

FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA



G.M.V

NATIONAL STRATEGY AND ACTION PLAN FOR THE IMPLEMENTATION OF THE GREAT GREEN WALL INITIATIVE IN ETHIOPIA

JULY 2012



List of acronyms

ADLI:	Agriculture Development Led Industrialization
AMAREW:	Amhara Microenterprise Development, Agricultural Research, Extension and Watershed Management project
AUC:	Africa Union Commission
asl:	Above sea level
bsl:	Below sea level
CAADP:	Comprehensive Africa Agriculture Development Program
CBO:	Community Based Organization
CEN-SAD:	Community of Saharan and Sahelian States,
CIFOR:	Centre for International Forestry Research
CRGE:	Climate-Resilient Green Economy
CSE:	Conservation Strategy of Ethiopia
CSIF:	Country Strategic Investment Framework
CSO:	Civil Society Organization
CWMOs:	Community Watershed Management Organisations Desertification
ECA:	Economic Commission for Africa
ENCCD:	Ethiopian NGOs/CBOs Co-ordination Committee on
EPA:	Environmental Protection Authority
EPACC:	Ethiopian Programme of Adaptation to Climate Change
FDRE:	Federal Democratic Republic of Ethiopia
FfE:	Forum for Environment
FfW:	Food for Work
GEF:	Global Environmental Facility,
GDP:	Gross Domestic Production
GGWSSI:	Great Green Wall for the Sahel and Sahara Initiative
GM:	Global Mechanisms (GM),
GO:	Government Organization
GTP:	Growth and Transformation Plan
GTZ:	Gesellschaft fur Technische Zusammenarbeit
IEC:	Information, Education and Communication
IGA:	Income generating activities
IGAs:	Income Generating Activities
IMF:	International Monetary Fund
INRM:	Integrated Natural Resources Management
ITCZ:	Inter Tropical Convergence Zone
JICA:	Japan International Cooperation Agency
LIA:	Labor intensive approach
MDGs:	Millennium Development Goals
MERET PLUS:	MERET through Partnerships and Land Users Solidarity
MERET:	Managing Environmental Resources to Enable Transitions
MoA(RD):	Ministry of Agriculture (and Rural Development)
MoFED:	Ministry of Finance and Economic Development
MoWR:	Ministry of Water Resources
NAGGWE:	National Agency for Great Green Wall Ethiopia
NAGGWI:	National Agency for the Great Green Wall Initiative

NAP:	National Action Programme to Combat Desertification
NCB:	National Coordinating Body
NEPAD:	Partnership for Africa's Development
NFPAs:	National Forest Priority Areas
NFSS:	Nation Food Security Strategy
NGO:	Non-Governmental organization
NPP:	National Population Policy
NRS:	National Regional States
NSC:	National Steering Committee
NSC:	National Steering Committee
OFWE:	Oromia Forestry and Wildlife Enterprise
ORDA:	Organization for Rehabilitation and Development of Amhara
OSS:	Sahara and Sahel Observatory
PASDEP:	Plan for accelerated and sustainable development to end poverty
PFM:	Participatory Forest Managements
PRSP:	Poverty Reduction Strategy Paper
PSNP:	Productive Safety Net Program
RAP:	Regional/State Action Programme
REST:	Relief Society of Tigray
RWH:	Rain water harvesting
SARDP:	Amhara National Regional State (ANRS) Rural Development Project
SDPRP:	Sustainable Development and Poverty Reduction Programme
SIDA:	Swedish International Development Agency
SLMP:	Sustainable Land Management Program
SNNPRS:	Southern Nations and Nationalities and People's Regional State
SSI:	Small Scale Irrigation
STC:	Scientific and Technical Committee
SWC:	Soil water Conservation
ToT:	Training of Trainers
TCP:	Technical Cooperation Programme
UNCCD:	United Nations Convention to Combat Desertification
UNEP:	United Nations Environment Programme
UNFCCC:	United Nations Framework Convention on Climate Change
UNCCB:	United Nations Convention to conserve biodiversity
USD:	United States Dollars
WEMP:	Water efficient management plan
WFP:	World Food Programme
WHIST:	Water Harvesting and Institutional Strengthening in Tigray Project
WLCA:	Wild Life Conservation Areas

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Executive summary

Desertification is a major threat to Africa where two-thirds of the continent land mass is dry lands and deserts. Particularly in the Sudano-Sahelian region of Africa, vast dry lands are inhabited by farmers and pastoralists whose traditional livelihoods heavily depend on the goods and services provided by the limited forests, trees, shrublands and rangelands. Unsustainable use, poverty and climate change are increasing the pressure on the natural resources causing desertification to expand.

Despite the global moves to fight desertification through the United Nations Convention to Combat Desertification (UNCCD), little progress has been registered in terms of actions on-the-ground and impact. This lack of action was the basis for the conception of the Great Green Wall for the Sahel and Sahara Initiative (GGWSSI). The GGWSSI was officially endorsed by the Africans as a Pan African program in December 2006 in Abuja, Nigeria. The initiative involves 11 countries along the edge of the Sahara including Ethiopia and Djibouti. The GGWSSI has been conceived as a model to help in the fight against desertification, ensure ecosystem restoration and development of arid and semi-arid zones.

Ethiopia, like most countries in the Sahelian region, is affected heavily by desertification and land degradation. About 75 per cent of the countries land mass is estimated to have been affected by the threat of desertification. This is why Ethiopia belongs to the pioneered countries in initiating and developing the GGWSSI.

As part of the GGWSSI realization process FAO designed a Technical Cooperation Project (TCP) (TCP/RAF/3302 (D)) to provide support to Ethiopia and other four countries (Chad, Djibouti, Mali and Niger) for the preparation of the countries National Strategy and Plan of Action for GGWSSI. This document is the product of the support of FAO to Ethiopia. The strategy document is prepared by international consultants with support and backstopping from a national consultant and the country's GGWSSI focal organization-the Ministry of Agriculture (MoA).

In the process of the document development, stakeholder consultations have been made at various levels. It is worth mentioning that two workshops have been conducted one for consultation at the beginning and the second for validation of the document. Using the information obtained from diverse sources including those from national stakeholders, this strategy and plan of action for the implementation of the GGWSSI in Ethiopia has been developed and validated.

The strategy document highlights the evolution of the GGWSSI; presents assessment of Ethiopia's biophysical, socio-economic and policy, legislation and institutional aspects as they relate to the initiative and potential areas across which the GGWSSI development could traverse in the country. It also highlights past integrated natural resources management experiences in the country, lesson learnt from and currently under implementation national development programs and plans for aligning the GGWSSI for increasing synergy and effectiveness both cost wise and in impact.

The strategy consists of six pillars namely: (i) sustainable management of improved production systems, (ii) development of basic socio-economic infrastructures, (iii)

development of income generating activities, (iv) promotion of good local governance, (v) capacity building of stakeholders and (vi) research and knowledge management.

These pillars have been inclined into 4 programmes for ease of implementation; these programmes encompass sub-programmes with objectives, outputs and activities presented in logic of intervention for the GGWSSI in Ethiopia.

For the five-year piloting plan a budget estimate of **Sixty Six million Seven Hundred and Eighty Thousands (66,780,000)** US dollars is proposed.

A coordination mechanism and system of monitoring and evaluation of the initiative has been proposed. Essential is that a National Agency for Great Green Wall Initiative in Ethiopia (NAGGWE) has been proposed to handle all issues related to the implementation, coordination, and monitoring of the initiative. Concurrently, a national scale 'national steering committee' and a scientific and technical committee have been proposed.

The following bullet points outline expected outcomes upon the implementation of the GGWSSI in Ethiopia:

- Recovery, development and diversification of agriculture and livestock through the control of water resources by creating retention ponds, artificial lakes and water works to improve production systems;
- Reduction of soil erosion due to the presence of a vegetative cover that will help reduce wind speed and facilitate the infiltration of rainwater, increasing organic matter contributing to the restructuring of degraded soils;
- Increasing the rate of reforestation in the grip of GGWSSI for the restoration of ecological balance, conservation, recovery of plant and animal biodiversity and increased coverage of local needs for forest products, including wood and fire service, but also in non-wood products (gums, resins, roots, leaves, bark, fruits, etc. pharmacopoeia), and
- Improvement of the peoples' standard of living and health through income generation and development of basic social infrastructure that will help bring back the "ecological migrants" into their rehabilitated areas.

Background to the GGWSSI

Desertification has been a major threat to development for countries in the Sahelian and Sahara regions of Africa. Countries in the region host vast area of dry lands and desert that are also experiencing impacts of climate change that exacerbates the pressure on natural resources that already suffered heavy stress from a growing population and pervasive poverty. Most of the countries in the region are parties to the United Nations Convention for Combating Desertification (UNCCD) and have developed their respective national action plans (NAP) to fight desertification. However, little progresses and achievements have been made so far with respect to actions on-the-ground to reverse desertification and improving human welfare. This has prompted his excellence Olusegun Obasanjo, the former President of the Federal Republic of Nigeria, to pioneer the new idea of a Pan Africa program called "Great Green Wall" at the interface of the Sahara/Sahel stretching from Senegal in the west to Djibouti in the east. The Seventh Conference of Leaders and Heads of State of the CEN-SAD held in Ouagadougou, Burkina Faso in 2005 adopted the initiative, followed by an official endorsement of the program by African Union as a Pan African program under the acronym Great Green Wall for the Sahel and Sahara Initiative (GGWSSI) in December 2006 in Abuja, Nigeria. This was followed by a further endorsement by the African Union's Eight Ordinary Session of the Assembly of Heads of State and Government meeting on 29 and 30 January 2007 in Addis Ababa, Ethiopia. A series of technical and strategic documents has been prepared by the Secretariat of the CEN-SAD, in collaboration with the Sahara and Sahel Observatory (OSS), Member States and partners. A concept paper and an action plan for 2008-2010 were presented at the Summit of the Conference of Leaders and Heads of State of CEN-SAD, held in Niamey, Niger.

The overall goal of the GGWSSI is to improve the resilience of human and natural systems in the Sahel-Saharan zone against climate changes through a sound ecosystems management and the sustainable development of land resources, the protection of material and immaterial rural heritage and the improvement of the living conditions and livelihoods of populations living in these areas.

Several conferences of Experts and Ministers as well as a panel in 2008 helped to finalize a Concept Note and documents about the criteria for defining limits of the GGWSSI, a list of suitable plant species, the role of rain water harvesting basins in the GGWSSI, the specifications for the development of the project document, and on the indicative cost of this pan-African initiative that calls for solid co-operation mechanisms at regional, sub-regional, and international levels, through a comprehensive and concerted approach. Recommendations and decisions from these meetings triggered actions that produced the following outputs:

- A Concept Paper, elaborated by The African Union Commission (AUC) with the collaboration with several partners (UNEP, FAO, UNCCD, OSS and WFP) was presented in December 2006 in Abuja, Nigeria, which was then endorsed by the African Heads of State and Government at their 8th Ordinary Session in Addis Ababa, Ethiopia in January 2007, with the recommendation to the Commission to develop an implementation plan that was completed in September of that same year;
- The CEN-SAD Secretariat and the OSS developed a concept paper and a plan of action (2008-2010) from a series of studies and technical consultations with member

States and partners, and the Conference of Leader and Heads of State of CEN-SAD (Niamey, Niger) requested the Republic of Senegal to give content to the idea of implementing the GGWSSI. This led to the elaboration of several documents that have been synthesized into a draft “Plan of Action for the Implementation of the GGWSSI”.

Ethiopia, like many other countries in the Sahel, is heavily affected by a widespread land degradation and desertification. About 75% of the country’s landmass is estimated to have been affected by desertification (Hawando, 1997; NAP, 1997; CEN-SAD, 2008). All forms of land degradation are occurring in Ethiopia: water and wind erosion; deforestation, loss of soil fertility, loss of biodiversity, salinization, alkalization and soil acidification. Statistics on natural resources degradation in the country are staggering:

- Loss of 140,000-200,000 ha per annum of forest and woodlands;
- annual nutrient losses of 30 kg/ha of nitrogen and 15-20 kg/ha of phosphorous;
- soil loss due to water erosion of 2 billion metric tons/yr (average of 42 tons/ha/yr).

Land degradation in Ethiopia stems largely from improper land use and poor land management practices, population pressure, overgrazing, deforestation and the use of crop residues and dung for fuel in rural areas. These are further exacerbated by factors such as inadequate input supply, insecure land tenure, weak agricultural research and extension services and poor marketing systems. Decades of policy failures and lack of capacity to implement government interventions also contribute to the degradation of land and other natural resources. These problems collectively have contributed to declining crop productivity, while growing human and livestock populations have led to agricultural encroachment on to marginal areas, significantly reducing the already dwindling forest and woodland resources of the country. Moreover, the dry lowlands, which are the focus areas of GGWSSI, are experiencing erratic rainfalls sometimes with very severe droughts the impact of which, together with land degradation, human population growth and climate change, has greatly impaired the country’s economic and social development and its food security status. It has been well recognized that combating desertification, land degradation and mitigating the effects of drought is the basis for accelerated sustainable development, poverty reduction and insuring food security in Ethiopia; the realization of which mainly requires strong partnership building and commitment at regional and international levels. Cognizant of this fact, the Ethiopia Government was one of the pioneering countries to accept and endorse the GGWSSI.

