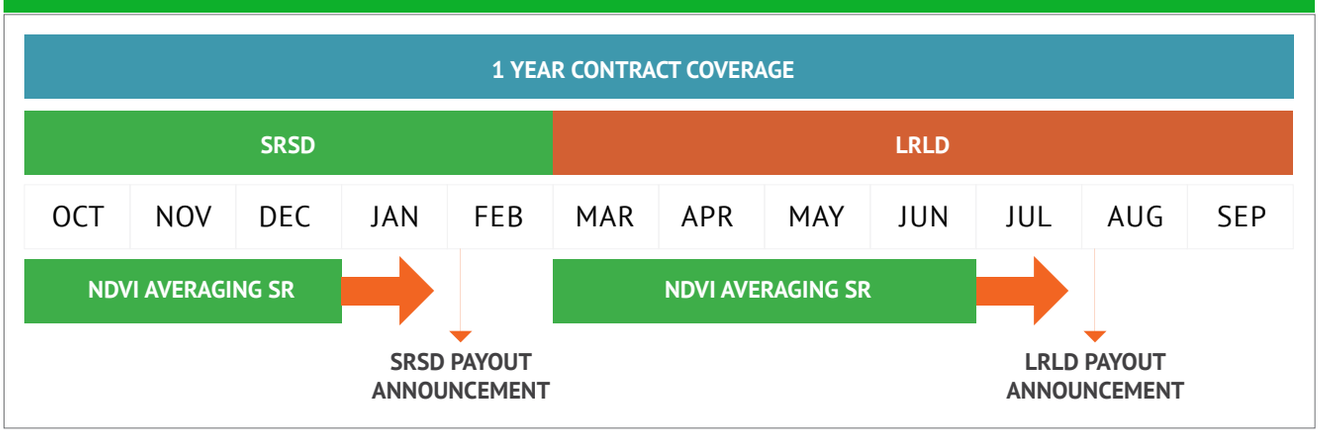
Source: Vrieling et al. 2016

In Niger, spatial aggregation units are called communes (administration level 3) and are the basic building blocks for UAIs. Unit areas of insurance are generally defined in collaboration with local stakeholders according to a set of criteria (Chelanga et al. 2017), but this is out of scope for a feasibility study. However, it should be noted that this is a very important step that should be planned for in the early implementation phases.

Temporal aggregation is set to seasonally aggregated data. To define the pasture growing season, temporal boundaries, unit level start of season (SOS) and end of season (EOS) dates are estimated using the Joint Research Centre (JRC) phenology maps.33 When the spatial variability of SOS and EOS is limited, fixed dates can be used. For Niger, SOS was fixed to June and EOS to November. Figure A2.2 shows an example of the temporal aggregation in the KLIP program.

Depending on the type of IBDRFI instrument used, the temporal aggregation can be customized. For example, running averages (e.g. monthly or quarterly) have been proposed and utilised as alternatives in the Hunger Safety Net Program in Kenya.

FIGURE A2.2 IBLI KLIP CONTRACT COVERAGE PERIOD, INDEX CALCULATION PERIOD AND TIMING OF PAYOUTS (KENYA)



Source: Fava et al. (2021)

The normalization approach is based on the use of standard scores. However, multiple options exist, such as linear scaling between minimum and maximum historic values (i.e. the vegetation condition index), percentile calculation or per cent deviation from average. However, there should be no major implications on the payouts related to the normalization metric used.

Payout function

The formulation of the payout function is a linear function of the index value between an index attachment and an index exit threshold. Payouts range from 0, below the attachment value to a predefined maximum value below the exit. In the standard model, the attachment threshold is calculated at unit level in terms of expected payout frequency (i.e. 1 out of 5 seasons) on the historical dataset. The exit threshold is commonly fixed or set to the minimum historical index value. The maximum payout is calculated as the cost of maintaining the livestock alive during a severe drought shock[34] These parameters are not constant across IBDRFI programs and need to be customized on a case by case basis.

The standard payout function is applied to end of season index values (in line with the temporal aggregation step described in the previous section). However, options for multiple seasonal payouts (e.g. one early and one end of season payout) have also been proposed and utilised. The early payout is not a fully independent payout, but an anticipation of the main payout.

