UNITED NATIONS FRAMEWORK CONVENTIONS ON CLIMATE CHANGE

THE INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT

THE GLOBAL ENVIRONMENT FACILITY
(Special Climate Change Fund)

For Official Use Only

THE REPUBLIC OF GEORGIA

ENHANCING RESILIENCE OF AGRICULTURE SECTOR IN GEORGIA (ERASIG)

PROJECT DOCUMENT

December 2014

Table of Contents

ANNEXES:

Currency equivalents

Monetary Unit	=	Georgian Lari (GEL)
USD 1	=	GEL 1.72
EUR 1	=	GEL 2.30

Weights and measures

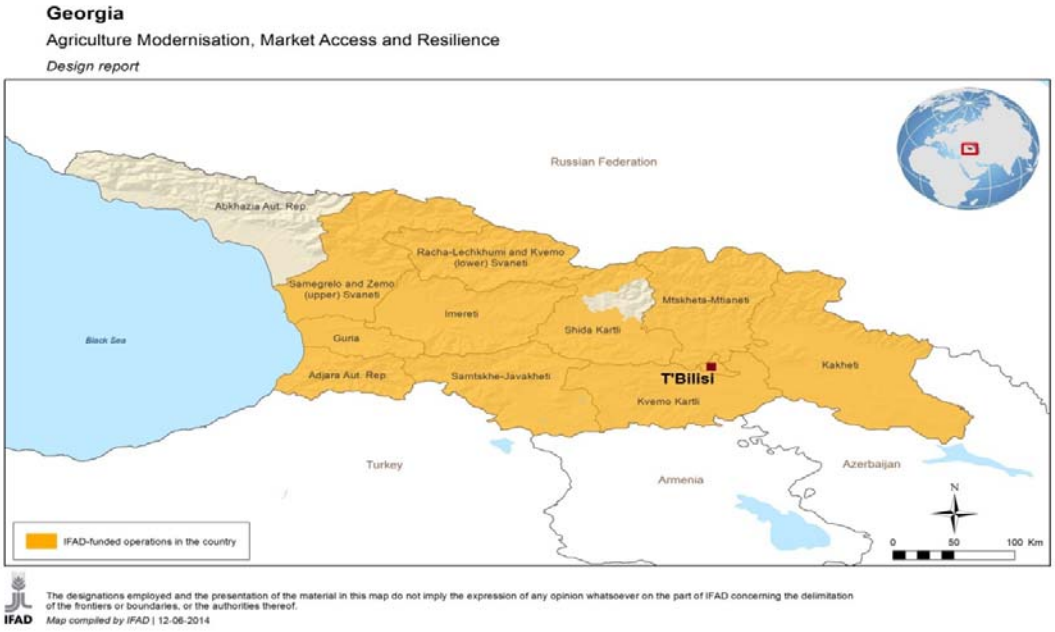
1 kilogram (kg)	=	2.204 pounds (lb)
1000 kg	=	1 metric tonne (t)
1 metre (m)	=	1.09 yards (yd)
1 square metre (m2)	=	10.76 square feet (ft2)
1 acre (ac)	=	0.405 ha
1 hectare (ha)	=	2.47 acres

Abbreviations and acronyms

AEC	Application Evaluation Committee
APR	Annual Project Report
ASP	Agriculture Supported Project
AWP	Annual Work Plan
C	Carbon
CA	Conservation Agriculture
CB	Capacity Building
CBD	United Nations Convention on Biological Diversity
CC	Climate Change
CDM	Clean Development Mechanism
CEE	Central and Eastern Europe
CENN	Caucasus Environmental NGO Network
CIS	Commonwealth of Independent States
CITES	Convention on International Trade in Endangered Species
CO	Carbon Monoxide
CoP	Conference of Parties
CSO	Civil Society Organization
CWR	Crop Water Requirements
DANIDA	Danish International Development Agency
DO	Dissolved Oxygen
EC	European Commission
ECA	European and Central Asia Region
EDPRP	Economic Development and Poverty Reduction Programme of Georgia
EIT	Efficient Irrigation Technology
ENPARD	European Neighbourhood Programme for Agriculture & Rural Development
ERASIG	Enhancing Resilience of Agriculture Sector in Georgia
EU	European Union
FAE	Finance and Administration Specialist
FAO	Food and Agriculture Organization
FL	Farm Leader
FSC	Farm Service Centre
GCM	General Circulation Model
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GEL	Georgian Lari (currency)
GHG	Green House Gas
GILMD	Georgia Irrigation and Local Market Development Project
GIS	Geographic Information System
GIZ	German Agency for Technical Cooperation
HA	Hectare
HH	Household
HTC	Hydro-Thermal Coefficient
IDPs	Internal Displaced Persons
IFAD	International Fund for Agriculture Development
INC	Initial National Communication to the UNFCCC
IPCC	International Panel on Climate Change
IPM	Integrated Pest Management
IOPID	International Organizations Projects Implementation Department
IRR	Internal Rate of Return or Economic Rate of Return
IW	Inception Workshop
IWR	Irrigation Water Requirements
KM	Kilometre
KP	Kyoto Protocol
LGAF	Land Governmental Assessment Framework
LR	Landscape Restoration
M	Meter
MM	Millimetre
MDGs	Millennium Development Goals

