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Enabling pathways for drought finance in agriculture



Enabling pathways for **drought finance in agriculture**

by
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Foreword

The increasingly frequent and severe drought events raise growing risks to societies and mounting costs of losses and damages to economies. The international development community recognized the importance to adopt proactive approaches instead of the previous crisis management. Many countries have started to integrate their drought plans or policies into their national regulatory frameworks. But drought management is often costly and resource-demanding, regardless of whether it takes a proactive or reactive measure. Consequently, inadequate financial resources are among the main barriers to the implementation of drought plans.

Drought finance is an emerging topic that has, yet not produced a substantial knowledge basis. Nevertheless, this does not impede the quick progress on the field. Innovative financial instruments are making a spectacular entry into the field of integrated drought management. Resilience-building and risk financing options are made available even in countries, where access to finance has been a long-standing and deep-rooted problem.

The stocktaking of identified challenges and experiences is a desirable step to array what has been learned so far and what should be done to advance drought finance. The goal is to answer how finance flows could be intensified and put in the service of integrated drought management.

This report is prepared under the framework of the project “Enabling Activities for Implementing UNCCD COP Drought Decisions”, implemented in collaboration with the United Nations Convention to Combat Desertification (UNCCD), and funded by the Global Environment Facility. The report investigates the challenges, options, and levers of drought finance, thus contributing to the establishment of an enabling environment for integrated drought management.



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Abbreviations and acronyms

AF	Adaptation Fund
ARC	African Risk Capacity
CSO	civil society organisation
COP	conference of parties
ESG	environmental and social governance
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GEF	Global Environment Facility
IDM	integrated drought management
KAIRMP	Kenya Agricultural Insurance and Risk Management Programme
KLIP	Kenya Livestock Insurance Programme
LDC	least developed country
LDCF	least developed country fund
LMIC	lower-middle-income countries
MADCT	more advanced developing countries and territories

MDB	multilateral development bank
OECD	Organisation for Economic Co-operation and Development
OECD DAC	Organisation for Economic Co-operation and Development's Development Assistance Committee
PEA	public expenditure analysis
UMIC	upper-middle-income countries
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
WFP	World Food Programme

Introduction

Financing the paradigm shift in drought management

The paradigm shift from reactive to proactive drought management requires an approach different from that adopted for financing only disaster recovery (UNCCD, 2022a; Tsegai and Bruntrup, 2019). The three pillars of integrated drought management (IDM) encapsulate the framework of resilience-building actions, as well as the critical aspects of finance. The first pillar, the monitoring and early warning, indicates ‘where’ and ‘when’ financing should be targeted and deployed. The second pillar, impact and vulnerability assessment, answers the question of ‘what’ and ‘who’ should be financed. The third pillar, the set of mitigation actions, outlines ‘how’ proactive drought management should be financed. Two persistent questions, however, remain: What is the source of finance? And, how should finance flows be intensified to support long-term resilience?

The height of the poly-crisis brings a new meaning to the efficient and effective use of financial resources, and risk financing is a promising option to increase the return on investment (UNFCCC, 2007; Farr et al., 2022; FAO, 2022a; Prasad et al., 2022; Zamid et al., 2022). Given the aftermath of the COVID-19 pandemic, the escalating conflict in Eastern Europe, and the economic downturn, financial forecasts consider numerous headwinds that disaster financing must weather (UN, 2022a). Despite the profound challenges, disaster risk financing, including drought financing, cannot wait more. Disaster risks and associated damages and losses keep rolling, and the more they remain unaddressed the more financial resources they will require for recovery. Drought is a climate-related disaster but not induced merely by climate change. It implies that even if efforts to mitigate climate change reach results and some adaptation needs can be reversed, drought risk cannot be entirely eliminated.



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Therefore, drought finance should not be dependent on the commitments related to climate change but be considered a long-standing, yet unresolved issue.

One good point is that risk-based approaches are particularly effective and advantageous in the case of predictable and modeled hazards such as drought (OECD, 2015a; Willitts-King *et al.*, 2020; WFP, 2022). Yet, the rapid start-up of risk financing is hardly conceivable in the case of a natural hazard that has been grossly underfinanced. In the past 20 years, the year 2016 registered the highest aggregate budget of official development assistance with drought objective. Even the total budget of 2016 fell below 700 million USD (OECD, 2022a). Worse still, much of this was used to finance response and recovery. In contrast to this volume, the direct economic losses to drought amounted to more than 126 billion USD between 1998 and 2017 (UNDRR *et al.*, 2015). To make matters worse, the direct economic costs are likely underestimated, as they do not calculate the cascading and indirect impacts on the associated sectors (UNDRR, 2021). Given that 75 percent of the global population will be affected by drought by 2050, the imbalance seems even more shocking and calls for the development of specific financial resources and instruments (UNCCD, 2022b). The above-mentioned figures must be taken with some reservations. While there are nearly realistic estimates of the cost of losses and damages, risk financing encounters a wide array of evolving assumptions and case-specific circumstances, which makes quantification and monetization difficult. Little wonder then, only a few countries have a robust dataset on drought finance flows, and most of the information is related to the cost of post-disaster reconstruction.

One thing at least seems certain: finance flows to drought resilience are way below the required. Even if existing resources are spent more efficiently, the finance gap far exceeds the currently active finance flows. Rising the profile of drought finance on the political agenda is timely and essential for build-

ing resilience at different levels. While the impacts of devastating drought events are evident, risk-based financing has not gained sufficient political will yet. This is partly because the risk financing is trapped in the middle of the collision between a slow-motion climate hazard and the prioritized development expenditures that require immediate financial assistance.

The public sector has a crucial role in strengthening the risk-based approach to drought management. Its role includes but is not limited to, catalyzing investment, constructing policies, setting protocols and standards, facilitating and harmonizing fund allocations, safeguarding the fundamental environmental and social principles, and correcting the market imperfections that might impair the fair, equal, and effective finance flows (Gardiner *et al.*, 2015; Pauw *et al.*, 2021; United Nations Human Rights Office of the High Commissioner, 2011; Ballesteros, 2010; Soanes *et al.*, 2017; UNEP, 2021). Altogether, the role of the public sector contributes to increasing the impacts of investment on beneficiaries in an inclusive manner. The public sector, itself, is not sufficient to close the finance gap, and the private sector has, thus, a crucial role to meet the monetary targets (Puig *et al.*, 2016; UNEP, 2022; Tall *et al.*, 2021; Caldwell and Ward, 2016).

Drought risk mitigation is context-specific, multi-sectoral, and periodic. The sum of these features can culminate in a high risk from financing institutes' viewpoint, as private sector investors expect market-rate returns with very low flexibility to compromise. Adding onto these concerns, vulnerable farming communities are far from being integrated into the finance sector (United Nations Secretary-General's Special Advocate for Inclusive Finance for Development, 2017). It is understandably a challenge to make actions on drought management financially attractive, thus, to engage the private sector in the already risk-prone agriculture sector.

To intensify investments, creating an enabling environment for the financial sector is the first step, and it must be done by aligning the interest of a wider range of actors, including public and private stakeholders, the development and scientific community, and the representation of impacted sectors. A broader cooperation has a great deal to offer by limiting the financial risk and eliminating the information asymmetries, and with it, aligning the finance flows to the objectives of the paradigm shift to integrated drought management. Therefore, this report investigates drought finance from different perspectives, including the interests and roles of a wide range of stakeholders.

The scope of the report

A complex assessment of drought finance would be certainly an ambitious undertaking. This report is the second issue of a series of four reports that provide reviews of drought finance. The first report “A rapid review of effective financing for policy, implementation, and partnerships addressing drought risks” by the Food and Agriculture Organization of the United Nations (FAO) was published to assess the effectiveness of the distinct layers and actors of financing (FAO, 2022a). The review concluded that the available funding windows are not easily accessible by all countries, and challenges to finding support are far to be resolved. This second report takes this recognition further and provides an in-depth analysis of the structural particularities and the status of drought finance. The report goes beyond the scope of an overview and lines up pathways to stimulate the financial environment by proposing innovative strategies. It responds to the pressing concern of what innovative instruments and strategies should be used to make drought finance attractive for all sectors. The objective is to roll out larger-scale programmes to enable drought financing to yield a good return in a way that makes sense for both the public and private sectors. This implies that the

interests of public and private sectors, financing and financed stakeholders, global governance, and local communities must be reconciled.

The third issue of the series will provide practical knowledge of the economics of drought through the review of the most likely cost types of drought management. It will showcase a ready-to-use methodology for investment decision-making in drought management. The fourth issue will further investigate drought finance from the recipient’s perspective. It will collate country experiences to showcase successful solutions that can be adopted. It will support peer-to-peer learning and the development of the community-of-practice.

To define pathways for increased financing, the present report is divided into three parts. The first part provides an analysis of the financing landscape to understand the structural inefficiencies that impede the intensification of finance flows. The second part investigates the innovations in financial instruments and access to finance, which set a fine example for the enhancement of drought finance. Given the scale of the topic, financial mechanisms are not discussed in this review but will be part of a subsequent publication. The third part builds on the conclusions of the previous parts and reviews the alternative pathways that can unlock access to finance, thus accelerating drought finance flows. The report responds to the following questions:

- What are the challenges of and patterns in drought finance from the viewpoints of the financial sector and the drought community-of-practice?
- How can financial instruments and mechanisms be framed to better align with diverse interests?

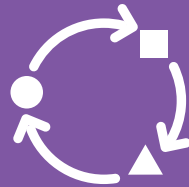
- What are the strategies to cure the acute barriers of drought finance in a smallholder context?

Responses to these questions are defined as chapter-specific key messages.

Defining the ingredients of an enabling environment depends on the purpose. Therefore, the following parameters are laid to limit the scope of the report:

Mitigation and adaptation

One of the obvious differences in the terminologies between the United Nations Convention to Combat Desertification (UNCCD) and the UNFCCC is the definition of mitigation. Mitigation in the context of climate change means the reduction of carbon emissions or enhancement of carbon sinks to contain the global temperature increase. Mitigation in the context of drought management refers to the reduction, neutralization, or elimination of impacts. One can note that this latter is close to the definition of adaptation to climate change. Therefore, the report uses risk or impact mitigation and adaptation as synonymous definitions.



Agriculture sector

Drought spans multiple sectors, but the degrees of impact are different. Agriculture absorbs 80 percent of drought-related losses in developing countries, and the sector-specific impacts are wide-ranging. The report sets the scope on the agriculture sector, more precisely, on smallholders in developing countries, as the most vulnerable stakeholders of drought management.



Climate finance, climate change finance & drought finance

Climate finance and climate change finance are used interchangeably, as per the definition of the United Nations Framework Convention on Climate Change (UNFCCC) (2022). Drought is a climate-related hazard but driven not merely by climate change. Climate change undoubtedly contributes to the intensification of frequency, severity, and duration of drought events, but drought had been occurring even without the evident impacts of climate change. This report, based on this argument, uses the term “climate finance” as a financial transaction that supports measures to mitigate the impacts of climate-related hazards, regardless of whether the financing is associated with an actual and ongoing drought event or with the risk probability. As a hazard-specific category, drought finance belongs to climate finance but focuses merely on financing for proactive and reactive drought management.



The landscape of drought finance

Challenges of drought finance in the smallholder context

Challenges posed by the nature of drought events are added to the conventional challenges of development finance. Drought finance must overcome a multitude of challenges, and only a handful of them turn out to be addressed. Drought finance has numerous assumptions that must be laid bare before any instrument is deployed. To understand this complexity, the theoretical framework of drought finance must be divided into two layers:

- Common challenges facing drought finance: most of the common challenges are encountered by drought finance, climate change finance, and development finance. These are not drought-related conditions that define the investment climate. Although they exist even without drought, they affect the way how drought finance should be deployed. Therefore, taking stock of the common challenges is the first step to setting up a baseline for drought finance.
- Financial challenges associated with the biophysical nature of a specific drought event: there are challenges associated with the specific nature of drought. These challenges are added to the common challenges.

The review of the literature shows that challenges are manifold, but they can be grouped under a few main headings. (Ikeda, 2021; Asian Development Bank, 2013; International Finance Corporation, 2010; World Bank, 2016; Tippmann *et al.*, 2013; Druce *et al.*, 2016; Omari-Motsumi *et al.*, 2019; Micale *et al.*, 2018; Chambwera *et al.*, 2014; UNCCD, 2022c, 2022d; Levine

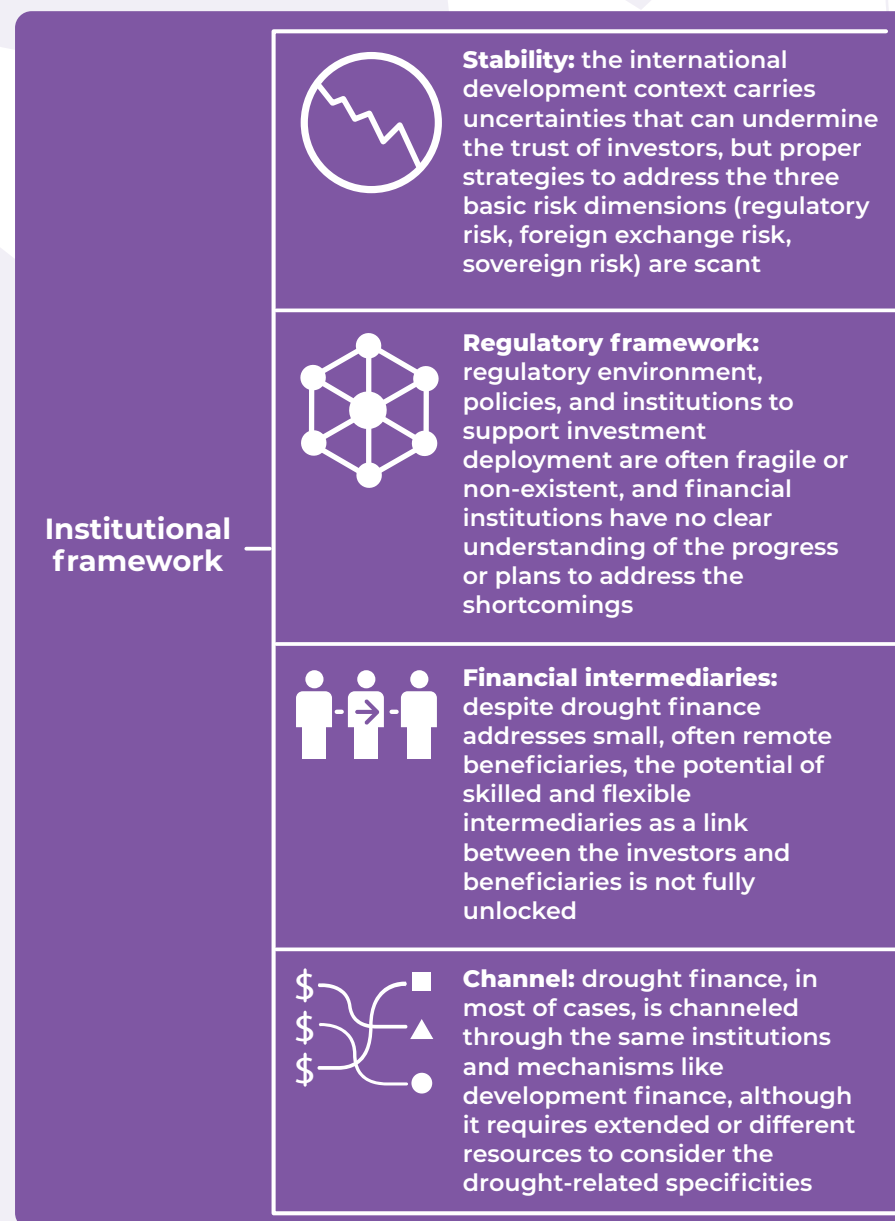
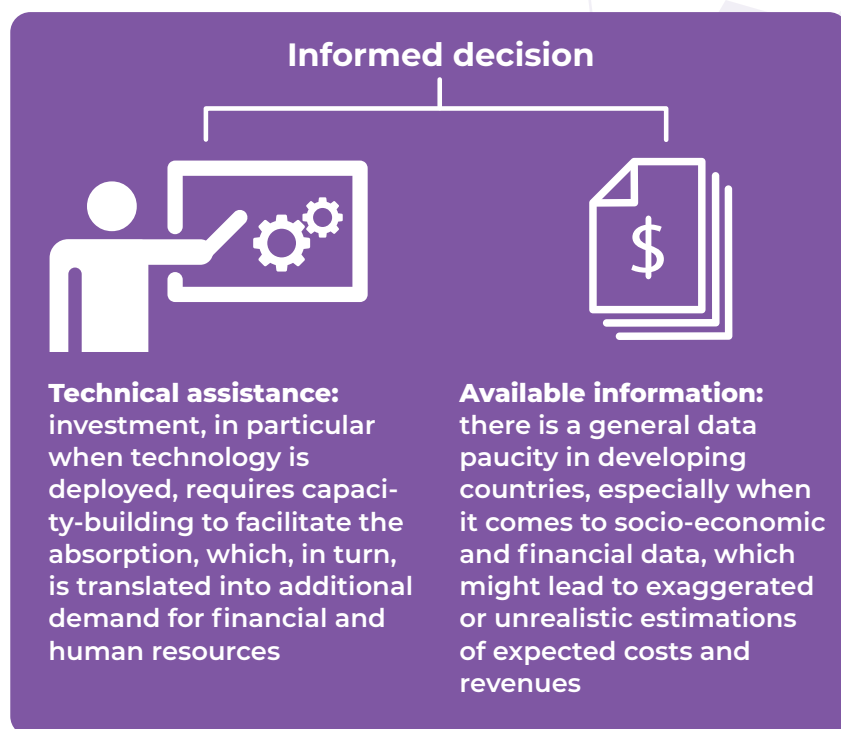


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and Gray, 2017; Moser and Ekstrom, 2010; Dougherty-Choux, 2015; Prasad *et al.*, 2022). The access to information, the institutional and regulatory framework, and the financial feasibility are the common impediments to a consistent finance flow. Information barrier appears in the list of drought event-specific challenges too but from a different perspective. Beyond it, more concrete problems arise, *inter alia*, the undefined boundaries of individual drought events, the required resources, and the definition of the tipping point when drought impacts become material.


Common challenges of drought finance




Financial feasibility




Externalities: drought financing tends to result in externalities (e.g. innovation spillover) that are not considered in the financial planning, thus impairing the business potential; nevertheless, mechanisms to internalize the foreseen externalities are often overlooked



Opportunity cost: drought financing has a high opportunity cost if large-scale mitigation measures are selected, drought is relatively infrequent in the given area, or other development needs are more pressing




Co-benefits: drought financing itself is not likely to increase the commercial viability of the affected business unless co-benefits with high returns are integrated into the investment design




Quantification of revenue: resilience-related revenues are not always direct or quantifiable, or quantification is built on broadly defined assumptions, which can compromise the accuracy of the cost-return ratio

Drought event-specific challenges


Nature of hazard




Multi-nature: drought affects different sectors, stakeholders at different levels, spatial extents, and time-horizons, which requires flexibility from financing approaches



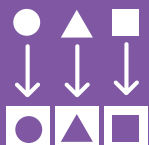
Slow onset: drought is an event with slow onset, which makes the definition of the benchmark tenor of any instrument difficult



Spatiality: the spatial extent of drought is variable, but drought is often transboundary, thus requiring regional collaboration during the definition of appropriate financing mechanisms




Occasional occurrence: drought does not strike every year, so the ability to post-assess the effectiveness of mitigation measures is limited to occasional events, but the current ex-ante assessments and models are not robust enough to estimate the potential impacts




Context specific: drought events affect stakeholders in different ways and require diverse and locally-led mitigation measures, but responding to the stakeholder-differentiated needs increases the transaction costs


Resources




Data: drought assessment, including vulnerability and risk, requires long time series, covering a minimum 30-year period, but such data volume is often not available or cannot be recuperated, furthermore, science is not sufficiently linked to financial actors



Infrastructure requirement: drought requires robust monitoring systems that are often not in place or poorly operated, thus, investors face a missing baseline to conduct a risk assessment




Vocabulary: drought finance has no universally accepted vocabulary, which increases the uncertainties during the assessment of business potential and hampers the development of a common understanding




Available technology: mitigation of all risks must integrate a mix of diverse and appropriate measures, which carries more complexity related to the subject of finance and requires routinely conducted technology needs assessments

Materiality



Declaration of drought: declaration must ensure that drought risk becomes reality within a certain timeline while corresponding with the materiality of the event, yet declarations are often inconsistent and disregard technical arguments



Periodicity: drought events happen periodically and often at long intervals, so impacts do not always turn into financial consequences, which could improve the predictability and planning of financial needs

Some challenges are at the macroscale or too complex to be addressed merely by drought finance, therefore, those challenges must be selected, which can be reasonably solved by feasible and short-term strategies, yet can lead to the intensification of financing. The broad palette of challenges calls for harmonized approaches, which together might surpass the scale of drought financing. For example, it is rather unrealistic that drought risk will trigger solutions to make regulatory frameworks functional or rebalance instability. Nevertheless, other challenges are easier to be counteracted, while they can substantially contribute to the stimulation of the financial environment. Such challenges are the information and knowledge-related barriers, the uncertainties around the financial feasibility of business cases, and unexplored channels to beneficiaries. This report focuses on these challenges and proposes some pathways to resolve them.

