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Final Report

Assessment of Investment and Financial Flows for Adaptation to Climate Change In the Agriculture Sector

July 2010

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List of accronyms

APD	ODA
ATPH	Togolese Association for the Advancement of Human
AVOTODE	Togolese Association of Volunteers for Development
BCEAO	Central Bank of the States of West Africa
BVRM	Draft Lower Valley Mono in Maritime Region
C2D	Crusade for Sustainable Development
CCNUCC	United Nations Framework Convention on Climate Change
CNI	Initial National Communication
DAER	Department of Urban and Rural Equipment
DEP	Directorate of Livestock and Fisheries
DGSCN	General Directorate of Statistics and National Accounts
DPCA	Department of Planning and Agricultural Cooperation
DPRH	Department of Planning and Human Resources
DSID	Statistics Directorate, Computing and Documentation
DSRP	Strategic Document for Poverty Reduction
DSRP-C	Full Strategy Document for Poverty Reduction
ENSI	National School of Engineers
ESA	School of Agronomy
O&M	Operation and Maintenance
FAO	United Nations Food and Agriculture Organization
FDS	Faculty of Agricultural Sciences
I&FF	Investment and Financial Flows
FONGTO	Federation of NGOs in Togo
I&FF	Investment and Financial Flows
ICAT	Institute Advisory and Support Technique
IDE	Foreign Direct Investissemnts
IHPC	Harmonised Index of Consumer Prices
IPC	Index of Consumer Prices
ITRA	Togolese Agricultural Research Institute
MAEP	Ministry of Agriculture, Livestock and Fisheries
MCDAT	Ministry of Cooperation, Development and Spatial Planning
MEF	Ministry of Economy and Finance
MERF	Ministry of Environment and Forest Resources
MICS	National Multiple Indicator Survey
OMD	Millennium Development
ONG	Non Governmental Organization
OSC	Civil Society Organization
NAPA	National Action Plan for Adaptation to Climate Change
PAP	Priority Action Program
PARTAM	Project Management and Rehabilitation of Agricultural Land in the areas of Mission-Tové
PDRIS	Integrated Rural Development Project in the Savannah region
PIB	Gross Domestic Product
PNIASA	National Program for Agricultural Investment and Food Security
PNUD	United Nations Development
RAFIA	Research Support and Training Initiatives Self
SOTOCO	Togolese Cotton Company
SRPA	Recovery Strategy for Agricultural Production
STABEX	System Stabilization of Export Revenue
UNOPS	United Nations Office for Project Support Services
UONGTO	Union of NGOs of Togo

1. Introduction

1.1. Objectives

Agricultural production in Togo is heavily dependent on climate, water resources and soil conditions and is therefore very sensitive to climate change. The choice of agriculture as a priority sector of Togo in the implementation of adaptation to climate change are justified partly by its vulnerability vis-à-vis climate change[1] and also by its significant contribution to GDP (38%)[2] and the share of the workforce in this sector (two thirds). To achieve the Millennium Development Goals (MDGs), it is necessary to address a number of technological and management challenges for a better adaptation of systems of agricultural production including livestock and fisheries production.

Adaptation measures to climate change in the agriculture sector are many and varied and require a substantial mobilization of financial, human and technical resources. The overall objective of this study is to evaluate and Investment and Financial Flows (I&FF) and sources of finace needed to address climate change concerns at the national level.

More specifically this paper seeks to:

- Analyze the current national efforts to address climate change
- Estimate the volume of financial resources, medium and long term to address climate change in agriculture
- Facilitate the integration of climate issues into national planning, while improving the sensitivity of policy makers on the implications for national development associated with climate change
- Contribute to the development of positions for international negotiations on climate in the field of agriculture
- Determine the role that various technical and financial partners both national and international can play in mobilizing financial resources for agriculture.

The expected results are:

- The efforts necessary for national adaptation strategies and policy issues in force in the agriculture sector are estimated
- The need for additional financing for adaptation are estimated
- The contribution of different stakeholders to identified adaptation measures are analyzed.

1.2. Context

1.2.1. Previous analysis used

After Togo ratified the United Nations Framework Convention on Climate Change (UNFCCC), on March 8, 1995, if prepared and submitted in November 2001 its Initial National Communication (INC) on Climate Change. This paper shows that the climatic deterioration is accompanied by a shift of seasons with a reduction in wet periods, an increase of evapotranspiration and soil drying increased. The system of power plants and disruption will cause a significant drop in agricultural production. The increase in temperature and decrease in rainfall will affect the nutritional value of fodder and result in a reduced resistance to disease in animals.

The NAPA document (National Action Plan for Adaptation) submitted to the secretariat of the UNFCCC in September 2009 and identified four major risks faced by patterns and livelihoods in the agriculture sector. These floods, rising temperatures, drought and poor rainfall distribution.

[1] CNI Communication Nationale Initiale 2001
[2] DSRP-C Avril 2009

At the margins of the NAPA, an inter-ministerial dialogue was held on 21 and 22 May 2009 in Lome in the Global Project on capacity building for policy makers and economic operators whose activities are affected by climate change.

Among other measures identified by these various initiatives (CNI, inter-ministerial Dialogue NAPA) include:

- Water management (management of lowland and irrigation)
- Agro-forestry-pastoral adaptation systems
- Improving agro-meteorological information and early warning system
- Promotion of endemic breeds resistance to climate change
- Research and development of varieties adapted to climate change
- Support for research and agricultural extension
- The establishment of an institutional framework for the conduct of the assessment of investment and financial flows
- Mobilization of internal and external financial resources.

The Complete Document Reduction Strategy Paper (PRSP-C) retained the agricultural sector as one of priority areas on which the Togo intends to consolidate the foundations of a strong and sustainable growth.

The document of the National Program for Agricultural Investment and Food Security (PNIASA) validated in November 2009 is the basic document for the agriculture sector. It aims to achieve by 2015, an annual agricultural growth of at least 6%. The document is PNIASA planning interventions at national level in the agricultural sector and incorporates some elements relating to adaptation.

1.2.2. Institutional arrangements and collaborations

The conduct of the I&FF assessment is under the jurisdiction of the Directorate of Environment Ministry of Environment and Forest Resources (MERF) which is the National Focal Point of UNFCCC. A coordinating work team has been implemented in this direction and works with the National Committee on Climate Change, which groups together a number of state institutions and private organizations and the Society Organizations (CSOs) and Non Governmental Organizations (NGOs). This team is composed as follows:

- Focal Point of UNFCCC
- Directorate of Environment
- Directorate of Planning and Human Resources Officer (CHRO) renamed the Department of Planning and Agricultural Cooperation (CAPD) of the Ministry of Agriculture, Livestock and Fisheries
- The Directorate of Urban and Rural Equipment (ADH)
- The Directorate of Statistics, Informatics and Documentation (IDDM)
- Directorate of Livestock and Fisheries (DEP)
- Council and Institute of Technical Support and (CITA)
- Togolese Institute for Agricultural Research (ITRA)
- Higher School of Agronomy (ESA)
- Faculty of Sciences (SDS)
- National School of Engineering (ENSI)
- The Directorate General of Development and Planning
- General Directorate of Statistics and National Accounts
- Cell STABEX European Union
- General Directorate of National Meteorology
- Directorate General for Water and Sanitation
- United Nations Fund for Food and Agriculture Organization (FAO)

- Central Bank of the States of West Africa (BCEAO)
- The Federation of NGOs of Togo (FONGTO)
- Union of NGOs of Togo (UONGTO)
- NGOs: Research Support and Training Initiatives Self (RAFI), Togolese Association of Volunteers for Development (AVOTODE), Togolese Association for the Advancement of Human / Crusade for Sustainable Development (ATPH/C2D)
- Project coordinators: Project Management and Rehabilitation of Agricultural Land in the areas of Mission-Tové (PARTAM), Integrated Rural Development Project in the Savannah region (PDRIS) Project and the Lower Valley in Mono County Shipping (BVRM) implemented by the Ministry of organic farm Livestock and Fisheries (MAEP) during the period.

A national expert team composed of specialists in agricultural economics, statistics, forestry and agronomy was recruited for the collection and processing of data and the preparation of this report. This team has received a three-day training on the I&FF methodology organized by the United Nations Development Programme and the United Nations Office for Project Support Services (UNOPS & UNDP).

1.2.3. Basic methodology and key terms

The basic methodology for I&FF assessments consists of eight steps to be undertaken in each sector assessment and a ninth step is to compile and analyze the sectoral assessments and to produce one single national synthesis report. The eight steps are:

i. Establish key parameters of the assessment

- Define in detail the scope of the sector
- Specify the assessment period and the reference year,
- Identify preliminary adaptation measures
- Choose the analytical approach.

ii. Compile historical data I&FF and operation and maintenance costs (O&M), subsidies and other input data for scenarios

- Compile historical annual I&FF, broken down by entity and source of investment,
- Compile historical annual O&M costs, broken down by entity and source of investment,
- Compile historical annual subsidy costs if subsidies are explicitly included in the assessment
- Compile other input data for the scenarios.

iii. Defining the baseline

- Describe the socio-economic and technological change, national and sectoral plans, and expected investments, given the current national and sectoral plans.

iv. Estimate IF, and FF annual and annual O&M costs and subsidies if included explicitly, for the baseline

- Estimate the annual I&FF for each type of investment broken down by investment entity and source of funding,
- The annual O&M costs, broken down by investment entity and source of funding,
- The annual cost of subsidies for each type of investment and for I&FF and O&M costs if subsidies are explicitly included in the assessment.

v. Define the adaptation scenario

vi. Describe the socio-economic and technological change, adaptation measures and investments, given the implementation of adaptation measures and estimate annual I&FF, O&M costs and subsidies, if included explicitly for the adaptation scenario

- Estimate the annual I&FF for each type of investment broken down by investment entity and source of funding and the annual O&M costs for each IF, broken down by entity and source of investment financing
- Estimate the annual cost of subsidies for each type of investment and relevant for I&FF and O&M costs if subsidies are explicitly included in the assessment.

vii. Calculate changes in I&FF and O&M costs and subsidy if included explicitly required to implement adaptation measures

- Calculate the changes in I&FF and cumulative O&M costs, by source of funding for each type of investment and for all types of investment (the total investment)
- Calculate the changes in annual &FF and O&M costs for each type of investment and for each source of funding, and all types of investment and sources of funding, consider calculating the subsidy changes, if subsidies are explicitly included.

viii. Assess policy implications

- Reassess the initial prioritization of adaptation measures undertaken in step 5;
- Identify policy measures to encourage induce changes in I&FF.

In this report, a number of key terms are used:

- **Investment flows (IF)**, the capital cost of an active material with a lifespan of more than a year.
- **Financial flows (FF)**, the ongoing expense for programmatic measures, the FF cover expenses other than those for the expansion or installation of new physical assets. Material goods purchased with investment flows (IF) have **operation and maintenance (O&M) costs** shareholders (that is to say, permanent fixed costs and variable costs such as wages and raw materials).
- **Households**, individuals or groups of individuals (i.e. families) who act as a financial unit.
- The **companies** include financial institutions (banks and micofinance institutions), non-financial enterprises, as well as profit and non-profit organizations.
- A **scenario** is a characterization of consistent and plausible future conditions over a specified period. We distinguish two cases, the **baseline scenario** describes the conditions of the status-quo, i.e. a description of what will probably happen if no new policy measure to cope with climate change is set place during the assessment period (2005-2030). The **adaptation scenario** includes new measures to address the potential impacts of climate change.
- The **assessment period**, the time horizon for assessment, i.e. the number of years covered by the baseline and the climate change scenario and associated annual I&FF and O&M costs. The assessment period to assess I&FF should cover at least 20 years and not more than 30 years.
- The **reference year**, the first year of the assessment period, that is to say the first year of the baseline. The base year should be a recent year for which information on I&FF and O&M costs are available.

2. Scope, input data and scenarios

2.1. Sectoral Scope

The agricultural sector including crop production, animal and fishery plays an important economic and social role in Togo because of his contribution: (i) achieving food security, (ii) the creation of jobs and returned to the workforce and (iii) the creation of goods and services.

Togolese Agriculture, mainly rain fed, is characterized by small family farms oriented towards subsistence crops. It is regarded as unproductive (maize yield from 0.9 to 1.2 t / ha) as much for structural reasons (institutional context marked by the withdrawal of the Executive in accordance with the structural adjustment policies, the absence or scarcity of bank facilities, lack of training ...) and related natural climatic constraints (climate variability, poor soils degraded, etc.).

2.1.1 Crop production

The main enterprises include food grains, tubers and legumes have contributed in recent years for two thirds to the training of agricultural GDP.

For the crop[3] year 2004/2005, the estimated acreage of grain amounted to 665 263 hectares for a production of 796,971 tonnes, including maize, are: 523,650 tonnes sorghum / millet and 204,802 tons rice paddy: 68,519 tons. Overall, food production has increased at an annual rate of 3% from 1990/91 to 2004/05 to 1.2% due to increased area and 1.8% to productivity growth. The productions that have recorded the highest annual rates are corn (4.6%) and paddy (6.7%). The productivity gains in corn are due, among other things, the rear end of the fertilizer applied to cotton, and those on paddy, due to the cultural development of slums.

The total area cultivated tubers[4] are estimated at 174,699 hectares in 2004/2005, with an output of 1,315,386 tons, consisting of yams (636,304 tons) and cassava (679,082 tons). The average annual production growth of tubercle 1990/1991 to 2004/2005 is 2.5%, mainly due to the extensiveness of the enterprises concerned, the areas which have increased by 3.4% per year while yields decreased by 0.8% per year. This decline in productivity is mainly due to the fall of cassava yield of 2% per annum during the period under review, that of yam, known with a slight increase of 1.1%.

In 2004/2005, the areas of pulses[5] have been estimated at 218,288 ha for a production of 84,289 tons, consisting primarily of beans (49,419 tons) and groundnut (34,870 tons). From 1990/1991 to 2004/2005, production increased at an annual rate of 4.1% and this growth is due to 1 / 3 to area expansion (1.4% per year), and 2 / 3 to productivity, averaging 2.7% per year.

The main crops are cotton, coffee and cocoa, and their share in GDP Agricultural (ABIP) represented, on average, 9% in recent years. In 2005, 2006 and 2007, cotton production has fallen by over 50% of the average for the period 1996-2004. This is due to significant difficulties in the sector related mainly to the delay in the payment of arrears of sums due to cotton producers by SOTOCO (2005 and 2006) and to a lesser extent, the decline in producer prices from 2005/06.

The production of coffee, 17,500 tons in 1996 fell to 5,000 / 6,000 tons between 2002 and 2004, before rising to 6640 tonnes in 2005. The fall in coffee production is mainly due to lower prices paid to producers, lack of maintenance of plantations and better revaluation of land and real returns.

[3] Except fonio, marginal product
[4] Except sweet potato and taro, marginal products
[5] Except bambara, marginal product

Over the last 10 years (1995-2005), cocoa production has fluctuated between 4000 and 6000 tonnes on average per year, except for the year 1996, when it rose to 14,500 tons and the years 2004-200, where production fell to 4,000 tons on average.

