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An AgriFoSe2030 Final Report from Theme 2 - Multifunctional landscapes for increased food security

Synthesis of Ethiopia's NDC and national polices with focus on agriculture and land use

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AgriFoSe2030

Agriculture for Food Security 2030
- Translating science into policy and practice

Today more than 800 million people around the world suffer from chronic hunger and about 2 billion from under-nutrition.

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The AgriFoSe2030 program directly targets SDG 2 in low-income countries by translating state-of-the-art science into clear, relevant insights that can be used to inform better practices and policies for smallholders.

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Front picture: A multi-functional landscape in Ethiopia. Photo taken by Staffan Rosell

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List of abbreviations

AFOLU	Agriculture, Forestry and Other Land Use
ASPPACC	Agriculture Sector Programme of Plan on Adaptation to Climate Change
MoFED	Ministry of Finance and Economic Development
BAU	Business As Usual
CHIP	Climate High Level Investment Program
CRGE	Climate Resilient Green Economy
DFID	Department for International Development
EDRI	Ethiopian Development Research Institute
FAO	Food and Agriculture Organization
FRA	Forest Resource Assessments
FTI	Fast Track Investments
GCF	Green Climate Fund
GHG	Greenhouse Gas
GTP	Growth and Transformation Plan
INDC	Intended National Determined Contribution
MCA	Multi Criteria Assessment
MDGs	Millennium Development Goals
MEA	Multilateral Environmental Agreements
MEFCC	Ministry of Environment, Forests and Climate Change
MoANR	Ministry of Agriculture and Natural Resources
MoI	Ministry of Industry
MoT	Ministry of Transport
MoWIE	Ministry of Water, Irrigation and Electricity
MUDH	Ministry of Urban Development and Housing
NAPA	National Adaptation Programme of Action
NDC	Nationally Determined Contribution
NGO	Non-Government Organization
ODA	Official Development Aid
OECD-DAC	Organization for Economic Co-operation and Development
OWL	Other Wooded Lands
UNFCCC	United Nations Framework Convention on Climate Change

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Summary

Ethiopia is currently on the road to become a middle-income country by 2025, while not exceeding their 2010 GHG emissions. With 80% of the population engaged in agriculture, land-use management is essential to succeed in this emissions target. There have been several Ethiopian climate plans and policies over the last decade to promote a green development, and they have been condensed and streamlined over time. The progress has been hard to evaluate, mainly due to poor data availability, and where data is available the benchmarks and indicators have not been consistent over time, making it very difficult to get a fair picture of the situation. GHG emissions have decreased over time since 1990, but so has also the forest cover in the country, which acts as a carbon sink. The problem with this data is that the benchmark used in the Ethiopian evaluation is widely different from the FAO forest cover estimate. While Ethiopia reports great progress in their 2010 Growth National Plan (GTP) of 50 percent increased forest cover over a five-year period, FAO estimates the increase in the same period to close to two percent. Other than forest cover, crop production is another indicator that has available data over time, and here the outcome has been aligned with the goal set in the GTP. To reach the goal of reducing emissions down to the 2010 levels, financing seems to be the largest problem. There is a great deficit in the planned budget, and the projected increase in the private sector's contribution has not been realized as of yet. As a result, it seems unlikely that the goal will be met, but Ethiopia is still taking big strides to becoming a green economy and have achieved a lot in a very short time. So, even if it may not happen by 2025, Ethiopia is serving as a good example for both low- and high-income countries, in its stride towards green development by having aligned policies throughout all sectors of the government.

Introduction

Being the second most populous country in Africa, with a population of over 100 million, and with the agriculture sector employing 80 percent of the population, Ethiopia faces numerous severe challenges posed by climate change (Selehu, Sebeko, Shekur, Sebuh, & Tadesse, 2011). The country is currently (2018) experiencing the harshest drought in 30 years, with more than 7 million people relying on food aid, but closer to 20 million are at risk (Schemm, 2017). With the pace climate change is occurring, the food security of the country is expected to worsen.

Ethiopia has for a long time been adapting and addressing the issue of climate change through various policies, but since February 2011, the government has committed to one of the most ambitious environmental mitigation plans seen by any country, including high-income countries, with the goal to become a middle-income country by 2025 without increasing its net carbon emissions compared to its 2010 levels (World Bank, 2016), This is regulated by the Climate Resilient Green Economy (CRGE) strategy, and the Ethiopian National Determined Contribution (NDC) submitted to the UNFCCC (Government of Ethiopia, 2017).

The focus of this synthesis report is to investigate how Agriculture, Forestry and other Land Use (AFOLU) and food security is described in the NDC and link its content to other policies and strategies in place in Ethiopia. This is done to investigate if it is, with these related policies as tools, possible to achieve the goals set in the NDC. Due to the interlinkages with the other national policies, mainly the

overarching CRGE, these will also be examined as an extension of the NDC. The analysis will also attempt to evaluate whether reaching the NDC targets is feasible based on key indicators and the trends in recent data.
The report will further highlight the importance of multifunctional land use in reaching NDC targets. This report's view on multifunctional land use and what is considered multifunctional land use, are usages that gives simultaneously support to habitat, productive, regulatory, social and economic aspirations (Mander et al., 2007). It is a combination of outputs and services, where some products and services can be private goods, such as agricultural yields or timber, and other can be public goods, such as downstream water or soil productivity in a landscape, and it can also include climate mitigation if the outcome is to deliberately reduce net GHG emissions. This means that in multifunctional land use there are different stakeholders with different power or rights and a number of trade-offs. The outputs and services can also have different time spans, hence there is a difference in short-term and long-term profit or benefits that is of relevance in policy-making. Multifunctional land-use systems have been identified as a win-win system to increased mitigation and adaptation capacity while intensifying production in a sustainable way (Bustamante et al., 2014). Given that the polices and AFOLU actions that Ethiopia is adopting through the CRGE and NDC hold desired outcome for climate mitigation and adaptation (carbon plus at least one other output) all the areas touched upon in this paper fall under multifunctional landscapes.

Background

Land use in Ethiopia

Crops

Ethiopia has a land area of roughly 1,100,000 km^2, most of which is dominated by small-scale, rain-fed, subsistence crop farming, which makes up roughly 95 percent of cultivated areas and 90 percent of the total production output, 67 percent of agricultural GDP, and 27 percent of total GDP (CRGE Agriculture, 2012). Farming techniques are mainly traditional using oxen-drawn wooden ploughs, and low to no amounts of pesticides, fertilizers and improved seeds. The current Greenhouse gas (GHG) emissions caused by crop production is 12 $MtCO_2e$ per year, which under a Business-as-Usual (BAU) scenario based on higher population and increased agricultural production is projected to reach 60 $MtCO_2e$ by 2030. The overarching goal to limit this is avoiding deforestation and adopting high-yielding, sustainable techniques. Two different scenarios regarding the future of crop production have been analyzed. Firstly, if climate change results in a warmer and wetter climate for Ethiopia, the crop production could increase in value roughly equal to 1 percent of today's total Gross Domestic Product (GDP) since rain-fed agriculture is so widespread, and the country often suffers from droughts. Secondly, if the future climate instead is warmer and drier, the total GDP is more likely to drop by 3 percent of the total GDP by 2050 (livestock included), and the GDP per capita might fall by up to 30 percent (CRGE Agriculture, 2012).
The main crops in Ethiopia today consist of cereals, pulses (legumes), coffee, oil seeds, herbs, vegetables, fruits, sugar cane and fiber. Coffee, which is a high value export good for Ethiopia, is very temperature sensitive, and land now used for its production is likely unusable for coffee during a warmer climate, and thus coffee production could fall by 40-90 percent by 2080. This would translate roughly to 30 percent lower export value in the coffee sector, meaning a USD 500 million loss in export revenues already by 2030. For irrigated crops, such as sugar canes, a drier future scenario would likely result in a 9 percent lower crop yield (CRGE Agriculture, 2012).