MENR	Ministry of Environment Protection and Natural Resources
MoA	Ministry of Food and Agriculture
MoF	Ministry of Finance
MoU	Memorandum of Understanding
MRDI	Ministry of Regional Development and Infrastructure
MT	Metric Tonne
NAMA	National Appropriate Mitigation Actions
NAPA	National Action Plan for Adaptation
NAPR	National Agency for Public Registry
NATO	North Atlantic Treaty Organization
NCB	National Competing Bidding
NCs	National Communications to the UNFCCC
NEA	National Environmental Agency
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
NPV	Net Present Value
NRM	Natural Resources Management
NWFP	Non-Wood Forest Products
OA	Organic Agriculture
O&M	Operations and Maintenance
OSCE	Organization for Security and Cooperation in Europe
PIM	Programme Implementation Manual
PIR	Project Implementation Reviews
PIU	Project Implementation Unit
PoP	Persistent Organic Pollutant
PP	Precipitation
REC	Regional Environmental Centre
S	Second
SADG	Strategy for Agriculture Development in Georgia
SAG	Technical Support and Advisory Working Group
SCCF	Special Climate Change Fund
SIDA	Swedish International Development Cooperation Agency
SLM	Sustainable Land Management
SNC	Second National Communication to the UNFCCC
SRF	Strategic Result Framework
T	Temperature
TNA	Technology Needs Assessment and Technology Action Plan for CC Adaptation
TNC	Third National Communication to the UNFCCC
ToT	Training of Trainers
UASCG	United Amelioration Service Company of Georgia
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollar
WB	The World Bank
WUO	Water Users Organization
WWF	World Wide Fund for Nature
Y	Year

Map of the project area



Executive Summary

The agriculture sector in Georgia is highly vulnerable to climate change (CC) and climate variability, leading to serious problems of production loss and threats to food security under a business as usual scenario. Recent extreme weather events - floods, windstorms, and drought - evidenced a marked land degradation trend throughout the country and a shifting aridification trend that is poised to heavily affect the already semi-arid Eastern portions of Georgia by the end of the century. Smallholder farmers in the country are highly sensitive to climate change due to their heavy reliance on subsistence agriculture. The limited access to financial resources, technologies, and adaptation knowledge entail low adaptive capacity and higher vulnerability to the extreme events, unpredictable climate variations, and environmental degradation caused by the combined effect of anthropogenic and climate change causes.

The proposed SCCF project, conceived within the framework of the overall IFAD programme for the Republic of Georgia, has been designed to address the climate change impact and adaptation priorities of the government for the agriculture sector in Georgia. Its overall goal is to enhance the adaptive capacity of farmers to climate change risks through resilient agriculture systems. The project aims to demonstrate the adaptation potential of climate-resilient crop production systems and technologies – especially efficient irrigation technologies (EIT) and conservation agriculture (CA) – combined with the rehabilitation and climate-proofing of irrigation schemes and value chain (VC) infrastructures - e.g. improved storage and processing facilities, and greenhouses - in ten selected crop VCs. The implementation of landscape restoration measures will mitigate the impact of climate-related risks, such as soil erosion, siltation and floods, damaging both farmland and infrastructures. The project will support multi-stakeholder processes involving all VC actors, knowledge generation and pro-poor farmers' investments leading to a more resilient agriculture production. The project will also support the Ministry of Agriculture (MoA) to mainstream CC adaptation into agriculture policies and regulations, to favour the sustainability and upscaling of the intervention supported by the project.

The SCCF funding is synergetic to the overall IFAD country programme, and it will cover additional costs associated with adaptation needs, for a total budget of USD 32.8 million (USD 5.3 million of SCCF funding, USD 26.8 million of two IFAD loans, and USD 0.7 million of IFAD grants).

The specific project objective is to improve water availability, farmland productivity and smallholders' income through investments in climate-resilient farming systems and VC technologies. The SCCF intervention is built around the following components: (1) On-farm efficient irrigation and soil and water conservation for sustainable agriculture production; (2) Landscape restoration to prevent climate-related risks; (3) Enabling environment for climate-risk reduction in agriculture; (4) Project management. The estimated project duration is 48 months, starting by 2015.

Component 1 of the project includes one specific outcome: (a) On-farm water efficiency and farming practices in irrigation and rainfed crop production systems are improved. The project will seek to integrate conservation agriculture and organic farming principles and practices into climate-proof efficient irrigation and rainfed agriculture systems so as to minimize environmental impacts. This component has a total SCCF budget of USD 3,102,000.