2.1.2. Animal Production

Livestock accounted for 13.4% of agricultural GDP during the period (2000-2005). Estimated livestock numbers produced by the Directorate of Livestock and Fisheries[6] has revealed for the year 2005 the following data: (i) 40,130 head for cattle, (ii) 1,464,000 head for sheep and goats, (iii) 301 400 head for pigs, (iv) 14,084,380 head of poultry. The coverage rate of consumption by domestic production, is at 64% from 2001 to 2003. On a more distant period in 1991, this rate was estimated at 79.6%. A case analysis shows that in recent years, the coverage rate is lower for cattle (27%) for poultry, it is 69% for sheep and goats and 83% for pigs 194%. In general, it is noted a downward trend in coverage. Overall, the livestock sub-sector can not meet domestic demand, except the pig, so that the country has to import large quantities of meat, causing a high cost in foreign currency. Total imports of meat and livestock amounts to 9000 tons per year on average during the year 2001/2003 at an annual cost in foreign currency of 2.8 billion CFA francs on average.

2.1.3 Fish Productions

Over the past decade, fishing (mainly traditional) occurred for 3.6% in agricultural GDP. Fish production (around 15,000 tonnes, of which 80% comes from the sea and 20% of river and lagoon system) has remained stable over the last decade, however, a relative decline between 2000 and 2002. The marine fishing industry is virtually zero in recent years. In the 90s, the fishing industry was relatively more developed, thanks to the installation of three fishing companies in free zones. The fishing industry operated on the high seas and processed the fish products locally for export.

The coverage of the domestic consumption of fishery products is less than 50% and is likely to decrease in the future. The market is therefore in this context not a limiting factor for production. Given the weakness of marine resources and exploitation of lagoon resources, the potential for improvement lies mainly in the development of fish farming, and more generally, in rationalizing the exploitation of inland fisheries resources. Catches national artisanal marine fisheries represent values from 3.5 to 4,000,000,000 CFA francs on average over the last ten years. Total imports of fish totaled 19,900 tons in 2006 against 29,800 tonnes in 2000, worth respectively, of 5.5 billion CFA francs and 8.2 billion CFA francs.

In conclusion, the agriculture sector is vulnerable to climate change. To enable this sector to adapt to the adverse effects of climate change, a number of measures should be promoted to enable it play its role in a context of food security and general economic crisis. Among these actions include:

- Water management (irrigation, hydro agricultural, etc.)
- Production of improved seeds
- Conservation and restoration of soil quality (amendments, water conservation and soil fertility of soils)
- Improvement of agricultural weather information system and timing of cropping calendars
- Protection of plants
- Improved farming practices
- Development of the livestock species most resistant to climatic conditions
- Epidemiological surveillance
- Development of fish farming (aquaculture and fishing)
- Development of mangroves.

[6] The Directorate of Livestock and Fisheries has now been split in the direction of the Animal Husbandry and Department of Fisheries and Aquaculture

2.2. Input data and scenarios

2.2.1. Period of assessment and costing parameters

Historical data collected cover the period 2000-2009. The year 2005 was chosen as the base year despite the rather limited data for the period 2005-2006. Indeed, the period before 2005 was known low level of registration of investments due in part to the socio-economic crisis has crossed the country.

The exchange rate used is **1 US$/ CFA = 450**[7]. The discount rate used for the assessment were provided by the statistical department of the BCEAO and recorded in the table below.

Table: Discount rate

Dates	22 March 2004 to 23 August 2006	24 August 2006 to 15 August 2008	16 August 2008 to 15 June 2009	16 June 2009 to date
Rate	4,50	4,75	6,75	6,25

Source: BCEAO

According to the proposed methodology, I&FF identified are translated into US$ at 2005 constant. To do this, the figures are adjusted using price indices (CPI) Togo (see table).

Table: Harmonised Indices of Consumer Prices (HICP) for Togo and the exchange rate during 2000-2009

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
IHPC	87,97	91,41	94,21	93,33	93,69	100,00	102,28	103,27	112,29	114,41

Source: BCEAO

a) Cost Convertion to current constant costs

Figures I&FF are first corrected by the technique of 'deflation', that is to say, the value adjusted current cost of a given year, determined by the Harmonised Index of Consumer Prices (IHPC) (2005 = 100) corresponding to this year. For example, if in 2007 has a flow, current cost, a value of 1500, this value must be divided by the IHPC (2005 = 100) for the year 2007 (103.27) and multiplied by 100. The result is that the 1500 current cost correspond to 1452.44 constant costs.

b) Convertion constant costs in US$

Once all amounts in constant 2005 costs (in this example 1452.44), the values are divided by the dollar exchange rate adopted for 2005 (i.e. by 450) for constant 2005 dollars as result. In our example, the result would be a value of 3, 27 US$.

c) Conversion of current US$ in constant dollars

If the numbers of I&FF obtained from one source are listed in US$ today, to make the necessary correction to express them in constant 2005 US$ will adjust the actual value in US$ by the IPHC US (2005 = 100). For example, if we, in 2006, a flow of investment in current dollars of 1000, this figure would be divided by 102.5 (eg US CPI), then multiplied by 100. The result is that 1000 US$ correspond to 975.22 constant 2005 US$.

d) Updating I&FF in constant US$ of the reference year 2005.

[7] Source: By convention sector teams have an average vacancy rate of 450 CFA francs / US$ 1 for the base year

To actualize the data, the discount rate used was 4.5%. This is the rate used by public entities in Togo who run the period from March 22, 2004 to August 23, 2006. Since the revision of this rate by the central bank has intervened in August 2008, it is valid for 2007. The discount rate is applied to I&FF in US$ constant 2005 and 2005 is used for the update.

2.2.2. Analytical Approach

All data on I&FF in national currency has been obtained from existing documentation on the projects funded and implemented in the agriculture and environment. Some investigations with business organizations, civil society, nongovernmental organizations and government entities in the agriculture sector have been organized.

The data obtained from households, businesses and government agencies have been compiled in Excel spreadsheets "historical I&FF" and "Costs of scenario" envisaged in the UNDP reporting guidelines.

In the compilation process, the difficulties are threefold:

- missing historical data from 2000 to 2005
- lack of information on the contribution of households and businesses to investment activities and financial flows identified
- The level of aggregation that does not allow to clearly identify the separate I&FF of the activities.

For the interpolation of missing data, the assumption adopted is the minimum number of the series of entity flows.

Regarding the lack of information on the contribution of certain entities to flow, we relied on common practices observed in the financing of agricultural projects and rural development. For households in these contributions are of the order of 6-20% depending on the projects. For this assessment, the rate of 10% was retained. Indicative ratios have been obtained for the consideration of companies through surveys of major NGOs involved in agriculture.

As regards foreign direct investment, their estimates are based on assumptions provided by the Central Bank of the States of West Africa (BCEAO) in the period 2000-2009. For the three different entities (households, businesses and government), the values are summed.

The analytical method used to project historical data to 2030 is to make an assumption perhaps suggested by Figure 1 on the functional form. Once this functional form determined, we made an adjustment of the function considered by applying the principle of least squares. The interest of the analytical method is to obtain an equation of the trend, which can be used to make predictions.[8] When the growth rate obtained by smoothing by the method of least squares is abnormally high (based on the knowledge we have of the sector), we applied the method of moving average calculation to determine the growth rate to be applied to estimates flows.

2.2.3. Historical data on I&FF and O&M costs and subsidies

Historical data I&FF and O&M costs were collected over the period 2000-2009. Data for 2006-2009 were collected to serve as a basis for the projections from 2006 to 2030.

Several sources were used in data collection, the most important are:

- The development of the national budget and the budget adopted in the agricultural sector for the period 2000-2009

[8] Of course it would have been more useful to calculate the average growth rate over the historical period. This is one of the easiest approaches, but since it implies a growth rate of static, it might not be very accurate over periods longe

- The development of public expenditure and expenditure of the agricultural sector from 1990 to 2009
- Changes in operating costs in the agricultural sector from 1990 to 2009
- Changing forecasts of capital expenditure in the agricultural sector by type of expense
- The distribution of public expenditure between national spending and external assistance
- Priority Action Programme (PAP) of the agricultural sector which is the plan of operationalization of the Strategic Document for Poverty Reduction (PRSP-C) for 2009-2015
- Investment projections of the State contained in the 2009-2015 National Program for Agricultural Investment and Food Security (PNIASA)
- National Programme for Food Security (NPFS)
- Estimates of investment and indicative costs of adaptation measures contained in the report national reflection on the key sectors of agriculture including livestock
- Document the Initial National Communication
- the socio-economic data from the document of National Action Plan for Adaptation to Climate Change (NAPA)
- Statistical data on the exchange rate, index of consumer prices and the discount rate the statistical department of the Central Bank of the States of West Africa (BCEAO)
- Etc.

As regards foreign direct investment, their estimates are based on assumptions provided by the BCEAO in the period 2000 -2009.

For the three different entities (households, businesses and government), the values are summed.

The data for the government entity were collected mainly for the period 2000-2009 for which data are available, as other entities, including households and businesses estimates were made through direct consultations with some state structures[9] and private (NGO development in the agricultural sector[10]) through a questionnaire that was sent.

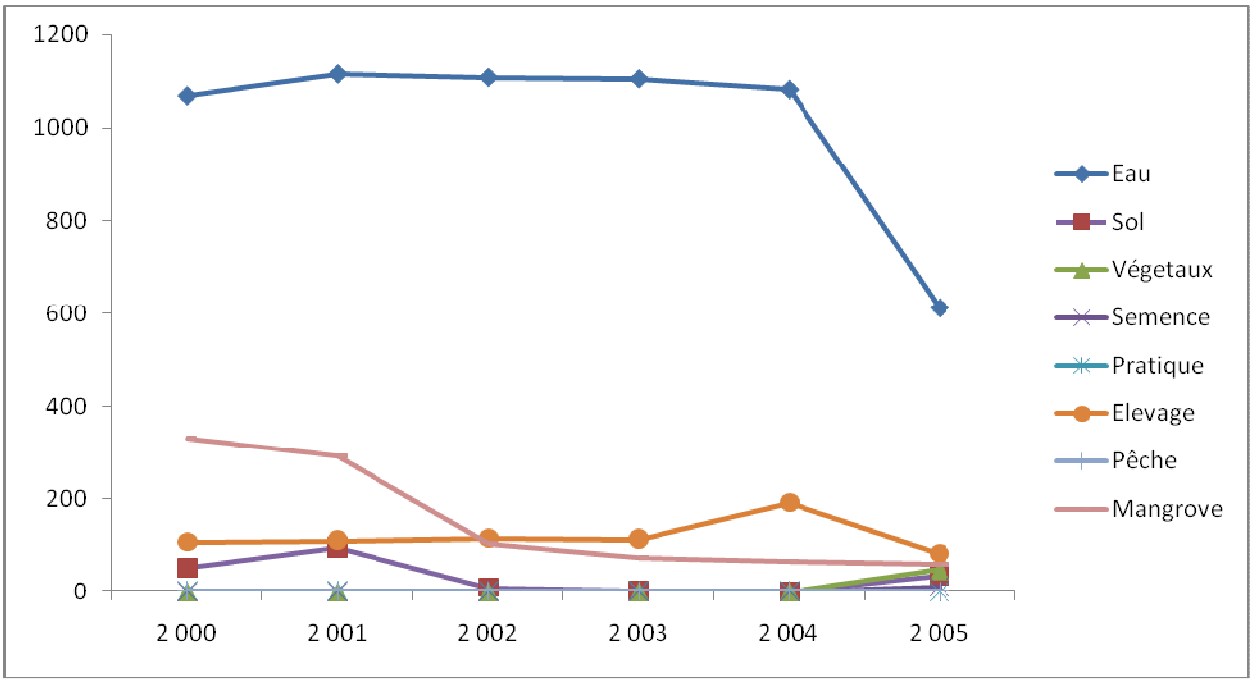
Of the identified activities, investments focused on water management, improved soil quality and protection, plant protection, management of grazing areas, development of breeding species more resistant to climatic conditions and management of mangroves. Funds invested in these activities have enabled the purchase of agricultural equipment (tractors, cultivators, combines, sprayers, etc.) Construction and rehabilitation of hydro agricultural store construction, construction of drying yards of agricultural products The fragmentation of irrigated areas, proliferation of progenitors, reforestation, planting of mangroves, etc.

A review of flows on the reference period (2000-2005) reveals a consistent programming in the water management (Figure 1), with nearly three quarters of investments whose assets acquired are still operating.

[9] Ministry of Agriculture, Livestock and Fisheries (MAEP), Minestère of Economy and Finance (MOEF), Ministry of Environment and Forest Resources (MERF), Ministry of Cooperation, Development and Spatial Planning (MCDAT).

[10] NGOs consulted: RAFIA in the Savannah Region, and AVOTODE ATPH respectively in the prefectures of Lakes and Hail in the Maritime region.

Figure 1 : Evolution of Investment Flows for the period 2000-200 (thousands of US$)

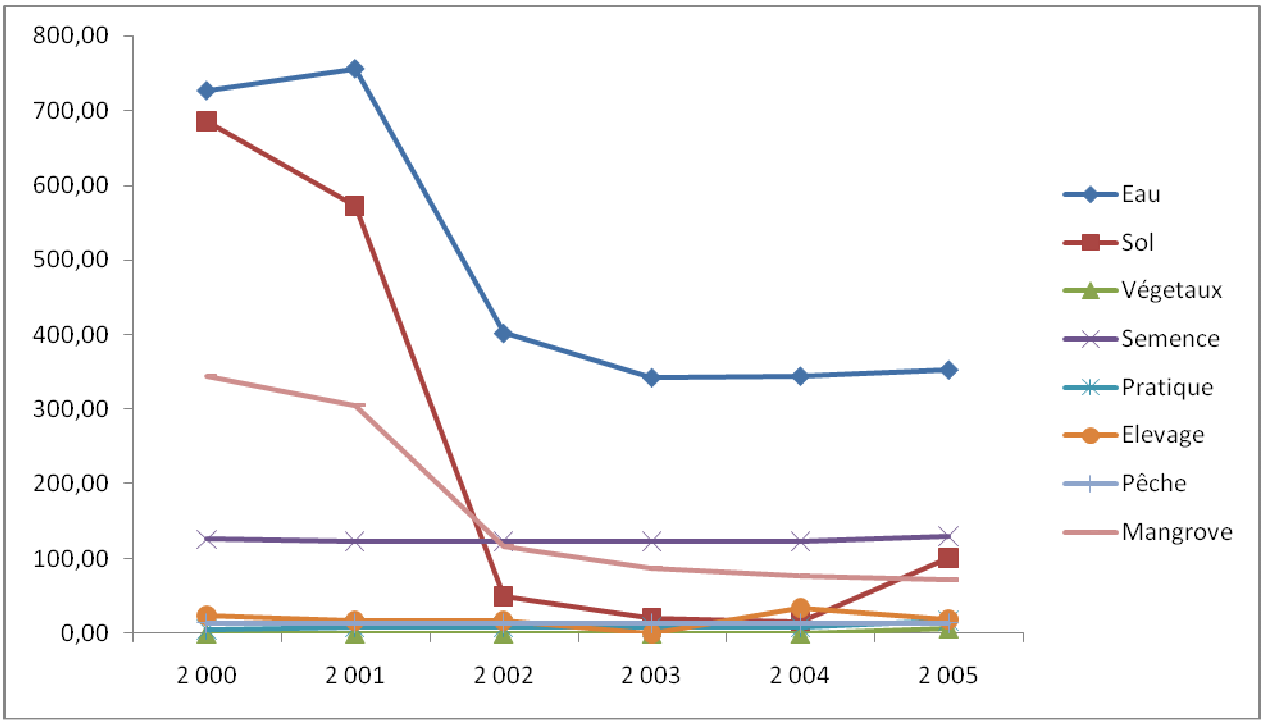


Source: Results of assessment

In the period 2000-2005 the investment flows have remained almost stationary and low between 100 and 400 thousand dollars for the entire operation of adjusting deductions except for water management activities, whose level is relatively high (around 1.2 million dollars) due to the implementation of certain projects.[11] Nevertheless, the period 2005-2006 experienced a drastic decline due to the political situation characterized by the suspension of the subsidy of most agricultural water management projects (Project Organization and Development in the Maritime region Villageaois (PODV) with support of the International Fund for Agricultural Development (IFAD), Spatial lowland with the support of the European Union, etc.).