The initial vision of GGWSSI focused on tree planting, but this has later been evolved into a more ecologically appropriate and socio-economically sustainable holistic approach, which would be more effective and directly benefit local land and water users through the identification and up scaling of best land management practices. The GGWSSI is now considered as a new approach to development with the peculiarity of uniting all African countries along the Sahara involved in the same battle for environmental restoration, combat desertification and enhance the wellbeing of their community. The initiative reflects a strong political commitment of the States concerned. Being an integrated intervention addressing multi-sectoral and multi-dimensional issues that cut across a wide range of aspects including natural resources (land, water, forest) management, pastoral development, sustainable agricultural production as well as gender and youth mainstreaming into development for improvement of livelihoods, the initiative will require huge investment of financial and human resources. It is also a long term engagement

stretching over several decades; although for the piloting phase that concerns this strategic document, a planning horizon of five years is considered.

A Pan-African Agency for the coordination of the implementation of the GGWSSI has already been created and is domiciled in Ndjamena, Chad. The overall vision of the initiative is to mobilize all stakeholders to address desertification and environmental degradation in coordination with the activities of natural resource management, taking into account the overall context of improving livelihoods of local communities in the Sahel and Sahara zones. The programme is not an isolated endeavor but seeks to capitalize on the results of previous experiences, while promoting synergies with on-going continental regional and national development programmes. It seeks to strengthen particularly the commitment of countries to implement global and regional initiatives such as the United Nations Convention to Combat Desertification (UNCCD), the United Nations Framework Convention on Climate Change (UNFCCC), The Convention on Biological Diversity (UNCBD) and the Comprehensive African Agriculture Development Programme (CAADP) of the African Union. The specific objectives of GGWSSI comprise:

- the satisfaction of domestic needs (in terms of wood and non-wood products, and pastures);
- the promotion of income generating activities and the establishment of basic social infrastructures;
- the diversification of production systems;
- the conservation / enhancement of biodiversity, and
- the increase in carbon sequestration in vegetation cover and soil.

2. Overview of Ethiopia

2.1. Biophysical features

Ethiopia is located in the Horn of Africa between 3° and 15° North latitude, 33° and 48° east longitude. It shares boundaries to the east and southeast with Djibouti and Somalia, to the north with Eritrea, to the south with Kenya, and to the west with the Sudan and Southern Sudan. The country covers 1.13 million square kilometers, with a wide altitudinal variation ranging from 110 meters (m) below sea level (bsl) in Kobar Sink to 4,620 m above sea level (asl) at Ras Dashen. The entire landscape is divided into two physiographic features: the highlands- areas above 1500 m asl altitude that share 37 per cent of the country and the lowlands- areas with altitude below 1500 m asl that covers 63 per cent of the country (Friis et al., 2010). The Great African Rift Valley runs diagonally across the country from northeast to southwest separating the western and southeastern highlands. The highlands on each side of the Rift Valley give way to extensive semi-arid and arid lowlands to the east, south, southeast and west of the country.



Figure 1: Location map of Ethiopia (Source: MoWR, 2007: Climate Change National Adaptation Programme of Action (NAPA) of Ethiopia).

Geographically Ethiopia belongs to the tropics but its climatic conditions are influenced not only by latitude but also by altitude (elevation) and the seasonal migration of the Inter Tropical Convergence Zone (ITCZ) following the position of the sun relative to the earth and the associated atmospheric circulation. As the result the country comprise diversified climate that combines tropical, sub-tropical and temperate types. Typical tropical climate is encountered in the low-lying areas, especially in the west and southwest. Temperature decreases towards the interior of the country where much of the area is mountainous. Maximum and minimum temperatures in the country range from over 40°C in the lowlands to less than 10°C in the highlands. The rain fall distribution is seasonal and is mainly governed by the ITCZ that passes over Ethiopia twice a year. The ITCZ movement causes variation in the wind flow patterns and the onset and withdrawal of winds from north and south. The mean annual rainfall ranges from 100 mm to 2800 mm depending on the site. The South-western region receives the highest annual rainfall which goes up to 2800 mm. The central and northern regions receive moderate rainfall that gradually declines towards the low-lying Arid and Semiarid Lands (ASALs) that receive an annual rainfall ranging between 100 - 700 mm. The Danakil Depression, the lower Awash River Basin and Eastern Ogaden are the driest areas of Ethiopia.

Traditionally five broad climatic zones are recognized in Ethiopia based on altitude and temperature namely: *Wurch* (cold climate at more than 3,000 m asl), *Dega* (temperate like climate – highlands between 2,300-3,000 m asl), *Weynadega* (warm 1,500 -2,300 m asl), *Kola* (hot and arid climate, less than 1500 m asl), and *Berha* (hot and hyper arid climate in the lowlands). These are typically sub-divided according to rainfall (wet over 1,400 mm/yr, moist 900-1,400 mm/yr, and dry below 900 mm/yr).

The ASALs are portion of the country relevant for the GGWSSI. These areas cover approximately 65 per cent of the country’s landmass (Mulugeta and Demel, 2004). The arid lands are characterized by mean annual rainfall of between 100 - 700 mm, mean annual temperature of 21-27.5 °C and mean annual potential evapotranspiration of between 1700 - 2600 mm. These areas comprise about 40 per cent of the Ethiopian Somali and 30 per cent

of the Afar regions and a small part of the north-eastern part of Wollo and 5 per cent of Oromia Region towards the southern tip which borders with the Ethiopian Somali Region (EPA, 1998). These semi-arid zones experience mean annual rainfall of between 300 – 800 mm, a mean annual evapotranspiration of 1600 - 2100 mm and a mean annual temperature ranging from 16 to 27 °C. The semi-arid areas cover almost 90 per cent of Tigray Region, 20 per cent of the southern, eastern and north-eastern parts of Oromia, over 60 per cent of Benishangul, some parts of the Southern Nations and Nationalities and People's Regional State (SNNPRS) as well as the extreme north-eastern part of the Ethiopian Somalia Region (including Jijiga) (EPA, 1998).

The climatic and landscape diversity have contributed to the formation of diverse ecosystems in Ethiopia. The ecosystems host a great diversity of flora and fauna resources. The flora of Ethiopia is estimated to comprise about 6,500 - 7,000 plant species; 12 per cent of these plant species considered as endemic. Endemism is reportedly high on the plateaus, mountains, in the lowlands particularly in the eastern and southeastern lowlands and in the western and southwestern rainforests. Diverse vegetation formation also exists in the country. The vegetation types range from the dry to very dry *Acacia* and *Commiphora* bushlands in part of the ASALs such as those in the northeast, east and south to the tropical rain forests and cloud forests in the southwest. Several attempts have been made to classify the vegetation of the country, and the most recent work of Friis et al. (2010) recognized 12 major vegetation types listed below:

- Desert and semi-desert scrubland;
- *Acacia-Commiphora* woodland and bushland;
- Wooded grassland of the Western Gambela region;
- *Combretum-Terminalia* woodland and wooded grassland;
- Dry evergreen Afromontane forest and grassland complex;
- Moist evergreen Afromontane forest;
- Transitional rain forest;
- Ericaceous belt;
- Afroalpine vegetation;
- Riverine vegetation;
- Freshwater lakes, lakeshores, marshes, swamps and floodplains vegetation, and
- Salt-water lakes, lake shores, salt marshes and pan vegetation.

Forests and other vegetation resources in Ethiopia provide goods and services in terms of fertile croplands to sustain agricultural productivity, act as natural rangelands (including forest grazing) to sustain one of the largest national livestock populations in the world, biomass for energy, diverse non-wood forest products (including herbal medicines to safeguard human and livestock health) that contribute to subsistent and cash needs of millions of rural and urban households (Mulugeta, 2008). The forest resources also contribute significantly to Ethiopia's national economy through exports (mainly non-wood forest products), import substitutions, employment generation and expansion of the gross domestic production (Mulugeta, 2008). They provide most, if not all, of the biomass used for energy in the country. The annual harvested fuelwood volume is estimated at 109 million m³, which worth about 420 million USD. Most importantly, the forests provides various environmental services such as soil protection against erosion, regulation of climate and water flow, protection of watersheds, conservation of biodiversity and as carbon sinks (Tsegaye, 2008).

On the other hand, forests and vegetated areas in Ethiopia have been subject to intense deforestation and degradation for millennia. This decline of forest cover is most evident in the northern and central highlands, and is gradually spreading to the south-western and all lowlands areas where relatively dense forests and woodlands are still remaining. Estimate of deforestation rate in the country ranges from 140,000–200,000 ha per annum (Reusing, 1998; FAO, 2010). Today, the high forests in the country covers about 4.7 million ha only (≈ 3.6 per cent of the country's landmass) (WBISPP, 2004). Woodlands in the ASALs of Ethiopia are also increasingly subject to deforestation and degradation due to population growth and agri-business investment related problems (Mulugeta et al. 2012).

2.2. Socio-economic characteristics

Ethiopia is the second most populous countries in sub-Saharan Africa. The current population of Ethiopia is estimated at 85 Million. Around 83 per cent of the population lives in rural areas (CSA, 2007). Life expectancy at birth was estimated at 58.7, and population growth rate is 2.1 (Table 1), and the population is projected to reach 129.1 million by the year 2030.

At US\$358 per capita, Ethiopia's GDP is much lower than the average for sub-Saharan Africa but, while the problem of poverty is still high, there has been significant progress since 1991 in key human development indicators. Primary school enrollments have tripled, child mortality has almost been cut in half, and the number of people with access to clean water has more than doubled. More recently, poverty reduction has been accelerated. The poverty headcount, which stood at 46 per cent in 1995/96, and 44 per cent in 2000/01, fell to 39 per cent in 2005/2006. However Ethiopia is still a long way for achieving many of the UN millennium development goals by 2015, given the country's very low starting point. Table 1 presents summary of several basic socio-economic characteristics of the country.

Ethiopia's economy is founded on agriculture (crop combined with livestock). The sector is the mainstay of the country's economy in export, GDP and employment. It accounts for 46 per cent of GDP, generates about 80 per cent of the total employment, provides about 40 per cent of the earnings from export (FDRE, 2011).

Land is a public property in Ethiopia. Out of the total area of 113 million hectares 69 per cent is classified as agriculturally suitable land for crop and livestock production. Until now only 14 million hectares (17 per cent) is put into cultivation. Smallholder subsistence farming system predominates in Ethiopia and the average plot of land worked per family is one hectare. Smallholder farmers form the backbone of the agricultural sector, cultivating 95 per cent of the cropped area, and producing 90-95 per cent of the country's cereals, pulses and oilseeds. Major cash crops for export are coffee, cereals, flowers and pulses. The farming system is rain-fed; only one per cent of arable land is irrigated today. Thus, Ethiopia's agriculture is liable to climate change impacts such as droughts and dry spells, a typical attributes of Ethiopia's agricultural sector. Farming practices across the country can be grouped in to three major agricultural systems: highland mixed (crop + livestock) farming system, low plateau and valley mixed agriculture, and the pastoral livestock production system that is practiced mainly in the ASALs. In the arid zone, nomadic and semi-nomadic pastoral livestock production dominates with camels and goats as important components. In the semi-arid, semi-nomadic or semi-sedentary zone, livestock production is practiced. The

major components of the livestock production here are cattle and sheep, although camels and goats are found.

Table 1.Key Socio-economic indicators for Ethiopia

	Indicators	2004/05
1.	Demography	
	Total population (in millions) (in 2010)	85
	Population growth rate (average rate of recent years in %)	2.1
	Fertility rate (2004/05)	4.7
	Infant mortality rate per 1000	67.8
	Urban population (%)	16
	Rural population (%)	84
	Population density (per/km2)	66
	Life expectancy at birth	58.7
2.	Education	
	Gross Primary Enrolment (1 to 8) (%)	79.8
	Literacy rate (%)	37.9
	Ratio of girls to boys (in primary school)	0.84
3.	Health	
	Primary health services coverage (%)	70
	Infant mortality rate	77/1000
	Under-five mortality rate	123/1000
	Maternal mortality rate	871/100000
4.	Water	
	Access to clean water- Rural (within distance of 1.5 km) (%)	35
	Access to clean water- Urban (within distance of 0.5 km) (%)	80
	Cumulative farm land developed with irrigation (ha)	62057
5.	Infrastructure	
	Average Time taken to all-weather road (hours)	5.0
	Road density (km/1100 km2)	33.2
	Population with access to electricity (%)	16
	Irrigated land out of the total irrigable land (%)	5
6.	Economy	
	GDP at constant prices in thousand Birr (for 2010)	138 Billion
	GDP per capita in USD for 2010	358
	GNI per capita in USD for 2006 in terms of purchasing power parity	1190*
	Share of agriculture & allied activities in GDP (%)	46
	Share of industry in GDP (%)	14
	Share of services in GDP (%)	40
	GDP growth rate (%)	10.6
	Growth rate of agricultural value added (%)	13.4
	Growth rate of industry (%)	8.1
	Growth rate of services (%)	8.4
7.	Agriculture	
	Major crops production (million tons)	16.7
	Meat production (1000 metric tons)	566

* **Source:** World Bank, IMF, UN, MoFED

2.3. Policy and legal framework

Since 1991 Ethiopia adopted a federal system of administrative composing 9 National Regional States (NRS) (Tigray, Afar, Amhara, Oromia, Somali, Benishangul-Gumuz, Southern Nations, Nationalities and Peoples Region (SNNPR), Gambella and Harari) and two city Administrative Councils (Addis Ababa and Dire Dawa). The NRS and the Administrative Councils are further divided into 62 zones and 523 woredas. The federal system devolved authorities and administrative powers to the NRS and city Councils. The Regions have extensive and exclusive powers in all matters except defense, foreign affairs, economic policy, the conferring of citizenship, the declaration of a state of emergency, the deployment of the armed forces where situations beyond the capacity of the regions arise, the printing of currency, the establishment and administration of major development undertakings, building and administrating major communications networks and the like. Thus, the Regional States have the power to raise their own revenues and plan and execute their own development activities including natural resources management related issues within the framework of policies issued by the of the Federal Government. This is believed to have improved how natural resources management are planned and implemented in the country.