The project will support the transfer and adaptation of innovative technologies for EIT, CA, OA and for the production, processing and marketing of better-adapted crop varieties and high value crops. The project will hire the services of VC experts to support interested farmers in developing production plans for the use of adaptation technologies and production systems – drip or sprinkler irrigation, land preparation, seeding and planting with minimal or zero tillage, continuous soil cover, crop rotation, crop-livestock integration, management of crop residues, optimization of nutrient amendments and integrated weed and pest management - storage and processing equipment to reduce perishability, help diversify production and increase market opportunities. The project will channel adequate investment into matching grants that will be made available to beneficiary farmers to acquire the technical equipment needed for the shift to climate-resilient agriculture systems and technologies. The introduction of sustainable agriculture practices and the diversification of revenues will allow a more efficient use of time and labour, creating good opportunities for households with more than one adult employed, and opening the labour market to more women and youth.

Component 2 of the project includes one specific outcome: (a) Landscape restoration plans developed and implemented to prevent climate risks (soil erosion, siltation and flooding). This component has a total SCCF budget of USD 1,400,000.

The project will adopt a landscape restoration (LR) approach to assess climate risks –wind and water erosion – in the target areas, identifying vulnerable sites that jeopardize the proper functioning of irrigation systems and the protection of agricultural land, and supporting ecological restoration measures and bioengineering technologies to restore them. The output of this component is the development and implementation of 150 landscape restoration plans, including the climate-proofing of the irrigation infrastructures that will be rehabilitated through the IFAD baseline investment. This will involve the use of ecological restoration methods and bio-engineering technologies for: (i) the establishment of protective shelterbelts along irrigation canals where applicable, as well as on the boundaries of farmland plots; (ii) the restoration of vegetation cover along riverbanks as a measure to enhance the protection of surrounding agricultural lands; (iii) the restoration of degraded land in/around farmland plots and pastures. The production, processing and marketing of aromatic/medicinal herbs, berries, fruit trees, honey etc. will be introduced as a by-product of landscape restoration, with a special gender focus, and geared towards the domestic market. Matching grants for the restoration interventions, and the processing of plant products will be made available to eligible beneficiaries.

The project will promote community participation in the restoration actions, to increase farmers' understanding, buy-in and commitment to maintain the restored land, and will provide training on ecological restoration techniques and the set-up of small local business for women based on the by-products of landscape restoration.

Component 3 of the project includes two specific outcomes: (a) concerned institutions are empowered through capacity building to develop a more conductive policy environment for climate-resilient agriculture, and water and soil conservation; (b) The adaptive capacity of key agriculture practitioners on climate-resilient soil and water management practices in agriculture is developed and applied in the value chain cluster areas. This component has a total SCCF budget of USD 548,000.

The SCCF project will assess gaps and needs to mainstream CC adaptation into agriculture policies and regulations, and trigger a policy dialogue to boost the adoption of CC adaptation technologies – EIT, CA/OA, LR – and expand public-private partnerships for climate-proof VC finance. A preliminary assessment of current policies and regulations and their coherence with cross-cutting policy issues, and an analysis of existing incentives, subsidies and credit lines will be used to provide recommendations and a road map for policy improvement in the fields of CC adaptation for agricultural production and agro-landscapes' restoration. The project will also strengthen public awareness on CC risks and adaptation needs in agriculture through a process that will be jointly designed and implemented with VC organizations – agribusinesses, extension and mechanization service centres, cooperatives, farmers' associations, NGOs, and research organizations. The information, data, and success stories generated during the life span of the project will eventually be fed into a set of guidelines on best practices that will be disseminated throughout the country.

The assessments of CC vulnerability and risks in the target areas, and the surveys on best practices of climate-resilient agriculture and landscape restoration in Georgia and abroad undertaken in Component 1, will be the basis for designing and implementing a capacity building programme, including: (i) training of trainers (TOT) targeting at least 50 participants from extension and mechanization service centres, agribusiness, cooperatives, researchers, NGO and civil servants from governmental departments dealing with sustainable land and water management and crop production; (ii) on-farm capacity development of about 3,000 farmers through the set-up of 30 field demonstration trials testing different EIT, CA and OA approaches and technologies for selected crop types and varieties in the target areas, with the support of TOT beneficiaries and VC experts hired by the project. Target farmers will also benefit from institutional development support for the creation of informal and/or formal farmers organizations for water users and agriculture production and marketing.

So far, IFAD programmes and projects in Georgia have not systematically streamlined CC adaptation into development activities. The predicted CC impacts and the consequent productivity loss, as well as the occurrence of extreme weather events impacting soils, water and agro-ecosystems, and peoples' livelihoods all justify the need to expand the scope of the IFAD's interventions in this direction. On the other hand, the IFAD programme in Georgia will contribute to increasing the adaptive capacity of farmers through: (i) the removal of infrastructure and equipment bottlenecks to facilitate the access to water for higher value crops, markets, assets and incomes of poor rural people; (ii) the improvement in a pro-poor manner of the efficiency and diversification of crop production and processing; (iii) the strengthening of local institutions and the

farmers' technical and entrepreneurial knowhow to address the need for changes in their production systems; (iv) the increased access of poor rural people to finance, which also facilitates the access to the necessary resources to modernize their production system and improve production.