Livestock

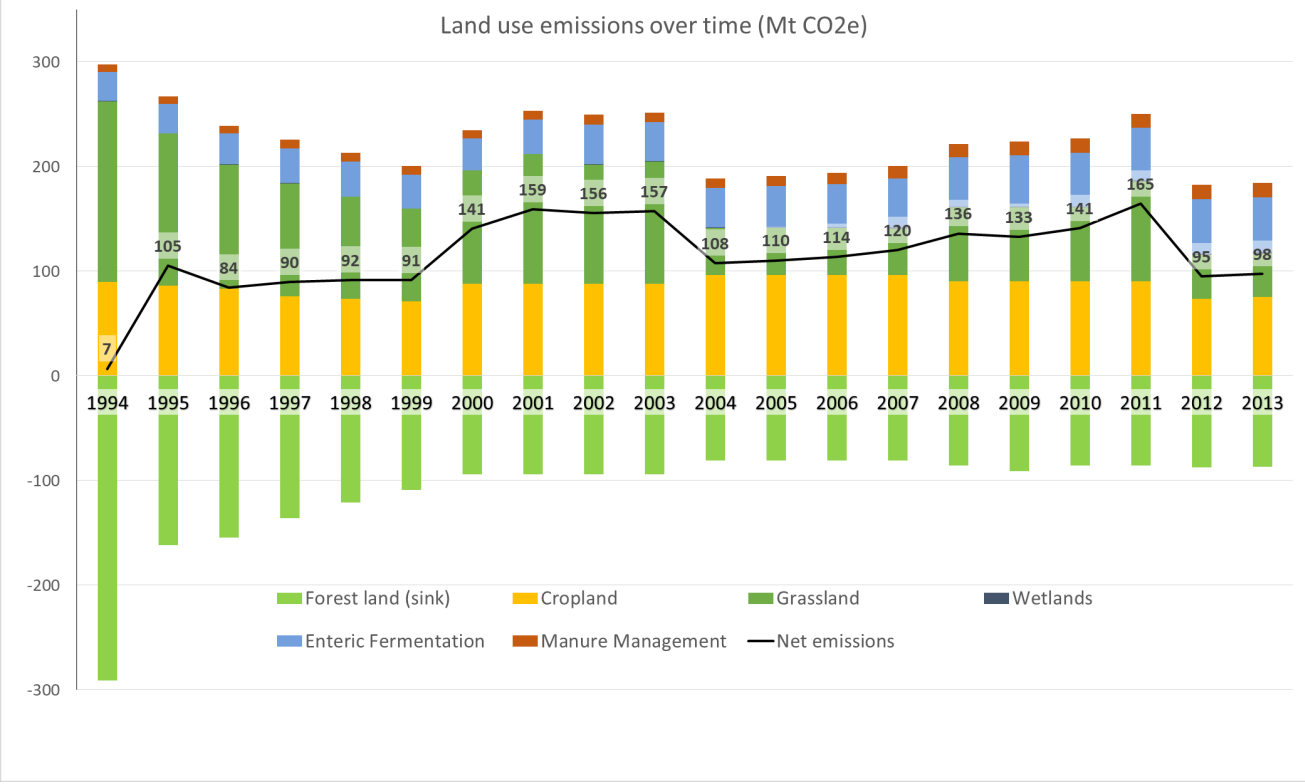
With the largest livestock population in Africa, the livestock sector in Ethiopia contributes 26 percent of the agricultural GDP (10 percent of total), but makes up 40 percent of the country's GHG emissions, and as the highest GHG emitting sector, emissions are likely to increase by 40 percent under a BAU scenario up to 91 $MtCO_2e$ annually. The livestock population is suffering from a poor gene pool, very limited access to veterinary services, and poor feed quality and feeding practices. In 2011 the estimate

was that there are 53 million cattle, 26 million sheep, 23 million goats and 50 million poultry in Ethiopia. The cattle population is expected to rise another 30 percent by 2030, and to avoid such an increase the main abatement method is to improve the efficiency of the beef production, and to promote chicken over beef (CRGE Agriculture, 2012).

Forestry

According to FAOs global Forest Resource Assessments (FRA), forest cover and Other Wooded Lands (OWL)[1] in Ethiopia covered an area of 12.3Mha and 44.6Mha respectively in 2010, and has since reduced by 1.25 percent (forest) and 1.8 percent (OWL) annually (FAO, 2014). The forestry sector makes up 5 percent of the agricultural GDP (3 percent of total), but in some places in the country, informal uses make up 30 percent of the local income. Deforestation is second largest GHG source emitting 55MtCO_2e annually and is expected to reach 90 MtCO_2e by 2030 under a BAU scenario. The main drivers of deforestation are pressure for land to be used for agriculture, as well as fuel since the vast majority of household still rely on wood and charcoal for household energy (Selehu, Sebeko, Shekur, Sebuh, & Tadesse, 2011).
Figure 1 illustrates the related emissions for each type of land use in the country, with forest areas being a carbon sink, and croplands and grasslands that allows for grazing are the highest emitting sectors. What is apparent is the reduction of forest cover over time, which has an effect on the net carbon emissions (MoEF, 2015).

Figure 1 – Land use and emissions over time



Source: (MoEF, 2015)

Ethiopian strategy documents for adaptation and mitigation

This section intends to give an overview of the different plans and policies that have formed and is currently making up the Ethiopian climate adaptation and mitigation efforts. The NDC is important, but

[1] Here the term "*Forest*" includes high wood lands and plantations, of which all have in common a crown density of >20% by the FAO FRA (2014) definition, and *OWL* includes low woodland and shrub lands.

in the case of Ethiopia it is a composition of national policies and goals that are already set since the country have already adopted several strategies to become a green economy with significantly reduced GHG emissions already in 2007, and these efforts have been re-iterated in the NDC.
The first substantial policy regulations document for Ethiopia was the National Adaptation Programme of Action (NAPA) in 2007, which early on showed Ethiopia's commitment to climate change adaptation and a green path forward. In 2010, the Growth and Transformation Plan I (GTP I) was adopted and set to run from 2010-2015 and continued the work that was set in motion by the NAPA, but more encompassing and more detailed in its objectives on how to move forward towards a green economy. In 2011 a supplementary detailed plan for the agriculture sector was developed, the Agriculture Sector Programme of Plan on Adaptation to Climate Change (ASPPACC). This was to complement the GTP I and described in further detail the policies to be undertaken to increase efficiency in the agricultural sector as well as climate adaptation. The CRGE, drafted in 2011 by the Ministry of Finance and Economic Development (MoFED), further integrated the NAPA and GTP I into a sector wide policy encompassing the majority of government ministries with the explicit goal for Ethiopia to become a middle-income country by 2025, and doing so with sustainable practices and becoming climate neutral in the process. In 2015 the GTP I reached its end and was evaluated and replaced with the GTP II. The GTP II outlines the plan of action for the next five-year period between 2015 and 2020, with explicit targets in all sectors and has integrated the CRGE objectives (GTP I, 2010). In 2015 the Intended National Determined Contribution (INDC) was submitted to the UNFCCC, being the result of the previous policies in place, with the CRGE as its core. In practice, the Ethiopian INDC is a light version of the CRGE but adapted to include the targets requested by the UNFCCC. In 2017 the INDC was adjusted and resubmitted (but largely unchanged) and is now the Ethiopian NDC. Each of these documents mentioned here will be further explained in the next section. We will start with the NDC and the CRGE due to their relationship (the NDC being a short version of the CRGE in practice), and then in chronological order.