Ethiopia's commitment to environmental management and sustainable development is reflected in the incorporation of several environmental issues into the supreme law of the land – the Constitution. The 1994 Constitution of Ethiopia under Articles 44 and 92, states that all citizens shall have a right to live in a clean and healthy environment, and the Government and citizens shall have a duty to protect the environment. It further indicates that the design and implementation of programmes and projects shall not damage or destroy the environment. The Constitution also incorporates a number of other provisions relevant for the protection, sustainable use and improvement of the environmental resources of the country. The incorporation of these important provisions into the supreme law of the country uplifted environmental concerns to the level of fundamental human rights.

Moreover, Federal and Regional Governments have formulated and issued several policies, programmes and strategies to insure sustainable development and environmental health. Some of these policies and programmes that are relevant to the GGWSSI include: the Agricultural Development Led Industrialization (ADLI) policy, the Conservation Strategy of Ethiopia (CSE), the environmental law of Ethiopia, the Forestry Action Plan (EFAP), the three subsequent poverty reduction plans (SDPRP, PASDEP and GTP), the National Population Policy (NPP), the National Food Security Strategy (NFSS), the forest policy and the Policy on Pastoral Development.

The broad national economic development policy of Ethiopia is known as the Agricultural Development-Led Industrialization (ADLI). ADLI put forward in 1993 is a long term development policy strategy of the government to realize the two main goals of the Government of Ethiopia, which are reduce poverty and achieve sustainable and fast economic growth. The objective of ADLI is to strengthen the linkages between agriculture and industry by increasing the productivity of small scale farmers, expanding large scale

private commercial farms, and by reconstructing the manufacturing sector in such a way that it can use the country's human and natural resources.

As part of the ADLI economic policy framework Ethiopia has developed and implemented three (two completed and the third just launched) generations of poverty reduction strategies. The first generation programme was called Sustainable Development Plan to Reduce Poverty (SDPRP) resulted in an increase in pro-poor spending from about 28% of the budget in 2000/01 to 57% in 2004/05, due in part, to direct budgetary support being provided by the donor community. Following the successful accomplishment of SDPRP, the second generation programme called Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) (2006-2010) was developed and implemented, and now the third generation programme called Growth and Transformation Plan (GTP) (2011-2015) is under way. The two earlier successive plans recognized poverty reduction as the core objective of the Ethiopian Government and its economic growth plan. The overall objectives of the SDPRP are to reduce poverty while maintaining macroeconomic stability with a major focus on growth, and a particular emphasis on greater commercialization of agriculture, enhancing private sector development, industry, urban development and a scaling-up of efforts to achieve the Millennium Development Goals. PASDEP was in turn Ethiopia's guiding strategic framework for development for the period 2006 to 2010. It represented the second phase of the Poverty Reduction Strategy Programme (SDPRP). The PASDEP carried forward important strategic directions pursued under the PRSP, and had followed important strategic directions identified under the SDPRP in terms of infrastructure building, rural development, food security, and enhancing capacity. It also outlined new orientations focusing on growth through greater commercialization of agriculture products, private sector development, industry, urban development and a scaling-up of efforts to achieve the Millennium Development Goals (MDGs). These two plans laid the foundation for the third and currently under implementation plan called Growth and Transformation Plan (GTP). These three poverty reduction strategies have encompassed several goals and actions that are in line with the goals of GGWSSI. The experiences gained from the implementation of the poverty reduction plans, therefore, can lay foundation for successful planning and implementation of the initiative within Ethiopia.

Ethiopia has also taken various measures to strengthen its National Early Warning System and Drought Mitigation capacity by enabling the National Meteorological Services Agency and by endorsing the National Policy for Disaster Prevention and Preparedness. This policy aims at concentrating efforts to prevent root causes of vulnerability to drought has also brought significant changes in the country's disaster management system by integrating relief with development.

Following the ratification of the United Nations Convention for Combating Desertification, Ethiopia has prepared its National Action Plan (NAP) in 1998. NAP has several similarities with the GGWSSI strategy, and has direct relevance for the implementation of the initiative. The NAP priority areas are:

- Promoting Peoples participation in sustainable development and natural resource management;
- Improving knowledge on drought and desertification;
- Managing natural resources leading to sustainable development;
- Improving the socio economic environment;
- Improving basic infrastructure;
- Promoting alternative livelihood;

- Intensifying agriculture;
- Promoting awareness;
- Improving institutional organization and capacity;
- Empowering women.

A number of concrete measures and action have been taken to implement NAP. It has been well integrated into the subsequent government poverty reduction strategies such as PASDEP. Furthermore, based on the national strategy district Environmental Management Plans have been prepared and implemented in various districts. Forest, soil and water conservation, area enclosure activities have been exercised as main actions to achieve the desired goals. Furthermore, guideline for the preparation and implementation of WEMP is being prepared, and training for ToT being provided on WEMP preparation and implementation. There also exist in Ethiopia a network of more than 125 national and international NGOs involved in activities related to combating desertification, with a national coordinating body that facilitates needed synergies for a sound implementation of NAP. Focal points have been identified both at the national and regional levels, and have benefited from capacity building training sessions during, which they received technical and material supports for the implementation of NAP.

Ethiopia formulated the first ever comprehensive forest policy in 2007. A forest law enacted with Proclamation No. 94/1994, in 1994 was in use earlier. The main objective of the forest policy is ‘to meet the forest product demands of the society and increase the contribution of forest resources to the national economy through appropriate management’. It identified the following six strategies to achieve the stated objective: (i) promoting private forest development and conservation, (ii) promoting forest development technologies, (iii) strengthening forest product markets, (iv) managing state forests, (v) preventing deforestation; and (vi) establishing an up-to-date information database. This Forest Policy asserts the following key success enabling elements for better management and development of forest resources in the country:

- the involvement of local communities, private entrepreneurs and the State in forest management activities from of the onset and all along of the formulation of the management plan;
- the integration of forestry development with the management of all other natural resources (land, water resources, energy resources, ecosystem and genetic resources, crop and livestock production);
- the selection of suitable species, with emphasis on native tree species in afforestation/reforestation efforts, and
- the utilization of forests based on their regenerative capacity in order to insure sustainability through the formulation and implementation of socially suitable, environmentally sound and economically acceptable management plans that restrict free grazing within protected forest areas.

Moreover, several successes are recognized for the forest sector at the regional levels. Examples include the establishment of the Oromia Forestry and Wildlife Enterprise (OFWE) in Oromia Regional State, the role played by government affiliated NGOs such as the Organization for Rehabilitation and Development of Amhara (ORDA) in Amhara Regional State, and the contribution of the Relief Society of Tigray (REST) in Tigray Regional State in forest development and conservation.

In 2005, Proclamation No. 456/2005 was also issued and is referred to as the Rural Land Administration and Land Use Proclamation which forbids farming and free grazing on rural lands with slopes exceeding 60% that should be devoted to tree planting, perennial crops and forage production. This was reinforced in PASDEP (2005) that developed a plan to increase forest cover in Ethiopia to 9 % by 2010.

Other important national policies and programmes relevant to the GGWSSI implementation process are also summarized in table 2.

Table 2. Other policies and programmes relevant to GGWSSI and their respective goals

No	Policies, programmes or plans	Main goal
1	The Conservation Strategy of Ethiopia and the Regional Conservation Strategies	The CSE provides an umbrella strategic framework, detailing principles, guidelines and strategies for the sustainable conservation and management of the country's natural resources and biodiversity. The CSE deals with eleven sectoral and eleven cross-sectoral issues.
2	Energy policy	The objective of this policy is to plan and expand the energy supply required for economic development, particularly the implementation of the ADLI, while at the same time, taking measures to transform energy consumption in the country from traditional to modern sources. The policy also emphasizes the need to take energy utilization, efficiency increasing measures as well as the promotion, whenever feasible, of indigenous energy sources which are cost-effective and reliable. The goals and objectives of this policy are to be attained through strategies which give priority to the development of hydro-power for modern energy development while afforestation will be expanded to meet traditional energy requirements.
3	Population policy	Objectives of this policy are to ensure a spatially balanced population distribution pattern with a view of maintaining environmental security, improve productivity of agriculture and introducing off-farm non-agricultural activities, and information and education programmes addressing issues pertaining to small family size and its relationship with human welfare and environmental security.
4	Social policy	This policy's focus is on poverty as a major social problem. The strategies devised to solve this problem include expansion of social services in the areas of health, education, creation of employment opportunities and establishing and strengthening a social security scheme.
8	National policy on biodiversity conservation, research and development	This is a policy directive with regard to the need to explore, collect, characterize, evaluate, conserve and utilize biodiversity. The policy directives emphasize the importance of community participation in the conservation and sustainable utilization of biodiversity resources together with the need to provide for access and benefit sharing for communities to and from biodiversity resources.

9	National agricultural research policy and strategy	This policy and strategy document has a number of objectives, including the development and selection of agricultural technologies which bring about increased productivity which will in turn bring about self-sufficiency in food. Agricultural research shall direct itself to solving the major issues and problems in agriculture, focusing on environmental protection and development and designed to get sustainable agricultural productivity in terms of quantity, quality and variety in the peasant agricultural sector. Research to develop appropriate technology by building upon traditional technologies shall be encouraged based-on the proper understanding of the farming systems and experiences.
10	Wildlife policy	The overall goal of this draft policy is stated as the preservation, development, management and sustainable utilization of Ethiopia's wildlife resources for social and economic development and for the integrity of the biosphere.
11	Environmental impact assessment proclamation	The objective of this proclamation is to facilitate the implementation of the environmental rights and objectives enshrined in the Constitution and the maximization of their socio-economic benefits by predicting and managing the environmental effects which a proposed development activity or public instruments might entail prior to their implementation

2.4. Multilateral agreements on environmental issues

Ethiopia is a signatory of several multilateral agreements on Environment. Prominent among these are:

- the Convention on Biodiversity Conservation (CBC) by the United Nations;
- the Convention on Combating Desertification (UNCCD);
- the United Nations Framework Convention on Climate Change (UNFCCC).

These Conventions have subsidiary initiatives that provide financial and technical support that enable Ethiopians to manage their forest resources sustainably. For instance, the Global Environmental Facility (GEF), the Special Climate Change Fund, Global Mechanisms (GM), Least Developed Countries fund and similar arrangements offer financial and technological support for sustainable forest management efforts.

In total Ethiopia has so far adopted about 15 multi-lateral environmental agreements (Table 3).

Table 3. Multilateral environmental agreements to which Ethiopia is a party (Source: Mwebaza et al., 2009)

No.	Multilateral environmental agreements	Adoption	Entry into force	Adoption by Ethiopia
1	Convention on Biological Diversity	27 May, 1992	29 December 1993	31 May 1994 Proclamation 98/1994
2	Cartagena Protocol on Biosafety to the convention on biological diversity	January 2000	September 2003	Signed 24 May 2000 Ratified 22 September 2003 Proclamation 362 2003
3	Convention to Combat Desertification	1994	26 December 1996	Ratified – 1997 Proclamation 80 1997
4	International Treaty on plant genetic resources for food and agriculture	November 2001	June 2004	Ratified - 2003
5	Vienna Convention for the protection of the Ozone Layer	March 1985		Became Party on January 1996
6	Montreal Protocol on Ozone depleting substances	September 1987	1 January 1989	Became a Party on January 1996
7	UN Framework Convention on Climate Change (UNFCCC)	1992	March 1994	31 May 1994
8	Kyoto Protocol to the UNFCCC	December 1997	16 February 2005	21 February 2005
9	Stockholm Convention on Persistent Organic Substances	May 2002	17 May 2004	Signed – 17 May 2002 Ratified – 2 July 2002 Proclamation – 279 2002
10	Rotterdam Convention on the Prior informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	10 September 1998		Ratified – 2 July 2002
11	Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal	1989	1992	Ratified – February 2000 Proclamation 192 2000
12	Basel Ban Amendment	22 September 1995		Ratified – 3 July 2003 Proclamation 356 2003
13	Protocol on Liability and	10 December		Ratified – 3 July

	Compensation for Damages resulting from Transboundary Movement of Hazardous Wastes and their disposal	2000		2003 Proclamation 357/2007
14	Bamako Convention on the Ban of the Import into Africa and the Control of the Transboundary movement and management of Hazardous Wastes within Africa	30 January 1991	22 April 1998	Acceded 2002 Proclamation 355/2003
15	Convention on international trade of endangered species of wildlife and flora	Signed – 3 march 1973	Entered into force 1 July 1975	Ratified – 4 July 1989

Ethiopia also adopted the Partnership for Africa's Development (NEPAD). NEPAD was formally adopted at the 37th Summit of the Organisation of African Unity in July 2001, and is an African driven initiative designed to address the current challenges facing Africa, in particular escalating poverty, underdevelopment and the continent's continued marginalisation. The challenges and options for change in the agricultural sector are set out in the NEPAD Comprehensive Africa Agriculture Development Programme (CAADP). CAADP focuses on four mutually reinforcing investment 'pillars' aimed at making rapid improvements in Africa's agriculture, food security and trade balance namely: (i) extending the area under sustainable land management and reliable water control systems; (ii) improving rural infrastructure and trade related capacities for market access; (iii) increasing food supply and reducing hunger; and (iv) agricultural research, technology dissemination and adoption. CAADP's first pillar is directly concerned with SLM and aims to: (i) reverse fertility loss and resource degradation, and ensure broad-based and rapid adoption of sustainable land and forestry management practices in the small-holder as well as commercial sectors; and (ii) improve management of water resources while expanding access to irrigation. The Ethiopian government has not yet ratified some important treaties, such as the Ramsar Convention on Wetlands, and the Convention on Migratory Species, both of which are also important in terms of the GGWSSI.

