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Integrating climate resilience into development planning

Draft country case study - Ethiopia

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This draft report will be discussed as item 7 at the meeting of WPCID on 9 December 2013. It accompanies a case study of Colombia [ENV/EPOC/WPCID(2013)16]. These two case studies form the basis of the synthesis report [ENV/EPOC/WPCID(2013)17]

It contributes to PWB 2.3.2.3 - Development and Environment Linkages

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NOTE FROM THE SECRETARIAT

This case study is part of the OECD project on *Integrating Climate Resilience into Development Planning*. This project aims to provide an overview of the current state of knowledge on climate-resilient development, summarising emerging lessons and remaining gaps.

The study has been conducted in parallel to a case study on climate-resilient development in Colombia (OECD, forthcoming, a), and it has provided input to the synthesis report *Integrating Climate Resilience into Development Planning* (OECD, forthcoming, b). The report builds on previous OECD work on climate change and development, notably the Policy Guidance *Integrating Climate Change Adaptation into Development Co-operation* (OECD, 2009) and *Putting Green Growth at the Heart of Development* (OECD, 2013). This case study also complements OECD work on Ethiopia's progress and perspectives on climate change mitigation and low-carbon development (Bass et al., 2013).

The work has been informed by expert interviews with Ethiopian government officials, academics and civil society actors gathered between December 2012 and September 2013, as well as a workshop with experts from other developing countries, OECD member states, donor agencies, academia and the private sector, held at the OECD in April 2013.

It is intended that this paper, along with the case study of Colombia and synthesis paper, will be published in Q1 2014.

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LIST OF ACRONYMS

CRGE	Climate Resilient Green Economy
CRS	Climate Resilience Strategy
DRF	Disaster and Recovery Fund
DFID	Department for International Development
DRM	Disaster Risk Management
EPA	Ethiopian Environmental Protection Authority
EPRDF	Ethiopian People's Revolutionary Democratic Front
EPACC	Ethiopian Programme of Adaptation to Climate Change
FDI	Foreign Direct Investment
GCAP	Global Climate Adaptation Partnership
GES	Green Economy Strategy
GGGI	Global Green Growth Institute
GTP	Growth and Transformation Plan 2010-2015
HABP	Household Asset Building Program
HARITA	Horn of Africa Risk Transfer Initiative
HDI	Human Development Index
ITCZ	Inter-Tropical Convergence Zone
MDGs	Millennium Development Goals
MEF	Ministry of Environmental Protection and Forests
MoARD	Ethiopian Ministry of Agriculture and Rural Development
MoFED	Ethiopian Ministry of Finance and Economic Development
NAPA	National Adaptation Programme of Action
OECD	Organisation for Economic Co-operation and Development
ODA	Official Development Assistance
PNSP	Productive Safety Net Program
SPIF	Strategic Programme and Investment Framework for Disaster Risk Management
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention for Climate Change

EXECUTIVE SUMMARY

Current development choices are often implicitly based on the assumption that they are occurring in a static climate. But the risk is that the chosen development pathway is unsustainable under future climate conditions. Moving towards "climate-resilient development" should help to reduce the vulnerability of economic growth and livelihoods to future climate change. For this, it will be necessary to reassess development objectives and to integrate climate projections into development and other planning procedures.

This paper analyses Ethiopia's experience in integrating the climate change into its development planning. It summarises lessons learned to date, and suggests ways for Ethiopia to further improve its climate-resilient development trajectory. The analysis draws on lessons learned from other countries and academic research. The lessons learned from this may also assist other countries as they seek to move towards climate-resilient development.

The government of Ethiopia is strongly committed to setting Ethiopia on a green and climate-resilient development pathway. Ethiopia has been historically prone to extreme whether events. Droughts and, more recently, floods occur on an almost annual basis, with severe consequences for Ethiopia's economy and people. The Ethiopian government recognises that climate variation and climate change may jeopardise the country's ambitious development goals, and is working to increase the resilience against varying climatic conditions. Aiming to adopt a strategic approach to both adaptation and mitigation to climate change, Ethiopia has put in place a new institutional arrangement, and is currently in the process of developing a national climate resilience strategy. The first sectoral strategy was released in October 2013 and targets Ethiopia's largest sector agriculture.

Ethiopia's experience revealed that the following related processes seem to be particularly relevant for enabling climate-resilient development:

- *Develop a national long-term development visions to ensure long-term commitment:* Ethiopia has developed and publicly championed its vision to build a climate resilient green economy by 2025 – an economy of middle-income status that is resilient to the impacts of climate change and does not result in high greenhouse gas emissions. This process was driven by strong and visible leadership, which has triggered high-level political support for this vision across the government.

- *Create institutional systems that allow for broad stakeholder engagement:* Ethiopia has designed a new institutional arrangement to facilitate cross-governmental co-ordination. Combining high-level political and lower-level technical co-ordination bodies, the new structure both encourages political commitment and ensures that the necessary expertise is available. It lifts climate change from being a primarily environmental concern to become a cross-governmental priority.

- *Build capacity and ensure sufficient financing:* Ethiopia has put in place both short-term and long-term measures to build the capacity in public institutions that is necessary to develop and deliver national climate resilience goals. These complement the capacity-building efforts under the national development plan. To secure sufficient financing, Ethiopia has established a dedicated national climate fund. The fund is linked to both national resilience and development planning processes and should therefore support coherence in investments for climate change adaptation and mitigation as well as alignment with national growth and development priorities.

- *Co-operate with development partners improve the evidence base and review response strategies as new climate data is available:* Studies conducted in partnership with development co-operation providers have significantly contributed to enhanced knowledge about current and future climate impacts. Given constrained resources and capacities, development co-operation will have an important role to play to support the further improvement of the evidence base. As current climate projections for Ethiopia entail very high uncertainties, it will also be important to develop flexible response approaches, and reviews policies ones new climate information becomes available.

While these steps constitute important enabling factors for climate-resilient development, future efforts will need to target the integration of climate-resilience priorities into existing policy goals and instruments. A mapping of Ethiopia's key growth sectors illustrates that there are numerous synergies between growth and resilience goals, but that in some instances climate resilience can compete with other policy priorities. Understanding these links and making them explicit will be vital for achieving climate-resilient development. Ethiopia has undertaken efforts to identify such synergies and conflicts for its agricultural sector. Future steps will need to include the undertaking of similar analyses for other sectors, notably the fast growing ones, and should possibly include the design of mechanisms for addressing identified conflicts between climate resilience goals and other policy priorities.

An analysis of climate resilience in the agricultural sector reveals that agricultural development can have both positively and negatively affect Ethiopia's vulnerability to climate change. Productivity increases through a number of measures under the national development plan principally bear the potential to increase farmers' resilience to climate variability and climate change; yet some forms of support may need to be adjusted to account for climate change. Water management is likely to be a key issue, as the substantial planned investments in irrigation systems may raise tensions with other water-reliant economic activities. Mainstreaming climate-resilience into agricultural extension services promises to be a particularly effective tool in Ethiopia, yet significant investments in human capital will be necessary to achieve this.

Macroeconomic management is identified as a second important entry-point for achieving climate-resilient growth in Ethiopia. Implementing Ethiopia's development and resilience goals will require a substantive mobilisation of both domestic and international resources, and Ethiopia's macroeconomic conditions will determine how public and private actors can access funds to finance growth or resilience investments. Climatic shocks that require emergency responses will further increase pressures on public financial resources, making the case for a strengthening of national contingency financial mechanisms. The analysis also finds that a deeper protection of vulnerable population will contribute to improved resilience at the macro-level.

1. Introduction

1. Climate change creates a new context for policy-making in developing countries. The economic costs of climate change can put their economic growth prospects at risk and endanger the achievement of their development objectives. At the same time, development can inadvertently increase vulnerability to climate change. Building "climate resilience" into development policies can help to reduce the costs of climate change and sustain economic growth and social well-being over time. Climate-resilient development includes climate change in the baseline for development planning. It aims to evaluate development priorities and measures in the context of future climate change, potentially changing policy objectives and priorities.

2. The cross-sectoral nature of climate impacts calls for a co-ordinated approach by the public sector, civil society and development partners across levels of governance. Climate-resilient development needs to go beyond individual programmes and projects and consider systemic aspects and linkages between economic development, climate change and resilience. This need has been acknowledged in international discussions that have recently shifted from project- and programme-based approaches for adaptation to promoting national, strategic responses to the effects of climate change. This includes the call for Least Developed Countries to develop National Adaptation Plans in the framework of the United Nations Framework Convention on Climate Change (UNFCCC). Practical experience with designing and implementing climate-resilient development is, however, still limited.

3. This case study discusses Ethiopia's experience in moving towards climate-resilient development. High current vulnerability to climate variation created a strong awareness about existing and future climate impacts in Ethiopian and triggered the decision to develop a comprehensive national response to climate change. Ethiopia aims to become a middle-income country by 2025, without increasing its greenhouse gas emissions and while protecting itself against the negative impacts of climate change. To achieve this, Ethiopia has designed new institutional arrangements to enable it to integrate both mitigation and adaptation policies into the country's broader national development planning processes. Its *Climate Resilient Green Growth Strategy* has provided a clear vision, high-level commitment and cross-governmental co-operation. Ethiopia's experience illustrates lessons learned that should be of value to other countries as they move towards climate-resilient development.

4. The paper is structured as follows. Section 2 provides an overview of the links between climate, resilience and development, and examines how the links manifest themselves in Ethiopia. Section 3 looks at key enabling factors and activities that pave the road for climate-resilient development. It discusses Ethiopia's policy framework, the institutional setting, capacity challenges, financing challenges, the development of a sound evidence base, and on the role of development partners. Section 4 analyses specific policy areas for building resilience into development processes. The section comprises an overview of sectoral development trends, and provides more detailed analysis for two distinct policy areas: agricultural development and macroeconomic management. Section 5 concludes with an outlook of priorities in the coming years.

Box 1. Definition of key terms

This report defines **climate resilience** as the capacity of a social, economic or ecological system to cope with losses or disturbances caused by climate change. While **resilience** refers more generally to the capacity to cope with any hazardous event or disturbance (UNISDR, 2013), climate resilience highlights the need to consider future climate change as it poses new risks and may require changes to traditional risk management. In this understanding, resilience is not only the outcome of deliberate adaptation activities, but also of other, often unrelated, policies and socio-economic trends. **Climate-resilient development** describes a sustainable improvement in economic growth, poverty reduction and other development objectives both under current and projected future climate conditions. Climate-resilient development thus implies a continuous and integrated process of climate change adaptation and other policies (Sperling et al., 2008).

Adaptation is defined as "the process of adjustment to actual or expected climate and its effects to moderate harm or exploit beneficial opportunities" (IPCC, 2012, p. 556). Thus, adaptation is understood as a process or specific activity, while climate resilience describes the outcome of adaptation and other, often unrelated, activities.

Vulnerability is defined in this paper as the "propensity or predisposition to be adversely affected" (IPCC, 2012, p. 564). Vulnerability describes the opposite of "resilience". Climate vulnerability can be understood in terms of exposure, sensitivity, and adaptive capacity.

In line with the IPCC (2012), this report defines **climate extremes** as either an extreme weather or extreme climate event, i.e. an event that is rare at a particular place and time of the year.

Box 2. Ethiopia's socio-economic context

Ethiopia is one of the poorest countries in the world, but it has also been one of the fastest growing. Between 2004 and 2011, Ethiopia's economy grew at an average rate of 10.7% per annum (World Bank, 2013a). GDP per capita almost doubled during this period, despite a rapidly growing population. Ethiopia's 92 million inhabitants reached a per capita income of USD 370 in 2011, which remains almost four times below the Sub-Saharan average of USD 1 270. In 2012, Ethiopia's growth rate decelerated to 7.0%, and it is projected to stay at about 6.5% over the next five years (World Bank, 2013a; IMF, 2012). The government of Ethiopia has established a growth plan that aims to resume double-digit growth rates over the next years and to reach middle income status by 2020-2023 (MoFED, 2010). To achieve this, the government aims to increase per capita income to over USD 1 000 by 2025 (Federal Democratic Republic of Ethiopia, forthcoming).

The agricultural sector is the major component of the Ethiopian economy and the main source of growth. In the 2011/12 financial year, crop production accounted for about one-third of GDP, with livestock rearing and hunting accounting for a further 10% (World Bank, 2013a). Yearly agricultural growth rates fluctuate widely, driven by climate variability and fluctuations in international prices for Ethiopia's export crops, notably coffee. The economic contribution of the services sector has been increasing over the past decade. Between 2003/04 and 2011/12, agriculture accounted for 51% and 44% of GDP respectively, while the contribution of the services sector increased from 38% to 45% (World Bank, 2013a). The industrial sector accounted for around 10% in 2011/12, but it has recently gained pace thanks to a rapid expansion of mining activities. Despite this shift in the structure of the economy, agriculture remains of overriding importance to the Ethiopian economy, accounting for 80% of employment and 70% of export earnings in 2011/12 (ADB et al., 2012; Bass et al., 2013).