The National Determined Contribution (NDC) of Ethiopia

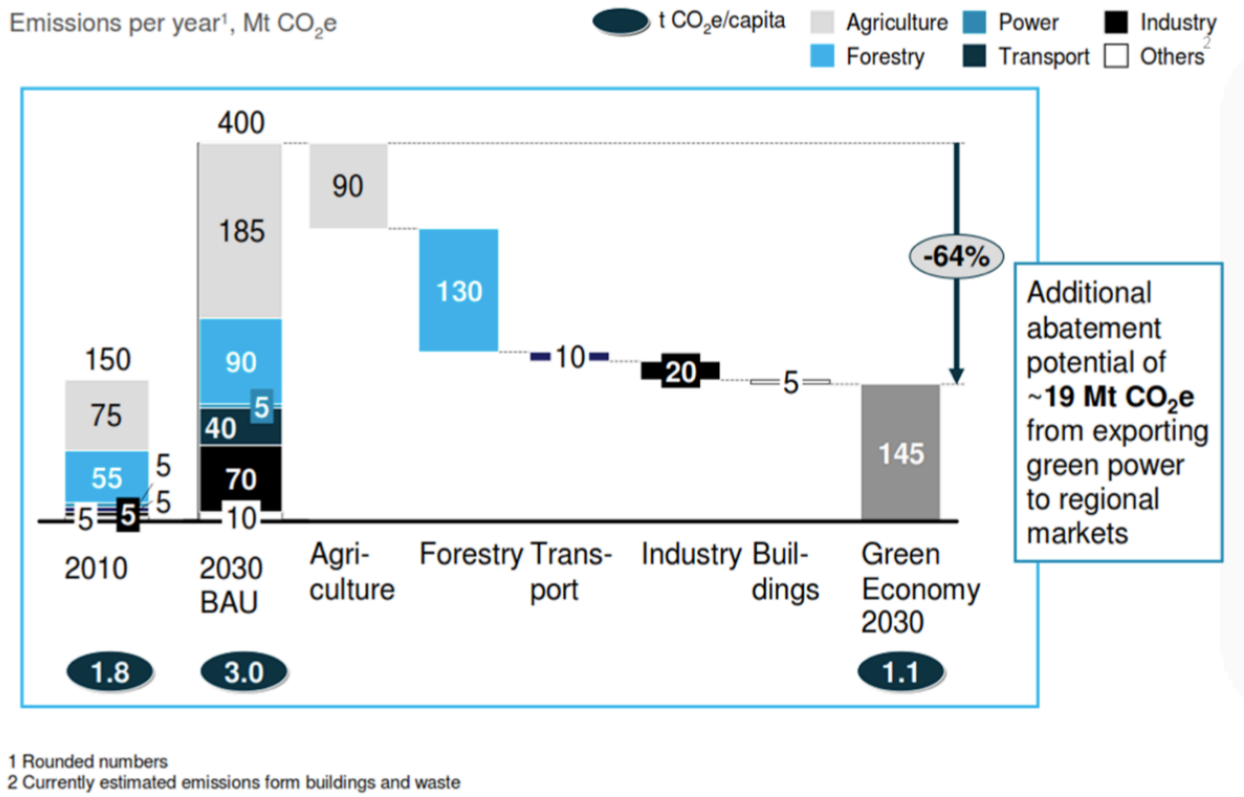
The NDC is a sector wide commitment which mirrors a lot of what the CRGE vision is, and that every ministry in the Ethiopian government must adhere to, with the five main objectives being:

1. Lifting Ethiopia to middle-income status by 2025;
2. Ensuring economic development is sustainable by limiting GHG emissions;
3. Creating green job opportunities;
4. Protecting the Ethiopian population and economy against the adverse effects of climate change; and
5. Contributing to the global effort in responding to climate change

(Government of Ethiopia, 2017).

The overarching, and more tangible, goal is to reduce the business-as-usual projection of 400 Mt CO_2e to 145 Mt CO_2e by 2030, a 255 Mt CO_2e reduction (~64 percent), which is the highest of all the INDCs submitted to the UN Framework Convention on Climate Change (UNFCCC) (Richards, o.a., 2015). In addition to this, Ethiopia has also committed to provide green energy through hydropower to neighboring states, which will have another 19 Mt CO_2e (5 percent) reduction. As seen in figure 2, agricultural and forest land use are by far the two biggest sectors and where the bulk of the adaptation and mitigation will be done. With 90 Mt CO_2e reduction for agriculture, and 130 Mt CO_2e for forest through increased carbon sequestration, and this sector will be the main driving force towards reaching the net emission reduction target (Government of Ethiopia, 2017).
The magnitude of Ethiopia's reduction goals puts the country at fourth place in terms of AFOLU based mitigation when looking at all (I)NDC's submitted to the UNFCCC (Forsell, o.a., 2016).

Figure 2 - NDC carbon emission reduction projections



1 Rounded numbers
2 Currently estimated emissions form buildings and waste

Source: (Government of Ethiopia, 2017)

The NDC emphasize the potential synergies between adaptation and mitigation where many of the agricultural and forestry interventions can provide substantial economic and livelihood benefits. The NDC is divided into mitigation and adaptation strategies, where in terms of agriculture and forestry, almost all are mitigating. The mitigation interventions aim towards productivity increase in agriculture, and afforestation, while the adaptation interventions relate to increased resilience and reduced vulnerability of livelihoods through flood prevention, drought resilience and risk management. These are not all interventions, but those relating to AFOLU:

Adaptation:

- Increase agricultural productivity, minimize food insecurity and increase incomes irrespective of climate change by breeding and making available improved crop varieties;
- Improve and diversify economic opportunities from agroforestry and sustainable afforestation of degraded forest areas.
- Enhancing ecosystem health through ecological farming, sustainable land management practices and improved livestock production practices to reverse soil erosion, restore water balance, and increase vegetation cover, including drought tolerant vegetation.

(Government of Ethiopia, 2017)

Mitigation:

- Protecting and re-establishing forests for their economic andecosystem services, while sequestering significant amounts ofcarbon dioxide and increasing the carbon stocks in landscapes;
- improving crop and livestock production practices for greater food security and higher farmer incomes while reducingemissions;

- improve economic opportunities from adopting agroforestry to a larger degree and sustainable afforestation of degraded forest areas (up to 7Mha of reforestation and afforestation);
- promote ecosystem health by adopting ecological farming, sustainable land management practices and improved livestock production practices in order to restore degraded and eroded lands.