3. Experiences and lessons learnt from past integrated natural resources management programmes in Ethiopia

Ethiopia has been engaged extensively in natural resources management, particularly following the 1970s and 1980s unpopular famines that hit the country. A number of developmental projects and programmes have been initiated and implemented by the Ethiopian governments and/or in collaboration with donor (bi-lateral and multi-lateral) communities and NGOs. Most of the early works focused on soil-water conservation, soil/land management for improved agricultural productivity and reforestation/afforestation practices. These early works are also recognized for their use of an approach commonly called Food-for-Work (FfW) relief assistance. The FfW approach focused mainly to mitigate soil erosion through the construction of physical structures such as construction of terraces, check dams, cut-off drains and micro-basins, and to a limited extent afforestation and revegetation of degraded and fragile hillside areas, and a large

volume of works have been done and some ecological benefits accrued from it, although a number of limitations have also been known to encounter it (Debele, 1994; Betru, 2002).

One of the early and long running development programmes in Ethiopia is called MERET. MERET stands for Managing Environmental Resources to Enable Transitions and has been running for about three-decades by the joint efforts between the World Food Programme (WFP) and the government of Ethiopia. Over time the MERET programme has evolved into what is called MERET PLUS (“MERET through Partnerships and Land Users Solidarity”). Earlier MERET programme focused much on SWC, however, the lessons gained from it has made it clear that the main objective of Integrated Natural Resources Management (INRM) should not be reducing soil loss but rather enhancement of rural livelihoods through development oriented sustainable land management (Gete 2005; Lakew et al. 2005a, b). Consequently, MERET PLUS (2007-2011) was formulated with expanded packages rather than confined to physical and biological SWC technologies. It also targeted soil fertility management, agro-forestry and forestry development and rehabilitation, income generating activities, homestead gardens and crop diversification, rain water harvesting (RWH) in the form of small household ponds, shallow wells, spring regeneration, and several other development oriented activities and strategies. Both MERET and MERET PLUS are acclaimed to have had positive impacts on both the environment and rural livelihoods.

The two previous poverty reduction strategies (PRSP and PASDEP) also offered great opportunities to tackle land degradation in Ethiopia. Particularly PASDEP prioritized sustainable land management and sector specific strategies to address the problem of land degradation and desertification comprehensively.

In 2008, another long term national programme called Sustainable Land Management Programme (SLMP) was launched. The objective of SLMP is to provide assistance to smallholder farmers to adopt sustainable land management practices on a wider scale to that will ultimately result in reversing land degradation in agricultural landscapes, increase agricultural productivity and income growth and protect ecosystem integrity and functions. SLMP is taking a more systematic implementation approach by targeting small watersheds, but in a larger watershed planning context. Important feature of the SLMP is the explicit and clear focus on enhancing farmers’ incomes and food security, for example, through support for small scale RWH, micro-irrigation, agro-forestry and other income generation activities. Unlike the MERET programme that focused mostly on low potential areas, SLMP shifted focus to high potential areas.

The SLMP is a holistic framework under which government, civil society, and development partners can work together to promote and scale up SLM. It targets to guide prioritization, planning, and implementation of SLM to more effectively address poverty, vulnerability, and land degradation, and seeks to scale up SLM practices with proven potential to restore, sustain, and enhance land productivity. The programme is highly focused on sustainability (institutional, financial); emphasizes active community participation and leadership, offering a choice of technologies; and seeks quick and tangible benefits for people while avoiding perverse incentives. With the support from the World Bank and GEF, a five-year SLM Project implementation is in progress already in 35 woredas in six Regional States i.e. Amhara, Oromia, Tigray, SNNP, Beneshangul Gumuz, and Gambela. The fact that SLMP is not including the pastoral areas in the arid and semi-arid areas of Ethiopia, mainly in Somali and Afar Regional States, make it of little relevance for the GGWSSI.

Another important national programme is the Productive Safety Net Programme (PSNP). The objectives of PSNP are to provide transfers to chronically food insecure people in chronically food insecure woredas. It provides support or grants for the creation of productive and sustainable household and community assets and incomes; and contributes to large-scale rehabilitation of severely degraded areas. It does this through public works on public or community lands using FfW and cash for work (for SWC, feeder roads, water supply, etc.) and farmer training. The SWC technologies and implementation strategy are based on those developed under MERET. The project provides grants to households whose adults participate in labour-intensive public works (mostly watershed and communal land management related work) and to households that are labor-poor and cannot undertake public works. PSNP already shows significant reductions in soil erosion and sedimentation, increased vegetation cover, increased forage for livestock, enhanced yields and base flows of springs, and increased access to safe water – all with a high benefit-cost ratio. The evaluation recommends inclusion of work on private lands, arguing the lack of attention to adjacent private lands is undermining the sustainability of improved land management on public lands, and reduced soil erosion on private lands is also a public as well as private good. However, other studies have report more nuanced and qualified findings.

Soil fertility management for improved agricultural productivity is also one of the major conservation oriented development and research programmes in which the government of Ethiopia has been heavily engaged. With respect to soil fertility management the major focus was on the importing, distributing and application of chemical fertilizers to improve the declining nutritional status and productivity of soils. As the result, introduction of fertilizer began in the 1970s and since then its use for productivity increment has continued. The use of fertilizer has increased from 947 metric tons in 1971 (when it was first introduced) to 142,000 metric tons in 1992, 168,000 metric tons in 1999, which remained more or less over 150,000 metric tons throughout the 2000s, except in 2004 (Figure 2).

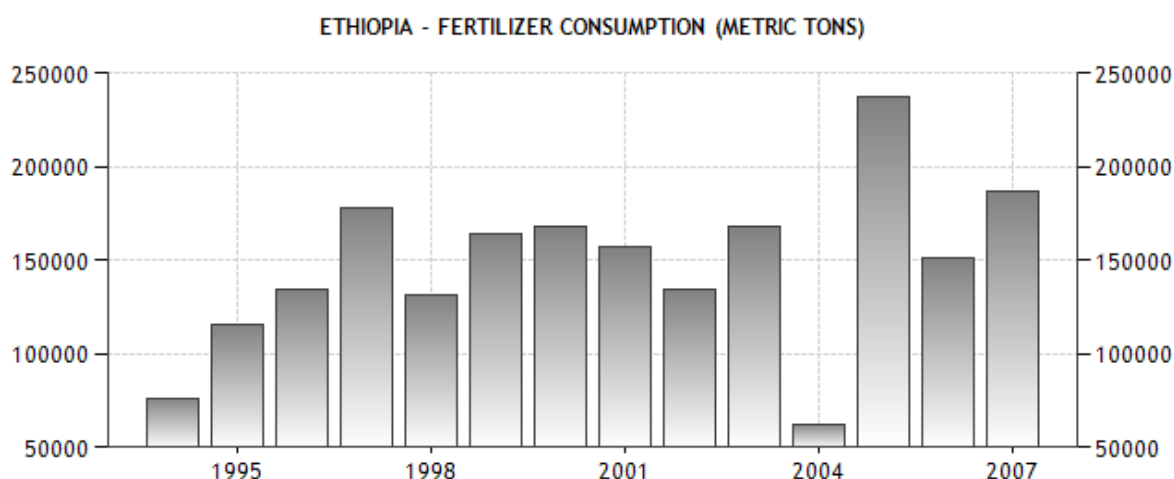


Figure 2. Trends of fertilizer use in Ethiopia (source: www.tradingeconomics.com, accessed Nov. 29, 2011).

Following the wide application of fertilizers, productivity has increased for most crops mainly maize, due to its responsiveness to fertilizer. Unfortunately, two constraints remain as the bottleneck for wider adoption of chemical fertilizer across the country: i) increasing price of fertilizer and hence affordability problem and ii) timely availability or delivery.

Economic incapability forces farmers to usually apply less quantity than recommended rate. Recognizing that resource-poor farmers do not adopt recommended packages at once, there are increasing Government extension programmes that focus on agronomic practices and organic fertilizer adoptions such as composts. Some of the agronomic practices include: raw planting, time of planting and residue management often supplemented with composting, conservation tillage and tie ridge practices.

Side by side the large INRM programmes listed above, there have been many smaller programmes and projects implemented at Regional levels, especially in Amhara and Tigray. Some of these type of programmes include the SIDA/Amhara National Regional State (ANRS) Rural Development Project (SARDP), implemented in several phases from 1998 to 2010 in Amhara region; the USAID-supported Amhara Microenterprise Development, Agricultural Research, Extension and Watershed Management project (AMAREW, 2002-2007); the Water Harvesting and Institutional Strengthening in Tigray Project (WHIST) supported by CIDA from 2001-2010; the BoA/GTZ Integrated Food Security Programme, South Gondar (1996-2004); Norway Development Fund-supported programmes with REST in Tigray (1997-2000), and the European Commission support for Rain Water Harvesting in Tigray through a multi-sector programme of "Comprehensive Community and Asset Building Approach," part of the 1998 and 2000 Integrated Food Security Programs.

SARDP was a long running participatory rural development program in two zones of Amhara Regional State. Its aim was the reduction of rural poverty through local-level capacity building; and improved natural resources management was a central thrust. AMAREW was an applied research project which, among other goals, sought to strengthen linkages among research, extension and farmers, promote new small-scale water management technologies, and develop innovative approaches to Integrated Water Management in a small number of woredas in Amhara. For example it tested the creation and empowerment of "Community Watershed Management Organizations" (CWMOs). WHIST was more focused on improving capacity for Small Scale Irrigation (SSI), but was affected severely by the Tigray government's policy shift from SSI to household rain water ponds.

Despite some weakness reported in the process of their implementations, in general the programmes and projects presented above were reported to have had several positive impacts on the management of the natural resources of the country. The major problem that the evaluations of most of these programmes and projects suffered was the lack of baseline data against which successes and impacts could have been compared, and the inadequate monitoring and evaluation works conducted during their implementations. In particular, MERET is reported to have provided excellent lessons including in shaping the formulation of many current programmes such as SLMP and PSNP.

With particular emphasis to forest sector interventions, many past programmes and successes can be identified in the country. Particularly during the 1970s and 1980s, a lot of forest development works and successes have been achieved through the promotion of both community and state forest developments. Forest development of the time targeted the conservation and rehabilitation of biodiversity, and development of industrial and energy forestry. With respect to energy forestry, about 55,000 hectares of plantations have been established around five major towns including Addis Ababa in the form of fuelwood projects in the 1980s. Industrial plantations started in the late 1960s had expanded during the 1970s and 1980s reaching a total of about 189, 000 ha in 1990. Exotic species dominate tree planting practice in Ethiopia. Industrial plantations are usually established from potted

seedlings at the stem density of 1500 - 2500 stems/ha. Productivity of planted exotics is very high: up to 40-55 m³/ha/yr for *Eucalyptus* on 5-10 years rotation (Örlander, 1986; Zerihun, 2002) and about 30 m³/ha/yr for older ages (Pohjonen and Pukkala, 1990). As expected, productivity varies considerably with site quality, even within species. The national scale average mean annual wood increment (MAI) of 30 m³/ha/yr for *E. globulus*, one of the successful species in the country, is considered fair when managed on short rotation (e.g. Pohjonen and Pukkala, 1990). For species like *Pinus patula* and *Cupressus lusitanica* productivity varies between 18 – 25 m³/ha/yr depending on site factors, intensity of silvicultural treatments (e.g. thinning) applied and when managed on 20-25 years rotation. The total clear cut yield is usually between 350-560 m³ ha⁻¹ (Örlander, 1986).

Moreover, in the 1980s, there was effort to demarcate the entire natural and some planted forests of the country as 'protected areas' or National Forest Priority Areas (NFPAs) for conservation. A total of 58 forest blocks were announced as NFPAs with the principal objective of protection for biodiversity conservation. Some lowland forests, woodlands and biodiversity-rich Afroalpine ecosystems have also been demarcated in the forms of national parks and wildlife sanctuaries (for example Awash, NechiSar, Mago, Abijata–Shalla, Yabello, Sinkile and Babile), which also forms part of the protected area management network in Ethiopia. The Wild Life Conservation Areas (WLCA) includes nine national parks, four sanctuaries, eight wildlife reserves and 18 controlled hunting areas. WLCAs cover about 188,710 km² (16.7 per cent of the country). Unfortunately, these designations as priority area or protected area could not stop the unsustainable use and illegal encroachment of the forest areas and all the efforts proved to be a total failure (Demel, 1999; Reusing, 1998). The forest resources continue to suffer intense human pressure including encroachment and settlement within parks. Consequently, assisted by several NGOs, new approaches to forest management began to emerge and the most important of these being Participatory Forest Management.

