Mainstreaming Drought Risk Management

A primer

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SQUAREPANTS

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This document has been produced as a component product of the Integrated Drylands Development Programme (IDDP). The IDDP is the framework programme through which support for the implementation of the United Nations Convention to Combat Desertification (UNCCD) and other drylands related initiatives is delivered to affected programme countries. The Programme is managed by the United Nations Development Programme's (UNDP) Drylands Development Centre (DDC). The Primer seeks to serve as a supporting document for the Coping with Drought and Climate Change (CWDCC) projects, which are being implemented by UNDP with financial support from the Global Environment Facility (GEF)-administered Special Climate Change Fund (SCCF). CWDCC projects intend to pilot innovative drought adaptation strategies in targeted communities in Ethiopia, Kenya, Mozambique and Zimbabwe.[1] The objective of the CWDCC projects is to reduce the vulnerability of dryland smallholder farmers and pastoralists to short-term climate variability and long-term climate change by developing and piloting a range of coping mechanisms, with special emphasis on preparedness and mitigation. This Primer is also expected to act as a practical tool for informing and guiding the implementation of other drought-focused initiatives being carried out at local, national and regional levels. UNDP-DDC will assist in putting into practice the key concepts and principles of the Primer through its support to IDDP programme countries as well as its regional knowledge sharing initiatives, such as the African Drought Risk and Development Network (ADDN).

This document was developed based on an extensive review of existing documentation and practices in drought risk management (DRM), climate risk management (CRM) and adaptation to climate change at different levels. The original document was produced by Joana Talafré, under the supervision of UNDP-DDC, with inputs from the regional coordination unit of the CWDCC projects. The document has benefited from insights and inputs from various constituents during the drafting, review and editing processes. It was also informed by its complementary publication, entitled "***Drought Risk Reduction Framework and Practices: Contributing to the Implementation of the Hydro Framework for Action***".

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1 The CWDCC project in Kenya will be implemented jointly with the World Bank as part of the broader multi-district project called the Kenya Adaptation to Climate Change in Arid Lands project.

List of abbreviations and acronyms

ADDN	African Drought Risk and Development Network
ALM	Adaptation Learning Mechanism
CBO	Community Based Organization
CILSS	Permanent Inter-state Committee for Drought Control in the Sahel
CRM	Climate Risk Management
CSO	Civil Society Organization
CWDCC	Coping with Drought and Climate Change
DDC	Drylands Development Centre
DM	Disaster Management
DRM	Drought Risk Management
EMC	Environmental Management Committee
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
FEWSNET	Famine Early Warning Systems Network
FMNR	Farmer Managed Natural Resources
GDP	Gross Domestic Product
GEF	Global Environment Facility
ICID	International Commission on Irrigation and Drainage
ICPAC	IGAD Climate Prediction and Applications Centre
IDDP	Integrated Drylands Development Programme
IGAD	Intergovernmental Authority on Development
IIED	International Institute for Environment and Development
IMD	Indian Meteorology Department
IPCC	Intergovernmental Panel on Climate Change
IRRI	International Rice Research Institute
IWMI	International Water Management Institute
LDC	Least Developed Countries
NAP	National Action Programme
NAPA	National Adaptation Programmes of Action
NDMC	National Drought Monitoring Center
NGO	Non-governmental Organization
NIDM	National Institute of Disaster Management
NRM	Natural Resources Management
OECD	Organisation for Economic Cooperation and Development
PRSP	Poverty Reduction Strategy Paper
SAARC	South Asian Association for Regional Cooperation
SAG	Sectoral Advisory Group
SCCF	Special Climate Change Fund
SEA	Strategic Environmental Assessment
SMART	Specific, Measurable, Achievable, Realistic and Time-bound
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN-ISDR	United Nations International Strategy for Disaster Reduction
USAID	United States Agency for International Development
WCMC	World Conservation Monitoring Centre

Executive Summary

Droughts cause widespread humanitarian crises. They often bring about famines, violent conflicts and displaced populations (refugees and internally displaced persons), and play havoc with economic growth and ecosystem health. Reducing the environmental and human impact of droughts and climate change is a complex undertaking that is rooted in poverty alleviation and livelihoods enhancement at the community level. The development of supportive and enabling policies and legislation at the national level is also an integral part of this process.

Much effort has been made in the fields of drought response, preparedness, adaptation and mitigation. Nevertheless, in many parts of the world, particularly in the drylands of Sub-Saharan Africa, it is likely that extreme weather events and aridification will become more frequent and intense as a result of climate change. These forces undermine and offset much of the progress already achieved in meeting the United Nations Millennium Development Goals and may contribute to the continued downward spiral of poverty and environmental degradation.

Alarming disaster conditions have led to recognition that any dialogue and/or actions on the subject must be fully integrated into mainstream development efforts in a systematic, strategic and timely fashion, rather than being addressed as an add-on or on an ad-hoc basis. Such an approach often referred to as a drought risk management/climate risk management (DRM/CRM), is essential in ensuring that the development process is free from the risks of short-term climate variability and long-term change.

DRM applies the risk formula (RISK = HAZARD x VULNERABILITY / RESILIENCE) in drought management. It provides a practical framework for empowering and strengthening the coping capacities of drought-prone communities to adapt to extreme weather conditions and mitigate their impacts on often already vulnerable livelihoods.

The overall purpose of this Primer is to provide a basic roadmap for mainstreaming DRM into development planning and programming at different levels. It suggests and outlines a stepwise approach to define the drought risks within a given context. It also presents a methodology for translating the risk assessments and metrics into specific policy measures, planning instruments and measurable interventions.

Five basic steps are involved in the DRM mainstreaming process, starting out with broad-based stakeholder identification and engagement. Drought is a cross-cutting issue, whose impacts are manifested across spatial, temporal and sectoral boundaries. It is therefore paramount that, first, multi-sectoral stakeholders' coordination mechanism be in place as a preliminary condition (Step 1) so as to ensure the successful implementation of all the following mainstreaming steps.

A stakeholder coordination mechanism must possess relevant scientific, technical, analytical and policy-related capacities for identification of drought risks and their integration into development processes. In addition, the priorities and needs of drought-prone communities, especially the specific requirements of women and other at-risk populations, must be adequately represented within the coordination mechanism to enhance sustainable results and developmental outcomes.

The second step (Step 2) consists of establishing the scientific basis for DRM, which includes the assessment of climate/hazard trends as well as underlying vulnerabilities determined by socio-economic, policy, cultural and environmental conditions.

The third step (Step 3) is to identify and prioritize a broad range of possible DRM options at different levels, building on the drought risk information and data compiled in Step 2. The DRM options would range from the most immediate relief operations to short-term preparedness measures, and further towards longer-term mitigation options that are designed to remove structural barriers.

The fourth step (Step 4) is to internalize the DRM concepts and measures described in the previous completed steps in the development policy and planning frameworks (entry points). This is to be achieved at national, sub-national and sectoral levels.

The fifth step (Step 5) entails the monitoring of the impacts of integrating the DRM concepts into mainstream development practices based upon a results-based roadmap. It incorporates a number of quantitative and qualitative indicators and mixed monitoring methods. This step, while presented as being the last stage of the DRM mainstreaming process, must be conducted as a continuous operation, rather than a one-off exercise.

It is expected that the generic stepwise approach suggested within this document can be readily modified and adapted to various country-specific contexts, sectoral structures and technical arrangements, and thus serve as a useful guide for various drought-focused projects. The Primer will also contribute to the growing body of knowledge on climate/drought risk adaptation in Africa and throughout the world.

The Annex to this Primer illustrates how the mainstreaming of DRM is taking place in three case countries, namely India, Zambia and Niger. It is expected that additional case studies will be presented in the future editions of the Primer to strengthen the knowledge base and validate the applicability of the DRM mainstreaming framework.

Introduction

In many parts of world, limited water availability already poses serious challenges to development. Droughts have long been known to contribute to widespread humanitarian crises, such as famines, violent conflicts and displaced populations. These problems have especially been experienced in African drylands where the resource base is severely limited and the socio-political environment is highly volatile. Droughts in Sub-Saharan Africa are projected to increase in frequency, intensity and duration as a result of climate change.

Drylands populations have developed unique pastoral and agro-pastoral livelihood systems, which have enabled them to cope with low and sporadic rainfall in the harsh environments they have inhabited for centuries. However, traditional coping mechanisms are becoming less efficient in addressing the growing challenges that communities now face. A number of humanitarian relief programmes and projects have already been implemented as a stopgap measure in response to pressing needs. Nonetheless it is increasingly recognized that there is a need to shift from a reactive to a proactive and anticipatory approach to drought management and drylands development. It is therefore paramount that urgent support be provided to strengthen the capacities of those who are at the highest risk, to help them better prepare for, and respond to the immediate effects of droughts as well as to further mitigate and adapt to long-term potential climate risks.

UNDP, with financial support from the GEF administered SCCF, is implementing the CWDCC projects with the objective of reducing the vulnerability of smallholder farmers and pastoralists in targeted drought-prone or impacted communities in Ethiopia, Kenya, Mozambique and Zimbabwe simultaneously. Reducing vulnerability to drought is a complex undertaking that needs to be completed holistically both in drought-prone or vulnerable areas themselves and throughout the hierarchy of government structure. It must be part of poverty alleviation and livelihoods enhancement at the community level. Additionally it must be included in the process of developing supportive and enabling policies at the national level. With this recognition, the CWDCC projects are exploring and piloting a range of innovative drought adaptation measures to support the integration of CRM/DRM across sectors, institutions and societies, combining traditional local knowledge with the application of modern scientific technology in demonstration districts. These projects are also linked with many other drought-focused initiatives in Africa through regional knowledge-sharing initiatives.

This document has been developed as a practical decision support tool to assist the CWDCC projects and other efforts in mainstreaming DRM concepts and practices into development planning and programme frameworks. It draws heavily on the consultations undertaken during the ADDN's Third African Drought Adaptation Forum. This Forum was co-organized by UNDP-DDC and the United Nations International Strategy for Disaster Reduction (UN-ISDR) in 2008 in Addis Ababa, Ethiopia.[2] At the forum, practitioners and policymakers from across Africa discussed ongoing efforts to mainstream DRM at different levels. They especially highlighted the importance of consolidating national and local experiences and developing materials to inform and guide future mainstreaming processes in a systematic and integrated manner. The essence of these discussions was also captured in a complementary publication, entitled "***Drought Risk Reduction Framework and Practices: Contributing to the Implementation of the Hydro Framework for Action***", on which this document is partly based.[3]

2 For more information on the forum, please refer to UN-ISDR, UNDP and United Nations Economic Commission for Africa (2008).
3 For more information on the publication, please refer to UN-ISDR (2009).

This Primer should be considered as a living and evolving document. It will be continuously reviewed in close consultation with partners and stakeholders through various knowledge-sharing mechanisms, including the ADDN forums, and revised to respond to changing circumstances. The Annex section will also be updated regularly, to reflect the lessons learned from the CWDCC projects and other initiatives implemented in and beyond Africa.

Development of the Primer was carried out under the overall umbrella of the IDDP. The IDDP is the flagship programme framework through which the support of UNDP-DDC is delivered to programme countries. Developed in 2002, the IDDP addresses three interlinked issues of importance for drylands development, namely: 1) mainstreaming of drylands issues into national development and planning frameworks; 2) reducing vulnerability of poor populations to climatic shocks, especially drought; and 3) improving local governance of natural resources management (NRM). The Primer will contribute, inter alia, to the second outcome area of reducing vulnerability of dryland communities to environmental, economic and socio-cultural challenges and building adaptation/mitigation capacity.

Scope and Objectives

The purpose of the Primer is to present a basic roadmap for integrating DRM into development planning and programming at different levels, based on best practices, lessons learned and experiences. It is expected that this document will not only provide useful guidance to the implementation of drought-focused projects, but also contribute to the growing body of knowledge on climate/drought risk adaptation in Africa and other regions.

After an overview of essential concepts and definitions associated with DRM, key steps in adopting a drought risk sensitive development approach at national, sub-national and sectoral levels are highlighted. Section 1 discusses the institutional coordination set-up and key capacities required to spearhead the DRM mainstreaming process (Step 1). Section 2 outlines the necessary procedures for assessing drought risks (Step 2). This entails the analysis of climate/hazard trends and other underlying vulnerability factors. Section 3 provides an overview of the types of DRM options that can be adopted for ensuring immediate responses, enhancing short-term preparedness and promoting long-term resilience (Step 3). The interventions depend on the risk profile within a given context. This section also highlights various policies, strategic and programmatic entry points into which the identified and prioritized DRM options should be integrated. Section 4 presents the key measures to be taken and factors to be considered when weighing DRM options at the various entry points at the local, national and sectoral levels (Step 4). Finally, Section 5 provides guidance for developing and implementing result-based monitoring and evaluation on the basis of specific, measurable, achievable, realistic and time-bound (SMART) indicators to measure the impacts of the DRM mainstreaming process (Step 5).

Case studies are presented in the Annex. The first case study presents an overview of policy and institutional reforms taking place in India, shifting from a reactive to a proactive disaster and drought management approach. This case study illustrates how the disaster/drought risk sensitive development approach, as spearheaded by the national government, is being incorporated into the planning and programme process at sectoral and sub-national levels.

The second case study presents the evidence of mainstreaming of DRM issues into policies and programmes as seen in the example from Zambia. In this case, DRM measures are reflected in terms of their links with food security concerns, perspectives and associated coping mechanisms. Here, agriculture and disaster management (DM) policies have been identified as operational frameworks and entry points to integrate drought related issues.

Finally, the third case study illustrates DRM practices from a preventative perspective, as demonstrated in the case of Niger, where efforts to build resilient communities with flexible approaches have resulted in evident environmental regeneration, as well as poverty reduction.

Target Audience

This Primer is intended for the following target audience:

- Decision-makers directly involved in the formulation of development policy and planning frameworks, including the approval and allocation of financial resources to such frameworks, at local, national, regional and global levels;
- Practitioners from governmental organizations and civil society organizations (CSOs), including non-governmental organizations (NGOs) and community based organizations (CBOs), engaged in various aspects and levels of the drought management cycle and supporting drought-prone communities in programme/project development and implementation;
- Private sector entrepreneurs and enterprises whose businesses are sensitive to climate variability and change; and
- Development partners who support government bodies and non-state entities to plan and implement activities that will likely bring about positive results in drought-prone areas.

Terms and Concepts

This section provides definitions of, and the semantic relations between, the terms and concepts related to the mainstreaming of DRM, around which this Primer evolves.

Basic Concepts of DRM

Drought is a normal, recurring feature of climate. In contrast to aridity, which is a permanent feature of climate, drought is a temporary occurrence and is a direct consequence of a reduction in the amount of precipitation received over an extended period of time, usually a season or more. It results in a water shortage for some activities, groups or environmental sectors (Wilhite and Svoboda, 2000).

Beyond this simple definition, there are other ways of understanding drought. For example, there exists a typology of droughts from a disciplinary perspective. Meteorological drought is defined by a precipitation deficiency over a pre-determined period of time, while agricultural drought is defined more commonly by the lack of availability of soil moisture to support crop and forage production. Hydrological drought is defined by deficiencies in surface and subsurface water supplies relative to average conditions. Socio-economic drought reflects the relationship between the supply and demand for some commodity or economic good that is dependent on precipitation (UN-ISDR, 2009).

Drought can also be related to the timing and effectiveness of precipitation, for example delays in the start of the rainy season; their intensity and duration. It is now commonly accepted that, for any definition to be useful, it must be applied to specific regional and sectoral contents, e.g., rainfed crop production system or livestock-dominated system. Different ecological, physical, socio-economic and cultural sets of circumstances will provide different definitions to the thresholds and intensity of each drought episode (Food and Agriculture Organization of the United Nations [FAO], 2004).

Hazard is generally defined as a potentially damaging phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption and environmental degradation (UN-ISDR, 2009). Based upon its atmospheric and hydrological phenomena, drought is categorized as a natural, or more specifically a hydro-meteorological, hazard. Drought hazard is a creeping phenomenon that develops over time, and thus its impacts are diffuse and spread slowly, in contrast to other rapid onset natural hazards, such as floods, earthquakes and landslides. Drought hazard also tends to have wide-reaching impacts over a large geographical area.

Vulnerability refers to the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard, as in the case of drought (UN-ISDR, 2009). Vulnerability is an encompassing composite term. It illustrates, for example, the capacity and nature of the resource base to continue to provide ecosystem goods and services during a period of severe rainfall deficit, or the degree to which people are directly dependent on the provision of water and other resources necessary for their well-being.

Disaster is defined as a serious disruption of the functioning of a community or a society that involves widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope, using its own resources (UN-

ISDR, 2009). While the initial direct or physical effects of drought disaster on the water-dependent sectors may be similar regardless of the type of economy, the long-term consequences of each event will depend on specific local circumstances. Examples of direct impacts include reduced productivity in the agriculture and livestock sectors and decreased water availability for domestic and energy generation purposes. Examples of "second round" or long-term drought disaster impacts include, amongst others, reduced income for farmers and disruption of livelihoods, conflicts over water and other natural resources, forced out-migration, famine and outbreak and spread of human and livestock diseases.

Risk entails the combination of the probability of an event and its negative consequences. Drought (Disaster) Risk refers to the potential loss of lives, reduced health status, livelihoods, assets and ecosystem services in connection with drought, which could occur to a particular community or a society over a specified time period in the future (UN-ISDR, 2009).