(Government of Ethiopia, 2017)

In the Ethiopian NDCs all the targets are conditional, and thus would require financial aid from outside the country, or they might not get implemented at all. The case of Ethiopia is however a bit different. With or without secured future funding, the country has committed to the CRGE, and has already implemented a sector wide change to achieve this. So even if enough funding for achieving the NDCs is not secured, Ethiopia is still likely to pursue the targets to the extent that is possible through implementing the CRGE. The plan for funding of the execution of the Ethiopian NDC (in addition to government funding through tax income) is, and will be, utilizing existing and emerging climate financing, as well as support from bilateral and multilateral partners, and the private sector. All financing goes through the CRGE Facility, based at the MoFED, whose task is to "provide flexible, coordinated and predictable funding to support the achievement of national priorities set out under the CRGE", which in this case is the same as the NDC (Government of Ethiopia, 2017). To realize the CRGE vision, the GTP II was created to outline specific targets in detail and break down the targets into specific policies to be evaluated and implemented.

Climate Resilient Green Economy (CRGE)

The CRGE is the main policy which streamlines all efforts into one cross-sectoral nationwide plan to make Ethiopia a middle-income country by 2025, without increasing its net carbon emissions based on the 2010 baseline in the CRGE. This document is what the INDC and NDC of Ethiopia was based on, and is the guiding policy for all ministries, and for that reason the CRGE can be as an extension of the NDC when looking at its objectives and targets. In addition to the main CRGE policy, we have also looked at the complementing strategy document; the *Climate Resilient Strategy: Agriculture*. These documents are divided into four sections; *Vision*, *Challenge*, *Response*, and *Making it happen*. They very thoroughly describe the current situation and future scenarios through risk analysis and projections, and in a big-picture kind of way describe what actions need to be undertaken. The policy presents 41 actions and describes shortlisted adaptation options, each presented with examples of interventions. The more notable ones of relevance for our report can be found in table A1 in the appendix.

The CRGE report explain broadly what Ethiopia wants to target in order to achieve the goals but, like in many of the other reports and policies, there are no specific projects or actions taking place. What the report talks about though are the underlying factors of human-, physical-, and natural capital as well as infrastructure and institutions, and how the plan will create resilience through its implementations. That is where the GTPs come in place (CRGE Agriculture, 2012).

National Adaptation Programme of Action (NAPA)

Adopted in 2007, the NAPA identified the most vulnerable sectors and areas with regards to climate change through stakeholder consultations and expert assessments. Agriculture was the sector identified as most vulnerable in the economy, and the areas that will suffer the most are the arid, semi-arid and dry sub-humid parts of the country as they are frequently suffering from droughts (NAPA, 2007).

Based on two national and eight regional consultative workshops, 37 different adaptation initiatives were identified. These were assed using a Multi Criteria Assessment (MCA) while also taking into consideration to Multilateral Environmental Agreements (MEAs). See table A2 in the appendix for the criteria and weights used in the MCA.

In the NAPA we find a priority list with the eleven projects that scored the highest in the MCA, and out of these eleven projects, all but two are directly linked to agriculture, land use or food security. For the full list, see table A3 in appendix. Each project on the priority list have a short description including rationale, objectives, activities, short-term outputs, long-term outcomes, risks and barriers, evaluation criteria and costs. The combined cost for all of them are USD 770M, though this includes the cost for a new hydropower dam, which makes up the bulk of all the costs at USD 700M (NAPA, 2007).

Growth and Transformation Plan I (GTP I)

The Growth and Transformation Plan was introduced in 2010 and was the main strategy for the entire nation on how to achieve economic growth and bring the country out of poverty. It ran from 2010 to 2015, and was also the last large-scale plan implemented, designed to achieve the Millennium Development Goals (MDGs), which had their deadline set for 2015. During the five-year run time, the GTP I aimed to have an annual GDP growth of 11.2 percent annually[2]. For the targets to be reached, six ministries were identified as crucial: Ministry of Agriculture and Natural Resources (MoANR), Ministry of Environment, Forests and Climate Change (MEFCC), Ministry of Industry (MoI), Ministry of Transport (MoT), Ministry of Urban Development and Housing (MUDH) and Ministry of Water, Irrigation and Electricity (MoWIE).

The GTP I explicitly stated that Ethiopia's economic growth will be led by the agricultural sector, by smallholder farms foremost. This was to be done by up-scaling and dispersing the best technologies and practices tested by model farmers, the overarching ones being: promotion of multiple cropping and better adaptation to climate variability to ensure food security (GTP I, 2010).

There were 52 targets in the five-year plan for the agricultural sector, of which 27 directly targeted land use and food security, and the rest focused on marketing and export. Each target had a baseline and target value for its indicators as seen in appendix table A4:

The projected expenditures for the GTP I was USD 41.5 billion, and of this USD 5 billion, was projected for the agriculture and food security objectives. The main contribution came from domestic tax revenues, but around 17 percent came from grants from NGOs and aid organizations (GTP I, 2010).

GTP I has been evaluated and the results are presented in section 7.

Growth and Transformation Plan II (GTP II)

The second Growth and Transformation Plan, running from 2016 to 2021, is based on GTP I and has the objective to reach an annual average real GDP growth rate of 11 percent annually, with agriculture being the driving sector. The GTP II was formed with the CRGE in mind and is the de facto a strategy to reach the CRGE targets (GTP II, 2016). Since it is built on the previous policies, especially the GTP I and CRGE, the GTP II also has a strong focus on the agricultural sector, but unlike GTP I that targeted six ministries. GTP II is fully intersectoral and every ministry and government agency must adhere to it. Altogether, the five year plans expected budget is USD 94,5 billion, with the agriculture sector making up 3.8 percent of this (USD 3.59 billion).

Regarding the agricultural sector, after reviewing the results of the GTP I, the GTP II has the objectives of (i) bring about accelerated and sustained growth of agriculture within the framework of the CRGE that equitably benefits people at all levels and that realizes structural transformation of the sector and the overall economy (ii) bring about a significant shift in agricultural productivity, build productive capacity and thereby enhance the contribution of the sector to the economy and stabilizing the macro economy; (iii) to enable women, youths and other stakeholders to participate in a structured and organized manner to contribute their part and benefit from the development outcomes. For specific targets see table A5 in appendix.

[2] The average GDP growth 2011-2015 was 11.2 percent (World Bank, 2016)

Overlap of NDC and Ethiopia policy documents regarding AFOLU

Given Ethiopia's ambitious and unique integration of green development into every sector, it is no surprise that there is a lot of overlap between policy documents and initiatives. Table 1 summarizes the focus points of the Ethiopian NDC and all the major policy documents that relates to green development, and where these overlaps. It becomes obvious that climate conscious development has been a priority for a long time, and it is important to remember that these policy documents are not stand-alone policies added on to the government's agenda, but rather sector wide guidelines that are embedded in all the ministries and policies for the country's development. Looking at table 1 it becomes apparent that the policies are not only fully aligned with the NDC, but go above and beyond and with new targets added in the GTP II.