[11] These projects include the PODV the proposed Arrangement lowland with support from the EU etc.

Figure 2: Evolution of Financial Flows for the period 2000-200 (thousands of US$)



Source: Results of assesssment

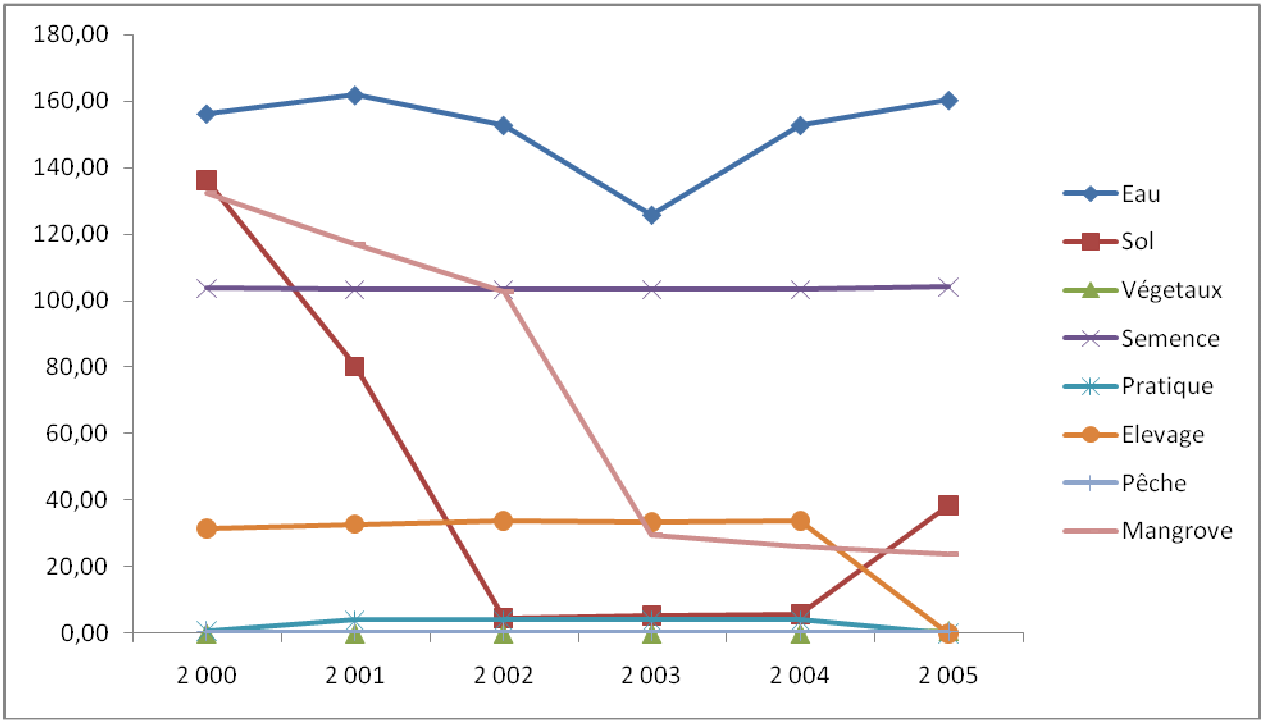
Analysis of the Financial Flows for the period under review shows an overall significant decline in financial flows. There is a drastic decrease in capital investments in the activities of water management, conservation and restoration of soil quality (amendments , water conservation and soil, soil fertility) and the development of mangroves.Quant other sectors are financial flows remained almost constant.

For activities of water management and soil conservation, the consideration of the state has been reduced significantly due to the suspension of the commitments of Bretton Woods instititions and multilateral partners. This was followed by a complete breakdown of cooperation with these institutions in 2005.

For sub-sectors of fisheries, soil protection and management of mangroves, the reported I&FF are the work of NGOs, households and some technical partners[12] who are active in this field.

[12] IFDC: International Development Center Fertilising

Figure 3: Evolution of operations and maintenance activities for the period 2000-2005 (thousands of US$)



Source: Results of assessment

Generally, operating costs remain low and exploitaion with a ceiling of US$ 200 000. These flows as for I&FF are more significant for the water management activities with an average annual US$ 150,000. Tandisque for other activities such costs are below US$ 100,000.

Table 1: Historical Flow of Investments 2000-2005

Activities	Amount (in million US$)	Percentage
Water management	6,09	75,93%
conservation and restoration of soil quality	0,20	2,43%
Crop Protection	0,05	0,59%
Production of improved seeds	0,01	0,14%
Improved farming practices	0,02	0,19%
Development of livestock species more resistant	0,72	9,01%
Development of aquaculture (fishing and aquaculture)	0,01	0,12%
Mangrove management	0,93	11,58%
Total	8,02	100%

Sources: Result of assessment

We find that the water management uses almost three quarters of investments (76%). Investments to improve soil quality, farming and mangroves varies between 2% and 11%, while fishing, crop protection, improved agricultural practices and improved seeds are each less 1% of investments (see Table 1).

Table 2 presents data for the base year. The distribution of these funds according to sources on the historical period is found in Annex 1.

Table 1: Investment and Financial Flows for the year 2005 reference in million US$

Entities /Activities	Water management (irrigation, hydro farm, etc.)		Production of improved seeds		Improving Soil Quality (Amendment soil conservation & fertility) and Emergency Information System		Upgrading agro meteorological and timing of crop calendars		Plant protection	
	IF	FF	IF	FF	IF	FF	IF	FF	IF	FF
Households										
Domestic										
Equity & debt	0,032873	0,001320	0,000000	0,004887	0,000000	0,003298	0,000000	0,000000	0,000000	0,001564
Total household funds	0,032873	0,001320	0,000000	0,004887	0,000000	0,003298	0,000000	0,000000	0,000000	0,001564
Enterprises										
Domestic										
Domestic equity	0,032864	0,004621	0,000000	0,000000	0,000000	0,011544	0,000000	0,000000	0,000000	0,005474
Domestic borrowing	0,033751	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Total domestic sources	0,066615	0,004621	0,000000	0,000000	0,000000	0,011544	0,000000	0,000000	0,000000	0,005474
Foreign										
FDI	0,034662	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Foreign borrowing	0,035598	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
ODA	0,036559	0,000000	0,000000	0,004887	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Total foreign sources	0,106819	0,000000	0,000000	0,004887	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Total corporation funds	0,173434	0,004621	0,000000	0,004887	0,000000	0,011544	0,000000	0,000000	0,000000	0,005474
Government entities										
Domestic										
Domestic funds	0,027528	0,155992	0,000000	0,150526	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Foreign										
Foreign borrowing	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Bilateral ODA	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Multilateral ODA	2,300454	0,492231	0,000000	0,000000	0,586467	0,164915	0,000000	0,000000	0,586467	0,078196
Total foreign sources	2,300454	0,492231	0,000000	0,000000	0,586467	0,164915	0,000000	0,000000	0,586467	0,078196
Total government funds	2,327982	0,648223	0,000000	0,150526	0,586467	0,164915	0,000000	0,000000	0,586467	0,078196
Total Funds	2,534289	0,654164	0,000000	0,160301	0,586467	0,179757	0,000000	0,000000	0,586467	0,085233

Entities / Activities	Improved farming practices		Livestock Development species better resistant to climate conditions		Epidemio-surveillance		development of fish farming (aquaculture and fisheries)		Management of Mangroves	
	IF	FF	IF	FF	IF	FF	IF	FF	IF	FF
Households										
Domestic										
Equity & debt	0,000000	0,000370	0,000000	0,008488	0,000000	0,000000	0,000000	0,000000	0,001828	0,001828
Total household funds	0,000000	0,000370	0,000000	0,008488	0,000000	0,000000	0,000000	0,000000	0,001828	0,001828
Enterprises										
Domestic										
Domestic equity	0,000000	0,001294	0,000000	0,029707	0,000000	0,000000	0,000000	0,000000	0,009141	0,009141
Domestic borrowing	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Total domestic sources	0,000000	0,001294	0,000000	0,029707	0,000000	0,000000	0,000000	0,000000	0,009141	0,009141
Foreign										
FDI	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Foreign borrowing	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
ODA	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Total foreign sources	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Total corporation funds	0,000000	0,001294	0,000000	0,029707	0,000000	0,000000	0,000000	0,000000	0,009141	0,009141
Government entities										
Domestic										
Domestic funds	0,000000	0,000000	0,000000	0,018581	0,000000	0,000000	0,000000	0,016251	0,000000	0,016251
Foreign										
Foreign borrowing	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Bilateral ODA	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
Multilateral ODA	0,000000	0,018484	0,309690	0,424390	0,000000	0,000000	0,000000	0,000000	0,060940	0,060940
Total foreign sources	0,000000	0,018484	0,309690	0,424390	0,000000	0,000000	0,000000	0,000000	0,060940	0,060940
Total government funds	0,000000	0,018484	0,309690	0,442971	0,000000	0,000000	0,000000	0,016251	0,060940	0,077191
Total Funds	0,000000	0,020147	0,309690	0,481167	0,000000	0,000000	0,000000	0,016251	0,071909	0,088160

2.2.4. Baseline Scenario

The baseline scenario describes the conditions of the status quo. In this respect, it reflects the continuation of the historical trend of achieving the investment and financial flows throughout the period used for the assessment (2005-2030).

Based on data available at the Directorate General of Statistics and National Accounts (DGSCN), the Togolese population is estimated at 5,512,000 inhabitants in 2005, against 4.635 million inhabitants in 2000, annual growth rate 2.4%.

The population projection made on the period 2005-2030 reveals that the total population would reach Togolese: (i) 2015, 6,607,000 inhabitants, 45, 8% live in urban areas, (ii) in 2030 , 9.43 million people with 56.1% of it that lives in urban areas, and (iii) in 2050, 14,012,000 inhabitants, of which 7 of 10 would be urban.

Table 3: Demographics 2000-2030

Year	Number of inhabitants
2000	4 629 000
2001	4 740 000
2002	4 854 000
2003	4 970 000
2004	5 090 000
2005	5 212 000
2006	5 337 088
2007	5 465 178
2010	5 868 190
2015	6 606 995
2030	9 429 818

Source: Initial National Communication, 2001

The macroeconomic framework is characterized by a Gross Domestic Product (GDP) in current francs, which rose from 921.4 billion CFA francs in 2000 to 1 118.3 billion CFA francs in 2007, representing an annual increase of 3 6%. The growth rate of real GDP (in constant francs) is 1.1% on average over the period 1995-2005 and 1.5% from 2005 to 2007. This low rate of growth is not sufficient to reduce poverty, in terms of population growth rate estimated at 2.4% per year. Real GDP per capita has decreased by 1.3% on average over the period 1995-2000 and 0.9% between 2005 and 2007, however, in 2006, Togo has initiated a modest economic recovery with GDP growth real 4.6, driven by services related to regional trade, which helped offset the slowdown in growth caused by the crisis in the cotton sector.

The baseline scenario assumes the following assumptions on socio-economic developments GDP growth of 6.5% per year by 2015 and 7.3% between 2015 and 2020.

Table 4: Growth rate of sectors in percentage

	2005-2007	2008	2009	2010	2011
Primary Industries	1,9	2,9	2,3	3,1	5,4
Farming	1,3	3,1	2,4	3	6
Livestock, Forestry and Fishing	3,7	2,9	2	3,5	4
Secondary Sector	3,9	0,8	2,8	4,5	3,4
Extractive Industries	-7,2	-0,6	-2	7,2	8,1
Manufacturing Industries	7,9	5	-1	2,5	2,5
Buildings and Public Works	11,1	0,9	20	9	2,5
Electricity, water and gas	2,6	-11	3	2,5	2,5

Tertiary Sector	0,7	-0,1	0,9	3	3,5
Tertiary merchant	0,6	0,4	0,9	2,6	3,5
Trade	3,5	-0,5	1	2	3,5
Transport, Storage and Communications	1,4	1,7	1	3,5	3,5
Banks and Insurance	-17,3	14,2	1	3	3,5
Other	-7,7	0	0,2	3	3,5
Tertiary non-market	0,9	-1,3	1	3,8	3,5
GDP	2,4	1,1	1,7	3,3	4,1

Source: Autorités Togolaises - FMI, 25 février 2009 (DSRP-C)

Togo is dependent on foreign assistance to finance much of its public investment program. Traditionally, 80% of public investment is financed by external resources consist of grants and loans on concessional terms. Due to the suspension of donor support since the early 90s, the level of public investment rose by 13.8% of GDP in 1990 to 3.3% of GDP in 2005, after reaching a low of 1.1% in 2003. This trend of declining public investment reduced the capacity of the country and slowed economic growth.

For each set of raw data on I&FF past trends has identified an average annual growth rate (Table 2) based on linear smoothing with the method of ordinary least squares. The rate thus obtained is applied to establish the projection for 2005-2030.

Table 5: Annual growth rate estimated from historical data as a percentage

Activities	Growth rate	
	IF	FF
Water management (irrigation, hydro agricultural, etc.)	2,7	0,5
Production of improved seeds	0,10	0,01
Improving Soil Quality and Protection	1,50	-2,9
Improved Agro Meteorological Information System and timing of crop calendars	0,1	0,01
Plant Protection	1, 20	0,10
Improved farming practices	0,10	0,10
Development of livestock species more resistant to weather	2,00	3,3
Epidemio-surveillance	0,10	0,01
Development of fisheries and aquaculture	2,00	0,06
Mangrove management	1,00	1,0

Source: Results of assessment

Based Destal growth thus generated pass Investment Flows (Table 6):

- For the water management 2.3 million in 2005 to 3.2 million in 2015 and $ 4.8 million in 2030
- For the fishing and aquaculture almost 0 2005-0690000 dollars in 2015 to 0.72 million in 2030
- For breeding species more resistant to climatic conditions of 0.31 million in 2005 to 1,060,000 dollars in 2015 to 1.42 million in 2030.

The estimated annual amounts of I&FF and O&M costs by type of investment per annum for the scenario based on the assessment period (2005-2030) is presented in Annex 2. When the cumulative data for each type of activity and different entities, they are recorded for the baseline scenario are in Table 7.