Tracking drought finance

Drought finance flows are not monitored and assessed systematically. The lack of a consistent and comprehensive tracking system is one of the major barriers to assessing the status of drought finance. Two major approaches can help retrieve adequate information about finance flows for drought: the statistics of the Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD DAC), and the joint multilateral development bank reporting approach (MDB approach) (OECD 2018, 2022a, 2022b, 2022c; DAC OECD, 2022; African Development Bank *et al.*, 2018). Organizations have been increasing efforts to harmonize the reporting methods, but no consensus has been reached yet. The major differences between the two include inter alia, the granularity, the integration of bilateral official actors, attribution principles, and the publication forms (Sangare and Benn, 2018). As the MDB approach provides only aggregate information on the reported finance flows, the database of OECD DAC is used in this report. This database is appropriate to provide a broader view of the characteristics and the patterns of drought finance flows, based on a standard and internationally endorsed protocol.

The statistics presented in the coming sections were produced based on the following assumptions:

- The data was extracted from the OECD DAC reporting system that collects and synthesizes information about the official development assistance for the objectives of the Rio conventions, called the “Rio marker” methodology. Therefore, the statistics rely on international development finance for developing countries, provided by bilateral and multilateral sources. The official development assistance projects marked by adaptation or mitigation markers were screened for drought-related projects.

- As the OECD DAC reporting system was set up and published from 2000, statistics are available from 2000 to 2020. The 20-year period isn’t long enough to correlate the finance flows with hazards, as climate hazards are measured at a longer timeline, but it gives a good understanding of the characteristics and evolution of the drought-related projects.
- The database of climate change-marked projects was screened for drought as an objective in the projects’ results framework. Only drought-related projects are featured in the statistics. The projects are analyzed as per the OECD terminologies and categorizations.

Detailed information on the methodology background of the statistics can be found in Annex I.

Statistics on finance flows

The compiled database includes over 1 200 projects with an explicit or partial scope on drought. The corresponding budgets of the projects are analyzed in absolute values and cover the reporting period 2000–2020. The statistics carry some uncertainties, as the accuracy is limited by the information availability and the parameters of the reporting system. It is also important to lay down that the analyzed dataset is only a portion of the actually deployed finance flows. Drought finance includes domestic and private sources too, but there is no consistent information at the global level. However, this analysis is a steppingstone to a potentially larger initiative to create a unified, robust, and up-to-date system for drought finance tracking. Such an initiative is important to align finance to the objectives of IDM.

Box 1 | Drought portal of FAO

FAO has developed a Drought Portal as a global knowledge-sharing platform to support countries and stakeholders in enhancing the resilience of agriculture and improving food security. The Portal draws on FAO's accumulated experience, including the lessons learned from over 400 projects, 14 drought-specific tools and methodologies, and 3 types of innovative learning methods. It has four overarching objectives:

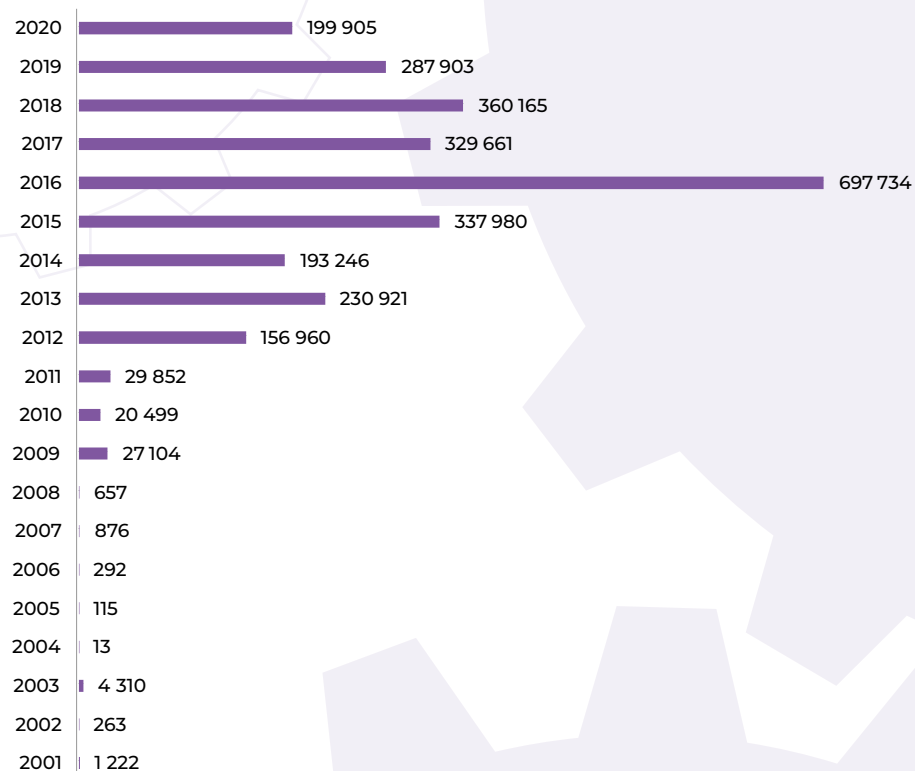
- supporting resilience-building by presenting field-tested solutions, lessons learned, ready-to-use tools, methodologies, and knowledge resources along the pillars of IDM;
- showcasing crisis-driven responses and post-disaster toolkits;
- supporting resource mobilization and allocation;
- facilitating the learning process.

The Drought Portal responds to the call of COP15 on moving policies into action by proposing a comprehensive results framework to monitor and report on the achievements. The Portal includes a function to track drought finance, based on the dataset of OECD DAC, as a first attempt to synthesize finance-related data and set up statistics in an interactive manner.

(Available at: <https://www.fao.org/drought-portal/en>)

Annual drought finance flows are uneven but steadily growing. The annual fund allocation shows a steady increase over the examined period (2000–2020), with some outstanding years, such as 2016 (Figure 1). Nevertheless, the allocation in 2016 is skewed by one project, namely the “World Food Programme (WFP) Emergency Operation for the South Sudan Humanitarian Assistance and Resilience Building Programme” with over 260 million USD budget. The project aims to build resilience to flood and drought in the fragile context of South Sudan. The other two projects with considerably high budgets are the “Drought Recovery and Resilience Programme” in Malawi, receiving over 40 million USD, and “Ethiopia’s Productive Safety Net Program”, receiving over 70 million USD. Some of the projects are implemented as a response to the impact of the 2015–16 El Nino weather phenomenon that has been the most extensive in the century. It is still unclear if these drought-related projects would have been financed without the fragile context and the heightened food insecurity (FAO, 2016a). What is certain, however, is that the period 2015–2017 accounted for 43 percent of the finance for emergency, and 51 percent for food assistance in the decade.

Figure 1: Annual drought finance flow in 1 000 USD (2020 discounted monetary value)

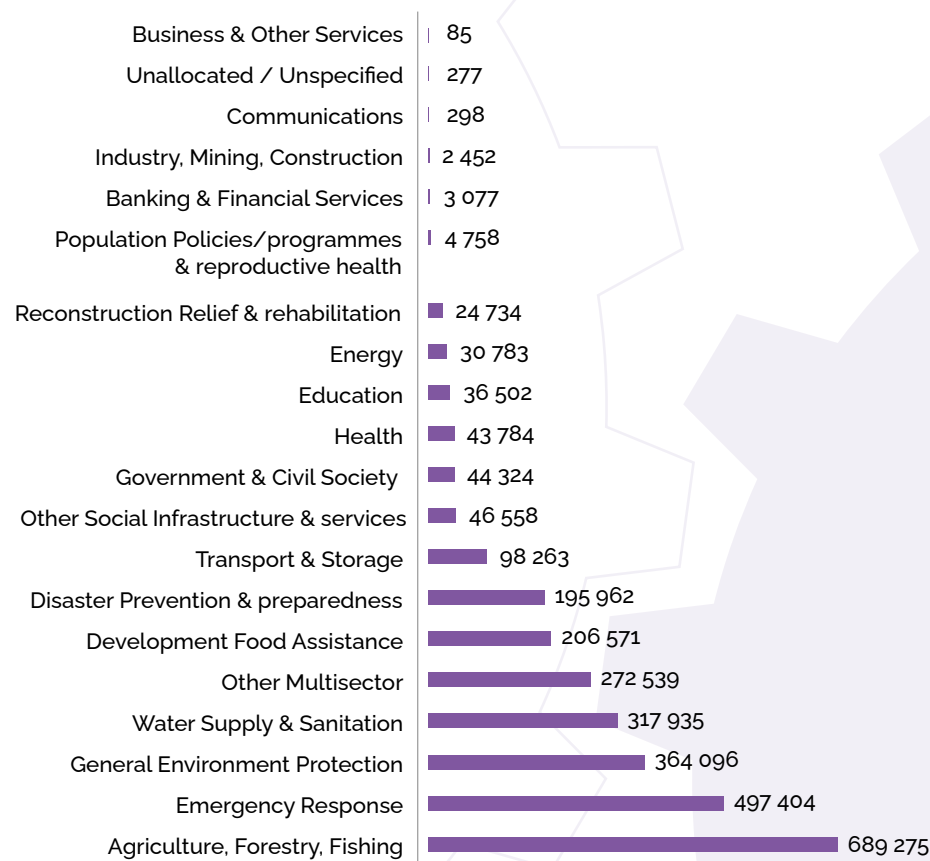


Source: Adapted from OECD, 2022.

Agriculture takes the largest share of finance flows. The distribution of fund allocation mirrors the degrees of drought impacts on sectors (Figure 2). Agriculture is the largest recipient, followed by emergency, environment protection, and water supply and sanitation. Drought impacts on agriculture are particularly challenging, as farmers face protracted consequences and knock-on effects. Firstly, because drought can span over years, and even if the peak period passed, the yield failure affects food security until the next harvest (FAO, 2018). If farmers, in particular vulnerable farming communities, cannot generate income to earn a living, outmigration from the agriculture sector might happen as a negative coping strategy. Finally, drought events often prompt governments to introduce emergency strategies such as the suspension of irrigation systems and the reallocation of water resources to other essential sectors such as potable water and sanitation. This might result in a prolonged arrangement, thus depriving agriculture of access to water for a longer period.

The two largest projects in the agriculture sector are the “Water Efficiency Improvement in Drought Affected Provinces” in Viet Nam with over 100 million USD budget and the “Africa Risk Capacity Pool for Drought Insurance” in the African region with over 50 million USD budget. Both projects aim to reduce the impacts of drought by either building resilience through infrastructure development or risk transfer transactions. The type of financial instruments is a special feature of these two projects. Although 97 percent of all projects use grants as financial instruments, these two projects are financed by debt instruments, or equity and shares in collective investment vehicles. From the perspective of the seniority ranking of capital structure, these two examples prove that less-secured instruments are also suitable for drought finance.

Figure 2: Aggregate distribution of drought finance flows per sector in 1 000 USD (2000–2020, discounted monetary value)



Source: Adapted from OECD, 2022.

Drought projects appear in almost all sectors, thus confirming the multi-sectoral nature of drought and calling for combined, multi-purpose solutions to serve the distinct and co-objectives. Although agriculture is the most affected sector by drought, other sectors also suffer losses and require financial assistance to build resilience. The types of interventions are widely varying, including process-based operations such as school meal programmes, capacity-building, disease prevention, or hard investment such as water supply development, early warning systems, or crop breeding. Drought resilience is either a primary objective or, in most instances, an additional measure to make investment drought-proof. Associating drought resilience with development objectives is a common strategy to address multiple challenges and to ensure that the deployed investment is recovered. For example, the “Water Efficiency Improvement in Drought Affected Provinces” in Viet Nam aims at modernizing the irrigation systems and improving water use efficiency not only to increase resilience but to enhance farmers’ income through high-value crops. The “Drought Resilience and Sustainable Livelihoods Programme in the Horn of Africa II” project involves the entire agricultural value chain from water management to marketing to strengthen the position and profitability of agro-pastoralism. Its goal is to eliminate the systematic vulnerability triggered by drought, social conflicts, and inequity in access to resources. Another example of combining drought resilience with social objectives is the project “Responding to the increasing risk of drought: building gender-responsive resilience of the most vulnerable communities” in Ethiopia, financed by the Green Climate Fund. The project supports rural communities to access water supply for year-round drinking water and small-scale irrigation, with a special focus on gender-responsive target indicators. Such approaches indicate the preference to use no-regret strategies while formulating projects. As drought is periodic and not necessarily a systematic risk, associating co-benefits to the investment is a good strategy to guarantee the return on investment.

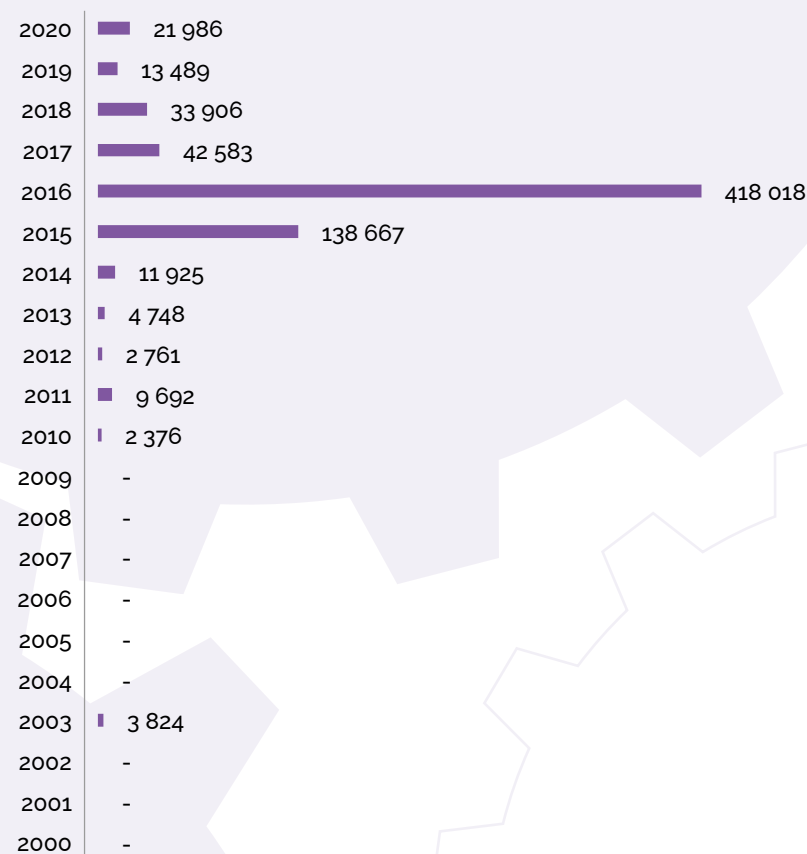
All water management projects are drought projects, but not all drought projects are about water management. Drought, by definition, is a water-related climate hazard. The approaches of water resource development to build drought resilience are distinct. Integrated water management (IDM) and water cycle management are popular approaches to avoid trade-offs between competing sectors. Also, the development of the water, sanitation, and hygiene sector appears often as the primary objective of IDM projects. Paradoxically, irrigation development is not dominant in the project list, despite the prominent position of agriculture in the financial allocation. Being a big-ticket investment, irrigation development is often financed from different modalities from official development assistance, for example, concessional loans from multilateral financiers or domestic financing. To trace back all irrigation investments to the providers is a much more difficult task than measuring the progress per recipient. Therefore, a fully accurate database of drought-related projects would require the systematic and long-term monitoring of the development of irrigated areas at the national level.

Emergency and food assistance take their due shares to make up for losses and damages suffered often by the most vulnerable. A large portion of the finance flow is dedicated to emergency and food assistance projects, flagging the need for a situation analysis of the status of resilience (Figure 3). Whilst some drought risks are virtually permanent, the current share of emergency finance indicates a low level of resilience. In most cases, the need for emergency and food assistance is driven by compounding factors, such as pre-existing vulnerabilities, constrained natural resources, or global crises. If the losses and damages reach beyond the capacity of the state, official development assistance is a critically important mechanism to compensate the victims.

Two issues are yet to be resolved. Firstly, a dedicated results framework is required to monitor the progress on the implementation of drought plans and policies, to estimate the predictable emergency costs. On the other hand, new strategies are required to blend emergency assistance and development

projects, which, in turn, can provide rapid responses to the occurring needs and build long-term resilience simultaneously.

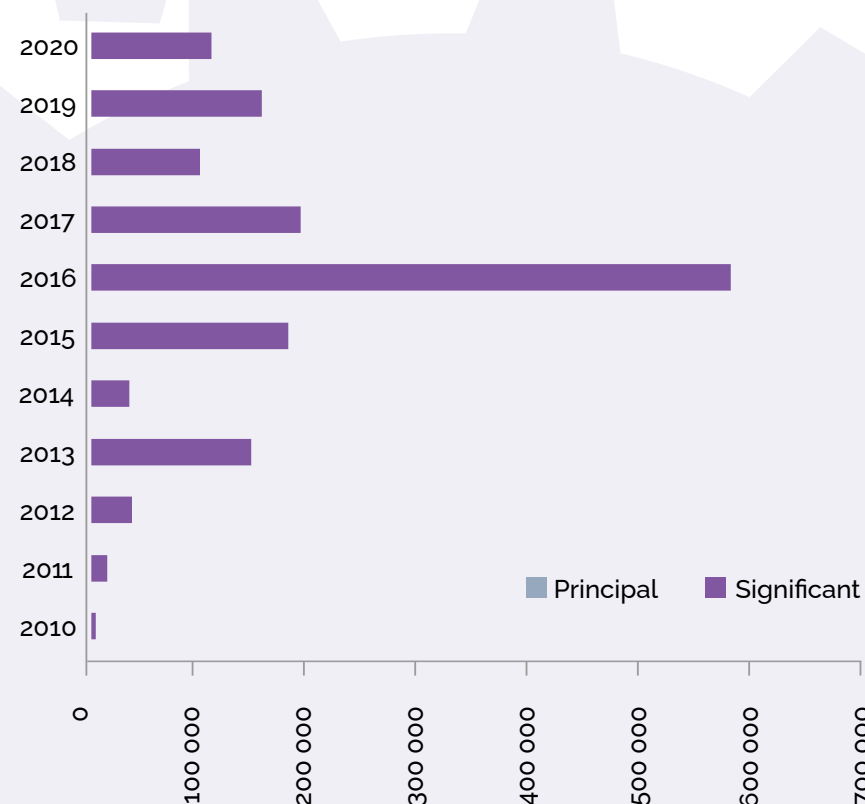
Figure 3: Annual allocation to emergency and food assistance in 1 000 USD (2000–2020, discounted monetary value)



Source: Adapted from OECD, 2022.

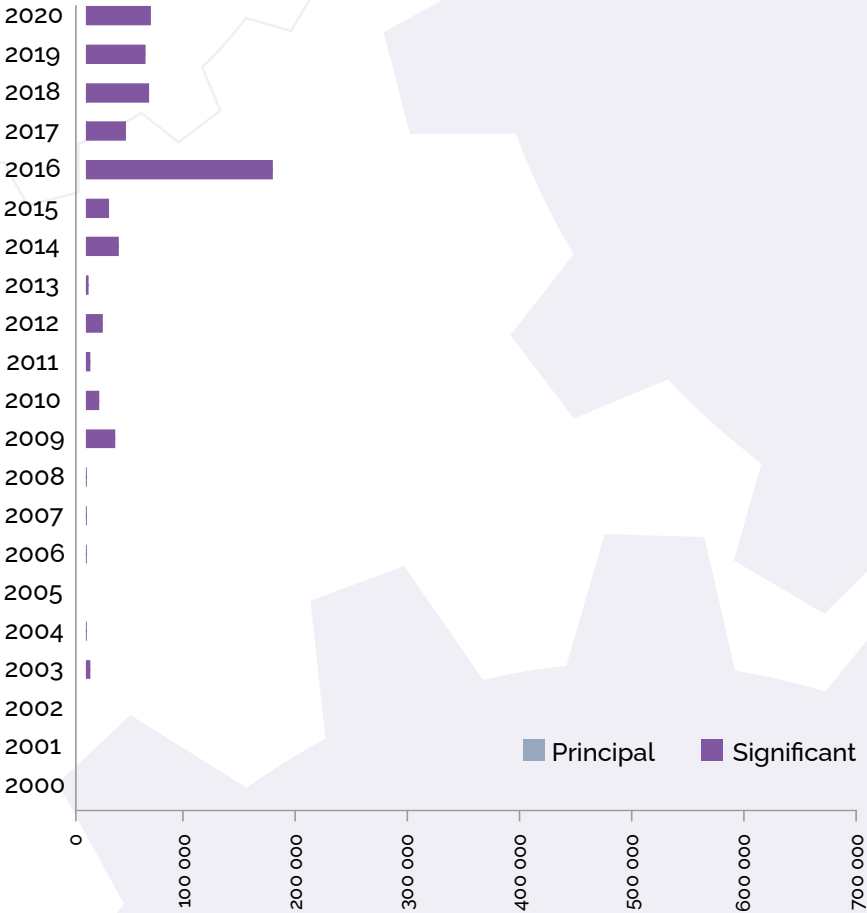
The majority of the drought projects are classified as adaptation-related, thus reinforcing the assumption of the similarity between drought risk mitigation and climate change adaptation. It is already assumed that the concept of drought risk mitigation is similar in nature to adaptation to climate change-induced drought. Therefore, adaptation-marked projects are more relevant in this context. Although the adaptation Rio marker was introduced only 12 years after the establishment of the reporting system, the vast majority of drought-related projects are adaptation-marked. However, the number of drought-related projects marked with mitigation objectives is subject to caveat. As the adaptation marker was established only in 2010, many adaptation projects were probably classified with the mitigation marker in the pre-2010 period. The analysis shows that the number of projects is balanced between 'principal' and 'significant' objectives. This means, on one hand, that projects with explicit and partial objectives are equally deployed to build resilience. On the other hand, projects with a significant objective combine activities on drought resilience-building, and on development or emergency.