Table 1 Policy documents summary and comparison

	Ethiopia (I)NDC	**NAPA**	**GTP I**	**ASPPACC**	**CRGE**	**GTP II**
Year	**2015/17**	**2007**	**2010**	**2011**	**2011**	**2015**
Crop targets						
Increased productivity	✓	✓	✓	✓	✓	✓
Drought protection	✓	✓		✓	✓	✓
Green technology and practices	✓	✓	✓		✓	✓
Improved crop varieties	✓	✓	✓	✓	✓	✓
Improved irrigation and water usage	✓	✓			✓	✓
Crop insurance		✓			✓	✓
Land and soil rehabilitation	✓	✓	✓	✓	✓	✓
Plant biodiversity				✓	✓	✓
Training and capacity building	✓			✓	✓	✓
Increased area of land cultivated			✓	✓		✓
More smallholder farms			✓	✓		✓
Access to fertilizer and pesticide	✓		✓	✓	✓	✓
Livestock targets						
Increase livestock productivity	✓		✓	✓	✓	✓
Gene diversification	✓		✓	✓	✓	✓
Increase general health of livestock	✓		✓	✓	✓	✓
Improving rangeland resource		✓	✓	✓	✓	✓

management practices						
Forest targets						
Agroforestry promotion	✓	✓	✓	✓	✓	✓
Sustainable afforestation	✓	✓	✓	✓	✓	✓
Home gardens				✓		
Forest conservation	✓	✓		✓	✓	✓
Enclosed areas				✓	✓	
Protected areas				✓	✓	
Other						
Improved wetland management		✓				✓
Flood prevention	✓	✓	✓	✓	✓	
Agricultural extension services	✓	✓	✓		✓	✓

Source: (Government of Ethiopia, 2017; NAPA, 2007; GTP I, 2010; CRGE, 2012; Selehu, Sebeko, Shekur, Sebuh, & Tadesse, 2011; GTP II, 2016)

Evaluation of multifunctional land use policies

So far, we have focused on the intentions and commitment of the government of Ethiopia and green development. In this section we will look at post impact evaluation and current status of projects from the policy documents. There are not that many large-scale impact evaluations ongoing in the country, but the CRGE Facilities, a government institute in charge of the implementation, are currently working with Ethiopian Development Research Institute (EDRI) to identify which indicators that are the most important, and establish a baseline for these, and this will be the basis for all upcoming impact evaluations (Nemera, 2017).

Evaluation of GTP I

The agricultural sector has been made more productive by improved technology dissemination, natural resource management and utilization, disaster prevention, agricultural marketing systems and private sector participation. Production per hectare of major crops increased by 35 percent, and if we include new areas utilized for food production, this led to an increase from 18 million in 2011 to 27 million metric tons for smallholder farmers in 2015 (GTP II, 2016).

Even though good progress was achieved, the evaluation of the program states that not much progress was made regarding structural transformation of the economy, and the industry, though even with a high GDP growth rate, still only make up 15 percent of the economy, with agriculture at 38 percent and services at 46 percent, still make up the major part of the GDP respectively. Within the agricultural sector, the effort to go from subsistence crops to high value crops was largely unsuccessful. Partial success could be seen in the area of coffee production reaching 60 percent of the annual average target of 690 thousand metric tons. Increased use of fertilizers was 72 percent of the target whereas improved seed was only 42 percent of the target. Dissemination of technology and new farming practices reached 55 percent of the target, which can be considered as a success even though not reaching all the way. The livestock target on the other hand was considered a failure with an increase in hybrid/improved cattle ratio by only 4 percent (GTP II, 2016).

Fast Track Investments

There has been one large impact evaluation looking at policies from the CRGE, through the Climate High Level Investment Program (CHIP) by DFID, who committed GBP 25.6 million since 2013 towards realizing the Ethiopian CRGE vision. The part of the evaluation that is of interest for this study is the evaluation of Fast Track Investments (FTI), which act like pilot projects in smaller scale, and if deemed successful will be rolled out on a large scale across the country.

For the impact evaluation DFID hired an unbiased third-party organization, LTS International, who evaluated the FTIs to achieve the CRGE vision. The FTIs are divided into different ministries implementing them and the two ministries of interest for this report are Ministry of Agriculture and Natural Resources (MoANR) that received USD 6 million for 3 FTI projects in 8 regions, and the Ministry of Environment, Forests and Climate Change (MEFCC) that received USD 3.5 million for 12 FTI projects in 8 regions.

The three projects from MoANR are directly land use related and deals with: (1) climate smart agriculture, (2) watershed activities, and (3) capacity building in vulnerable areas. Together these projects have reached around 3,500 households and 17,000 people. Some 11,000-22,000 hectares of land have been rehabilitated with 3.9 million seedlings planted. The cost per hectare of soil and water conservation measures was roughly USD 670, which is compared to USD 64 in the Sustainable Land Management Program (LTS International, 2016).

The 12 projects by MEFCC include land enclosure, tree planting, development of joint forest management agreements, bamboo plantation and support structures. The projects reached 25,000 people, and 8,300 hectares of land were rehabilitated, and 10.8 million seedlings were planted. The calculated cost per rehabilitated hectare lands between USD85 and USD185, and the cost per beneficiary was USD60-200, see table 2 for projection and result summary. Overall, these FTI projects were successful in reaching their targets at a fairly low cost.

(LTS International, 2016).

Table 2 - Result summary of Fast Track Investments

	Ministry of agriculture and natural resources	Ministry of environment, forests and climate change
Budget (USD)	*$6,035,000*	*$3,478,000*
Direct beneficiaries (#)	*Target:* 3,065 – 3,725 *Result:* 3,065 – 3,725 (~100%)	*Target:* 16,122 *Result:* 24,475 (152%)
Area greened/ managed (ha)	*Target:* 11,000-22,000 *Result:* 11,000-22,000 (~100%)	*Target:* 12,580 *Result:* 8,378 (67%)
Seedlings/trees planted (#)	*Target:* 3.0m *Result:* 3.9m (130%)	*Target:* 7.3m *Result:* 10.8m (149%)

(LTS International, 2016)

Overall the FTI projects were deemed to have had positive changes to productivity, incomes and jobs, though unclear how long these results will be sustained, and how resistant they are to climate shocks in the future (LTS International, 2016).

Some of the LTSI criticism in the case of the projects managed by MoANR and MEFCC, was that there might be a conflict of interest between the government and the private sector in these FTIs. Ideally the private sector would be involved in and benefit from the FTI initiatives, However, since MoANR delivered all inputs such as supplies, and managed the loans for farmers through farmer cooperatives in these projects there was a risk, pointed out by LTSI, that the private sector might be crowded out. For the forest projects handled by MEFCC, the government managed most of them, through a direct hire of labor.
LTSI also suggested improvements to these flaws by using private microfinance loans and establishing local service providers. A performance-based payment system to private suppliers of nurseries and tree planting, and bonus payments for survival rates exceeding one year incentivizing practices increasing survival of the plants, was also suggested (LTS International, 2016).