Table 6: Projected Investment and Financial Flows for the years 2015 and 2030 under the baseline scenario in millions of US$

Activities / Years	Reference year (2005)			Year 2015			Year 2030		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Water management (irrigation, hydro agricultural, etc.).	2,300454	0,492231	0,103412	3,230501	0,967440	0,241860	4,817553	1,051233	0,262808
Production of improved seeds	0,000000	0,000000	0,000000	0,266283	0,884001	0,264230	0,270305	0,885328	0,268204
Improving Soil Quality and Protection	0,047406	0,166699	0,547971	1,954157	0,730623	0,182656	2,443150	0,469874	0,117469
Improved Agro Meteorological Information System and timing of crop calendars	0,000000	0,000000	0,000000	1,000000	0,035000	0,000350	1,000000	0,035000	0,000350
Plant Protection	0,586467	0,085233	0,007976	2,670196	0,251572	0,161344	3,193382	0,255372	0,163781
Improved farming practices	0,000000	0,020147	0,000000	0,325071	0,896174	0,172294	0,299697	0,899660	0,174896
Development of livestock species more resistant to weather	0,309690	0,481167	0,000000	1,056915	1,608059	0,174952	1,422468	2,617018	0,179279
Epidemio-surveillance	0,000000	0,000000	0,000000	0,559020	0,838529	0,143556	0,559020	0,838529	0,143556
Development of fisheries and aquaculture	0,000000	0,016251	0,000000	0,698677	0,371347	0,092837	0,725048	0,374263	0,093566
Mangrove management	0,071909	0,088160	0,028764	0,677515	0,667470	0,166868	0,786574	0,774912	0,193728

Source: Results of assessment

Table 7: Estimates of the cumulative amounts discounted I&FF and O&M costs for the baseline scenario in million US$ (2005-2030)

Entities / Activities	Water management (irrigation, hydro farm, etc.)			Production of improved seeds			Improving Soil Quality (Amendment soil conservation & fertility) and Emergency Information System			Upgrading agro meteorological and timing of crop calendars			Plant Protection		
	IF	FF	O&M	IF	FF	O&M	IF	FF	O&M	IF	FF	O&M	IF	FF	O&M
Households															
Domestic															
Equity & debt	1.090136	0.035344	0.008404	0.551696	0.126225	0.029504	3.103666	0.067924	0.014916	0.000000	0.000000	0.000000	5.115883	0.039689	0.009570
Total household funds	1.090136	0.035344	0.008404	0.551696	0.126225	0.029504	3.103666	0.067924	0.014916	0.000000	0.000000	0.000000	5.115883	0.039689	0.009570
Enterprises															
Domestic															
Domestic equity	1.089813	0.214408	0.052090	0.551696	2.435641	0.441841	3.187465	0.237734	0.047523	0.000000	0.000000	0.000000	5.241364	0.138911	0.441841
Domestic borrowing	1.119241	1.029347	0.257337	0.566579	2.501401	0.441841	3.273524	1.609785	0.402446	0.000000	0.000000	0.000000	3.168992	0.503792	0.441841
Total domestic sources	2.209054	1.243755	0.309427	1.118276	4.937043	0.883682	6.460989	1.847519	0.449969	0.000000	0.000000	0.000000	8.410356	0.642703	0.883682
Foreign															
FDI	1.149437	1.057138	0.264285	0.581881	2.568935	0.441841	3.452693	1.653249	0.413312	0.000000	0.000000	0.000000	5.528216	0.517396	0.441841
Foreign borrowing	1.180476	1.085682	0.271420	0.597601	2.638310	0.441841	3.545912	1.697883	0.424471	0.000000	0.000000	0.000000	5.677482	0.531372	0.441841
ODA	1.212344	1.114996	0.278749	0.634401	0.129549	0.026213	3.641635	1.743722	0.435930	0.000000	0.000000	0.000000	5.830773	0.545720	0.441841
Total foreign sources	3.542258	3.257816	0.814454	1.813883	5.336793	0.909895	10.640240	5.094854	1.273713	0.000000	0.000000	0.000000	17.036471	1.594487	1.325522
Total corporation funds	5.751312	4.501572	1.123881	2.932159	10.273836	1.793576	17.101229	6.942373	1.723682	0.000000	0.000000	0.000000	25.446827	2.237190	2.209204
Government entities															
Domestic															
Domestic funds	0.912865	4.149597	1.287726	0.630298	3.917845	3.339091	3.739972	1.790798	0.447699	0.000000	0.000000	0.000000	5.988195	0.560440	0.441841
Foreign															
Foreign borrowing	1.207537	1.176018	0.294004	0.664784	2.857833	0.441841	3.840950	1.839163	0.459791	0.000000	0.000000	0.000000	6.149878	0.575579	0.441841
Bilateral ODA	1.240136	1.207771	0.301943	0.682737	0.632459	0.441841	3.944651	1.929856	0.482464	0.000000	0.000000	0.000000	6.315928	0.591113	0.441841
Multilateral ODA	77.938491	13.011993	3.249622	0.701178	3.014244	0.441841	17.384561	3.618175	0.790588	22.000000	0.770000	0.007700	16.844926	1.984450	0.198445
Total foreign sources	80.386164	15.395781	3.845569	2.048700	6.504537	1.325522	25.170163	7.387194	1.732843	22.000000	0.770000	0.007700	29.310732	3.151142	1.082127
Total government funds	81.299029	19.545378	5.133295	2.678997	10.422382	4.664614	28.910135	9.177992	2.180543	22.000000	0.770000	0.007700	35.298926	3.711582	1.523967
Total Funds	88.140476	24.082294	6.265580	6.162853	20.822443	6.487694	49.115031	16.188289	3.919140	22.000000	0.770000	0.007700	65.861636	5.988461	3.742742

Table 7 (continued): Estimates of the cumulative amounts discounted I&FF and O&M costs for the baseline scenario in millions of US$ (2005-2030)

Entities / Activities	Improved farming practices			Development of livestock species more resistant to weather			Epidemio-surveillance			Development of aquaculture (fishing and aquaculture)			Mangrove management		
	IF	FF	O&M	IF	FF	O&M	IF	FF	O&M	IF	FF	O&M	IF	FF	O&M
Households															
Domestic															
Equity & debt	0.720898	0.009714	0.002151	1.214575	0.304480	0.073738	0.000000	0.000000	0.000000	1.959232	0.860039	0.215741	0.052969	0.052969	0.014065
Total household funds	0.720898	0.009714	0.002151	1.214575	0.304480	0.073738	0.000000	0.000000	0.000000	1.959232	0.860039	0.215741	0.052969	0.052969	0.014065
Enterprises															
Domestic															
Domestic equity	0.740362	0.034000	0.441841	1.247372	1.065680	0.441841	0.000000	0.000000	0.000000	1.600020	0.823896	0.205974			
Domestic borrowing	0.760362	12.263641	0.441841	1.281902	2.441426	0.441841	0.000000	0.000000	0.000000	1.643231	0.846136	0.211534	1.894211	2.117069	0.529267
Total domestic sources	1.500724	12.297641	0.883682	2.529273	3.507106	0.883682	0.000000	0.000000	0.000000	3.243251	1.670032	0.417508	2.159058	2.381915	0.599592
Foreign															
FDI	0.780872	1.259479	0.441841	1.315648	2.507326	0.441841	0.000000	0.000000	0.000000	1.687592	0.868973	0.217243	1.945361	2.174210	0.543553
Foreign borrowing	0.801964	1.293501	0.441841	1.351156	2.575044	0.441841	0.000000	0.000000	0.000000	1.733148	0.892453	0.223113	1.997874	2.232921	0.558230
ODA	0.436316	1.191619	0.441841	1.387645	2.644578	0.441841	0.000000	0.000000	0.000000	1.779945	0.916530	0.229133	2.051827	2.293225	0.573306
Total foreign sources	2.019153	3.744598	1.325522	4.054448	7.726948	1.325522	0.000000	0.000000	0.000000	5.200685	2.677956	0.669489	5.995061	6.700357	1.675089
Total corporation funds	3.519877	16.042239	2.209204	6.583722	11.234054	2.209204	0.000000	0.000000	0.000000	8.443936	4.347988	1.086997	8.154119	9.082272	2.274681
Government entities															
Domestic															
Domestic funds	0.845846	1.364288	0.441841	1.425114	0.709239	0.441841	0.000000	0.000000	0.000000	1.828006	0.422069	0.093329	2.107219	0.470838	0.105522
Foreign															
Foreign borrowing	0.868706	1.401124	0.441841	1.503111	2.789297	0.441841	0.000000	0.000000	0.000000	1.877355	0.966707	0.241677	2.164130	2.418721	0.604680
Bilateral ODA	0.892146	1.438959	0.441841	1.543696	2.864617	0.441841	0.000000	0.000000	0.000000	1.928059	0.992806	0.248202	2.222557	2.484015	0.621004
Multilateral ODA	0.485385	0.437555	0.441841	9.836052	15.224004	0.441841	12.298430	18.447645	3.158237	0.198012	1.019618	0.254904	1.765643	1.765643	0.468834
Total foreign sources	2.246236	3.277638	1.325522	12.882859	20.877918	1.325522	12.298430	18.447645	3.158237	4.003426	2.979132	0.744783	6.152330	6.668379	1.694518
Total government funds	3.092083	4.641926	1.767363	19.466581	32.142157	1.767363	12.298430	18.447645	3.158237	5.831432	3.401201	0.838112	8.259549	7.139217	1.800039
Total Funds	7.332858	20.693880	3.978719	27.264877	43.680691	4.050305	12.298430	18.447645	3.158237	16.234600	8.609228	2.140850	16.466638	16.274458	4.088786

Source: Results of assessment

2.2.5. Adaptation scenario

To allow agriculture to adapt to the adverse effects of climate change in Togo, a number of measures are promoted. They are:

- **Water management (irrigation, hydro farm, etc.):** It includes all activities of hydro agricultural water management for agricultural production. It includes the management of lowland irrigation activities it is basic or intense, collinear or depressions.
- **Production of improved seeds:** it all initiatives to develop and disseminate high-yielding crop varieties, disease resistant and resilient to climate change. These initiatives will take into account the multiplication and dissemination of seed of improved varieties of grains and tubers and other crops vulnerable to climate change.
- **Improvement of soil quality (soil conservation amendment, soil fertility) and Protection:** Here we will discuss the rational use of land resources to reduce its degradation by using techniques and practices of sustainable land management. The development activities include actions to defend and restore soil, soil water conservation and integrated management of soil fertility.
- **Improvement of agro meteorological information and timing of crop calendars:** It is essential that the adaptation measures take into account access to information and agro-weather dissemination of cultural practices and more resilient. The climate risk management must also be located downstream to allow players to predict the difficult conditions and minimize risk. These activities relate to the prediction of climatic hazards that may occur during the growing season, the revision of sowing dates and the redeployment of other activities accordingly. These measures are from the capacity building of agro meteorological stations to the extension service (advisory support) and peasants.
- **Plant protection:** This includes measures to promote the fight against the emergence of new diseases or the proliferation or rapid spread of old diseases because of climate change. It will also be the question to diagnose these diseases and provide effective coping methods.
- **Improved cultural practices:** With climate change, it is essential to promote practices that are resilient endogenous or it is necessary to import them. In all cases, the advisory agencies will take care of recycling agricultural players more protection methodologies and adapted to agricultural ecosystems because of their fragility.
- **Epidemio-surveillance and livestock development of more resistant species to climatic conditions:** The set of activities to select animal species that best adapt to climate characterized by the scarcity of good quality forage (less digestible) and the upsurge of waterborne diseases and diseases due to heat. There will be no question of providing adequate prophylactic programs and develop a program of animal breeding.
- **Development of fish farming (Aquaculture and Fisheries):** In some regions (lowland areas), the development of fishponds will be a solution for the diversification of activities and efficient use of rainwater. This has the advantages to channel and store rainwater and to reuse it to avoid flooding but also to diversify the products in the context of climate change.
- **Management of Mangroves:** This measure aims to replant mangroves for the production of firewood in the context of the struggle against the scarcity of wood. This activity will lead to other activities related to harvesting of fish products such as crabs and shrimp.

These adaptations have been chosen after consultation with the various policy documents plans, strategies and programs of agriculture and resources developed through adaptation to climate change. This is the note of Agricultural Policy developed in 2006, the Recovery Strategy for Agricultural Production (AFS), adopted in 2008, the National Agricultural Investment for Food Security (PNIASA) developed in 2009, the National Strategy Conservation and sustainable use of mangroves developed in 2006, the National Action Plan for Adaptation to Climate Change, adopted in September 2009, the Full Document Reduction Strategy Paper (PRSP-C), adopted in 2008, Document of vulnerability assessments and adaptation of agriculture on behalf of the Second National Communication on Climate Change. These policies and programs including PNIASA and PRSP-C for end point 2015 and are subject to the time of mobilization of resources from technical and financial partners of Togo.

The adaptation scenario is based on an overall annual growth rate of investment in the agricultural sector estimated at 40% by 2015. This rate was obtained on the basis of a rate of 35% provided in the National Agricultural Investment Program for Food Security (PNIASA) for the next 5 years. It should help boost agricultural growth of 6%. Based on analysis of activities in the PNIASA, there should be an additional rate of 5% to take into account other adaptation activities including agro-meteorological information and the timing of cropping calendars, management of mangroves, etc. For the period 2015 - 2030, in the absence of document long-term planning in the sector, it was decided to apply for each activity the growth rate obtained on the basis of historical data.

Projections of annual values of investment and financial flows for each accommodation are included in table 9. These estimates combined for each type of activity for the periods 2005-2015 and 2016-2030 are shown in Table 10.

Table 8: Adaptation scenario: Estimates of annual amounts of I&FF and O&M costs by type of activity in US$ million