Figure 4. Annual budget distribution of drought-related projects with adaptation objective in 1 000 USD (2020 discounted monetary value)



Source: Adapted from OECD, 2022.

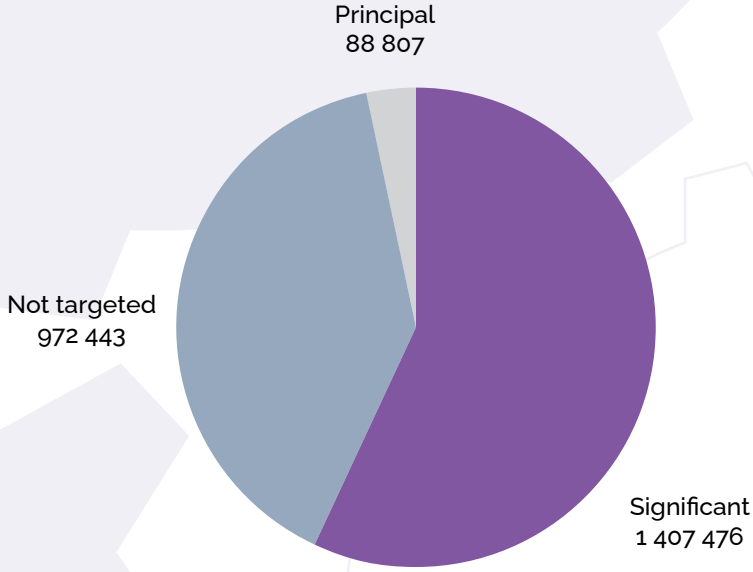
Figure 5: Annual budget distribution of drought-related projects with mitigation objective in 1 000 USD (2020 discounted monetary value)



Source: Adapted from OECD, 2022.

Gender considerations are not mainstreamed into the project designs. Gender targeting is a less encouraging aspect, given the recent finance trends. Women’s vulnerability to climate hazards has been already recognized, and several assessments show that women are more exposed to the impacts, as they have less decision-making power, they own less productive resources, and their labor market participation is subject to different barriers (Osman-Elasha 2022). Nevertheless, only around 3 percent of the total finance targets gender issues as a principal objective (Figure 6). This is 10 times less than the projects with non-targeted gender. This figure speaks volumes and flags a structural imbalance in investment trends.

Figure 6: Share of projects with gender targeting in 1 000 USD (2000–2020, discounted monetary value)



Source: Adapted from OECD, 2022.

Inclusion of vulnerable communities depends on appropriate targeting strategies, established by the development finance. Targeting is a broader concept than vulnerability and impact assessments, but it is the ultimate expedient to reach out to the most vulnerable. Drought vulnerability assessment can be part of a targeting strategy, but its importance can be easily dwarfed by other poverty-related issues. This becomes more evident if the geographical distribution of poverty differs from the typically drought-prone areas. And vice versa, if households just above the poverty line are exposed to drought, they might be deprioritized during targeting. Such households can slip back into poverty as an immediate effect of a single drought event.

Targeting strategies are constructed to serve multiple objectives, such as balancing economic growth, redistributing resources for better equity, or achieving progress on national and international development objectives (Van Domelen, 2007). Often, targeting is more of a political question than a technical one, but even if political objectives are mainstreamed into the methodologies, they are most likely combined with any type of livelihood or poverty assessment. If drought finance flows are based on solid and justified targeting strategies and targeting strategies integrate rigorous vulnerability assessments, they can serve dual objectives more easily. As a result of the continuous efforts put into the development of IDM, an ample number of tools and methodologies are available to support vulnerability and impact assessments. There is an emerging need to bring it all together and construct tools and methods for vulnerability assessments, which are compatible with targeting strategies too.

Box 2 | Social protection programmes as levers

There are on-going efforts to link climate finance, disaster risk finance and social protection to help resilience-building in rural communities (Davies *et al.* 2008). The most striking cross-section amongst the three is the involvement of agriculture sector. Agriculture is the mainstay of the rural poor but is the most affected sector by climate hazards. In many cases, the rural poor is the most vulnerable to drought, and thus may be eligible for both drought finance and social protection programmes.

According to the Agrawal *et al.* (2019), climate finance, including drought, and social protection can be combined in different ways:

- making social protection programmes more effective, thus gradually building coping capacities and reducing vulnerability, including drought vulnerability;
- integrating disaster finance into the social protection programmes;
- layering and bundling social protection and disaster finance instruments.

Although the combination of drought finance and social protection is a promising way to ensure that the most vulnerable is included, the coverage of social protection programmes is still low. The financing gaps in achieving the sustainable development goal 1.3. (implement social protection systems) and 3.8 (achieve universal health coverage) exceeded 1 190 billion USD in low and middle income countries in 2002 (Behrendt *et al.*, 2021).

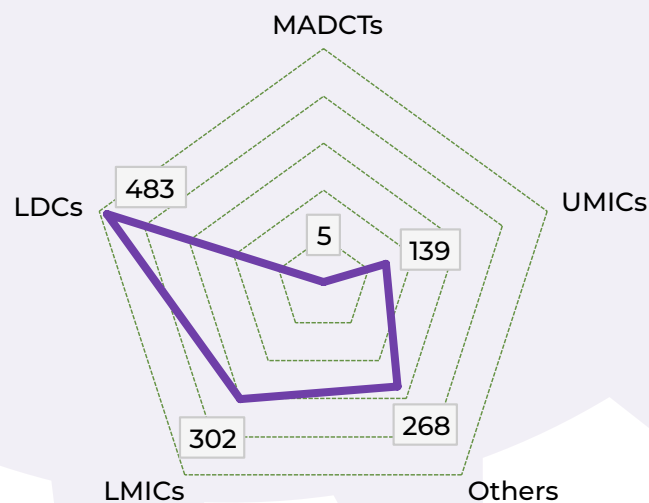
Furthermore, a linear expansion of social protection alone is not sufficient to improve drought resilience if there is no geographical overlap between the recipients and drought-prone areas. Approaches to combine the two should follow a layered approach, whereas historical drought maps are cross-compared with the coverage of social programmes. If the design of the social protection programme is scalable, for example social assistance interventions can be bundled with agricultural insurance, drought finance can be delivered in a more efficient and targeted manner (FAO, 2021a).

Features of drought projects

Most projects are deployed in least developed contexts even though drought impacts are globally recognized. The analysis of the number of projects per climate change objectives looks at matters from a different standpoint (Figure 7). Analyzing the number of projects is necessary because different countries have different price levels that affect the purchasing power of money. This holds even if countries from the same region are compared. For example, the same infrastructure development in Lebanon would certainly require a higher initial outlay than in Egypt. OECD classifies five country groups: least developed countries (LDCs), low and middle-income countries (LMICs), upper middle income countries (UMICs), more advanced developing countries and territories (MADCTs), and others. The majority of projects are deployed in LDCs and LMICs. However, the ‘others’ category includes all regional projects covering countries from the other four categories. Most of the specified regional projects are in Africa and South Sahara. Other unspecified projects include global interventions, such as the development of methodologies, policy support, and pilots of innovative financing methods. An example of the latter is the World Bank-financed “Global Partnership on Output-based

Aid”, which is a global initiative to pilot an innovative financing method. The partnership is tasked to develop options for output-based aid, so to increase the effectiveness of funds (World Bank, 2022a; Mumssen, 2010).

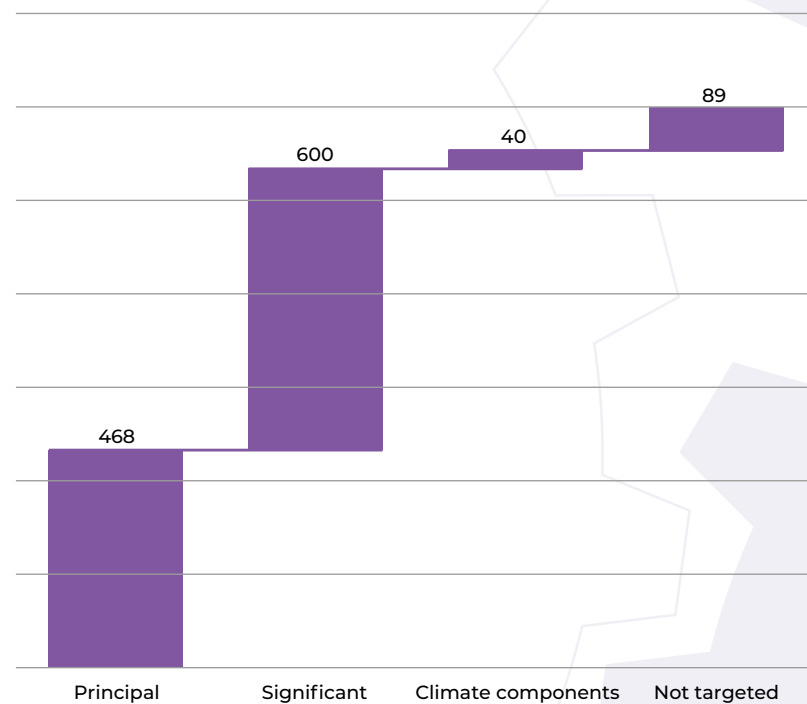
Figure 7: Number of projects per country classification (2000–2020)



Source: Adapted from OECD, 2022.

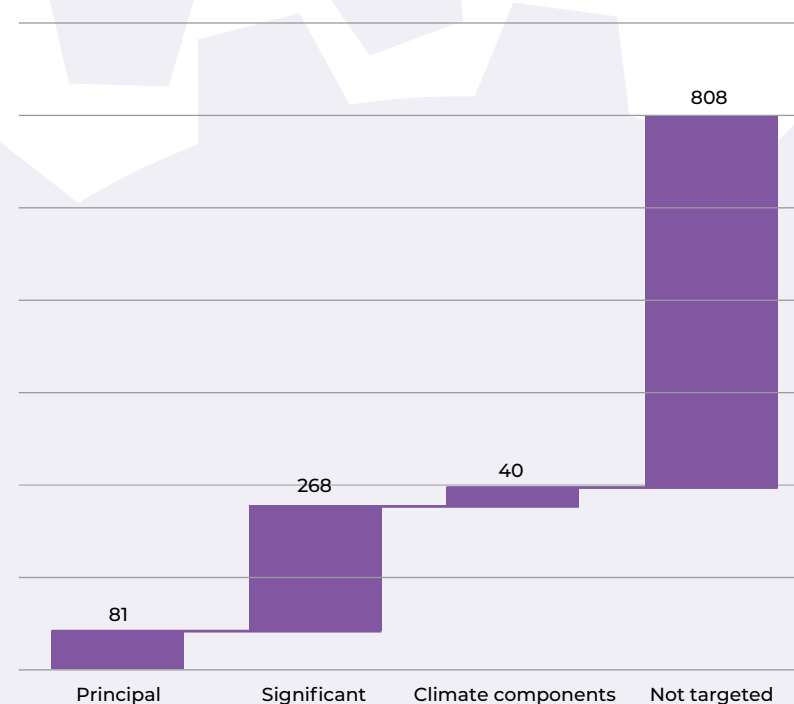
Drought appears even in climate change mitigation-marked projects but as a secondary objective. The mitigation-marked dataset (Figure 9) includes many not-targeted projects. This means that projects that are not mitigation-marked have merely an adaptation or climate objective. This trend is less prevalent in the adaptation-marked project (Figure 8). It can be assumed that mitigation-marked projects more likely have a dual objective, thus addressing an adaptation objective too.

Figure 8: Number of projects with adaptation objective (2000-2020)



Source: Adapted from OECD, 2022.

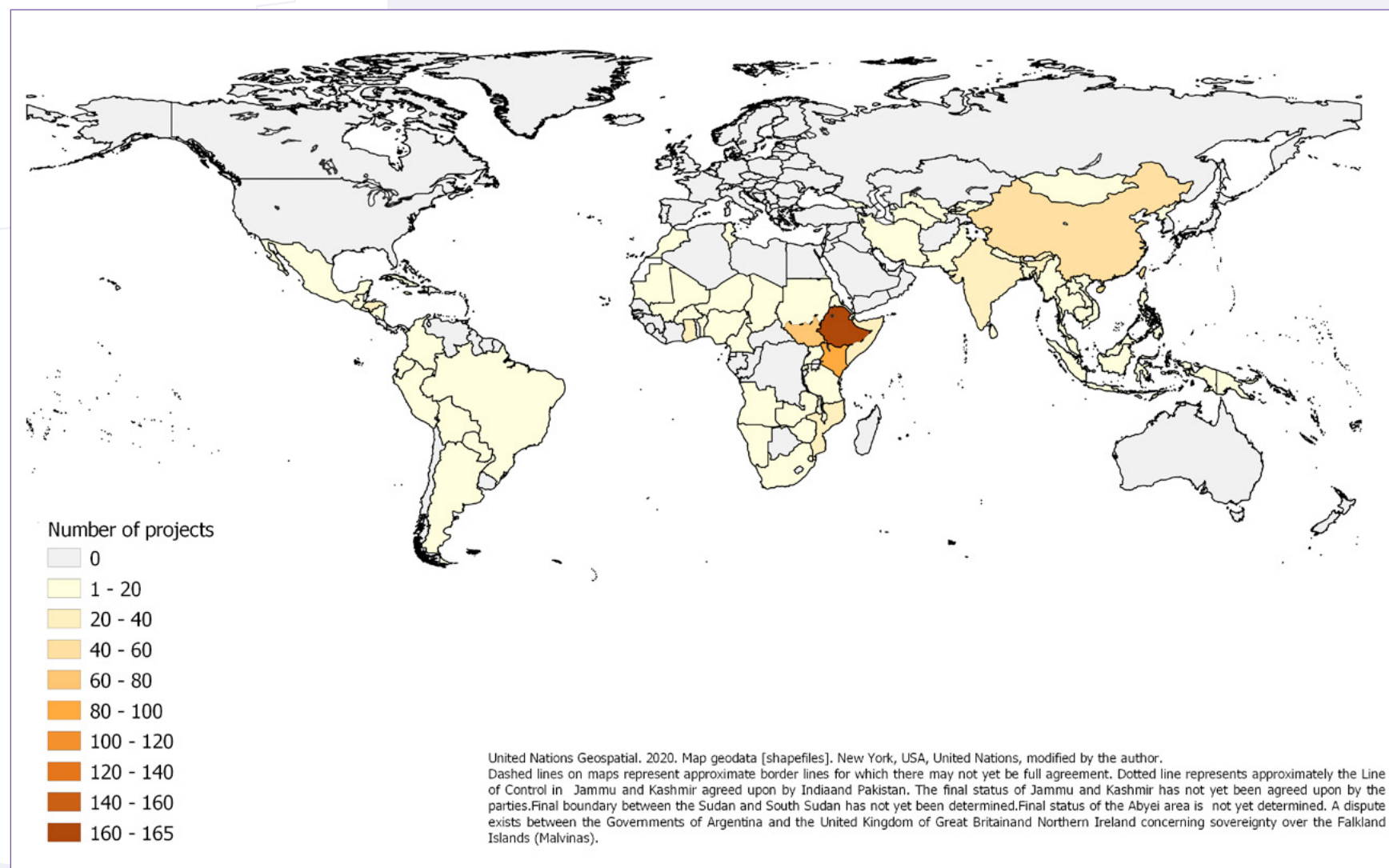
Figure 9: Number of projects with mitigation objective (2000-2020)



Source: Adapted from OECD, 2022.

The geographical distribution of drought projects is largely concentrated. As Figure 10 shows, there is a large geographical imbalance in the distribution of single-country projects. 10 countries out of 92 share almost 55 percent of the total number of projects. Out of these, Ethiopia takes 17 percent, Kenya 9 percent, and South Sudan 7 percent. They are followed by China, Somalia, Ghana, India, Mozambique, Honduras, and Cambodia. In conclusion, drought projects are concentrated in the Horn of Africa and the intersection of South and East Asia.

Figure 10: Map of the single-country projects (2000–2020)



Source: Adapted from OECD, 2022.

The distribution of projects does not fully reflect the absorbed impact. According to the United Nations Office for Disaster Risk Reduction *et al.* (UNDRR *et al.*, 2015), almost half of the drought events are reported in Africa. Nevertheless, Asia shares over 70 percent of the affected population, indicating a high vulnerability level from a social perspective. The imbalanced rate can be attributed to the population density in Asia, but several aspects are still little understood, such as the average extent, the timeline, and the magnitude of drought events.

Key messages

Drought finance is often used synonymously with development finance or climate finance. In most cases, drought finance shares the same funding mechanisms as development finance, but drought impacts are not associated with varying levels of development. Also, drought is a climate hazard not merely caused but intensified by climate change. This hypothesis suggests that drought events happen at different scales, with or without climate change. Drought finance, therefore, must leverage climate finance sources and build on the attainments of development finance, but its concept must create its own discipline.

Drought finance must overcome the common challenges just as development and climate finance, including for example the fragile institutional framework, the concerns about the financial feasibility, and the general lack of information. Drought finance has further challenges that can prevent investment, and these challenges are stemming from the specific nature of drought, such as context-specificity, technology-based management, or the definition of materiality. Drought finance is a specialized area of finance, which does not have the full scope to abolish all challenges, in particular some of the common challenges. Therefore, those drought-specific barriers

must be addressed primarily, which can be realistically removed and can open ways to the intensification of financial flows.

Investigating the constructed database of official development assistance, a large share of drought projects is marked as adaptation or has a dual objective (adaptation and mitigation). If climate change-induced, drought risk management falls under the concept of adaptation. As drought events cannot be prevented, the only option is to manage and build resilience to their impacts. Therefore, drought finance can interact with adaptation objectives, and vice versa.

International drought finance flows target mainly four priority sectors: agriculture, fishery and forestry, emergency, environment protection, and water supply and sanitation. Except for the emergency sector, it remains unclear which phase of drought is financed, whether it is drought risk, during drought, or post-drought. To support the paradigm shift to proactive management, sector-wise development should be matched with the drought phases. This would also support the selection of suitable financial instruments.

Building drought resilience is often associated with co-benefits, such as humanitarian emergency response, livelihood development, or ecosystem restoration. The overall picture shows that no-regret strategies to build drought resilience are already widely applied to convince donors or to rebalance the risk-return profile of the investment. The principle of no-regret strategy is particularly important for a slow-onset and less frequently re-occurring hazard such as drought. Otherwise, the price tag of drought management remains the simple equation of the probability of a drought event multiplied by the cost of losses and damages. Drought resilience mainstreamed into development projects is also an approach that would allow vulnerable countries to leapfrog phases of development, which

were previously underestimated by transitioning or developed countries. A more rigorous reporting system could help differentiate which projects are designed for drought resilience with development co-benefits or for development objectives with components for drought-proofing.

The volume of emergency finance indicates a low level of resilience. Also, drought finance flows span almost all sectors, thus showing the multifaceted and far-reaching impacts. Drought resilience requires a near-continuous situational analysis. To this end, a unified results framework would benefit the financing institutions and the recipients to keep track of the progress.

Gender is vastly overlooked in drought finance. This gap must be urgently addressed, as otherwise there is a danger of the most vulnerable being precluded from critical assistance. It is important to note that a reporting

system does not necessarily identify the actual share of women in reported projects, and the on-paper gains are far more ambitious than the social reality. Undoubtedly, gender should appear rather as a principal than a significant objective in projects, otherwise, the risk of exaggerated benefits remains persistent.