Feasibility

Finance

Given the ambitious objectives of the NDC and CRGE, it is not a small task to achieve its targets. If we look at the AFOLU sectors which are covered by the MoANR, one of the main constraints is funding. Table 3 breaks down what the ministry estimates as the shortage to achieve the NDC targets. Note that these numbers are estimates from 2012, and they are the *additional funding* needed in the existing budgets:

Table 3 - CRGE Agriculture additional funding needed to reach NDCs in millions of USD (in 2008 prices)

	2015	2020	2025	2030
MoANR Total additional funding needs	163	240	321	499
Bilateral Donors	2	2	2	2
Private Sector	39	57	78	101
Grand total and target	**205**	**299**	**401**	**603**

Source: (CRGE Agriculture, 2012)

Official Development Assistance (ODA) in this table is very low, especially considering what we mentioned earlier that all the items in the NDC are conditional on foreign support. What is not specified in table 3 is ODA from multi-lateral donors. Due to aid fungibility, (i.e. possibility that aid is used in ways not intended by donor/funders) it is difficult to say exactly how much aid money that is funneled into the agriculture sector, but according to OECD-DACs ODA statistics (2017) the sums in table 4 were transferred to the sector “Agriculture, forestry and fishing”. Given that the country is landlocked and does not have fresh water fishing on an industrial scale, we can assume that almost all the money will go to activities related to agriculture and forestry.

Table 4 - ODA to Agriculture, forestry and fishing sector in Ethiopia (millions of dollar)

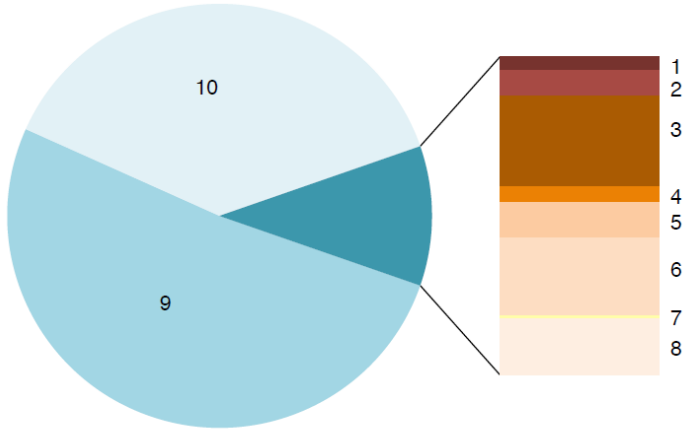
2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
66.57	43.08	70.54	156.58	124.62	210.19	292.13	195.18	329.79	201.40

Source: (OECD-DAC, 2017)

Comparing the budget grand total in table 3 above, USD 205 million, for 2015 with the actual funds given to the sector in table 4, USD 330 million, it is clear that the majority of the ODA does not go to

the implementation of the CRGE, but to other AFOLU activities and to fund the policies and infrastructure already in place in a day-to-day basis. To put these sums into an overall international perspective, the Green Climate Fund (GCF) under the UNFCCC have been pledged USD 10.2 billion from 43 different nations. The additional funding needed in the CRGE budget for 2015 was roughly 2% of that, so for the CRGE vision to be realized, the funds needed are relatively low.
In spite of the relatively high ODA for AFOLU, the CRGE realization seems distant when we look at the composition of the actual spending. Figure 3 shows the 2012 composition of the Ethiopian total budget for agriculture. Areas 1-8 are resilience based and productivity improving activities, but is given only one eighth, or 12-13 percent, of the total budget. MoANR has in the CRGE Agriculture Strategy (2012) confirmed that the main constraint to reaching the NDC targets is the lack of financing. From this data, it can be argued that not enough of the budget goes towards climate change adaptation and mitigation and resilience promoting activities. The private sector part of financing and participating in such a successful implementation of the CRGE, and realization of the NDCs is also lagging behind.

Figure 3 – Ethiopian agriculture budget composition (2012)



1. Capacity and institutions
2. Information and awareness
3. Crop and water management on-farm
4. Value chain and market development
5. General animal and value chain improvements
6. Sustainable agriculture and land management
7. Forestry, conservation and biodiversity
8. Disaster risk reduction
9. Social protection for high priority groups
10. Non-resilience related

Source: (CRGE Agriculture, 2012)

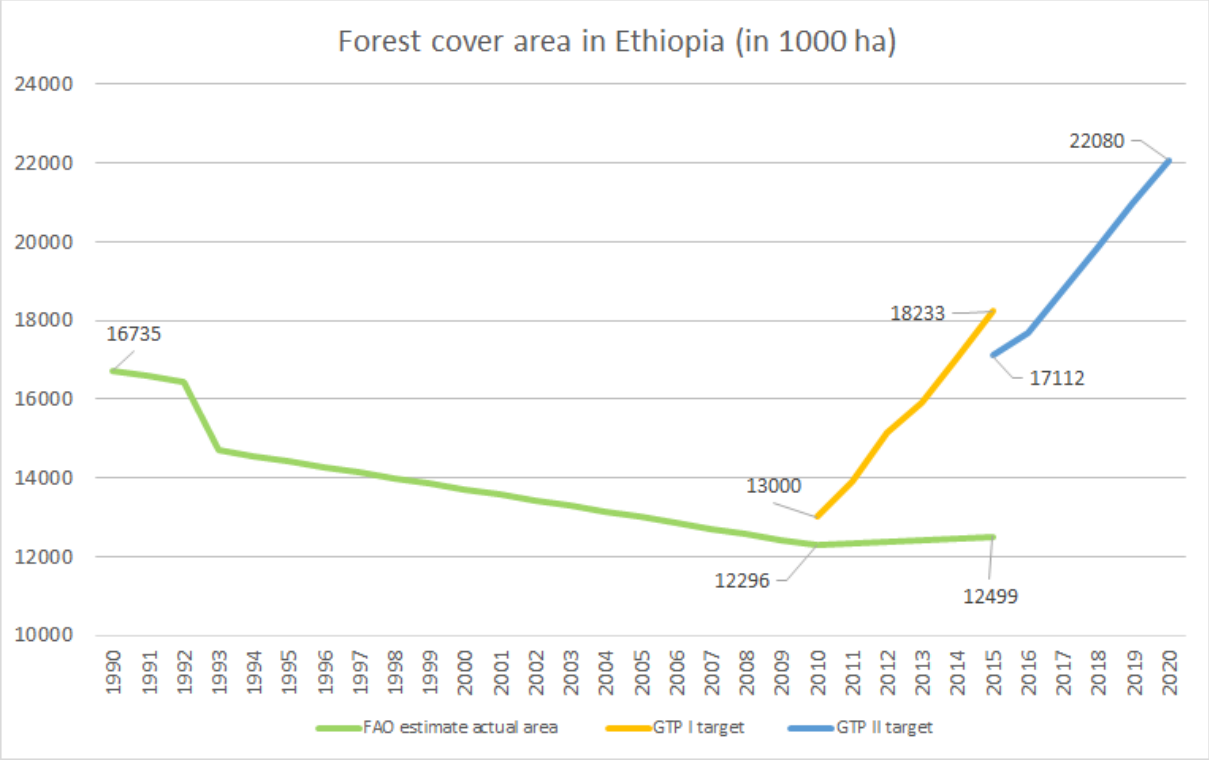
Indicators

In order to try and give an estimate on progress and whether the NDC targets are too ambitious we have looked at historical data on key indicators and compared them with future goals. The documents used for this analysis are GTP I & II since they have most detailed targets as well as established baselines for these. This data has been combined with National communications documents from the Ethiopian government and international databases. Given the inconsistency in indicators between the reports, we have chosen a few key ones to focus on. Even if the numbers might not be 100 percent accurate, we can still draw conclusion from the relative change in the numbers if they are from the same source, with the assumption that the potential inaccuracy is the same at the different times of measure.