Year / Activities	Water management (irrigation, hydro agricultural, etc.)			Production of improved seeds			Improving soil quality (soil conservation amendment, soil fertility) and Emergency			Improved Agro Meteorological Information System and timing of crop calendars			Plant protection		
	IF	FF	O&M Costs	IF	FF	O&M Costs	IF	FF	O&M Costs	IF	FF	O&M Costs	IF	FF	O&M Costs
2005	0,751788	0,433155	0,197122	0,013684	0,159714	0,127987	0,043985	0,123770	0,047406	0,000000	0,000000	0,000000	0,058647	0,008523	0,000938
2006	0,900668	0,231353	0,116664	0,000000	0,162256	0,129511	0,547971	0,660330	0,048805	0,000000	0,000000	0,000000	0,586467	0,085233	0,007976
2007	2,534289	0,654164	0,260889	0,000000	0,160301	0,128534	0,586467	0,179757	0,016821	0,000000	0,000000	0,000000	0,586467	0,085233	0,007976
2008	3,753226	1,210129	0,302532	0,370196	1,161281	0,290320	2,465047	1,188551	0,297138	0,000000	0,000000	0,000000	3,438806	0,329149	0,082287
2009	3,854563	1,216613	0,304153	0,370567	1,161398	0,290349	2,502022	1,154083	0,288521	1,026000	0,035910	0,000359	3,480072	0,329478	0,082370
2010	3,958637	1,223145	0,305786	0,370937	1,161514	0,290378	2,539553	1,120615	0,280154	1,026000	0,035910	0,000359	3,521832	0,329808	0,082452
2011	4,065520	1,229728	0,307432	0,371308	1,161630	0,290407	2,577646	1,088117	0,272029	1,026000	0,035910	0,000359	3,564094	0,330138	0,082534
2012	4,175289	1,236362	0,309091	0,371679	1,161746	0,290437	2,616311	1,056561	0,264140	1,026000	0,035910	0,000359	3,606864	0,330468	0,082617
2013	4,288022	1,243048	0,310762	0,372051	1,161862	0,290466	2,655555	1,025921	0,256480	1,026000	0,035910	0,000359	3,650146	0,330798	0,082700
2014	4,403798	1,249788	0,312447	0,372423	1,161978	0,290495	2,695389	0,996169	0,249042	1,026000	0,035910	0,000359	3,693948	0,331129	0,082782
2015	4,522701	1,256583	0,314146	0,372796	1,162095	0,290524	2,735820	0,967281	0,241820	1,026000	0,035910	0,000359	3,738275	0,331460	0,082865
2016	4,644814	1,192497	0,298124	0,373168	1,162211	0,290813	2,776857	0,939229	0,234807	1,026000	0,035910	0,000359	3,783134	0,331792	0,082948
2017	4,770224	1,198998	0,299750	0,373542	1,162327	0,291102	2,818510	0,911992	0,227998	1,026000	0,035910	0,000359	3,828532	0,332123	0,083031
2018	4,899020	1,205554	0,301389	0,373915	1,162443	0,291391	2,860787	0,885544	0,221386	1,026000	0,035910	0,000359	3,874474	0,332455	0,083114
2019	5,031293	1,212166	0,303041	0,374289	1,162560	0,291681	2,903699	0,859863	0,214966	1,026000	0,035910	0,000359	3,920968	0,332788	0,083197
2020	5,167138	1,218835	0,304709	0,374663	1,162676	0,291971	2,947255	0,834927	0,208732	1,026000	0,035910	0,000359	3,968020	0,333121	0,083280
2021	5,306651	1,225563	0,306391	0,375038	1,162792	0,292262	2,991463	0,810714	0,202679	1,026000	0,035910	0,000359	4,015636	0,333454	0,083363
2022	5,449931	1,232351	0,308088	0,375413	1,162908	0,292553	3,036335	0,787204	0,196801	1,026000	0,035910	0,000359	4,063824	0,333787	0,083447
2023	5,597079	1,239202	0,309800	0,375788	1,163025	0,292844	3,081880	0,764375	0,191094	1,026000	0,035910	0,000359	4,112589	0,334121	0,083530
2024	5,748200	1,246116	0,311529	0,376164	1,163141	0,293135	3,128109	0,742208	0,185552	1,026000	0,035910	0,000359	4,161941	0,334455	0,083614
2025	5,903401	1,253095	0,313274	0,376540	1,163257	0,293427	3,175030	0,720684	0,180171	1,026000	0,035910	0,000359	4,211884	0,334790	0,083697
2026	6,062793	1,260143	0,315036	0,376917	1,163374	0,293718	3,222656	0,699784	0,174946	1,026000	0,035910	0,000359	4,262426	0,335124	0,083781
2027	6,226488	1,267259	0,316815	0,377294	1,163490	0,294011	3,270996	0,679490	0,169873	1,026000	0,035910	0,000359	4,313576	0,335460	0,083865
2028	6,394604	1,274447	0,318612	0,377671	1,163606	0,294303	3,320061	0,659785	0,164946	1,026000	0,035910	0,000359	4,365338	0,335795	0,083949
2029	6,567258	1,281709	0,320427	0,378049	1,163723	0,294596	3,369861	0,640651	0,160163	1,026000	0,035910	0,000359	4,417723	0,336131	0,084033
2030	6,744574	1,289047	0,322262	0,378427	1,163839	0,294889	3,420409	0,622072	0,155518	1,026000	0,035910	0,000359	4,470735	0,336467	0,084117

Source: Results of assessment

Table 8 (continued): Adaptation scenario: Estimates of annual amounts of I&FF and O&M costs by type of activity in US$ million

Year / Activities	Improved farming practices			Development of livestock species more resistant to weather			Epidemio-surveillance			Development of aquaculture (fishing and aquaculture)			Mangrove management		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
2005	0,000000	0,020147	0,000000	0,101933	0,022222	0,000000	0,000000	0,000000	0,000000	0,002031	0,017063	0,000569	0,073941	0,088972	0,029332
2006	0,000000	0,020147	0,000000	0,312772	0,079403	0,000000	0,000000	0,000000	0,000000	0,002031	0,017063	0,000569	0,073941	0,088972	0,029332
2007	0,000000	0,020147	0,000000	0,309690	0,481167	0,000000	0,000000	0,000000	0,000000	0,000000	0,016251	0,000000	0,071909	0,088160	0,028764
2008	0,490713	1,166638	0,291659	1,037776	1,271585	0,317896	0,000000	0,000000	0,000000	0,964404	0,496718	0,124179	0,884702	0,830646	0,207661
2009	0,484500	1,166770	0,291693	1,058532	1,313547	0,328387	0,657966	0,986949	0,168966	0,966250	0,496966	0,124242	0,893549	0,838952	0,209738
2010	0,478703	1,166912	0,291728	1,079703	1,356894	0,339224	0,657966	0,986949	0,168966	0,968133	0,497216	0,124304	0,902485	0,847342	0,211835
2011	0,473296	1,167063	0,291766	1,101297	1,401672	0,350418	0,657966	0,986949	0,168966	0,970056	0,497469	0,124367	0,911510	0,855815	0,213954
2012	0,468255	1,167224	0,291806	1,123323	1,447927	0,361982	0,657966	0,986949	0,168966	0,972018	0,497722	0,124431	0,920625	0,864373	0,216093
2013	0,463556	1,167393	0,291848	1,145789	1,495709	0,373927	0,657966	0,986949	0,168966	0,974020	0,497978	0,124495	0,929831	0,873017	0,218254
2014	0,459177	1,167572	0,291893	1,168705	1,545067	0,386267	0,657966	0,986949	0,168966	0,976063	0,498235	0,124559	0,939129	0,881747	0,220437
2015	0,455100	1,167760	0,291940	1,192079	1,596054	0,399014	0,657966	0,986949	0,168966	0,978148	0,498495	0,124624	0,948521	0,890565	0,222641
2016	0,451304	1,167957	0,292232	1,509274	2,198059	0,399536	0,657966	0,986949	0,168966	0,980276	0,498756	0,124689	0,916260	0,856723	0,214181
2017	0,447772	1,168163	0,292524	1,539460	2,270595	0,400063	0,657966	0,986949	0,168966	0,982448	0,499019	0,124755	0,885096	0,824168	0,206042
2018	0,444488	1,168378	0,292817	1,570249	2,345525	0,400594	0,657966	0,986949	0,168966	0,984664	0,499284	0,124821	0,854993	0,792849	0,198212
2019	0,441435	1,168602	0,293110	1,601654	2,422927	0,401131	0,657966	0,986949	0,168966	0,986925	0,499550	0,124888	0,825913	0,762721	0,190680
2020	0,438600	1,168834	0,293403	1,633687	2,502884	0,401672	0,657966	0,986949	0,168966	0,989233	0,499819	0,124955	0,797823	0,733738	0,183434
2021	0,435968	1,169075	0,293696	1,666361	2,585479	0,402219	0,657966	0,986949	0,168966	0,991588	0,500089	0,125022	0,770688	0,705856	0,176464
2022	0,433527	1,169324	0,293990	1,699688	2,670800	0,402771	0,657966	0,986949	0,168966	0,993991	0,500362	0,125090	0,744475	0,679033	0,169758
2023	0,431265	1,169582	0,294284	1,733682	2,758936	0,403328	0,657966	0,986949	0,168966	0,996443	0,500636	0,125159	0,719155	0,653230	0,163307
2024	0,429170	1,169849	0,294578	1,768356	2,849981	0,403892	0,657966	0,986949	0,168966	0,998945	0,500912	0,125228	0,694695	0,628407	0,157102
2025	0,427233	1,170124	0,294873	1,803723	2,944031	0,404461	0,657966	0,986949	0,168966	1,001498	0,501190	0,125297	0,671068	0,604528	0,151132
2026	0,425443	1,170407	0,295168	1,839797	3,041184	0,405036	0,657966	0,986949	0,168966	1,004104	0,501470	0,125367	0,648244	0,581556	0,145389
2027	0,423790	1,170699	0,295463	1,876593	3,141543	0,405617	0,657966	0,986949	0,168966	1,006762	0,501752	0,125438	0,626197	0,559456	0,139864
2028	0,422267	1,170998	0,295758	1,914125	3,245214	0,406204	0,657966	0,986949	0,168966	1,009475	0,502036	0,125509	0,604899	0,538197	0,134549
2029	0,420865	1,171306	0,296054	1,952407	3,352306	0,406798	0,657966	0,986949	0,168966	1,012243	0,502322	0,125580	0,584326	0,517746	0,129436
2030	0,419576	1,171622	0,296350	1,991456	3,462932	0,407399	0,657966	0,986949	0,168966	1,015067	0,502610	0,125652	0,564452	0,498071	0,124518

Source: Results of assessment

Table 9: Estimates of the cumulative amount of discounted I&FF and O&M costs for the adaptation scenario in million US$

Year / Activities	Water management (irrigation, hydro agricultural, etc.)			Production of improved seeds			Improving soil quality (soil conservation amendment, soil fertility) and Emergency			Improved Agro Meteorological Information System and timing of crop calendars			Plant Protection		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Households															
Domestic															
Equity & debt	1,480142	0,043535	0,010884	0,772375	0,157558	0,039389	4,345133	0,076036	0,019009	0,000000	0,000000	0,000000	7,144995	0,050967	0,012742
Total household funds	1,480142	0,043535	0,010884	0,772375	0,157558	0,039389	4,345133	0,076036	0,019009	0,000000	0,000000	0,000000	7,144995	0,050967	0,012742
Enterprises															
Domestic															
Domestic equity	1,479729	0,263876	0,065969	0,772375	3,409898	0,856496	4,462452	0,266126	0,066532	0,000000	0,000000	0,000000	7,337909	0,178383	0,044596
Domestic borrowing	1,519685	1,268634	0,317158	0,793211	3,201794	0,804225	4,582934	2,060525	0,515131	0,000000	0,000000	0,000000	4,436589	0,644853	0,161213
Total domestic sources	2,999414	1,532510	0,383128	1,565586	6,611691	1,660721	9,045385	2,326651	0,581663	0,000000	0,000000	0,000000	11,774498	0,823237	0,205809
Foreign															
FDI	1,560685	1,425031	0,356258	0,814634	3,596509	0,903369	4,833770	2,314549	0,578637	0,000000	0,000000	0,000000	7,739502	0,724354	0,181088
Foreign borrowing	1,602830	1,338064	0,334516	0,836642	3,377037	0,848242	4,964276	2,173291	0,543323	0,000000	0,000000	0,000000	7,948475	0,680156	0,170039
ODA	1,646099	1,503023	0,375756	0,869003	0,157558	0,039575	5,098289	2,441210	0,610303	0,000000	0,000000	0,000000	8,163083	0,764008	0,191002
Total foreign sources	4,809614	4,266118	1,066529	2,520279	7,131103	1,791187	14,896335	6,929049	1,732262	0,000000	0,000000	0,000000	23,851060	2,168518	0,542129
Total corporation funds	7,809028	5,798628	1,449657	4,085865	13,742794	3,451908	23,941721	9,255700	2,313925	0,000000	0,000000	0,000000	35,625558	2,991754	0,747939
Government entities															
Domestic															
Domestic funds	1,239471	4,702870	1,175717	0,882417	4,436820	1,114438	5,235961	2,292221	0,573055	0,000000	0,000000	0,000000	8,383473	0,717363	0,179341
Foreign															
Foreign borrowing	1,690551	1,449400	0,362350	0,930698	3,658027	0,918821	5,377331	2,354129	0,588532	0,000000	0,000000	0,000000	8,609829	0,736741	0,184185
Bilateral ODA	1,736191	1,628084	0,407021	0,955832	0,885443	0,222405	5,522511	2,701798	0,675450	0,000000	0,000000	0,000000	8,842299	0,827559	0,206890
Multilateral ODA	103,579840	14,839862	3,709966	0,981649	3,858233	0,969109	22,688594	3,475936	0,868984	22,572000	0,790020	0,007900	21,858684	2,329906	0,582476
Total foreign sources	107,006582	17,917346	4,479337	2,868179	8,401703	2,110335	33,588437	8,531863	2,132966	22,572000	0,790020	0,007900	39,310812	3,894205	0,973551
Total government funds	108,246053	22,620216	5,655054	3,750596	12,838523	3,224774	38,824398	10,824084	2,706021	22,572000	0,790020	0,007900	47,694285	4,611569	1,152892
Total Funds	117,535224	28,462379	7,115595	8,608836	26,738875	6,716071	67,111251	20,155821	5,038955	22,572000	0,790020	0,007900	90,464837	7,654290	1,913572

Source: Results of assessment

Table 9: Estimates of the cumulative amount of discounted I&FF and O&M costs for the adaptation scenario in million US$ (continued)

Activities / Entities	Improved farming practices			Development of livestock species more resistant to weather			Epidemio-surveillance			Development of aquaculture (fishing and aquaculture)			Mangrove management		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Households															
Domestic															
Equity & debt	1,009257	0,012047	0,003012	1,700405	0,412933	0,103233	0,000000	0,000000	0,000000	2,737237	1,201780	0,300445	0,052342	0,052342	0,013086
Total household funds	1,009257	0,012047	0,003012	1,700405	0,412933	0,103233	0,000000	0,000000	0,000000	2,737237	1,201780	0,300445	0,052342	0,052342	0,013086
Enterprises															
Domestic															
Domestic equity	1,036507	0,042166	0,010541	1,746320	1,445267	0,300378	0,000000	0,000000	0,000000	2,240028	1,153455	0,288364	0,266478	0,261710	0,065428
Domestic borrowing	1,064506	15,697460	3,924365	1,794663	3,125025	0,649492	0,000000	0,000000	0,000000	2,300524	1,083054	0,270763	2,126013	2,133605	0,533401
Total domestic sources	2,101014	15,739626	3,934907	3,540983	4,570291	0,949871	0,000000	0,000000	0,000000	4,540551	2,236509	0,559127	2,392490	2,395315	0,598829
Foreign															
FDI	1,093221	1,763270	0,440818	1,841907	3,510257	0,729557	0,000000	0,000000	0,000000	2,362629	1,216562	0,304140	2,183422	2,396617	0,599154
Foreign borrowing	1,122750	1,655681	0,413920	1,891618	3,296056	0,685039	0,000000	0,000000	0,000000	2,426407	1,142340	0,285585	2,242361	2,250361	0,562590
ODA	0,610843	1,668266	0,438771	1,942703	3,702409	0,769494	0,000000	0,000000	0,000000	2,491923	1,283143	0,320786	2,302916	2,527806	0,631952
Total foreign sources	2,826814	5,087217	1,293509	5,676227	10,508722	2,184090	0,000000	0,000000	0,000000	7,280959	3,642044	0,910511	6,728698	7,174785	1,793696
Total corporation funds	4,927828	20,826843	5,228415	9,217210	15,079013	3,133960	0,000000	0,000000	0,000000	11,821510	5,878553	1,469638	9,121188	9,570099	2,392525
Government entities															
Domestic															
Domestic funds	1,184185	1,746289	0,436572	1,995160	0,826504	0,171777	0,000000	0,000000	0,000000	2,559209	0,477846	0,119461	2,365087	0,425383	0,106346
Foreign															
Foreign borrowing	1,216188	1,793438	0,448360	2,104355	3,570300	0,742037	0,000000	0,000000	0,000000	2,628297	1,237385	0,309346	2,428962	2,437613	0,609403
Bilateral ODA	1,249005	2,014543	0,503636	2,161174	4,010464	0,833518	0,000000	0,000000	0,000000	2,699283	1,389929	0,347482	2,494539	2,738112	0,684528
Multilateral ODA	0,679538	0,489093	0,128636	12,756319	18,876952	3,923309	14,475252	21,712879	3,717245	0,277217	1,305111	0,326278	1,776518	1,595186	0,398796
Total foreign sources	3,144731	4,297074	1,080632	17,021849	26,457717	5,498864	14,475252	21,712879	3,717245	5,604796	3,932425	0,983106	6,700019	6,770911	1,692728
Total government funds	4,328916	6,043363	1,517204	24,090100	37,728905	5,670641	14,475252	21,712879	3,717245	8,164005	4,410271	1,102568	9,065107	7,196294	1,799073
Total Funds	10,266001	26,882254	6,748631	35,007715	53,220851	8,907835	14,475252	21,712879	3,717245	22,722752	11,490604	2,872651	18,238637	16,818735	4,204684