Ethiopia's growth strategy is characterised by high public-sector investment. In 2011/2012, public spending accounted for almost two-thirds of total GDP growth. Large public investments were financed through shifts in budgetary priorities, official development assistance (ODA) and domestic and external borrowing. While external debt has so far remained at a sustainable level, the large domestic borrowing contributed to increasing inflation rates, which peaked at 40% in mid-2011. Ethiopia has managed to reduce the official inflation rate to 7% in March 2013, aided by tighter monetary policy and a slowdown in global food and fuel price inflation (World Bank, 2013a; IMF, 2012). Mobilising financial resources for the substantial investments foreseen in the government's growth strategy while maintaining a stable macroeconomic environment will be challenging for the Ethiopian government. Ethiopia's high investment rates coexist with a low domestic savings rate of 5.2% of GDP, resulting in a wide and persistent savings and investment gap (MoFED, 2013). The World Bank and IMF have recommended strengthening private sector investment to help sustain growth over the next decade (World Bank, 2013a; IMF, 2012).

The strong and generally broad-based economic growth has brought about positive effects on poverty reduction and development. The number of people living below the national poverty line (less than USD 0.6 a day) decreased from 38.7% to 29.6% between 2004/05 and 2010/11 (MoFED, 2012a). Ethiopia has also achieved notable progress with regard to human development. Over the past decade, life expectancy increased by 8 years, expected years of schooling increased from 4.4 to 8.7 years, and Ethiopia is also on track to meet its Millennium Development Goals (MDGs) related to child mortality, HIV/AIDS and malaria (UNDP, 2013). However, despite rapid progress, poverty remains high by international standards. Almost 80% of the Ethiopian population live under the USD 2 poverty line; 39% live in extreme poverty with less than USD 1.25 a day (World Bank, 2012a). The absolute number of people living under food poverty increased by almost 2 million over the last decade, reaching 28.4 million in 2010/11. Ethiopia currently ranks 173 out of 187 countries in the Human Development Index (HDI), and significant investment will be needed to meet poverty reduction and development goals, given the scale of these challenges.

Ethiopia's political context is shaped by a long history of centralized government. A decentralization reform was commenced in 1991 when the incumbent ruling party, the Ethiopian People's Revolutionary Democratic Front (EPRDF), came into power. The EPRDF introduced a market liberalisation of the formerly planned economy, along with a democratisation process under a multi-party constitution. In the past decade, the EPRDF has consolidated sound financial management and increased "pro-poor" spending. Substantive progress has also been made in decentralising authority and service delivery, even though significant capacity constraints remain at the regional and notably the district (*woreda*) and village (*kebeles*) levels. The EPRDF dominates the political landscape at all levels of governance (World Bank, 2012a).

2. Links between climate, resilience and development

5. There is a strong link between socio-economic development and resilience to the effects of climate and climate change. This section presents the rationale for taking a climate resilience approach to development planning and policies. The second part of this section discusses the links between climate, resilience and development in Ethiopia and discusses how this is likely to change in light of climate change.

2.1 Understanding the links

6. Extreme climate events can reduce economic growth (McDermott et al., 2013; UNISDR, 2013). This slowdown, which can affect a country for several years, is in marked contrast with developed countries, where disasters have the potential to act as an economic stimulus (Cavallo and Noy, 2010; Loayza et al., 2009). Developing countries also bear the heaviest human burden. Between 1970 and 2008, 95% of deaths due to natural disasters occurred in developing countries (IPCC, 2012). This vulnerability is due to a combination of factors, including a lack of coping capacity, low levels of disaster preparedness and high dependence on the agricultural sector for development and livelihoods.

7. Development itself is one of the most effective means to increase the capacity to cope with disasters. Higher disposable income, better education and healthcare, and improved transport infrastructure are some of the characteristics of development progress that also strengthen resilience. But this is not automatic. Development choices can lead to a concentration of economic activities and assets along rivers and coastlines; places which are vulnerable to flooding, storm surges and sea-level rise. There is also evidence that certain characteristics of middle-income countries, such as a high reliance on physical infrastructure for GDP creation and a high interconnectedness between economic sectors, can increase their vulnerability to extreme events (Benson and Clay, 2004; Ghesquiere and Mahul, 2010; Okuyama, 2009; Cummins and Mahul, 2009).

8. Climate change adds a new dimension to this relationship between development and resilience. Development as usual – and even development that strengthens resilience against current variability – might not be a sufficient strategy to prepare for future climate challenges. Gradual changes in climate can reduce labour productivity and give rise to additional costs for climate-proofing infrastructure and productive activities. This can even lead to shifts in countries' comparative advantages. Disaster risk is likely to increase, as certain phenomena such as temperature extremes, heavy precipitation and extreme coastal high water levels become more frequent (IPCC, 2012). The parallel developments of economic and population growth and climate change can have significant consequences. For example, climate change and urbanisation are expected to triple the population exposed to coastal flooding in the 136 biggest port cities in the world by 2070 (Hallegatte et al., 2013). Most of these coastal cities will be located in today's developing world, mostly in Asia.

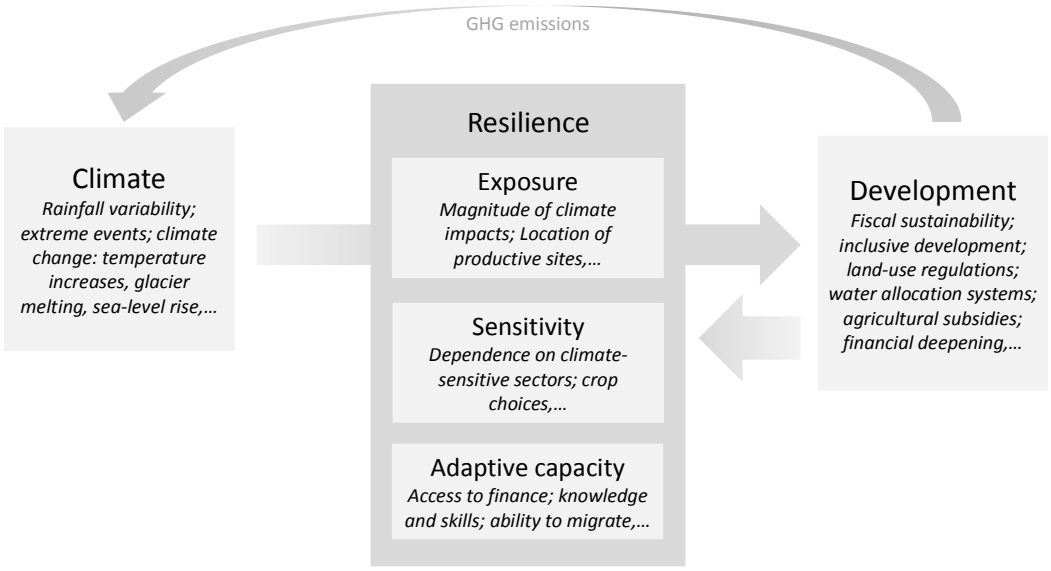
9. The links between climate, resilience and development interact through three broad channels: exposure, sensitivity and adaptive capacity (IPCC, 2007). These channels can be used to understand how development patterns can exacerbate or prevent negative effects of climate variability and change (see figure 1):

- *Exposure* depends on physical patterns, such as the magnitude of climate, character and rate of climate change, as well as geographical patterns such as the location of human settlements and economic activity. Development planning can directly influence exposure through land-use planning, or decisions about where to locate infrastructure. Development planning will also affect exposure indirectly, for example through its influence on rates of rural-urban migration.

- *Sensitivity* is the degree to which people or the economy as a whole is affected, either adversely or beneficially, by climate variability or change. Development planning can affect this through the prioritization of certain economic sectors, such as agriculture, or certain resources, such as climate-sensitive crops.

- *Adaptive capacity* is the ability or potential to respond successfully to climate variability and change. Development planning can affect this through its influence on underlying factors such as income, health and education, and also through investments in capacities that are specifically aimed at supporting climate resilience.

Figure 1. Links between climate, resilience and development



Source: (OECD, forthcoming, b)

2.2 Understanding the links in Ethiopia

10. Climate patterns have a strong impact on Ethiopia's population and economy. Erratic rainfall regularly causes local and regional droughts and floods. These in turn trigger food shortages and food insecurity, damage communication and road infrastructure, accelerate land degradation, and contribute to the outbreak of diseases such as malaria, dengue and cholera (Federal Democratic Republic of Ethiopia, 2007).

11. The economic costs arising from climate variation and climate extremes are significant, and expected to increase under climate change. Ethiopia's GDP could be reduced by as much as 8% between 2010 and 2050 due to climate change (Robinson et al., 2013). The World Bank projects even higher welfare losses. Assuming a 2°C increase in global average temperature by 2050, Ethiopia's GDP growth is projected decrease by 0.5% to 2.5% per year (World Bank, 2010). By putting in place effective measures to build climate resilience, Ethiopia can significantly reduce its vulnerability and lower the costs of climate change. The following section outlines some of the links between climate, resilience and development, along the three channels of vulnerability – exposure, sensitivity and adaptive capacity.

2.2.1 Exposure

12. Ethiopia is highly exposed to climate risks. Its geographical location and topography expose Ethiopia to very high rainfall variability and make it prone to extreme climate events and hazards. Precipitation varies considerably across the country, and there is a strong variation in the onset, intensity, and duration of rainfall, both across seasons and across years (see Box 2). The high variability regularly causes droughts and floods, with severe consequences for Ethiopia's people and economy. Since the 1980s, Ethiopia has suffered from seven major droughts, five of which resulted in famines, as well as dozens of local droughts. Concentrated rainfalls have caused several major floods, including both large-scale flooding in the lowlands and flash floods caused by intensive rainfall after drought periods in the highlands (World Bank, 2010).

13. The majority of Ethiopians (approximately 90% of the population) and most of the country's food crop production are concentrated in the country's humid highlands. Approximately10% of the population, largely pastoralists and agro-pastoralists, resides in the arid and semi-arid lowlands that face increased risks of drought. The majority of the highland area usually receives sufficient rainfall to sustain agricultural production, less than one-third of the area is considered as drought prone (World Bank, 2010). The high inter-seasonal and inter-annual variation in rainfall however puts both agricultural activities at risk. In addition, an increasing proportion of Ethiopia's population and assets are exposed to flooding. For example, the rapidly growing capital of Addis Ababa has increasingly experienced flash floods during the rainy seasons in recent years (Bass et al., 2013; World Bank, 2013b).

14. Climate change will expose large parts of Ethiopia's population to even greater weather variability, increasing their vulnerability to climate variation. Ethiopia is expected to experience a temperature increase of 1.1°C to 3.1°C by 2060 (McSweeney et al., 2008). There is large uncertainty about the effects of this temperature increase on annual rainfall and the exact participation patterns. However, most climate models project an increase in weather variability, with an increasing proportion of rain falling in 'heavy' events, and a higher likelihood of extreme weather events. Studies suggest that losses from climate change will be concentrated in Ethiopia's humid highlands. This area is densely populated and highly cultivated, and important for the country's food security (World Bank, 2010; Ferede et al., n.d.). There is also evidence that climate change, in combination with development and population pressures, will exacerbate asset destruction in urban areas due to flood events (Jalayer et al., 2013).

Box 3. Ethiopia's topography and climate

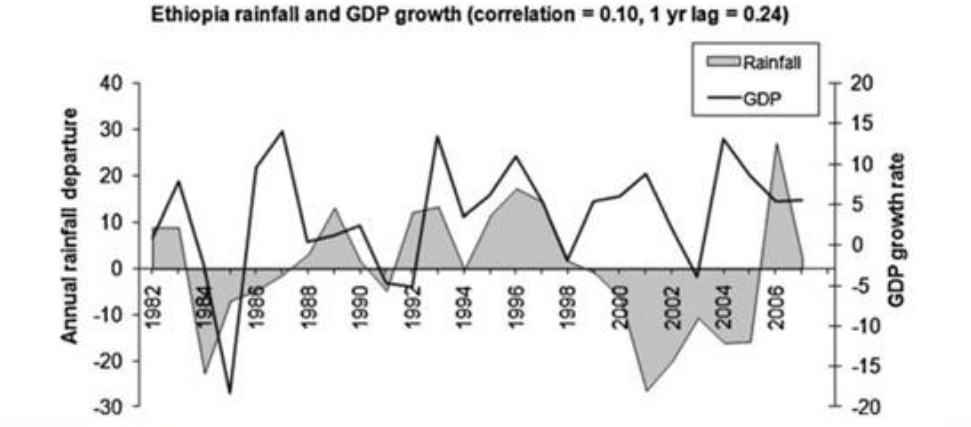
Ethiopia is a land-locked country and its varied topography results in diverse ecological and climatic conditions. Mountains and elevated plateaus cover almost half (45%) of the total area. These highland areas are divided and surrounded by lowland plains and deserts. The wide range of altitudes results in varying climatic regions, which are traditionally divided into five distinct agro-ecological zones based on altitude and temperature: i) the cold highlands (*Wurch*) 3 000 m above sea level; ii) the alpine vegetated cool and humid highlands (*Dega*) between 2 500 m and 3 000 m above sea level; iii) the cool and sub-humid highlands (*Woina Dega*) between 1 500 m and 2 500 m of altitude; iv) the warm, semi-arid lowlands (*Kolla*) below 1 500 m; and v) the hot, hyper-arid zone of the lowlands (*Bereha*) with desert-type vegetation (Chamberlin and Schmidt, 2011; Mengistu, 2006). The mean annual temperature varies between 10°C in some highland areas and 35°C in the hot lowlands. Likewise, rainfall patterns differ significantly across zones, ranging from 500 mm in mean annual rainfall in lowland areas to more than 2000 mm in some highlands (EPA, 2007).