Forest

Regarding forest data, we can see in figure 4 that according to FAOs data there has been a steady decline in forest cover since 1990, but from 2010 the rate flattened out, and the forest area actually showed a slight increase. As shown by figure, the baseline data in GTP I in 2010 is some 700 000 Ha higher than in the FAO Estimate and the baseline data in GTP II in 2015 some 4 600 000 ha higher than the FAO estimate. As can be seen there is a discrepancy in the numbers between the historical data is provided by FAO (green line), and the baseline of GTP I (yellow line) and that of GTP II (blue line). If the data from GTP I is correct, that means that the forest cover in 2015 was higher than in 1990 since data collection started, which would be very impressive. But at the moment there is no information on how the data from the GTP baselines has been collected, and it is likely that the FAO numbers are more accurate (FAO, 2017). However, the fact is that all data shows an increase in forest cover from 2010 and onwards, tells us that something is happening, and it is going in the right direction.

Figure 4 - Forest cover area over time

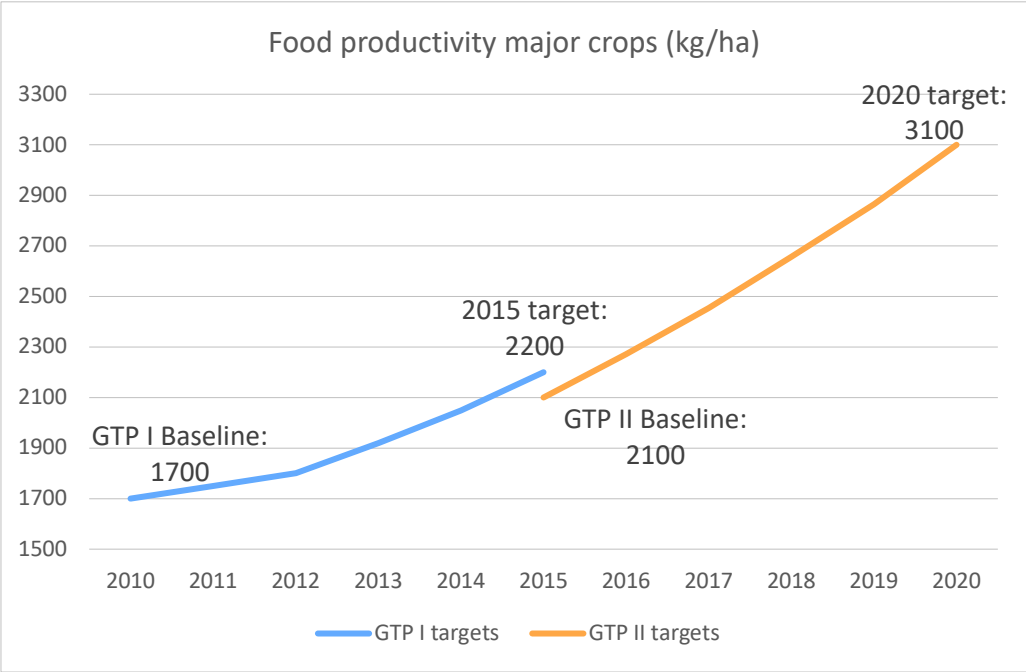


Source: (FAO, 2017) (GTP I, 2010) (GTP II, 2016)

Crops

Looking at food productivity (figure 5), the data shows that the target of the GTP I (2200kg/ha) is not far off from the actual value in 2015 (the baseline of GTP II, 2100kg/ha). Food productivity ell a bit short, reaching 80 percent of the planned increase, but still with a steady growth rate. Given the targets of the GTP II and the current trends, it seems feasible to reach the food productivity goal, if they can maintain the projected budget and follow the same trend (FAO, 2017).

Figure 5 - Food productivity GTP I & GTP II



Source: (FAO, 2017)

Conclusion

It is clear that Ethiopia has strong aspirations to become a green middle-income nation within the near future and has streamlined national policies and plans since 2010. It is linking all government ministries via the CRGE Facility, and to the CRGE vision, which is also reflected and reiterated in the Ethiopian NDC.

Whether it will be a successful endeavour or not is hard to tell, but based on trends and current data, it does not look like the targets will be reached by 2030. Financing the AFOLU activities has not been completely successful, and there is a need for the private sector and the international donor community to get involved and contribute to the larger portion of the financing. The lack of consistent indicators over time (due to changing and removing indicators for the baselines in the different evaluation and targets) gives us a limited toolbox to estimate whether Ethiopia is on track or not. The indicators we could use though is forest area and crop productivity.

Forest cover in Ethiopia is increasing, but if we are to believe the FAO) data (FAO, 2017) there is a modest increase in forest area of 1.6 percent between 2010 and 2015, compared to the government's estimated 40 percent increase during the same period. The gap between these two data sources is obviously too large to attribute to measurement errors. Instead there seems to be a structural monitoring problem that makes it hard to evaluate progress.

Overall, it seems unlikely that Ethiopia will be able to fully implement the NDC and CRGE, but the country appears to be committed to reach NDC and CRGE targets. This is shown in the structural changes in government governance aligning all sectors with the CRGE. The results are starting to materialise through an increase in food productivity and forest area, and we will have to wait and see whether these trends will continue. What is desperately needed however, is a harmonization of indicators and the creation of solid benchmarks with reliable data, in order to accurately measure progress and identify successful interventions. This is also what the Ethiopian Development Research Institute EDRI is currently undertaking.

However, whether or not Ethiopia will reach all goals, the Ethiopian efforts in reaching NDC targets is a great endeavour, and even if they end up reaching reach 50 percent of the goals, it could still serve

as a strong source of inspiration to other low-income countries, that it is possible to transition into greener and more sustainable middle-income countries.