Moreover, a number of regional and national programmes and projects also contributed to forest development of the country after 1990. Some of the prominent forestry related programmes and plans include:

- The planning and success of increasing the forest cover of the country from 3.6% to 9 % during the PASDEP period (2005-2010) ;
- The large area enclosures established in different parts of the country mainly in Tigray and Amhara since the early 1990s. In Tigray alone about 700,000 ha of area enclosures have been established, most of these being established during the past 20 years.
- The huge seedling planting activities accomplished in recent years, whereby 2.21 billion seedlings were reported to have been planted in 2009 alone (450 million in Oromiya, 133 million in SNNP, 907 million in Amhara and 720 million in Tigray), through the PSNP, PASDEP etc. programmes.

Since the mid 1990s, Participatory Forest Management (PFM) scheme emerged to become an important approach for improved forest management practices in Ethiopia. PFM was introduced by NGOs, notably by FARM Africa, SOS Sahel, GTZ and JICA. These non-state actors attempted to respond to the prevailing forest management problems of Ethiopia through the introduction, adaptation and advocacy of PFM projects, with the ultimate aim of mainstreaming it as one model for forest management in the country. By 2012 nearly 2.4 Million ha of forestland in the country has been put to various degrees in one PFM scheme or another. Today most of the remnant high forests of the country are embraced under PFM scheme. However, current PFM projects and those planned focus mostly on the high forests:

the dry afro-montane and wet afro-montane forests. Woodlands, those in the dry lowland areas, are largely ignored in the so far PFM projects in Ethiopia. In general, in areas where it has been introduced in Ethiopia, PFM is shown to have significantly improved forest management outcomes.

Private small scale woodlot establishment is the most recent development in the forest sector of Ethiopia. This practice is rapidly expanding in the highlands of the country playing significant role in wood products supply at household and national level. The new rural land policy that attempted to increase tenure security through land certification is applauded to stimulate private small scale forest development in rural Ethiopia.

4. Strategic Approach of the Great Green Wall

4.1. Geographical Scope for GGWSSI in Ethiopia

GGWSSI is flexible in terms of priorities for action as well as geographic delimitations as these vary from country to country, taking into account the socio-economic and environmental circumstances. While the path of the GGWSSI within Ethiopia has been set to be open to adapt to specific national requirements in terms of space, its general focus will be on the dry lands of the country. In fact, the term ‘wall’ does not also convey the message that activities of the GGWSSI to necessarily be a continuous wall of trees or development activities, but rather a mosaic of complementary land use practices in areas affected by advancing desertification and land degradation along the arid and semi-arid zones of the country according to criteria developed by the respective implementing stakeholders and their priorities. Such areas are found in several regional states such as the Tigray, Amhara, Oromia, Southern National, Beneshagul Gumuz, Gambella, Afar and Somali Regions (EPA, 1998). The potential area covers about 60% of the country’s landmass. The following table gives estimates of dry lands along with their major characteristics.

Table 4: Estimates and characteristics of dry land areas suitable for GGWSSI in Ethiopia

Eco-region	Area ('000 ha)	M.A.T.	M.A.R	M.L.U	Regional distribution (% of total area)
Arid	42,300	21 – 27.5	100 -800	Pastoral	Somali (40 %), Afar (30%), Oromia (5%)
Semi-arid	2,900	16 – 27	300 – 800	Agropastoral	Tigray (90%), Oromia (20%), Beneshangul (60%)
Dry sub-humid	19,000	16 - 28	700 - 1000	Mixed farming	Oromia (10%), Amhara (10%), Benishangul (10%), Gambella (15%), SNNPRS (5%)

Source: Adapted from Mulugeta and Habtemariam, 2010 (MAT = Mean annual temperature; MAR = mean annual rainfall)

4.2. Stakeholder consultation and recommendation

A first national GGWSSI stakeholders' consultation workshop was held in Ethiopia on August 16th, 2011. A total of 63 participants covering a wide range of stakeholder groups participated in the workshop. The participants included heads of various regional offices, representatives of various federal ministries, academic, research and civil organizations. The consultation meeting produced a contribution to the formulation of a number of governing principles for a successful implementation of the GGWSSI in Ethiopia. Some of these principles include:

- The need to redefine the ecological range for GGWSSI. The participants clearly argued and justified that the original geographic description given to the GGWSSI i.e. the isohyets of 100-400mm rainfall for instance, hardly fits the condition in Ethiopia as very narrow and patchy geographic areas satisfy such criteria. It was suggested that GGWSSI should broaden itself to also encompass dry lands in general as these are affected by degradation and threatened from desertification rather than limiting itself to rainfall ranges between 100-400 mm;
- The initiative should begin from existing resources of the dry lands such as native vegetation that have economic and ecological values mainly gum-resin bearing plants; aloes and others rather than attempting of introducing what will be assumed of best as seem in other places;
- It should also target generation of knowledge and skill on dry land forest management and tree development as this is critically weak regionally, globally as well as nationally;
- Private sector engagement in the initiatives must be given due attention as they may facilitate very well the value chains and market infrastructure for products generated as an outcome of the initiative.

It should also:

- create synergies with existing national and local initiatives in order to capture best practices and lessons from the past land rehabilitation activities across Ethiopia (experiences in Tigray and Amhara) and also factors for successes and challenges in prior land management projects;
- involve during the very first planning stages existing development actors and civil society organizations;
- develop alternative energy projects promoting solar and/or wind energy, efficient energy-saving stoves to reduce heavy fuel wood use, hence to alleviate pressure on natural vegetation that is one of the main causes of land/vegetation degradation;
- recommend the need to pay greater attention to invasive plant and bush encroachment, range land rehabilitation and pastoral development though market information system, value chain development and forage development;

The participants emphasized also the pursuit of participatory approach and capacity building initiatives on awareness creation, education of local people, institutional innovations and interventions rather than just focusing on technical strategies.

In addition they stressed the inclusion of cross cutting issues such as population growth, immigration and gender aspects as core element of the implementation of the GGWSSI. Further, they recognized the need to provide for more support to research and education

on dry lands while learning and capitalizing on existing traditional knowledge and NRM systems.

4.3. Governing principles

The implementation of the GGWSSI in Ethiopia is the country's responsibility and will be led and owned by Ethiopia. However, the expectation is that collaborative efforts among countries that share similar biophysical setting, for instance those countries involved in the GGWSSI, would enhance the achievement of the common goals of arresting further degradation of soils and land resources within the desert margins north and south of the Sahara. In the FDRE, the GGWSSI will bridge with other programmes and projects to strengthen the efforts already undertaken by the Ethiopian Government, including poverty alleviation, fight against land degradation and desertification, preservation of biodiversity and adaptation to climate change. The design and implementation of the GGWSSI is guided by the following core principles:

- Integrated and multi-sectoral approach;
- involvement (participation) of local community;
- Sustainable development through INRM;
- Social development and gender sensitivity;
- Poverty reduction and livelihood improvement;
- Soil, water and biodiversity conservation and restoration;
- Building on local knowledge and existing INRM programmes and initiatives;
- Making best use of resources, traditional institutions and past experiences;
- Flexibility and learning by doing.

4.4. Vision and objectives

In the FDRE, the GGWSSSI programme will bridge with other programmes and projects to strengthen the efforts already undertaken by the Ethiopian Government, including poverty alleviation, fight against land degradation and desertification, preservation of biodiversity and adaptation to climate change. The overall objective of this national strategy of the GGW is to create conditions for sustainable socio-economic and environmental development for the populations. In terms of specific objectives, the implementation of the GGWSSI should aim to:

In the short and medium term: (i) conserve, restore and enhance biodiversity and soils, (ii) diversify production systems, (iii) meet domestic demand, and increase in comes through the promotion of generating income activities (iv) improve/install the basic social infrastructure;

In the long term: (i) improve the capacity of carbon sequestration in vegetation cover and soils, (ii) reverse migration flows to the restored areas, (iii) improve the living conditions of local communities.

4.5. Linking GGWSSI with on-going plans and programmes in Ethiopia

By its very nature GGWSSI is not a standalone programme. But it is an initiative to be implemented as part and parcel of other on-going national programmes and strategies to increase both effectiveness and impact. GGWSSI may differ from other initiatives only in its spatial spotlight as it specifically focuses on arid regions. Otherwise its goals and strategies are more or less similar to other development programmes being under implementation in the country. Therefore, GGWSSI will be complementary to several policies and development strategies of the Government of Ethiopia such as the Growth and Transformation Plan (GTP), the climate resilient Green Economy Plan (CRGE) and others, and support the implementation of programme of regional and global environmental conventions such as the National Action Programme to Combat Desertification, the Convention on Biological Diversity, the Strategy for Reducing the Impacts of Climate Change, and the National Action Plan for the Environment. The goals of the initiative are also aligned with the goals of Millennium Development Goals that Ethiopia is earnestly pursuing. This also means the successful implementation of the GGWSSI in Ethiopia will depend on how effectively it is integrated with all the on-going strategies and on the synergy created for actions. Below are some of the major on-going Government programmes that GGWSSI should synergize with.

4.5.1. Sustainable Land Management (SLM)

Ethiopia in collaboration with multi-donor groups has launched a 15 year national initiative named Ethiopian Sustainable Investment Framework for Sustainable Land Management (ESIF-SLM) Project that seeks multi-sectoral partnerships among different stakeholders committed to harmonize and align their investments in order to alleviate rural poverty through restoring, sustaining and enhancing the productive capacity, protective functions and bio-diversity of Ethiopia's natural ecosystem resources (FDRE/MoARD, 2008). The overall goal of SLMP is to provide an integrated holistic framework to effectively address poverty, vulnerability, and land degradation in order to improve the livelihoods of land users while restoring ecosystem functions and ensuring sustainable land management.

The SLMP is a multi-sectoral, multi-stakeholder and multi-donor financed programme that brings communities, the government, donors and the private sector together on a common platform. The SLMP, unlike the MERET's one, targets mostly small watersheds areas with high production potential, and focuses on enhancing farmers' incomes and food security through development of small scale resource water harvesting, micro-irrigation, agro-forestry and other income generation activities.

With support from the World Bank and GEF the programme has already begun in 35 woredas in six Regional States (Amhara, Oromia, Tigray, SNNPRS, Beneshangul Gumuz, and Gambela) that cover about 300 thousand hectares.

Sustainable land management involves both the conservation and improvement of the present vegetation cover, such as through enrichment planting, enhancing soil fertility and carbon stock in agricultural soils, rehabilitating degraded lands and popularizing the cultivation of high value crops to enhance the income generating capacity of the local communities and, hence, reduce pressure on and destructive use of other natural resources.

Successful forest conservation and development results have been obtained through PFM by solving the problems associated with open access to forest resources through sustainable forest management involving the local communities neighboring forest areas as co-managers and co-beneficiaries of the generated revenues.

4.5.2. The Growth and Transformation Plan in Ethiopia

Ethiopia's five-year Growth and Transformational Plan (GTP) is a proposal that succeeds the previous Plan for Accelerated and Sustained Development to End Poverty (PASDEP). The GTP, even though it incorporates positive achievements and lessons learnt from anterior national experiences, shifts from a strategy dependent on foreign investment to a locally driven economy and targets an economic growth of 14.9 per cent comparatively to the high average economic growth of 11 per cent accounted for during the 2005-2010 period. The plan is designed to ensure food security as well as to address issues related to youth, women, and also predicts the development of infrastructure (Increase the country's power production from 2,000MW to 10,000 MW, construction of 2,395km of railway lines).

The FDRE's GTP also recognizes that the development of agriculture is very important for social and economic development but unlike the PASDEF, the GTP puts emphasis on using national contractors. A number of other strategies and priorities have been put in place within the framework of sustainable development with direct relevance to the implementation of the Great Green Wall in Ethiopia.

4.5.3. Ethiopia's Climate-Resilient Green Economy: Green economy strategy

As an effort to overcome the effects of climate change, Ethiopia has adopted a new, sustainable development model by initiating the Climate-Resilient Green Economy (CRGE) that will help meet the targeted realization of middle-income status before 2025 in a climate-resilient green economy (FDRE, 2011). As indicate in the GTP, this will be achieved by increasing significantly agricultural productivity, strengthening the industrial base, and fostering export growth.

In order to achieve these economic development goals in a sustainable way, the green growth path adopted by Ethiopia will follow a sectoral approach that has identified priority areas in its green economy plan based on four pillars:

- Improving crop and livestock production practices for higher food security and farmer income while reducing emissions;
- Protecting and re-establishing forests for their economic and ecosystem services, including as carbon stocks;
- Expanding electricity generation from renewable sources of energy for domestic and regional markets;
- Leapfrogging to modern and energy-efficient technologies in transport, industrial sectors, and buildings.

Most recently, the Ethiopian government, in its attempt to address this huge and urgent challenging task of building climate resilience to prevent future disasters in terms of flooding, drought, and other negative impacts on the country's economy sectors (health,

transport, agriculture, natural resources, energy, and industry) has developed a grassroots initiative, the Programme of Adaptation to Climate Change (EPACC) that will help develop climate change adaptation strategies into sectoral and regional action plans.