Alternative formulations of the payout function have also been proposed but not yet applied in operational programs in Africa. For example, an alternative formulation of the payout function is based on the persistency of forage deficit conditions rather than the seasonally aggregated values. In this case, when index values fall below a predefined attachment threshold for a given number of consecutive time periods (e.g. 2 or 3 dekads), payouts are triggered. The payouts increase proportional to the length of the forage deficit period till a maximum payout is reached.

33. Available at https://mars.jrc.ec.europa.eu/asap/

34. In Kenya the monthly sum insured is currently 1,167 Kenyan Shilling (KES) per TLU per month (KES amount = USD 1.00 at date) to cover the costs of purchased fodder and feed supplements. The Kenyan IBLI programs provide payouts to enable pastoralists to purchase supplementary feeds for their animals over the 5-month short dry season (October to February) and for the 7-month long dry season (March to September). Therefore the sum insured to feed 1 TLU over 12 months is KES 14,000 (KES amount = USD 1.00 at date) per TLU.

Appendix 3. Technical feasibility assessment methods

The technical feasibility analysis is based on the standard IBLI product. This product has been specifically designed and tested for extensive pastoral systems of east Africa, therefore, a few conditions need to be met for its use in different geographic contexts as discussed below. In addition to these requirements, the product can be refined, customized and improved to reflect conditions within a specific country.

To be technically suitable, three major factors are considered:

1. **Dominance of extensive rangelands: required to provide a clear linkage between satellite NDVI values and ground forage conditions.** The estimation of forage indices is built on spatial aggregation of predefined units, referred as insurance units. Thus, heterogeneous landscapes, such as agro-pastoral systems, mixed crops, agroforestry areas, non-forage production areas etc. are challenging to drought index design and are not suitable for IBLI.

2. **Sufficient forage production that can be easily detected by clear satellite NDVI signals.** Since NDVI is used as an indicator of forage availability for determining insurance index and payouts, rangelands that have little or no forage resources, such as barren lands must be identified and excluded from the index calculation. Similarly, areas with no inter-annual variability (e.g. evergreen vegetation, water and artificial surfaces) need to be excluded.

3. **Clear seasonal patterns for both wet and dry seasons to allow identification of the risk period and related insurance parameters** (i.e. coverage period, sales windows and time of payouts).

To determine rangeland dominance, forage availability and seasonality, the analysis was based on various satellite products (Table A3.1) including 10-day eMODIS[35] NDVI time series at 250 metres spatial resolution, decadal rainfall estimates from CHIRPS (CHIRPS; Funk et al., 2015) available at a spatial resolution of 0.05° for the period, 2002-20, land cover characteristics defining cropland/rangeland extent derived by the Copernicus Global Land Cover product and phenological metrics for the number of growing seasons (NGS), SOS and EOS obtained from the Joint Research Centre. The metrics NGS, SOS and EOS are derived from the long-term average of eMODIS NDVI data at 1 km resolution for the period, 2003-16 (Klisch & Atzberger, 2016).

35. Earth Resources Observation and Science Moderate Resolution Imaging Spectroradiometer

TABLE A2.1 SATELLITE DATA PRODUCTS USED IN THE STUDY

Data	Product	Description and Source
NDVI	◆ NDVI	◆ A 10-day temporal smoothed NDVI product at 250 m spatial resolution covering the period July 2002 to July 2020 from eMODIS, United States' Geological Survey (USGS)
Land cover	◆ Copernicus Global Land Service: Land cover 100 m; ◆ Collection 3: 2019 epoch, globe ◆ Copernicus Global Land Service: Fractional overs for grass, shrubs, trees, bare, built-up and croplands	◆ A global near real-time annual product for the 2019 epoch collection 3 land cover maps at 100 m spatial resolution ◆ These are produced by the global component of the Copernicus Land Service, derived from ROBA-V satellite observations and ancillary datasets ◆ The global map includes a discrete classification with 23 classes aligned with UN-FAO's Land Cover Classification System (Meroni, 2018) ◆ Global land cover fractions, i.e. percentage of ground cover for the four main classes used in the analysis for 2019
Phenology	Phenological timings ◆ Number of growing seasons ◆ Start of season ◆ End of season	Three products were used**:** ◆ Number of growing seasons per year ◆ Start of season and ◆ End of season ◆ The IGAD region has both unimodal and bimodal precipitation regimes thus each season has a start and end ◆ These metrics were derived from long term averages of the 10-day eMODIS NDVI data produced by BOKU university at 1 km resolution for the period, 2013-16 (Klisch & Atzberger, 2016), produced by the European Joint Research Centre
Precipitation	◆ Climate Hazards Group InfraRed Precipitation with Station data CHIRPS	◆ Computed decadal averages using the 10-day product for Kenya for the years 2002 to 2018 available at 0.05° (Funk et al., 2015)

The classification approach used for each criterion is described below. All unit-level analyses were conducted at administration 2 spatial aggregation level.