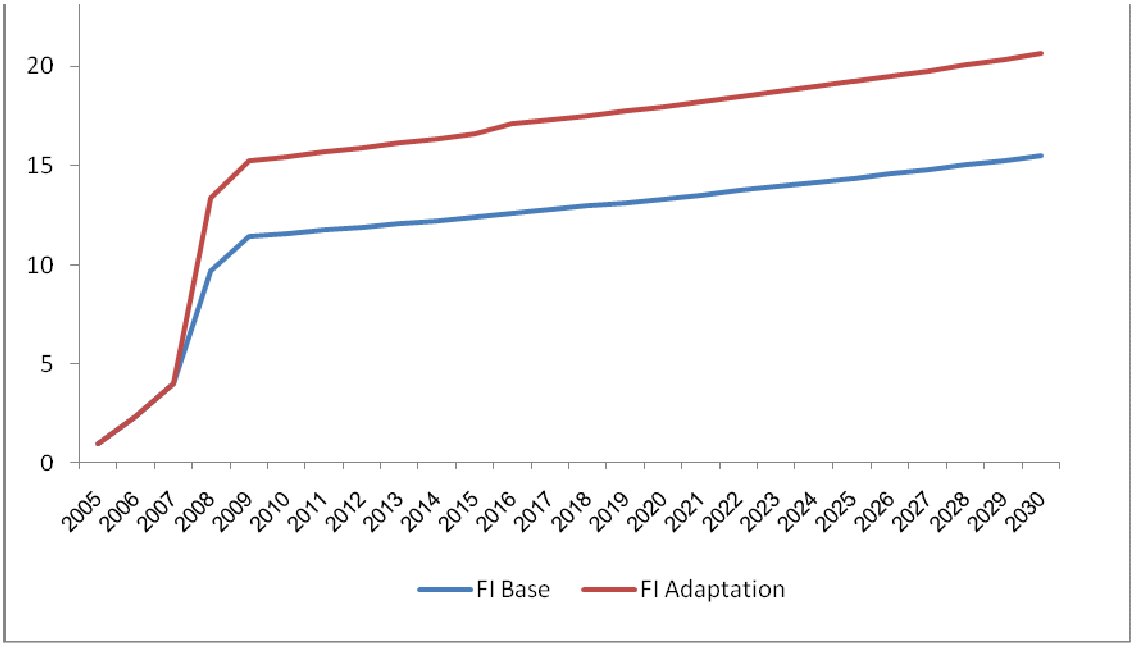
Source: Results of assessment

3. Results

Adaptation measures in agriculture require additional investments for each of the selected activities in the framework of this assessment. Indeed from the simulations for both the baseline and the adaptation scenario, the additional amount required to cope with the effects of climate change by 2030 in the agriculture sector in Togo amounted to US$ 117.21 million (Annex 3).

The current investment in agriculture, judging by the strategies and policies implemented shows a growing investment but does not sufficiently take into account aspects of adaptation in this sector. Figure 4 shows the gap to be bridged between current efforts and adaptation needs.

Figure 4: Evolution of Investments flows for the period 2005-2030 (million US$)



Source: Result of assessment

3.1. Changes in I&FF, O&M costs and subsidy costs

In reference to the policies and strategies in place that set a 2015 annual growth rate of at least 6%, an additional 31.5 million US$ is required to take into account adaptation to climate change in the agriculture sector. The three main activities that require sustained effort of investment are the water management, plant protection and improvement of soil quality with the needs estimated at 9, 8 and 6 million US$ respectively.

For the year 2015-2030, for the same business needs are estimated at 24, 18 and 13 million US$, total investment on this additional period is estimated at 72 million.

Table 10: Estimated incremental cumulative amounts of I&FF and O&M costs for the periods 2005-2015 and 2016-2030 in millions of dollars US

Activities / Years	Value of flow in million US dollars					
	2005-2015			2016-2030		
	IF	FF	O&M costs	IF	FF	O&M costs
Water management (irrigation, hydro agricultural, etc.).	9.435	2.269	0.567	24.147	3.429	0.857
Production of improved seeds	0.849	2.224	0.217	1.611	4.175	0.398
Improving Soil Quality and Protection	5.939	2.103	0.526	13.235	2.828	0.707
Improved Agro Meteorological Information System and timing of crop calendars	0.182	0.006	0.000	0.390	0.014	0.000
Plant Protection	8.198	0.637	-0.626	17.649	1.208	-1.187
Improved farming practices	1.078	2.173	0.961	1.855	4.076	1.809
Development of livestock species more resistant to weather	1.010	-0.086	1.465	7.457	10.209	3.393
Epidemio-surveillance	0.693	1.039	0.178	1.484	2.226	0.381
Development and Aquaculture	2.220	1.015	0.254	4.272	1.917	0.479
Mangrove management	2.094	1.724	0.431	-0.107	-0.915	-0.229
Total	31.698	13.105	3.973	71.994	29.166	6.609

Source: Results of assessment

Table 11: Estimated incremental amounts accumulated from 2005 to 2030 I&FF and O&M costs by type of investment and entity in millions of US$

Entities / Activities	Water management (irrigation, hydro agricultural, etc.)			Production of improved seeds			Improving soil quality (soil conservation amendment & fertility) and Emergency			Improved Agro Meteorological Information System and timing of crop calendars			Plant Protection		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Households															
Domestic															
Equity & debt	0,390007	0,008191	0,002480	0,220679	0,031332	0,009886	1,241467	0,008112	0,004093	0,000000	0,000000	0,000000	2,029111	0,011278	0,003171
Total household funds	0,390007	0,008191	0,002480	0,220679	0,031332	0,009886	1,241467	0,008112	0,004093	0,000000	0,000000	0,000000	2,029111	0,011278	0,003171
Enterprises															
Domestic															
Domestic equity	0,389916	0,049468	0,013879	0,220679	0,974256	0,414656	1,274986	0,028392	0,019009	0,000000	0,000000	0,000000	2,096546	0,039472	-0,397245
Domestic borrowing	0,400444	0,239286	0,059822	0,226632	0,700392	0,362384	1,309410	0,450740	0,112685	0,000000	0,000000	0,000000	1,267597	0,141062	-0,280628
Total domestic sources	0,790360	0,288755	0,073701	0,447310	1,674649	0,777040	2,584396	0,479132	0,131694	0,000000	0,000000	0,000000	3,364142	0,180534	-0,677872
Foreign															
FDI	0,411248	0,367892	0,091973	0,232752	1,027574	0,461528	1,381077	0,661300	0,165325	0,000000	0,000000	0,000000	2,211286	0,206958	-0,260752
Foreign borrowing	0,422353	0,252382	0,063095	0,239041	0,738727	0,406402	1,418365	0,475407	0,118852	0,000000	0,000000	0,000000	2,270993	0,148784	-0,271802
ODA	0,433755	0,388027	0,097007	0,234602	0,028009	0,013362	1,456654	0,697489	0,174372	0,000000	0,000000	0,000000	2,332309	0,218288	-0,250839
Total foreign sources	1,267357	1,008301	0,252075	0,706395	1,794310	0,881292	4,256096	1,834196	0,458549	0,000000	0,000000	0,000000	6,814589	0,574030	-0,783393
Total corporation funds	2,057717	1,297056	0,325776	1,153706	3,468958	1,658332	6,840492	2,313327	0,590243	0,000000	0,000000	0,000000	10,178731	0,754564	-1,461266
Government entities															
Domestic															
Domestic funds	0,326607	0,553273	-0,112009	0,252119	0,518975	-2,224653	1,495989	0,501423	0,125356	0,000000	0,000000	0,000000	2,395278	0,156923	-0,262500
Foreign															
Foreign borrowing	0,483015	0,273382	0,068345	0,265914	0,800193	0,476980	1,536380	0,514966	0,128741	0,000000	0,000000	0,000000	2,459951	0,161162	-0,257656
Bilateral ODA	0,496055	0,420313	0,105078	0,273095	0,252984	-0,219436	1,577860	0,771942	0,192986	0,000000	0,000000	0,000000	2,526371	0,236445	-0,234951

Multilateral ODA	25,641348	1,827870	0,460344	0,280471	0,843988	0,527268	5,304033	-0,142239	0,078396	0,572000	0,020020	0,000200	5,013758	0,345456	0,384031
Total foreign sources	26,620418	2,521565	0,633768	0,819480	1,897166	0,784813	8,418273	1,144669	0,400123	0,572000	0,020020	0,000200	10,000081	0,743064	-0,108575
Total government funds	26,947024	3,074838	0,521759	1,071599	2,416141	-1,439840	9,914262	1,646092	0,525479	0,572000	0,020020	0,000200	12,395358	0,899987	-0,371075
Total Funds	29,394747	4,380085	0,850014	2,445983	5,916431	0,228377	17,996221	3,967532	1,119815	0,572000	0,020020	0,000200	24,603200	1,665828	-1,829169

Source: Results of assessment

Table 11 (continued): Estimates of incremental amounts of cumulative 2005-2030 I&FF and O&M costs by type of investment and entity in millions of US$

Entities / Activities	Improved farming practices			Development of livestock species more resistant to weather			Epidemio-surveillance			Development of aquaculture (fishing and aquaculature)			Mangrove management		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Households															
Domestic															
Equity & debt	0,288359	0,002333	0,000861	0,485830	0,108453	0,029495	0,000000	0,000000	0,000000	0,778005	0,341741	0,084704	-0,000627	-0,000627	-0,00098
Total household funds	0,288359	0,002333	0,000861	0,485830	0,108453	0,029495	0,000000	0,000000	0,000000	0,778005	0,341741	0,084704	-0,000627	-0,000627	-0,00098
Enterprises															
Domestic															
Domestic equity	0,296145	0,008166	-0,431299	0,498949	0,379586	-0,141463	0,000000	0,000000	0,000000	0,640008	0,329559	0,082390	0,266478	0,261710	0,06542
Domestic borrowing	0,304145	3,433819	3,482524	0,512761	0,683599	0,207652	0,000000	0,000000	0,000000	0,657292	0,236918	0,059230	0,231801	0,016536	0,00413
Total domestic sources	0,600290	3,441985	3,051225	1,011709	1,063186	0,066189	0,000000	0,000000	0,000000	1,297300	0,566477	0,141619	0,233433	0,013399	-0,00076
Foreign															
FDI	0,312349	0,503792	-0,001023	0,526259	1,002931	0,287717	0,000000	0,000000	0,000000	0,675037	0,347589	0,086897	0,238061	0,222406	0,05560
Foreign borrowing	0,320786	0,362180	-0,027921	0,540462	0,721012	0,243198	0,000000	0,000000	0,000000	0,693259	0,249887	0,062472	0,244487	0,017441	0,00436
ODA	0,174527	0,476647	-0,003070	0,555058	1,057831	0,327653	0,000000	0,000000	0,000000	0,711978	0,366612	0,091653	0,251089	0,234581	0,05864
Total foreign sources	0,807661	1,342619	-0,032014	1,621779	2,781774	0,858567	0,000000	0,000000	0,000000	2,080274	0,964088	0,241022	0,733636	0,474428	0,11860
Total corporation funds	1,407951	4,784604	3,019211	2,633489	3,844959	0,924756	0,000000	0,000000	0,000000	3,377574	1,530565	0,382641	0,967069	0,487827	0,11784
Government entities															
Domestic															
Domestic funds	0,338338	0,382001	-0,005269	0,570046	0,117265	-0,270064	0,000000	0,000000	0,000000	0,731202	0,055777	0,026132	0,257868	-0,045455	0,00082
Foreign															
Foreign borrowing	0,347482	0,392315	0,006519	0,601244	0,781003	0,300196	0,000000	0,000000	0,000000	0,750942	0,270678	0,067670	0,264832	0,018892	0,00472
Bilateral ODA	0,356859	0,575584	0,061795	0,617478	1,145847	0,391678	0,000000	0,000000	0,000000	0,771224	0,397123	0,099281	0,271982	0,254097	0,06352
Multilateral ODA	0,194154	0,051538	-0,313204	2,920267	3,652949	3,481468	2,176822	3,265233	0,559008	0,079205	0,285493	0,071373	0,010876	-0,170457	-0,0700
Total foreign sources	0,898495	1,019436	-0,244891	4,138990	5,579799	4,173341	2,176822	3,265233	0,559008	1,601370	0,953294	0,238323	0,547690	0,102532	-0,00179
Total government funds	1,236833	1,401437	-0,250159	4,623520	5,586747	3,903278	2,176822	3,265233	0,559008	2,332573	1,009070	0,264456	0,805557	0,057077	-0,00096
Total Funds	2,933143	6,188375	2,769912	7,742838	9,540160	4,857529	2,176822	3,265233	0,559008	6,488152	2,881376	0,731801	1,771999	0,544277	0,11589

Source: Results of assessment

Table 12: Estimated incremental annual amounts of I&FF and O&M costs for the period of 2005-2030 activity adaptation in millions of US$