4.6. Strategic pillars for GGWSSI of Ethiopia

The implementation of activities of the Great Green Wall in Ethiopia is positioned on the programmatic approach focused on sustainable land management to allow Ethiopia gradually rebuild a coherent and comprehensive operational framework for the implementation of the national policy of SLM, and improve the efficiency of public spending through the development and implementation of the programme.

The approaches should lead to a simplification of the management of the rural sector and at the same time avoid the scattering of means and methods by harmonizing procedures and funding mechanisms.

The GGWSSI in Ethiopia is seen as a development opportunity for local communities that aim to help achieve strategic objectives relating to sound management of natural resources, increased food security, efficient fight against poverty and improvement of living conditions of rural populations.

Several strategy and/or policy oriented documents (ADLI, CSE, NPP, NFSS, PPD, PRSP) have highlighted major priority areas to be developed to pursue important strategic orientations emphasizing greater commercialization of agriculture, enhancing private sector as well as industry and urban development while scaling-up efforts to achieve the MDGs.

These principles, summarized below, form the basis of strategic pillars for the implementation of the GGWSSI in Ethiopia: *(i) Building all-inclusive implementation capacity and developing infrastructure to boost a massive push to accelerate growth; (ii) Creating the balance between economic development and population growth; (iii) Strengthening human resource development with a particular attention to unleashing the potentials of Ethiopian women; (iv) Creating employment opportunities* (FDRE/MoFED,2006).

The reformulation of these identified avenues gives the following backbones for the action plan for the implementation of the GGWSSI in Ethiopia:

- The promotion of good governance to improve social cohesion by putting in place an enabling policies, and legal frameworks and capacity building programmes;
- The creation of a conducive environment to robust and diversify economic growth through the development of infrastructures that will trigger growth potential of the rural sector, and strengthen human resources' capacities;
- The sustainable management of natural resources through the protection, restoration and enhancement of productive potential of threatened ecosystems while managing against the adverse effects of climate change;
- The development of revenue generating activities within an integrated land and water resource development approach including forest, rangeland and soil management;
- The formulation and implementation of an effective communication strategy to inform educate and exchange on important cross-cutting issues (gender and youth

mainstreaming, early warning and disaster risk management, conflict management and resolution).

It is understood that the results of the on-going diagnostic exercises for identifying areas for the implementation of the GGWSSI will help specify, in detail, the description of the activities chosen for the axes. These strategic areas of intervention are further elaborated and are presented below, along with the logic of intervention.

Pillar 1: Sustainable Management of Natural Resources

The activities in this pillar focus on the sustainable management of natural resources by developing activities to protect and restore the potential of production of ecologically fragile areas through ecosystem management. This will encompass using reforestation and agroforestry technologies, activities to improve rangeland, implementation of soil and water conservation techniques, strategies for biodiversity conservation.

The overall objective is to make agriculture, in its broadest sense, the main lever for rural development, economic and social growth in order to preserve the foundation of productive agricultural land, pasture and forest to increase arable land and agricultural productivity. Particular attention will be given to traditional knowledge in the formulation and implementation of activities related to farming, rehabilitation of degraded rangelands (development of forage crops, studies to determine carrying capacities for purposes of spatial planning of animal husbandry activities), and development of appropriate strategies for rural water (rehabilitation of pastoral wells and the construction of water retention ponds to collect and store runoff).

The sustainable management of improved production systems within the zones of the GGWSSI will depend on how well extension services, NGOs, government agencies and the local people will succeed in their efforts to intensify and diversify agricultural production through the use of proven technologies in vegetables gardening, tree cropping and agroforestry or any other areas related to concerns expressed by the people.

The involvement of these key players in the identification, implementation, and monitoring of the identified actions will highly contribute to their success and sustainability.

However, the achievement of food security by giving high priority agricultural intensification is unlikely to be achieved without improving basic social infrastructure, enforcing the legislation on management of pastoral resources, and the development of income generating activities, all backed by strategies for rural financing opportunities.

Pillar 2: Development of basic socio-economic infrastructures

Although during the last seven years the government of Ethiopia has been spending more than 60 per cent of its total expenditure on poverty oriented sectors (agriculture, education, health, water and road development) to induce “pro-poor” economic growth, there is still room for improvement. The government needs to pursue its efforts in public sector investment for health service coverage and school enrollment for larger segments of the population to strengthen human capital development; these efforts should also consolidate

achievements in the expansion of asphalt roads and rural community roads, and for improving access to drinkable water, electricity and telecommunication services to all Ethiopians.

The development of peoples' living conditions within the areas covered by the GGWI will greatly contribute to fight poverty, built basic social infrastructure (housing, education, health), facilitate access to water and energy, strengthen their technical and organizational capabilities, and secure land tenure.

The communities through which the GGWSSI is passing are not well endowed with some basic social infrastructure. To ensure ownership of the achievements made within the framework of the GGWSSI the following activities need to be carried out:

- integrated development of degraded areas for the sustainable management of natural resources;
- development of basic social infrastructure likely to fight against poverty and allow growth of local populations in education, health, housing, rural roads, energy supply, community facilities, structuring and strengthening of farmer organizations, the integration of market producers and land security.

The actions identified for the promotion of basic infrastructure are:

- the construction of health facilities and schools in communities that do not have;
- increased water supply works for people and their animals;
- the construction of social housing in the regions through which the great green belt passes;
- the realization and strengthening of sanitation to improve the living conditions of the populations;
- the development of road infrastructure and rural roads to facilitate travel and trade in rural areas.

These actions will encourage people to get more involved in carrying out activities aiming at developing marginal areas and at managing sustainably natural resources in these degraded environments.

Pillar 3 Development of Income Generating Activities

In order to succeed more rapidly in combating poverty, there is need to stimulate improvements in farmers'/pastoralists' income from agriculture activities, as well as off-farm revenues generating enterprises by encouraging the shift from the production of low value to high value products.

These efforts in developing income generating activities (IGAs) will help build household asset, a safety net for settlement programmes (FDRE/MoWR, 2007). These IGAs will be implemented gradually with due consideration to the specific settings of the targeted areas (spatial specialization, market availability and infrastructural development conditions).

It would be interesting to support these players to continue these activities but also to plan and implement other activities such as:

- the promotion of labor intensive approach (LIA) for the construction of infrastructure;

- the organization of traders into associations and / or groups;
- the development of microcredit;
- the development of ecotourism by increasing capacities (hotels and restaurants);
- the development and promotion of local crafts.

The successful colonization of arid and semi-arid areas will be strongly dependent on the decline in rural poverty through the promotion, in communities throughout the areas concerned by the GGWSSI, of IGAs in the forms of micro-projects such as gardening, fattening of domestic animals, crafting, sewing, dyeing, ecotourism, beekeeping, poultry, etc. These revenues generating activities could, for example, be financed on a revolving fund that could also promote establishment of basic social infrastructure. This is in direct line with the “safety net programme” and will be implemented jointly with household asset building programme (FDRE/MoFED, 2010).

Special attention needs also to be paid to people having very small plots and landless youth and women who will be encouraged to engage in non-farm income generating activities with help and support in the forms of capacity building (provision of skill and business management trainings), provision of credit and facilitating markets.

Considerable efforts should be devoted to strengthen women by encouraging them to increase their revenues by participating in off-farm IGAs, and also to actively participate in all educational activities.

However, caution should be exercised in order to avoid some of the pitfalls of some local development projects and programmes that have privileged solutions such as infrastructure without considering the ecological aspects that are crucial to sustainable natural resource conservation.

Pillar 4: Promoting good local governance

The government of Ethiopia has already started to improve social cohesion and the effectiveness of policies through devolution to Woredas and Kebeles, and also by making significant steps towards strengthening the council of peoples' representatives and operationalizing the Ombudsman and Human Right Commission.

These are two priority actions for Ethiopia for consolidating and reinforcing democracy and good governance in the country. Almost in all policy documents, Good Governance has been recognized as an important condition for development because it involves cross cutting issues and is based on successful application of existing laws through their:

- dissemination by extension agents to the common public in order to make them aware of these regulations on the protection of the Environment, the sustainable management of natural resources and the conservation of biodiversity;
- contribution to improve the institutional, legislative, and regulatory framework of natural resources management on established standards for forest resources, grazing and water management;
- Principles of good governance, as indicated in the Ethiopia’s PRSP that emphasizes the improvement of the environment in order to foster partnerships for economic development and social harmony.

In this regard, the role of governments and NGOs will be to:

- promote the implementation of public/private partnerships to support development initiatives;
- act as facilitator in the conduct of extension and advisory support units;
- establish mechanisms to protect peasant farmers against possible abuses such as the obligation to pay taxes and illegally;
- Develop “platforms” for consultation among all stakeholders at all levels of planning, implementation and monitoring of local development initiatives.

The role of producers (farmers-producers) will be to:

- access information which is useful in planning, monitoring, and evaluation;
- participate in consultative structures.

Pillar 5: Capacity building of stakeholders

The government is currently committed to carry capacity building measures by undertaking various training programmes at all levels, for various actors engaged in development oriented enterprises across almost all segments of the country’s national economy. The Ethiopian authorities have been providing key stakeholders (beneficiaries, programme staff, partners, local associations) adequate knowledge as to enable them play their role. Indeed, such institutional support for capacity building is essential to the success and sustainability of natural resources development and management, and for improved social welfare.

Strengthening capacity involves support for participatory planning with the objective to create the conditions to enhance involvement of beneficiaries in the decision making processes for the management of resources in their own environment; It involves also improved access to agricultural inputs, technical know-how, and assistance from extension services for timely responses to disasters in terms of preparedness by building increased food and non-food reserves. Storage capacity will be built in line with the expected increase, particularly food security reserves.

Capacity building efforts will consist of programmes for both institution strengthening and human resources development through training/advice activities tailored for specifically identified needs of thousands of community members across the areas within the path of the GGWSSI.

These capacity strengthening activities provided by government agencies and NGOs will also be reinforced through various agricultural equipments and tools.

Pillar 6: Research and Knowledge Management

Strengthening technical and research capacities is essential for meeting expectations in terms of achieving sustainable rehabilitation and/or conservation of natural resources for today’s Ethiopians and for future generations.

In order to be effective and sustainable, successful management of complex ecosystems (and of the people who use them) needs to be grounded on solid, sound and scientifically

proven results obtained from research activities in natural and social sciences. Considerable efforts are being made on forestry research in Ethiopia even though improvements are needed to enable addressing identified issues and challenges (Mulugeta and Tadesse, 2008).

Research proposals based on demand driven thematic areas should be elaborated and implemented to provide answers to questions and concerns of people and other partners.

The research topics will, in all likelihood, include the following priorities:

- Prospective research in support of policies through the study of production systems dynamics in the context of the implementation of activities related to the GGWSSI, and other national programmes;
- Agricultural intensification through integration of agroforestry technologies (windbreaks, live fences, fodder banks, runoff-induced erosion control);
- Improving livestock productivity (rationalization and intensification of herd management models, feeding, disease control, genetic improvement);
- Development and promotion of aquaculture through stocking of water for fish farming.

5. Coordination and monitoring - evaluation

5.1. Coordination mechanisms

The implementation of the GGWSSI, an integrated and cross-sectoral programme, requires the involvement of all stakeholders at local, regional and national levels, and also representatives from the States' technical services, from local communities, NGOs, the CSO, etc. This requires the establishment of an effective coordination, monitoring and evaluation system for achieving the desired synergies throughout all stages of the implementation of the GGWSSI.

The National Agency for GGWSSI in Ethiopia will capitalize on the experiences of existing institutional bodies in charge of Rural Development at large, including consultation frameworks that exist at every decentralized levels (woredas, regional, and national).

However, because of its specificity and to ensure consistency and efficiency in the management of the GGWSSI, the structures of control and monitoring will be implemented as follows, and their compositions and missions defined hereafter.

5.2. The National Steering Committee (NSC)

The NSC is the institutional body for decision-making and policy formulation, strategy and management. Its mandate focuses on the following roles:

- Guide the implementation of the national strategy and action plan of the GGW in Ethiopia;
- promote coordination among key decision makers involved;
- Ensure consistency between the sub-sectoral and sectoral approaches both regionally and nationally;
- Oversee the implementation by the National Agency of the GGW planned activities.

The NSC consists of twenty five (25) members, twenty (20) with voting capacity and five (5) having only advisory capacity. These two groups of members are representatives of:

- the Advisor for the Environment of the Presidency of the Republic;
- the Prime Ministry Cabinet;
- the Ministry of Defense;
- the Ministry of Agriculture and Rural Development;
- the Ministry of Finance and Economic Development;
- the Ministry of Water Resources;
- the Ethiopian Forum for Environment;
- the Ministry of Higher Education;
- the Pan-African Agency of the GGW;
- the Director General of National Agency for the implementation of the GGWSSI in Ethiopia;
- the Environmental Protection Authority;
- the National Meteorological Agency;
- the Ethiopian NGOs/CBOs Co-ordination Committee on Desertification;
- each of the nine (9) National Regional States, of the two (2) Administrative Councils.