Finally, drought events are increasingly devastating, and financing has been intensifying to address the impacts. Reiterating the above, policy support for drought management requires its own reporting system on finance to keep pace with the finance flows and establish a baseline for measuring effectiveness. How this system will be implemented must overcome the dilemma of whether the derived data from the existing reporting systems is sufficient to retrieve quality information, or whether the reporting system should establish its own protocol for primary data collection on drought.

Taxonomy of financial instruments and sources

Categorization of financial instruments

Financial instruments must be diversified away from grants to secure further financial sources. The aspect of applied financial instruments requires further investigation. Firstly, because grant-based financing makes development contingent upon external financial assistance, and global economic turmoil can easily lead to a relapse in donor funding. Also, the ambition to engage the private sector calls for the diversification of financial instruments, more business-like approaches, and the definition of the impact areas. To set up a categorization for instruments and mechanisms, the clear objective of drought finance must be defined. According to the FAO (2022a), strategic investment in risk financing requires interventions to adapt or transform resources for reduced emissions, impact mitigation, and increased sustainability in living and consumption patterns. The definition suggests that the systematic approach cuts across the short- and long-term visions of resilience, based on which further grouping logic can be formulated.



The existing categorization methods of instruments are not fit-for-purpose to collate the angles of finance and drought management. There have been several attempts to create a taxonomy for drought finance, along which financial instruments can be grouped. The most frequent approaches are the followings:

- financial institution-based: categorized as per the groups of financial institutions, such as banks, institutional investors, and private investors;
- source-based: categorized as per the source of finance, such as public, public-private, and private sectors;
- drought timeline-based: categorized as per the fund allocation per the phases of the drought event, such as pre-, during- and post-drought finance (Harris and Jamie, 2019) ;
- cash waterfall-based: categorized as per the seniority and priority of instruments, from senior debt to mezzanine instruments, to preferred equity;
- financing mechanism-based: categorized as per the delivery method of finance, such as project finance, public-private partnership, on-balance sheet financing;
- risk layering-based: categorized as per the interventions at different frequencies and impacts of hazards etc. (Global Risk Financing Facility, 2021);
- approach-based: categorized as per the intervention approach of finance, such as project or programmatic;

- pillar-based: categorized as per the three pillars of IDM, including early warning and monitoring, vulnerability and risk assessment, and mitigation actions (UNCCD, 2022a).

Integrated drought management requires a mix of instruments, but not all instruments are suitable for all phases of drought. A critical component of a successful drought financing strategy is the identification of the right mix of mechanisms and instruments. It is certainly not possible to compress all types of categorizations into one comprehensive overview, to visualize the role and the potential of instruments at once. It must be emphasized that no agreed and endorsed taxonomy of drought finance exists yet.

A certain taxonomy on risk mitigation measures as per their timeline and conditionality should be established to show pathways on which measures should be deployed and when. A sensible approach is the impact horizon-based categorization that groups the relevant instruments according to the probability of impacts, the time horizon of the mitigation measure, and the corresponding pillars of IDM. Such an approach rests on the fact that drought measures act at different timelines. For example, the development of an irrigation system builds resilience for the long term, while anticipatory actions address near-real-time needs. Categorizing the measures as per the timeline of drought events supports the concept that the onset and the pace of the evolution define and gradually pare down the applicable drought measures. For example, the timeline of a flash drought would not give sufficient time to design and create a larger-scale emergency reservoir. Or an already ongoing drought event would not justify the prioritization of an early warning system over concrete impact mitigation measures. The timeline of a drought event, then, is decisive in terms of the selection and operationalization of a drought measure. The timeliness of measures has an implication also on the financial instruments, as the access to and use of instruments involve different procedures. The impact horizon-based cate-

gorization rests on this logical path, but the transfer of this categorization should be done with some reservation. While it was constructed based on the experiences in agriculture, some sectors can safely adopt it but others do not. For example, the same taxonomy can be used in water sectors or natural resources management. Nevertheless, the energy and health sectors have different structures that might require a distinct logical path.

The promotion of integrated drought management (IDM) does not encourage the fallacious hope that all drought impacts will be or can be eliminated (World Bank and Global Facility for Disaster Reduction and Recovery, 2018; Jackson, 2011; Bellon and Massetti, 2022). Therefore, the room for emergency financial assistance should remain open. What is rather important in this context is to rebalance the scales of fund allocations for the benefit of proactive measures.

Three impact-horizon categories are proposed: improved resilience, early response, and recovery and restoration. This type of categorization follows the dynamics of drought disasters and applies the terminology of the United Nations Office for Disaster Risk Reduction (UNDRR, 2022a). This categorization is displayed along four parameters:

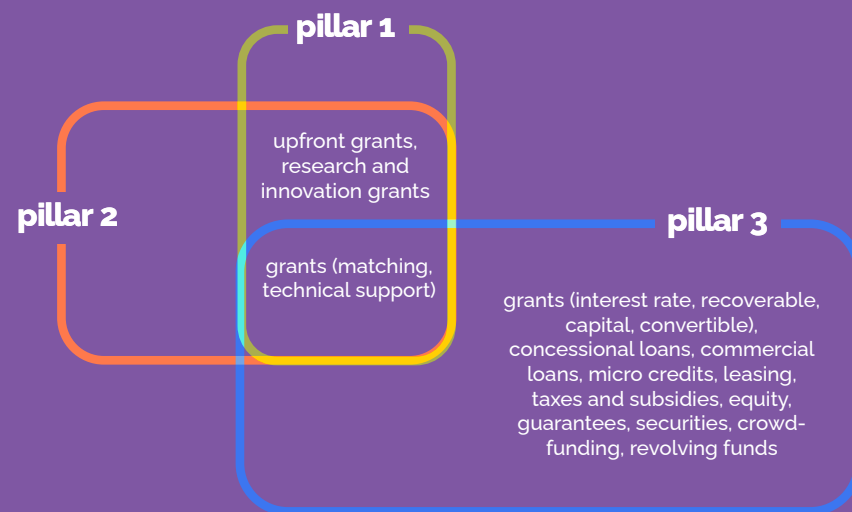
- definition of expected impacts,
- timing of the intervention,
- investment scale/horizon, and
- identified instruments per the three pillars of IDM.



HORIZON 1

Improved Resilience

- building long-term resilience to improve the ability of systems to withstand, adapt to, transform and recover from drought, including the preservations and restorations of basic functions
- time-neutral, but before a successive drought event would be forecasted and priority actions should be taken
- large

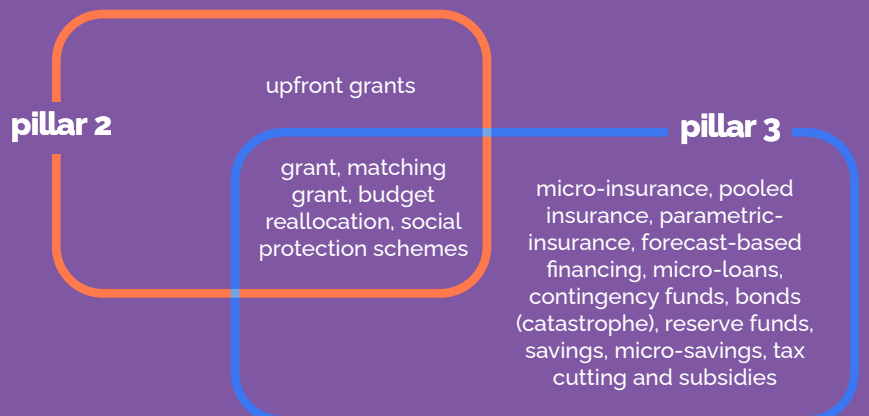




HORIZON 2

Early response

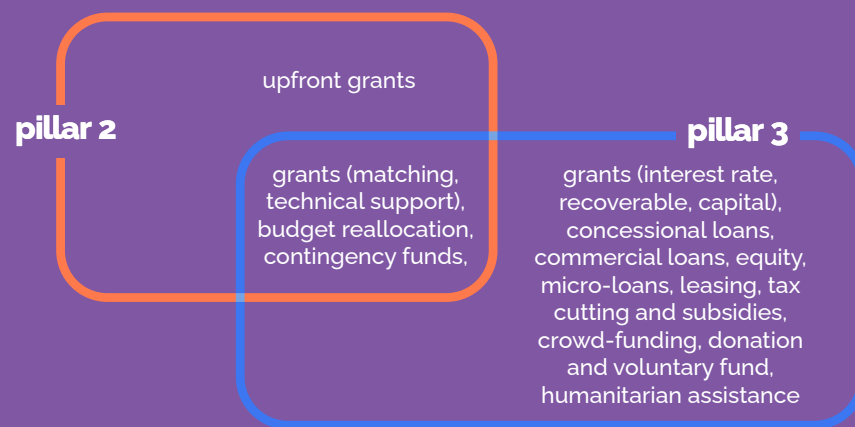
- taking actions and mitigating the direct impacts of already forecasted drought, and ensuring safety and basic needs of affected systems
- before the impacts of a forecasted or on-going drought event occur
- small to medium



HORIZON 3

Recovery and restoration

- recovering from drought events after impacts occurred and restoration of systems by building back their basic functions
- post-drought event, when impacts occurred
- small to large



Early response contributes to resilience-building, and vice versa, but they act at different timelines, thus requiring different instruments. Improved resilience and effective delivery of early responses are reciprocal, with the difference that early response assumes an actual risk of drought in the near or distant future (UNDRR, 2022a). Given their distinct definitions, a substantial difference between resilience and early response is the real-time presence of threats. The distinction is a fundamental aspect of the applicability of financial instruments. The often-uncertain trajectories of drought events presume that improved resilience is rather a dynamic process than a one-time event. Implemented measures might prove effective in certain cases but incomplete in others, thus calling for more flexible and complementary measures to fill the void and address the residual risks. Hence, more innovative financial instruments are needed to reach this objective. Nevertheless, a myriad of innovative instruments has already emerged under the category of early responses.

Conventional approaches in drought finance grew out of the experiences of development finance. The conventional approaches within the horizon of improved resilience are similar to the approaches used by agriculture or food system development because their objectives are at least partially mutual and reinforcing. They target the same markets, sub-sectors, actors, and areas. No wonder, they traditionally share the same finance delivery channels (Chiriac and Naran, 2020). Moreover, a consortium of multilateral development banks increasingly considers resilience as an additional environmental and social safeguard or pre-requisite to be mainstreamed into development projects, instead of being a single-standing project objective (Agence Francais de Development *et al.*, 2019). Given its complexity and integrated nature, resilience-building generally requires a large-scale investment, with integrated components on capacity development, infrastructure or process deployment, and institutional enhancement. The sheer scale of investment and the risks associated with the uncertainties and timeline of

the return are defining issues of the selection of the instruments (Belianska, 2022). This is where long-established and more mature approaches are preferred. Concessional loans, leasing, or grants are typical instruments, but which instrument is the most appropriate depends on the risk appetite and the expected return by the investor. It should be noted that, although the current structure of financing largely relies on grants, grants do not technically belong to the definition of financial instruments (Ikeda, 2021). Grant, is, thus, considered here as a financial instrument only because of its predominant role in drought finance.

Likewise, there are some traditional instruments assigned to the horizon of early response. Risk transfer and risk retention approaches have been introduced in the agriculture sector for a longer period. Insurance markets offer a large variety of instruments to cover drought-related events. However, even developed economies, such as European countries, encounter market imperfections that impede the extensive uptake of insurance products (Santeramo and Ramsey, 2017; Mahul and Stutley, 2010). This is why only 45 and 23 percent of the total insurable production value was insured in 2008 in the European Union and the United States of America respectively (Bielza Diaz-Caneja *et al.*, 2008). The picture is much worse in developing markets, whereas only 19 percent of the smallholders, equaling 51 million farmers, have agr-insurance. Furthermore, the coverage is concentrated in India, where 30 million of the total 51 million farmers are based. In some regions, agro-insurance is virtually non-existent, for example, less than 3 percent of the smallholders are insured in Sub-Saharan Africa (Shakhovskoy and Mehta, 2018).

Investors factor the market imperfection into their products through different strategies such as increased premiums (Ceballos and Kramer, 2019). In turn, the affordability of insurance products reduces dramatically. Such traditional insurance products, therefore, have a low penetration rate in

developing markets that are stricken by crippling information gaps, lack of reliable customer segmentation, no history of market information, and in general, poor integration into the financial markets.

The financial sector is undertaking innovations that can offer solutions to the early delivery of suitable financial instruments for poor households.

Many inventions in drought finance are related to the horizon of early response because this horizon requires the widest flexibility and rapid operationalization. The mushrooming number of innovations in early response endorses the assumption that not all risks can be eliminated with long-term resilience measures (Richmond *et al.*, 2021). Innovations in risk transfer and risk retention are the most apparent, as these instruments have well-established ancestors. New risk transfer-related instruments were shaped by past limitations, such as parametric insurance was designed to overcome the shortcomings of indemnity insurance products. One of the argued downsides of indemnity is the actual loss-based payout (Cummins and Mahul, 2019). In other words, these products cover only the post-impact phase. In the context of poor households, the re-positioning of pay-out is vital, because communities without resources and alternative livelihood cannot afford and absorb losses even in the short term. Parametric risk transfer products address this market gap by offering financing for anticipatory actions to reduce the severity of losses.

Box 3 | Forecast-based Financing Programme of the German Red Cross

The Forecast-based Financing Programme by the Red Cross uses forecasting models and early warning indicators to predict the probability of extreme weather events and to decide when, where, and how to allocate resources in the context of humanitarian assistance (Heinrich and Bailey, 2020). If the forecasted probability of a hazard reaches the threshold, resources are allocated to protect the population by taking early actions such as the set-up of shelters and stocking food and water.

The Forecast-based Financing Programme goes beyond securing the productive and produced assets as the case of the German Red Cross demonstrates. Apart from slow onset events, it is effective in the case of rapid onset events, such as floods and cyclones, consequently, it is a powerful approach to protect lives and health. In conclusion, the Forecast-based Financing Programme can be considered both a monetary and non-monetary instrument with sufficient flexibility to serve multiple purposes, including health protection, stabilization of social security, and agricultural production.

It is important to keep in mind that parametric insurance does not always correlate with sustained losses, and it does not provide loss adjustment (Hofman and Brukoff, 2006). This characteristic concerns both the insurer and the insured, the development of insurance products, therefore, is almost always accompanied by research to advance the robustness of models.

The success of innovation in drought finance depends on how technology and scientific achievements can be translated into the development of financial products. A particular pre-requisite of parametric insurance products is the availability of accurate forecasting and early warning systems, as well as reliable historical data (Ward *et al.*, 2015). Also, financial institutes must find the best-fitting index to act as a trigger. This critical pre-requisite is well demonstrated by the operation mechanism of the African Risk Capacity (ARC), the disaster risk financing facility of the African Union. In short, ARC developed the Africa RiskView (2022) decision-support system to estimate the quantified risk and define the level of drought risk transferred to the ARC risk pool. Africa RiskView uses the water requirements satisfaction index developed by FAO to simulate the interaction of rainfall deficit and crop yields or availability of pasture. In the next step, the drought index is overlaid with the population vulnerability information to estimate the affected population and the response costs. The vulnerability is defined as the combination of resilience measured by the households' distance from the national poverty line and the exposure measured by the percentage of household income from agricultural activities. Finally, the cost of response is estimated at the country level (African Risk Capacity, 2022). Although the Africa RiskView is highly versatile and overarching, some critics view that it requires further customization processes for countries to improve its validity. The development of such financial products is data-intense, and errors might exacerbate the inequity in access, so innovation in finance must go hand in hand with drought science.

The definition of indices develops together with scientific progress. Drought is one of the climate hazards that can be predicted, even if not with full certainty. Nevertheless, risk including vulnerability has a more volatile nature. From the perspective of drought, drought events evolve over time and have layering impacts that can unfold even after the end of the drought

events. Vulnerability and risk are also shaped by many other factors, such as the changing degree of resilience, the social dynamics of affected communities, the availability of alternative supports, the co-existence of other hazards, etc. Such complexity is a driver of the further development of trigger indices. The development of science, the availability of data, and a better understanding of drought support the improvement of indices, which can be translated into a better design of financial products (Heinrich and Bailey, 2020). Moreover, combined drought indices are more powerful to capture the invisible but adverse effects across systems.

Box 4 | Drought indicators and indices

The World Meteorological Organization (WMO) and Global Water Partnership (GWP) (2016) published a handbook that collects and synthesizes drought indicators and indices. The handbook presents and classifies over 50 indicators and indices. Such knowledge resource is fundamental to understand the potential and limitation of certain indicators, thus, it supports the rigorous selection for forecast-based financing. A future step would be the release of a second volume to investigate the applicability of indicators in the financial markets.

Technology development and scientific results are key to designing other financial products too. For example, early actions are increasingly piloted in social protection programmes, whereas interventions, such as cash transfers, are triggered by indices. Moreover, interventions can be diversified, depending on which sectors or areas are more affected. Innovative technologies for data collection such as satellite images, crowdsourcing applications, or in-situ sensors can improve trigger accuracy.

Advanced insurance products are not the only innovation in drought finance. There are other debt-type instruments such as micro-insurance or catastrophe bonds, and the number of existing options keeps increasing (United Nations University Institute for Environment and Human Security, 2021). Innovative financial instruments act in different ways, but there is one intersection that makes them outstanding. New-generation instruments reach out to a particular customer segment that has not been integrated into the financial market yet, namely the vulnerable communities in developing countries. In other words, the era of impact investment is on the horizon, thus opening a window for an enormous but untapped market potential that is carried by smallholders in developing countries.

Impact investment has an upward trend, although some claim that impact investors can expect only sub-commercial profits (International Finance Corporation, 2019). To date, impact investment is concentrated in some sectors such as energy. Entenmann (2021) concluded that impact investment in smallholder farming is yet to overcome barriers related to the high transaction costs generated by the remote locations, the lack of mutual understanding, and the power imbalances. Other concerns are the lack of an ecosystem of venture incubators and a lack of awareness (Global Impact Investing Network, 2015). Despite the uncertainties, investment in rural smallholders can turn lucrative, and many initiatives have already proved it (Agyekumhene *et al.*, 2022). To this end, innovative instruments such, as crowdfunding or micro-loans, are promising. However, more innovative infrastructure and funding mechanisms are needed.

Finance for recovery, or emergency finance, has been perhaps the most traditional category and is largely reliant on grant-type instruments. The quantification of emergency finance need is an unwieldy and complex issue in the post-impact phase, which is not only about physical infrastructure

but human toll. Beyond the economic losses, non-economic losses must be compensated too. Therefore, post-disaster finance is often tied to in-kind or non-financial measures such as social protection policy, migration policy, diversification schemes, and others (Carty and Walsh, 2022). Encouraging though, recent designs of emergency finance opt for the concept of “building back better” which is also in line with the Priority 4 of the Sendai Framework for Disaster Risk Reduction called “enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction. For example, projects addressing recovery in drought-prone areas often promote diversification options such as drought-resilient cropping patterns or alternative income sources. Like this, post-disaster finance can become a source for improving resilience. This does not by any means imply that fund allocation should wait for emergency finance. The concerns about the skyrocketing costs of ever-devastating impacts call for the innovation of post-disaster finance. The required innovation refers to all segments, including the amount of funds, the creation of facilities for continuous funding, and the improved capacity of the delivery system (World Bank and Global Facility for Disaster Risk Reduction and Recovery, 2018).

Box 5 | Financing loss and damage for preparedness

The 27th conference of parties of the UNFCCC agreed on the establishment of a dedicated fund for loss and damage. The fund will support developing countries in responding to loss and damage by climate disasters. Loss and damage have no agreed definition though, but it is important to differentiate it from humanitarian assistance. Humanitarian assistance is used explicitly to respond to an event, while loss and damage can involve early and proactive financing too (Bhandari *et al.*, 2022). This is the innovation required by post-disaster finance to complete the circle amongst the impact horizons and create a link between the reactive and proactive instruments.

The World Food Programme (WFP) plays a pioneering role in the loss and damage agenda. WFP uses an experimental analytical framework that helps in the pre-positioning of interventions under the loss and damage umbrella (WFP, 2014). It consists of four steps:

- climate risk and food security analysis to assess the historical correlation between climate trends and food security;
- climate scenarios to assess future trends;
- estimation of loss and damage to measure the impact on food security;
- identification of priority interventions to identify areas where loss and damage incurred or is anticipated.

This approach is a suitable instrument under the early response time horizon, which help make loss and damage avoided.