Year / Activities	Water management (irrigation, hydro agricultural, etc.)			Production of improved seeds			Improving soil quality (soil conservation amendment, soil fertility) and Emergency			Improved Agro Meteorological Invormation System and timing of crop calendars			Plant Protection		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
2005	-0,751788	-0,433155	-0,197122	-0,013684	-0,159714	-0,127987	-0,043985	-0,123770	-0,047406	0,000000	0,000000	0,000000	-0,058647	-0,008523	-0,000938
2006	-0,900668	-0,231353	-0,116664	0,000000	-0,162256	-0,129511	-0,547971	-0,660330	-0,048805	0,000000	0,000000	0,000000	-0,586467	-0,085233	-0,007976
2007	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
2008	1,072350	0,278315	0,069579	0,105770	0,277899	0,027925	0,704299	0,290795	0,072699	0,000000	0,000000	0,000000	0,982516	0,079331	-0,077931
2009	1,101304	0,279824	0,069956	0,105876	0,277926	0,027693	0,714864	0,282362	0,070590	0,026000	0,000910	0,000009	0,994306	0,079410	-0,078009
2010	1,131039	0,281344	0,070336	0,105982	0,277954	0,027460	0,725587	0,274173	0,068543	0,026000	0,000910	0,000009	1,006238	0,079489	-0,078087
2011	1,161577	0,282878	0,070719	0,106088	0,277982	0,027228	0,736470	0,266222	0,066556	0,026000	0,000910	0,000009	1,018313	0,079569	-0,078165
2012	1,192940	0,284424	0,071106	0,106194	0,278010	0,026995	0,747517	0,258502	0,064625	0,026000	0,000910	0,000009	1,030532	0,079649	-0,078244
2013	1,225149	0,285983	0,071496	0,106300	0,278038	0,026761	0,758730	0,251005	0,062751	0,026000	0,000910	0,000009	1,042899	0,079728	-0,078322
2014	1,258228	0,287556	0,071889	0,106407	0,278065	0,026528	0,770111	0,243726	0,060932	0,026000	0,000910	0,000009	1,055414	0,079808	-0,078400
2015	1,292200	0,289143	0,072286	0,106513	0,278093	0,026294	0,781663	0,236658	0,059164	0,026000	0,000910	0,000009	1,068079	0,079888	-0,078479
2016	1,327090	0,219808	0,054952	0,106620	0,278121	0,026320	0,793388	0,229795	0,057449	0,026000	0,000910	0,000009	1,080896	0,079968	-0,078557
2017	1,362921	0,221016	0,055254	0,106726	0,278149	0,026346	0,805288	0,223131	0,055783	0,026000	0,000910	0,000009	1,093866	0,080048	-0,078636
2018	1,399720	0,222235	0,055559	0,106833	0,278177	0,026372	0,817368	0,216660	0,054165	0,026000	0,000910	0,000009	1,106993	0,080128	-0,078714
2019	1,437512	0,223466	0,055866	0,106940	0,278204	0,026397	0,829628	0,210377	0,052594	0,026000	0,000910	0,000009	1,120277	0,080208	-0,078793
2020	1,476325	0,224707	0,056177	0,107047	0,278232	0,026423	0,842073	0,204276	0,051069	0,026000	0,000910	0,000009	1,133720	0,080288	-0,078872
2021	1,516186	0,225960	0,056490	0,107154	0,278260	0,026449	0,854704	0,198352	0,049588	0,026000	0,000910	0,000009	1,147325	0,080368	-0,078951
2022	1,557123	0,227225	0,056806	0,107261	0,278288	0,026475	0,867524	0,192600	0,048150	0,026000	0,000910	0,000009	1,161092	0,080449	-0,079030
2023	1,599165	0,228502	0,057125	0,107368	0,278316	0,026501	0,880537	0,187014	0,046754	0,026000	0,000910	0,000009	1,175026	0,080529	-0,079109
2024	1,642343	0,229791	0,057448	0,107475	0,278344	0,026528	0,893745	0,181591	0,045398	0,026000	0,000910	0,000009	1,189126	0,080610	-0,079188
2025	1,686686	0,231094	0,057773	0,107583	0,278371	0,026554	0,907152	0,176325	0,044081	0,026000	0,000910	0,000009	1,203395	0,080690	-0,079267
2026	1,732227	0,232410	0,058102	0,107691	0,278399	0,026580	0,920759	0,171211	0,042803	0,026000	0,000910	0,000009	1,217836	0,080771	-0,079346
2027	1,778997	0,233739	0,058435	0,107798	0,278427	0,026606	0,934570	0,166246	0,041562	0,026000	0,000910	0,000009	1,232450	0,080852	-0,079426
2028	1,827030	0,235083	0,058771	0,107906	0,278455	0,026632	0,948589	0,161425	0,040356	0,026000	0,000910	0,000009	1,247240	0,080932	-0,079505
2029	1,876359	0,236441	0,059110	0,108014	0,278483	0,026658	0,962818	0,156744	0,039186	0,026000	0,000910	0,000009	1,262206	0,081013	-0,079585
2030	1,927021	0,237814	0,059453	0,108122	0,278511	0,026684	0,977260	0,152198	0,038050	0,026000	0,000910	0,000009	1,277353	0,081094	-0,079664

Source: Results of assessment

Table 12 (continued): Estimates of annual incremental amounts of I&FF and O&M costs for the period of 2005-2030 activity adaptation in millions of US$

Year / Activities	Improved farming practices			Development of livestock species more resistant to weather			Epidemio-surveillance			Development of aquaculture (fishing and aquaculture)			Mangrove Management		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
2005	0,000000	-0,020147	0,000000	-0,101933	-0,022222	0,000000	0,000000	0,000000	0,000000	-0,002031	-0,017063	-0,000569	-0,073941	-0,088972	-0,029332
2006	0,000000	-0,020147	0,000000	-0,312772	-0,079403	0,000000	0,000000	0,000000	0,000000	-0,002031	-0,017063	-0,000569	-0,073941	-0,088972	-0,029332
2007	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000	0,000000
2008	0,140204	0,271592	0,120567	0,117668	-0,009564	0,144704	0,000000	0,000000	0,000000	0,275544	0,126630	0,031657	0,252772	0,208084	0,052021
2009	0,138428	0,271584	0,120429	0,120022	-0,009880	0,154952	0,098946	0,148420	0,025409	0,276071	0,126702	0,031676	0,255300	0,210165	0,052541
2010	0,136772	0,271578	0,120293	0,122422	-0,010206	0,165542	0,098946	0,148420	0,025409	0,276610	0,126775	0,031694	0,257853	0,212267	0,053067
2011	0,135227	0,271575	0,120159	0,124871	-0,010542	0,176488	0,098946	0,148420	0,025409	0,277159	0,126849	0,031712	0,260431	0,214389	0,053597
2012	0,133787	0,271574	0,120028	0,127368	-0,010890	0,187801	0,098946	0,148420	0,025409	0,277719	0,126923	0,031731	0,263036	0,216533	0,054133
2013	0,132444	0,271576	0,119899	0,129915	-0,011250	0,199492	0,098946	0,148420	0,025409	0,278291	0,126997	0,031749	0,265666	0,218699	0,054675
2014	0,131194	0,271580	0,119771	0,132514	-0,011621	0,211575	0,098946	0,148420	0,025409	0,278875	0,127072	0,031768	0,268323	0,220886	0,055221
2015	0,130028	0,271587	0,119646	0,135164	-0,012004	0,224062	0,098946	0,148420	0,025409	0,279471	0,127148	0,031787	0,271006	0,223094	0,055774
2016	0,128944	0,271596	0,119766	0,431221	0,536935	0,224321	0,098946	0,148420	0,025409	0,280079	0,127224	0,031806	0,231970	0,182578	0,045645
2017	0,127935	0,271607	0,119886	0,439846	0,554654	0,224582	0,098946	0,148420	0,025409	0,280699	0,127301	0,031825	0,193964	0,143281	0,035820
2018	0,126996	0,271621	0,120006	0,448643	0,572957	0,224844	0,098946	0,148420	0,025409	0,281332	0,127378	0,031845	0,156949	0,105154	0,026289
2019	0,126124	0,271637	0,120126	0,457615	0,591865	0,225107	0,098946	0,148420	0,025409	0,281979	0,127456	0,031864	0,120889	0,068149	0,017037
2020	0,125314	0,271655	0,120246	0,466768	0,611396	0,225373	0,098946	0,148420	0,025409	0,282638	0,127534	0,031883	0,085748	0,032220	0,008055
2021	0,124562	0,271676	0,120366	0,476103	0,631572	0,225640	0,098946	0,148420	0,025409	0,283311	0,127613	0,031903	0,051492	-0,002677	-0,000669
2022	0,123865	0,271699	0,120486	0,485625	0,652414	0,225908	0,098946	0,148420	0,025409	0,283997	0,127692	0,031923	0,018088	-0,036585	-0,009146
2023	0,123219	0,271724	0,120607	0,495338	0,673944	0,226178	0,098946	0,148420	0,025409	0,284698	0,127772	0,031943	-0,014497	-0,069545	-0,017386
2024	0,122620	0,271751	0,120727	0,505244	0,696184	0,226450	0,098946	0,148420	0,025409	0,285413	0,127852	0,031963	-0,046293	-0,101595	-0,025399

2025	0,122067	0,271781	0,120848	0,515349	0,719158	0,226724	0,098946	0,148420	0,025409	0,286142	0,127933	0,031983	-0,077330	-0,132775	-0,033194
2026	0,121555	0,271813	0,120969	0,525656	0,742890	0,226999	0,098946	0,148420	0,025409	0,286887	0,128015	0,032004	-0,107638	-0,163120	-0,040780
2027	0,121083	0,271847	0,121090	0,536169	0,767406	0,227276	0,098946	0,148420	0,025409	0,287646	0,128097	0,032024	-0,137244	-0,192666	-0,048166
2028	0,120648	0,271883	0,121211	0,546893	0,792730	0,227556	0,098946	0,148420	0,025409	0,288421	0,128180	0,032045	-0,166176	-0,221446	-0,055362
2029	0,120247	0,271921	0,121332	0,557831	0,818890	0,227837	0,098946	0,148420	0,025409	0,289212	0,128263	0,032066	-0,194460	-0,249494	-0,062374
2030	0,119879	0,271962	0,121454	0,568987	0,845914	0,228120	0,098946	0,148420	0,025409	0,290019	0,128347	0,032087	-0,222121	-0,276841	-0,069210

Source: Results of assessment

3.2. Policy Implications

Review existing policies reveals a plea to the place of all stakeholders is necessary for the consideration of climate change. The current policy of agricultural development does not adequately address issues of adaptation, despite the clear desire of the state to make agriculture the engine of the economy and working for sustainable agriculture.

It is therefore of necessity:

- Revisit these policy documents by inserting clear action on adaptation to climate change
- Educate all stakeholders (government and partners) on priority actions to implement and mobilize financial resources and technical
- Strengthen the legal and legislative
- Strengthening human and institutional capacities.

(Now that the technical part of the I&FF assessment is completed, we think the team might benefit from taking a closer look at the political implications from the results of the assessment. Chapter 3.2 (Political implications) can elaborate in more detail what political activities would be needed to reach the adaptation scenario, which incentives could be set, and how could the additional I&FF needed be induced.)

3.3. Key uncertainties and limitations of the methodology

As part of this assessment it was difficult to collect all data on investment and financial flows as well as those made outside Togo.

Regarding the contribution of households and even those organizations of civil society, we simply make estimates based on current practices observed in terms of participation in financing projects in the country.

This situation did not identify all investments during the historical period.

The estimated investment is probably underestimated compared to what is actually done. It is therefore necessary to conduct a study on public expenditure review in the agriculture sector in order to have the real volume of investment in this sector.

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Annexes

Annex 1: Investment and Financial Flows recorded for the accumulated historic years 2000-2005 by entity and type of activity in millions of US$

Entities / Activities	Water management (irrigation, hydro agricultural, etc.)			Production of improved seeds			Improving soil quality (soil conservation amendment, soil fertility) and Emergency			Improved Agro Meteorological Information System and timing of crop calendars			Plant Protection		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Households															
Domestic															
Equity & debt	1,090136	0,035344	0,008404	0,551696	0,126225	0,029504	3,103666	0,067924	0,014916	0,000000	0,000000	0,000000	5,115883	0,039689	0,009570
Total household funds	1,090136	0,035344	0,008404	0,551696	0,126225	0,029504	3,103666	0,067924	0,014916	0,000000	0,000000	0,000000	5,115883	0,039689	0,009570
Enterprises															
Domestic															
Domestic equity	1,089813	0,214408	0,052090	0,551696	2,435641	0,441841	3,187465	0,237734	0,047523	0,000000	0,000000	0,000000	5,241364	0,138911	0,441841
Domestic borrowing	1,119241	1,029347	0,257337	0,566579	2,501401	0,441841	3,273524	1,609785	0,402446	0,000000	0,000000	0,000000	3,168992	0,503792	0,441841
Total domestic sources	2,209054	1,243755	0,309427	1,118276	4,937043	0,883682	6,460989	1,847519	0,449969	0,000000	0,000000	0,000000	8,410356	0,642703	0,883682
Foreign															
FDI	1,149437	1,057138	0,264285	0,581881	2,568935	0,441841	3,452693	1,653249	0,413312	0,000000	0,000000	0,000000	5,528216	0,517396	0,441841
Foreign borrowing	1,180476	1,085682	0,271420	0,597601	2,638310	0,441841	3,545912	1,697883	0,424471	0,000000	0,000000	0,000000	5,677482	0,531372	0,441841
ODA	1,212344	1,114996	0,278749	0,634401	0,129549	0,026213	3,641635	1,743722	0,435930	0,000000	0,000000	0,000000	5,830773	0,545720	0,441841
Total foreign sources	3,542258	3,257816	0,814454	1,813883	5,336793	0,909895	10,640240	5,094854	1,273713	0,000000	0,000000	0,000000	17,036471	1,594487	1,325522
Total corporation funds	5,751312	4,501572	1,123881	2,932159	10,273836	1,793576	17,101229	6,942373	1,723682	0,000000	0,000000	0,000000	25,446827	2,237190	2,209204
Government entities															
Domestic															

Domestic funds	0,912865	4,149597	1,287726	0,630298	3,917845	3,339091	3,739972	1,790798	0,447699	0,000000	0,000000	0,000000	5,988195	0,560440	0,441841
Foreign															
Foreign borrowing	1,207537	1,176018	0,294004	0,664784	2,857833	0,441841	3,840950	1,839163	0,459791	0,000000	0,000000	0,000000	6,149878	0,575579	0,441841
Bilateral ODA	1,240136	1,207771	0,301943	0,682737	0,632459	0,441841	3,944651	1,929856	0,482464	0,000000	0,000000	0,000000	6,315928	0,591113	0,441841
Multilateral ODA	77,938491	13,011993	3,249622	0,701178	3,014244	0,441841	17,384561	3,618175	0,790588	22,000000	0,770000	0,007700	16,844926	1,984450	0,198445
Total foreign sources	80,386164	15,395781	3,845569	2,048700	6,504537	1,325522	25,170163	7,387194	1,732843	22,000000	0,770000	0,007700	29,310732	3,151142	1,082127
Total government funds	81,299029	19,545378	5,133295	2,678997	10,422382	4,664614	28,910135	9,177992	2,180543	22,000000	0,770000	0,007700	35,298926	3,711582	1,523967
Total Funds	88,140476	24,082294	6,265580	6,162853	20,822443	6,487694	49,115031	16,188289	3,919140	22,000000	0,770000	0,007700	65,861636	5,988461	3,742742

Source: Results of assessment

Annex 1: Investment and Financial Flows recorded for the combination of historic years 2000-2005 by type of business entity and in millions of US$ (Continued)