Ethiopia's current climate is characterised by significant rainfall variability and it regularly experiences extreme weather events. Precipitation varies significantly across seasons and years. The majority of the country experiences one main wet season from June to September. Parts of northern and central Ethiopia have a second rainy season (February-May) consisting of more sporadic and lesser rainfall; the southern regions have two distinct wet seasons (March-May and October-December); and the eastern part receives very little rainfall at any time of year (McSweeney et al., 2008). Rainfall variability is the result of geography and the influence of large-scale weather systems. Seasonal variability is mainly driven by north-south movements of the Inter-Tropical Convergence Zone (ITCZ). The ITCZ's exact movements differ from year to year, due to the El Niño Southern Oscillation phenomenon. The resulting variability with respect to the onset and the duration of rainfall seasons frequently causes extreme weather events.

2.2.2. Sensitivity

15. Ethiopia's population and economy are sensitive to climate patterns, and impacts are likely to become even more severe as climate extremes become more frequent and intense. Figure 2 shows a time series of rainfall and GDP growth, demonstrating the strong effects of climate on Ethiopia's macroeconomic development. It can be noted that a decoupling appears to have occurred after 2000. The authors of that study suggest that this could be attributed to the fact that the 2000-2003 droughts concentrated in southern and south-eastern Ethiopia where productivity and contribution to GDP are relatively low (Conway and Schipper, 2011). The Ethiopian government recognises climate variability as being one of the major causes of fluctuations in real GDP growth rates (Federal Democratic Republic of Ethiopia, 2001).

Figure 2. Historic relation between rainfall variability and GDP growth in Ethiopia



Source: Conway & Schipper, 2011

16. The high sensitivity of Ethiopia's economy to climate variation can largely be attributed to its strong dependence on climate-sensitive activities for economic development. Despite a gradual shift in the economy's structure towards stronger reliance on services, the agricultural sector remains of overriding importance to the Ethiopian economy (ADB et al., 2012). The sector is dominated by small-scale rain-fed farming that relies on traditional farming techniques, making agricultural yields very dependent on prevailing climate conditions. Pastoralism and livestock production in the arid lowlands are equally climate-sensitive. Studies suggest that many regions will face a decrease agricultural production and productivity due to climate change (World Bank, 2010; Robinson et al., 2013; Ferede et al., n.d.). As the majority of the Ethiopian population derives their income directly or indirectly from agriculture, fluctuations in agricultural production can have strong effects on household income. Due to its central role for income and employment, the agricultural sector also acts as a transmission channel for climate shocks towards other sectors of the economy.

17. Ethiopia's transport and energy infrastructure is also vulnerable to climate variability. Heavy rainfall and floods regularly damage Ethiopia's road system and lead to interruptions of supply chains. Approximately 80% of Ethiopia's road network consists of unpaved roads which are easily degraded by precipitation (Federal Democratic Republic of Ethiopia, 2007; World Bank, 2010). Ethiopia's energy infrastructure is also linked to climatic conditions given its reliance upon hydroelectric power generation. At present, rainfall variability has little impact on the power generation, yet the sector's sensitivity is expected to increase nonlinearly after 2030, due to a combination of climate change and a significantly greater volume of hydroelectric power. Depending on future hydropower investments, new climatic conditions could lead to significant fluctuations in annual energy generation (World Bank, 2010).

18. Economic growth, and the patterns of growth, will alter Ethiopia’s sensitivity towards climate variations and climate change. For example, uncontrolled land conversion could accelerate environmental degradation and decrease the resilience of ecosystems to climate impacts (Secretariat of the Convention on Biological Diversity, 2009). In Ethiopia, some land management practices, such as over-cultivation and over-grazing, have already led to severe land degradation. This, combined with population pressures and deforestation, has put ecosystems under significant pressure and increased the sensitivity of Ethiopia’s forest, water and biodiversity resources (Federal Democratic Republic of Ethiopia, 2001). In some regions, notably the highlands, pressures on land resources have led to an expansion of the agricultural frontier into forest areas and steep slopes. This has accelerated environmental degradation and made agricultural production very vulnerable to weather shocks (Diao, 2010).

2.2.3 Adaptive capacity

19. As a low income country, Ethiopia’s adaptive capacity is generally viewed to be constrained (World Bank, 2010). Traditional strategies to cope with climate variations and extreme weather events include reductions of consumption levels, the sale of assets such as livestock and agricultural tools, and temporary or permanent migration in search of employment (Federal Democratic Republic of Ethiopia, 2007). Coping strategies that involve the depletion of productive assets, such as the sale of livestock, can have severe and long-lasting consequences on poor households. If a climatic shock is severe enough to make it impossible for households to rebuild their asset stock, it may even create poverty traps (Carter et al., 2007). In Ethiopia, such strategies are however common practice for small-scale farmers and large parts of the rural population. Uptake of modern adaptation measures, such as small-scale irrigation systems, new seed variations, and other engineering solutions, remains low in Ethiopia. This is often due to lack of financial and technical capacity at the macro-level, and capital and knowledge constraints at the micro level.

20. Adaptive capacity is closely linked to economic growth. Determinants of adaptive capacity are often related to generic development factors such as education, income and health – factors that are currently at low levels, yet likely to improve as Ethiopia moves towards higher income levels. Inclusive economic growth would therefore bring about advances to the adaptive capacity of Ethiopia's population and economy; as will the gradual improvement in market access, capital access, and the productivity of Ethiopia's economy.

3. Enabling climate-resilient development

21. Ethiopia has recognised the close links between development and climate resilience and therefore aims to link its responses to climate change to its broader growth and development planning processes. This section outlines the steps Ethiopia has undertaken to make its development more climate resilient, focussing in particular on the national planning process and Ethiopia's policy framework. The section begins by briefly outlining the development process of Ethiopia's adaptation policy. This is followed by an examination of the institutional framework Ethiopia has chosen to support the development and implementation of its national climate change response. Subsequent sub-sections cover the steps Ethiopia has taken to build capacity, to secure sufficient finance, and to develop the evidence base for climate-resilient development planning; and the final sub-sections explores the role played by development partners.

3.1 The policy framework: Ethiopia's Climate Resilience Green Economy Initiative

22. Ethiopia's response to climate change has been shifting from a project-based approach towards a more systematic approach to adaptation in recent years. National-level preparations for the effects of climate change in Ethiopia began with the 2001 National Communication to the United Nations Framework on Climate Change (UNFCCC), followed by the identification of eleven priority adaptation projects through Ethiopia's National Adaptation Programme of Action (NAPA) in 2007. In 2010, the government developed the Ethiopian Programme of Adaptation to Climate Change (EPACC), which signalled a shift from the project-based NAPA towards a more strategic approach to adaptation (EPA 2011). A common thread in all of these elements has been the importance of adaptation in the agriculture and water sectors, complemented with a focus on building human and technical capacity to respond to climate variability and climate change.

23. Ethiopia's historic exposure and sensitivity to climate variability has created a strong awareness of the potential risks that climate change poses to Ethiopia's economy and society. In its current national development plan, the Ethiopian government explicitly identified climate variability and climate change as a threat to its ambitious development goals, and called for "[a] plan of action, strategies, laws, standards and guidelines to implement measures that are designed to lessen the effect of forecasted climate change" (MoFED, 2010). This was complemented by the strong leadership and commitment of the late Prime Minister Meles Zenawi. A strong advocate for sustainable development, the Prime Minister continuously highlighted the importance of the environment for Ethiopia's long-term prosperity and emphasised the synergies that exist between Ethiopia's environmental and economic goals. His vision to put Ethiopia on a climate-resilient green growth path helped to make sustainable development become a political agenda beyond the 'traditional' environmental community, and it has been an important trigger for the development of a national, integrated approach to climate-response planning.

24. With the launch of the *Climate Resilient Green Economy* (CRGE) initiative in February 2011, Ethiopia laid the foundation for integrated resilience planning. The CRGE initiative intended to shift both climate mitigation and adaptation from the environmental sphere to become a cross-government priority.

Building on Ethiopia's national development plan, the initiative aims i) to foster growth and economic development; ii) to manage greenhouse gas emissions; and iii) to improve resilience to climate change (EPA, 2011). The CRGE consists of four elements which, once finalised, are intended to build a comprehensive national framework for Ethiopia's climate change mitigation and adaptation policy. These include: i) the development of a national *vision*, laying out the key objectives and long-term development goals; ii) the development of a national *strategy*, outlining concrete steps for both climate change adaptation and mitigation; iii) the establishment of an *institutional climate change system* to facilitate cross-governmental co-operation and planning linkages; and iv) the establishment of *financial and capacity-building mechanisms* to support the implementation of the national CRGE strategy.

25. The *CRGE Vision* was the first step in Ethiopia's efforts to achieve climate-resilience green development. It formalised Ethiopia's aspiration to become a climate-resilient green economy by 2025, and set the framework for the development of concrete policy action (EPA, 2011). The vision summarises key challenges and opportunities arising from climate change in Ethiopia, defines common goals and objectives, and outlines key steps required to achieve for achieving a climate-resilient development. Prepared under the leadership of the Prime Minister's office, the CRGE vision has been an important step for creating awareness about the benefits of climate resilience for economic and social development across the government, and helped building a momentum for change. The vision also received noteworthy international attention when it was presented at the 2011 climate negotiations in Durban.

26. Building on this vision, Ethiopia began to develop a national *CRGE Strategy* to identify and priorities concrete steps for building a climate-resilient green economy. The CRGE strategy comprises two distinct components: the mitigation-focused Green Economy Strategy (GES) and the adaptation-focused Climate Resilience Strategy (CRS). The GES has been published in September 2011, and the development of the CRS began in early 2012. Building on the previous climate change adaptation efforts under the EPACC, the CRS will deliver multiple sectoral adaptation strategies. The first sectoral CRS on agriculture use was released in October 2013; the second CRS focussing on water and energy is currently being developed. This sequential approach to climate-resilience planning will allow Ethiopia to focus its capacity and resources on specific sectors, i.e. those which are most important to the Ethiopian economy, or which are most at risk from climate change. However, it also risks that the majority of federal ministries will continue operating under "business as usual" conditions in the short to medium-term.

27. The other two components of Ethiopia's CRGE initiative are discussed in the subsequent sections. The institutional arrangement that Ethiopia has chosen to support the development and implementation of the CRGE is discussed in section 3.2; capacity-building and financing mechanisms are covered in section 3.3 and 3.4, respectively.

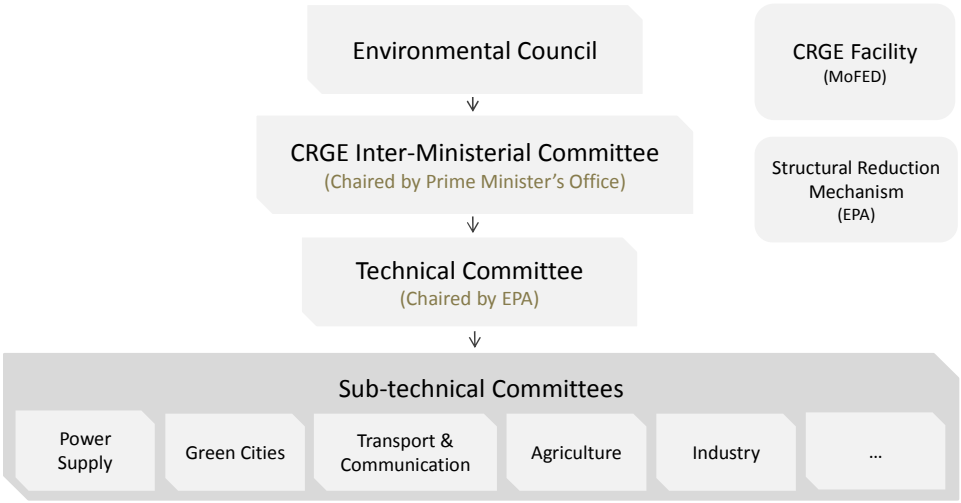
28. The CRGE strategy is intended to build on and, at a later stage, feed back into the Ethiopia's national development plan. The *Growth and Transformation Plan 2010-15* (GTP), Ethiopia's current development plan, is the national and economy-wide planning document of the country, setting out the development objectives, strategies and targets for the five-year period (see section 4.1 for details). The GTP is the key national planning document, guiding policy action at all levels of government. The CRGE process builds on the GTP and can be understood as a GTP complement to ensure that Ethiopia's development targets are achieved in a low-carbon and climate resilient manner. While this is an important first step, achieving climate-resilient development will require that climate priorities under the CRGE will directly feed into the next iteration of GTP, which will cover the period 2015-2020. This will allow for going beyond "climate-proofing" existing objectives, to consider how climate change might affect the choice of goals themselves. Given the early stage of the CRGE process, it remains to be seen whether the institutional set-up, capacities and resources will allow for this to happen.