Emergency-related financial instruments are revisited to increase preparedness for unavoidable losses and evoke resilience-building. Post-disaster financing also encounters major changes in approaches to improve effectiveness and responsiveness. Paradoxical as this may sound, post-disaster financing also requires preparedness to deliver on expectations (Calcutt *et al.*, 2021). For example, well-oiled mechanisms for in-kind food assistance or master plans for the emergency rehabilitation of water systems are critically important to stop drought from becoming a famine. As concluded in a study by the World Bank and the Global Facility for Disaster Reduction and Recovery (2018): “In practice, the foundation for building back stronger is best laid before a disaster”. In conclusion, the success and innovation of post-disaster financing depend on the delivery mechanisms and the capacity of involved institutes.

Instruments can be selected to operate in parallel or in a combined manner, and even the same instruments can be diversified to cover different objectives. The goal of the introduction of different instruments is to demonstrate the diversity and the application areas. The most effective combination of instruments depends on the countries’ context. For example, social security schemes combined with contingency funds are more suitable in a fragile context, while the combination of debt and pooled insurance are rather recommended in more a predictable environment such as smallholders in transition to more commercial production. Also, concessional loans are more relevant to large-scale adaptation measures in crop production such as irrigation system development, while microloans and reserve funds are more appropriate for small-scale pastoralism.

Box 6 | Mix of instruments to finance drought risk – the case study of Kenya

Kenya is particularly vulnerable to drought, and the economic impacts of drought account for 8 percent of the GDP over 5 years. The annual natural occurrence stands at 9.7 percent over 30 years. The drought event in 2020-2022 is considered one of the most devastating in the century, with the highest rainfall deficit in March-April 2022 over the past 70 years (Intergovernmental Authority on Development *et al.*, 2022). Kenya has been operating multiple funds to reduce the risks and build resilience, amongst which several funding options support anticipatory actions to avoid irreversible impacts. At the national level, the Kenya Livestock Insurance Programme (KLIP), National Drought Emergency Fund, and the Kenya Agricultural Insurance and Risk Management Programme (KAIRMP) have been operating to provide insurance and grant instruments to avoid or reduce the consequences. Kenya also participated in the regional ARC to increase the coverage of insurance, though it never received a pay-out, thus, stopped taking out the insurance policy (E-Pact 2017).

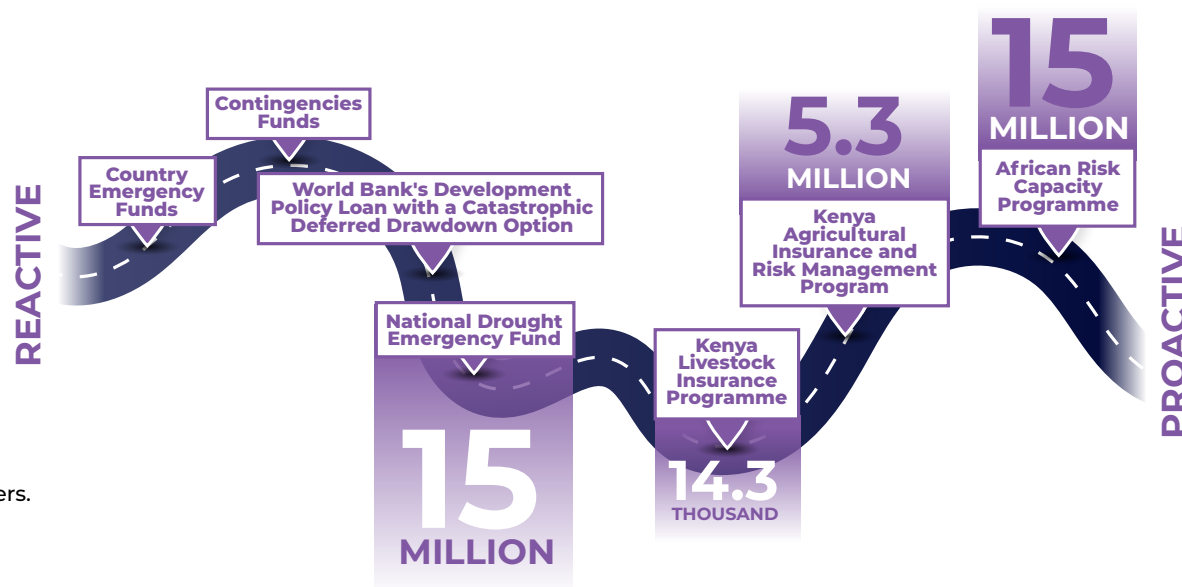
The KLIP, KAIRMP, and ARC use index-based insurance but for different sectors and at different scales:

- KLIP was delivered through a public-private partnership mechanism to protect vulnerable households. The index is based on the remote monitoring of the vegetation condition of pastures.
- The KAIRMP is a national insurance programme subsidized by the Government to protect farmers from weather-related perils. KAIRMP is an area yield insurance provided for maize and wheat producers.
- Kenya, as one of the first countries of the ARC, purchased drought insurance coverage until 2016.

Membership in the funds is voluntary, and farmers can join through the co-insurers sales agent networks. Although the initiatives are largely supported by the Government, an important feature of product development is the participatory approach and consultation with the community. The concept of parametric insurance is less tangible or physically experienced than loss-based, indemnity insurance, so due awareness-raising and information exchange are inevitable to increase the satisfaction and willingness of farmers.

Figure 11 displays the mix of mechanisms and instruments to build resilience for all sectors in Kenya. While some mechanisms, such as the Country Emergency Fund, are still considered traditional, reactive responses to drought, Kenya maintains multiple mechanisms for proactive financing.

Figure 11: Mix of instruments and mechanisms for drought risk management in Kenya



Source: Mungai, 2022.

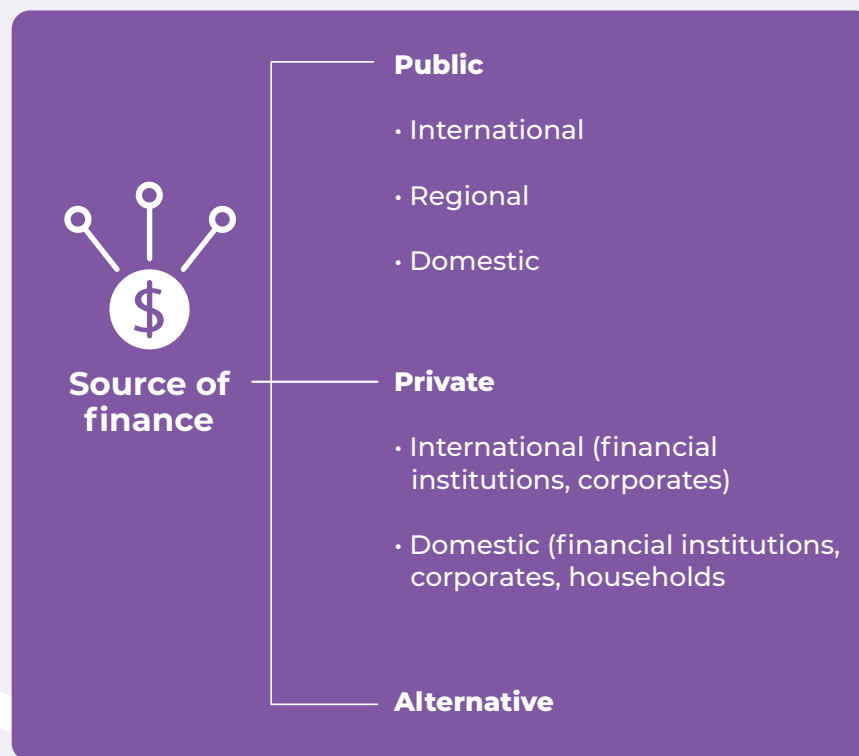
The selection of instruments depends on the country assessments, included in the national drought plans or other disaster risk strategies. Action frameworks defined in such plans should be used to understand the applicability of instruments. The mix of instruments can overcome the impracticality of isolated financial options that target individual actions. Bundled products such as microloans with index-based insurance, or commercial loans with public guarantees can resolve many issues from both sides of financiers and clients (World Bank, 2017). They can reduce the risk of investment by providing security or coverage for potential losses that could impact farmers' solvency. In turn, the addressed risk can improve farmers' creditworthiness.

Another possible benefit of combined solutions is the improved accessibility and inclusivity of financial products while maintaining their marketability. For example, different forms of support or concessional finance to reduce the insurance premium and capital costs are gaining ground. Supporting premium and capital has multiple advantages compared to simple concessional finance, such as the facilitated market growth rate, cost-effectiveness, prudent capital management, and affordability (Topper and Stadtmuller, 2022). In conclusion, the mix of instruments should be a set of complementary and supplementary instruments to achieve gains for both the beneficiaries and financing partners.

The source and actors of finance

Three financial sources are traditionally differentiated: public, private, and alternative sources (UNFCCC, 2022a). The picture is more nuanced when financial sources are investigated. To clarify the structure of sources, which is used in this report, Figure 12 displays the sub-categorization at different levels.

Figure 12: Categorization of the source of finance



Source: author's elaboration

Public finance is not sufficient to cover all needs but is critical to address additional economic, social and environmental goals where the probability of market failure is high. The public sector has three major functions in development assistance: the “distributive” function to foster equity, “allocative function” to ensure efficient provision of public goods, and “stabilizing” function to shield the economy from volatility and uncertainty (UN, 2013). Resilience to climate hazards, including drought, falls mainly under

the allocative function at the global level, but risk management tends to also involve the other two. Enough to think about the impacts of an extensive drought event on the national economy in Small Island Developing States, where natural resources are limited, and the import of relief measures entails disproportionately high transaction costs. Beyond providing financing, setting evidence, standards and best practices in financial resource allocation is an undisputable role of regional and international public sources. Regional and international (also called 'global') public sources serve also as indicators of aid effectiveness, as they are accurately monitored and evaluated. In the lack of systematically collected and collated data on financing, the exact contribution of different sources is hard to estimate, but there are main actors and financial mechanisms to understand the trends and standards of drought finance. To this end, it is important to look more closely at the status of the structure, starting from the global coordination to the specialized actors.

The UNCCD can play a key role to diversify financial resources and help setting standards for financing. The Global Mechanism of the UNCCD was established under Article 21 to support member countries in resource mobilization to implement the Convention and address desertification, land degradation, and drought (UNCCD, 2022a). The UNCCD's financial mechanism has been channeled through the Global Environment Facility (GEF) since 2010. GEF contributes to the implementation of the Convention and allocates funds to enable the UNCCD Secretariat and the Global Mechanism to deliver technical advice and capacity-building support. Other significant contributors to the UNCCD are the African Development Bank Group and the Land Degradation Neutrality Fund. From these, GEF has the largest contribution to drought-specific projects in developing countries, using two specialized funds, the GEF Trust Fund and the least developed country fund (LDCF). GEF approaches drought finance in an integrated manner, whereas drought is

included in the land degradation focal area as a goal. Aiming to achieve global environmental benefits, the strategy of GEF is to address the interconnected factors and sources of drought risk, such as land management practices. GEF receives technical advice from the UNCCD to help countries in engaging in the process. Most importantly, the mutual support also encourages countries to identify elements in their national drought plans, which can be taken into GEF-financed projects.

Beyond acting as a financial mechanism of the UNCCD, GEF has delivered 29 projects since 2005, which have at least one component of drought resilience. The project database includes two global projects, five regional projects, and 22 national projects. Most of these falls under the focal area of climate change as a full-size project.

Box 7 | GEF – 8th replenishment and its impacts

GEF concluded its 8th replenishment (GEF-8) in 2022, with 5.25 billion USD pledged to support its mandate at a critical moment of the history (Global Environment Facility, 2022). The increasing funding is a great opportunity for the UNCCD to continue supporting countries in developing large-scale projects for drought resilience and providing technical assistance on relevant matters. The GEF-8 Land Degradation Focal Area has four objectives:

- avoid and reduce land degradation through sustainable land management;
- reverse land degradation through landscape restoration;
- address desertification land degradation and drought, particularly in drylands,
- Improve the enabling policy and institutional framework for land degradation neutrality.

While all objectives are relevant to drought management and land-based interventions for drought mitigation are more emphasized in GEF-8, two objectives have a direct reference to drought management:

- avoid and reduce land degradation through sustainable land management – including drought-smart land management; and
- address desertification, land degradation, and drought issues, particularly in drylands – including proactive drought risk management to reduce impacts on communities, economies, and the environment.

The structure of the financial sources for drought financing is lopsided due to the lack of coordination or link between public and private actors. The different approaches and interests of the public and private sectors are reflected in the structure of financing to date. The current structure is more disconcerting than the case of climate change finance. The private sector is strongly present in climate change finance, but its contribution is concentrated on mitigation finance (OECD, 2015c). Suffice it to think of the market of renewable and clean energy technologies or the green vehicle industry. Nevertheless, adaptation, also including drought resilience, has not attracted sufficient financing from the private sector yet. The lack of diversification of sources and involvement of the private sector is concerning. It is up to the public sector to showcase financially feasible business options that can encourage private-sector investment (Murphy, 2022). Although mobilization of private sources is merely market-driven, enhanced coordination could help to guide the involvement of the private sector.

Technical assistance is a critically important instrument to strengthen readiness and build capacities for effective financing, but technical assistance programmes almost entirely neglect the private sector. Countries and entities have direct access to bilateral and multilateral funds. In addition, a range of national and regional funds have been established to implement drought-related strategies and plans. Without a doubt, effective programming begins with readiness and increased technical capacities at all levels. Readiness programmes, as a type of technical assistance, are both about the development of individual entities to manage financial resources in the most efficient way and the generation of information to build global knowledge.

Firstly, readiness is an important starting point given the fact that building drought resilience requires transformative approaches. Transformation essentially entails a shift away from business-as-usual operations, and this has an implication on how investment is structured and delivered. Inceas-

ing readiness has, therefore, grown into a strategic objective of financial mechanisms.

Box 8 | Readiness Programme of the Adaptation Fund

Adaptation Fund (AF) provides several options for readiness support to enhance the capacities of national implementing entities to access and effectively coordinate climate finance. The Programme includes innovative elements to facilitate the learning process not only through the adoption of the Funds' policies but also through peer-to-peer interactions. The key focal areas include support to accredited implementing entities, cooperation and partnership, support for accreditation, and knowledge management. The following grants are available to enhance the readiness: readiness package grant, project formulation grant, technical assistance grant, and project scale-up grant. Developing knowledge resources and harnessing the potential of partnership is at the heart of the Funds' policy, and as a result, AF built the Community of Practices for Direct Access Entities to support mutual learning, experience sharing, and peer support (Adaptation Fund 2022).

The United Nations Development Programme (UNDP, 2015) defines four components of readiness: increased capacities in (1) financial planning, (2) accessing finance, (3) delivering finance, and (4) monitoring, reporting, and verification. An additional component can be the increased capacity to leverage and scale out the results. This is even more important if public entities aim to create an enabling environment to mobilize the private sector, thus, increasing finance flows. Creating such a link between readiness and the involvement of the private sector is of utmost importance to stimulate the environment for drought finance. Otherwise, resilience-building

interventions might become subject to the availability of public funds, and the achieved progress might relapse if funding is discontinued. The unparalleled opportunity is already recognized by some financial mechanisms. For example, the Green Climate Fund (GCF) has four key areas to support resilience building, including the integration of the private sector. One area is related merely to the readiness by creating enabling policy environment. The other area loops back to the link between readiness and private sector involvement. This area aims to catalyze innovation, development, and adoption of new technologies, which in turn, have a crowding-in effect on the private sector, thus accelerating the investment in the green recovery. To strengthen the involvement of the private sector, GCF has a unique mechanism, called Private Sector Facility, to support private sector development by providing concessional loans, equity, guarantee, and grants. While a large share of the support for the private sector is still related to mitigation activities, the number of adaptation projects is steadily increasing. Such an innovative approach must be further promoted and supported to avoid being early-adapted-and-abandoned. This is particularly important in integrated drought management (IDM), where drought might occur over a longer time horizon, thus deterring private investors from revisiting and further developing approaches to address uncertain and distant events. Incubating business models to support diffusion and marketability are needed to overcome the issue of time lag and create an enabling environment. In conclusion, readiness should be considered as an opportunity to build capacities in a holistic manner, addressing both public and private entities.

Information asymmetries cripple the business potential of drought financing, but technical assistance can fill the information gaps along the cycle of drought management. Insufficient or asymmetric information is a typical problem of development, also drought finance (Druce *et al.*, 2016). The lack of proper understanding at investor and beneficiary levels has been an unresolved issue, and this has been widely admitted. Technical assistance programmes have an overarching role from resource mobilization to the

sustainability of project results. In all cases, technical assistance aims to address critical needs and gaps and achieve a catalytic effect. Technical assistance has become a common instrument of development finance, but it has an even more extended contribution to drought financing. Stadelmann and Falconer (2015) differentiate five types of technical assistance programmes: policy advice, support for project development and funding, data provision, programme coordination, and institutional capacity-building. Financing drought resilience used to be surrounded by an information gap, including the knowledge of the biophysical nature of drought, the trajectories of drought impacts, and the inter-sectoral relevance and impacts. No wonder the UNCCD defined the availability of information systems as a selection criterion for participation in the national drought planning process by the Drought Initiative (Tsegai, 2019). This requirement suggests that no phases of drought management planning and financing can be done without robust data and information on climate, water, land and socio-economic contexts. In conclusion, technical assistance for drought financing should include the following reinforcing functions:

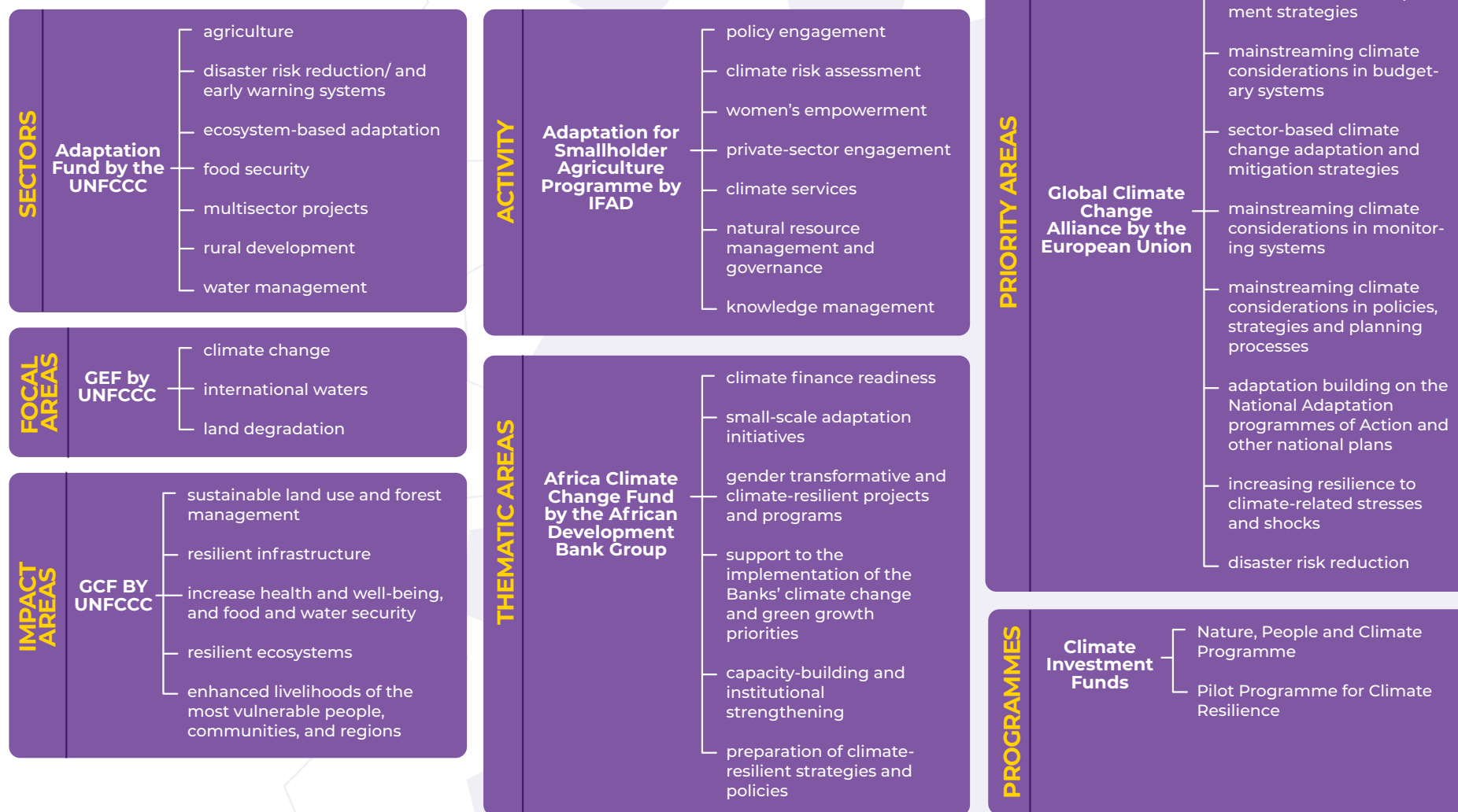
- creation of data and information systems: developing multidimensional information systems with analysis and forecasting features tailored to local context;
- responsive support and change management: creating a mechanism to assist emerging issues and review the results of previous assistance programmes;
- science integration: establishing a permanent link between science and end-users in an inclusive manner; and
- time management: recommending best approaches to generate a return on investment, with or without drought.