The SCCF project is about promoting a pro-poor agriculture development approach to address gaps in policies and practices linked to climate change adaptation, while ensuring that small farmers' investments frameworks and technology transfer take into account climate change risks. As demonstrated elsewhere, the CC adaptation technologies supported by the project – EIT, CA, LR - are particularly promising adaptation measures in areas suffering extreme weather events, such as torrential rainfall, windstorms, and drought. A side effect of the restoration of non-crop habitats such as protective shelterbelts is the enhancement of key ecosystem services, such as erosion control, pollination and pest control services, soil water regulation, income diversification, which contribute to a more resilient agriculture production.

The long-term sustainability of the project will be ensured through a broad, deep, and participative CB programme, designed to create a critical mass of practitioners at the national level, and among all actors – from institutional to grassroots. Replicability will be guaranteed with the dissemination of lessons learnt by MoA, providers of services and smallholder farmers beyond the project timeframe. The demonstration and promotion of adequate, locally adapted equipment will also contribute to replicability. Another important element for sustainability and replicability will be the mainstreaming of CC adaptation into the agriculture policy and legislation framework, as a measure to encourage replication and disseminate the experiences and achievements of the project.

The MOA will be the lead executing agency through the Rural and Agriculture Development Fund (RADF) entity as the fully blended AMMAR/ERASIG project' implementing agency. The RADF will be responsible for overall coordination and management of the project, including management and fiduciary aspects. The RADF will be substantially strengthened to manage the forthcoming projects and certain management and staff positions will be shared between AMMAR/ERASIG. The Management Team will include: an overall Project Manager, a VC Coordinator/Deputy Project Manager, a Climate Change Adaptation Specialist (GEF coordinator funded by ERASIG), a Planning M&E Officer[1], a Finance Manager, an Accountant, a Procurement & Contracts Officer, an Administrative Assistant, and some technical staff (VC specialists, engineers) and advisor (International Technical Advisor). Two Drivers will also be part of the project staff.

The GEF funded CC Adaptation Specialist (ERASIG Coordinator) will have responsibility for coordination and monitoring the ERASIG project components under the supervision of the PIU Coordinator. He/she will have the responsibility to generate draft annual work plans and budgets for the ERASIG project, including the source and use of funds, and a procurement plan. The draft annual work plans will be submitted to the PSC for review and approval. The PC will also provide the necessary information to the PIU Coordinator to complete the six-monthly and annual progress reports in English to be submitted to IFAD and GEF.

The recently re-vitalized regional MOA district offices, typically with 4-6 technical staff, will be engaged to: (i) support the project team in the facilitation of the local multi-stakeholder processes in each value chains, (ii) providing monitoring and technical back stopping of the farmer training and technology plots, and (iii) support the project team to follow up with farmers investing using grants.

Local service delivery to farmers, including delivery of farmer consultancy, training and management of climate-resilient EIT and CA technology plots, will be subcontracted to local service providers operating in each of the target locations (e.g. farm service centres, mechanization centres, farmer associations, private service providers, cooperatives, NGOs).

A project implementation manual (PIM) will be prepared as part of the project start-up activities, to assist the project legal entity with guidance for planning, implementing and monitoring activities, procurement of technical assistance and services, and project investments. The implementation manual will build on the practice of IFAD's operations in Georgia, defining procedures, criteria and procurement conditions for the project investments through matching grants, addressing climate resilience and gender requirements. All international and national providers of services will have to apply for competition by fulfilling specific criteria defined in the IM. To the extent possible, Quality and Cost-based Selection (QCBS) procedures will be used for procuring these consulting services.

[1] Cost sharing of position with WB GILMD project from 2015-2019

I. Situation Analysis

A. Geographical and Environmental context

1. The Republic of Georgia, with a total area of 69,700 km2, is situated in the South Caucasus. The country is surrounded to the east by the Black Sea, to the north by Russia, to the west by Azerbaijan and to the south by Armenia and Turkey. Its complex orography, geology and climate determine the variety of Georgia's landscapes: humid subtropical coastline, lowlands and wetlands, plains, semi-deserts, highlands, and mountains covered by forests and glaciers. Mountains cover a significant part of the country, with 54% of the territory at an altitude over 1,000 m above sea level (3): the Greater Caucasus Range, with the highest peaks rising more than 5,000 meters, and the various interconnected mountain ranges and plateaus of the Lesser Caucasus Range and the Volcanic Highlands in Southern Georgia, that do not exceed 3,400 m.

2. The country has two quite distinct climate zones in the West and the East regions (2):

(i) On the West coast, along the Black Sea, the climate is humid and subtropical, with average annual temperature of 14°C to 15° C and extremes from -15°C to 45°C. The influence of the Black Sea implies mild winters, hot summers, and large amounts of annual precipitation, between 1,500 mm and 2,500 mm. In the mountainous parts of the West region, average annual temperature ranges from 2ºC to 10°C with a minimum of up to -35°C, and annual precipitation from 1,200 mm to 2,000 mm.