1. **Dominance of extensive rangelands.** To determine rangeland extent and dominance, the Copernicus fractional cover products for 2019 available at 100 m spatial resolution (Table A3.1) were used in the decision tree classification. First a savanna layer was produced by adding the shrubs, herbaceous and herbaceous wetland fractional covers. The created savanna layer coupled with the continuous field layers of built-up areas and croplands (here both referred to as human landscapes), tree and bare land fractions, were used in the classification approach to create ad hoc rangeland masks within the communes.

To assess the rangeland dominance at unit level, the following conditions for the fractional covers were considered to determine suitability class:

- **Suitable:** Rangelands where both human landscapes and trees cover ⩽ 25% and bare lands cover ⩽ 20%;
- **Suitable but needing rangeland review:** Rangelands with human landscapes in excess of 25% but ⩽ 40%. This class requires an assessment of their use as pastoral or agro-pastoral areas prior to implementation;
- **Non-suitable:** All the remaining areas.

2. **Sufficient forage production.** The forage availability units were evaluated to eliminate areas without sufficient NDVI intensity, e.g. bare lands or with no inter-annual variability as these are unsuitable for IBLI implementation. Therefore, a valid pixel mask was generated first by computing the NDVI amplitude as the difference between the 95th and 5th percentiles of NDVI values in the full time series and masking out pixels with amplitude values < 0.1 (Vrieling et al., 2016). To eliminate non-land areas, pixels where the NDVI time series comprised < 60% of positive NDVI values were masked out.

The generated masks for 'valid' and 'non-valid' pixels were finally used at unit level to assess the overall feasibility classes, considering the following conditions:

- If a unit comprised of ⩾ 50% valid pixels, then the unit was classified as **suitable;**
- If the non-valid pixels in the unit were > 50%, then the unit was classified as **suitable but needing forage review** to allow further considerations by users on the extent of forage availability for pastoral use.

3. **Clear seasonal patterns.** The seasonality conditions were assessed by extracting the phenological metrics of NGS, SOS and EOS per commune with further refinement using average precipitation conditions and NDVI profiles. Two seasonality classes were derived, (i) **clear**: if the season had well defined wet and dry seasons and (ii) **undefined**: if seasons were not clearly defined.

IBLI feasibility classification

The three conditions of rangeland dominance, sufficient forage production and seasonality were scored and merged to produce four feasibility classes: suitable, rangeland review, forage review and unsuitable, as summarized in Table A 1.

TABLE A3.1 INDEX-BASED LIVESTOCK INSURANCE FEASIBILITY CLASSIFICATION CRITERIA

Rangeland condition	Forage condition	Seasonality condition	Feasibility class
100% satisfied	100% satisfied	100% satisfied	Suitable
Partially satisfied	100% satisfied	100% satisfied	Rangeland review
Fully/partially satisfied	Partially satisfied	100% satisfied	Forage review
Not met	Not met	100% satisfied	Unsuitable

Appendix 4. Stakeholder engagement

Based on the literature review done for the scoping mission, key stakeholders were identified for further information and fact finding to assess the socio-economic and operational feasibility of a drought risk financing product. The stakeholders were representatives from the insurance markets, private and public sector, regulators, members of government bodies, financial organizations, international development organizations and local pastoral groups. A list of key stakeholders is provided in Table A4.1.

TABLE A4.1 LIST OF STAKEHOLDERS

No	Type	StakeHolder
1.	Insurance providers	IBISA
2.	Agro-meteorological and research organizations	AGRHYMET INRAN
3.	Government bodies	Ministry of livestock Ministry of ICT
4.	International development organizations	Mercy Corps USAID WFP
5.	Pastoral organizations	AREN RBM

Appendix 5. Scenario analysis

The assumptions made for scenario PS1 (commercial micro-insurance) and PS2 (social livelihoods protection) are illustrated in Table A5.1. These assumptions are based on very general and simplified considerations, therefore, the presented costs should be seen as purely illustrative.