The level of drought disaster risk is often measured by the combination of (a) the degree of exposure to a drought hazard and (b) the level of vulnerability that a community (sector or system) faces (African Development Bank, et al., 2004). This concept is expressed in the following formula:

RISK = HAZARD x VULNERABILITY

According to this principle, a large number of individuals subjected to exposure to a moderate drought hazard could be considered at the same risk level as a smaller number of people who live with a higher frequency and/or severity of drought hazards. It is important to recognize, however, that this equation has no numerical value. There is no single real-valued measure that can quantify hazard and vulnerability. Moreover, it is difficult to set a standard procedure to examine risk levels because of the slow onset and creeping nature of drought. Section 2 will address the different indicators and tools used to define drought risks.

It is impossible to circumvent the natural processes of drought hazards – disruptions or anomalies in the global circulation pattern of the atmosphere. Nonetheless, it is still possible to prevent drought disasters, mitigate their impacts and reduce their risks to human lives and livelihoods by increasing the degree of resilience.

Resilience is generally defined as the ability of a system, community or society that is potentially exposed to hazards to resist, absorb, accommodate and recover from the effects of a hazard in a timely and effective manner, including through the preservation and restoration of its essential basic structures and functions (UN-ISDR, 2009). This ability is determined by the degree to which the social system is capable of increasing its capacity for learning from past disasters, and translating the lessons into improved future protection and risk reduction measures (African Development Bank, et al., 2004).

Resilience is the opposite of vulnerability; the higher the level of resilience of a community, the lower the degree of vulnerability. In other words, the likely impact of drought would increase as (a) the hazard level (measured, for example, by the number of persons exposed and/or frequency/ severity of drought) is higher and (b) the vulnerability of a community (or sector or system) is greater. However, the drought risk of a given community is decreased when resilience is increased. Such a relative relationship modifies the above mentioned formula as follows:

$$\text{RISK} = \frac{\text{HAZARD} \times \text{VULNERABILITY}}{\text{RESILIENCE}}$$

Considering that communities have little control over exposure to hazards other than relocating, the focus of development actors should be directed on finding ways to reduce the degree of vulnerability and increase the level of resilience. Whether a community is vulnerable or resilient to drought is largely a function of its Coping or Adaptive Capacity. This is generally defined as the ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters (UN-ISDR, 2009). Coping capacity is often understood to be intrinsic to an affected community. However, the level of capacity may also rely on external factors, such as the existence/extent of a social safety net, for example in the form of emergency livestock marketing support, food-for-work, cash-for-work, cash transfers, remittances, etc.

It is worth noting that strengthening coping capacities involves strengthening of skills and resource bases both in normal times and during crisis periods. In the context of a drought hazard, this can be considered as the degree to which adjustments in practices, processes or structures can moderate or offset the potential for damage, and take advantage of opportunities created by a given change in weather or, on a longer time scale, climate (Intergovernmental Panel on Climate Change [IPCC], 2001). For example, if projections indicate that there will likely be increased frequencies of extreme weather events in the forms of droughts and floods associated with climate change, water harvesting structures could be a worthwhile investment. This can not only mitigate the possibility of flood occurrence but also improve water availability during the drought period. Large-scale landscape modification, however, may be beyond the scope and capacity of particular communities.

CRM and DRM are the systematic processes of implementing strategies, policies and programmes, by using administrative directives, organizations, and operational skills and capacities, to build coping capacity to weather risk and adaptive capacity to climate change, which lead to lessen the adverse impacts of (drought) hazards and the possibility of (drought) disaster (UN -ISDR, 2009). CRM and DRM are approaches to climate sensitive decision-making and involve proactive 'no regrets' strategies which maximize positive, and minimize negative, outcomes for disaster prone communities and societies. These strategies ensure that climate shocks and longer-term climate changes do not destroy development gains. The 'no regrets' aspect of CRM means taking climate-related decisions or actions that are rooted in development practice, even though a specific climate threat may not actually materialize in the future (International Research Institute for Climate and Society, 2007).

Management of climate-related disasters is a continuous process, which generally involves four phases:

- Mitigation, to prevent climate hazards from developing into disasters or to lessen the adverse impacts of disasters when they occur;
- Preparedness, to develop plans of action so as to effectively address the impacts of likely, imminent or current hazard events;
- Response, to mobilize necessary emergency services in the disaster-hit area; and
- Recovery, to restore the affected area to its previous state. [4]

4 It is worth noting that mitigation in this context does not mean, unlike in the field of climate change, reducing the production of greenhouse gasses. It refers rather, as in the field of disaster risk reduction, to structural and non-structural measures undertaken to limit the adverse impact of natural hazards and associated environmental degradation (African Development Bank, et al., 2004).

CRM efforts may be directed towards not only ex-ante but also ex-post phases of the disaster cycle. Some of the adverse effects of climate hazards are unavoidable and too severe and hence require a timely response and effective recovery support mechanisms. However, the primary focus of CRM should be placed on the mitigation and preparedness phases, which contribute to the elimination and reduction of causal factors, i.e., risks, of climate disasters. This will reduce the possibility of future disaster occurrences and the subsequent need for external humanitarian interventions.

DRM is a subset or an application of the principles of CRM in drought affected areas. Of all the other eco-regions, drylands are considered to be most prone to drought. Drylands are defined as the areas that have arid, semi-arid and dry and sub-humid climates. Depending on the term's definition and criteria, drylands cover 34.9 per cent (United Nations Convention to Combat Desertification; UNCCD) to 44.6 per cent (United Nations Convention on Biological Diversity, UNCBD) of the earth's surface.[5] Most dryland populations live in developing countries, and they are often among the world's poorest. DRM is of vital importance in these eco-regions, given their high exposure to erratic weather and their fragile resource base.

Risk management is by no means a new approach in the language and practice of dryland systems. Communities in these eco-regions have been managing climate-related risks as part of their livelihood systems for centuries. Therefore, CRM and DRM are incorporated into planning processes and investment strategies on a daily basis. However, the majority of these traditional practices have been passed down from generation to generation locally without being officially documented. Accordingly, they have hardly been recognized by experts and decision-makers and/or been captured into broader development planning processes.

Moreover, many traditional coping strategies are likely to become ineffective to the task, especially when faced with changing socio-economic conditions and challenges: e.g., population growth; land use transformations from nomadic pastoralism to sedentary agro-pastoralism and farming; conversion of forested areas to intensive cropping and other land uses. Some traditional strategies have also been failing to respond to changing climatic settings, e.g., growing frequency/severity and the diminishing predictability of hydro-meteorological shocks, which result from climate change.

With all these externalities in mind, DRM attempts to fill in the gaps facing traditional risk management models in a variety of ways. The initial focus is to start by systematically analyzing the sources of vulnerability and identifying the range of opportunities and actions for building resilience to drought within a given context. This should be followed by integrating the identified priority actions into decision-making process through the appropriate points of entry (mainstreaming).

This Primer is presented as a guiding document. It outlines the sequence of the analyses and actions which are to be incorporated at different decision-making levels. Furthermore it highlights the key factors that must be considered at each and every stage. It also underscores that all forms of mainstreaming of DRM principles must involve all relevant stakeholders, in a practical and efficient manner, and that special attention must be placed on the gender dimension.

5 Size of drylands varies depending on the inclusion/exclusion of hyper-arid zones. For more information, please refer to Sörensen (2007).

Stakeholders are defined as individuals and groups having a "stake" in the process and outcome of a policy or programme. In the context of DRM, these may represent all levels of government, affected communities, NGOs and CBOs, the private sector and development partners, among others. Engagement and representation of stakeholders is essential to the successful application of CRM and DRM principles. For example, in order to identify the drought risk facing pastoral livelihoods, rights of pastoralists to water, grazing and other natural resources must be assessed in relation to the rights and needs of other resource users in the region, such as farmers and other business operators.

DRM has an important Gender Dimension that must be taken into account. In many countries, particularly farming and pastoral societies in developing countries, women and men are impacted in different ways when faced by drought hazards. Women tend to be primary natural resource managers in these societies. They are often responsible for obtaining water supplies and producing subsistence food crops. They also serve as the repository of local knowledge of indigenous plant biodiversity, and are the most familiar with local soil conditions and cropping systems. However, they rarely own the land they desperately depend on in many dryland communities (UNCCD, n.d.). It is essential that women, as well as other marginalized people, fully participate and their expertise and knowledge be included in the entire DRM mainstreaming processes.

Basic Concepts of Mainstreaming

Mainstreaming is defined as a process of change, whereby certain issues are integrated into planning and decision-making processes and these issues continue to be part of the agenda in subsequent planning, implementation and revision (UNDP, 2008). Mainstreaming helps achieve multiple goals: i.e., development of cross-sectoral and mutually reinforcing policies, and leveraging of national and international funding and other resources. In the case of DRM, mainstreaming helps redefine drought, not simply as a natural phenomenon but as a more complex development issue. It internalizes drought risks throughout the planning, funding and implementation stages of any development framework. The mainstreaming process also serves to ensure that sectoral policies do not counter their intended purposes of drought mitigation and preparedness-related efforts, and that an enabling environment is created to reinforce the adaptive capacity of communities and societies in a sustainable fashion.

UNDP (2008) outlines three broad angles of mainstreaming:

Procedural mainstreaming is the integration of environmental issues into planning and decision-making processes.

Methodological mainstreaming involves the integration of different approaches and concepts representing key actors, based on varying degrees of intensities and covering different points in time. In this context, mainstreaming calls for a critical assessment of institutional mandates on the one hand, and their relationship with other institutions and structures, e.g., line ministries, local government structures, communities, private sector, NGOs, CBOs, etc. on the other.

Substantive mainstreaming is the integration of environment (biophysical) with social, economic and other issues on varying scales (from the local to the global) and within a range of time perspectives.

DRM involves a broad range of thematic issues, stakeholders and processes. This Primer's proposed approach brings together a combination of procedural, methodological and substantive mainstreaming. Building on the basic understanding of mainstreaming, a generic five-step process can be envisaged in order to mainstream DRM.

1. **Setting up a stakeholders' coordination mechanism**. A robust and broad-based institutional setting must be established as a preliminary step to spearhead DRM mainstreaming. The conditions required for the stakeholders' coordination structure include the participation of all key sectors with the strong champion institution assuming a leadership role. The joint effort should be supported by adequate financial and technical resources. It is also necessary that a clear results-based road map be delineated. The following section (Section 1) will discuss the key capacities that are required for the group to effectively complete the DRM mainstreaming steps. This step addresses the "who" of mainstreaming.

2. **Defining a drought risk profile**. As a second step, it is important to collect data about hazards and assess the vulnerability and resilience of a given community or system. These exercises will be based on available hydro-meteorological information and an analysis of local socio-economic, policy, ecological and institutional contexts. Risk profiling helps direct the policy and programmatic focus onto the underlying causes of droughts (risks) rather than their effects (impacts). This step, which is explored in detail in Section 2, provides the basis for the establishment of the goals that will determine the "why" of mainstreaming.

3. **Identifying DRM options and defining the mainstreaming entry points**. Based on the defined risk profile, a series of risk management options and adaptive measures will then be identified to help enhance local coping capacities. In addition, relevant policy, strategic and programmatic entry points will be defined into which the prioritized DRM options will be integrated. This step, which is explored in Section 3, provides the "what" and "where" of mainstreaming.

4. **Internalizing DRM into the development framework**. Section 4 focuses on the implementation of the DRM options, as identified in Section 3, at different levels. In particular, it overviews the approaches and methodologies used to mainstream DRM into development policy and programme frameworks at national, local and sectoral levels. This step can be viewed as the "how" of mainstreaming. The case study from Zambia in the Annex effectively demonstrates how DRM issues were integrated into agriculture and agriculture-related planning frameworks.

5. **Measuring the impacts of DRM mainstreaming**. The final step involves monitoring and evaluation of the mainstreaming process – either from the perspective of measuring policy change or from the perspective of measuring changes in adaptive capacity. This step, while presented as the last stage in the process in Section 5, must be conducted in a continuous manner while implementing all of the above mentioned steps.

Figure 1 provides a graphic overview of the key steps in the mainstreaming of DRM.

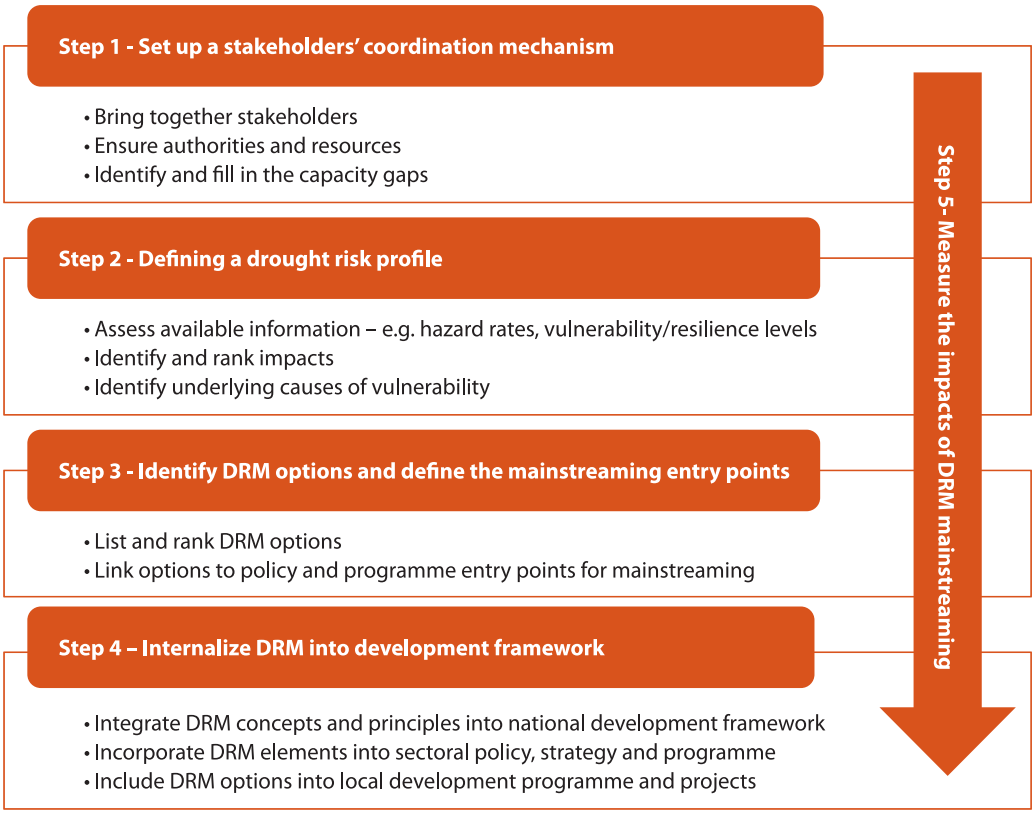
Within the scope of this document, mainstreaming is primarily perceived as a government-led initiative, although non-governmental entities are essential contributors during the various described steps of the process. DRM mainstreaming is a task which can only be achieved through a truly participatory and integrated approach, building on existing and evolving knowledge, experiences and networks contributed by various stakeholders.

In addition, although the process is described mainly from a central government perspective, it can equally be commenced and led by sub-national authorities, e.g., provincial, district or municipal levels. Regional institutions are best positioned to coordinate the mainstreaming of drought-related issues of a transnational nature. An example of this is the use of shared resources, such as river basins and lakes, cross-border movement of livestock in dry periods and prevention and management of regional conflict over these often limited resources. International bodies also play an important role in DRM mainstreaming processes. For example, UNCCD assists its member countries in their efforts to combat desertification, land degradation and drought through its support for National Action Programmes (NAP). Likewise, UN-ISDR facilitates the integration of disaster risk reduction into development by coordinating the formulation and implementation of Hyogo Framework for Action (2005–2015).

While the DRM mainstreaming steps are presented in a simple chronological order in Figure 1, they should not be prescriptive at face value. They need be adapted to respond to the country's specific problems, as one size does not fit all circumstances. For example, if a country may already have a comprehensive hazard map and sufficient understanding of vulnerability at the national level, it may proceed with the identification of entry points (see Step 2) as an initial stage. Similarly, many countries already benefit from a well-constructed multi-sectoral coordination body in dealing with drought management. Such a scheme may simply need to be strengthened in order for it to effectively function as a focal point for mainstreaming drought issues. In such a case, the main focus of the DRM mainstreaming efforts will be placed on Step 3.

The processes presented in this document are not intended to form a rigid model of the mainstreaming approach. It should be clear that each step can assume its own individual form, as much depends on prevailing conditions, capacities and local or national priorities. The various described steps represent building blocks in designing and implementing an effective mainstreaming strategy.

Figure 1: Basic steps in mainstreaming DRM



I. Step 1: Setting Up a Stakeholders' Coordination Mechanism

Because drought is a multi-dimensional issue affecting a broad range of sectors, DRM cannot be exercised in a vacuum, but requires multi-sectoral consultations and interventions. Consequently mainstreaming DRM into development planning and programmes, be it at national or local levels, must be carried out not solely as an expert top-down model, but as a partnership-based exercise. This section outlines 1) procedures to be taken in setting up a multi-sectoral stakeholders' coordination mechanism in enabling DRM mainstreaming, and 2) key capacities necessary for the stakeholders' coordination entities to assume their roles and responsibilities in an effective and efficient manner.