(ii) The climate in the East is also complex. The plains in eastern Georgia have a dry subtropical climate, while mountain areas have an alpine climate. The average annual temperature is 11ºC to 13°C in the plains, and 2ºC to 7°C in the mountains, with a minimum of -25°C and -36°C, respectively. Temperatures in the high mountains range from -42°C to 42°C. Annual precipitation is 400 to 600 mm in the plains, and 800 to 1,200 mm in the mountains.

3. Soils differ markedly between the west, east and south of the country. Lowland wetland podsols, mountain-forest and mountain-meadow soil zones are predominant in the west. Chestnut and black soils are found in the steppes while brown soils are typical for the mountains in the eastern part of the country. The fertile soils of the country provide favourable conditions for land cultivation, as well as animal husbandry (3).

4. The agricultural area covers 35.53% of the Georgian territory (FAOStat data from 2011): 16.77% of arable land; 4.66% of permanent crops; 78.57% of permanent meadows and pastures; 17.54% of total area equipped with irrigation). Maize, wheat and grapes are the traditional, predominant crops. Other important crops are potatoes, barley, hazelnuts, citrus, sunflower, beans, and tomatoes. The traditional types of animal husbandry include cattle breeding and sheep breeding.

Table 1. Dominant crops in Georgia (FAOstat, 2013)

Item	Area harvested (ha)	Yields (t/ha)
Maize	146,700	2.48
Wheat	44,100	1.8
Grapes (2012)	45,000	3.2
Potatoes	25,900	11.45
Barley	27,400	1.27
Hazelnuts with shell (2012)	12,400	2
Tangerines, mandarins, clementins (2012)	17,900	3.97
Sunflower seed	17,000	0.58
Beans, dry	8,200	1.28
Tomatoes (2012)	5,800	11
Apples (2012)	12,500	3.6

5. Forests cover around 43% of Georgia's territory while the alpine/subalpine meadows and glaciers account for roughly around 10% of the land (2):

- Western Georgia's ecosystems below 600 metres consist mainly of deciduous forests – oak, hornbeam, oriental beech, elm, ash and chestnut – although most of the natural habitat has been converted into agriculture. Mixed broadleaf and conifer forests – beech, spruce and fir – occur between 600-1,000 meters, conifer forests up to 1,800 metres, and alpine meadows up to 3,000 metres. The glacier zone is found above the 3,000 metres line.

- In Eastern Georgia, nearly 85% of forests are deciduous – beech, oak, hornbeam, maple, aspen, ash and hazelnut – except for a few areas where conifers dominate. The alpine meadows extend from 2,000 to 3,500 metres up to the limit of the glacier zone. Lowlands in drier Eastern Georgia are characterized by steppes and semi-desert grasslands, scrublands and open woodlands (pistachio, juniper, oak, and the endangered salt tree, bongardia). Floodplain forests have largely been converted to agriculture, and patches only remain in the Alazani valley.

Table 2. Land classification in Georgia (SNC, 2009)

Total area (x 1000)	**Agricult. area** (x 1000)	**Forest area** (x 1000)		**Mountains** (over 1,000 m)	**Lakes, rivers, reservoirs** (x 1000)	**Wetlands**	**Glaciers**	**Semi-deserts**
km2	ha	ha	%	%	ha	km2	km2	km2
69.7	3,025.8	2,456.2	43	54	835.1	600	511[2]	70

6. Georgia is part of the Caucasus Ecoregion, which represents one of the 34 biodiversity "hotspots" identified by Conservation International for their high levels of endemism which are seriously threatened by habitat loss (11). The natural ecosystems provide the habitat for about 4,130 vascular plant species, of which about 1,000 are Caucasian or Georgian endemics. About 2,000 species of Georgian flora have direct economic value and are used as timber, firewood, food (e.g. fruit plants, aromatic herbs), cosmetic, medicinal, and animal forage, etc. The fauna of Georgia accounts for 16,054 species, including 19 mammals, 3 birds, 15 reptiles and 3 amphibians that are endemic to the Caucasus.

7. The Southern Caucasus is considered the centre of origin of species and varieties of several cereal, legume and fruit tree/shrub species (12). Early diversification and domestication of crops in Georgia included a wide range of species and varieties of wild cereals (barley, wheat, oat and rye), legumes (lentils, vetches, peas, *Lathyrus*, chick peas, and fava beans), fruit trees and shrubs (more than 100 species, such as almonds, cherries, plums, apples, quince), and common grape (about 500 varieties).

8. Georgia is rich in freshwater systems - rivers, lakes and springs (3). The rivers Rioni, Enguri, Tskhenistskali, Natanebi, and Supsa flow into the Black Sea. The Alazani, Iori and Mtkvari/Kura (the largest river in the country, with tributaries in Turkey and Armenia) flow into Azerbaijan before entering the Caspian Sea. Georgia has 43 main dams with a total reservoir capacity of about 3.4 km3, mainly used for irrigation and hydropower.