3.2 Getting the institutions right

29. Linking climate change and development planning will require the engagement of all stakeholders relevant to development planning, including sectoral and sub-national planners (OECD, 2009). This requires close co-ordination and co-operation across ministries and levels of government. In recognition of the need for this, the Ethiopian government has designed a new institutional structure to support the development and implementation of the CRGE strategy. As the process of CRGE development and implementation is an on-going process (which is at a relatively early stage), the exact institutional design and allocation of responsibilities may be subject to adjustments, and shall hence be considered preliminary. The following description and analysis is based on the state of knowledge as of October 2013.

30. Overall responsibility for the CRGE rests with the Environmental Council.[1] The Council is chaired by the Prime Minister and comprises members from federal ministries, presidents of regional states, as well as private sector and civil society representatives. A new body, the CRGE Ministerial Committee, was established to directly oversee the development and implementation process of the CRGE. Composed of high-level representatives from line ministries and chaired by the Prime Minister's Office, the Ministerial Committee is intended to facilitate cross-governmental co-ordination and to ensure overall policy coherence. It is supported by the cross-sectoral Technical Committee and the Sub-technical Committee, which focus on particular operational issues (see Figure 3). Finance for the implementation will be provided through the CRGE Facility, which will be hosted by the Ethiopian Ministry of Finance and Economic Development (MoFED) (see section 3.4). Federal ministries and regional environmental agencies are intended to establish "CRGE units" to develop and implement sectoral and regional action plans, based on the priority sectors and initiatives identified in the national CRGE Strategy. This will be facilitated by a supporting implementation mechanism to be managed by the EPA.

Figure 3.
Ethiopia's new institutional set-up to address climate change



Source: Adapted from EPA (2011), Ethiopia's vision for a climate resilient green economy, EPA, Federal Democratic Republic of Ethiopia, Addis Ababa; EPA (2012), United Nations Conference on Sustainable Development (Rio+20): National Report of Ethiopia, EPA, Federal Democratic Republic of Ethiopia, Addis Ababa

[1] Ethiopia's Environmental Council, is an established public institution, which is responsible for recommending laws and regulations for approval by the Council of Ministers. The Council has the power to independently approve environmental standards and directives (Federal Democratic Republic of Ethiopia, 2011).

31. The new institutional structure is intended to facilitate broad stakeholder engagement, lifting climate change from an environmental sphere to a cross-governmental level. The CRGE strategy, including both the mitigation-based GES and the adaptation-focused CRS, combines inputs from ministries and sectoral agencies with guidance and co-ordination from the national level. For example, the development of the GES has been driven by seven sectoral teams involving more than 50 experts from 20 government institutions. The cross-sectoral Technical Committee and the EPA co-ordinated and facilitated this process (EPA, 2012; Federal Democratic Republic of Ethiopia, 2011). Similar arrangements are foreseen for the development of the CRS. The new CRGE institutional set-up formalises and institutionalises the engagement of institutions and stakeholders that are relevant to climate change. The newly created bodies, notably the high-level Ministerial Committee and the lower-level Technical Committee, facilitate co-ordination and link high-level, cross-governmental political support with lower-level mechanisms for technical co-ordination. This structure will help allocating responsibilities among ministries, overcoming potential conflicts and avoiding unnecessary duplication of activities.

32. The structure also has the potential to encourage the integration of climate change into existing development planning processes. The Ministerial Committee is chaired by the chief economic advisor to the President, which provides a direct link to Ethiopia's national development planning. In addition, regular meetings within these inter-ministerial bodies will facilitate the exchange of climate-related information and hence support awareness-building and the creation of climate change expertise of sectoral politicians. Enhanced awareness and knowledge should, in turn, sensitise sectoral practitioners to considering climate resilience in their sectoral policy planning. The establishment of CRGE will also contribute enhance awareness-building and will help create in-house expertise in sectoral and regional institutions. These CRGE units will also ensure that climate change responsibilities are clearly allocated within the respective institution, and warrant commitment and the allocation of dedicated resources necessary for effective implementation.

3.3 Building capacity to deliver policy action

33. Capacity constraints in the public sector constitute a major challenge to effectively implement the CRGE. Human resources and capacities, statistical and technical knowledge, and financial resources are constrained at all levels of government, particularly at the regional and local level where many public services are delivered. These challenges are amplified by a high level of staff turnover in the public sector, which makes it difficult to build and maintain the technocratic capacity necessary in many policy areas, including climate resilience. Identifying capacity needs at each level and implementing appropriate capacity building measures will be critical to translate national-level decisions for climate resilience into policy action on the ground.

34. To loosen capacity constraints, the government has established the so-called "Sectoral Reduction Mechanism" (SRM) as the CRGE's implementation vehicle. The system foresees that implementing entities (i.e. line ministries and regional governments) develop sectoral and regional implementation plans as well as concrete investment proposals. Through the SRM, these entities can then request financing from the CRGE Facility. The SRM is aimed to facilitate a programmatic and longer-term approach to implementation, and to avoid fragmented and project-focused implementation.

35. The SRM will primarily be managed by the EPA. The EPA will run an "SRM Register", which will capture and enhance the visibility of all climate change mitigation and adaptation measures. While intended to support predominantly measures under the CRGE strategy, the SRM will also be open to activities conducted outside the auspices of the CRGE. It should therefore support the implementation of development activities across Ethiopia, while helping to ensure that measures conform to the needs and priorities identified in the CRGE. Finance can be disbursed both as catalytic funding to enable action, and

as ex-post payments in recognition of achieved reductions in emissions or vulnerability. Funding proposals and payment requests will be reviewed and approved by the CRGE Technical Committee, chaired by the EPA. Implementing entities can also request capacity building support (to be provided by the EPA) through the SRM.

36. The SRM will be complemented by a Capacity Development Programme, which will encompass all institutions at the national and regional level that are involved in CRGE implementation. The programme will first focus on building capacity within MoFED and the EPA as the two key institutions for climate resilience-related work, and will in 2014 expand to include line ministries and regional governments. Building sufficient capacity within ministries and sub-national institutions will be vital to stimulate CRGE activities across the government. It will therefore be important that the dedicated CRGE units acquire sufficient resources and technical capacity to co-ordinate and monitor the implementation. The Capacity Development Programme also foresees to encompass capacity building measures for the private sector and civil society organisations. To encourage immediate action within ministries and regional governments, the EPA has already begun to organise workshops to inform sectoral and sub-national policy-makers about the functioning of the SRM and the CRGE Facility (MEF, 2013a). The government is also seeking to enhance the technocratic capacity of future policy-makers and analysts through the establishment of a graduate programme in climate economics at Addis Ababa University.

37. To support the implementation of the CRGE, the government has recently upgraded the EPA, the main co-ordinating body for climate-related work, to become the Ministry of Environmental and Forests (MEF). MEF has so far been playing a key role in building capacity (i.e. by assisting sectoral and regional planners in the process of developing respective adaptation strategies and plans) and will continue to drive effective implementation through the mechanisms described above. So far, MEF has benefited from considerable technical and financial support from Ethiopia's international partners. In the medium-term, there will be a need to develop internal capacity to take this work forward.

3.4 Securing sufficient financing

38. Limited financial resources constitute another major limitation to the integration of climate resilience into national planning. Ethiopia is already facing significant financing requirements to meet the ambitious growth and investment goals outlined in its national development plan – and the CRGE strategy further adds to them. Implementing the GES component alone is estimated to require investments of USD 150 billion until 2030 (Federal Democratic Republic of Ethiopia, 2011). The full financing requirements for the CRS have yet to be identified. As for the first sectoral CRS for agriculture, the Ethiopian government estimates that additional investments of around USD 236 million per year will be necessary (Federal Democratic Republic of Ethiopia, forthcoming). These relatively low costs can be explained by the fact that the majority of agricultural CRS measures build on existing activities. As further CRSs are developed, the overall implementation costs for climate resilience investments are likely to increase. Pressure on both domestic and international finance to deliver resilience-building is therefore likely to increase.

39. Ethiopia is implementing measures to mobilise domestic financial resources, but ODA remains a major source of income to the country. In 2010/11, net ODA totalled at USD 3.5 billion, which equals about 11% of GNI (OECD, 2012a). In absolute terms, net ODA has almost tripled during the last decade; while there has been a slight decrease in ODA as percentage of GNI. From the ODA received in 2010/11, 11% (about USD 388 million) was related to climate change adaptation projects, making Ethiopia the seventh largest ODA recipient in terms of climate adaptation aid (OECD, 2012a).

40. To mobilise and disburse finance for the CRGE's implementation, the government established the "CRGE Facility", which became operational in late 2012. This intends to channel all climate and domestic finance into one multi-donor trust fund (EPA, 2011). Institutions applying for finance can apply directly to this fund, rather than attempting to source funding directly from international climate finance providers. The Facility will primarily be accessed by government institutions, but other actors (i.e. civil society, private sector organisations) can also apply for financing. The Facility will be based in and overseen by the Finance Ministry MoFED, and governed by the CRGE Ministerial Committee. The Ministerial Committee will set the overall policy direction and guidance, as well as criteria and scope for approving investment plans. The CRGE's Technical Committee will assess and approve investment plans prepared by implementing entities (MoFED, 2012b). The Committee will be attended by MoFED's Planning and Research Directorate, which will allow for ensuring coherence of CRGE investments, as well as and alignment with the GTP.

41. Resources will be allocated to CRGE activities through two financial windows: a "strategic window" which will support activities identified through the CRGE strategic planning process; and a demand-driven "responsive window" for measures which have not been identified through CRGE planning. This will help to target funding to the most needed areas (as identified under the CRGE), while also allowing for financial responses to unforeseen, immediate implementation needs. The "strategic window", which is intended to account for three quarters of the Facility's funds, will minimise contributors' earmarking of funds, while the "responsive window" will allow for earmarking. While the Facility is managed by MoFED, the United Nations Development Programme (UNDP) will be responsible for the disbursement of funds through the responsive window. UNDP will also manage financing that contributors are unable to channel through MoFED (e.g. due to fiduciary requirements). The intention of these arrangements is to enable the Ethiopian government to attract more external financing, while it builds up the domestic capacity for attracting, managing, and disbursing climate finance.

42. The additional climate finance raised through the Facility is intended to complement existing investment and funding streams. Government ministries could therefore draw on the Facility to access additional funding for CRGE projects. The Facility will hence run alongside current departmental budgets. The Facility is now in the process of being capitalised, with Austria providing an initial tranche of development support. The Ethiopian Parliament has also endorsed an allocation of 2% of the federal budget to the Facility (MEF, 2013b). The allocation of resources between green economy and climate resilience measures has yet to be decided. Constraints on technical capacity and staff resources may serve as a barrier to accessing the CRGE Facility's funding. Interviews with Ethiopian officials suggested that this is likely to be a particular issue at the local and regional level.

3.5 Developing the evidence base

43. Accurate data about climate change and future climate impacts is an important precondition for concerted adaptation planning. Ethiopia's climate patterns are complex, and incomplete climate information and data remain an important constraint. The government has generated high-level data on social and economic trends, environmental developments, climate change scenarios and sectoral impacts and vulnerabilities in support of its 2001 National Communication to the UNFCCC, and its 2011 CRGE planning. However, local-scale climate data and forecasts, and detailed socio-economic projections remain limited.

44. In some cases, policy makers have relied on external studies and climate data, including information generated by academics, NGOs and international agencies. The World Bank's *Economics of Adaptation to Climate Change* (2010) included an Ethiopia case study, which provided estimates of the economic impacts of different climate change scenarios as well as projected costs of different adaptation

options. There are also informative modelling projections on sectoral climate impacts by the International Food Policy Research Institute (Robinson et al., 2013). These national-level studies provide a starting point for the context-specific and sub-national analysis required to assist climate resilience and growth planning related decisions.

45. Ethiopia is making progress in closing existing data gaps. In the process of the CRGE development (particularly the CRS component), the EPA has made significant investments in technical resources to improve the evidence base needed for informed decision-making. For example, the EPA – with support of external partners such as the Global Green Growth Institute (GGGI) and Global Climate Adaptation Partnership (GCAP) – has produced a vulnerability analysis of livelihoods to support the CRS for agriculture. Such analysis combines climatic hazards maps with livelihood maps, and will help to identify where key socio-economic challenges are likely to arise due to climate change. The EPA has also produced detailed analyses of vulnerabilities and adaptation options for key economic sub-sector, such as coffee and sugar. While these activities have helped identify key risks and priorities response measures, developing similarly detailed analyses for other sectors will require significant resources and may hence depend on continued support from development co-operation partners.

46. Improving local-scale data and forecasts remains a challenge. To support the development of regional adaptation plans, all regions identified key climatic hazards affecting their local populations and assets, and their most vulnerable sectors. Some regions also conducted local-scale historical trend analyses for temperature and rainfall. However, limited climate records make such historical trend analyses very difficult. Many regions remain without detailed estimates of future climate impacts and (quantified) estimates for economic losses under future climate scenarios. Where such protections and estimates exist, they are often not at a higher resolution than the national level projections (GGGI, n.d.). Given Ethiopia's varied agro-ecological zones, the continued collection of such local-scale data is crucial, yet also likely to depend on resources and technical support by development partners.