1.1. Procedures for Setting up a Stakeholders Coordination Mechanism

The establishment of a consortium of governmental and non-governmental stakeholders with an interest in drought issues must be led by a politically-respected and solid champion institution(s) so as to effectively manage, monitor and coordinate the mainstreaming process. Ideally, the lead institution should represent a cross-section of stakeholders in all the concerned sectors from government, local communities to non-governmental entities.

Some countries already have departments or parastatal institutions whose functions are dedicated to disaster risk management, or more specifically emergency preparedness and response, e.g., the National Platform for Disaster Risk Reduction. These entities often lead the DRM mainstreaming process by facilitating regular risk and vulnerability assessments, collating and disseminating climate-related information and coordinating mitigation actions across a range of sectors. It is essential that adequate decision-making power be delegated to such a body to guarantee a broad-based buy-in and mobilize appropriate resources necessary to smoothly and systematically facilitate mainstreaming.

At times it may also be necessary to replicate or mirror the national coordination mechanism at sub-national levels, for example at provincial, district and lower levels. This is because vulnerability factors and the corresponding short, intermediate, and long-term risk management measures differ considerably, depending on local contexts. In particular, the establishment of local institutional coordination mechanism should be undertaken in line with the decentralization reforms currently taking place in many African countries (see Box 1). This process should be accompanied by the devolution of adequate authority and responsibility, bolstered and supported with corresponding human, financial and physical resources as well as technical backstopping.

The following preliminary exercises promote the efficient sectoral coordination during the process of mainstreaming DRM:

a) **Conducting a stakeholder analysis** to ensure the participation of all relevant stakeholders, and their cross-sectoral inputs. The active participation of government agencies in charge of finance and planning is of particular importance, so that the DRM related activities will be formally recognized as an integral part of the national development process and adequately

budgeted. It is also necessary to explore the roles and functions of CSOs including NGOs, CBOs, private sector representatives, donors and other development partners in many different aspects of DRM mainstreaming, e.g., advocacy, awareness raising, networking, technical and financial support.

Moreover, it is important that the needs and concerns of the affected communities are captured thoroughly and represented in the decision-making process of the coordination group. In particular, women in rural areas are often the poorest, marginalized, and thus most susceptible to climate variability and change. Therefore the coordination mechanism must take into account and guarantee an appropriate gender balance, which may be exercised in the form of a proportional representation.

b) **Defining roles, responsibilities and accountability procedures** among the stakeholders. Upon the identification of members from different ministries and sectors to participate in the DRM mainstreaming process, their responsibilities and communication/ accountability structures must be clearly defined. Such preconditions are necessary in minimizing redundancy of effort and conflict of agendas and maximizing the effectiveness of the coordination mechanism. In addition, such a process contributes to a sense of ownership and assures stronger ties within a committed stakeholder group. For example, relevant line ministry focal points should be delegated the responsibility for integrating various elements of DRM into their sectoral policy and strategic frameworks (see Figure 2 for an example of an institutional set-up for DRM at the national level, as well as the first case study from India in the Annex).

c) **Ensuring appropriate resources** are provided to support the coordination group member organizations in assuming their agreed roles and responsibilities. Having access to resources is of particular importance, as the DRM mainstreaming process often faces additional challenges, tasks and unexpected costs, e.g., policy analysis, internal deliberations and monitoring at both national and sub-national levels.

d) **Developing a road map** for mainstreaming as a work plan. It provides members of the coordinating body with milestones, benchmarks and outcome indicators. It will be useful for measuring the success and the degree of impact (see section 5 for more detail).

Box 1: Decentralized drought and desertification management mechanism in Ghana

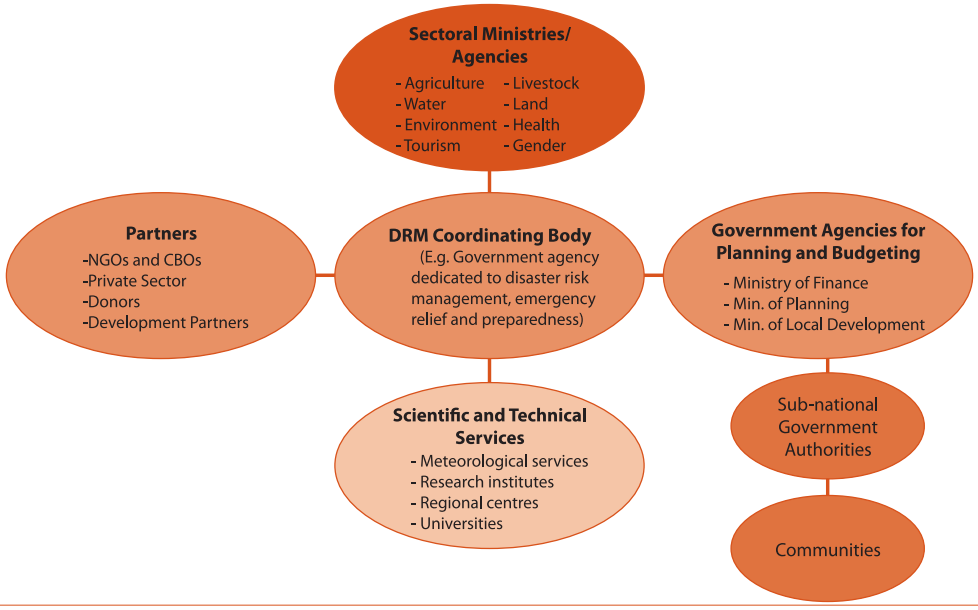
Ghana has been undergoing a decentralization reform in environment sector under Local Government Law in order to promote broad-based participatory environmental planning and management. In particular, in support of the effective implementation of the UNCCD NAP, the Ghana Environmental Protection Agency (EPA) instituted four levels of desertification and drought control in the country, namely national, regional, district and community.

Environmental Management Committees (EMCs) on Desertification and Drought are the main bodies responsible for the NAP activities at regional, district and community levels. The EMC is an interdisciplinary committee, each consisting of 11-15 governmental and non-governmental members who represent the different aspects of drought and desertification issues. Regional EMCs, for example, are established in three dryland regions (Northern, Upper East and West) and comprise the regional heads of departments and organizations, such as the EPA, Forestry Service Division, Ministry of Food and Agriculture, Fire Service and Regional Planning and Coordinating Unit, as well as the representatives from NGOs, CSOs, private sector, women organizations, District Assemblies and traditional local and regional authorities.

District EMCs are the main entities coordinating and monitoring the various sectoral desertification prevention and drought mitigation initiatives in line with the NAP, whilst the Regional EMCs provide technical backstopping support to the activities whose scope goes beyond district boundaries. Community EMCs serve as the organs through which the NAP initiatives are carried out. Progresses of the NAP implementations are reported back to the EPA through the National Desertification Committee.

Source: Government of Ghana, Environmental Protection Agency (2005).

Figure 2: Example of institutional set-up at national level for mainstreaming DRM



1.2. Capacities Needed for Mainstreaming DRM

There are several key capacities necessary for the successful implementation of DRM mainstreaming at all levels. These include, but are not limited to 1) scientific and technical capacities and 2) analytical and policy development capacities. Upon the establishment of a stakeholders' coordination mechanism, all the available capacities and resources must be assessed and any gaps and shortfalls found must then be addressed so that the mainstreaming process will not be interrupted.

1. Scientific and technical capacities

As a basic prerequisite for undertaking a DRM, drought-related data must be readily available as a basis of risk (hazard and vulnerability/resilience) assessment. Meteorological agencies responsible for weather monitoring must have the sufficient capacity to collect, map out, process, analyze and store the precipitation/temperature data, and the access to advanced forecasting technologies and modern equipment.

Conducting an assessment of the characteristics and severity of drought status is a complex and multi-faceted endeavour. Hence an integrated approach is essential, linking climate hydrological data (e.g., stream flow, groundwater and reservoir levels, condition of soil moisture) with diverse environmental factors (e.g., land use pattern, integrity and density of existing vegetative cover, current and anticipated level of degradation) and socio-economic variables (e.g., food security situations, demographic dynamics, social behaviours and infrastructure conditions) as well as other relevant parameters and indices.

In some countries, however, the high cost of data collection acts as a barrier to the timely flow of needed information. Data is often treated as a critical asset and considered as an essential source of revenue, especially by parastatal research institutions. It is paramount to ensure that data-sharing protocols and agreements, such as memorandums of understanding, are in place among government agencies, universities and other technical service providers involved in drought monitoring and early warning.

Concurrently, adequate infrastructure and procedures for communication and information management should be established. Otherwise, the provision of evidence-based drought-related advisories for end users at national (e.g., drought sensitive sectors) as well as local (e.g., communities and CSOs) levels becomes problematic. Today climate/drought monitoring reports are regularly published in many countries. However, they are often available only at restricted locations, such as district government offices and internet, to which many drought prone communities cannot readily access. Furthermore, most of the products remain highly technical and user-unfriendly and thus not fully appreciated or utilized in formal and informal decision-making process. Usability of existing drought products to different stakeholders must be continually reviewed to improve communication and feedback mechanisms between the producers and the users of information.

2. Analytical and policy development capacity

In integrating drought-related scientific data and information into development pathways at various levels, decision-makers must perform analytical procedures. DRM coordination mechanisms must have appropriate analytical capacities as a prerequisite for translating applied technical data into policy-relevant recommendations to help the government bodies responsible for development planning and budgeting, i.e., Ministries of Economy, Finance and Planning, and other sectoral agencies make informed decisions. As an added measure, expertise in undertaking Strategic Environmental Assessments (SEA) or Environmental Impact Assessments may be useful (please refer to Section 4.2).

Mainstreaming involves a complex interplay of advocacy, facilitation, coordination and mediation to influence policy processes. Hence, the DRM coordination body must have a clear understanding of policy making and implementation processes and strong negotiation and communication skills. It should also be equipped with the mandate and necessary resources to build public awareness and provide opportunities for consultation and networking during all stages of DRM mainstreaming.

II. Step 2: Defining a Drought Risk Profile

As mentioned in the previous sections, risks of drought disaster occurrence depend on the combination of exposure to natural hazard events and the social, economic and environmental vulnerability (or resilience) to these challenges in the affected communities. Profiling of drought risk thus involves 1) gathering of climate/hazard data and 2) subsequent analysis of vulnerability/resilience factors, using various tools and indicators.

Collectively, drought risk is a diverse concept. It cuts across sectoral spheres, e.g., agriculture, livestock and water, and is constantly evolving and changing over time and geographic areas. Hence, risk assessment is a multidisciplinary task that requires inputs from various sectoral practitioners, scientific experts and policymakers as well as the communities directly affected by hazards. Defining drought risk may at times inevitably entail various trade-offs. In a context where the drought risk is attributed to numerous hazard/vulnerability factors, for example, identification of the most pressing factors and prioritization of corresponding risk management measures will be necessary.

2.1. Gathering of Climate/Hazard Data

The first step to be taken in drought risk profiling is the collection of scientific information regarding climate variability and the frequency, severity and extent of extreme weather events. This process requires the gathering of historical climate/hazard trend data along a broad range of indicators. Some examples of indicators that can help measure and characterize drought hazard patterns include:

- Trends in temperature
- Frequency, intensity and geographical coverage of precipitation events
- Changes in seasonal distribution of precipitation events
- Evapo-transpiration rates (the combination of water transpired from the plant and evaporated from the soil and plant surfaces)
- Soil moisture and sediment conditions
- Groundwater, reservoir and lake levels
- Stream flow (the flow of water in rivers, streams and other surface channels)
- Ecosystem conditions (changes in land use pattern, vegetative and tree cover and health, etc.)
- Trends of El Niño and La Niña phenomena
- Climate change projections

Empirical data indicates that no single indicator is adequate to accurately define hazard benchmarks and thresholds. Indeed, in many countries, scientists and policymakers continue to struggle with the recognition of the onset and the end to a drought. Of critical importance is the systematic comparison of multiple indicators in developing a holistic understanding of short-term climate variability and longer-term shifts (Wilhite, Hayes and Knutson, 2005). It is also important to note that, with the growing effects of climate change, drought hazard projections based on historical trends and averages have increasingly become constrained. Agencies and institutions engaged in drought issues have to consider scenarios of how to address the drought events that do not fall into the pattern of historical norms (Engle, 2009).

A variety of indices and models are currently in use in different regions for the monitoring of meteorological, agricultural and hydrological drought. For example, the ***Standardized Precipitation Index*** assigns a single numeric value to precipitation and can be compared across regions with different climates. The ***Palmer Drought Severity Index*** measures the duration and intensity of long-term drought-inducing circulation patterns. The ***US Crop Moisture Index*** measures the impact of short-term drought on agriculture. ***Global Circulation Models*** are used to provide predictions of upcoming climate anomalies. The ***IPCC Assessment Report*** assesses scientific information relevant to human-induced climate change and their impacts. Regional climate outlooks are also useful in predicting events, as seen in Box 2 (Steinemann, Hayes and Cavalcanti, 2005).

Box 2: Examples Of Regional Climate Monitoring System In Sub-Saharan Africa

Agrhymet Regional Centre

The Agrhymet Regional Centre was established in 1974 as a specialized institute of the Permanent Inter-state Committee for Drought Control in the Sahel (CILSS). It aims to contribute to achieving food security, increased agricultural production and improved NRM in the CILSS member states, namely Mauritania, Mali, Niger, Senegal, Guinea Bissau, Burkina Faso, Cape Verde, Gambia and Chad. The Centre manages and disseminates wide ranging data and information on regional agro-meteorological and hydrological monitoring across the Sahelian region:

- Climatological: rainfall, temperatures, relative humidity, winds, potential evapo-transpiration, insolation, frequency and duration of dry spells, daily, decadal, monthly and annual data starting from 1875 for rainfall and 1950 for the other data.
- Hydrological: Major watercourses' daily instantaneous discharges and water levels starting from 1903.
- Agricultural: Sowing dates, surface areas seeded, crop, soil moisture conditions and yield assessment starting from 1960.
- Food: Cereal balance sheets (needs, production, food aid, stocks), risk zones etc. starting from 1987.
- Phytosanitary: Inventory of diseases and phytosanitary situations starting from 1993
- Pastoral: Vegetative cover, livestock population, animal health and pastoral water supply starting from 1985

For more information on the Agrhymet Regional Centre, please visit http://www.agrhymet.ne/eng/.

Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC)

ICPAC is an inter-governmental disaster monitoring network. The Centre evolved from the former Drought Monitoring Centre – Nairobi, and provides services to the seven IGAD member countries in the Greater Horn of Africa. In coordination with the World Meteorological Organization, national meteorological and hydrological institutions and other regional and international centres, ICPAC monitors, predicts and disseminates early warning information on weather and climatic hazards, primarily droughts and floods, over the sub-region in the form of ten day, monthly and seasonal climate outlook bulletins.

For more information on the ICPAC, please visit http://www.icpac.net/.

Availability of climate/hazard data depends largely on the capacity for drought monitoring. In some countries, meteorological and hydrological departments are not adequately equipped with modern observation and research infrastructure to carry out climatic monitoring, resulting in the undermining of data reliability. In other instances, accessibility to data represents the main capacity constraint, as the climate/hazard data collection and management functions are fragmented, with limited coordination or exchange across sectoral boundaries, e.g., climatic data is typically managed by the Meteorological Department, while other drought-related data is maintained by different agencies, such as agronomic data by the Ministry of Agriculture and hydrological data by the Ministry of Water. Still in other countries, where a high degree of data collection, treatment, analysis and mapping skills exist, the monitored and compiled products are not effectively disseminated to concerned government departments and agencies. It is even more difficult for the data to find its way to local stakeholders in the affected communities in a timely and practical manner, due to the lack of effective communication channels. Consequently, the drought early warning information is not being reflected adequately in the decision-making process (UN-ISDR, 2007).

In order to successfully mainstream a DRM approach into development processes, as mentioned in the previous section, capacity and knowledge gaps in climate/hazard data collection and sharing must be identified and an enabling policy and institutional environment established to bridge these gaps. A multiplicity of drought indicators clearly demonstrates that drought monitoring is a cross-cutting exercise, which does not necessary fall under the sole mandate of meteorological or hydrological services, but also relies on agricultural, livestock and socio-economic services. It is for this reason that roles and coordination mechanisms among the various technical branches of government engaged in the monitoring process must be clearly defined at both the national and local levels.

Furthermore, climate/hazard monitoring and early warning products must be tailored to suit the specific needs of users, so that they will be effectively incorporated into operational decision-making. For example, the agriculture/livestock sectors may require the data on the beginning and end of the rainy/dry season and the distribution of rainfall to identify the optimal timing of planting, livestock destocking/restocking, supplementary feeding and pasture rotations. The water sector may be more interested in changes in stream flow and reservoir levels for water resource planning for hydropower generation, irrigation and industrial/domestic uses (Wilhite and Svoboda, 2000). As outlined in Boxes 2 and 3, periodic monitoring reports and occasional special assessments, particularly prior to the onset of, and during times of, drought events, form the backbone for the identification of short-term risk preparedness actions. Such information outreach products will also provide the basis on which long-term mitigation measures can be agreed.

Box 3: Publication Of Climate-Related Decision Support Products – Example Of The Famine Early Warning Systems Network (FewsneT)

FEWSNET is an initiative funded by the United States Agency for International Development (USAID), since its creation in 1985. It analyzes a variety of data and information, such as market prices, precipitation and crop failures to predict if, when and where food insecurity will occur, and issues alerts on predicted crises for early decision-making. It covers 17 countries in Africa through national and regional centres.