These reinforcing functions are already applied in some technical assistance programmes but not in a consistent manner. Their common objective is to make technical assistance more dynamic, adjustable, and prospective. In short, technical assistance should not be limited to a project-based contribution, but their results should extend beyond the end dates of projects.

Information asymmetry is further strained by the lack of technical vocabulary for drought finance. Information asymmetry is not only about the availability of information but about building a common understanding. The world has entered the era of data and information, but the more knowledge materials are available the more assistance is required to clarify them. Drought finance is a mix of multiple sciences, whereas each science works with its own vocabulary. Common understanding requires the construction of an agreed vocabulary that collates the science-specific terminologies. A common vocabulary is also important to balance the interests of all stakeholders in the finance cycle.

Public sources dominate drought financing, but international and regional funds are only sufficient to generate good practices and establish standards. Public finance is administered at global, regional, and national, in other words, domestic levels (Fallasch and Siemons, 2020). Resilience has been traditionally perceived as the responsibility of the public sector and affected parties are accustomed to governmental assistance even in risk management (PricewaterhouseCoopers, 2013; United Nations Secretariat of the International Strategy for Disaster Reduction, 2007). Several attempts have been done to summarize the public international finance in a thematic manner, for example, sources of development finance, climate change finance, environment finance, etc. Building on the finance architectures by Schalatek and Bird (2022) and Amerasinghe *et al.* (2017), **Figure 13** displays those international and regional funds that have drought-relevant areas. The list is non-exhaustive as multilateral funds keep multiplying, and bilateral donors, too, regularly revisit their strategic areas.

Figure 13: Drought-related thematic areas of multilateral funds and initiatives



Source: Schalatek and Bird, 2022; Amerasinghe *et al.*, 2017

The above visualization clearly highlights that most of the multilateral funds approach resilience from the perspective of addressed sectors and not from the perspective of hazard types. Although it makes the estimation of drought financing difficult, it allows to link drought and impacted sectors. Accordingly, it supports the understanding of how drought finance relates to development objectives.

Although drought-related projects are eligible to be financed by the displayed thematic areas, their actual share falls short of their potential. For example, adaptation to climate-induced drought is relevant to seven sectors of the AF. By 2021, the aggregate budget of the seven sectors exceeded 600 million USD (Adaptation Fund, 2022). Yet, the aggregate budget of projects with drought as the principal objective does not reach 50 million USD. Drought finance has a lot more opportunity than what is currently harnessed through climate finance funds. Although climate funds are the most frequently used sources, drought finance must go beyond and tap on other resources.

Regional and international public sources are often analyzed together because the mechanism of resource mobilization is broadly similar. For example, regional development banks, such as the Asian Development Bank or African Development Bank, are created on the same basis as the global multilateral development banks, such as the World Bank. The multilateral funds are largely cross-cutting and have overlapping objectives. Nevertheless, the delivery mechanism and instruments are distinct, as well as the funds have their own fiduciary standards, legally binding policies, and environmental and social safeguards (Belianska *et al.*, 2022). Another demanding aspect of the qualification is the ability to manage risks, including implementation-related risks and environmental and social risks. Even though the demand for financial resources is high, the variety of delivery mechanisms, policies, and the requirement for cross-compliance give rise to certain difficulties from the perspective of implementing entities (OECD,

2015b). Coordination with separate funds is often excessive and necessitates the involvement of special expertise. The complexity and resource-intensive application have been already recognized by multiple institutes. Despite the lengthy process to comply with all criteria, multilateral funds are, yet, the most popular and targeted sources of drought financing.

Box 9 | The collaboration of the multilateral funds

The secretariats of the multilateral funds, including the AF, GCF, GEF, and Climate Investment Fund decided on enhanced complementarity and collaboration in 2021. The commitment is based on three pillars: exploring synergies in programming, monitoring, evaluation and learning, and communication and outreach. The initiative is a great step towards more harmonized processes in access to the major climate financing mechanisms. A particularly important point is the goal of the development of methodologies and guidance to maximize the impacts through project design, monitoring and evaluation. A more harmonized reporting methodology will also pave the way for the systematic collection and aggregation of investment and achieved impacts (Ollikainen *et al.*, 2022).

The requirements of international funds bring benefit to the institutional environment too. Granted budgets are administered through an agreed institutional arrangement. Recipients, like this, are obliged to describe the disbursement mechanisms amongst stakeholders. Drought management is known to be a multi-actor process that implies the multitier administration of funds. If the institutional settings are not optimized, financial resources can spread thin, and transaction costs rise. Tested and efficient institutional arrangements that are created from the experience with international funds can be transmitted to the management of domestic funds then.

Domestic public sources are sizable reserves, but knowledge of domestic sources is in disarray. Although international and regional sources are the first to come to mind when drought financing is at issue, their monetary contribution does not exceed other sources in all cases. Domestic public resources are mobilized mostly through national tax systems, and even conservative estimations suggest that domestic resources have been already exceeding the registered official development assistance in many developing countries (Chiriack and Naran, 2020; Carrozza, 2015; UN, 2014). Some countries operate drought-specific funds, for example, the Future Drought Fund by the Government of Australia, the Emergency Relief Programme by the United States of America (2022), or the European Union Solidarity Fund. Nevertheless, most of the domestic financial resources are integrated into a multipurpose mechanism, such as disaster risk funds or agricultural funds. It is already evident that also developing countries finance drought resilience through domestic sources. One unique example is the Social Safety Net Programme of Ethiopia, which was designed to mitigate the effects of drought and facilitate recovery. The Government of Ethiopia set the goal to reduce donor dependency and shift the funding to national sources. The Social Safety Net Programme is established by recognizing the vulnerability of drought-affected communities. It offers options for beneficiaries to provide in-kind services to the recovery works, such as water network rehabilitation or infrastructure improvement. In turn, beneficiaries receive support in cash transfers and food supplies. Increasing drought resilience is not only a social but an economic accelerator in Ethiopia, as public spending on social assistance affects the margins for financial manoeuvres and the allocation to productivity-enhancing interventions (International Monetary Fund, 2018). Although the substantial economic and social cost of drought is increasingly becoming a driver of domestic spending, the information about the allocated budget for drought finance is scant (Burmeister, 2019). It is clear that dedicated funds for drought resilience are most relevant

for countries, where drought is frequently recurring and material to the national economy.

Box 10 | Public expenditure analysis tools as guidance for spending

Public expenditures analyses (PEAs) have been in practice for a long time. Spearheaded by the World Bank, the first Public Expenditure Tracking Survey was conducted in Uganda in 1996. Ever since then, methods and tools have been refined to depict an accurate picture of public expenditures.

PEAs are systematic assessments of the allocation, the management, and, occasionally, the effectiveness of public expenditures for priority sectors. United Nations Children's Fund (UNICEF, 2017) released a guide on the comparative assessment of public expenditure analysis tools. The assessment included the following, publicly available tools:

- **Public expenditure review:** used for the assessment of the quantity and the quality of public spending against policy goals and performance indicators.
- **Public Expenditure Tracking Survey:** used for the tracking of finance flows across the institutional levels to assess the bottlenecks, delays, and leakages of public funds.
- **TrackFin:** used for producing accounts of sector financing, national benchmarking, and cross-country comparison.

- Budget Brief: used for the analysis of sector-specific spending in the annual budget through performance indicators (adequacy, efficiency, effectiveness, and equity).

Furthermore, the PEAs can be purposed for very specific sectors. Relevant examples are the public expenditure in support of food and agriculture developed by FAO (2021b), or the social protection expenditure review developed by the UN. PEAs can be also combined with other types of analyses such as institutional reviews. The Climate Public Expenditure and Institutional Review methodology is an attempt to frame PEAs in the climate change context and analyze expenditure and institutions together (Bird *et al.*, 2012; UN, 2017). The combined approach is relevant also for drought finance because drought management operates at a tiered administrative level and across many institutions. An ongoing analysis of FAO shows the complexity of the institutional set-up. For example, over 20 authorities are involved in drought management in Kenya, and over 40 authorities in the Philippines. Tracking the finance flows and setting up a balance for the cash-in and cash-out are of paramount importance. Nevertheless, PEAs have not been adopted for drought management. A PEA framework for drought management could recuperate the missing information on domestic public sources and guide more efficient spending. Nevertheless, the development of the PEA framework should by no means take a top-down approach. Institutional set-ups are unique in each case and are often dynamic. A fit-for-purpose PEA framework should build on evidence to incorporate the diverse patterns of financial management.

The scale and required fiscal buffer of domestic public sources largely depends on the frequency and monetary consequences of drought events.

The measurement of domestic public resources for resilience building is inextricably complex but will be soon required to effectively assist national efforts. Except for some long-term investments, drought financing remains a contingent liability from the fiscal policy perspective (Serhan and Guohua, 2018). Therefore, it is less understood whether countries with moderate fiscal impacts could or should maintain dedicated funds such as natural disaster funds. More precisely, countries must define the tipping point when droughts turn into systematic financial and social consequences. Based on it, they can design the scale of the fiscal buffer. Wherever losses and damages are not close to systematic, and the opportunity cost of fiscal buffers would be too high, options can be the drought-proofing of development projects or ad-hoc resource mobilization methods such as activating contingency reserves. This way, impacts are mitigated without taking unreasonable institutional costs of specialized funds or jeopardizing the fiduciary duty of the state. Efforts should be invested to understand the borderline between the sufficiency of drought-proofed development approaches and the need for specialized funds. This could substantially increase the effectiveness of domestic sources. Undoubtedly, domestic public resources require additional regional and global resources to achieve national sustainable development targets, especially in vulnerable countries where the administration of domestic resources is not rigorous or transparent. Regional and global resources are also important to set standards and good practices for domestic sources so that risks associated with domestic spending can be reduced.

Box 11 | Estimating the size of fiscal buffers for drought management

The International Monetary Fund defines four guiding principles to estimate the size of the required fiscal buffers for disaster risk management (Serhan and Guohua, 2018):

- estimation of the fiscal cost of disasters, including direct and indirect costs;
- assessment of the ability to borrow in case of emergency, to cover the unexpected and out-of-budget costs of disasters;
- estimation of the opportunity cost of the fiscal buffers, including the impact on the development of other sectors; and
- forecast of the funding need to cover all phases of the disasters.

Opportunity cost is arguably the most critical point in the case of drought management because drought can become protracted but also infrequent in the long run. Nevertheless, drought can entail significant costs in multiple sectors, so buffers should have a large enough size to cover all. Building a fiscal buffer for a relatively infrequent disaster would imply an unreasonable trade-off at the expense of other development objectives. Therefore, developing economies must calculate opportunity costs in a prudent and realistic manner.

Private sources are rarely deployed, and the private sector is not yet convinced to partake in drought financing as private financiers are not supported to accurately assess the risk associated with investments in

drought resilience. Practices and literature on private sector investment in drought resilience are still scarce. The bottom line is that financial investors mind their own risk, regardless of whether it is a production-, market-, price- or climate hazard-related risk (PricewaterhouseCoopers, 2013). They only consider drought-related risk material if it affects their cost-profit expectations. Two approaches are used to address business risk to mobilize private investment: addressing the market imperfection and compensation for risks (International Development Research Centre 2018). A realistic example of the correction of market imperfection in drought management is the establishment of quality standards for monitoring systems, which can help investors make an accurate judgement of the triggers for market demands. As for compensation, risk mitigation measures such as public guarantees or shares in collective investment vehicles are time-tested practices. Reserved estimates suggest that official guarantees mobilized over 15 billion USD from the private sector for infrastructure development between 2009 and 2011 (OECD and World Bank, 2015). Multilateral development banks (MDBs), such as World Bank, operate guarantees programs to accelerate private investments, but to date, only a limited number of sectors reached a meaningful sum through guarantees. The energy and transportation sectors have benefited the most so far, but the surge in severe disasters can easily reshuffle the investment priorities. To bring agriculture into play, other missing baselines that hamper risk management must be restored:

- Monitoring and early-warning systems are not accurate enough to predict the severity and foreseen impacts of drought events.
- Communities are not mapped out to gain information about their financial needs and potential.
- Relevant investment types are not identified.

Risk quantification and risk management strategies can be crafted only if these conditions are fulfilled.

The potential contribution of the private sector cannot be defined without the identification of infrastructure-type mitigation measures. It is also fair to conclude that not all drought-related investments can or should be financed by the private sector. Private sector mobilization is concentrated on the third pillar of integrated drought management (IDM). Monitoring and early-warning systems do not generate revenue if data is not monetized, but data selling would have a negative effect on the poor, and, thus, work against the main global development objectives. Vulnerability and risk assessment, likewise, is a non-profit venture, without potential revenue generation. The third pillar offers a breadth of profitable interventions with different risk profiles, but the major concern is the diversity and the local-specific nature, which might diminish the market demand. Drought mitigation measures span from short- to long-term, from infrastructure to policy interventions. For the private sector, infrastructure-related measures are the most relevant. One critical gap is the lack of a systematically collected menu of required mitigation measures. Without a clear understanding of the demand side, there is no basis for opening investment talks.

Box 12 | Risk assessment tools for the private sector

There are many types of risk from an investor perspective such as liquidity risk, operation-related risk, market risk, etc. Since this report uses the private sector as an aggregate category of private financiers and commercial and for-profit enterprises, a proper typology assessment of risks cannot be constructed. Nevertheless, drought finance has some distinguishing aspects that determine how risk assessment should be carried out.

Firstly, the development context carries more risk, and individual investment cases cannot be assessed without detailed knowledge of the macro conditions. Although no stocktaking has been prepared to list the existing approaches in risk assessment for the private sector, some tools can be adopted to obtain a macroeconomic overview, such as the International Monetary Fund Financial Sector Assessment Programme, International Monetary Fund Early Warning Exercise, and International Monetary Fund – World Bank Public-Private Partnerships Fiscal Risk Assessment Module. The macroeconomic outlook is only the stepping-stone for a broader and more granular risk assessment that leads to the final investment decision-making. Screening against an investor's risk tolerance is not supported by international experience though. Despite the plethora of tools for climate risk assessment in private investment, these tools are limited to the physical risk of climate change to businesses, and no empirical methodology is available to assess the business risk in drought investment. Although financiers use complex and specialized tools and models to assess the risks, these are usually customized to specific profiles. No comprehensive tool or guidelines exists, which could support investors in integrating the specificities of drought finance into their risk assessment or modeling procedure.

Private sector engagement is happening but at a very slow pace. The self-awakening of the private sector might happen due to two different reasons: impacts becoming material for the financial sector, or arising business opportunities from drought management. As an example with regard to the former, decreasing yield together with the disrupted creditworthiness of smallholder borrowers is an indirect risk to a financial institute, hence, the financial sector perceives drought impacts as a business-operation-related risk. An example of the business opportunity is the increasing need for certain technologies to withstand droughts, whereas the private sector can tap on the gaps of upstream or downstream markets. Although drought risk is not yet mainstreamed in most of the businesses, more frequent and severe hazards will soon call for actions from the private sector. By that time, private sector must be prepared, and sufficient information must be available to react fast. To initiate the process, the public sector should provide indisputable evidence of financially feasible business options, viable delivery mechanisms, and tested models for engagement (Chiriac and Naran, 2020; PricewaterhouseCoopers, 2013; Buchner *et al.*, 2021; Murphy, 2022).

Box 13 | The integration of environmental and social governance (ESG) into private investments

Private investments are regulated by several reporting requirements and due diligence regimes. (Taganova, 2023). To date, the most comprehensive framework is the European Union regulation on sustainability-related disclosures in the financial services sectors. It aims to increase transparency in the market for sustainable investment products by requiring more precise disclosure standards. Financial market participants offering financial products are obliged to publish their Principal Adverse Impact disclosure as per the provision of the regulation.

The Principal Adverse Impact disclosure must declare through a set of metrics and indicators that the investment had no adverse effect on environmental or social factors. More and more private investors make further commitments by adopting non-financial performance indicators, such as ESG standards. Despite the unresolved conflict between the profit-maximizing nature of the private sector and the sustainability objectives, ESG-compliant entities can gain additional revenues. Many principle-based voluntary initiatives have been already set up to support the integration of ESG standards into private investment (United Nations Global Compact 2023):

- United Nations Global Compact, registering 21 892 participants in 162 countries.
- Principles for Responsible Investment registering 4 902 signatories with a total of 121.3 trillion USD asset under management.
- United Nations Environment Programme Finance Initiative, involving over 450 banks and insurers with assets exceeding 100 trillion USD.
- Equator Principles, involving 138 financial institutions in 38 countries;
- Principles for Sustainable Insurance, with 149 signatories and 102 supporting institutions.
- *Sustainable Stock Exchange Initiative, with 130 members.*

As ESG compliance shapes market demand by influencing customer preferences, more private sector actors are expected to adopt ESGs. To support a more consistent development of ESG investments and corporate responsibilities, more standardized and universally applicable guidelines and procedures are required to improve transparency, comparability, and quality of data (OECD, 2022f).

The private sector requires functional partnerships to be eligible for a wider spectrum of businesses. Beyond the complexity to define entry points with market potential, the scale of the required interventions is also a barrier. The private sector cannot be expected to provide solutions to all sorts of interventions. A major concern for private investors is that a better-performing water sector is a big part of drought resilience. Water availability is the core of drought management, therefore, investment in the water sector cannot be separated from investment in drought resilience. In the first step, the interdependency between freshwater ecosystems, the well-being of societies, and drought resilience must gain more recognition (Sayers *et al.*, 2016). If recognized, the private sector still has to align its strategies to the water management cycle, whereas certain steps cannot be taken away from the state, such as the policies on water allocation, surveillance of economic and social safeguards, or provision of the minimum required quantities. This, by default, limits the investment window. On the other hand, if private sector involvement is tied by the scale of intervention, coordinated delivery mechanisms, such as public-private partnerships including build-own-transfer or build-lease-transfer, can help overcome the dilemma and secure a good trade-off for both public and private actors. To unlock investment opportunities in the water sector, technology development and operation, and infrastructure management are promising entry points for the private sector.

Box 14 | Public-private partnership for drought resilience in Sub-Saharan Africa

Despite the yield- and resilience-increasing potential of irrigation, the vast majority of farms are rainfed in Sub-Saharan Africa. Irrigation expansion is timely and essential to move towards sustainability and resilience objectives. There is a relatively long but limited-in-number history of irrigation development in Sub-Saharan Africa, with many large-scale projects fading into dusk. Scheumann *et al.* (2017) concluded that public-private partnerships can address many factors that have previously hampered the efficient operation of larger-scale schemes. The common feature of successful public-private partnerships was the presence of farmer-owned liability companies. The private sector contributes to different tasks in irrigation management, including service provision or market access. Set-ups of public-private partnerships are always unique, and safeguards must be defined, but this is an encouraging approach to mobilize the private sector. And, by investing in water resource development, there is a direct and immediate impact on drought resilience.

Non-financial intermediaries are the missing link between financial sources and beneficiaries to manage financial risks. A little explored institutional actor of drought finance is the non-financial intermediaries, who could make investment deployment more impactful. In this context, and while there is no agreed definition of intermediaries, they are accredited or trusted entities that can mediate between finance institutions and recipients on demand. Mediation roles are of different types, for example, technical assistance, social and cultural engagement, information provision, layered financial mechanism, or monitoring and evaluation (Chaudhury, 2020). COVID-19 took the importance of intermediaries to new heights. International finance

institutes were restricted in their mobility, which in turn, impacted their ability to deploy, monitor and evaluate their investments (PricewaterhouseCoopers Limited, 2020; Laubenstein, 2021; Tageo *et al.*, 2021). Locally embedded, flexible, and well-connected intermediaries have a critical role in this situation to operate and maintain businesses (Omari-Motsumi *et al.*, 2019). Field-based client monitoring is a standard procedure to manage risk, but financial institutions must carefully balance the associated costs and the scale of risk (International Finance Corporation, 2014). This is where intermediaries can provide a financially optimal solution if client management is properly outsourced. Intermediaries should not be assessed merely through the entailed transaction and institutional costs but through the added value and the overall economic and social impacts of financing. A consortium led by the Humanitarian Advisory Group (2021) concluded that “the proposed future role is that intermediaries empower local and national organizations to drive, define and deliver principled humanitarian responses to needs in their communities.” Harnessing the potential of intermediaries and making them fit for purpose would certainly become a guarantee for inclusive and responsive financing.