TABLE A5.1 SUMMARY OF THE ASSUMPTIONS MADE IN THE COSTING ANALYSIS

Item	Micro-level commercial insurance (PS1)	Macro-levelsocial protection coverage (PS2)	Authors' assumption
Uptake in 5 years	2,5% of total herd, 0.5%/ year increase rate	5% of total herd, 1%/year increase rate	Uptake levels are generally lower in PS1, while they can be pre-defined in PS2
TLU per policyholder/ beneficiary	5	5	Aligned with existing programs[36]
Total Sum Insured/TLU	150 USD	150 USD	Indicative average value provided by stakeholder during interviews
Trigger Frequency	1 in 5	1 in 5	Realistic frequency in the country
Premium rate	Pure loss rate* 1.5	Pure loss rate* 1.3	Higher commercial loadings are expected for PS1. These loadings are lower than typical loadings applied internationally by the insurance sector and should be carefully reviewed for the local markets
Subsidies (government or donors)	50%	100%	PS1 is partially subsidized. PS2 needs to be fully subsidized. However, any intermediate subsidy option is also possible
Registration costs (Gov or donors)	-Not available	USD 5 /beneficiary	For PS1 the cost is covered by the private sectors. The amount is purely illustrative
Awareness creation	USD 5 / policyholder	USD 5 /beneficiary	This is an important component to support markets and informed demand
Monitoring & Evaluation	USD 5 /policyholder	USD 5 /beneficiary	This is an important component to demonstrate the value of the initiative. The amount is purely illustrative

The yearly and total indicative costs for the two scenarios are instead presented in Tables A5.2 and A5.3. The premium paid by each policyholder for each TLU in the S1 scenario can be obtained using the formula, *(Premium-Subsidy)/TLUs*.

36. Five TLUs have been selected on the KLIP and SIIPE macro-level social safety-net protection insurance programs as this is considered to be the minimum number of 'breeding' stock/TLUs to maintain a viable herd through severe drought periods. However, this value is country specific.

TABLE A5.2 YEARLY AND TOTAL COSTS FOR PS1 IMPLEMENTATION OVER 5 YEARS (IN USD)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Beneficiaries	5,000	10,000	15,000	20,000	25,000	75,000
TLUs	25,000	50,000	75,000	100,000	125,000	375,000
TSI[37]	3,750,000	7,500,000	11,250,000	15,000,000	18,750,000	56,250,000
Premium	587,796	1,175,592	1,763,388	2,351,184	2,938,980	8,816,939
Subsidy	293,898	587,796	881,694	1,175,592	1,469,490	4,408,470
1. Electronic registration of livestock producers	0	0	0	0	0	0
2. Farmer awareness, education and training	25,000	50,000	75,000	100,000	125,000	375,000
3. Monitoring and evaluation	25,000	50,000	75,000	100,000	125,000	375,000
Total	343,898	687,796	1,031,694	1,375,592	1,719,490	5,158,470

TABLE A5.3 YEARLY AND TOTAL COSTS FOR PS2IMPLEMENTATION OVER 5 YEARS (IN USD)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Beneficiaries	10,000	20,000	30,000	40,000	50,000	150,000
TLUs	50,000	100,000	150,000	200,000	250,000	750,000
TSI	7,500,000	15,000,000	22,500,000	30,000,000	37,500,000	1,12,500,000
Premium	1,037,287	2,074,574	3,111,861	4,149,148	5,186,435	15,559,304
subsidy	1,037,287	2,074,574	3,111,861	4,149,148	5,186,435	15,559,304
1. Electronic registration of livestock producers	50,000	50,000	50,000	50,000	50,000	250,000
2. Farmer awareness, education and training	50,000	100,000	150,000	200,000	250,000	750,000
3. Monitoring and evaluation	50,000	100,000	150,000	200,000	250,000	750,000
Total	1,187,287	2,324,574	3,461,861	4,599,148	5,736,435	17,309,304

Appendix 6. Key operational lessons learned in the implementation of micro-level commercial IBLI and macro-level social livelihood protection programs

This appendix presents an overview of key operational lessons learned from the implementation of IBDRFI programs for pastoralists in east Africa (ILRI 2021) using the two implementation options illustrated in this study.