FEWSNET offers a number of periodical reporting products, such as the monthly Food Security Updates, monthly Weather Hazards Impact Assessments and Rain Watches and one page reports issued every 10 days assessing the progress of the current rainy season and its implications for food security in a specified area. Other non-regular products that also provide useful information in assessing drought mitigation and preparedness options include the Livelihood Zone Profiles, descriptions of the livelihood options and market access by different wealth groups in a livelihood zone and the hazards to which they are vulnerable; and the Livelihood Baseline reports, which provide quantified breakdown of household livelihood options for different wealth groups.

For more information on the FEWSNET, please visit http://www.fews.net/Pages/default.aspx.

2.2 Analysis of Drought Vulnerability/Resilience

As defined earlier, vulnerability/resilience refers to the characteristics and circumstances of communities, systems or asset which make them susceptible/resistant to the damaging effects of a hazard. Assessment of drought vulnerability/resilience level – as to what is at risk and why – therefore begins by measuring the nature and magnitude of drought hazard effects over time. This process entails the identification of direct and immediate consequences of a drought, which include reduced crop yields, livestock losses and groundwater depletion, as well as the tracking of secondary and longer-term impacts, including income and livelihood losses and migration of population.

In general, impact assessment is carried out by reviewing the past or current drought records. However, consideration should also be given to the potential drought impacts foreseen in the short to long-term future in accordance with the existing climate change scenarios. By highlighting historic drought impacts, prospective trends will become more evident (Knutson, Hayes and Phillips, 1998).

Tables 1-3 provide examples of direct and indirect impacts of drought within economic, environmental and social contexts, which are linked closely to each other.

Table 1: Economic impacts of drought

	Direct Impacts	*Indirect Impacts*
Costs and losses to agricultural producers	• Annual and perennial crop losses • Damage to crop quality • Reduced productivity of cropland, e.g., wind erosion • Insect infestations • Plant diseases • Wildlife damage to crops	• Income loss to farmers because of reduced crop yields • Increased irrigation costs • Cost of new or supplemental water resource development, e.g., wells, dams and pipelines • Long-term loss of organic matter • Loss to industries directly dependent on agricultural production, e.g., food processors • Increased commodity prices
Costs and losses to livestock producers	• Reduced productivity of range land, animal carrying capacity • Increased travel time for grazing • Decreased stock weights and reduced milk production • Increased livestock diseases • Closure/limitation of public lands to grazing • Range fires	• Forced reduction of foundation stock (seeds) • High cost/unavailability of feed or water for livestock • Reductions in livestock market prices • Increased feed transportation costs • Disruption of reproduction cycles (delayed breeding, more miscarriages) • Increased predation and pouching
Costs and losses to industry and urban activities	• Higher cost of water and sanitation • Decrease in public water supplies • Impacts on transportation • Higher cost/lower availability of hydro-electric power	• Higher cost or unavailability of water for horticulture, agri-food processing and value-added manufacturing • Impaired productivity of forest land and reduced timber production • Increased pollution, e.g., dust • Increased diseases • Reduction in tourism revenue, e.g., wildlife • Strain on financial institutions, e.g., greater credit risks

Source: National Drought Monitoring Center (NDMC), University of Nebraska (2006).

Table 2: Environmental impacts of drought

	Direct Impacts	*Indirect impacts*
Hydrological	• Lower water levels in reservoirs, lakes and ponds • Reduced stream flow • Loss of wetlands • Increased groundwater depletion and land subsidence	• Increased time and cost for water collection and transfer • Lower water quality, e.g., salinization and temperature increase • Waterborne diseases • Wind and water erosion on soils
Biological	• Loss of trees and vegetation • Loss of animal species diversity	• Fragmentation and destruction of wildlife habitats • Migration, concentration and increased predation • Loss of biodiversity

Source: NDMC, University of Nebraska (2006).

Table 3: Social impacts of drought

	Direct Impacts	*Indirect impacts*
Reduced quality of life	• Increased workload for women in collecting fuel-wood and water • Reduced levels and variety of food sources • Increased government expenditure on relief	• Increased poverty • Migrations (rural to urban areas, cross-border) • Reduction or modification of recreational activities • Disruption of cultural practices and belief/ value system • Loss of cultural sites and aesthetic values
Increased conflicts		• Water user conflicts • Political conflicts • Management conflicts • Other social conflicts, e.g., scientific and media-based
Health	• Physical and emotional stress, e.g., anxiety, depression and loss of security	• Health-related low-flow problems, e.g., cross-connection contamination, diminished sewage flows, increased pollutant concentrations and reduced fire fighting capability • Reductions in nutrition • Loss of human life • Public safety from forest and range fires • Increased respiratory ailments • Increased disease caused by wildlife concentrations

Source: NDMC, University of Nebraska (2006).

Drought impacts are often diverse, comprising both structural and non-structural damages and covering a wider range of spatial and temporal scales, in contrast to other natural hazards, such as floods, hurricanes and earthquakes. The ultimate goal of the DRM is to reduce the hazard impacts holistically by addressing all the vulnerability factors. However, in reality, limited resources – in terms of financial, technical, human capital and time – may require the targeting of impacts to be tracked, for example, within specific sectors, population groups and activities.

Different criteria can be used to weigh impacts. They include, but are not limited to, direct economic costs, geographical distribution, duration of impact, urgency, trends over time, equity, public priorities, and/or the ability of the affected area to recover (Knutson, Hayes and Phillips, 1998). In the process of categorization, it may also be useful to consider the temporal aspects and distinguish between direct and indirect impacts, as is illustrated in Tables 1-3. Direct and immediate impacts are usually biophysical ones associated with water levels, crop yields and changes in disease vectors, while indirect and long-term impacts involve a wide range of livelihood challenges (Practical Action, 2009).

The Guidelines for the Development of National Adaptation Plans of Action (United Nations Framework Convention on Climate Change [UNFCCC], 2002) suggests a multi-criteria analysis for prioritizing adaptation needs, along the following categories:

- Loss of life and livelihood
- Impacts on human health
- Food security and agriculture
- Water availability, quality and accessibility
- Essential infrastructure
- Cultural heritage
- Biological diversity
- Land-use management and forestry
- Coastal zones and associated loss of land
- Damage to other environmental amenities

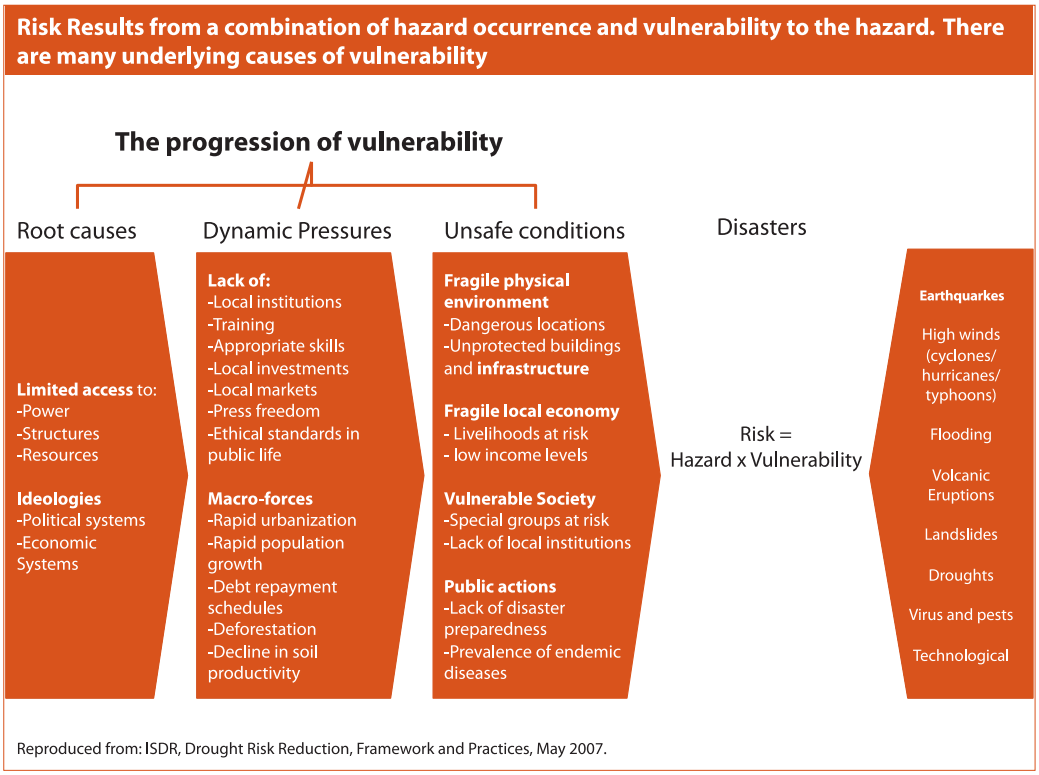
Weighing and ranking of drought impacts must be exercised in a participatory manner, especially in close consultation with affected communities. Impact assessments and prioritization of identified problems can greatly benefit from community mobilization, as the significance of drought impacts will vary according to local circumstances, including the availability of coping mechanisms and adaptive capacity. Localized ratings for each impact, drawing on indigenous knowledge, will pave the way for locally-adapted risk definitions and DRM approaches.

Identification and prioritization of drought impacts will raise an important question: why these significant impacts have occurred or why they might occur? Mapping out the cause-effect relationships of such impacts helps us understand where the triggering factors exist, how these underlying factors interact with each other at both micro and macro levels and how these dynamics create vulnerability/resilience within a society.

Vulnerability is a context-specific rather than a generic condition. It combines various immediate and underlying factors, encompassing human, social, economic, political, physical and environmental dimensions. As demonstrated in Figure 3, although the observed impacts of a drought event can be similar from one place to another, each set of prevailing causal conditions vary significantly, and this may put one community at higher risk of future drought disaster than another. For example, in one community, income loss as a result of crop failure (impact) may be attributed to an inappropriate crop selection, because of the farmers' disbelief in the value of introducing drought-resistant seeds, using hybrid varieties or spreading out the risk between various crops. Their decisions may be based simply on a limited knowledge of different farming options and unavailability of accessible or competent extension service. In another community, reduced income may stem from more deep-rooted economic, social and political factors, such as weak local markets brought about by historical marginalization, insecure land tenure, prevalence of pandemic diseases, such as HIV/AIDs, or violent tribal conflict taking place in bordering areas.

It is important to note that the context-specificity of vulnerability is evident not only amongst but also within affected communities. Different segments of a community experience different levels of vulnerability. Thus, it is critical to involve community members representing different ages, genders, ethnicity, seniorities and income groups in the vulnerability analysis process, including women and children. They are the ones for the most part prone to the effects of climatic hazards.

Figure 3: Progression of disaster vulnerability

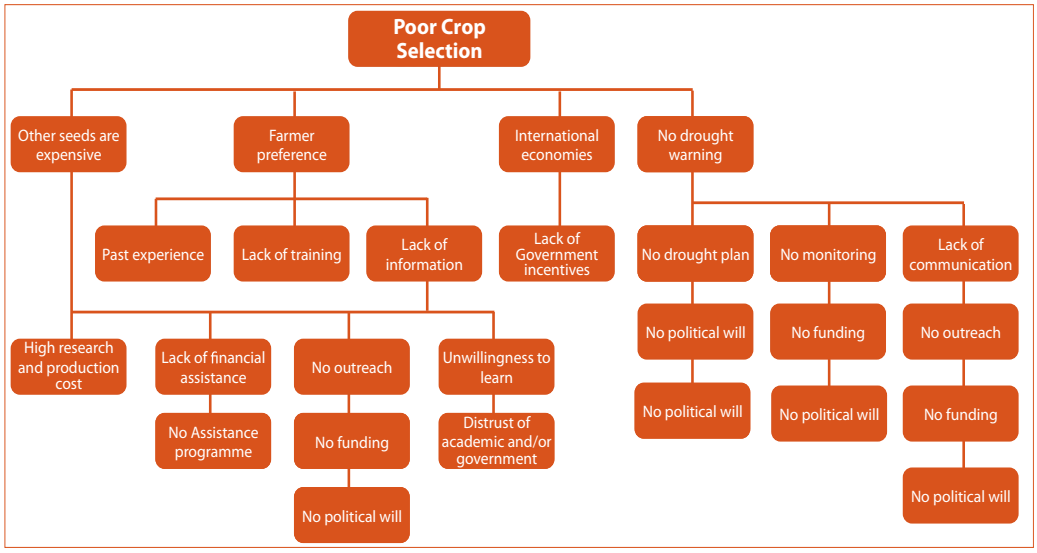


Source: UN-ISDR (2009).

Several different tools could be utilized in understanding the ever-changing causal structure between drought impacts and underlying vulnerability factors. For example, a tree diagram illustrates the triggering factors corresponding to specific observed impact on a linear basis (see Figure 4). Scenario building and case studies may be employed as other types of structural defining tools (UN-ISDR, 2009).

The climate/hazard data collected and set of vulnerability factors identified help determine the relative risk in a given society to future drought events and any capacity gaps. The following sections will discuss how the drought risk profile developed will be translated in the DRM options and integrated into the Government processes of development planning and practices.

Figure 4: Example of drought impact tree diagram in the agriculture sector



Source: Knutson, Hayes and Phillips (1998).

III. Step 3: Identifying DRM Options and Defining the Mainstreaming Entry Point

Based on the clear understanding of drought disaster risks, a set of risk management measures can be identified. In line with the context-specificity of drought risks, DRM measures also need to be calibrated and tailored to the specific circumstances facing the affected communities.

This section outlines the process of: 1) listing and prioritizing the selected DRM options to be pursued; and 2) defining the policy, strategic and programmatic entry points into which the identified DRM options are to be integrated.

3.1 Identifying DRM Options

There are still a limited number of tested strategies for identifying appropriate DRM measures. Nevertheless, several procedures must be considered.

Deciding between risk management options requires careful analysis of their feasibilities based on a variety of potential constraints and opportunities. Some constraints include time, cost, technical feasibility, availability of human resources, equity, effectiveness, institutional, legal, environmental and socio-cultural contexts, etc. For example, relocation of the drought-affected populations to less-prone areas may reduce their immediate vulnerability, thus mitigating their future drought risks, substantially, in theory. However, such a drastic option is considered unfeasible under most real life circumstances, due to the lack of alternative land and financial resources for assistance to the affected households. In addition, there are adverse impacts that may arise on the afflicted community, such as dilution of a group's cultural identity and the potential conflicts amongst the old and new settlers over shared and often already limited resources.

Some of the questions to be asked in identifying feasible DRM options include (Knutson, Hayes and Phillips, 1998):

- What are the cost/benefit ratios of the DRM options?
- Which options are deemed appropriate by the government, affected communities and/or general public?
- Which options are sensitive to the local environmental contexts, i.e., sustainable practices?
- Which options address the right combination of vulnerability factors to adequately reduce the relevant drought risk?
- Are there options already proven successful in other countries/communities? – If so how applicable are they?
- Which options would fairly represent the needs of affected individuals and groups, especially marginalized people?

Following the feasibility screening, identified DRM options should be grouped into immediate response, short-term preparedness and mid-/long-term mitigating measures. Immediate and short-term measures aim to address an incoming drought event within the existing framework of infrastructures and management policies. Meanwhile, mid-/long-term measures are more focussed on reducing underlying vulnerabilities that are faced by the impacted communities.

Such actions are designed to allow communities to further strengthen their resilience in order to respond to future challenges.

Immediate measures undertaken at the onset or during the drought hazard events often take the form of emergency relief. The provision of such assistance is based on standing contingency plans that seek to reduce the loss of human lives and property, and to further minimize the range of social hardships. In general, any such interventions are considered only as temporary activities, categorized in the realm of response and recovery phases within the disaster cycle, and thus are not the primary focus in DRM efforts. In actual practice, concerns are often made that many response interventions instituted by governments, international organizations and donors unexpectedly lead to increased vulnerability by bringing about greater dependency of drought affected communities on internal and external assistance (Wilhite and Svoboda, 2000). However, these safety net measures have the potential to contribute significantly to drought coping capacity building when they are effectively coupled with appropriate longer-term mitigation measures (UN-ISDR, 2009).

Examples of DRM measures are listed below. It is important to note that this is an indicative list and may not be necessarily applicable to all cases. For each activity, it is critical to define the "triggers", the varying degrees of intensity and the extenuating and contributing circumstances under which a given measure will enter into force.