9. In accordance with Georgian legislation, water resources are property of the state, which issues licenses for water use (13). Major consumers are power engineering (approx.100 large and small hydropower stations) and irrigated agriculture (8).

B. Social National Context

10. The population of Georgia is just above 4.6 million (2). Tbilisi, the capital of the country, has approx. 1.5 million inhabitants and is situated on the banks of the River Mtkvari (Kura). Georgia's population has been decreasing slightly (-0.32%) over the last decades, due to a high rate of migration (4.36 per 1000 capita). As a result of the wars in the 1990s in Abkhazia and South Ossetia, and the 2008 Georgian-Russian conflict, Georgia currently has 258,595 Internally Displaced People (IDPs) with inadequate housing conditions and high levels of unemployment.

11. The population of Georgia is ethnically diverse, with 83.8% ethnic Georgians, 6.5% ethnic Armenians, 1.5% ethnic Russians, and 2.5% other ethnic groups (2002 census). Approx. 71% of the population speaks Georgian as a native language, 9% speaks Russian, 7% Armenian, and 6% Azeri. Several religious groups co-exist, with 83.9% orthodox Christians, 9.9% Muslims, 3.9% Gregorian Christians, 0.8% Catholics and various other denominations.

[2] Based on 1960 data; latest estimate indicates that this area has been decreased to about 400 km2.

12. At present, approximately 2.1 million people (47% of the population) lives in rural areas, where low-input, subsistence and semi-subsistence farming is a major source of livelihoods (GEOSTAT, 2012) (57). There are around 550,000 rural households (HH) with an average of 3.75 people per household. Agriculture accounts for 45% of the income of rural households, a further 28% coming from social payments and pensions and only 27% from salaried work. Subsistence agriculture accounts for 73% of rural employment. Work in agriculture has been impacted by the ongoing regional conflicts and displacement of the labour force. With rural poverty incidence estimated at 41.7% and a widening rural-urban gap, the performance of agriculture is critical for poverty reduction.

13. Although education enrolment rates show no difference between female and male students, gender gaps are evident in labour force participation and remuneration, and women are less represented at higher positions. In 2008, only 54.8% of the adult female population was employed compared to 73.9% of adult males (9). Additionally, a great number of women reported as employed are in reality self-employed, a significant proportion of them in agriculture. As a consequence, women's income is on average less than half that of men.

C. National Economic Context

14. Georgia is a lower middle-income country with a GNI per capita of USD 3,290 in 2012, ranking 79th on the Human Development Index (UNDP, 2014). Between 2004 and 2008, the country experienced sustained economic growth with average yearly growth rates of 6.8% (57). However, the 2008 military conflict had a negative impact in the country's economy, with heavy losses in all sectors of the economy, a 3,8% contraction in the 2009 GDP and a 16,9% rise in unemployment rates (57). Economic growth rebounded strongly, and GDP growth averaged 6.4% from 2010-12, accompanied by an expansion of bank lending, recovery of exports (including wine and nuts) and high public spending. GDP growth slowed in 2013 to an estimated 3.2% because of the decline of public investment as a result of audits of ongoing projects, and the reduction of private investment because of political uncertainty, given the Presidential election. Rural areas were heavily impacted by the decline of the agricultural sector, whose share in GDP fell from 19.3% in 2003 to about 10% in 2011 (9). Nonetheless, the largest share of employment (50%) is still found in this sector (57). Estimates for 2013 indicate 9.3% real growth in the agricultural sector, based on the first three quarters, partly driven by a programme of subsidies to smallholder farmers to procure inputs and the easing of trade relations with Russia.

15. In spite of the country's economy recovery with rates at almost pre-2008 crisis, a substantial part of the population is still living in poverty. Poverty rates were an estimated 35.6% against a $2 a day (PPP) poverty line and 18% against a $1.25 (PPP) extreme poverty line in 2010 . At the same time, against the national poverty line, the national poverty headcount was 20.9% in 2010 and had declined to 14.8% in 2012. Poverty rates are 80% higher in rural areas than urban areas - 18.8% vs 10.5% respectively in 2012 against the national poverty line. (World Bank, 2014). The social costs of assisting thousands of homeless Internally Displaced Persons (IDPs), as well as the reduced purchasing power have imposed a heavy burden on the economy (3).

16. The overall unemployment rate is estimated at 15% (2013) - the highest in the region - and among youth aged between 15-24 years is 35.5%. There is a considerable difference between the rural and urban data. Particularly, the unemployment rate in the rural areas is less than 8%, while in the city it reaches 28%. This could be explained by the fact that most earning income from agriculture, do not perceive themselves as employed. However, high (self-) employment in mainly subsistence agriculture in rural areas does not safeguard from poverty, which is also reflected by higher poverty rates in rural areas. Of those nominally employed, 79% are self-employed in rural areas compared to 30% in urban areas. The rural self-employed are typically smallholder farmers and subsistence-oriented agricultural households (often locally referred to as "peasants" as distinct from farmers) and account for 50% of all employment in the country. There are currently about 700,000 agriculture holdings of which some 90 percent are classified as family farms[3]. Rural households (HH) are typically highly dependent on low productive agriculture. (GeoStat, 2014). Overall, and especially in rural areas, households headed by women with children are particularly vulnerable to poverty.