47. While the collection of data and climate information is improving, it will be important to ensure appropriate communication of results in order to increase their relevance for policy-makers. Limited capacity, human capital, and climate change expertise in public and private institutions limit the use of currently available data. Stakeholders noted that available information (e.g. on projected climate impacts) is often not well articulated and hence difficult to interpret. Sustained efforts are therefore likely to be needed to ensure that the data and information produced is directly applicable by policy makers or relevant stakeholders in the private sector and civil society. It will also be important to ensure that the currently developed tools – such as livelihood and product vulnerability assessments – are not just used in the initial planning phase, but will transfer across to sectoral implementation of the CRS to ensure that adaptation decisions continue to be made effectively.

3.6 The role of international co-operation

48. International donors have a key role to play in supporting countries in integrating climate resilience into their national planning processes. This applies for the entire chain of activities necessary for achieving climate-resilient development: the collection of climate data and the assessment of sectoral and local vulnerabilities, the development of national visions and medium-term strategies, the design of co-operation mechanisms, as well as technical and financial support to deliver implementation. In Ethiopia, development partners have provided significant support to the design and establishment of Ethiopia's climate resilience framework. The CRGE was initiated domestically and co-ordinated by the Ethiopian government, yet the development of both the GES and the CRS for agriculture has drawn on considerable input and support from external development partners. The Global Green Growth Institute (GGGI) in

particular provided substantial support CRGE development, from the data collection phase to the prioritisation of mitigation and adaptation measures.

49. While external actors played an important role in supporting the technical development of the CRGE, it will be important to find a balance between drawing on external support and maintaining domestic ownership. There is some concern among government officials that the CRGE is primarily an externally promoted and conducted exercise – concerns that could erode the commitment of domestic political actors to the CRGE in the medium to long term. Close co-operation between external and domestic actors can enhance ownership and increase the likelihood that external inputs serve as a stimulus for continuation of the work within domestic institutions. During the planning process of the CRS for agriculture, for example, GGGI experts were based alongside the CRGE team in the EPA offices in Addis Ababa, and all strategies were produced collaboratively and were subject to ministerial review and approval. Involved EPA officials believe that the initial phases of the CRGE process created institutional impetus, such that there would be support for continuing the development of sectoral resilience strategies even without external support from GGGI or other development partners.

50. It will be important to ensure however that donor support is harmonised and aligns with country priorities. At present, as in many developing countries, there is a tendency for development support to be fragmented, ad-hoc and supply-driven (OECD, 2012b). Ethiopia's long-term vision and investment frameworks under the CRGE may however help ensure that external support is focused and efficient, and that aid flows better align with national concerns.

Box 4. Lessons learned and recommendations

- *Sustain leadership and high-level political commitment:* Ethiopia's climate resilience efforts have been driven by strong and visible leadership. This has helped to establish and maintain high-level political support across the government. An important component of this was the emphasis on synergies between economic growth and resilience objectives.

- *Formalise national development visions and defining key climate resilience objectives:* The formulation of a national vision for climate-resilient development helped raise awareness of the benefits and opportunities of enhanced resilience, thereby building momentum for institutional and policy change. Ethiopia's vision may also be conducive for improved coherence across development projects undertaken by development co-operation partners.

- *Link climate resilience to key national planning documents:* Ethiopia's CRGE initiative builds on the national development plan and aims to climate-proof Ethiopia's set development goals. This provides a vital first step, yet could be complemented by a "resilience-focused" revision of existing sectoral development strategies to identify synergies and to avoid lock-in in long-term vulnerabilities. The government's intention to integrate the CRGE into the 2015-2020 development plan will be key to achieving this.

- *Create institutional mechanisms that encourage cross-sectoral co-ordination and high-level political commitment:* The CRGE institutional system was explicitly designed to facilitate and encourage co-ordination across ministries. The CRGE's newly created cross-sectoral bodies – the high-level Ministerial Committee and the lower-level technical committees – encourage political commitment and ensure that the necessary expertise is available.

- *Design short and long-term instrument to overcome possible capacity gaps:* Ethiopia designed a dedicated mechanism to support sectoral and sub-national planners in the implementation of national resilience objectives. This is complemented by a programme to address capacities needs in the medium-term, as well as ad-hoc capacity building measures to address immediate needs.

- *Secure dedicated financing for resilience investments:* Ethiopia's CRGE Facility is linked to both national resilience and development planning processes. As such, it should support coherence in investments made under the CRGE and alignment with national priorities. Alignment with the national budget should help to ensure that domestic resources complement international financing.

- *Establish partnerships to improve the evidence base:* Studies conducted in co-operation with donors have significantly contributed to the analysis of current and potential future climate impacts. Collecting this information will be important for creating awareness and triggering policy action in sectoral ministries.

4. Policy action for building resilience

51. The formulation of national resilience objectives and strategies and the organisation of government structures are important steps towards increasing climate resilience in Ethiopia. Equally important is the translation of resilience strategies into existing policy-making and planning processes. This section focusses on selected policy areas that are relevant to climate-resilient development. The first part maps out current development trends in Ethiopia and provides a framework on how these trends can be examined in the context of climate change. Subsequent sub-sections analyse two entry-points that appear to be of particular relevance in the Ethiopian context: agricultural development planning (section 4.2), and macro-economic management (section 4.3).

4.1 Exploring entry points for climate-resilient development

52. Development planning makes implicit decisions about the future vulnerability to climate change because it influences the exposure, sensitivity and adaptive capacity of people, ecosystems and the economy. Integrating climate resilience requires considering future climate change as one variable that determines the relative merits of different policy options. Thus, it can make these decisions about future vulnerability explicit. In prioritising adaptation activities, the links between economic development and climate resilience are likely to be particularly important for three types of economic activity:

- activities that are highly sensitive to climate change;
- activities that have a negative impact on the climate resilience of ecosystems or communities;
- activities that are important for economic development because they make a significant contribution to GDP; are growing very quickly, or sustain a large group of poor populations.

53. In Ethiopia, the sector that scores highest along all three parameters is agriculture, yet this may change as the country develops and diversifies its income sources. Ethiopia's economy has always been characterised by a strong dependence on agriculture, with the majority of the Ethiopian population being directly or indirectly dependent on it. The sector's (socio-) economic importance, combined with its historically high sensitivity to climate variation, was one of the main motivations for Ethiopia to develop a national resilience-strategy. The growing importance of the services and industrial sector suggests however that climate-resilience planning will need to expand its scope in future. The Ethiopian government's aspiration to achieve strong economic growth rates and to become a middle-income country by 2025 implies that Ethiopia is likely to see considerable structural transformation of its economy in the coming decades, which in turn will affect the country's vulnerability to climate and climate change. A thorough analysis of current and future growth patterns and their implications for resilience is therefore timely.

54. Public action in Ethiopia is strongly driven by the national development plan, making it a key entry point for achieving climate-resilient development. The GTP, Ethiopia's current development plan, outlines the medium-term growth strategy (including specific growth targets) to transform Ethiopia into a middle-income economy by 2020-2023 (see Box 5). The GTP serves as the Ethiopia's main policy document and guides policy action at all levels of government. As such, the GTP has a direct influence on Ethiopia's socio-economic patterns of development and hence its future vulnerabilities to climate change. If To achieve sustainable, climate-resilient development in Ethiopia, it will be vital to include climate change considerations into the next iteration of the GTP, which will cover the period 2015-2020. This in turn, requires a good understanding of how the current growth strategy could be disrupted by climate change, and how it may alter the Ethiopia's climate resilience.

Box 5. The Growth and Transformation Plan 2010-2015

The main goals of the Growth and Transformation Plan (GTP) are to achieve high growth rates so as to reduce poverty and to meet the MDGs. It sets the path for Ethiopia to reach middle-income status by 2020−23. Its stated objectives are to attain high growth rates of 11% in a stable macroeconomic framework; to achieve the MDGs in the social sector; and to establish a stable democratic and developmental state. Economic growth and employment creation is the key rationale for accomplishing these objectives. Modern agriculture is identified as the primary engine of growth, with industrial development being expected to play an increasing role over time.

OBJECTIVES
1. Maintain at least an average real GDP growth rate of 11% and meet the Millennium Development goals
2. Expand and ensure the quality of education and health services thereby achieving the MDGs in the social sectors
3. Establish favourable conditions for sustainable state building through the creation of stable democratic and developmental state
4. Ensure growth sustainability by realising all the above objectives within a stable macroeconomic framework

STRATEGIC PILLARS						
1	2	3	4	5	6	7
Sustaining faster and equitable economic growth	Maintaining agriculture as a major source of growth	Creating favourable conditions for industry to play a key role in the economy	Enhancing expansion and quality of infrastructure development	Enhancing expansion and quality of social development	Building capacity and deepening good governance	Promoting women and youth empowerment and equitable benefit

The GTP envisages modern agriculture as the primary engine of growth, with the industrial sector playing an increasing role over time. The strong support for the agricultural sector reflects the sector's importance in terms of both GDP and employment. The GTP supports the intensification of the production of marketable agricultural products by both small and large farmers. This intensification relies on a shift towards high value crops, greater commercialisation and greater support for large-scale commercial agriculture. A further crucial component of the agricultural development plan is support for smallholder farmers, including a scaling-up of best technologies and practices across smallholders, expansion of small-scale irrigation schemes and encouraging a gradual shift to the production of high-value crops. The GTP also encourages greater development of pastoral areas and targeted interventions to boost livestock production and its contribution to the economy. Chemical fertilisers are also intended to play an important role in boosting productivity.

Industry is intended to play an increasingly important role in Ethiopia's economy, with its contribution to GDP projected to increase from 13% in 2010 to 32% in 2025. The Federal Government intends to provide additional support to export-oriented and import-substituting industries, and for industries that are labour intensive and based on agricultural inputs. Micro and small enterprises are therefore a key strategic focus, though there will also be support for a range of medium and large industries (including textiles, leather, sugar, cement, metals and engineering, chemicals, pharmaceuticals and agro-processing).

The GTP also contains plans for extensive infrastructure investments, which are intended to support economic growth in the short term and to build the foundation for future growth and industrial development. The GTP's targets for the 2010-2015 period include expanding the road network by 30%, increasing power generation capacity by 300%, doubling the construction of electricity distribution lines, increasing potable water coverage from 68.5% to 98.5%, and increasing the land developed for medium and large scale irrigation schemes from 2.5% to 15.6%. The GTP recognises that previous efforts to increase infrastructure provision have been hampered by shortfalls in the foreign capital required to meet all investment needs, and by insufficient domestic capacity for infrastructure development and hence a reliance on foreign capacity. While the GTP makes explicit provisions to increase domestic savings and reduce foreign currency needs by promoting the substitution of imports by domestic products and services, it nonetheless envisages that external official development assistance will be necessary to fund all planned investments.

Source: Based on MoFED, 2010; EPA, 2011

55. There is considerable overlap between growth objectives under the GTP on the one hand, and climate-related goals as specified in the CRGE on the other. For example, the GTP places substantive emphasis on capacity building within public institutions, driven by the desire to achieve development outcomes. While enhancing institutional development is not specific to climate resilience, improved institutional quality will also help the government to better cope with climate shocks, e.g. in providing emergency services, or capacity building services for its citizens. In other cases, development strategies may be in tension with resilience goals. As an example, the GTP foresees a broad expansion of the country's road network, particularly in rural areas (aiming to connect every village with main highways). Modelling studies suggest however that current road design standards inadequately address climate variability or climate change and will hence negatively affect economic growth e.g. through disrupted supply chains (World Bank, 2010). This implies that there are potential trade-offs between meeting the government road expansion targets under the GTP and ensuring that all roads meet climate-resilient standards.

56. These examples illustrate dimensions that become important when designing climate-resilient growth strategies. Further examples are provided in Table 1, which maps the economic sectors that are likely to be important for Ethiopia's medium-term economic development against potential synergies and trade-off with climate resilience. Understanding such links and making them explicit when assessing the merits of different policy options is vital, and may uncover needs to change the "business as usual" development path. This process has begun with the CRS of agriculture, with other sectors to follow.

57. Ethiopia intends to undertake a detailed analysis of the impacts of climate change on its key growth sectors. The CRS on agriculture, the first sectoral resilience strategy, presented an in-depth examination of current and future climate trends and its impacts on agricultural activities in Ethiopia's different agro-ecological zones. The CRS constitutes a good example illustrating how a climate lens can be applied to examine whether existing policy strategies and policy instruments are sustainable, and where they need to be adjusted to make growth and development compatible with future climate conditions. The analysis of the agricultural CRS explores which measures would be needed to build climate resilience into the sector, and subsequently analyses how these measures differ current policy practices. It classifies these options along into three categories: i) "win-win" measures, which yield benefits for both growth and resilience goals; ii) "climate-proof" measures, which adjust existing policies to minimise potential negative side-effects; and iii) "climate-justified" measures, which are not directly linked to growth objectives (Federal Democratic Republic of Ethiopia, forthcoming).