Immediate safety net measures:

- Supplying food aid and other non-food items to affected communities
- Providing emergency livestock purchases and subsidies to transport animals to market
- Providing supplementary livestock feeding (fodder, forage, hay distribution, water hauling, opening of strategic grazing area, etc.)
- Promoting emergency vaccination and de-worming
- Providing seed distribution, stockpiling cereals and low-interest agriculture loans and emergency assistance programmes
- Facilitating borehole rehabilitation and water-trucking
- Establishing local coordinating body to ensure emergency response based upon priorities

Short-term measures:

- Developing water use guidelines based on the types of drought and the duration
- Developing emergency-situation water allocation strategies
- Increasing communication of climate-related information, with specific advisories
- Increasing local drought monitoring capacity and infrastructure
- Providing support to farmers in purchasing of drought/crop insurance
- Establishing food subsidy programmes for drought-affected individuals
- Providing support to most vulnerable groups, such as women and youth

Mid-term measures:

- Expanding efforts to promote rainwater harvesting
- Introducing improved soil management techniques that decrease soil erosion and increase soil water holding capacity
- Adopting of alternative cultivars or crops that are more drought resistant or heat tolerant
- Addressing bottlenecks in seed delivery systems

- Establishing a system for sharing of experience and capacity development for vulnerable groups in their adaptation measures/responses

Long-term measures:

- Investigating business and farm/ranch diversification strategies (e.g., selecting drought tolerant varieties, implementing irrigation where feasible and diversifying away from rainfed crops to less water-dependent products, such as honey from bee-keeping)
- Addressing deforestation and desertification (land degradation in drylands)
- Reviewing the effectiveness of mid-term measures and strengthen capacities as needed
- Strengthening market access and rural infrastructure
- Reinforcing legal, policy and institutional frameworks for drought risk mitigation and dryland development

As drought-prone societies are faced with diverse risk factors, corresponding DRM options must be equally diverse and flexible. Special consideration should be given to prioritizing actions that address the specific needs of the most vulnerable segments of the population. Conflicting DRM activities promoted by different sectors and sub-sectors during the course of a drought must also be mediated. For example, in the agriculture sector, priority activities often clash between industrial farmers (cash crops) and subsistence farmers (food crops). Priorities for farmers may differ from those of other land users in the same region, such as pastoralists. In the process of prioritizing and mediating various DRM options, it may be useful to further divide the measures into two sub-categories, namely supply-oriented and demand-oriented ones (Bazza, 2002). Table 4 illustrates how the priority DRM options may vary in connection with the water use and management, conditional on the supply-demand dynamics among different sectoral contexts.

Table 4: Diversity of DRM options in addressing water shortage-related risk

Category	Long-term	Concerned sectors (*)	Short-term	Concerned sectors (*)
Supply management	• Desalinate brackish and saline water	U	• Mix fresh and low quality water	U,A,I,R
	• Treat and reuse wastewater	A,I	• Divert water from given uses	U,A,I
	• Transfer water	U,A,I,R	• Exploit high-cost waters	U,A,I
	• Groundwater recharge	U,A,I	• Over-draughting aquifers	U,A,I
	• Monitoring and forecasting	U,A,I,R		
	• Increase water collection and storage opportunities (reservoirs)	U,A,I,R		
	• Adjust legal and institutional framework	U,A,I,R		
Demand management	• Adopt supplementary and deficit-irrigation	A	• Restrict agricultural uses (rationing, subjecting certain crops to stress, etc.)	A
	• Water saving irrigation techniques (drip, sprinkler)	A	• Restrict municipal uses (lawn irrigation, etc.)	I
	• Water recycling	U, A, I, R	• Review operations of reservoirs	U,A,I
	• Incentives to invest in water saving technology	U,A,I	• Water rationing	U,A,I
	• Dual distribution networks for drinking water supply	U	• Water metering and pricing	U,A,I
	• Inventory private wells and negotiate their public use	U,I	• Education and awareness creation	U,A,I
	• Assess vulnerability and advise water users	U,A,I	• Provide permits to exploit additional resources	U
	• Elaborate alert procedures	U,A,I,R	• Drilling equipment	U
	• Adjust legal and institutional framework	U,A,I,R	• Negotiate transfer between sectors	U,A

(*) U: Urban; A: Agriculture; I: Industry; R: Recreation
Source: Bazza (2002). pp. 3-4.

3.2 Defining the Mainstreaming Entry Points

In order for DRM approaches to attain concrete and sustainable results all stakeholders must commit themselves to the implementation of the selected DRM measures as essential components of their development agenda, rather than an add-on or one-off intervention. Each DRM measure must permeate the relevant types and levels of planning and decision-making frameworks.

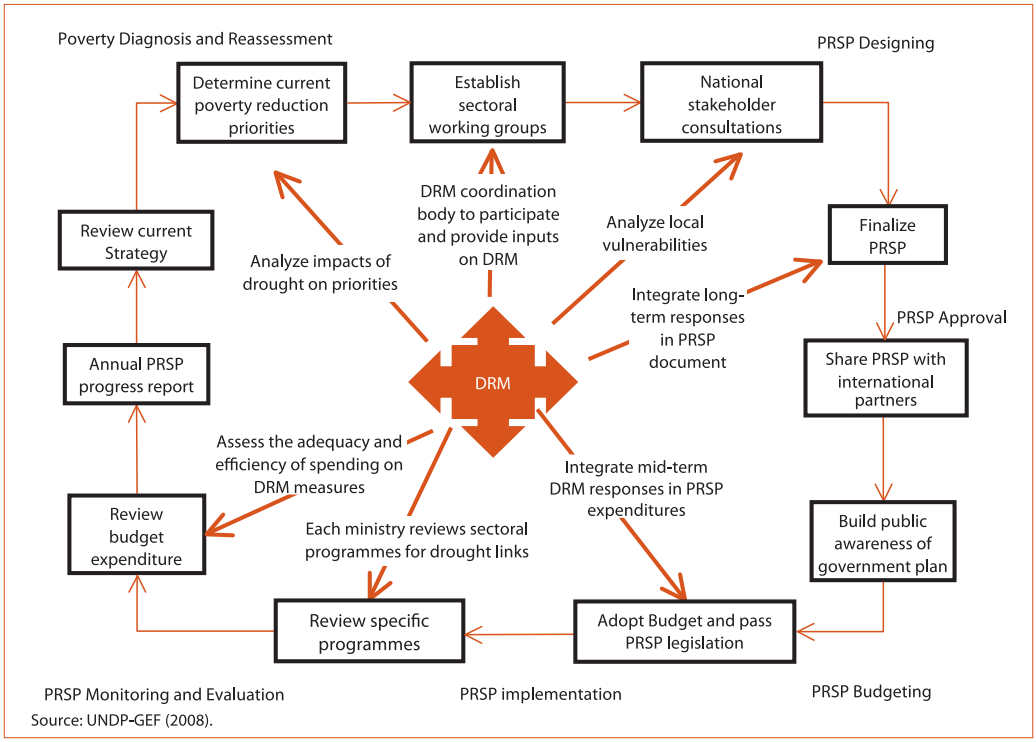
For example, long-term measures designed to remove underlying vulnerabilities would be mainstreamed in the concerned sectoral policies or within broad-based national development planning frameworks: e.g., National Development Plans and Poverty Reduction Strategy Papers (PRSPs). Short and mid-term measures may be integrated in existing programmes and projects at national or sub-national level: e.g., child nutrition programmes and community-based natural resource management initiatives (see Table 5). Targeted grass-root measures can also be up-scaled from the community to a higher level where local interventions have demonstrated good results, as illustrated in the Niger case study in the Annex to this document.

Table 5: Examples of planning and decision-making frameworks into which DRM options are mainstreamed

Elements of DRM	*Possible entry points*
Short-term options	• Disaster preparedness plans • Contingency plans • Annual national, regional and local development plans
Mid-term options	• Relevant sectoral programmes and projects • Mid-term sectoral strategic plans
Long-term options	• Drought related laws, regulations and by-laws • Relevant sectoral policies, e.g., DM policy, water policy, land allocation or resettlement policy, energy policy • Poverty Reduction Strategy Papers • Long-term national, regional and local development plans • National Action Programmes for international conventions such as United Nations Convention to Combat Desertification and United Nations Framework Convention on Climate Change, etc. • Hyogo Framework for Action Strategic National Action Plan

Successful mainstreaming requires not only a thorough understanding of the policy, programmatic and strategic frameworks relevant to DRM in the target country, but also a clear recognition of the key phases of these frameworks, or entry points, into which the DRM options can be fed. The potential entry points within a policy process include, for example, the stages of taskforce formation, agenda setting, internal discussion, public debate, approval, implementation and monitoring and evaluation, amongst others. Similarly, each country sets its own specific steps and unique timeframe for national development planning and budgeting processes. Figure 5 represents a typical PRSP development cycle and identifies possible entry points for DRM. Naturally these entry points will vary from one country to the next, depending on the concepts and procedures followed.

Figure 5: Examples of entry points for DRM in a PRSP cycle



Source: UNDP-GEF (2008).

In addition to the steps and timing of the framework development, there is a need for adequate recognition of the key individuals and entities responsible for decision-making as well as the degree, nature and types of technical inputs and information required for DRM mainstreaming (Global Mechanism of the UNCCD, 2008). For example, ministries responsible for finance, planning, economic development, etc., are typically the leading players in the development and implementation of long-term strategic plans, such as PRSP. They will benefit significantly from quantitative as well as qualitative data, which demonstrate the real and potential impact of drought on the country's economic performance and gross domestic product (GDP) growth.

On the other hand, disaster contingency plans may be designed and managed by the responsible agencies that are tasked with emergency preparedness and response. They require more context-specific analytical inputs on the socio-economic and environmental conditions of drought-prone communities. The previously developed risk and vulnerability profile should serve as a basis for such research and evidence-based planning.

IV. Step 4: Internalizing DRM Into Development Frameworks

As described in the previous section, each mainstreaming process follows distinct phases and entails varying degrees of consultation, analytical support and negotiation. The exact form that the procedures follow depends on elements of DRM options that are to be mainstreamed and the policy/programmatic entry points into which mainstreaming is being sought. For example, integrating a specific short-term DRM measures into an existing drought contingency plan may be as simple as adding an activity to a work plan. Meanwhile, broad-based mainstreaming of DRM principles and issues into the relevant sectoral strategic plans may lead to significant changes in policy orientation; hence more substantial analytical and political undertakings are required.

This section highlights the various procedures to be followed and conditions necessary to internalize DRM concepts and principles into development policies and planning frameworks at 1) national, 2) sectoral and 3) sub-national/local levels respectively.

The first case study presented in the Annex summarizes the processes of incorporating drought risk concepts and concerns into national development plans, sectoral policies and local DM frameworks in India.

4.1 Mainstreaming DRM into National Development Frameworks

Mainstreaming DRM into national development frameworks, such as PRSP, National Development Plans or national budgets, can serve two functions. Firstly, drought risks are recognized explicitly as a critical constraint to national development, which must be integrated into sectoral policy and strategic frameworks at macro level in order to promote risk sensitive development. Secondly, the integration of risk management principles under such broad based frameworks can provide the basis for mobilizing resources in the attainment of DRM measures.

In particular, internalizing DRM in national development frameworks entails the detailed costing of drought impacts in a given country or region in monetary terms, with the purpose of developing arguments that will be appealing and acceptable to decision-makers. The needed data for policy and decision-making can be derived from the historical and prospective analysis of drought impacts and their risks (see Section 2).

Quantifying and valuing the economic impacts of drought can be a complicated and daunting task, as the impacts occur at different levels, in both temporal and spatial terms, and they have a tendency to be dispersed across sectors. Benson and Clay (1998) indicates that, "counterintuitively, some of the relatively more developed or 'complex' Sub-Saharan African economies (…) may be more vulnerable economically to droughts shocks than less developed and more arid countries (…) that are undergoing conflict-related emergencies." This may be due in part to the fact that, in some transition countries, drought impacts are distributed along a variety of sectors upon which the national economy is dependent. In the less developed countries, where local economies are dominated by a single sector, response choices will be limited and the intervention more focused.

There are a number of useful tools adopted in evaluating drought impacts. For example, a rough estimation of the drought costs in the agriculture and livestock sectors can be partially derived by correlating the production of crop/livestock commodities, e.g., meat, egg, milk, hides and skins and manure, with precipitation levels in both drought and non-drought years (Pandey and Bhandari, 2007). Similar aggregate level estimates may be used for other directly/indirectly water-dependent sectors, such as energy, water and tourism, while attention also needs to be drawn to other non-water factors contributing to the variances in productivity and production. For example, productivity of hydro-electric power would rely not only on precipitation level but also the condition of water storage facilities and the status of river ecosystems. Table 6 lists the estimated costs incurred by major water-dependent sectors associated with the 1998 to 2000 El Niño/La Niña induced drought in Kenya.

Table 6: Direct economic losses associated with the 1998-2000 El-Niño/La-Niña induced drought in Kenya

			Estimated Cost (millions)	
Attribute	*Effects*	*Associated Costs*	*Kenyan shillings*	*United States dollars*
Drought	Loss of crops	(a) Crop loss	19 000	241
	Loss of livestock	(a) Livestock mortality (b) Veterinary expenses (c) Reduced livestock production (d) Conflict management	5 800 93 5 100 6	73 1 64 -
	Forest fires	(a) Forest destruction and damage	29	-
	Damage to fisheries	(a) Reduced aquaculture production	19	-
	Reduced Hydro-power generation	(a) Increased cost of generation (b) Increased import substitutes	51 000 806	632 10
	Reduced industrial production	(a) Loss of production	110 000	1 400
	Water supply	(a) Increased water collection time – Arid and semi-arid lands (b) Increased water collection time – Nairobi (c) Time loss due conflict management meetings (d) Cost of vendor water in Nairobi	5 100 4 400 3 22 000	64 55 - 270
Total			**220 000**	**2 800**

Source: Mogakaet al. (2006).

There exist a number of studies that have successfully quantified the drought impacts on a national economy by using different indicators. These studies contribute to improved level of recognition among decision-makers that the failure to take drought risk into account in the development pathways has the potential of bringing about significant adverse economic implications. In the case of the 1992 Southern Africa drought, for example, Benson and Clay (1994) estimate the impacts in terms of the decline of GDP by 9 per cent, 8 per cent, and 3 per cent in Zambia,

Zimbabwe and South Africa respectively. Jury (2007) analyzes the contribution of the drought to unemployment rate in the region (30 per cent increase), while Glantz, Betsill and Crandall (1997) evaluate the foreign exchange losses incurred as a result of the drought-related crisis at US $60 million in Zimbabwe. Vogel (1994) also concludes that 22 per cent of agricultural debt could be traced directly to these drought impacts. Box 4 illustrates in more detail the economic impacts of the 1992 drought, using South Africa as an example, with special focus on the agriculture sector.

Box 4: Impacts of the 1992 drought on the agriculture sector in South Africa

The agricultural sector accounts for a relatively small share of the South African economy – less than three per cent of GDP, which is similar to that of Australia. However, the sector still provides an important source of employment. Today 10 per cent of the South African workforce is employed in the agricultural sector, compared with 5.5 per cent in Australia, which places South Africa in a more susceptible position when faced with drought, as the impacts can bring about even greater consequences for the domestic market, for example, reducing the level of private savings and dampening demand for goods and services.

Statistics demonstrate that the 1992 drought in Southern Africa region resulted in the reduction of the agricultural GDP by 27 per cent, and the decline of the overall GDP by 2.4 per cent in South Africa. In comparison, losses in the manufacturing sector were limited to 3.3 per cent, in spite of the sector's relatively high dependence on water, since the past investments had effectively assured the continuity of water supply in urban areas even during the period of rainfall deficit.

Decline in the agricultural GDP directly accounted for a 1.5 per cent drop in GDP. The rest of the decline was attributed to, amongst other things: 0.9 per cent drop in consumer expenditure due to lower disposable income and reduced food prices; 8.4 per cent reduction in gross domestic saving; and a 4.2 per cent decline in gross domestic investment. In monetary terms, the drought brought about the need to import maize totalling some R1.725 billion (US$604 million) between April and December 1992 alone and an increased level of imports continued into 1995. Maize export earnings fell by an estimated R365 million, with further declines in other agricultural exports, as well as an estimated R335 million drop in exports from related sectors. However, lower domestic demand as a consequence of the drought was expected to bring about a reduction of non-agricultural imports by R1.2 billion. Meanwhile, the drought was estimated to have resulted in the loss of 49,000 agricultural jobs and 20,000 formal sector jobs in non agricultural sectors. Farmers' indebtedness was also expected to have risen, cutting some farmers off from access to additional credit.

Source: Benson and Clay (1994).

It is important to note that most of the quantified drought impacts focus primarily on the direct and immediate economic impacts, while not capturing the indirect environmental and social impacts that are also likely to have economic implications in the mid to long-term (see Tables 1-3). For example, the costs associated with the outbreak of waterborne diseases and other drought-related health problems will need to be considered, both in terms of incurred medical care expenses, and the time lost from work and leisure activities. Costs of conflicts that result over limited natural resources may be calculated through the costs involved in security reinforcement, mediation, reconstruction and rehabilitation (both psychosocial and physical) and lost revenue as a result of disruption of livelihood activities. However, it is impossible to estimate the true cost of lost species and the impact on ecosystems (biodiversity).

Uncertainty regarding the probability and extent of drought disasters in the future makes it difficult to translate the DRM goals into budgetary terms. Nonetheless, it is possible to quantify the budgetary requirements, comparing various indicators, such as historical data on the drought-associated costs, prospective drought risks and estimated costs of different DRM options. For example, Table 7 compares the actual costs spent for emergency relief during the 1999-2001 drought that was experienced in 10 districts in Kenya with the prospective costs required to reduce the impacts of drought of a similar magnitude with the ex-ante interventions. Such figures not only provide the financial implication of DRM measures but also demonstrate the cost-effectiveness of proactive preparedness and mitigation-oriented approaches in addressing drought issues over both the short and long-term.