[3] Less than 2ha holdings.

17. There is a substantial wage gap between agricultural and other sectors, with the average monthly wage in 2013 in agriculture of 486 GEL (USD293) versus 1112 GEL (USD670) in non-agricultural sectors. Thus agricultural wages are just 44% of non-agricultural wages. (GeoStat, 2014).

The Agriculture sector

18. Agriculture is one of the most important and traditional sectors of Georgia's economy. Since 2010, agriculture has begun to reverse its long-term decline after 15 consecutive years of neglect (as % of GDP and in GEL output). By 2013 the agriculture sector's output had grown by 40.3% over 2010 levels in nominal terms to reach GEL 3363 million. In 2013 agricultural output grew 12.2%, above the 2.5% nominal GDP growth rate, and in real terms grew by 9.8% year on year contributing 1.0% of real GDP growth (World Bank, 2014; GeoStat, 2014). At the same time, agriculture's share of GDP has grown to 9.3% in 2013 from a low of 8.4 percent in 2010 compared to 28 percent at independence in 1991. (World Bank, 2014; GeoStat, 2014, Bank of Georgia Research, 2014).

19. The state budget for agriculture has increased dramatically since 2010 - in absolute and relative terms. Agriculture's share of the state budget is 3.8% in 2014 and almost three-fold increase from 1.3% in 2010. So, combined with a growing overall state budget, the actual state budget for agriculture has increased by over 350% in the last five years. It is notable that the increased allocations to agriculture had begun under the previous government with substantial increases in 2011 and 2012 with further increases in 2013 and 2014 since the new government came to power in Oct 2012. This suggests a growing consensus across the political spectrum of the urgent need for renovation of Georgian agriculture as part of the country's economic and social development. (MOF, 2014)

20. Agriculture remains the largest employer of the Georgian economy, 51% of all males and 57% of all female employed in the sector. Agriculture accounts for 25% of exports, however the country's net trade in agriculture and food products remains negative. In 2012 the sector was declared as a priority for the development of the national economy (10). The government's sectoral priorities are to develop agriculture infrastructure, reform the management of irrigation and drainage systems, develop viticulture and promote food quality and safety. Expected results over the medium term include an enabling environment for agribusiness and enhanced competitiveness of Georgian agriculture products in international markets.

21. There is a considerable potential for growth in agriculture production. During the Soviet period, Georgia had a far more productive agriculture sector than neighbouring countries (3). However, the bitter civil war experienced when the country became independent after the dissolution of the Soviet Union in 1991, led to the collapse of agriculture. The land held by large state-owned collective farms, which averaged 428 ha in size during the Soviet period, was quickly distributed to rural households in an attempt to avoid famine. Georgian agriculture quickly recovered in 1993-95, raising the volume of production by 25%-30% above its lowest level in 1993, yet the initial collapse was so dramatic that agricultural output today is still 40% below what it was in 1990.

22. The land privatization process of the 1990s transferred 760,000 ha (60%) of arable land and perennials to about 4 million Georgians. About 460,000 ha remained in public ownership, of which 3000,000 ha were leased-out. In addition, some 1,750,000 ha of communal pastureland are left in the hands of the local administrations, and are available to residents for a small annual fee. The second phase of land privatization, which involves direct sale to lessees or public auction, started in 2005 and is ongoing. In 2007, the "Agro 100" program started, privatizing target land plots over 50 ha. The National Agency of Public Registry (NAPR) is responsible for land registration and is highly efficient by international standards.

23. Except for IDPs, more than 90% of the population living in rural areas owns land. The average size of an individual farm is 0.85 hectares and only 5% of farmers' holdings are larger than 2 hectares. Moreover, small family holdings are highly fragmented into two or three land parcels. Small subsistence farm households, with no or only a small part of production being marketed, represent about 98% of these farms, so the country's consumer market is saturated with imported food products (6). Semi-subsistence farmers try to market their surplus when available, albeit with significant difficulties due to: i) poor quality of the products caused by poor production and post-harvest practices; ii) low commodity prices, iii) inability to market the produce even though the market is not saturated, iv) transportation problems and iv) lack of access to agro-processing (58).

24. The expected dynamic of the land privatization process was that there would be a gradual consolidation of holdings through a lease process and a functioning land market. This result has not yet been

achieved, mainly due to the incomplete sectoral reform and the difficult access to financial services - so small plots are still predominating.