Key lessons learned from micro-level program

1. **The micro-level approach shows promise as a resilience-building tool for pastoralists.**For the micro-level IBLI program implemented thus far, there is robust evidence supporting the positive impacts of micro-level IBLI for pastoralists. However, while pastoralists paid an actuarially fair premium, the administrative and operational costs for insurers were heavily subsidised by international donors. Had the programs operated in a fully commercial manner, IBLI cost effectiveness for pastoralists would likely have decreased drastically.

2. **Fully commercial (unsubsidized) micro-level IBLI distribution model with its very high administrative and operational costs is not financially sustainable for insurers and their reinsurers.**Underwriters have tried to sell IBLI to pastoralists in the ASALs for the last 10 years utilising many different distribution methods. However, none of these have been able to raise sales volumes significantly.

37. Total Sum Insured

3. **Micro-level IBLI programs must explore new low-cost ways of distribution.** Any commercially oriented IBLI program targeted at individual pastoralists will need new product distribution channels. Alternative models should be evaluated, especially meso-level approaches, which have the added benefit of reducing basis risk combined with applications of digital financial platforms such as mobile banking for the collection of premiums and settlement of payouts directly to each insured pastoralist.

4. **Commercial micro-level IBLI must be accompanied by additional investments in capacity and awareness building of pastoralists.** The low insurance demand by agricultural producers was confirmed by the low numbers of micro-level IBLI sales. As levels of financial awareness, understanding and inclusion are still very low among pastoralists, the importance of providing appropriate training services to them cannot be overemphasized. This may require continued public sector support.

5. **Continued public/private/donor premium subsidies will likely be a prerequisite for any micro-level IBLI program to operate and reach scale.** Scaled-up agricultural insurance programs anywhere in the world tend to rely heavily on subsidies. Given the particularly severe challenges faced by the micro-level IBLI programs, it is unlikely that achieving significant scale will be feasible without continued public sector (and/or private sector and donor) financial support in the form of premium subsidies and/or subsidies on the administrative and operational costs of these programs. These subsidies should be justified by a value for money analysis as well as the value of asset protection and potential savings in humanitarian aid.

Key lessons learned from macro-level social livelihoods protection program (i.e. KLIP and SIIPE)

1. **Macro-level social livelihoods protection programs can help build drought resilience of the most vulnerable.I**ncreasingly, evidence of the positive impacts of KLIP and SIIPE are emerging. These include, amongst others, better protection of pastoralist livelihoods in the face of drought and enhanced management of scarce public resources to respond to drought.

2. **Macro-level social livelihood protection programs should actively help build an enabling environment for micro-level commercial products.** Macro-level programs can facilitate the operationalization of micro-level IBLI programs. For this to happen, however, they need to be planned and operated jointly as one. Strong incentives should be put into place, encouraging underwriters of the modified macro program to also invest in micro-level distribution infrastructure.

3. **Clear graduation and financial sustainability framework should be agreed in advance.** Both KLIP and SIIPE struggle with ensuring longer term sustainability of the full premium financing on their respective programs. While both options harbour the objective of eventual graduation into fully commercial IBLI programs with nil or partial premium subsidies, no definitive decisions have been made in that respect. This is because of the several challenges faced by the micro-level IBLI program. However, reducing premium subsidies to 50% and relying on micro-level IBLI in its current form does not seem like a sustainable option. For future programs, financial contributors should plan for the longer term from the beginning.

4. **Insurance contracts should be concluded on a multi-year basis to encourage private sector investment.** The current one-year government tender and revolving insurance structure of KLIP is too short for insurers to confidently invest in distribution and awareness creation networks, activities that aid micro-level IBLI sales. Future programs should consider providing insurers with longer contracts.

5. **Whenever possible, beneficiary selection and claims handling should be done using digital tools.** Beneficiaries should be registered in electronic databases and receive potential insurance payouts directly into mobile money bank accounts. This would not only facilitate better administration, but it also strengthens accountability, supports financial inclusion and enhances alignment with related initiatives when databases are shared. While many pastoralists still do not have access to mobile money bank accounts, that share without access to mobile money bank accounts is shrinking rapidly. Any potential future initiative could also consider investing in large-scale pastoralist registration and/or providing them with mobile banking access.

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