Table 7: Comparison of actual costs incurred in drought response and prospective costs required for drought preparedness (1999-2001 drought in 10 districts in Kenya)

Item	***Cost (US $ million)***
Actual costs to respond to drought:	300.0
Cost of emergency relief interventions	38.6
Value of livestock lost	5.0
Cost of current early warning system	
Total Drought Cost	**343.6**
Prospective cost to prepare for drought:	
Cost of early warning system with rapid response capacity	51.9
Cost of subsequent essential relief	120.0
Total Necessary Cost	**171.9**
Potential Savings through proactive measures	**171.6**

Source: Bushell and Wekesa (2001)

4.2 Mainstreaming DRM into Sectoral Frameworks

Ideally, mainstreaming of DRM into the policy, planning and programme frameworks of drought-vulnerable sectors – such as agriculture, livestock, water, energy, tourism and wildlife amongst others – must take place in parallel to the mainstreaming into the broader national development framework so as to address drought in an integrated and holistic manner. However, especially in a context of scarce resources and limited capacities as well as the different planning schedule, it may be difficult to fully integrate DRM into all relevant sectoral frameworks at one time. It is for this reason that concentration of efforts may be required to target the sectors that will lead to maximum risk reduction or that are expected to lift key barriers to adaptive capacity building.

For example, strengthening tenure and land titling regimes in the land sector may be considered as being the most important element of risk management in a country. Improved land access and use rights would better enable farmers to gain access to credit, secure agricultural inputs and crop insurance products. Policy and legislative recognition of customary land rights is critical in providing for secure nomadic pastoral livelihoods. In combination, these measures can result in greater stability in crop/livestock production and a subsequent increase in overall food security even during periods of adverse weather. A scarcity of water may be recognized in other countries as being the single most limiting factor to barrier to an increased level of drought resilience and, accordingly, efforts may be directed towards making improvements in both the availability and quality of water. In other settings, the highest priority may be given to the agriculture sector and the promotion of risk-sensitive agricultural development, so as to increase the adaptive capacity and the flexibility of already drought-prone farming communities and other potentially affected communities to respond to shocks if and when they may occur.

A phased approach may be applied in mainstreaming DRM into sectoral development frameworks:

- Based on the analysis of vulnerabilities, drought risks concerns and DRM concepts are integrated into the visions, goals and objectives of the sectoral policy and strategic frameworks, e.g., growth in crop productivity and production in the agriculture sector.
- DRM principles are incorporated into the sectoral planning process in the forms of target, milestones, outcomes, and budgets, etc., e.g., setting the diversification of agricultural crop varieties as a priority action point.
- Specific DRM options are included at the programme and project levels, e.g., drought-tolerant crops promoted and distributed at local level and extension services provided.

Table 8 presents the process of different DRM measures being incorporated into various sectoral policy frameworks in Sub-Saharan Africa.

Table 8: Examples of DRM measures mainstreamed in sectoral policy frameworks in Africa

Country	*Measure*	*Policy/Framework*
Burundi	Provide better safeguards of tenure to smallholders (long-term measure to address underlying vulnerability)	Land Code
Burundi	Integrate environmental and climate-based safeguards in community forest management (mid-term measure)	Forestry Code
Tunisia	Promote regional economic diversification (long-term measure, underlying vulnerability)	10th National Socio-Economic Development Plan
Uganda	Development of cost effective irrigation and water harvesting technologies including community valley dams to mitigate against the potential impact of drought	Plan for the Modernization of Agriculture
South Africa	Introduction of a national water protection classification system that determines the levels of change that are unlikely to damage the resilience of water resources to drought	Water Policy

Source: UNCCD (2006)

The aforementioned economic analytical tools may also be useful in boosting the mainstreaming of DRM in sectoral development frameworks. For example, quantified data of drought costs in the agriculture sector will contribute to the development of drought-sensitive and field proven agricultural policies and the incorporation of drought mitigation measures, such as sustainable land management and water conservation, in the sectoral planning.

DRM should also be integrated in other, less weather-sensitive sectors, for example health and education. In order to achieve the broadest possible integration of risk management principles and measures into sectoral frameworks, there is a need for a clear understanding of the linkages between drought events and sectoral visions/performances/outlooks. Box 5 discusses how the SEA tool can be utilized to make explicit these linkages.

Box 5: Strategic Environmental Assessment (SEA)

SEA is the process by which environmental considerations are integrated into the preparation and adoption of policies plans and programmes. An SEA should consider a number of factors:

- The scope and nature of the likely environmental effects
- The need for mitigation to reduce or eliminate adverse effects
- The likely impact of any adverse environmental effects

It is possible to include the impacts of climate and environmental degradation on a given programme or policy, for example by asking the following questions:

- What are the relevant criteria and indicators for the assessment?
- What methods should be used to assess future vulnerability and adaptation needs, characterise future climate-related risks, etc.?
- What impacts will climate change likely have on the effectiveness of the policy, plan and programme, and the target population?
- What impacts will the policy, plan or programme have on environmental sustainability and development outcomes?
- What responses (options) would reduce climate risks impacts and improve development outcomes?
- What are the barriers, costs and impacts of those options?

These questions help ensure that policies and programmes not only prevent negative impacts on the environment, but are somewhat safeguarded from negative impacts from the environment.

Source: Organisation for Economic Co-operation and Development (OECD; 2006) and Martonakova (2007).

4.3 Mainstreaming DRM into Local Development Planning

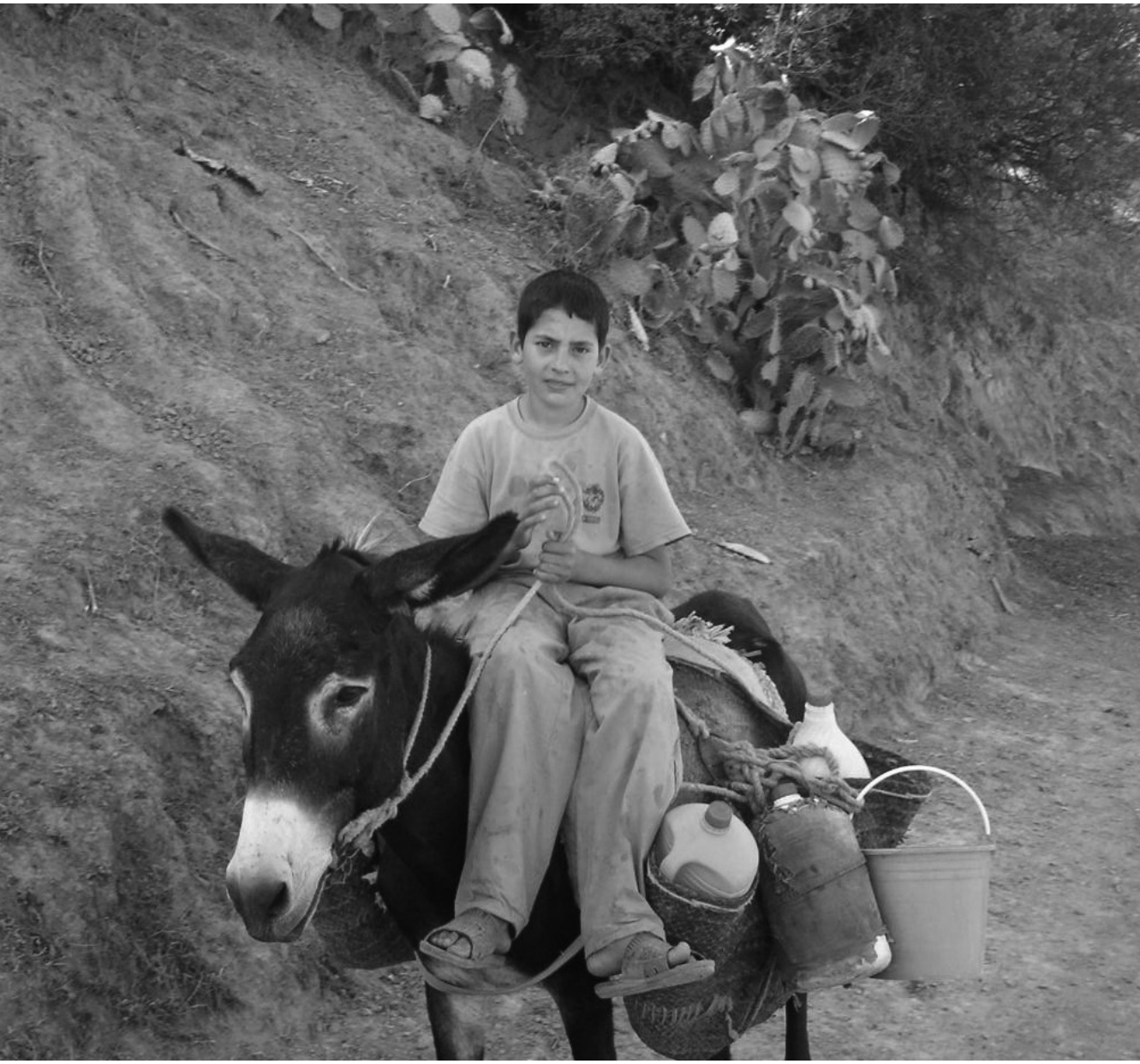
Integrating DRM at sub-national and local levels implies decentralizing DRM roles and responsibilities. It requires strengthening the capacity of local institutions to develop and implement DRM-oriented programmes. This would include the allocation of adequate budgetary resources, the deployment of relevant technical personnel such as health, livestock and agricultural extension officers and the enhancement of their capacities to respond to the specific needs and concerns of drought-affected populations.

In Africa, many local government institutions face significant capacity constraints. Mainstreaming DRM in local development may therefore take a longer time and need higher degree of commitment than mainstreaming does at the central level. In fact, successful mainstreaming at the local level may depend on the integration of DRM in national policy and budgetary frameworks as an initial step in ensuring a flow of resources to lower levels where it is most needed.

Ministries of Local Government, or an equivalent institution, will play a critical role in mainstreaming DRM as part of local development efforts. These responsible entities would serve as a broker to identify local resources and capacity needs and incorporate them into decision-making processes

at higher levels. Where sub-national/local institutions represent the areas of particular interest and concern, they may directly participate in the national-level DRM discussion. For example, river-basin management agencies and provincial authorities covering drought-prone dryland regions would inform and provide constructive insights into macro-level DRM mainstreaming.

Local development policies that warrant particular attention for DRM mainstreaming could include, amongst others: local water and agriculture plans, land distribution schemes, rangeland management plans, afforestation and reforestation schemes, zoning and infrastructure, urban planning and sanitation.



V. Step 5: Measuring the Impact of DRM Mainstreaming

Mainstreaming requires first and foremost influencing the policy process and convincing decision-makers in relevant sectors to integrate DRM-related concerns and principles into their working areas. In this regard, one of the key tangible end-results in the mainstreaming process would be the ***documented*** integration of DRM elements into policy papers, strategic plans and programme documents, etc. Yet this may not be sufficient to ensure lasting impacts. Success in mainstreaming DRM should rather be measured at subsequent stages in terms of the changes in underlying vulnerabilities, adaptive capacity and resilience of drought-vulnerable communities and the corresponding future risks as a result of these policy and programmatic changes.

This section provides a general framework for monitoring the DRM mainstreaming processes and assessing their impacts on the drought risk dynamics using a results-based roadmap. The roadmap technique not only enables us to assess the effectiveness of the measures undertaken to promote better performance but also provides useful learning opportunities for other countries undergoing or planning a similar DRM mainstreaming activity.

5.1 Result-based Roadmap to Monitor DRM Mainstreaming

Once the DRM options are selected and mainstreaming entry points are determined, building on the drought risk profiles developed and vulnerability factors identified, it is important for the coordinating body to develop a mainstreaming roadmap. A roadmap is a useful tool to monitor the outputs, outcomes and impacts of actual mainstreaming measures, as opposed to the inputs allocated in the forms of financial resources and physical and technical capacity, within the set timelines. It is also useful in clarifying and reviewing the roles and responsibilities of individual members of the mainstreaming coordinating body. This tool may also be called interchangeably a 'results framework' or 'action plan', depending on the context.

A roadmap should be based on concrete goals/objectives that have been mutually agreed within the coordinating body as well as a realistic prioritization of mainstreaming interventions. Each roadmap activity should be linked to a corresponding output with clear indication of timelines, responsible parties/partners and needed inputs in terms of budgets and other resources, e.g., staff time, consulting services and information products. Milestones in the process may be associated with entry points and policy planning stages, e.g., at submission of budgetary estimates or during local government council sessions. Table 9 outlines the key elements that a DRM mainstreaming roadmap includes.

There is no fixed schedule or duration to a mainstreaming intervention. Rather, it must be conceived as a continuous and evolving process. Any mainstreaming endeavour may not necessarily be a one-time effort, as policies, development planning and programme frameworks and, most importantly, decision-makers will change over time. In the case of DRM, adjustments in priorities, approaches and methodologies may also be necessary over time to respond to emerging challenges which may potentially alter the hazards-vulnerability/resilience-risk dynamics dramatically, as in the case of climate change.

Table 9: Key elements of a DRM mainstreaming roadmap

Element	*Explanation / example*
Goal / Objective	• Statement of vision and direction describing what the initiative (mainstreaming intervention) aims to achieve, e.g., "Reduced poverty in drought-prone communities"
Outcome	• An intended mid-term result expected from a set of outputs or activities, e.g., "Vulnerability of drought-prone communities reduced and drought risk mitigated"
Output	• A distinct activity or product leading to the achievement of the outcome, e.g., "Food security improved in drought-prone communities"
Input	• Resources used to carry out the activities, e.g., financial, physical, technical, etc. • If possible, the source of support for the activity should be indicated. For instance, if it is to be sourced from regular staff time or outside contributions, e.g., "Ministry of Agriculture 5 persons/month"
Activity	• Process which transform inputs into outputs • Activities can also be broken down into sub-activities to facilitate tracking and monitoring of complex tasks, e.g., "prepare information leaflet on drought and the economy"; "Provide and promote the use of drought-resistant crops and livestock species"; "Rehabilitate boreholes"; "Conduct policy advocacy to integrate the needs of dryland populations into agricultural and livestock planning", etc.
Responsible Party / Partner	• The entity or individual who is responsible for the implementation of specific activity and attainment of corresponding output • Should contain Leading responsible actor, as well as detail supporting functions (partner), e.g., Ministries of Agriculture and Livestock for drought-resistant crop/livestock species provision (leaning responsible party) in collaboration with local NGOs and CBOs (partners); Ministry of Water for borehole rehabilitation (responsible party) using community labour (partner) and with support from development partners (partner); Ministry of Finance for financial allocation, etc.
Indicator	• Quantitative or qualitative variable used to verify the change produced by the activity, e.g., the number of people receiving the information leaflet; number of women trained in sustainable land use techniques; number of boreholes rehabilitated; elaboration of DRM commitment in the sectoral planning documents, etc. • Quantitative evaluation method may be used to measure the satisfaction of beneficiaries, e.g., "0 – status quo, 1 – partial improvement, 2 – near complete activity, 3 – most desirable status"
Baseline	• Situation before activity begins • Using the indicator, this value will describe the actual situation or the situation at start-up, e.g., amount of drought-resistant crops/species used; number of functioning boreholes, etc.
Target	• Level of achievement that a project expects to reach within a specific timeframe. Using the indicator, this value describes the desired status, e.g., "1,000 leaflets distributed at community level in three months"; "10 boreholes rehabilitated in one year", etc.
Priority	• Relative importance and sequence of activities, e.g., "all high priority tasks should be implemented first", "High-Medium-Low", and "Urgent and Important"
Timeline / Milestone	• Timeline is a schedule/timetable within which activities are carried out and targets achieved. Along with determining the priority level of a given activity, the time of its desired completion or the time of its expected duration shall be determined • Milestone is a critical point in the life of a project by which time key activities should have been completed and/or key targets reached, e.g., "at local council meetings", or "during 1st quarter", etc.
Risks and Assumptions	• Risks refer to potential events or circumstances whose probability of occurrence is unknown that may cause hindrance to the implementation of activities. • Assumptions are statements that are taken as true, but that if found to be false, can cause obstacles, e.g., Risk: "elections may cause disruptions in the policy process"; Assumption: "government ministries are willing to participate"

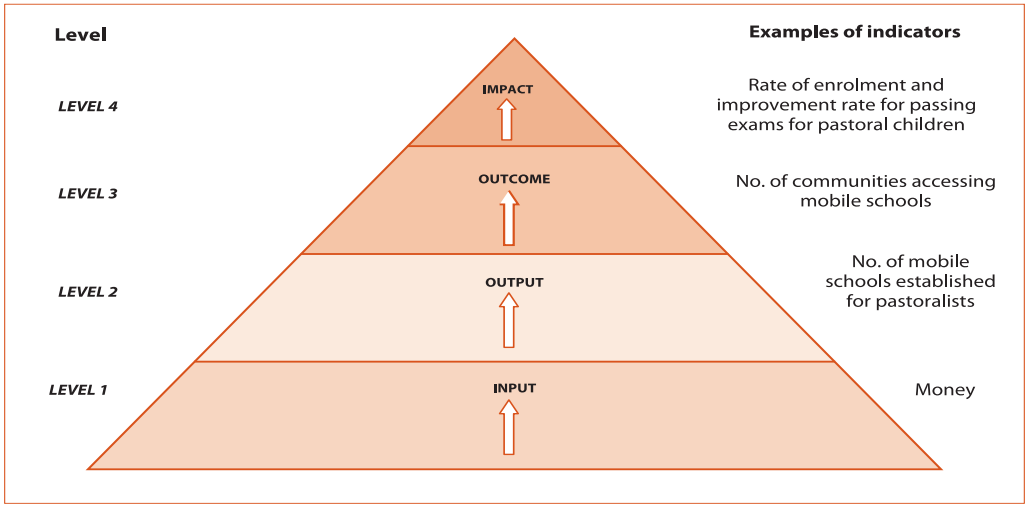
Source: UNDP-GEF (2008).