58. The identification of synergies between resilience and development options was central in the CRS analysis. The CRS drew on a long list of almost 1 000 policy options for resilience-building and, after a first categorisation, filtered these down to 41 final policy measures according to four criteria: i) relevance and feasibility to be implemented; ii) contribution to reaching GTP targets; iii) contribution to reaching poverty eradication and ensure food security efforts; and iv) reduction of current and future costs of climate impacts. In other words, the CRS explicitly sought to identify adaptation measures that would also support Ethiopia's growth and development targets. This led to the conclusion that 38 out of the 41 policy options identified are already being delivered in some form by the Ministry of Agriculture and Rural Development (MoARD), implying that the focus will be on making "resilience"-adjustments to on-going efforts, rather than on instituting a raft of new measures. However, the CRS also revealed some gaps where business-as-usual could lock-in vulnerabilities. For example, the GTP strongly promoted the production of Arabica coffee, yet the CRS analysis revealed future production could be threatened by climate change, given the very temperatures thresholds in which Arabica coffee grows. Sustaining coffee production may therefore require changing the coffee crops (i.e. away from Arabica), or complementing production support measures with resilience support measures (i.e. planting sharing trees). This example illustrates how considering climate resilience could entail adjustments or reconsiderations of policy strategies and instruments.

59. Looking forward, it will be important that Ethiopia undertakes similar analysis for its other sectors, particularly the fast growing ones, such as infrastructure, and those expected to gain in importance over the next decade, such as industry.

Table 1. Sectoral development trends and possible links to climate resilience

Economic Sectors	Growth trends / targets under GTP	Sensitivity to climate change	Potential synergies with climate-resilience	Potential trade-offs with climate-resilience
Agriculture & rural development	• Agricultural growth of 9% foreseen for 2010-15; through increases in both crop and livestock production; smallholder support promoting best-practices, use fertiliser, shift to higher-value crops; focus on 'high-potential areas' • Promotion of medium and large-scale agricultural farms	• High, yet depending on agro-climatic zone, crop/livestock choice, farming techniques and technology • Climate change will increase pressures on natural capital stock	• Increases in productivity levels will increase farm income and reduce likelihood of poverty-related resilience-gaps • Productivity enhancing measures such as irrigation schemes, new crop varieties, improved farming techniques	• Expansion of cultivated land might increase pressure and increase sensitivity of eco-systems • Promotion of climate (e.g. water) sensitive crops may increase vulnerability
Industry & trade	• Growth strategy is agricultural-led industrialisation, focussing on labour-intensive, export-oriented, import-substituting industries linked to agricultural input and outputs • Particular emphasis on promotion of micro and small-scale enterprises; as well as selected medium and large-scale industries	• Currently low, but could increase depending on i) linkages to agricultural sector and ii) exposure of activity to at-risk areas	• Promotion of micro and small-scale enterprises may encourage income diversification and reduce climate sensitivity at farm level	• Vertical and horizontal linkages of agriculture and industry may increases sensitivity of industrial sector due to stronger indirect effects of climate-induced shocks
Mining	• Expansion of the mining industry planned (coal industrial minerals, petroleum, water and geothermal resources)	• Low		• Possible environmental impacts could weaken the resilience of ecosystems and communities
Water & energy infrastructure	• Energy supply and security recognised as precondition for meeting growth targets; energy exports planned in medium to long-term; large investments in hydropower foreseen • Focus on harnessing water use; six-fold increase of irrigated land (small, medium and large scale)	• Water: high for both demand and supply • Energy: medium, will depend on future reliance on hydro and trend changes in rainfall	• Hydropower installations, i.e. dams, can facilitate irrigation schemes • Irrigation schemes increase number of options available for water management	• Technological lock-in: Large reliance on hydro may lead to vulnerabilities if climate change leads to reduced annual average rainfall • Multiple demands and scarcity issues: possibly conflicts between large-scale irrigation and hydro; danger of side-effects on wetlands
Road infrastructure	• Significant investments in road infrastructure foreseen (30% expansion of current network), particularly in rural areas	• Currently high, given large share of climate-sensitive unpaved roads; possibly lower if road standards adjusted to climate change	• Improved resilience through better connectivity (e.g. for disaster responses), access to market can cushion impacts of local climate shocks	• Tension between rapid network expansion and meeting climate-resilience standards (climate shocks can induce disruption and transport and supply chains)
Construction & urban sector	• Expansion of urban infrastructure foreseen to enable rapid, equitable growth in urban centres • Construction industry is growing quickly	• Increasing: people and assets in urban areas increasingly affected by flash-flooding	• Improved building standards could reduce sensitivity to climate impacts	• Uncontrolled growth might accelerate soils degradation, leading to increased sensitivity of urban areas to flooding

Source: MoFED, 2010; World Bank 2013, 2013b, 2010.

4.2 The agricultural sector

60. The integration of climate change into sectoral planning is a key element for achieving climate-resilient development. In Ethiopia, this is particularly true for the agricultural sector, as it is: i) the backbone of the economy and intended to remain so for in the short to medium-term, ii) very sensitive to climate variation and climate change, iii) and the pattern of agricultural development and growth will directly affect the vulnerability of Ethiopia's economy and people. This section explores the links between agricultural development and climate resilience in more detail, before discussing two selected sub-aspects of agricultural development that seem to be particularly relevant in the Ethiopian context – extension services and irrigation and water management.

4.2.1 Agricultural development in the context of climate variability and change

61. Ethiopian agriculture is characterised by low productivity and high sensitivity to climate variation. Over 90% of total agricultural output is produced by small-scale subsistence farmers, of which more than 50% operate on an area of one hectare or less. Production is largely rain-fed and is heavily based on traditional production practices, leading to very low productivity levels and high output fluctuations along rainfall patterns. The limited diffusion of modern agricultural technologies can mainly be attributed to high input prices (e.g. for seeds or fertilizers), credit constraints, and limited access by smallholder farmers to improved production technologies, irrigation systems and agricultural markets (MoARD, 2010). Limited agricultural research and extension services, inadequate transport networks, land degradation and tenure insecurity are further factors contributing to low agricultural productivity (World Bank, 2010).

62. Climate change is expected to have significant effects on the agricultural sector. Temperature increases that coincide with dryer climatic conditions are expected to reduce crop yields over time, particularly for irrigated crops such as sugar. Water supply shortages that might emerge due to lower rainfalls accelerate pressures on water resources from population growth, rising incomes, and increasing demands from industrial activities. Temperature increases might also alter the feed intake, mortality and growth of animals – effects which collectively are expected to have a negative impact (up to a 30% decline) on livestock productivity (World Bank, 2010). Climate change may also alter the incidence of some animal diseases (EPA, 2007). These effects will be exacerbated by the projected increase in the frequency and severity of climate extremes, notably droughts, floods and heat waves. The severe impacts of climate extremes on agricultural production became visible in 2002 and 2003, when the lack of two rainy seasons resulted in harvest declines of up to 30% for some crops such as coffee (Federal Democratic Republic of Ethiopia, forthcoming). Projections of future crop yields under climate change suggest there will be increasing variation in crop yield, which conforms with the projections that climatic shocks will occur with increased frequency and severity (Robinson et al., 2013; World Bank, 2010) .

63. Climate impacts on the agricultural sector will not be uniform, but will vary over regions, crop types, and time-scales. Costs and benefits of an increase in annual average temperature or a decrease in average annual rainfall will differ significantly across Ethiopia's agro-climatic zones. For example, the humid highlands are likely to most be affected by climate change, while the impacts on lowland pastoralist areas seem smallest, due to its little dependence on crop production and very low levels of productivity (Ferede et al., n.d.). Climate effects will furthermore vary through time. Research suggests that the moisture sufficient highlands, which account for most agricultural production, may experience an increase in overall crop productivity until 2030 as a result of climate change, yet a sharp decline due to water shortages and waterlogging thereafter. In contrast, land productivity and crop yield the drought-prone highlands is expected to decline continuously over the coming decades (Gebreegziabher et al., 2011).

Box 6. Facts about agricultural production in Ethiopia

Ethiopia's agricultural industry is diverse, owing to the complex and varied topography and climate. Crop production dominates the agricultural sectors, accounting for about 67% of agricultural GDP (approximately 27% of total GDP). Principal crops include coffee, maize, teff, wheat, sorghum and other cereals, pulses, oilseeds, potatoes, sugarcane, and vegetables. Coffee and oilseeds are the main export goods. Most agricultural production concentrates in Ethiopia's moisture-sufficient highlands.

Livestock accounts for about 25% of agricultural GDP (10% of total GDP). Ethiopia is the tenth largest livestock producer in the world, and the largest one in Africa. Cattle, sheep, goats and poultry are the largest livestock sectors. As in agricultural cropping, livestock production is mainly based on traditional farming practices, and most producers operate on very small areas, or with very few animals, respectively. Livestock is being hold both in the highlands (following a typical mixed crop–livestock system) and the arid lowlands (dominated by pastoralist systems).

Forestry accounts for about 7% of agricultural GDP (3% of total GDP) through the provision of timber, fuel-wood, and non-timber forestry goods. Despite its relatively low contribution to GDP, forestry is an important source of income in some regions. Forestry base activities may contribute to as much as 30% of per capita income in some areas. There are serious trends of deforestation, mainly caused by pressures for agricultural land and energy demands.

Source : Federal Democratic Republic of Ethiopia, forthcoming; MoARD, 2010; World Bank, 2012a.

64. Despite the sector's vulnerability to climate change, agriculture is likely to remain the backbone of the Ethiopian economy. The GTP states that the government will "continue the on-going effort of improving agriculture productivity in a sustainable manner so as to ensure its place of the engine of growth" (MoFED, 2010), which reflects the sector's dominance in the economy and employment and its importance for poverty reduction and food security. The GTP aims to achieve an agricultural growth rate of 8.6% on average per year until 2014/15 (both for crop and livestock production levels) and an annual 4% increase in total value productivity per crop and livestock unit. Key measures to boost agricultural productivity and output growth include the diffusion of agricultural "best practices" and the promotion of improved seeds and fertilizers through public extension services, improved water management and irrigation development, and increased commercialisation of agricultural production.

65. There are many synergies between agricultural development and resilience, but conflicts may arise both at the micro and the macroeconomic level. In general terms, research suggests that agricultural growth in Ethiopia will be pro-poor, generating proportionally more income to farm households (Diao, 2010). Higher household income, in turn, may reduce poverty-related gaps in adaptive capacity and hence to improve the resilience against climate variations. On the aggregate level, agricultural productivity increases may also help to ease food shortages after external shocks (of climatic or non-climatic nature) and pressures on local or, in case of extreme drought, national food prices. In fact, the Ethiopian government views improved agricultural output and productivity as an essential part of its wider risk-management strategy. However, agricultural growth that is blind to climate change may increase climate vulnerability in the longer term. For example, growth that is based on the use of water intensive crops risks high crop failures during periods of drought, or unsustainable use of groundwater resources.

4.2.2 Improving agricultural productivity: extension services, improved inputs, and fertiliser use

66. Extension services are an important instrument to realise synergies between productivity and resilience improvements. The core objective of extension services is to increase agricultural development by supporting small-scale farmers to acquire knowledge, tools and skills to improve the productivity of their activity. This in turn should support a more stable and higher farm income and allow farmers to undertake investments that would reduce their vulnerability to climate impacts (e.g. to purchase more weather robust seeds). Empirical research suggests that access to extension services increases farm investments in Ethiopia and, if combined with the provision of information on climate change, can strongly affect farmers' decision to undertake adaptation investments (Di Falco et al., 2011; Deressa et al., 2010). These studies also found that farmers who undertook adaptation measures (e.g. changing crops) tend to have higher food productivity and higher farm net revenues, which illustrates the potentially strong co-benefits between productivity improvements and resilience. Explicitly linking extension services to climate resilience activities will be key to ensure that synergies are realised and that technologies or practices leading to maladaptation are being avoided.

67. Building on the GTP's plans to expand extension services, Ethiopia aims to mainstream climate resilience into extension services. Ethiopia's agricultural extension system is one of the largest in the world, with more than 60 000 development agents providing training to local farmers (ATA, 2012). The GTP foresees to further expand services, tripling the number of users top over 14 million beneficiaries by 2015 (MoFED, 2010). The intention to integrate climate change into the public extension service activities was already stipulated in the EPACC, Ethiopia's first national adaptation programme (EPA, 2011). The CRS on agriculture also foresees to adjust extension services to better disseminate information and promote climate-resilience building activities (Federal Democratic Republic of Ethiopia, forthcoming). However, the strategy does not specify how climate-relevant information will be better disseminated, and how the services will promote resilience-building in practise. At present, access, quality, and the level of adoption of extension services remain a barrier to the effectiveness of service provision (Gebremedhin, 2006). Some authors attributed the limited success the strong top-down character of the services and a too strong focus on the dissemination of ‘standard’ production processes (Davis et al., 2010). The government recently shifted towards a more 'farm-driven' approach to deliver services that are more responsive to farmers’ needs. However, limited skills and capacities of development agents remain a barrier to providing more targeted support.