The Directorate of the National Agency for the implementation of the GGWSSI in Ethiopia will assume the Secretariat for the NSC. The Committee will elect a Chairman among its members for two-year term, renewable once. The steering committee will meet at least twice a year, and whenever necessary, to review results, discuss programmes, approve budgets and spending.

The steering Committee will also draft an annual work programme, and also will produce a yearly report.

5.3. The Scientific and Technical Committee (STC)

A Scientific and Technical Committee will be established to ensure consistency in the interventions for the implementation of the GGWSSI that is a complex endeavor that merges many existing disciplines and experiences. The STC has an advisory role in the technical validation of programmes, and in all scientific and technical issues pertaining to the implementation of the GGWSSI in Ethiopia.

The STC also contributes in the formulation of technical and strategic documents related to the activities of the National Agency for the implementation of the GGWSSI in Ethiopia. The STC will include the fifteen (15) following national members, representing:

- the Ministry of Agriculture and Rural Development;
- the Ministry of Water Resources;
- the Pan-African Agency GGW;
- the Director General of National Agency for the GGW in Ethiopia;
- the National Coordinator of the GGW in Ethiopia;
- the Environmental Protection Authority;
- the National Meteorological Agency;
- the Ethiopian NGOs/CBOs Co-ordination Committee on Desertification;
- the Director of Forestry Research;

- the Forum for Environment;
- the Natural gum processing and marketing enterprise;
- the Environmental Protection Authority;
- The Director of the Institute of Biodiversity Conservation;
- The Director of the Institute for Sustainable Development;
- The Director of the Department of Irrigation and Drainage.

The STC will use a group of Experts/Evaluators, chosen in Ethiopia and among scientists from the international community to complement and enhance its expertise in specific areas. The representative of the Director General of National Agency of GGWSSI in Ethiopia will provide the Secretariat of the STC.

5.4. Monitoring and Evaluation

Monitoring and evaluation are essential for a number of reasons that include:

- Ensuring rigorous management of the project through a regular monitoring of technical and financial activities;
- Strengthening the synergies between the project and sectoral strategies, plans or other development programmes and more generally with all those involved;
- Optimizing the management of all information generated or used by the management of the National Agency and shared with all stakeholders to be involved in the collection, storage, analysis and dissemination of information to allow decision-making transparent and efficient.

The system of monitoring and evaluation will provide all the information for “measuring” the differences between plans and achievements, and thus to propose, on time, the appropriate redevelopment. It will also better inform stakeholders by providing regular reports on the terms of reference of the actors, the status of activities in relation to timing, problems encountered, the financial position of the Project, the value of key performance indicators and impact.

5.4.1. Monitoring and Evaluation of Operational Activities

The monitoring system for the implementation of the GGWSSI in Ethiopia will include important aspects of information collection and organization from activities of the programme outlined in the logic of intervention and follow up plans. For this, clear indicators and criteria for assessment will be formulated and exercised by the NAGGWE. Important in this regard is the development of a well-structured data base where information will be stored and retrieved when essential.

5.4.2. Monitoring and evaluation of effects and impacts

Impact monitoring is complex, and it is usually not the task of individual programmes or even sectors but rather relates to the general process of poverty reduction as monitored by the national systems of Poverty Reduction Strategy. However, collecting impact-related information on key proxy indicators, whenever feasible on, for example, income

improvement and nutritional levels, etc. can be of great help (provided the data is reliable, updated and targets the relevant geographical areas and population segments). In some instances, it will be necessary to undertake comprehensive household baseline and impact surveys using rigorous sampling methods to greatly reduce the associated costs of such surveys.

The importance and scope of the project fully justify the establishment of appropriate procedures for managing information and knowledge to ensure a good flow of information among the various people/structures involved in the project. A manual will be written, preferably, before the implementation of the Project. This activity will also consider building a website that will include several features to accommodate different categories of partners:

- The "general public" who wants to access a presentation of Ethiopia, the rural sector and the GGWSSI and performance;
- The financial partners of the Project will have access to various technical and financial progress reports, highlighting the Project's achievements and impact indicators;
- The technical partners with whom a permanent electronic forum will promote tools for exchange on experiences among both national and international experts on topics and/or various documents.

The NAGGWE will establish a monitoring and evaluation system for self-assessment at the end of each quarter and based on predefined indicators, beneficiaries, field activities for which they are responsible. Externally, an assessment will be at the end of the first half of the third year of the project to develop a mid-term and proceed eventually to the Project redevelopment. There will be a final assessment of the Project by the various development partners and the Government.

5.5. Information and communication

The conception and implementation of an adequate system of communication and information sharing will greatly contribute to the realization of the objectives and targeted outputs of this Action Plan by facilitating the flow of information among all the partners involved in the implementation of the GGWSSI (beneficiaries, technical services, private operators and the public).

Regular and periodical meetings, dissemination of written materials, computer networking, organization of documentation and archives, acquisition of multimedia equipment (cameras and camera digital multimedia projector, laptop, etc.) should be considered at the onset of the GGWI in order to enable dissemination of information to all stakeholders, including government and development partners.

Leaflets and/or brochures presenting the GGWSSI and the actions to be implemented, expected outcomes or achievements should be edited and distributed through the most appropriate channels and target audiences.

A documentary film on the achievements will be produced to increase the visibility of the planned or realized activities in the implementation of the GGWI.

5.6. Resource mobilization

As part of the implementation of this strategy and to secure long term funding, it is essential to establish an appropriate and sustainable funding mechanism. To do this the following options are provided:

The Government: it should support efforts the structure responsible for implementing the activities of the GGW through internal mobilization of financial resources. A budget allocation could be provided annually in the budget planning to support not only operating costs but also activities in the field.

The national agency of the GGW: it must develop bankable projects on a sectoral or integrated basis on identified themes in this strategy and its action plan and submit to government and technical and financial partners.

Local authorities: they must provide margins in their annual budget programme to support the financing of certain activities in their localities.

Local communities: their contributions could be negotiated in a flexible manner with other stakeholders involved in implementation of activities of the GGW.

Synergy must be created with other ongoing projects or programmes in the country.

States' contributions (voluntary or statutory) and regional institutions (AUC, CEN-SAD, IGAD, etc.) could be considered and taken into account in the resource mobilization strategy.

6. Plan of action

6.1. Objectives of the Plan Action

This strategy and plan of action aim to translate the government's desire to harmonize sectoral policies and strategies within a national framework for socio-economic development, associated control and sustainable management of natural resources and the fight against poverty; it also translates the willingness to adapt to changing international, regional and national situations. In the political and legislative aspects, it appears urgent to propose operational solutions.

The plan of action must also allow the selection and implementation of priority structural and concerted actions of short and long term basis in the field along the GGWSSI.

Consultation with institutional partners and local stakeholders for the evaluation, modification, ownership and criteria control as well as the feasibility of measures, is an integral part of the development process of this plan. It is also necessary to facilitate the support of potential partners before the implementation of this plan.

This action plan is consistent with the strategy and will have a 5 years term from 2012 to 2016.

6.2. Expected results

The following points indicate the expected results after the implementation of the GGWSSI in Ethiopia:

- Recovery, development and diversification of agriculture and livestock through the control of water resources by creating water retention ponds, artificial lakes and other water works to improve production systems;
- Reduction of soil erosion due to the presence of a vegetative cover that will help reduce wind speed and facilitate the infiltration of rainwater, increasing organic matter contributing to the restructuring of degraded soils;
- Increasing the rate of reforestation in the grip of GGW for the restoration of ecological balance, conservation, recovery of plant and animal biodiversity and increased coverage of local needs for forest products, including wood and fire service, but also in non-wood products (gums, resins, roots, leaves, bark, fruits, etc. pharmacopoeia);
- Improvement of the peoples' standard of living and health through income generation and development of basic social infrastructure that will help bring back the "ecological migrants" into their rehabilitated areas.

6.3. Priority programmes

The arid and semi-arid lands targeted for the implementation of the GGWSSI in Ethiopia have various resources with huge development opportunity; still, important challenges exist

and need to be addressed during the planning, implementation, and monitoring phases. The development programmes should be integrated, participatory and location specific with attractive economic returns. The following programmes could be considered as priority in Ethiopia and considered in the implementation of the initiative:

1. Promotion of good governance and management of natural resources with 2 sub-programmes (i) Governance of natural resources and (ii) Sustainable management of natural resources
2. Promotion of Local Community intervention along the Great Green Wall with 3 sub-programmes (i) Capacity building of local actors and (ii) Development of basic socio-economic infrastructure iii) Development of wealth creation activities and improvement of the nutritional health of the populations.
3. Strengthening food security through improved agrosilvopastoral production with 2 sub-programmes (i) Improve agro-forestry production systems through restoration of degraded land; (ii) Improving food security through the development of agricultural and pastoral production systems by valuing underground and runoff water resources.
4. Research and knowledge management with 2 sub-programmes (i) Research; (ii) Knowledge Management

These main priority programmes will be developed in the logic of intervention especially in terms of objectives and expected results.

6.4. Logic of intervention

For each of the above programmes, the following logic of intervention summarizes the activities for this plan of actions.

Table 5: Logic of intervention

Logic of intervention	Descriptive Summary	Objectively verifiable indicators	Means of verification	Budget (1,000 USD)
Programme 1: Promotion of good governance and management of natural resources		Natural resources are well managed for the interest of the populations	Legislative and regulatory framework documents	
Sub - programme 1.1: Governance of natural resources				
<i>Objective 1.1.</i>	<i>To secure land and tree resources through improvement of legislative and regulatory framework</i>	<i>Land and tree tenure well clarified along the GGW</i>	<i>Documents available</i>	
Output 1.1.	Land and tree resources are secured for the implementation of the GGW	Conflict minimize	Document available	
Activities1.1.1	Support awareness campaign at all levels on land and tree tenure	All stakeholders are sensitized	Report of various meetings	120
Activities1.1.2	Support the development or reinforcement of law and regulations related to forestry and pastoral management	Law and regulations are in place	Reports available	100
Activities1.1.3	Develop technical notes on the management of land, water and tree resources	Stakeholders are using the technical notes	Documents available	50
Sub - programme 1.2: Sustainable management of natural resources				
<i>Objectives 1.2.1.</i>	<i>To improve knowledge on natural resources</i>	<i>Increase awareness on natural resources</i>	<i>Reports and papers from meetings and workshops</i>	
Output 1.2.1	Knowledge of natural resources has improved	Many people are now aware about the status of natural resources in the country	Reports and other writings on the evaluation and other actions	

			taken	
Activities 1.2.1.1	Establish land use classification along the Great Green Wall	The type of land uses are known along the GGW	Reports from studies, meetings and workshops	500
Activities 1.2.1.2	Map and inventory of forests, agricultural and pastoral lands along the GGW	The extent of agriculture, forestry and pastoralism apprehended	Reports from studies, meetings and workshops	700
Activities 1.2.1.3	Inventory of water, fisheries and wildlife resources	Information on water, fisheries and wildlife resources	Reports from studies, meetings and workshops	1000
Activities 1.2.1.4	Develop and adopt a guide to participatory management of shared natural resources	Good management of shared natural resources	Reports from studies, meetings and workshops	50
Activities 1.2.1.5	Develop indicators for assessing the impacts of intervention	Better information available	Reports from studies, meetings and workshops	400
Activities 1.2.1.6	Create a network of institutions working on natural resources both at national and regional levels	Institutions working on the issues	Reports from meetings and workshops	60
<i>Objective 1.2.2.</i>	<i>To improve management of natural resources</i>	<i>Natural resources managed sustainably</i>	<i>Reports and papers from studies, meetings and workshops</i>	
Output1.2.2	Management of natural resources improved	Posterity benefiting	Reports and papers from studies	
Activities1.2.2.1	Increase agro-sylvo-pastoral production by improving the traditional system	Productive traditional systems	Reports and papers from studies	600

Activities1.2.2.2	Support the dissemination of best practices of local governance of natural resources	Increase awareness on best practices	Reports and papers from studies, meetings and workshops	500
Programme 2: Promotion of Local Community intervention along the Great Green Wall				
Sub - programme 2.1: Capacity building of local actors				
<i>Objective2.1.</i>	<i>Reinforce the capacity of locals in planning, implementing, monitoring and evaluation of activities</i>	<i>Activities well implemented</i>	<i>Reports and other writings from studies, training sessions and workshops</i>	
Output2.1.	The capacity of locals in planning, implementing, monitoring and evaluation of activities is reinforced	Locals manage efficiently the activities	Reports and other writings from studies, training sessions and workshops	
Activities2.1.1	Support locals to acquire integrated environmental planning tools targeting results based management approach	Tools are in use by locals	Reports and other writings from studies, training sessions and workshops	600
Activities2.1.2	Support the locals to participate in monitoring and evaluation exercises	Locals are using the tools	Reports and other writings from studies, training sessions and workshops	400
Activities2.1.3	Strengthen capacities of a technical advisory team at local level	Locals are well empowered	Report and other writings from workshops and meetings	500