5.2 Evaluating the Effectiveness of the Mainstreaming Process

DRM mainstreaming processes must be continuously monitored based upon an agreed roadmap. Responsible parties for monitoring and evaluation should measure the effectiveness of the DRM activities, define the remaining gaps and identify the gap-filling measures, taking into account the changing circumstances and/or the new constraints/opportunities arising.

UNDP (2008) illustrates the four levels at which the effectiveness of mainstreaming can be measured, namely input, output, outcome and impact levels (see Figure 6). At each level, a set of indicators for "success" must be clearly stated to help determine if the process is on track. For example, indicators to assess progress and performance may be: flow of national and international resources towards the DRM mainstreaming initiatives at input level; documented evidence of integration of DRM issues into policy documents, development of new drought mitigation programmes or projects and /or creation of new communication and coordination mechanisms at central and local level for strengthened drought monitoring at output level; higher levels of awareness of drought issues at local or national level and increased number of water points and the number of pastoralists introducing the drought tolerant livestock species at outcome level; and reduced frequency of drought-related disaster occurrence at impact level. Indicators should be reviewed, validated and improved periodically in order to provide the required flexibility.

Figure 6: Different levels for measuring effectiveness of mainstreaming



Source: UNDP (2008).

In particular, in terms of inputs and outputs, special attention must be paid to the budgetary commitment of government at different levels to DRM measures. Many countries make the mistake of stopping the mainstreaming process when issues have been integrated into planning frameworks, and limited financial resources for the implementation of the frameworks have been allocated. Table 10 outlines the guiding questions to evaluate the soundness of inputs for DRM mainstreaming.

Table 10: Guiding questions to evaluate the soundness of inputs for DRM mainstreaming

Topic	*Questions*
Priority given to drought-related programmes mentioned in the national development planning framework	• Is the government's commitment to implementing DRM mainstreaming activities within the national development planning framework reflected in the budget? • In real terms, what share of the budget is allocated to and spent on areas related to DRM? • What share of sectoral and departmental budgets are being dedicated to DRM-related policies or programmes at national, sub-national and local levels?
Adequacy of spending on DRM-related programmes	• What is the total amount budgeted for DRM mainstreaming programmes? • How has the amount budgeted for DRM programmes changed in real terms compared to previous years? • Is the amount budgeted for DRM appropriate?
Equity in allocating funds for DRM-related programmes	• How much is budgeted per capita for DRM areas in all sectors in the national development planning framework? • How much is actually spent per capita on DRM-related policies and programmes?
Efficiency of spending on DRM-related programmes	• Are financial resources allocated to the DRM-related programmes being spent as planned? • Is growth in allocations to the DRM-related programmes translating into growth in actual spending?

Source: UNDP (2008).

To the extent possible, indicators for measuring success of mainstreaming efforts should be SMART. However, in reality, not all the progresses and achievements can be measured in a quantitative manner. In such cases, qualitative data, such as opinions of beneficiaries of DRM mainstreaming process, may be collected using the various tools. They include semi-structured interviews, questionnaires and focus group discussion, among other various field research methods. Table 11 lists the examples of the quantitative questions to be addressed to measure the effectiveness of the mainstreaming process. The scale used to rank interviewees' perceptions ranges from 1 to 5, with 1 being the lowest value and 5 the highest.

Monitoring results and evaluation findings should be shared regularly with other countries that are undergoing a similar process of DRM mainstreaming. A wealth of knowledge-based resources already exists on DRM and drought resilience building in many countries. Various communication and networking mechanisms are available to facilitate the exchange of these resources, such as ADDN at regional level and the Adaptation Learning Mechanism (ALM) on the global level (see Box 6). Compilation of knowledge, experiences and lessons learned is an important pathway for up-scaling the innovative and proven DRM tools and techniques in policy-setting, programme planning and actual project implementation.

Table 11: Quantitative analysis for measuring the effectiveness of the mainstreaming process

Criteria	*Scale*					*Evaluation questions*
	1	*2*	*3*	*4*	*5*	
Political leadership						• How supportive is the political leadership in terms of environmental and drylands issues? • Do key individuals in government hold environmental responsibilities? • Is there a national strategy for sustainable development?
Institutional commitment						• Are there institutions specifically mandated for environmental management? • Are they committed to drylands mainstreaming? • Are the institutions responsible for planning and finance equally committed to environmental and drylands mainstreaming?
Coordination						• Is there an institution that coordinates environmental mainstreaming? • Is it well staffed, with technical backstopping? • Are there subcommittees, sector working groups or task forces on environmental mainstreaming? • Have they been successful in advocating for environment and drylands issues in particular?
Participation						• Was planning done in a participatory manner? • Did the direct beneficiaries participate? • Was there a plan to cost-effectively manage participatory/consultative processes?
Communication reporting						• Are there good and regular communication links among the institutions and groups involved in mainstreaming? • Is there sharing of information on mainstreaming practices? • Is the media used to disseminate emerging good practices?

Source: UNDP (2008).

Box 6: Network mechanisms facilitating the DRM knowledge sharing and peer-learning

African Drought Risk and Development Network (ADDN)

ADDN is a region-wide network for knowledge sharing, peer learning and capacity building implemented by UNDP-DDC and UN-ISDR since 2005. It aims to support the decision-makers and practitioners in improving their efforts to mitigate and adapt to the increasing risk of drought and climate change in African dryland by providing a platform for dissemination and application of good and innovative practices.

To this end, a range of communication and networking building tools and modalities have been developed within the ADDN framework, which include:

- Organization of regular African Drought Adaptation Forums which bring together some 100 participants engaged in DRM at different levels; the last forum was held in Addis Ababa, Ethiopia, in September 2008.
- Issuance of monthly ADDN e-newsletters circulated to more than 1,500 interested governmental and non-governmental parties and individuals to keep them up-to-date on a range of drought-related information (e.g., projects, publications, workshop/training events and employment opportunities) produced at local, national sub-regional and region-wide levels.
- Facilitation of online discussion forums, which were established on an experimental basis in 2009 in collaboration with the United States Agency for International Development-supported FRAMEweb to respond to the increasing demand for sustained interaction, dialogue and reflection among those working in DRM.
- Publication of knowledge products, (e.g., discussion papers, policy briefs, guideline documents, etc.) and drawing on case studies, lessons, good practices, thematic information, policy approaches and community-scale knowledge provided by the ADDN participants.
- Facilitation of exchange visits and study tours for the target ADDN members to support the integration of innovative DRM options into actual policies and practices.

Building on the positive results and the pool of experiences from ADDN, the Africa-Asia Drought Risk Management Peer Assistance Project was developed in 2009. It aims to create an enabling environment for inter-regional knowledge sharing and technical cooperation among drought-prone countries in Africa and Asia. The initiative is supported by the Government of Japan, For more information on ADDN, please visit http://www.frameweb.org/CommunityBrowser.aspx?id=3003&lang=en-US.

Adaptation Learning Mechanism (ALM)

ALM is a web-based platform that helps practitioners and decision-makers in developing countries share climate change adaptation knowledge and expertise in the form of case studies, lessons learnt documents, guidance, etc. and then to integrate these resources into development planning. It was launched in 2007 with financial support from the GEF, with co-financing from the Swiss Agency for Development and Cooperation and the Institut de l'Énergie et de l'Environnement de la Francophonie, and implemented by UNDP in partnership with the World Bank and the United Nations Environment Programme.

Drawing from experiences on the ground, ALM intends to develop tools and practical guidance to meet the needs of developing countries in:

- Adaptation practices – what can be done to adapt to climate change on the ground?
- Integration of climate change risks and adaptation into development policy, planning and operations – how can policies and plans support adaptation over time?
- Capacity building – how can people be better assisted in becoming equipped for adapting to climate change?

For more information on ALM, please visit http://www.adaptationlearning.net/.

Conclusion

This document has been produced as a basic guidance tool for countries undertaking or planning to embark on integrating DRM into development policies, plans and programmes. DRM mainstreaming should be recognized as an approach by which development gains can be protected from climate change and variability. It represents a marked paradigm change in the institutional culture of doing business, by creating the mechanism of incorporating what was formerly perceived as an external concern into evolving policy frameworks and their implemented activities.

Many would argue that risk management is the approach which has been practiced for millennia by those deriving their livelihoods from natural resources. Today these efforts need to be stepped up and brought to the fore, to keep up with the pace of socio-economic and environmental changes. Many countries in Africa are increasingly engaged in strengthening the resilience of communities and their economies in an attempt to proactively adapt to climate related risks. This comes as a complement to previous models, which emphasized reactive approaches. Adopting a DRM/CRM approach at every level can help reduce vulnerability and hence ensure that climate shocks – or even slower long-term changes – do not further impede development gains.

Drought management may at first impression appear as a straightforward practice based on common sense and local knowledge. In actual practise, however, it is a complex operation that encompasses a variety of interrelated steps and approaches at different levels. Especially in situations where resources (human, technical and financial) are scarce, drought has to compete with many other priority issues in order for it to receive appropriate political attention and to gain the needed commitment. In this context, a risk management approach provides an effective framework for internalizing drought into decision-making processes systematically as a cross-cutting theme and as an integral part of poverty reduction and sustainable development pathways, rather than as a stand-alone issue that is addressed in isolation by single sectors.

As mentioned in this document, mainstreaming is an iterative process of changes, one that first and foremost involves changing the thoughts, behaviours and decisions of key stakeholders at all levels. While a potentially complex and lengthy process, the benefits of these changes reach further than the simple ability of managing a specific climate risk: they can also create more effective patterns of collaboration and mobilization, which in turn can create enabling conditions for a qualitative jump towards sustainable development. Furthermore, the methods proposed in this Primer are applicable to a variety of policy processes and thematic issues, from the rational identification of threats and impacts (defining a risk profile) to the identification of stakeholders and the participatory selection of mitigation options. In fact, it can be said that the key factor of success in the mainstreaming process is the inclusion of and collaboration with all stakeholders.

Whereas it is clear that drought will continue to occur, and likely to become more intense and frequent, all countries – whether or not they are currently coping with aridity and desertification – need to be prepared to deal with these increasing climate hazards. Beyond simply providing a framework for managing the impacts of drought, the process of DRM mainstreaming could provide countries with an opportunity to consider deeper policy transformations designed to lead their economies increasingly away from vulnerable investments or towards more balanced sources of growth. It is hoped that this Primer has provided both a tool for immediate DRM planning and some avenues into this longer-term strategic thinking.

The benefits of mainstreaming DRM and other climate factors into national development and sectoral planning frameworks are now more evident in those countries that are progressing in the direction of integrated risk-sensitive planning. The benefits are beginning to bear fruit in that not only are development plans and programmes/projects more sound and sustainable, they are being demonstrated as being more cost-efficient over the long term, in spite of uncertainties in the evolution of local climates. This tendency has especially been noted by the subsequent reduction in the amount of funding needed for humanitarian assistance and disaster relief work. Such positive experiences, some of which are summarized in the Annex to this Primer, should be further documented and widely distributed in promoting the analytical discussions of what works, why and what conditions are required to upscale successful approaches and techniques for a wider audience of stakeholders.

Annex: Case Studies

Integration of Drought Risk into National, Sectoral and Local Development Planning in India

Quick Facts

- India is home to more than 1 billion people, 72 per cent of whom live in rural areas.
- The Semi-Arid Tropical and Humid Zones have high incidence of poverty 24 per cent.
- The country is a federation of 28 States and 7 Union Territories, which are subdivided into districts, panchayats and villages.
- Due to the erratic behaviour of monsoons, both low and medium rain fall regions, which constitute about 68 per cent of the total area, are vulnerable to drought.
- From 1890 to 2008, India witnessed 22 major droughts.

Source: Government of India (2009).

India is one of the most disaster prone countries in the world, affected recurrently by different types of the world's worst natural and man-made disasters, including drought (South Asian Association for Regional Cooperation [SAARC], 2008). India has been undergoing a series of legal, strategic and institutional reforms to strengthen the country's DM capacity and to integrate this into development planning and implementation. This case study intends to illustrate the transition of DM paradigm in India from response-centred to prevention and mitigation-oriented approaches in the past decade. It outlines how the mainstreaming process has been taking place in the field of drought risk reduction and management at central, state and lower levels.

Drought Response Mechanism

India has a well-established institutional structure for managing drought response, relief and rehabilitation. At central level, the Indian Meteorology Department (IMD) is responsible for weather monitoring and forecasting. It prepares district-specific aridity maps and rainfall summaries on a weekly basis based on data gathered from 2,800 rain-gauge stations throughout the country. These updates are submitted to the Crop Weather Watch Group, an inter-ministerial committee created under the aegis of the Ministry of Agriculture, serving as a lynchpin to observe emerging early warning signs. Comprising representatives from IMD and other ministries and agencies responsible for various aspects of DM such as water, plant protection and energy, the Watch Group meets weekly during the rainy season, with increasing frequency during droughts to assess the situations and response options. A similar type of group exists at state level, and regular exchanges of information between the different levels help make decisions about triggering and activating drought response systems (Prabhakar, 2004; Samra, 2004).

Upon the declaration of drought based on the various levels of monitoring and a set of triggers, relief assistance is provided through the permanent budgetary arrangements from the Calamity Relief Fund and National Calamity Contingency Fund, as well as other sponsored programmes at various levels. These resources are typically used to purchase food grain and animal fodder, carry out emergency water works and implement special community relief plans, such as the Employment Guarantee Scheme and the Mid-day Meal Scheme (Government of India, 2008).

Where resources are insufficient, additional support is often redirected from various other government-funded programmes. However, growing drought relief expenditure has been adding

stress to the government budget, resulting in a severe long-term setback to socio-economic development. In the case of the 2002-2003 drought, supplementary resources were diverted from the Integrated Child Development Scheme. Weak monsoon rains in several regions of the country in 2009 resulted in a 10 per cent cut in non-plan expenditure for the 2009-2010 fiscal year, in all government ministries and departments (Jagota and Gangopadhyay, 2009).

Shift from Reactive to Proactive Approach

It has often been noted that drought management in India is historically inclined to ad hoc relief-oriented measures, rather than preventive and mitigative interventions. While these temporary measures, when triggered in a timely and effective manner, can reduce immediate mortality and livelihood losses, they make a limited contribution to long-term resilience building among drought prone communities. Indeed, while billions of rupees have been spent during most of the drought-hit years, a further rise in drought recovery cost is deemed unavoidable in the future given the projected increase in frequency and intensity of extreme weather events, because of the effects of climate change. Furthermore, there has been a growing concern on the tendency to inflate the impacts of drought at local level to obtain larger grants. This, in many cases, generates stronger dependence on external relief support on the ground and even diverts limited resources away from the most affected and vulnerable segment of the population.

A number of rural development programmes have been implemented to date to address the diverse needs of the population in drought-prone areas, including the Drought Prone Areas Development Programme, Desert Development Programme and National Watershed Development Project for Rainfed Areas, amongst others. While undoubtedly useful, most initiatives have yielded mixed results due to their failures to recognize the resource specifics in drought prone areas and relate them to the traditionally-practised adaptation and coping strategies (Government of India, 2009).

Reflecting on the growing risk and impacts of disasters, a paradigm shift has been taking place in the past decade from the reactive (ex-post) to the proactive (ex-ante) approach. A High-Powered Committee was set up in 1999 with the aim of preparing DM plans and making recommendations on effective disaster mitigation mechanisms. A Tenth Five-Year Plan (2002-2007) elaborated, for the first time, on the need to incorporate DM as a development issue. The Twelfth Finance Commission (2005-2010) was also mandated to review the financial arrangements for DM. As part of these processes, in 2003, the Disaster Relief Department was transformed into the Disaster Management and Relief Department with enhanced responsibilities for prevention, mitigation and preparedness.

In 2005, a Disaster Management Act was enacted to institutionalize DM mechanisms, including drought management, and to integrate them into the development planning processes throughout the hierarchy of government structures. Consequently the Disaster Management Authority was established at national, state and district levels to lead the formulation of policies, guidelines and plans for effective and synergetic DM and to coordinate their enforcement and implementation respectively. A National Policy on Disaster Management prepared by the National Disaster Management Authority was approved by the Union Cabinet in October, 2009.

The act also created the National Institute of Disaster Management (NIDM), a government think-tank responsible for coordinating research projects, capacity building programmes and database

development on disasters. For example, NIDM has been organizing the Disaster Management Congress since 2006 on a biennial/triennial basis. It brings together over 1,000 practitioners, scientists and policymakers working on different aspects of DM in India and beyond to share knowledge, lessons and challenges and discuss areas of mutual cooperation. In addition, DM Cells were formed under the State Administrative Training Institutes to further enhance the government's capacity in DM and DM plan development.

Mainstreaming of Drought Risk into Planning – Local Level Efforts

Given that the types, frequency and severity of disasters differ substantially from one region to another, considerable emphasis is being placed on decentralized DM under new legal and institutional frameworks. For example, Rajasthan, one of the most drought prone states in the Northwest region, developed a DM Manual to replace its age-old Famine Code guideline, which was adopted in 1880. The objective of the manual is to provide short and long-term visions for addressing the various drought-related challenges at state, district and panchayat (village) levels, utilizing the improved drought monitoring and mitigation methods and technologies (Disaster Management and Relief Department in Rajasthan State, n.d.).