The involvement of intermediaries should not be taken as a “cure-all remedy” though. Tripartite implementation methods can easily lead to a situation when national, including local, entities are bypassed, eventually, their capacities and ownership are not strengthened sufficiently to take over the responsibility (Green Climate Fund Independent Evaluation Unit, 2019). To avoid the exclusion, more emphasis should be given to the parallel development of national entities and local actors to accelerate the learning curve and conserve in-situ knowledge.

In the context of integrated drought management (IDM) and risk management, the delivery of pillar 2 “vulnerability and impact assessment” undoubtedly requires the involvement of intermediaries who are versed in

local dynamics. Also, mitigation measures are more likely to be embraced by communities if decision-makers and recipients are linked to each other. Intermediaries can act as a bridge across actors and communities. At a global coordination scale, the UNCCD applies a bottom-up approach to mainstream participatory processes in the implementation of the convention. Civil society organizations (CSOs) are fully integrated into the decision-making process of the UNCCD. On this matter, the Declaration of Civil Society Organizations Attending the Fifteenth Session of the Conference of the Parties called for further collaboration: “We encourage the parties to actively engage with CSOs as we are working closely with the communities where the practical actions on sustainable land management and restoration are being taken.” (UNCCD, 2022e, p. 25). The role of CSOs is not unrelated to the context-specific tasks of intermediaries. Yet, clear directions are missing for defining the typologies and terms of references, without which intermediaries and their contributions are not sufficiently integrated into the financing process.

Key messages

There is a need for a revamped taxonomy of financing in the context of drought. Conventional approaches have been largely restricted to grant-type financing, concessional loans, and agricultural insurance, but more ex-ante and flexible instruments are emerging to manage risk instead of loss compensation. While these instruments prove effective, their implementation is predominately done by public and humanitarian actors. Proactive and innovative approaches in finance, including risk-based ones must be piloted at a larger scale and results should be promoted to enhance the literature on lessons learned and provide successful business cases for scale-out and private-sector engagement.

The success of innovative instruments such as index-based financial products, largely depends on scientific progress. The more the science advances the more robust modelling approaches can be mainstreamed into insurance products to dispel any doubts about reliability and accuracy, and to generate buy-in.

Not all risks can be eliminated or mitigated, therefore, emergency financing still has a vital part to protect the vulnerable. Nevertheless, emergency financing has been reconfigured to achieve a more holistic impact. Integration of in-kind and non-financial measures, including the ones with social gains and prospective planning is necessary to address wider consequences beyond the economic impacts and to roll out resilience-building at the post-disaster phase.

The ultimate success of financing depends on the appropriate selection of instruments. Complementary and supplementary instruments can ensure that all types of impacts are addressed in the most effective way, thus providing safeguards to beneficiaries. Bundled or combined products are also effective to reduce the risk of investment for financing actors and making drought-risk financing more appealing. Innovation of combined products is beneficial to the recipients too. The emerging approach of premium and capital support opens the way for the most vulnerable to access affordable insurance products.

Public sources still dominate the finance landscape of drought risk management. While public sources have the important function to allocate resources efficiently, the diversification of financial sources is necessary to integrate the private sector, thus, to fill the finance gap.

Domestic public sources have a substantial contribution to building drought resilience, but they are neither tracked nor sufficiently assessed. The

establishment of national tracking systems, for example, specialized public expenditure reviews, is of utmost importance to understand the financial needs and the modality of the delivery mechanism. This can also define whether drought events are frequent or material enough to maintain specialized funds, or it is sufficient to finance drought resilience by drought-proofing development projects. Another role of public expenditure analysis is the optimization of institutional arrangements that are known to be intricate in the case of drought management.

Technical assistance is a critical instrument to improve readiness. Nevertheless, readiness programmes often overlook the potential of private sector inclusion. Drought finance is even more intricate, as it is still surrounded with many information gaps. Extended functions of technical assistance programmes should fill the void by addressing the information asymmetry and opening the way for private sector inclusion.

Decision-making should be facilitated through the development of a common vocabulary of drought finance, as the first step of abolishing information asymmetry. The language of the finance sector should be gradually mainstreamed into drought management operations to support the understanding of risks and potential for financial actors.

Private sector involvement in drought financing is far from being sufficient. To increase the contribution of the private sector, tested models, financially viable business options, and facilitated delivery mechanisms are required. Also, private sector contribution is almost entirely limited to the infrastructure-type measures related to the third pillar of integrated drought management (IDM). Nevertheless, no comprehensive menu of measures has been set up, thus hampering the identification of entry points for private sector involvement.

Risk management strategies are the ultimate deal breakers in businesses, and private investors use their own systems and models to screen investments against their risk tolerance. Drought finance is a special segment of investment, which requires additional or different measures to manage risks. Tools and guidelines on integrating drought-specific measures into risk management strategies or risk functions could enhance private sector engagement.

Large-scale investments that tap on the potential of natural resources have a deterrent effect on the private sector. Irrigation development is a typical case of big-ticket investment for drought resilience in agriculture. Therefore, private sector involvement calls for more innovative financing mechanisms, such as private-public partnerships.

Non-financial intermediaries play a decisive role in effective and inclusive resource distribution. Intermediaries act as a bridge between financial institutions and communities. The definition of a more fit-for-purpose profile is required to enact intermediaries to fulfil their role.

Enabling pathways for drought finance

Acute barriers to drought finance

Drought finance and agricultural finance share the same barriers, and smallholders are at the heart of the process, but smallholders are not directly linked to the financial actors. Drought finance has the same and very similar challenges as development and climate finance, as explained previously. Being more specific, smallholders as the target group is another challenging characteristic that is shared by both drought and agricultural finance. The same concern arises when market segmentation and customer profiling are carried out in agricultural development programmes. The effectiveness and impact of financing largely depend on the ability to strengthen the currently fragile link between investors and smallholders (World Bank, 2016). The thorny path between smallholders and financial actors starts with the risky business of agriculture, which has been a long-standing challenge. The low-profit margins, high market and field risks, and questionable profitability are among the factors that tighten the investment criteria and, eventually, limit the availability of financial products at affordable prices (FAO, 2016b).



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The International Fund for Agricultural Development listed the major barriers to financial access of smallholders in developing countries, including the poor legislative frameworks at the national level, the lack of enforcement mechanisms, the uncertainties related to land tenure rights, the lack of collaterals, and the physical accessibility of remote areas (Chiriac and Naran, 2020). Looking at the larger picture, the International Finance Corporation distinguishes three types of barriers to investment: financial, structural, and information and capacity-related (Tall *et al.*, 2021). These together deter financial actors from investing. Many of the barriers can be addressed only through public interventions and adjusted policy frameworks, as they constitute the pillars of enabling environment.

Another material issue is the high transaction cost that is directly rooted in the nature and characteristics of smallholders. There are two main reasons for high transaction costs: the scale and the diversity of smallholders, and the low pace of bank account penetration. The homogeneity of smallholders in developing countries is a misconception, as even farmers within communities have varying levels of resources and capacities (Salman *et al.*, 2022). The diversity, then, engenders further complications for investors, because the chain of fund allocation entails disproportionately high transaction costs, and the lack of detailed information about farmers raises the risk profile (Mahul and Stutley, 2010). Understanding the unique features of often-remote smallholders is a resource-intensive process. The issue is even more salient in the case of semi-commercial or subsistence farmers who take part only at certain stages of the value chain, so there is no sufficient market information to characterize them. (International Finance Corporation, 2014). A reasonable prospect is that this issue can be addressed at the individual level.

Due to the unilateral scientific progress on drought, development is outpacing understanding. The root cause of all barriers boils down to the lack of knowledge that surrounds the drought-finance-smallholder nexus.

This concern was already expressed when information asymmetry was discussed. However, information asymmetry appears at different scales, and it is important to take stock of the situation. The knowledge gap hampers both the definition of risk mitigation options and the evaluation of such options, including the quantification of business risk (Burton *et al.*, 2002). Smallholders are mostly concerned by the first problem of the definition of options. Enormous efforts have been put to define mitigation measures in IDM, but much of this remains at the pilot level, conducted by academia and development organizations. It is less clear how projects empower communities to drive the process. Functional literacy approach is still the most popular knowledge management tool in rural community development (UNESCO, 2019). Functional literacy, by definition, is limited to very specific subjects that are directly related to the livelihood and the mainstay of communities. When agricultural development is contextualized in the domains of drought management and finance, more integrated approaches are required to convey sufficient information. Innovation in knowledge management is necessary to combine these domains and convey learning materials to an underserved stakeholder group characterized by a high level of illiteracy (Zelezny-Green *et al.*, 2018).

Addressing the systematic issue of the knowledge gap is not as clear as it appears to be though. Knowledge gaps are of different types, including lack of data and information, lack of access to existing knowledge, lack of systems or tools to generate and process knowledge, and lack of methods to transform and correlate the levels of knowledge (e.g. from science to community level), lack of access to the physical infrastructure of knowledge management, and lack of approaches to integrating sector-wise knowledge (UNFCCC and UNEP, 2016; Nakashima *et al.*, 2012). The lack of access to existing knowledge, physical infrastructure, and methods for information transformation is relevant and decisive rather to communities. The scientific

knowledge must be translated into actionable measures, while the definition of measures should, in theory, be always bottom-up. The actual understanding of drought measures and their alternatives is just unfolding. At the local level, no in-depth stocktaking has been undertaken to assess the technology needs and match them with the alternatives in the markets. The lack of disaggregated menus of required technologies does not appear as market demand then. Thus, investment portfolios are not substantiated with real-term needs. The lack of knowledge requires a more intense collaboration among stakeholders. The iterative process assumes that researchers and communities must have at least two points of contact. The first is the assistance to provide data for the formulation of risk mitigation options. The second is the weather service to provide information about the forecasted drought, thus defining the timing of mitigation options. To address both, umbrella infrastructure for information dissemination and localized interventions for community development are both required. Gupta and Hisschemoller (1997) argue that climate change adaptation, including drought risk management, requires dissemination and information platforms.

Broader knowledge of projections and forecasting is not sufficiently diffused, although it is needed also for the financial sector to understand the demand of customers and prepare for expanding the business potential. Data and information generation is the most discussed and targeted knowledge gap type in IDM. Countries have already recognized the importance of monitoring and early warning systems, and all countries that joined the Drought Initiative of the UNCCD have established systems. Nevertheless, information should be scaled and conveyed to a larger stakeholder group. For example, the accuracy, resolution, and explanatory power of many systems are far from the required level of the financial sector. A survey conducted by the United Nations Environment Programme Finance Initiative (2011) found that financial institutions require extensive support in obtaining reliable

predictions of climate change impacts and disasters. Such predictions are fundamental for understanding the business risk of investment.

Drought management is even more intricate than other disasters or adaptation options because risk mitigation measures depend on the continuous availability of science-backed forecasting infrastructure. If financial institutions have no sufficient capacity to operate sector-specific technical units, they seek alternative information sources for their decisions such as public data or external experts. To date, no drought event can be predicted with absolute certainty, to say nothing of the expected impacts. Within the financial sector, insurance companies are the most equipped for disaster prediction, but they often prefer to establish their own infrastructure at the micro-level, so to create a direct link with the served communities. The survey of the United Nations Environment Programme Finance Initiative revealed that different financial institutions are similarly concerned about the recorded increase in weather-related damages and the potential future increase. Changing frequency and severity of drought events have twofold impacts. Firstly, financial institutions must review the risk management mechanisms of their existing portfolios to address the physical risk of drought on their operation. On the other hand, changes induce new and intensified demands for risk transfer, thus creating more business opportunities (UNEP and Sustainable Business Institute, 2011). In turn, business opportunities can be seized only if the private sector is supplied with data and information that can be integrated into their risk quantification methods.

Drought awareness is waxing and waning as the result of drought periodicity. The report of the United Nations Secretariat of the International Strategy for Disaster Reduction (2007) concluded a more in-depth recommendation: “an investment in human resources by increasing individual capabilities across generations is likely to have more lasting value than other investments or measures to reduce risks”. Despite the importance of investing

in human capacities and awareness, drought management is often faded by other liabilities. Both at state and household levels, the prioritization of investment is often based on the presence of actual risks. Drought is a recurring natural hazard but often happens at long intervals, thus disincentivizing the affected stakeholders from maintaining preparedness and investing in mitigation measures. If drought happened in the distant past, other, more pressing issues can easily subordinate the investment in mitigation measures. The myopic investment behavior is not unique to disaster risk but requires a different, technology-based approach in the case of drought management. One of the frequent criticisms against drought monitoring and early warning systems is retrospective or real-time information production. If the warning is activated only when drought is about to strike, only limited and rapid solutions can be used to mitigate the impacts. In the worst case, monitoring systems are not even in place to inform decision-makers. This is why emergency and food assistance programmes are still dominant in drought finance. Knowledge development itself is not sufficient to break the vicious cycle of react-invest-neglect. Long-term and permanent drought awareness is required to maintain even finance flows into resilience and preparedness. However, only a few resources are available to increase awareness in periods when no actual drought risk occurs.

Box 15 | The concept of “disaster myopia”

The disaster myopia theory was developed by Guttentag and Herring (1986) to investigate the reason of recurring crises in the financial sector. Roughly summarized, it argues that under optimal conditions, the investors disregard the significance of the information about the increasing risks, and the longer the non-crisis period the more the adverse outcomes are underestimated (Cornand and Gimet 2011).

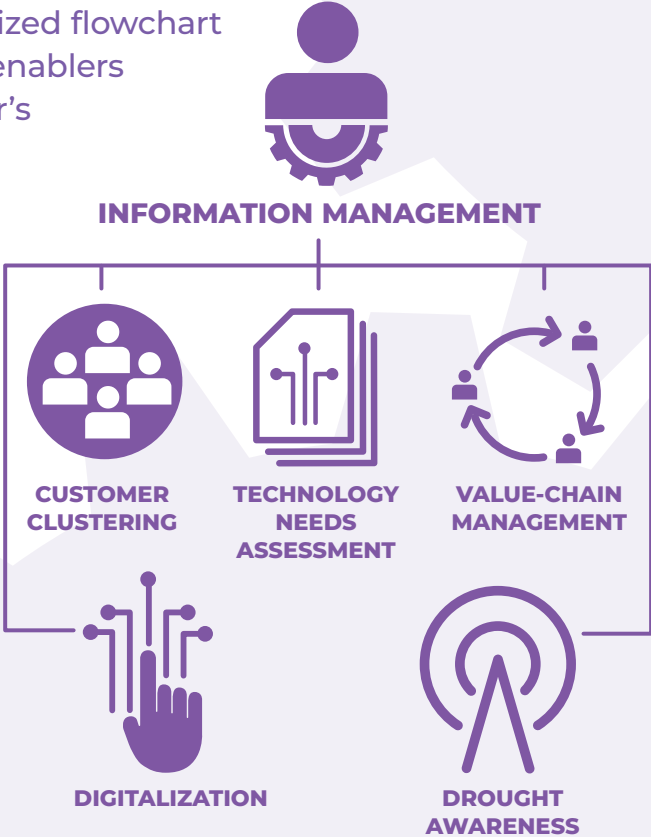
Disaster myopia carries connotations with low onset and infrequent disasters such as drought, with the difference that the recurring crises in the financial sector are self-induced while climate disasters are natural processes. Nevertheless, the lack of action to mitigate the risk is controllable. There are regions such as the Horn of Africa where drought is relatively frequent, and countries have been constructing programmatic actions to manage risk. Nevertheless, drought awareness and preparedness are not common in countries with infrequent occurrence. Access to information is crucial to overcome the myopia because unlike many economic and political shock, drought can be managed at all levels. Even if the political actions are late, households can decide to invest in mitigation within their own abilities.

Alternative enablers of drought finance

Some complex and holistic challenges cannot be resolved merely by new approaches in drought finance, but in-situ coordination of actors can help address others. Governance-related and holistic barriers such as legislative frameworks, land tenure rights, or access to remote areas cannot be reduced without multi-sectoral public interventions. These processes are likely to evolve together with the development finance in agriculture and rural development. Alternative directions must be explored, which either operate at the

community-level or are drought-specific. A practical approach is to define pathways that can abolish the acute barriers and can be initiated by the development and financial community, without setting unrealistic pre-conditions. The solution lies in the approximation of communities and financial actors. If a direct interaction can be created without being dependent on long-term public interventions, the process can be partly transferred to the stakeholders. To this end, six independent but complementary enabling pathways are discussed. These pathways are short-term and realistic strategies to drive drought finance forward (Figure 14).

Figure 14. Stylized flowchart of alternative enablers (source: author’s elaboration)



- 
 information management as the core infrastructure and vehicle of the enabling process
- 
 digitalization as means of interface and channels amongst the financial actors and recipients
- 
 drought awareness as means of interface and channels amongst the financial actors and recipients
- 
 technology needs assessment as a tool for value proposition and market analysis
- 
 customer clustering as strategy for demand management
- 
 value-chain management as strategy for demand management

The alternative pathways can contribute to a more intense finance flow toward drought risk management, but they act in different ways. One thing they have in common is that they create a link between the finance provider and the recipient. Also, they are critical elements of or solutions to business risk management, thus they are able to reduce information asymmetry.

Digitalization is a key enabler to intensify drought finance through better information management because it creates an interface between the financial actors and smallholders, but the sluggish progress in financial inclusion impedes its potential. Digitalization of the financial sector is possibly the most powerful way to overcome many barriers, including information asymmetries, inaccessibility of clients, or high transaction costs of financial operations. Digital solutions are already in use to create a customer interface and channel, for example through customer profiling and collection of reliable information about farmers (International Finance Corporation 2014). Nevertheless, there are still countries with over 90 percent unbanked adults, and even the most covered regions such as East Asia and the Pacific have only around 50 percent adult population with bank account (Sile, 2013). Furthermore, online banking is often limited to simple transactions such as money transfers and online payments. The recent coverage of banking services is, in fact, a major barrier when financial strategies for drought management are developed. Much of the drought impacts could be mitigated at the household level through risk retention methods, such as micro-saving if financial inclusion could be facilitated. Also, documented credit history and tracked financial records are sufficient evidence for financial institutions to make informed decisions. More than ever, the financial inclusion of smallholders must be accelerated to operationalize drought finance and to direct resources to end-users.

Digitalization is a promising strategy not only in terms of conventional financial services such as money transfer. Many digital solutions in the finance sector have extended functions to combine sector-specific information with financial services, a configuration often used by health insurance

companies. The agriculture sector too registers successful pilots in this area. An example is the multipurpose mobile applications that serve both farmers and insurance companies. Farmers have access to real-time recommendations on best practices, while the app provides reliable information to financial institutions. Digital solutions are useful information brokers that can be integrated into almost all phases of drought finance.

Drought awareness is both an interface and channel amongst actors, but it can only be achieved if drought information systems are designed for longer-term predictions and through end-to-end system configurations. Even sophisticated early warning systems are limited to around a month-ahead forecast, while a season-ahead forecast is nearly unavailable. Even if complex climatic processes diminish the ability to make longer forecasting, drought awareness is not only about the communication of catastrophic events. If information distribution is near-continuous, even though a drought event is not forecasted, stakeholders remain aware of the risk and are more incentivized to invest. The architecture and the content of the information flow require further investigation, as drought is not a linear process of few climatic parameters. Drought awareness can be addressed through weather parameters, such as rainfall, or bio-physical conditions, such as changes in water flows. Communication of drought is a local-specific process, and many countries have already constructed strategies in their national drought plans. Operationalization of the communication channels is a timely action to increase drought awareness.

Access to data and information is exclusive in many countries, because either the responsible authorities restrict the data-sharing or the protocol to obtain data is too intricate. Nevertheless, appropriate mitigation measures are built around relevant information. End-to-end systems can help create a link among the concerned parties and provide homogenous information along the chain. Ideally, early warning and forecasting systems that can be managed directly by communities are the most efficient ones to ensure inclusive information flow. Early warning and forecasting systems require

specific technical knowledge, resources for maintenance and access to customer service and repair shops. Even inexpensive and user-friendly technologies have a relatively slow uptake. Large-scale programmes for the production and distribution of community-centred early warning and forecasting systems must be constructed to pave the way for predictable and planned investment in mitigation measures at the household level.

Access to reliable and relevant information is the bottom line for drought finance, but existing information portals are built around technical measures. Many comprehensive portals and systems are constructed to support the implementation of integrated drought management (IDM). These portals usually represent two thematic lines: monitoring and early warning systems based on remote-sensing technologies, and systematic collections of mitigation measures. Such portals are gap-filling and play a major role in knowledge transfer. Nevertheless, many of them fail to display granular information that can inform financial actors. There is an abundance of information that can support drought finance, but obtained knowledge is not yet synthesized. This means that information management should be created around a pre-defined architecture that is aligned with the steps of investment decision-making. The IDM pillars are good starting point to do so, but information portals are not yet structured in a way that could attract and support investors. Even though some systems can predict drought events with high certainty, they do not create a link between the prediction and the estimated impacts. Next-generation systems should enhance the synergies amongst the three IDM pillars to support financial planning. For example, if monitoring and early warning systems can depict a pattern of drought events at the micro level, data should be available on the specificities of the local economies and households. This information is sufficient to define concrete mitigation measures, towards which financing should be directed. Such complex information can support financial actors in setting up an investment portfolio and constructing risk management strategies.