68. Given the great number of smallholder farmers in Ethiopia, the cumulative effect of multiple small actors’ decisions will have a significant effect on the sector’s overall resilience to climate change. Agricultural extension is a suitable instrument to reach out to small-holders and encourage adjustments or changes to traditional practises (e.g. farming techniques, crop choices, etc.), which is difficult and unlikely to be achieved through policy instruments such as regulations. Improving the design and ensuring the effective implementation of services therefore promises to be a particularly effective tool for realising growth-resilience synergies in Ethiopia. While the top-down character of some services could facilitate the mainstreaming of climate considerations into the service provision, it will be important to further enhance training and capacity building of development agents to increase the effectiveness of services (e.g. by tailoring services to local needs) and to address specific barriers that prevent farmers from engaging in adaptation activities. Such training could for instance target areas that are relevant to both growth and resilience goals, such as using climate information, intensifying or diversifying farming systems, and in agricultural marketing.

69. In addition to extension services, the Ethiopian government places high priority on making modern agricultural inputs available to farmers. For example, both the GTP and the CRS plan for a scaling-up of access to and use of fertiliser in order to boost agricultural productivity. This includes a doubling of the supply of fertiliser and the establishment of a domestic fertiliser production facility under the GTP and

possibly an increase in composting organic manure and residues under the CRS (MoFED, 2010; Federal Democratic Republic of Ethiopia, forthcoming). At present, obtaining fertilizers is often both difficult and cost-prohibitive for many small-scale farmers. Some farmers have even reduced fertiliser use since the start of the GTP yet is a critical means for further improving agricultural productivity. Measures to reduce the costs of fertilisers may therefore be equally or more important than measures to increase supply. Domestic production of fertilisers and international bulk-buying efforts through the World Bank may provide important first steps to bring prices down.

70. Equally important will be the promotion and provision of improved and high-value seeds. The GTP aims to increase the use of improved seeds six fold to raise smallholder productivity; and the CRS proposes to conduct specific research programmes to develop new, more climate-resilient seed varieties. Ethiopian seed research is quite established and has released hundreds of new varieties over the past years. However, farmer adoption rates of improved seed – even in reliable rain-fed areas – are low (Davis et al., 2010). Insufficient market transparency and inadequate financing can partly explain this phenomenon. In 2012, the government has endorsed a national strategy to strengthen both the formal seed sector and informal and intermediate sub-sectors (ATA, 2012). There are also efforts to strengthen the network of and co-operation with cooperatives to enhance market and disseminate improved seeds. The CRS acknowledges past investments and initiatives aimed at improving agricultural research, but identifies a high adaptation deficit. It suggests to increase investments and to prioritise research on emerging trends.

4.2.3 Irrigation, water and natural resource management

71. In light of the strong rainfall variability in Ethiopia, water management and systems that can ensure more reliable water supply are of critical importance for building agricultural resilience. Key instruments securing rain-fed agriculture against environmental shocks and variability are water storage installations and irrigation systems, both of which are currently rare in Ethiopia. The World Bank estimates artificial water storage capacity in Ethiopia to be approximately 43 m^3 per capita, which compares to 750 m^3 in South Africa and 6 150 m^3 in North America (World Bank, 2006). The need for improved water storage forms part of the government's rationale to invest in new dams. Ethiopia is currently constructing one of the continent's largest reservoirs (the Grand Ethiopian Renaissance Dam), with a capacity of 63 billion m^3. While the primary focus is on hydroelectric power generation, the government's ambitious programme of dam-building also includes irrigation and water storage as secondary objectives.

72. Irrigation is considered to be particularly relevant in Ethiopia. Ethiopia's potential for irrigation is significant, with regard to both available land and available water resources. MoARD estimates Ethiopia's aggregate irrigation potentials to be 3.73 million hectare. However, only 186 500 hectare are developed at present, which corresponds to less than 5% of the total crop area. Small-scale irrigated area covers approximately 86 500 hectare, medium and large-scale about 100 000 hectare, in addition to traditional irrigation schemes generally based on community constructed diversions (which however are frequently washed away with rainy season floods) (World Bank, 2006). The government of Ethiopia has identified irrigation as a major component for climate-resilient agricultural growth. The GTP aims to increase small scale irrigation from about 850 to 1 850 million hectare, and to increase the percentage of land developed for medium and large scale irrigation schemes from 2% to 15.6% until 2015 (MoFED, 2010). The CRS for agriculture also plans for investments in different irrigation techniques (e.g. drip, communal, small- scale, home, and rain water harvesting) as well as dams, reservoirs and wells (Federal Democratic Republic of Ethiopia, forthcoming).

73. However, there are technical and economic limits to productivity and resilience improvements from irrigation. These are related to the amount of land that can be irrigated, to technical limits to productivity improvements on irrigated land, and to the availability of water for irrigation purposes.

Importantly, irrigation is currently not well regulated, increasing the risks related to both water quality and water security. The increasing use of water in irrigation may also negatively affect other water-reliant economic activities and increase water scarcity conflicts under climate change. This could be the case for agro-processing or textile industries, which are likely to expand as the agricultural sector gradually moves towards higher commercialisation. Socio-economic developments (i.e. population growth and rising incomes) will accelerate possible pressures on water resources. Conflicts may also likely to arise with respect to hydropower. Water planning models suggest that if hydropower generation receives priority over irrigation, up to one billion m^3 of water could be taken away from irrigated agriculture, which may cause a 30-40% drop in yields as land would be forced to revert to rain-fed conditions (World Bank, 2010). The Ethiopian government may therefore face a number of potential trade-offs between different economic and social goals in implementing its irrigation plan.

74. In addition to irrigation, the CRS plans for substantive investments in improved natural resource management, including the improved conservation and rehabilitation of wetlands and water. In fact, natural resource management and eco-system services have been identified as being not sufficiently addressed in the GTP. The CRS therefore proposes several measures to enhance natural resource management through e.g. agro-forestry, biodiversity conservation, and soil and water conservation structures. To improve efficiency in water use, the CRS also suggest modifications to Ethiopia's water allocation mechanisms, including a stronger usage of market-based systems.

75. Natural capital accounting can be an important step to improve effective and sustainable management of natural resources. Natural capital will be critical for Ethiopia's medium-term development. This is not only due to potential pressures on water demands. Many livelihoods, particularly smallholder and subsistence farmers, will continue to depend on natural capital at least in the short to medium-term. In addition, the government plans for increasing its mining activities and mineral exports under the GTP. By including natural capital measurements in national accounts, the Ethiopian government can help to ensure that the economic and social value of natural capital is recognised. It might also encourage an explicit recognition and incorporation of natural resources and environmental services into policy planning, for example into the next iteration of the GTP.

4.3 Macroeconomic management

76. Macroeconomic management is closely linked with climate resilience. Not only can climate shocks endanger macroeconomic stability in the short-term, but they can also lead to sustained reductions in economic growth over time. Macroeconomic conditions in Ethiopia will also determine whether public and private actors can access sufficient funds to finance long-term adaptation measures and to respond to climate-related disasters. While Ethiopia has maintained a relatively stable macroeconomic environment over the past decade, mobilising sufficient finance to implement the GTP will be challenging. High public investment also implies that fewer resources will be available to respond to external shocks such as droughts or floods. To minimise the impact of climatic shocks on its macro-economy, Ethiopia has mainly relied on the reduction of its physical vulnerability to climate shocks, but is exploring a range of financial risk reduction and risk transfer measures.

4.3.1 Macroeconomic context and implications for investment needs

77. The macroeconomic conditions in Ethiopia pose considerable challenges to public and private-sector access to finance. A key challenge that has been shaping Ethiopia’s macroeconomic context is high inflation, which averaged at 33% over 2011 (World Bank, 2012b). Inflation rates of this magnitude not only threaten macroeconomic stability, but can also crowd-out private savings and investments that will be

important for sustaining growth (World Bank, 2013a; IMF, 2012). Over the past years, private savings and investment rates in Ethiopia have been among the lowest in the world. The past two years saw an improvement of these indicators, but inflation and low savings rates remain a policy challenge that will complicate the realisation of the government's growth and development goals, and may lead to suboptimal investments in climate resilience. Moreover, high inflation has constituted a particularly heavy burden for Ethiopia's poor population, increasing their vulnerability to external shocks and their capacity to undertake resilience building investments (World Bank, 2013a).

78. Food prices have been a significant driver of recent high inflation rates in Ethiopia, which hints to possible indirect links between climatic factors and macroeconomic variables. High global food prices in 2008 and 2011 triggered inflation rates of 60% and 40% in Ethiopia; food prices in Ethiopia saw an even stronger increase of 60% and 100% respectively (World Bank, 2012b). Domestic factors further exacerbated the effects of international prices – including primarily public investments that heavily relied on monetary financing, increased fuel prices, and agricultural supply shocks due to localised droughts (World Bank, 2011; FAO-GIEWS, 2011; World Bank, 2012b). The most recent 2011 Horn of Africa Drought, for example, contributed as much as 6% of total price inflation in Ethiopia, according to IMF estimates (cited in: GFDRR, 2012). As climate change is projected to influence international and domestic food prices, it might exacerbate the occurrence of future food price-induced inflation in Ethiopia, with adverse consequences on macroeconomic stability, economic growth and development.

79. In an effort to control inflation, the Ethiopian government has introduced both temporary and longer-term measures. In response to the 2011 peak in inflation, the government has introduced a tighter monetary policy, began importing and distributing wheat, edible oil and sugar, and introduced a ban on exporting certain agricultural goods, which helped the inflation rate to decelerate below 10% in 2013. However, inflation could rise again if pressure from international food prices resumes (World Bank, 2011). Ethiopia is also undertaking measures to address the underlying causes of inflation, trough measures also related to growth and resilience-building – i.e. measures aimed at increasing agricultural productivity and national food production and at promoting adaptation to climate variability and change in the agricultural sector (see section 4.2). Bottlenecks remain, however, in the areas of transport infrastructure and other trade logistics, as well as market access of small-scale farmers in particular (World Bank 2013). As high fuel prices have been responsible of exacerbating food price inflation in the past, there may also be scope to link adaptation strategies such as the CRS to Ethiopia's Green Economy by promoting alternative sources of energy and fuel efficiency.

80. A key element for ensuring macroeconomic stability will be to increase the rate of domestic savings, which would also have positive implications on realising climate resilience. The GTP aims to increase household savings by strengthening Ethiopia's financial sector. The two priorities are increasing the efficiency of financial institutions (through capacity building measures) as well as improving coverage of both commercial banks and microfinance institutions. The network extension of financial institutions could trigger important growth-resilience synergy effects, as they boost gross domestic savings while also creating buffers for rural poor and vulnerable households to small or medium shocks. After two years of the GTP implementation, Ethiopia's efforts to increase savings appear to be bearing fruit – savings have already increased to 16.5% of GDP in 2011/12, from 5.2% in 2009/2010 (MoFED, 2013). Whether this progress can be maintained will however depend on the government's success in preserving a stable macroeconomic environment, notably low levels of inflation and positive real interest rates.

81. Despite these improvements in macroeconomic conditions, the financing of Ethiopia's ambitious growth remains a challenge, and climate-resilience goals will further add to this. Ethiopia already has one of the world's highest public investment rates, and total public expenditures are expected to increase by another 5 percentage points to 23.7% of GDP during the GTP period (MoFED, 2010; World Bank, 2013a). This ambitious target will require a substantial increase in resource mobilisation, and resilience-objectives

under the CRGE will further amplify financial needs. The GTP does not mention specific strategies for mobilising external funding, but recognises the importance of international aid flows and foresees an increase in foreign direct investments. Furthermore, the objective is that external borrowing will be expanded "in a way that does not adversely affect macro-economic stability" (MoFED, 2013). Increased domestic revenues are intended to be raised through tax reforms, but are also expected from higher revenues from public enterprises, and increased private savings and investments.

4.3.2 Fiscal management of natural disasters and other external shocks

82. Climate-related disasters, such as droughts and floods, pose a risk to Ethiopia's fiscal balance and jeopardise the achievement of its development objectives. As Ethiopia's GTP investments are likely to require full use of available domestic and international credit, mobilising additional domestic and international finance after climate extremes may be challenging, and threaten macroeconomic stability. In the past, Ethiopia's primary risk management strategy has been to reduce the physical vulnerability to extreme events, particularly through measures in the agricultural sector (section 4.2). A financial strategy to deal with extreme events might be required as climate change is expected to increase their frequency and severity (IPCC, 2007).

83. Ethiopia faces a range of external risks, which increase pressure on the government's budget, and impede the country's fiscal sustainability and overall macro-stability. Together with shocks in international oil and coffee prices, climate variability has created the greatest external shocks to the Ethiopian economy. Economic losses due to droughts and floods, notably in the agricultural sector, occur almost on an annual basis. While there is no systematic tracking of economic losses or government expenditures following climatic shocks, Oxfam estimates that droughts alone cost Ethiopia approximately USD 1.1 billion per year. The most recent drought for example, the 2011 Horn of Africa drought, resulted in total costs of USD 454.3 million of emergency food and non-food aid between July and December, accounting for nearly 1.4% of GDP (GFDRR, 2012).[2] Although these costs were primarily covered by international aid, the government's expenditure for poverty reduction increased by about 1.2% of GDP due to drought responses, increasing the country's fiscal deficit.

84. In addition to direct effects on countries' fiscal position, climatic shocks may also release a range of knock-on effects with wider impacts on the macro economy. In Ethiopia, the indirect effects are limited at present, given the high share of subsistence farming and hence relatively weak linkages to other sectors (e.g. food-processing or garment industries). However, these linkages are likely to become stronger once the agricultural sector modernises and increases the share of tradable agricultural goods, as foreseen by the GTP.