In Rajasthan, like elsewhere, there has long been an absence of clear and uniform indicators of drought impacts, due to their creeping and complex phenomena, resulting in indecision/inaction and/or scattered efforts being made during times of crisis (Rathore, 2005; Chakrabarti, Srivastava and Shakya, 2009). The manual comprehensively analyzes the adverse effects of drought in the region in light of economic, environmental and social contexts, as well as other factors found to contribute to vulnerability. It delineates the roles and responsibilities of government departments and agencies at different stages of the DM cycle, including the normal rainfall period, to enhance systematic and holistic vulnerability reduction. It also draws attention to the issue of diversification of livelihoods options, given that the majority of the state's population consists of smallholder rainfed farmers (Disaster Management and Relief Department in Rajasthan State, n.d.).

Mainstreaming of Drought Risk into Planning – Sectoral Efforts

At sectoral level, in response to the seasonal rainfall deficit in 2009, the National Rainfed Area Authority of the Ministry in Agriculture developed the Drought Management Strategy. India's drought management is closely tied to its agricultural policy and rural development efforts, as 60 per cent of the farmlands in the country are rainfed. The agriculture sector faces a number of drought related challenges, such as: lack of holistic drought management planning and its integration into local agricultural development plans; non-participation of local farmers and limited integration of indigenous knowledge in drought management practices; non-availability of accurate and reliable spatial and temporal data, etc. The strategy aims to address these issues in a systematic and transparent manner. It sets the short-term strategy for drought contingency planning as well as the mid-/long-term strategy for enhanced food security through improved crop and livestock related production.

NIDM also developed a National DM Manual in 2010 as a decision support tool in DRM planning and implementation, broadly at both national and local levels. This document is expected to provide a clear and objective definition of drought, which will help to build a common understanding of the

onset and end of a drought, identify the intervention measures accordingly in different sectors and further promote inter-sectoral collaboration. It is also expected to clarify the roles of civil society and NGOs in the planning and execution of decentralized, community-based DRM measures. In the face of climate change and other environmental challenges as well as in the context of socio-economic disparities, drought risk is now considered to be on the rise in many parts of the country. These include the regions that were formerly categorized as less drought-prone, such as the Northeastern States, where average annual rainfall is 1,100 mm; severe rainfall deficits have however recently been increasingly observed, e.g., 2001/02 and 2005. The manual demonstrates the government's commitment to work in both the vertical and horizontal dimension of the DRM institutional structure and to build capacity of vulnerable populations to cope with, and adapt to, subsequent drought impacts.

Mainstreaming of Drought Issues in Zambia

This case study illustrates the integration of drought management aspects into Zambia's agricultural policy and programmes, as well as the links between crop policies and drought impact mitigation. It demonstrates that in most drought-prone countries, many entry points for DRM mainstreaming are self-evident, but that benefits can also be gained by linking DRM to the economic and trade aspects of agriculture planning. Shifting from a DRM policy that is focused on emergency relief to a resilience-building approach can be a long process. Nonetheless, there are multiple benefits that can arise from interventions designed to remove barriers and address underlying vulnerabilities.

Identifying the Rationale for Mainstreaming

In Zambia, drought-induced crop failures have been the most common disaster in recent years. Levels of chronic malnutrition in Zambia are now among the worst in the world; and a large portion of the country is particularly susceptible to periodic droughts. For most rural households in Zambia, the cultivation of maize provides the primary source of income and half of the calories consumed. As a crop, maize is particularly vulnerable to drought, and in light of increasingly erratic and lower rainfall, yields of maize have been substantially reduced. Given a lack of consistent rainfall patterns, and that less than five per cent of crop land is irrigated, Zambia's maize production fails to satisfy national requirements on average in one year out of three (Dorosh, Dradri and Haggblade, 2007).

Until the 1990s, the policy was to encourage maize production throughout the country through the introduction of uniform agricultural inputs prices and crop producer prices, along with subsidies to basic agro-processed products. These schemes resulted in an increased production level but at a high cost to the overall economy. The policy of liberalization in the agriculture sector – the removal of subsidies – has encouraged farmers to grow crops that are acclimatized to their region, while having contributed to a reduction of maize production. It is estimated that the resulting diversification towards sorghum, millet, or cassava has helped build resilience in the areas with high drought vulnerability (Chizuni, 1994).

The rationale for integrating drought mitigation into mainstream development efforts is therefore first and foremost a food security argument, which can lead to a focus on emergency relief efforts during drought events. However, since the economic development of the country is highly dependent on agriculture, Zambia's approach includes element of DRM in its efforts to improve agricultural productivity as a hybrid of social, economic and trade policies.

Identifying Entry Points

Zambia adopted a National Disaster Management Policy in order to undertake a coordinated approach to prevention and mitigation efforts. The policy recognizes underlying causes of vulnerability to disasters, including:

- Lack of access to resources,
- Degradation of environment,
- Weak institutional structures to promote social welfare,
- Lack of access to information and knowledge,
- Lack of access to political power and representation,
- Weak buildings/infrastructure, and
- Limited food diversity.

The vision of the policy "is to promote a 'safety net' for protection of the citizenry, their assets and the environment against disasters through a pro-active, community-based, developmental and multi-sectoral approach that combines disaster preparedness, prevention and mitigation, and integrates DM into national development plans. These should embrace all aspects of DM, namely: mitigation, prevention, preparedness, response, relief, rehabilitation and construction (Republic of Zambia, 2005)." In addition, the National Disaster Management Policy and its Operations Manual set forth institutional mechanisms for preventing, monitoring, and mitigating disasters, including the ascribed roles and responsibilities of various actors at national, regional and local levels. In addition, they also determine the different procedures and conditions for accessing relief services.

As called for under the Vision, the natural entry points for integration of DRM issues are the National Development Plan and Agriculture Policy. Integration of DRM measures into the Fifth National Development Plan testifies to the pervasiveness of underlying vulnerabilities as well as the need to undertake risk-proof development. This integration takes place at various levels: providing increased visibility to issues related to underlying vulnerabilities, e.g., infrastructure, or limited food diversity, as well as integrating programmatic and policy response measures, e.g., increased focus on drought-tolerant crops, facilitation of credit, or removal of subsidies (Banda, 2005).

DRM in the National Development Plan and Agriculture Policy

The Fifth National Development Plan (2006-2010) integrates various elements of DRM, namely through its impacts on the agriculture sector as an engine of economic growth. The National Agriculture Policy (2004-2015) provides additional detail about various strategies used in increasing agricultural production. At the policy level, elements of DRM are integrated into both frameworks, which include the continued promotion of agricultural diversification as a means to combine increased food security at the household level and export expansions. For example, crops such as cassava, sorghum, millet, sweet potatoes and beans are targeted for increased yields and productivity, while research efforts would target horticultural crops (Republic of Zambia, 2004).

Other measures include the predicted increased investments in rural infrastructure, including doubling the area under irrigation, road-building and market access measures, as well as the

dissemination of better soil and water practices. As part of the overall fiscal policy reform agenda rural finance will be strengthened, which addresses one of the underlying vulnerabilities. From a financial perspective, public spending on agricultural development shall be increased considerably and appropriately allocated. Agriculture spending is envisaged to rise to about 8 per cent of the budget.

Sectoral and regional plans are also established in the Fifth National Plan, highlighting specific measures, including the rehabilitation of water infrastructures on a preventative and emergency basis in the event of drought or the dissemination of appropriate drought-resistant crops (Republic of Zambia, 2006). At the programmatic level, various sectoral plans included in the National Plan will also incorporate elements of DRM, including plans to strengthen meteorological monitoring capacity.

In addition, the government-owned Zambia State Insurance Corporation has introduced two agriculture insurance products to help farmers face disasters. These cover damages to crops from natural hazards, including droughts and floods.

Mainstreaming through Coordination and Decentralization

The National Development Plan was developed through a decentralized approach. District and provincial plans were developed through a consultative process and facilitated by the Ministry of Finance and National Planning. The consultation process integrated the views of 21 Sectoral Advisory Groups (SAGs) and included the preparation of 72 district development plans that were approved by respective district level organizations. Consultations were incorporated into the Provincial Plans and then summarized into the National Plan. Based on this bottom-up approach, it becomes evident that local concerns, including drought and others related to underlying vulnerabilities – which are also the determinants of poverty – would surface through to the National level.

At the central level SAGs, chaired by the respective Permanent Secretaries, were given revised Terms of Reference to enable them play a strategic role in the development of the Fifth National Development Plan. Members of SAGs include government officials, representatives of cooperating partners and representatives of CSOs. Coordination at this level helps ensure that issues related to DRM are appropriately integrated into sectoral planning. For example, key elements of the National Disaster Management Policy were incorporated into the National Adaptation Programme of Action on Climate Change (Republic of Zambia, 2007).

In addition, as highlighted in the National Disaster Management Policy, the participants in the SAGs are most likely to be the same as those participating in the National Disaster Management Committee, itself chaired by the Vice-President. This includes ministries in drought relevant sectors, such as (Republic of Zambia, 2005):

- Defence
- Home Affairs,
- Communications and Transport,
- Agriculture and Cooperatives,
- Energy and Water Development,
- Finance and National Planning,
- Local Government and Housing,
- Community Development and Social Services,
- Work and Supply,
- Health
- Tourism Environment and Natural Resources
- Education
- Information and Broadcasting Services.

The case of Zambia illustrates the convergence between methodological and substantive mainstreaming. In effect, the mainstreaming approach is a result of a combination of factors including the close links between the economy and the vulnerable sectors of the economy. Hence the similarities in composition between the coordinating bodies for various major frameworks and sectoral plans, as well as, conscious efforts on the part of the country's leadership to move from a reactive, emergency relief approach to drought management towards a longer-term approach that addresses the underlying vulnerabilities – thereby promoting drought-proof development.

Local DRM for Enhanced Resilience in Niger

This case study illustrates how DRM initiated at the community level can have wide ranging results in terms of land regeneration, improvement of food security and, in general, reduction of poverty. The case study shows the interdependencies between land regeneration, improving quality and range of food production and strengthening community organization. Initiatives like these are suitable for up-scaling beyond the initial intervention areas. Complementing the local level regeneration projects with national policies and strategies for combating desertification, rural development and poverty reduction enable an integrated approach to DRM. In many drought prone countries in the Sahel, traditional farming systems can be adapted and enhanced to address not only cyclical drought periods but also cope the increasingly negative impacts of climate change.

Identifying the Rationale for Mainstreaming

Niger's ecosystems, like those of all countries in the Sahel region, are fragile and vulnerable to extensive periods of drought and climate change impacts. Historically, due to low population density in the country, the traditional integrated agricultural systems were adequate to satisfy the needs of the rural population, even during periods of inadequate rainfall. Since the 1930s, however, growing demands for export crops as well as population growth have resulted in land clearing and tree harvesting practices have become increasingly widespread. Furthermore, French colonial policies regarding forest management, centralizing the property of all trees, resulted in disincentives for farmers to maintain trees and care for their land. In fact, farmers had to pay licences if they wanted to benefit from trees on their own land.

Following independence the Nigerian government maintained the central ownership over forest resources. More land was stripped of its natural tree and vegetative cover to increase areas for crop production, thereby exacerbating depletion of soil fertility and exposing the vulnerable land to devastating wind erosion. Farmers were fined for even cutting branches; investment in and nurturing of trees was discouraged. One additional consequence was a reduction of forest products in local markets, forcing families to use animal dung and crop residue as fuel source, thus further reducing their capacity for maintaining some level of soil fertility. While centrally managed reforestation programmes were launched during that period, due to a lack of appreciation of the importance of the local tree and plant resources these programmes often destroy the natural environment even further by ploughing under any natural vegetation, and removing any remaining trees during the preparation for ploughing.

In extended periods of drought, such as in the nineteen sixties and seventies, conditions further deteriorated. Hand in hand with the depletion of the top soil and vegetative cover a reduction in food production was brought about, livestock numbers and of water resources became limited, thereby further increasing the vulnerability of the affected communities. By the 1970s and 1980s, following another extensive drought period, international agencies launched a range of development programmes. Efforts focused on training foresters and establishing tree nurseries and fuel-wood plantations. However, most of these initiatives introduced exotic tree species into the ecosystem and local people were rarely consulted. Often, the government also appropriated land that farmers and herders had used. While over a period of 12 years some 60 million trees were planted in Niger, less than half have survived (World Resources Institute, 2008).

Identifying Entry Points

During the 1980s several projects, however, embarked on taking a different approach to the needs of DRM, food security and sustainable development in rural regions of Niger. These primarily farmer-led projects grew out of the realization that an ecological and humanitarian crisis was threatening the lives and livelihoods of millions of people, and an adequate response could only be addressed if ,

- farmers were fully involved in land regeneration processes;
- an integrated farming approach was taken based on local biodiversity of tree, plant and crop species and agroforestry reintroduced as part of the agricultural system; and
- low cost methods could be identified and implemented by farmers themselves, and these be based on traditional techniques that could easily be applied and shared across the communities.

The adopted restoration techniques applied were essentially improved traditional techniques such as planting pits, stony cords, the use of crop residues and other soft techniques including the half-moons.[6] These activities, which are manually completed, are left to the initiative of individual farmers who were convinced of the need to adopt such measures them. Several pilot projects have demonstrated that farmers were willing to enthusiastically put into practice the various techniques presented to them. Women farmers also became increasingly involved and community organizations were formed to share experience and lessons learned. [7]

6 A stony cord is a line of stones used to prevent water-induced erosion in dry areas.. Half moons are crescent shaped piles of earth used to slow down run-off, conserve soil moisture and reduce erosion.

7 Several pilot projects are described and analysed in detail in Boubacar, et al. (2005).

Over a period of twenty years, from 1984 to 2004, the results of the farmer led programmes all across the southern regions of Niger brought impressive results. Satellite images confirm the change in the landscape from a non-productive eroded landscape into a territory that is green with vegetation and tree cover.

Some impacts of investments in NRM in Niger (Reij, 2006):

- Rehabilitation of degraded land (250,000 ha); Farmer managed natural resources (FMNR) (at least three million ha)
- Increase in cereal yields and strong increase in production of dry season crops
- Improved household food security and nutrition (also in drought years)
- Improved access to water (local groundwater recharge, but not everywhere)
- Increase in fodder resources
- Less labour migration (exodus) from villages with investments in NRM
- Social capital building
- Most small livestock owned by women (80 per cent)
- Reduction in time required for collection of firewood

The consistent positive results of the farmer managed land and natural resource regeneration on all areas of poverty reduction and improvement of ecosystem health in the project areas makes these projects prime initiatives for mainstreaming across all across comparable land areas in Niger and across the Sahelian region. The impacts demonstrate the strengthening of the resilience of the communities and the evident environmental regeneration are important indicators for preparation to cope with drought conditions and future impacts of climate change (Larwanou, Abdoulaye and Reij, 2006).

Such initiatives at the community level, actively involving all sectors of the community, provide an important entry point for policy formulation and upscaling. It is estimated that in all some five million hectares of land are now involved in the regeneration programmes, which represents almost half of the cultivated land in the country. It is further estimated that around four and a half million people benefit from these programmes. People now eat better and have access to improved nutrition, easier access to fuel and incomes have increased through trade. These resilient communities are also better prepared for future periods of drought and the impact of climate change. Communities that have been part of the FMNR methodologies and programmes have suffered less during the most recent drought in 2004/05. According to several observers the famine was the worst since 1984, however the overall cereal shortage was smaller, less for example than in 1990. This would suggest that the crisis had multiple causes, the shortage of agricultural produce only being only one of them (Magha, 2005).

DRM in National Strategies and Rural Policy

Since 2000, the government of Niger has introduced a range of new policies in the area of sustainable development, environmental protection and poverty reduction. Encouraged and assisted by the international community. Niger adopted its NAP to Combat Desertification in 2000, a Poverty Reduction Strategy in 2002 and a new Rural Development Strategy in 2003. In 2004 wide ranging consultations on harmonizing the various strategies led to plans for their integration and coordination of this through a national coordination body, Conseil National de L'Environnement pour un Développement Durable (République du Niger, 2004). Of interest here is that several

factors of rural development were recognized as having been insufficiently addressed in previous policy documents, and these were subsequently changed in light of an understanding of the issues. For example, the policy of central control over forestry resources was abandoned and replaced in 2004 by legislation aimed at enabling decentralized responsibility for the environment to be placed with the local communities (République du Niger, 2004).

Mainstreaming through Coordination and Decentralization

The Central Coordinating Committee established several technical committees tasked with advising the main committee on a wide range of specialist areas. The representation of civil society groups has been an integral element of the committee and its technical composition. The entry point for the implementation of policies at all levels is the complex and multi-sectoral combat against desertification, given the environmental conditions of the country. At the same time, the government has emphasized, through the establishment of the coordination committee and its multidisciplinary outlook and integration of the three essential policy strategies the interlinking of the combat against desertification, rural development and poverty reduction. This approach lends itself to successfully developing DRM and CRM strategies.

The government report further stresses the important participation of women at all levels. In fact, it is recognized that women hold a major responsibility for NRM and a special office for women has been established under the office of the President. Recognizing local knowledge and the participation of all stakeholders in NRM programmes is stressed throughout the report. Projects are being designed to promote the wide collection and use of best practices and lessons learned. The different stakeholder groups will be organized in networks that will also encourage feed back to the national coordination committee (République du Niger, 2004).

While challenges for the committee and its work remain, in particular in terms of the need for adequate financial resources and capacity development in management areas, a process of decentralization has been embarked upon. According to the report, Regional Environmental Councils for Sustainable Development will become operational in the near future and will, through their extension operatives, reach out to local communities for capacity development and coordination of activities (République du Niger, 2004).

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