Activities / Entities	Improved farming practices			Development of livestock species more resistant to weather			Epidemio-surveillance			Development of aquaculture (fishing and aquaculture)			Mangrove management		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
Households															
Domestic															
Equity & debt	0,720898	0,009714	0,002151	1,214575	0,304480	0,073738	0,000000	0,000000	0,000000	1,959232	0,860039	0,215741	0,052969	0,052969	0,014065
Total household funds	0,720898	0,009714	0,002151	1,214575	0,304480	0,073738	0,000000	0,000000	0,000000	1,959232	0,860039	0,215741	0,052969	0,052969	0,014065
Enterprises															
Domestic															
Domestic equity	0,740362	0,034000	0,441841	1,247372	1,065680	0,441841	0,000000	0,000000	0,000000	1,600020	0,823896	0,205974			
Domestic borrowing	0,760362	12,263641	0,441841	1,281902	2,441426	0,441841	0,000000	0,000000	0,000000	1,643231	0,846136	0,211534	1,894211	2,117069	0,529267
Total domestic sources	1,500724	12,297641	0,883682	2,529273	3,507106	0,883682	0,000000	0,000000	0,000000	3,243251	1,670032	0,417508	2,159058	2,381915	0,599592
Foreign															
FDI	0,780872	1,259479	0,441841	1,315648	2,507326	0,441841	0,000000	0,000000	0,000000	1,687592	0,868973	0,217243	1,945361	2,174210	0,543553
Foreign borrowing	0,801964	1,293501	0,441841	1,351156	2,575044	0,441841	0,000000	0,000000	0,000000	1,733148	0,892453	0,223113	1,997874	2,232921	0,558230
ODA	0,436316	1,191619	0,441841	1,387645	2,644578	0,441841	0,000000	0,000000	0,000000	1,779945	0,916530	0,229133	2,051827	2,293225	0,573306
Total foreign sources	2,019153	3,744598	1,325522	4,054448	7,726948	1,325522	0,000000	0,000000	0,000000	5,200685	2,677956	0,669489	5,995061	6,700357	1,675089
Total corporation funds	3,519877	16,042239	2,209204	6,583722	11,234054	2,209204	0,000000	0,000000	0,000000	8,443936	4,347988	1,086997	8,154119	9,082272	2,274681
Government entities															
Domestic															
Domestic funds	0,845846	1,364288	0,441841	1,425114	0,709239	0,441841	0,000000	0,000000	0,000000	1,828006	0,422069	0,093329	2,107219	0,470838	0,105522
Foreign															
Foreign borrowing	0,868706	1,401124	0,441841	1,503111	2,789297	0,441841	0,000000	0,000000	0,000000	1,877355	0,966707	0,241677	2,164130	2,418721	0,604680
Bilateral ODA	0,892146	1,438959	0,441841	1,543696	2,864617	0,441841	0,000000	0,000000	0,000000	1,928059	0,992806	0,248202	2,222557	2,484015	0,621004
Multilateral ODA	0,485385	0,437555	0,441841	9,836052	15,224004	0,441841	12,298430	18,447645	3,158237	0,198012	1,019618	0,254904	1,765643	1,765643	0,468834
Total foreign	2,246236	3,277638	1,325522	12,882859	20,877918	1,325522	12,298430	18,447645	3,158237	4,003426	2,979132	0,744783	6,152330	6,668379	1,694518

sources															
Total government funds	3,092083	4,641926	1,767363	19,466581	32,142157	1,767363	12,298430	18,447645	3,158237	5,831432	3,401201	0,838112	8,259549	7,139217	1,800039
Total Funds	7,332858	20,693880	3,978719	27,264877	43,680691	4,050305	12,298430	18,447645	3,158237	16,234600	8,609228	2,140850	16,466638	16,274458	4,088786

Source: Results of assessment

Annex 2: Baseline scenario - Estimated annual amounts of I&FF and O&M costs by type of investment in millions of US$

Year / Activities	Water management (irrigation, hydro agricultural, etc.)			Production of improved seeds			Improving soil quality (soil conservation amendment, soil fertility) and Emergency			Improved Agro Meteorological Information System and timing of crop calendars			Plant Protection		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
2005	0,751788	0,433155	0,197122	0,013684	0,159714	0,127987	0,043985	0,123770	0,047406	0,000000	0,000000	0,000000	0,058647	0,008523	0,000938
2006	0,900668	0,231353	0,116664	0,000000	0,162256	0,129511	0,547971	0,660330	0,048805	0,000000	0,000000	0,000000	0,586467	0,085233	0,007976
2007	2,534289	0,654164	0,260889	0,000000	0,160301	0,128534	0,586467	0,179757	0,016821	0,000000	0,000000	0,000000	0,586467	0,085233	0,007976
2008	2,680876	0,931814	0,232953	0,264426	0,883383	0,262395	1,760748	0,897756	0,224439	0,000000	0,000000	0,000000	2,456290	0,249818	0,160219
2009	2,753260	0,936789	0,234197	0,264690	0,883471	0,262656	1,787159	0,871721	0,217930	1,000000	0,035000	0,000350	2,485765	0,250068	0,160379
2010	2,827598	0,941801	0,235450	0,264955	0,883560	0,262918	1,813966	0,846441	0,211610	1,000000	0,035000	0,000350	2,515595	0,250318	0,160539
2011	2,903943	0,946850	0,236713	0,265220	0,883648	0,263180	1,841176	0,821895	0,205474	1,000000	0,035000	0,000350	2,545782	0,250569	0,160700
2012	2,982349	0,951938	0,237985	0,265485	0,883736	0,263442	1,868793	0,798060	0,199515	1,000000	0,035000	0,000350	2,576331	0,250819	0,160861
2013	3,062873	0,957065	0,239266	0,265751	0,883825	0,263704	1,896825	0,774916	0,193729	1,000000	0,035000	0,000350	2,607247	0,251070	0,161021
2014	3,145570	0,962232	0,240558	0,266017	0,883913	0,263967	1,925278	0,752443	0,188111	1,000000	0,035000	0,000350	2,638534	0,251321	0,161182
2015	3,230501	0,967440	0,241860	0,266283	0,884001	0,264230	1,954157	0,730623	0,182656	1,000000	0,035000	0,000350	2,670196	0,251572	0,161344
2016	3,317724	0,972689	0,243172	0,266549	0,884090	0,264493	1,983469	0,709434	0,177359	1,000000	0,035000	0,000350	2,702239	0,251824	0,161505
2017	3,407303	0,977982	0,244496	0,266815	0,884178	0,264756	2,013221	0,688861	0,172215	1,000000	0,035000	0,000350	2,734666	0,252076	0,161666
2018	3,499300	0,983319	0,245830	0,267082	0,884267	0,265020	2,043420	0,668884	0,167221	1,000000	0,035000	0,000350	2,767482	0,252328	0,161828
2019	3,593781	0,988700	0,247175	0,267349	0,884355	0,265284	2,074071	0,649486	0,162372	1,000000	0,035000	0,000350	2,800691	0,252580	0,161990
2020	3,690813	0,994128	0,248532	0,267617	0,884444	0,265548	2,105182	0,630651	0,157663	1,000000	0,035000	0,000350	2,834300	0,252833	0,162152
2021	3,790465	0,999603	0,249901	0,267884	0,884532	0,265812	2,136760	0,612362	0,153091	1,000000	0,035000	0,000350	2,868311	0,253086	0,162314
2022	3,892808	1,005126	0,251282	0,268152	0,884620	0,266077	2,168811	0,594604	0,148651	1,000000	0,035000	0,000350	2,902731	0,253339	0,162476
2023	3,997913	1,010700	0,252675	0,268420	0,884709	0,266342	2,201343	0,577360	0,144340	1,000000	0,035000	0,000350	2,937564	0,253592	0,162639
2024	4,105857	1,016324	0,254081	0,268689	0,884797	0,266607	2,234363	0,560617	0,140154	1,000000	0,035000	0,000350	2,972815	0,253846	0,162802
2025	4,216715	1,022002	0,255500	0,268957	0,884886	0,266873	2,267879	0,544359	0,136090	1,000000	0,035000	0,000350	3,008488	0,254099	0,162964
2026	4,330566	1,027733	0,256933	0,269226	0,884974	0,267139	2,301897	0,528573	0,132143	1,000000	0,035000	0,000350	3,044590	0,254354	0,163127
2027	4,447492	1,033520	0,258380	0,269496	0,885063	0,267405	2,336425	0,513244	0,128311	1,000000	0,035000	0,000350	3,081125	0,254608	0,163290
2028	4,567574	1,039365	0,259841	0,269765	0,885151	0,267671	2,371472	0,498360	0,124590	1,000000	0,035000	0,000350	3,118099	0,254863	0,163454
2029	4,690899	1,045268	0,261317	0,270035	0,885240	0,267938	2,407044	0,483907	0,120977	1,000000	0,035000	0,000350	3,155516	0,255117	0,163617
2030	4,817553	1,051233	0,262808	0,270305	0,885328	0,268204	2,443150	0,469874	0,117469	1,000000	0,035000	0,000350	3,193382	0,255372	0,163781

Source: Results of assessment

Annex 2: Baseline scenario: Estimated annual amounts of I&FF and O&M costs by type of investment basis in millions of US$ (continued)

Year / Activities	Improved farming practices			Development of livestock species more resistant to weather			Epidemio-surveillance			Development of aquaculture (fishing and aquaculture)			Mangrove management		
	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs	IF	FF	O&M costs
2005	0,000000	0,020147	0,000000	0,101933	0,022222	0,000000	0,000000	0,000000	0,000000	0,002031	0,017063	0,000569	0,073941	0,088972	0,029332
2006	0,000000	0,020147	0,000000	0,312772	0,079403	0,000000	0,000000	0,000000	0,000000	0,002031	0,017063	0,000569	0,073941	0,088972	0,029332
2007	0,000000	0,020147	0,000000	0,309690	0,481167	0,000000	0,000000	0,000000	0,000000	0,000000	0,016251	0,000000	0,071909	0,088160	0,028764
2008	0,350509	0,895046	0,171093	0,920108	1,281149	0,173192	0,000000	0,000000	0,000000	0,688860	0,370088	0,092522	0,631930	0,622561	0,155640
2009	0,346071	0,895186	0,171264	0,938510	1,323427	0,173435	0,559020	0,838529	0,143556	0,690178	0,370264	0,092566	0,638250	0,628787	0,157197
2010	0,341931	0,895334	0,171435	0,957280	1,367100	0,173681	0,559020	0,838529	0,143556	0,691524	0,370441	0,092610	0,644632	0,635075	0,158769
2011	0,338069	0,895488	0,171606	0,976426	1,412214	0,173930	0,559020	0,838529	0,143556	0,692897	0,370620	0,092655	0,651078	0,641426	0,160356
2012	0,334468	0,895649	0,171778	0,995954	1,458817	0,174181	0,559020	0,838529	0,143556	0,694298	0,370800	0,092700	0,657589	0,647840	0,161960
2013	0,331111	0,895817	0,171950	1,015874	1,506958	0,174435	0,559020	0,838529	0,143556	0,695728	0,370981	0,092745	0,664165	0,654318	0,163580
2014	0,327984	0,895992	0,172122	1,036191	1,556688	0,174692	0,559020	0,838529	0,143556	0,697188	0,371163	0,092791	0,670807	0,660862	0,165215
2015	0,325071	0,896174	0,172294	1,056915	1,608059	0,174952	0,559020	0,838529	0,143556	0,698677	0,371347	0,092837	0,677515	0,667470	0,166868
2016	0,322360	0,896362	0,172466	1,078053	1,661125	0,175215	0,559020	0,838529	0,143556	0,700197	0,371532	0,092883	0,684290	0,674145	0,168536
2017	0,319837	0,896556	0,172639	1,099614	1,715942	0,175481	0,559020	0,838529	0,143556	0,701748	0,371718	0,092929	0,691133	0,680886	0,170222
2018	0,317491	0,896757	0,172811	1,121607	1,772568	0,175750	0,559020	0,838529	0,143556	0,703331	0,371906	0,092976	0,698044	0,687695	0,171924
2019	0,315311	0,896965	0,172984	1,144039	1,831063	0,176023	0,559020	0,838529	0,143556	0,704947	0,372095	0,093024	0,705025	0,694572	0,173643
2020	0,313286	0,897179	0,173157	1,166919	1,891488	0,176300	0,559020	0,838529	0,143556	0,706595	0,372285	0,093071	0,712075	0,701518	0,175379
2021	0,311406	0,897399	0,173330	1,190258	1,953907	0,176579	0,559020	0,838529	0,143556	0,708277	0,372476	0,093119	0,719196	0,708533	0,177133
2022	0,309662	0,897626	0,173503	1,214063	2,018386	0,176863	0,559020	0,838529	0,143556	0,709993	0,372669	0,093167	0,726388	0,715618	0,178905
2023	0,308046	0,897859	0,173677	1,238344	2,084992	0,177150	0,559020	0,838529	0,143556	0,711745	0,372864	0,093216	0,733651	0,722775	0,180694
2024	0,306550	0,898098	0,173851	1,263111	2,153797	0,177442	0,559020	0,838529	0,143556	0,713532	0,373059	0,093265	0,740988	0,730002	0,182501
2025	0,305166	0,898343	0,174024	1,288373	2,224872	0,177737	0,559020	0,838529	0,143556	0,715356	0,373257	0,093314	0,748398	0,737302	0,184326
2026	0,303888	0,898595	0,174198	1,314141	2,298293	0,178037	0,559020	0,838529	0,143556	0,717217	0,373455	0,093364	0,755882	0,744675	0,186169
2027	0,302707	0,898852	0,174373	1,340424	2,374137	0,178340	0,559020	0,838529	0,143556	0,719116	0,373655	0,093414	0,763441	0,752122	0,188031
2028	0,301619	0,899116	0,174547	1,367232	2,452483	0,178649	0,559020	0,838529	0,143556	0,721054	0,373856	0,093464	0,771075	0,759643	0,189911
2029	0,300618	0,899385	0,174722	1,394577	2,533415	0,178962	0,559020	0,838529	0,143556	0,723031	0,374059	0,093515	0,778786	0,767240	0,191810
2030	0,299697	0,899660	0,174896	1,422468	2,617018	0,179279	0,559020	0,838529	0,143556	0,725048	0,374263	0,093566	0,786574	0,774912	0,193728

Source: Results of assessment

Annex 3: Cost differential between the adaptation scenario and the baseline by entities over 2005-2030 in millions of US$

Activities / Entities	Baseline Scenario				Climate Change Scenario				Incremental costs			
	IF	FF	O&M costs	IF+ FF	IF	FF	O&M costs	IF+ FF	IF	FF	O&M costs	IF+ FF
Households												
Domestic												
Equity & debt	12.59	1.19	0.29	13.79	17.54	1.59	0.40	19.14	4.95	0.40	0.10	5.35
Total household funds	12.59	1.19	0.29	13.79	17.54	1.59	0.40	19.14	4.95	0.40	0.10	5.35
Enterprises												
Domestic												
Domestic equity	12.68	4.15	1.70	16.83	17.60	5.58	1.40	23.17	4.92	1.43	-0.30	6.35
Domestic borrowing	12.43	20.87	2.73	33.30	16.82	26.09	6.53	42.91	4.40	5.22	3.80	9.62
Total domestic sources	25.10	25.02	4.43	50.12	34.42	31.67	7.92	66.08	9.32	6.64	3.50	15.96
Foreign												
FDI	15.13	10.10	2.76	25.23	20.59	13.44	3.36	34.02	5.46	3.34	0.60	8.80
Foreign borrowing	15.53	10.37	2.80	25.91	21.14	12.62	3.16	33.76	5.61	2.24	0.36	7.85
ODA	15.59	7.94	2.43	23.52	21.18	10.35	2.61	31.53	5.59	2.41	0.18	8.00
Total foreign sources	46.25	28.41	7.99	74.65	62.91	36.40	9.13	99.31	16.67	7.99	1.14	24.66
Total corporation funds	71.35	53.43	12.42	124.78	97.33	68.06	17.05	165.40	25.98	14.64	4.63	40.62
Government entities												
Domestic												
Domestic funds	16.05	12.68	0.62	28.73	21.85	14.80	3.70	36.65	5.80	2.12	3.09	7.92
Foreign												
Foreign borrowing	16.77	11.24	0.29	28.01	22.88	13.67	3.42	36.55	6.11	2.43	3.13	8.54
Bilateral ODA	17.23	9.28	0.30	26.50	23.50	12.19	3.05	35.69	6.27	2.91	2.75	9.18
Multilateral ODA	149.62	44.07	0.90	193.69	188.89	50.40	10.71	239.29	39.27	6.33	9.81	45.60
Total foreign sources	183.62	64.58	1.49	248.20	235.27	76.25	17.18	311.52	51.65	11.67	15.69	63.32
Total government funds	199.67	77.26	2.11	276.93	257.12	91.05	20.88	348.17	57.45	13.79	18.78	71.24
Total Funds	**283.61**	**131.88**	**14.82**	**415.49**	**371.99**	**160.71**	**38.34**	**532.70**	**88.38**	**28.83**	**23.51**	**117.21**

Source: Results of assessment