85. To date, Ethiopia's response to climate-related disasters has been primarily based on ex-post disaster risk financing mechanisms, with much of the financial resources being mobilised by international aid. Every year for the past 20 years, the government has issued appeals for international humanitarian aid of up to USD 350 million per year, primarily for emergency food security interventions, but also for fast onset disasters such as floods (GFDRR, 2012). However, the country's federal contingency budget[3] has also made available major amounts of financial resources for disaster response mechanisms.

[2] This amount represents the cost of livelihood interventions for transiently food insecure populations beyond the chronically food insecure covered under Ethiopia's food security safety net programme.

[3] The government allocates annual budgets to sectoral ministries with DRM responsibilities that are expected to account for foreseeable disaster response costs; ministries, however, are able to apply for additional funding from the contingency budget in the case of emergency costs that exceed their capacity.

86. Over the past decade, the Ethiopian government has taken steps to increase the use of ex-ante disaster risk financing mechanisms. In 2002, the government established the National Disaster Prevention and Preparedness Fund (NDPPF), an emergency fund providing resources for relief measures. The fund's financial reserves were intended to provide bridge funding for immediate disaster response, as well as funding emergency employment schemes to support food security after natural disasters. The NDPPF has made a small number of loans since its inception in 2002, but it has never received sufficient funding to provide significant contingency financing in the event of disasters (GFDRR, 2012). The government's recent *Disaster Risk Management Strategic Programme and Investment Framework* (SPIF) therefore sets out to review the financial mechanisms for disaster response and recovery, including the NDPPF, and to create a new, reformed national contingency fund for disasters, the national Disaster and Recovery Fund (DRF) (MoARD, n.d.). The intention is that the Fund would primarily be capitalised by international partners, either through the CRGE Facility or through a dedicated pooled fund for disaster risk management programmes. However, given the low capitalisation of the NDPPF contingency fund in the past and the substantial investments already planned under the CRGE Facility, it remains to be seen whether the DRF will accumulate sufficient resources.

87. Another example of an ex-ante financial management tool against natural disasters is a contingency budget that the government established within the Productive Safety Net Program (PSNP). The contingency budget holds 20% of the PSNP's total budget and is administered at the regional and *woreda* level. This is the first source of financing to extend the PSNP's coverage beyond the capacity of the core programme, financing e.g. unforeseen needs of transiently food-insecure populations e.g. after climate extremes (GFDRR, 2012). In 2010, a federal contingency financing window was established to complement the regional and *woreda* contingency budgets. Capitalised with almost USD 160 million by international partners, this instrument was designed to cover localized and intermediate droughts that exceed capacities of the local and regional contingency budget, but that are not severe enough to trigger a humanitarian response. It also intends to provide bridge financing until humanitarian aid is delivered. The national financing window was triggered for the first time in August 2011 after four consecutive failures of seasonal rains. It released cash and food transfers worth USD 134.7 million to approximately 6.5 million PSNP beneficiaries and another 3 million transitory food insecure people living in PNSP areas. Both the regional and local contingency budgets and the national drought risk financing window proved to be important risk response instruments, allowing for immediate scaling-up of PSNP activities in response to drought events.

88. Ethiopia has been a pioneer in the use of sovereign insurance as a tool for financial management of natural disasters. In 2006, Ethiopia piloted a macro-level drought index insurance, in which the World Food Programme (on behalf of the Ethiopian government) purchased a weather derivative with the AXA Re reinsurance company to secure contingency funding for emergency relief if extreme drought were to occur in Ethiopia's 2006 agricultural season. The maximum pay-out was fixed at USD 7 million for an annual premium of USD 930 000 (equalling a 13.1% premium rate), primarily paid by the United States Agency for International Development (Cummins and Mahul, 2009). The pay-out would have provided financing to provide cash transfers to up to 62 000 households; however the contract did not trigger and has not been renewed in the following year, due to "limited donor appetite" (GFDRR, 2012). Nevertheless, the pilot demonstrated the general feasibility of using risk transferring mechanisms to the private sector for managing extreme climate risks in a low-income country. The government's recent disaster risk management investment programme SPIF plans to examine the feasibility of establishing a National Insurance Programme, which could be integrated as a separate track of the reformed contingency fund DRF.

4.3.3 Building financial resilience at the micro-level

89. Financial disaster risk management tools may also include instruments that increase financial resilience to climate risks at the individual level. There are two reasons for paying attention to the micro-level when designing macro-level responses. First, insufficient risk coping mechanisms imply that households will undertake low risk but low return activities (i.e. plant less profitable crops), which may result in lower household income as well as aggregate welfare losses (i.e. lower agricultural productivity). Second, the lack of risk coping mechanisms may lead to the depletion of assets in times of stress, which will in turn increase vulnerability to future shocks and, in the worst case, may create irreversible development setbacks and poverty traps. For example, the 1990 droughts in North-Eastern Ethiopia which led to severe food insecurity forced farmers and herders to sell parts of their livestock. The sudden oversupply of livestock from these distress sales led to a price drop of more than 50% (cattle prices dropped from an average of USD 74 in the pre-drought period to USD 35) (Carter et al., 2007). Price swings of this magnitude constitute a huge capital loss, which could have been dampened if insurance pay-outs or credit had been available to these farmers to smooth their consumption.

90. An increasing body of literature suggests that social protection schemes can be an important instrument for increasing resilience of the most vulnerable households, reducing the necessity for post-disaster state intervention (Béné et al., 2012; Davies et al., 2009). An example is Ethiopia's food and cash transfer programme PSNP. Established in 2004, the programme aims to protect household assets in periods of increased stress, and to promote asset building at the individual and community level. The PSNP provides predictable cash and food transfers to almost 8 million chronically food-insecure households in exchange for seasonal labour-intense public works. Projects for public works are decided upon at the community level and focus on the development of community assets, such as soil and water conservation, water harvesting and water supply schemes, small scale irrigation systems, afforestation activities, community infrastructure (i.e. rural road rehabilitation, schools, and clinics), and social services. Households who are labour-poor and cannot undertake public works (about 15% of beneficiaries) receive direct support. In times of climatic shocks, the PSNP expands to also cover transitory food insecure households in districts that participate in the PSNP (currently in 319 of Ethiopia's 800 *woredas*). The total PSNP budget amounts to more than USD 2.1 billion for the 2010-2014 phase. Most of the financing is provided by a group of nine donor institutions.

91. A specific component under the PSNP umbrella that seeks to support longer-term resilience is the Household Asset Building Program (HABP). The HABP aims to help chronically food insecure populations to improve their risk management, diversify their income sources, and to build up household assets. This is intended to be achieved through the access to microfinance and by strengthening the agricultural extension system to provide households better technical and business advice. A key component of the HABP-supported activities is the development of business plans, which would guide households' investments. Other activities include training for improving input sources, marketing, and supporting off-farm activities. Credit is provided through microfinance institutions and Rural Savings and Credit Cooperatives; yet is not linked to agricultural extension services. The HABP has the ambitious goal of graduating 80% of PSNP recipients out of chronic food insecurity by 2014 (Berhane et al., 2011).

92. The PSNP and its HABT are important entry points for resilience-building at the micro-level, as they allow households to respond to climate-related shocks, reduce pressures to engage in maladaptive coping strategies such as asset depletion and allow for resilience and assets building investments. While there are studies suggesting limits to the effect of the PSNP on food security and risk resilience (e.g. Gilligan et al., 2008; Andersson et al., 2011), more recent research found that PSNP beneficiaries' have experienced less severe food insecurity after external shocks, including climate-induced ones (Béné et al., 2012; Berhane et al., 2011). However, it has also been noted that the PSNP may not be robust enough to

protect the poorest from severe climate shocks. Systematically exploring the ways in which Ethiopia's PSNP and HABT can improve risk management related to climate change will be important to increase the programmes' effectiveness and should form part of the planning process of the PSNP's next phase. This could include the redesign of asset building measures, to ensure improved climate resilience while avoiding a simple reinforcement of existing coping mechanisms at the individual level.

93. Private insurance schemes constitute another important climate risk management instrument, but large parts of the Ethiopian population remain without access to insurance services. Most farmers and herders are located in rural areas that are remote from the distribution network from traditional insurance companies. The development of the domestic insurance market is impeded by uncertainties on how rural markets can be accessed, and how agricultural risks can be assessed and priced (GFDRR, 2012). However, numerous trials and pilot programmes have tested the development of smallholder crop and livestock insurance products. Most of these pilots promote weather index insurances – products in which losses are based on the measurement of a certain weather parameter according to an agreed pay-out scale that is assumed to proxy actual losses. Often, the insurance initiatives are components of a broader agricultural and financial service extension programmes. The largest and longest-lasting pilot for an index-based insurance programme is the Horn of Africa Risk Transfer Initiative (HARITA), now called the R4 Rural Resilience Initiative (see Box 7).

Box 7. Index-base crop insurance in Ethiopia: The HARITA programme

The Horn of Africa Risk Transfer Initiative (HARITA) programme is an innovative and one of the largest projects providing risk-reduction for rural farmers in Ethiopia. The programme was initiated in 2007 by a consortium of development partners led by Oxfam America to help teff farmers in the Tigray Region in northern Ethiopia to strengthen their food and income security. The programme offered farmers a full risk-management package, including measures and support for (1) reducing risks through better resource management, (2) transferring risks through insurance schemes, and (3) prudent risk-taking through access to micro-credit.

The programme aimed to barriers often associated with drought insurances, i.e. high administrative costs and the inability of cash-poor smallholders to afford premiums. Building on Ethiopia's PSNP infrastructure, HARITA enables farmers to obtain index-based crop insurance, either through conducting community labour, or through standard cash payments. Farmers using the "insurance for work" option engage in risk-reducing or resilience-building tasks, such as cleaning teff seeds and constructing flood diversion structures. In the event of a seasonal drought, insurance pay-outs would trigger automatically ones rainfall drops below a predefined threshold. The programme also partners with local microfinance institutions to offer farmers access to credits to make investments in disaster resilience. The scheme therefore constitutes an innovative instrument that increases both technical and financial resilience to climatic shocks.

Having started as a pilot project with 200 households in one village in 2009, the schemes has expanded significantly since, covering more than 20 000 households in 80 villages in 2013. The programme also expanded to include additional crop varieties and diversified the contract types it offered. The insurance triggered in 2011 for the first time, with more than 1 800 farmers receiving small pay-outs (on average less than USD 10). Almost 90% of farmers had paid their policies through public works. The success of the project led to the launch of the "R4 Rural Resilience Initiative" which, in co-operation with the World Food Programme, aimed to expand HARITA to a multinational scale. R4 became operative in 12 villages in Senegal in 2013; and further scale-up and expansion to another two countries is planned for the next five years.

Source : R4 Rural Resilience Initiative, 2013; GFDRR, 2012

6. Conclusions

94. High current vulnerability to climate variation has created strong awareness about current and future climate impacts in Ethiopia. This awareness, combined with strong leadership and high-level political commitment, has driven Ethiopia's decision to develop an integrated national response to climate change, and to create a system that would allow for integrating both mitigation and adaptation policies into the country's broader national development planning processes.

95. With its *Climate Resilient Green Growth* initiative (CRGE), Ethiopia has laid the foundation that will enable ministries to integrate climate change adaptation into their national and sectoral planning processes. The CRGE has made remarkable strides in providing vision and high-level commitment, which has helped reaching policy makers beyond the 'traditional' adaptation community. The sectoral CRGE components that have been developed so far are based on a series of detailed analyses, which have improved the understanding of climate change impacts and vulnerabilities in Ethiopia's key economic sectors. The institutional arrangement foreseen for the CRGE implementation allows for the necessary co-ordination among relevant ministries and provides several linkage points with the country's national development planning process.

96. Given that the CRGE has been developed in response to the *Growth and Transformation Plan* (GTP), Ethiopia's current national development plan, it will be important that federal ministries revise their sectoral strategies and plans to take into account the climate priorities outlined in the CRGE. The revision of government programmes with a view to add climate change should help ensure that climate resilience is effectively incorporated into medium-term and long-term strategies, and can also inform future mainstreaming efforts. Looking forward, it will be important that the information gained and that the policy guidelines established during these mainstreaming processes will be used to inform future iterations of the GTP.

97. Ethiopia's next development plan will cover the period of 2015-2020 and it is expected that the preparation of sectoral plans will commence in late 2014. This provides an opportunity to go beyond climate-proofing existing growth and development priorities, to consider climate resilience as a factor affecting the choice of development goals. While the government aims to integrate climate adaptation and mitigation into the next cycle of the GTP, it is not yet clear whether the existing structures sufficiently allow for such integration, and whether capacities and support mechanisms in line ministries are sufficiently developed. Evidence from other developing countries suggests that a close co-ordination with the key growth institutions, notably the Ministry of Finance and Economic Development, will be crucial. An involvement of the central CRGE institutions or the Ministry of Environmental Protection and Forests, which aggregates the information and expertise from the CRGE's design and implementation process, would further facilitate the integration of resilience into the planning process.

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