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Appendix

Table A1 - CRGE Land use option

Theme	Prioritized option	Example of intervention
Crop and water management on-farm	Crop switching and new varieties	More heat resistant and drought tolerant crop varieties in addition to changing planting dates.
	Fertilizer use	Additional fertiliser to increase productivity including the use organic manure and residues.
	Farm management and technology	Improved farm practice including increased use of labour, diversified crop rotation and mechanisation.
	Pests and disease (including post-harvest losses)	Monitoring of crop disease, improved storage facilities.
	Irrigation	Different irrigation techniques including drip, communal, small- scale, home, and rain water harvesting.
Livestock	Herd diversification	Changing species that are more resilient to climate change such as a move from cattle to sheep, goat and camel.
	Breeding programmes	Breeding of climate resistant livestock
	Improved animal health	Veterinary services, vaccines, changing practices
	Fodder and feed improvement and resilience	Addressing food shortage, forage development, natural pasture improvement, changing feeding practices
	Rangeland rehabilitation and management	Rotation of grazing, restrict free range grazing, promotion of stall feeding, natural pasture improvement
	Resilient animal housing	Shading and cooling, suitable housing for poultry farming
Sustainable agriculture and land management	Conservation agriculture	Zero or low tillage, cover crops, crop residues for mulching and soil cover
	Soil and water conservation (SWC) structures	Bunds, trees, grass strips, contour levelling, terraces, shade trees, waterways.
	SWC water harvesting	River basin planning, improved land managements
	Soil management	Residue and manure crop fertilisation, agroforestry, efficient use of fertilisers.
	Agroforestry	Integration of forage legumes into agroforestry systems.
Forestry, conservation and biodiversity	Using forests for adaptation	Supporting and encouraging forest growing, remove incentives for deforestation, create integrated land use planning.
	Resilience measures for forests	Support R&D, develop a national monitoring system for forests, ensure forest and species are resilient to changing climate.
	Conservation and rehabilitation	Land, wetland, ecosystems, rangeland, biodiversity, water

	Promoting biodiversity in agriculture	Control and management of pest and diseases, institutions for biodiversity promotion, regional level monitoring systems
	Payment of ecosystem services	Develop policy with a focus on watersheds

Source: (CRGE Agriculture, 2012)

Table A2 - MCA criteria and weights

Criteria	**Weights**
Level of Climate Change Risk (Loss Avoided by Poor People)	0.30
Poverty reduction potential (Impact on poor peoples' Income Growth)	0.20
Cost effectiveness	0.20
Complementarities with national and sectoral plans, policies & strategies, and other MEAs	0.15
Synergy with national plans including action plans under MEAs	0.15

Source: (NAPA, 2007)

Table A3 - MCA priority list

Rank	Title of project	Average standard score	Estimated cost (Million USD)
1	Promoting drought/crop insurance program in Ethiopia	1.00	8
2	Strengthening/enhancing drought and flood early warning systems in Ethiopia	1.00	10
3	Development of small-scale irrigation and water harvesting schemes in arid, semi-arid, and dry sub- humid areas of Ethiopia	0.99	30
4	Improving/enhancing rangeland resource management practices in the pastoral areas of Ethiopia	0.95	2
5	Community based sustainable utilization and management of wet lands in selected parts of Ethiopia	0.95	2
6	Capacity building program for climate change adaptation in Ethiopia	0.85	3
7	Realizing food security through multi-purpose large- scale water development project in Genale–Dawa Basin	0.80	700
8	Community Based Carbon Sequestration Project in the Rift Valley System of Ethiopia	0.78	1

9	Establishment of national research and development (R&D) center for climate change	0.78	2
10	Strengthening malaria containment program (MCP) in selected areas of Ethiopia	0.78	6
11	Promotion of on farm and homestead forestry and agro-forestry practices in arid, semi-arid and dry-sub humid parts of Ethiopia	0.76	5
	Total cost		770

Source: (NAPA, 2007)

Table A4 GTP I Baseline and targets

Description of target	Baseline 2009/10	Target 2015/15	Change
Cultivated land			
1. Total cultivated land utilized by major food crops (Mill. ha)	11.25	12.17	8.18%
2. Production of cereal (Mill. ha)	9.1	9.6	5.49%
3. Cereals productivity (qt/ha)	17	22	29.41%
Coffee production and productivity			
4. Cultivated land by smallholder farmers (ha)	462000	815,000	76.4%
5. Coffee production (tons)	341,000	831,000	143.7%
Livestock development			
6. Cattle feed production (qts)	50,000	145,000	190%
7. Improved cattle breeds (%)	10.3	37	259%
8. Production and distribution of improved livestock gene (Mill. dose)	0.35	2	471%
9. Production of livestock vaccinated (%)	40	65	62.5%
10. Proportion of low-grade hides and skins (%)	50	15	-70%
11. Production of improved animal fodder seeds (qts)	50,000	145,000	190%
Agricultural input supply			
12. Supply of improved seeds (Mill. qts)	0.56	3.6	542,9%
13. Supply of chemical fertilizers (Mill. tons)	0.83	1.66	100%
Agricultural extension			
14. Number of beneficiaries of agricultural extension services (Mill.)	5.09	14.64	187.6%
15. Of the beneficiaries of agricultural services proportion of women and youth (%)	-	40	-
Improving soil fertility			
16. Areas under Vertisol development (Mill. ha)	0.6	3	400%
17. Acidic land treated with lime (Mill. ha)	2210	37850	1613%
18. Area of land rehabilitated (Mill. ha)	3.21	10.21	218%
19. Land developed under community-based water shade development program (Mill. ha)	3.77	7.78	106%
20. Total area of land subjected to soil fertility research (Mill. ha)	0.894	2.82	215%

21. Total area of land covered with forest and with forest master plan (Mill. ha)	0.7	2.2	214%
22. Area of land covered with multi-purpose trees (Mill. ha)	6.06	16.21	167%
23. Forest coverage (Mill. ha)	13	18.23	40%
24. Increase multipurpose trees (ha)	5,062	10,154	100%
25. Natural resource conservation activities in pastoral areas (ha)	200,000	350,000	75%
Horticulture development			
26. Land under the production of vegetables, fruits and herbs (ha)	2,472	33,000	1235%
27. Production of vegetables, fruits and herbs (tons)	58,400	979,6000	16674%

Source: (GTP I, 2010)

Table 5 – GTP II projections

	Baseline 2014/2015	**Target 2019/2020**
Crops		
Productivity of stalk cereal	2.9 metric tons/ha	4.3 metric tons/ha
Total production of stalk cereal	11.5 mill. metric tons	17.1 mill. metric tons
Productivity of non-stalk cereal	2.1 metric tons/ha	3.1 metric tons/ha
Total production of non-stalk cereal	12 mill. metric tons	18 mill. metric tons
Productivity of coffee	0.75 metric tons/ha	1.1 metric tons/ha
Total production coffee	12 mill. metric tons	18 mill. metric tons
Improved seed distribution	187,000 metric tons	356,000 metric tons
Livestock		
Meat production (cattle, goat, camel, poultry)	1.32 mill. metric tons	2.1 mill. metric tons
Milk production (cattle, goat, camel)	5.3 bill. liters	9.4 bill. liters
Egg production	163 mill.	3.9 bill. eggs
Land management and irrigation		
Number of watersheds with a development plan	19,748	93,713
Land areas rehabilitated through area closure	10.86 mill. ha	22.54 mill. M ha
Provide land use certificates for household	-	7.2mill.new certificates
Land area covered by irrigation[3]	2.34 mill. ha	4.14 mill. ha
Biodiversity and conservation		
Number of degraded plant species conserved	836	2,313
Number of degraded microbial species conserved	605	1055
Number of degraded animal species conserved	4	8
Number of in-situ plant species conserved	614	1,026
Number of in-situ animal species conserved	15	36
Food security		
Contingency food reserve	405,000 metric tons	1.5 mill. metric tons
Safety program beneficiaries	3.4 mill.	8.3 mill.

[3] This will mean that 80% of smallholder farms will have access to at least one alternative water source, with 50% of these being users of full irrigation farming.

Male and female head of household graduating from safety net programs	1 mill.	5 mill.

Source: (GTP II, 2016)