Activities2.1.4	Train and organize the professionals of NWFP in managing the resources	Professionals of NWFP are empowered	Training reports	200
Sub - programme 2.2: Development of basic socio-economic infrastructure				
<i>Objective2.2.</i>	<i>To improve basic socio-economic infrastructure along the GGW</i>	<i>Conducive environment created</i>	<i>Reports</i>	
Output 2.2.	Basic socio-economic infrastructure is improved along the GGW	The populations are better off	reports	
Activities2.2.1.	Construct / rehabilitate new rural roads, health centers, classrooms	Facilities are in place	Reports from evaluation	2000
Activities2.2.2.	Promote renewable energy in rural areas	Lesswood uses	Reports from evaluation	2000
Activities2.2.3.	Create potable water sources in rural areas	Health of locals improved	Reports from evaluation	2000
Sub - programme 2.3:Development of wealth creation activities and improvement of the nutritional health of the populations				
<i>Objective2.3.1.</i>	<i>Promote income generating activities (IGA)</i>	<i>Locals are better off</i>	<i>Reports and fact sheets from relevant studies and workshops</i>	
Output 2.3.1.	The IGAs are promoted in rural areas	Unemployment is reduced	Reports and fact sheets from relevant studies and workshops	
Activities2.3.1.1	Inform, educate and train people on good IGAs	Locals are empowered on IGAs	Reports and fact sheets from relevant studies and workshops	100
Activities2.3.1.2.	Establish financial and technical support for the promotion of vegetable crops and animal fattening by women	Locals are empowered	Reports and fact sheets from relevant studies and workshops	1000

Activities2.3.1.3.	Cultivate commercial trees and crops (Gum arabic, myrrh, Frankincense), Olive trees cultivation, promotion of value added processing e.g. wild essential Oil and medicinal product extractions (e.g. aloe), market development and market chain management	Locals are empowered	Reports and fact sheets from relevant studies and workshops	2000
Activities2.3.1.4.	Support farmers involved in the processing of agrosylvopastoral products	Value added to agrosylvopastoral products	Reports and fact sheets from relevant studies and workshops	1000
<i>Objective2.3.2.</i>	<i>To diversify and improve food and income for the populations</i>	<i>Wealth and health are improving</i>	<i>Reports and fact sheets from relevant studies and workshops</i>	
Output2.3.2.	Food and income diversified and improved for the populations	Livelihoods improved for the populations	Reports from relevant studies, meetings, workshops and other relevant writings	
Activities2.3.2.1	Support the promotion of high nutritional value plants, growing fruits, raising broilers and laying hens;	Increase diversity of nutritious foods	Reports from relevant studies, meetings, workshops and other relevant writings	1000
Activities2.3.2.2	Promote fisheries and aquaculture, beekeeping and non-conventional food resources rich in micronutrients	Diversity of food products	Reports from relevant studies, meetings, workshops and other relevant	1000

			writings	
Activities2.3.2.3	Conduct regular control and health inspections of food	Food security guaranteed	Reports from evaluation	100
Activities2.3.2.4	Scale up on-farm and homestead forestry and agro-forestry practices to meeting subsistence and market wood demands	Energy and other wood demand met	Reports from relevant studies, meetings, workshops and other relevant writings	1000
Activities2.3.2.5	Conduct IEC activities to promote the consumption of quality food	Locals are sensitized	Reports from evaluation	200
Programme 3: Strengthening food security through improved agrosilvopastoral production				
Sub - programme 3.1: Improved agro-forestry production systems through restoration of degraded lands				
<i>Objective3.1.1</i>	<i>To conserve soil and water and protect crop lands</i>	<i>Production system enhanced</i>	<i>Reports from studies, papers and other relevant writings</i>	
Output 3.1.1	Soil and water conserved and croplands protected for enhanced agricultural production	Production systems improved	Reports from studies, papers and other relevant writings	
Activities 3.1.1.1.	Improve management of soil fertility (multiple cropping, crop rotation, fallowing, cover crops and green manures, compost, mulch, manure, inorganic fertilizer use when and where applicable, agroforestry)	Production systems improved	Reports from studies, papers and other relevant writings	1000
Activities 3.1.1.2.	Conserve soil and water (conservation tillage, tied ridges, grass strips, trash lines, level bands, bench terraces, trenches (big or micro), microbasins such as half-moon (small and big), trapezoidal, negarim basins, rehabilitating	Production systems improved	Reports from studies, papers and other relevant writings	3000

	gullies, checkdams, improving soil OM and structure, zai and planting pits, eyebrow basins, Re-greening (area enclosure), fanyajuu terracing, gully plugging)water management (macro-catchments such as small and medium size dams, floodwater harvesting, Roofwater harvesting, subsurface dams, sand dams, farm ponds, rock catchments, water tanks and storage tanks such as dome-cap tanks, brick-cap tanks, bottle-shaped tanks, hemispherical tanks or ferrocement tanks, diversion channels, percolation ponds and contour trenches, water harvesting from roads, water harvesting roofs, protecting and rehabilitating wetlands, organic and plastic mulching, protection of springs and recharge zones, river diversion, controlled drainage, surface and ground water retention weirs, diversion weir, irrigation such as uncontrolled flooding, basin irrigation, furrow irrigation, drip irrigation, pitcher or clay pot irrigation or bottle irrigation)			
Activities 3.1.1.3.	Improved management of livestock and fodder resources (over/under sowing, stock exclusion areas, rotation grazing, controlled grazing, fodder banks, controlled burning, permanent grass-legume pasture, agro-silvipasture, cut-and-carry system, planting forage as live fences and other forms of agroforestry, improved forest/woodland grazing, rangeland management from invasive plants, etc.	Production systems improved	Reports from studies, papers and other relevant writings	1500
Activities 3.1.1.4.	Promote on farm and homestead forestry and agro-forestry best practices (parkland agroforestry management such as olive tree agro-forestry, gum/incense trees agroforestry, legume-based (e.g. <i>F.albida</i> tree) based agroforestry, Moringa and other edible trees based agroforestry, fruit trees agroforestry, enrichment planting in rangelands, area		Reports from studies, papers and other relevant writings	1500

	exclosure and cut-and-carry system in degraded pasturelands, reforestation/afforestation, improved woodland management, fuelwood plantation, fodder tree planting, shade tree planting, multistory homegarden, home-garden horticulture			
Activities 3.1.1.5.	Protect water bodies against silting	Erosion reduced	Reports from evaluation	2000
Activities 3.1.1.6.	Rehabilitate degraded natural forests and agroforestry parklands	Forests and parklands back to production	Reports from studies, papers and other relevant writings	2500
<i>Objective 3.1.2</i>	<i>Promote in-situ and ex-situ conservation of biological diversity</i>	<i>Biodiversity conserved well</i>	<i>Reports from studies, papers and other relevant writings</i>	
Output 3.1.2.	In-situ and ex-situ conservation of biological diversity promoted	Biodiversity conserved well	Reports from studies, papers and other relevant writings	
Activities 3.1.2.1	Support the National Forest Seed Centre (NTSC) for the production of quality seeds and creation of arboreta	Conditions for conservations in place	Reports and fact sheets from relevant studies and workshops	2000
Activities 3.1.2.2	Control invasive terrestrial and aquatic species	Reduction of invasive species	Reports from studies, papers and other relevant writings	1000
Activities 3.1.2.3	Create village woodlots and greenbelts around cities	Villages and cities well protected	Reports and fact sheets from relevant studies	2000

			and workshops	
Activities 3.1.2.4	Promote village tree nurseries	Enough seedlings for tree planting	Reports and fact sheets from relevant studies and workshops	1000
Sub –programme 3. 2: Improving food security through the development of agricultural and pastoral production systems by valuing underground and runoff water resources.				
<i>Objective 3.2</i>	<i>To improve agricultural production through mobilization of ground and runoff water</i>	<i>Irrigation programme in place</i>	<i>Reports and fact sheets from relevant studies and workshops</i>	
Output 3.2	Agricultural production improved through use of ground and runoff water	Increased agricultural production	Reports and fact sheets from relevant studies and workshops	
Activities 3.2.1.	Build/rehabilitate mini dams	Enough water reservoirs	Reports and fact sheets from relevant studies and workshops	5000
Activities 3.2.2.	Rehabilitate valleys for agricultural production	More lands for agricultural production	Reports and fact sheets from relevant studies and workshops	2500
Activities 3.2.3.	Construct and equipped wells with generators for agricultural production in rural areas	More agricultural production	Reports and fact sheets from relevant studies and workshops	1500
Activities 3.2.4.	Support farmers with agricultural technologies and inputs	Well-equipped farmers	Reports and fact sheets from relevant studies	2000

			and workshops	
Activities 3.2.5.	Establish and equip cereal banks	Agricultural inputs available	Reports and fact sheets from relevant studies and workshops	1200
Activities 3.2.6.	Support the establishment of modern integrated farms and disseminate the same	Increased agricultural production	Reports and fact sheets from relevant studies and workshops	3000
Activities 3.2.7.	Support the development of modern animal production system and disseminate the same	Increased animal production	Reports and fact sheets from relevant studies and workshops	3000
Programme 4: Research and knowledge management				
Sub-programme 4.1: Research				
<i>Objective 4.1.</i>	<i>To strengthen technical and research capacities in order to obtain scientifically proven results for successful management of complex ecosystems (and of the people who use them)</i>	<i>Information available</i>	<i>Reports and fact sheets from relevant studies and workshops</i>	
Output 4.1.	Solid, sound and scientifically proven results from research activities in natural and social sciences	Information available	Reports and fact sheets from relevant studies and workshops	
Activities 4.1.1	Establish specialized arid region training and research Centre and furnish it with required facilities	Facilities in place for research activities	Reports and fact sheets from relevant studies and workshops	3500
Activities 4.1.2	Promote NRM (crop, livestock hydrology, forest and livelihood) intensification researches, (rationalization and intensification of herd management models, feeding,	Information available	Reports and fact sheets from relevant studies	2000

	disease control, genetic improvement)		and workshops	
Activities 4.1.3	Conduct research in support of policies through the study of production systems dynamics in the context of the implementation of activities related the GMVI, and other national programmes	Policies backed by research information	Reports and fact sheets from relevant studies and workshops	1500
Activities 4.1.4	Support the establishment of a national network of scientists working in themes related to the Great Green Wall	All stakeholders connected	Reports and fact sheets from relevant studies and workshops	500
Activities 4.1.5	Involve students to conduct their research on various aspects of the GGW	Information generated	Reports and fact sheets from relevant studies and workshops	400
Sub-programme 4.2: Knowledge Management				
<i>Objective 4.2.</i>	<i>Create a data base of information related to the GGW and disseminate the same</i>	<i>Information available</i>	<i>Reports and fact sheets from relevant studies and workshops</i>	
Output 4.2.	A complete database of information is created and disseminated	Information available	Reports and fact sheets from relevant studies and workshops	
Activities 4.2.1.	Capitalize traditional and local knowledge available in the country on natural resources management	Information available	Reports and fact sheets from relevant studies and workshops	1500
Activities 4.2.2.	Create a framework of consultation between stakeholders	All stakeholders informed	Reports and fact sheets from relevant studies	500

			and workshops	
Activities 4.2.3	Produce and disseminate research results through the appropriate channels of communication	Information available	Reports and fact sheets from relevant studies and workshops	2000
Total				66780

Overall budget

The indicative budget for the identified major programmes during the first five (5) years period of this action plan is estimated at **Sixty Six million Seven Hundred and Eighty Thousands (66,780,000)**US dollars.

Conclusion

Ethiopia is a dry land country with natural resources contributing significantly to the socio-economic development of millions of human beings and “and environmental resilience”. However, these resources have been heavily exploited and urgent measures that would help in sustainably managing these resources are needed.

The conception, implementation and monitoring of appropriate land use plan ought not to be delayed any longer in order to rehabilitate degraded environment, conserve biodiversity in a context of heavy natural (climate change related effects) and anthropogenic pressures (human beings induced disturbances).

Natural resources in the arid and semi-arid areas of Ethiopia offer important development opportunities although they are threatened by a series of challenges and constraints that need to be overcome by developing strategies and programs that are integrated, participatory and location specific.

In relation to the production potential of these already fragile arid ecosystems, there is a pressing need, through the enforcement of existing laws, to address issues related to the conversion forests and woodlands to farming and/or to any other uses, the sustainable management of rangelands for improving animal husbandry, the well planned utilization of water resources for irrigation and for developing eco-tourism, bearing in mind the nation’s goals in terms of fighting land degradation, combating desertification, biodiversity conservation in context of climatic change.

Strengthening research capacity for the generation of knowledge and skills on dry land resources and their management options, as well as knowledge management, ought also to be addressed in order to ensure sound guidance to the planned activities as to guaranty the achievement their expected outcomes.

The participation of the private sector in the initiative must be encourage for value chains and market infrastructure facilitation for products generated as an outcomes of the initiative. Key factors for the achievements of the expected outcomes include consideration of cross cutting issues such as population growth, immigration and gender aspects and other core elements like redefining the ecological range for GGWSSI to encompass all dryland areas affected by degradation and threatened from desertification, and not only those within the 100 to 400 mm rainfall range. It is even conceivable that the initiative develops activities within other areas that do not fulfill the initially defined path because ecosystems form a continuum with various interactions... This will participate in creating the necessary

synergies with existing national and local initiatives for successful implementation of the GGWSSI;

Although the implementation of the GWSSI in Ethiopia will require the mobilization of important financial and human resources, this challenging task is worth being undertaken through the formulation, implementation, and monitoring of development strategies and programmes that are integrated, participatory and location specific with attractive economic returns.

Indeed, the implementation of the GGWSSI offers a way out of poverty and avenues to combat land degradation and desertification in the country's vulnerable areas while participating to the conservation of biodiversity and to the mitigation of adverse climatic changes.

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