Technology needs assessment can stimulate investment by supporting the value proposition, thus, it supports the creation of a market from both the demand and supply sides. Many countries have already completed their technology needs assessment in the context of climate change. The results of the assessments set out a menu of technologies that are needed to fulfill the national mitigation and adaptation objectives. Technology needs assessment is required also in the context of drought, and they must be accurate enough to map out the potential technology markets. The investigation of drought-related technology needs is a pre-requisite of private sector involvement, without which there is no basis for conducting proper business risk assessments. As discussed previously, the private sector's interest is centred around the third pillar of mitigation measures, more specifically, the infrastructure and technology-type measures. Technology needs assessment supports the investment decision from two directions. First, it informs investors whether a mitigation measure has a demand, so to finance a business case. On the other hand, it mobilizes the supply-side actors and guides their production line.

Technology needs assessment is not only about the prioritization of demanded technologies but the optimization of investment by lining up alternative mitigation measures. Furthermore, it provides information for the cost-benefit analysis of the technology production. Drought is a hazard that can be mitigated through multiple mitigation measures. For example, a smallholder scheme can be made resilient through the development of a complex irrigation system at system- and farm-levels, or through the provision of water tanks for supplementary irrigation. Also, drought resilience can be built through inexpensive farming practices that improve soil water retention in the same scheme. While these measures address the same drought impact, the required technologies and their costs operate at different scales. Nevertheless, the lifespans of these technologies, thus the sustainability vary. Investment decision-making is a complex process, but technology needs assessment is the first step to understanding the subject

of the investment. To secure market demand and technology uptake, the assessment must directly involve the beneficiaries.

Affordable and scalable products of drought finance must reach economies of scale to understand the scale of demand. When the dilemma of proper customer profiling is solved through better information management such as digital solutions, the next step is to cluster smallholders based on similar characteristics and needs. On one hand, a drought event is an acute physical risk from the perspective of financial institutions (Impax Asset Management, 2021). Droughts can turn into systematic or idiosyncratic risks, depending on the severity, expansion, and duration (Aglietta and Espagne, 2016). If droughts develop a geographical or spatial pattern, the risk can be called systematic, and most literature refers to drought as a systematic risk (UNDRR, 2021). However, this categorization can be interpreted differently if drought is not recurring in the short- or medium-run, or when its impacts occur in a sporadic manner. Despite the cumbersome rating of drought risk, drought financing is more explicit than other climate threats with clear systematic risks, such as temperature increase or change in rainfall pattern. Another enabling condition is that drought impacts are spatially predictable in a relatively homogenous environment once drought strikes. Simply put, it is very unlikely that two neighboring farmers measure different impacts on the same production systems. This is an important aspect for investors or private sector actors who aim to develop and sell products. Meaningful investment requires a certain scale of economies at the lowest possible transaction cost. Drought complies with this criterion, as the risk is mutual and similar to a large number of communities. The challenge is to carry out a sensible segmentation exercise to identify farmers with similar needs and potential mitigation actions. Once a reasonable scale of the group is obtained and the needs are translated into project pipelines, the demand can be matched with existing portfolios or new, drought-specific portfolios can be developed. The process also supports standardization and rating. A larger customer base, then, can

become appealing also to the private sector. The public sector, national entities, development agencies, and NGOs play a fundamental role here, as they have the necessary knowledge to understand both parts of the equation.

Box 16 | The relevance of homogenous customers to weather index-based insurance

The basis risk of parametric insurance is relatively high. Basis risk is defined as the difference between the actual loss and the received pay-out. As index-based insurance is based on projection and not on actual impacts, fully accurate estimation is not possible, but the margin of error can be decreased to the minimum. In general, the modelling of index-based insurance is more robust in areas where the impacts are homogenous, and the correlation between the loss and the peril is without doubt (International Fund for Agricultural Development, 2011; Weingartner, 2022). Pooling of farmers with similar risk profile can improve the scalability and delivery mechanism of insurance products.

While technology needs assessment is a strategy to map out the market, customer clustering informs the market size, its location, and potential expansion. Customer management and technology needs assessment are interlinked and complementary pathways that act on the supply and demand sides.

Value-chain approaches can integrate the entire range of stakeholders of drought finance in a way that risks associated with the different produc-

tion phases can be systematically eliminated and demand is guaranteed. While enabling environment is fundamental for financing, its creation is a reciprocal process, as financial institutions too can guide farmers to identify risk management strategies. The most evident area is the role of financial instruments to shape national cropping patterns and food production systems. Traditional cropping patterns move only very slowly, depending on the market dynamics, the available agro-technology, the traditions, the willingness of farmers, and the national policies. Nevertheless, if certain crops are regularly affected and fail to withstand climate hazards such as drought, there is a need to diversify. Diversification is an income-increasing strategy, and financing institutions often promote it to secure a return on investment. Even though it is a risk for farmers because they are requested to venture into a new production system. If upstream and downstream markets are not carefully mapped and prepared, diversification might succeed to build drought resilience at the production phase but fail to provide benefits for farmers. For example, the introduction of new crops without establishing post-harvest facilities and market links to processors is beyond the risk level that farmers could bear. The same applies to the livestock sector. If destocking must take place as a response to drought, the existence of functional markets and processors is crucial. This includes ad-hoc and effective coordination amongst slaughterhouse facilities, traders, marketers, veterinary services, food safety services, and others. (Veterinaires Sans Frontieres, 2018). In conclusion, it is not sufficient to profile only farmers and their practices, but the entire agricultural value chain must be understood to assess the financial prospects.

The value chain approach is a potential pathway toward profitable and risk-free investment in drought resilience (FAO and UNDP, 2020; International Finance Corporation, 2014). There are several advantages that can be exploited in drought finance. For example, value chain management

enhances cohesion amongst the actors. Drought management requires the coordination of multiple actors, and having an umbrella mechanism can help move stakeholders toward a common objective while using streamlined institutional channels. On the other hand, value chain management involves markets from the demand side. Involving buyers and downstream markets can make sure that the production responds to the demand. Finally, the value chain approach can guide the right actions to eliminate risks such as the risk posed by drought. Contract farming is an option for value chain approaches where investors have a space to control and manage production risks, while market risks are eliminated by the business strategies of contractors. Contract farming is a pre-arranged agreement between farmers and buyers, whereas the terms and conditions of the production are agreed in advance. The first-generation contract farming agreements were focused on the production quality, quantity, and timing from the supply side, and the price from the demand side. A large share of new and extended contract farming agreements has additional articles that bring social and environmental benefits. Contract farming can be an instrument of capacity-building and technology transfer if contractors are encouraged or obliged by law to support communities (International Institute for the Unification of Private Law *et al.*, 2015). Development banks have been already pioneering innovative approaches to include climate-resilience measures as special contractual terms. If the private sector is trained on contract farming compliant with social and environmental safeguards, the diffusion of information, knowledge, or technologies of drought-resilient farming is likely to speed up. This can eventually support an in-situ mechanism of capacity-building in areas where no risk mitigation measure is practiced.

Key messages

In terms of barriers, drought finance has a lot in common with development finance in agriculture. Analyses show that many barriers are related to systematic and governance-related issues such as poor regulatory and legislative environment or the incompleteness of rural infrastructure. Drought finance itself is unlikely to resolve these barriers, but progress in development finance can surmount some of them. Alternative strategies that create a direct link between communities and financial actors can enhance the in-situ intensification of finance flows. The creation of the link can lead to better information management that, in turn, can reduce information asymmetry.

Access to finance depends on the status of financial inclusion at the community level. Delivery of funds and access to financial services go hand in hand. The digitalization of the financial sector is a great opportunity to improve access by establishing a direct interface between financial institutions and smallholders, but there is a large disparity amongst regions and countries. Increasing the rural coverage of financial inclusion together with access to online banking services is a fundamental strategy to tap on more financial resources.

The knowledge gap in drought management and drought finance cannot be addressed through the traditional ways of capacity-building, because it integrates multiple sectors and sciences. To address the gap, scientific advances should be translated for a broader range of stakeholders. Furthermore, information dissemination should be structured in a way that is meaningful for the financial actors too. Accessible and easy-to-interpret information can guide investment decisions then.

Drought is a slow onset and periodically recurring event. The longer a drought event happened, the less risky it is perceived. Thus, stakeholders become “drought-myopic” and are less incentivized to invest in risk management.

Future projections of drought events and the inclusion of end-users into the information chain are critical to maintaining drought awareness.

A poor understanding of the technology needs hampers the investment and the diversification of financial sources. Investors’ interest is centred around the infrastructure and technology-type measures that have a clear market demand. Technology needs assessment is fundamental to the definition of the subject of drought measures, thus to the creation of markets. It is a tool to support investment decisions and optimization through the stocktaking of needed measures and the analysis of realistic costs and benefits. Protocols for drought-related technology needs assessments should be developed and conducted to assess not only the technology requirements but the related financial needs.

The diversity of smallholders must be addressed during the design phase of financial instruments such as innovative insurance products. Re-aggregation of farmer groups based on similar patterns requires the support of the public sector. Nevertheless, it is a demand-side strategy to optimize and understand the market potential. Customer clustering is even more important in drought management, because drought mitigation measures are widely varying, based on the local contexts. Individual needs must be, then, aggregated to find solutions at affordable prices.

The feasibility of financial instruments requires an iterative process between smallholders and the financial actors. Recommendations to change farming systems to improve resilience should be taken with precaution to avoid increasing farm risks. Value chain approaches, such as contract farming, should be preferred to reduce the market risk of drought-resilient production forms. Value chain approaches can also guarantee the demand and coordinate stakeholders under one umbrella.



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Conclusions

Integrated drought management (IDM) requires new approaches in finance to complete a paradigm shift. The report investigates the finance- and drought-related challenges that have so far hampered financing, the innovative financial instruments, and the financial sources that are suitable to mitigate all impacts of drought. It also explores enabling pathways that support the intensification of finance flows.

The implementation of IDM cannot be planned without predictable and accessible financial resources. However, there is a tight and prudent supply of resources due to the uncertainties surrounding drought. Financial sources, right now, are concentrated in the public sector, and the persistent barriers do not allow new participants to enter the domain. Barriers must be addressed to the most possible extent to diversify the sources, thus closing the financing gap.

Innovation in finance is needed along the entire cycle of resilience-building, from risk financing to post-disaster relief. Innovations must work towards enhanced preparedness and measurable impacts, so finance can be put in the service of integrated drought management. Innovative financial instruments are effective to mitigate all impacts if used in conjunction, but the best mix must be assembled in a context-tailored manner.

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Drought finance requires continuing and concerted efforts to build common understanding amongst actors. It needs coordination across horizontal and vertical stakeholders and also enabling private sector inclusion. Strategies to create direct links amongst beneficiaries and other stakeholders, including academia and financial institutions, is a desirable way to intensify finance flows.

Drought finance is a relatively new domain that calls for further work in terms of both theoretical and practical development. The aim of this report is to roll out a large-scale programme towards this objective, by building a basis for further knowledge resources.

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Annex

Methodology background of statistics about drought financing

The following description explains in sequence how the dataset of drought finance statistics was compiled. The data was extracted from the OECD DAC library and reporting system, the most comprehensive information system for development finance to date.

Rio Markers. OECD DAC applies the Rio Markers to define the contribution of the ODA to the Rio Conventions on biodiversity, climate change, and desertification. In total, there are five Rio markers: environment, desertification, biodiversity, climate change mitigation, and climate change adaptation (introduced only in 2010). Drought, by default, belongs to the desertification marker. The recommended adjustment to the eligibility criteria of desertification marker refers to the activities related to the 1) protection or enhancement of affected ecosystems, 2) integration of desertification, land degradation, and drought concerns with recipient countries' development objectives, 3) developing countries' efforts to meet their obligations under the Convention and voluntary targets. However, the reporting system does not include further sub-criteria to separate the target areas, therefore, drought-related projects cannot be identified in the "desertification-marked" dataset (Organisation for Economic Co-operation and Development, 2022b).

Double-counting. Another particularity is that projects can be reported with multiple Rio Markers. For example, many drought-related projects are marked under desertification and climate change at the same time, as drought events are often attributed to climate change. The aggregation of projects marked with different markers might lead to double-counting. Therefore, it is recommended to use only one Rio marker to compile the dataset.

Publication method. Desertification marker is published in the Creditor Reporting System database, which is an online, interactive system to explore official development assistance statistics. The search criteria include the following attributes: donor, sector, marker, year, and amount type. However, disaggregated project information, including the project descriptions, cannot be retrieved, so manual search criteria cannot be applied to filter drought projects. The climate change marker is also reported in the Creditor Reporting System, but project-specific data can be downloaded in spreadsheet format. This enables manual data management to search drought projects. Using a climate marker to analyze drought finance is more accurate than the desertification marker that aggregates all projects compliant with the eligibility criteria. Consequently, this report uses the dataset of "climate change-marked" projects, 2000-2020. The dataset provides detailed information about the project objectives, thus enabling the screening of drought-related projects.

Perspective: The OECD DAC system registers projects from two separate perspectives: recipient and provider perspectives. The "recipient" perspective includes projects from bilateral and multilateral providers, while the "provider" perspective includes projects from bilateral providers. The report uses the dataset compiled as per the methodology of the "recipient" perspective because it provides a more accurate picture of the projects effectively reaching the partner countries.

Project selection. The dataset of climate change finance is downloaded in spreadsheet format filtered by keyword search. The search process used ‘drought’ and its wildcards as keywords to screen the titles and descriptions of the projects. The search returned over 1 200 records that include drought either as main or partial scope. The search process does not take a more granular approach, as many project documents are not available to assess the significance of drought within the project activities. Therefore, all climate change-marked projects that include drought as the main or sub-component are included in the statistics.

Climate change objectives. The projects marked with climate change are sub-categorized into adaptation and mitigation objectives. A project can have both objectives at the same time, depending on the objectives of the sub-components. As mentioned in the definition of the project scope, this report puts emphasis on adaptation, as mitigation can build drought resili-

ence only in the long term, and the causal relationship between mitigation and drought resilience is non-linear. Therefore, the report gives more emphasis on projects with an adaptation objective.

Scoring: The scoring system for markers distinguishes three degrees of objectives: principal, significant, and not-target. For definition clarification, ‘principal’ means that the objective (adaptation/mitigation or gender-related) is explicitly stated as fundamental in the design of, or the motivation for, the activity; ‘significant’ means that the objective (adaptation/mitigation) is explicitly stated but is not the fundamental driver or motivation for undertaking it; “not targeted” means that project activities do not target the objective in any significant way. This report includes only those projects in the dataset, whereas the project objectives are scored as principal or significant.

Glossary

Basis risk: basis risk, in the context of parametric insurance products, is the probability that the insurance does not pay out the actual incurred losses due to the mismatch between the index and the on-ground reality. Basis risk can be the failure in triggering pay-out, overpayment, or unequal payment amongst beneficiaries with the same degree of losses (International Association of Insurance Supervisors, 2018).

Bundled product: bundling financial products such as agriculture insurance with other financial services, such as credits to reduce costs or mitigate financial risks (Mukherjee *et al.*, 2017).

Cash flow waterfall: the priority order of payments, in other words, the cash inflow and outflows. It includes the distribution order of the capital by seniority, from senior debt to preferred equity.

Climate finance: climate finance refers to local, national, or transnational financing—drawn from public, private, and alternative sources of financing—that seeks to support mitigation and adaptation actions that will address climate change (UNFCCC, 2022a). In this report, climate finance refers to the finance of climate-related hazards, which happen with or without climate change.

Co-benefit: in the context of climate change, co-benefit means an integrated approach to address climate change concerns while meeting development objectives simultaneously (Ministry of the Environment of Japan, 2008). In the context of adaptation, so as of drought management, adaptation co-benefit refers to a socially, economically, and/or environmentally desir-

able outcome that is generated from the implementation of an adaptation policy or measure. Co-benefits fall generally into two categories: climate (i.e. mitigation or adaptation) and non-climate (i.e. development) benefits (Crumpler and Meybeck, 2020).

Concessional loan: loans with more generous conditions than market loans through, for example, lower interest rates or longer grace periods (OECD, 2022d).

Disaster risk finance: finance that addresses the fiscal impacts and economic losses caused by natural hazards and supports countries to increase their financial resilience to natural disasters. Under risk finance, this report refers to the finance for the entire cycle of resilience-building, including long-term and short-term investments (World Bank, 2022b).

Early response: actions taken directly before, during, or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety, and meet the basic subsistence needs of the people affected (UNDRR, 2022a).

Foreign exchange risk: the risk entailed by the changes in the exchange rates between currencies, which can impact the financial performance of the position of businesses. (Corporate Finance Institute Team, 2022a).

Fragility: the combination of exposure to risk and insufficient coping capacity of the state, systems, and/or communities to manage, absorb or mitigate those risks. Fragility can lead to negative outcomes including violence, poverty, inequality, displacement, and environmental and political degradation (OECD, 2022e)

Functional literacy approach: functional literacy refers to the capacity of a person to engage in all those activities in which literacy is required for the effective function of his or her group and community and also for enabling

him or her to continue to use reading, writing, and calculation for his or her own and the community's development (UNESCO, 2022).

Indemnity insurance: the insurance contract which pays out the compensation based on the value of the net loss. Payout is determined based on the assessment of losses or post-event (Centre for Disaster Protection, 2022).

Materiality: events or information are material when they affect the decision of investors. In accounting, material information or events must be disclosed along with corresponding financial statements (Business Literacy Institute, 2023).

No-regret strategy: in climate finance, a no-regret strategy is when an investment/action generates social or economic benefits independent of climate change (World Bank, 2011). In the context of the report, a no-regret strategy is an option when sufficient co-benefits are produced to justify the viability of financing with or without drought.

Opportunity cost: the opportunity cost is measured by reference to the opportunities foregone at the time an asset or resource is used, as distinct from the costs incurred at some time in the past to acquire the assets, or the payments which could be realized by an alternative use of a resource (UNESCO, 2022).

Parametric insurance: non-traditional insurance product type which does not indemnify the net value of the loss, but the value of payout depends on pre-agreement and is activated upon a trigger event (Centre for Disaster Protection, 2022). It is also called index-based insurance.

Private sector: a wide range of private sources can be tapped for the financing of private investment. This report uses the private sector as an overarching definition of different actors, including private companies, local, regional,

and global commercial banks, non-bank financial institutions, leasing companies, private equity investors, and institutional investors (International Finance Corporation, 2022).

Recovery and restoration: restoring or improving livelihoods and health, as well as economic, physical, social, cultural, and environmental assets, systems, and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and "build back better", to avoid or reduce future disaster risk (UNDRR, 2022a).

Regulatory risk: regulatory risk is related to the features of the countries' regulatory frameworks that have associated risks for investors and limit the potential (World Bank, 2020).

Resilience: the ability of a system, community, or society exposed to hazards to resist, absorb, accommodate, adapt to, transform, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management (UNDRR, 2022a).

Senior debt: money owed by an investor that has a priority claim on the company's capital structure. Senior debt is the most secure capital, as the lender is granted a first lien claim over other lenders, for example, equity owners (Corporate Finance Institute, 2020a).

Sovereign risk: sovereign risk, in the context of disaster management, is the economic or financial impact a government would face in the event of a disaster, e.g. the effects on creditworthiness or fiscal balance (UNDRR, 2022b).

Transaction cost: costs incurred that don't accrue to any participant of the transaction. In economics, the theory of transaction costs is based on the assumption that people are influenced by competitive self-interest.

Transaction costs can be associated with search and information costs, bargaining costs, and policing and enforcement costs (Corporate Finance Institute, 2022b).

Drought risk mitigation is context-specific, multi-sectoral, and periodic. The sum of these features can culminate in a high risk from financing institutes' viewpoint, as private sector investors expect market-rate return with very low flexibility to compromise. Adding onto these concerns, vulnerable farming communities are far from being integrated into the finance sector (United Nations Secretary-General's Special Advocate for Inclusive Finance for Development, 2017). It is understandably a challenge to make actions on drought management financially attractive, thus, to engage private sector in the already risk-prone agriculture sector.

To intensify investments, creating an enabling environment for the financial sector is the first step, and it must be done by aligning the interest of a wider range of actors, including public and private stakeholders, the development and scientific community, and the representation of impacted sectors. A broader cooperation has a great deal to offer by limiting the financial risk and eliminating the information asymmetries, and with it, aligning the finance flows to the objectives of the paradigm shift to integrated drought management. Therefore, this report investigates drought finance from different perspectives, including the interests and roles of a wide range of stakeholders.

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