25. Between 2000 and 2012 the sown area decreased by 57% from 610,800 ha to 259,600 ha, with a significant increase in 2013 up to 310,700 ha (GEOSTAT, 2014). Between 2007 and 2013, the production of some annual crops have increased (68,100 tons more of maize, 67,400 tons more of potatoes and 6,100 tons more of wheat). Conversely, the production of barley, soybean, sunflower seed, grapes and fruits have significantly fluctuated since 2007, with a general reduction trend. Between 2007 and 2013, livestock production increased steadily in the case of cattle (from 1,061,900 heads up to 1,128,800) while in the case of sheep and goats it has significantly fluctuated with a tendency to decrease (from 343,500 heads of pigs to 204,300; from 92,400 heads of goats to 54,400; from 696,800 heads of sheep to 688,200). In the same period, the production of animal husbandry has decreased (slight reduction in milk and wool production; the production of beef, pork, sheep and goat meat has halved or more) except for eggs, honey and poultry meat. Stocks of beehives have steadily increased from 146,300 in 2007 up to 347,500 in 2013.

26. The agriculture productivity in Georgia compared with other neighbouring and important producer countries is near the bottom in terms of yield per hectare for almost every crop of vegetables (e.g. about 11.45 t/ha of potatoes in 2013 against almost 20 t/ha in Armenia, 30 t/ha in Turkey and 45 t/ha in the Netherlands), fruits (e.g. about 3.6 t/ha of apples against 20 t/ha in Turkey and 45 t/ha in the Netherlands), nuts (e.g. about 2 t/ha of walnuts against 3 t/ha in Azerbaijan and 6 t/ha in Ukraine), berries (e.g. about 2 t/ha of strawberries against more than 10 t/ha in Germany), grains (e.g. about 2.48 t/ha of maize against almost 6 t/ha in Armenia and Azerbaijan) and oilseeds (less than 1 t/ha of sunflower against almost 2 t/ha in Turkey) (59). The primary reasons for the low productivity are the low use of inputs (e.g. fertilizers), the uncertain supply of irrigation water, the lack of extension services and advice with respect to modern production and post-harvest handling practices, among others.

27. Agricultural exports increased 51% year on year in 2013 to USD774 million (equivalent to 27% of total exports), benefiting from the re-opening of the Russian market for some products in 2013 and exports to Russia reached USD107 million, approaching the pre-embargo level of USD129 million in 2005. The lifting of the embargo was initially for wines and water but the fruits and vegetables resumed in Oct 2013. Overall, major exports are wine, nuts, livestock.

Irrigation

28. Georgia has a tradition of land improvement through irrigation and drainage, and the irrigation potential is estimated at 725,000 ha (2). River diversion is the main source of water for irrigation, as groundwater is rarely used for this purpose. Major investments were made in the irrigation sector during the Soviet period, resulting in a total area of about 500,000 ha equipped for irrigation at the beginning of the 1980s, mainly in the arid eastern part of the country. Most of the schemes are large-scale (e.g. the upper Alazani with 41,100 ha, the lower Alazani with 29,200 ha, the upper Samgori with 28,100 ha, and the lower Samgori with 29,200 ha). All irrigation schemes are managed by the State through its United Amelioration System Company (UASCG). Though irrigation remains a responsibility of the State, irrigated lands can be owned either by private farmers or by the State but leased to farmers, cooperatives or agro-firms.

29. The main irrigation technology is surface irrigation. The major crops cultivated under full or partial control irrigation in the 80s were fruit trees and grapes, pasture and fodder crops, vegetables, potatoes, wheat, maize and sunflower. In 1986 average irrigated crop yields were 3.0 tonnes/ha for winter wheat, 2.9 tonnes/ha for maize, 4.8 tonnes/ha for grapes, 5.0 tonnes/ha for fruits and 12 tonnes/ha for potatoes.

30. During the 1990s, irrigated areas shrunk significantly, mainly due to civil strife, war, vandalism and theft, as well as problems associated with land reform and transition to a market economy, and the loss of markets with traditional trading partners. In 1996, over 300,000 ha were estimated to be in need of rehabilitation. It has been reported that during the severe drought of 2000, only about 160,000 ha were irrigated, and almost all pumping schemes were out of order (14). The abandonment and subsequent degradation and ineffectiveness of the irrigation systems have followed a sustained and accelerated trend, leading to a decline of the irrigated area from 386,000 ha in 1988 to approximately 62,000 ha in 2013 as reported by the MoA. Recent climate disasters (e.g. 2012 summer heavy rains accompanied with strong winds) devastated several irrigation schemes and left many areas in an emergency situation, further reducing the ability of the country to develop irrigated agriculture sector. As a consequence, the Government of Georgia has given priority to the rehabilitation of irrigation schemes and has requested the support to

IFAD, WB and other aid agencies, recognizing the pivotal role of irrigated agriculture in the rural economy of the country.

D. Institutional Context, National Policies and Legislation

31. In the past two decades, the Government of Georgia has paid little attention to the agriculture sector. A turning point occurred in 2010, when drought-based restrictions of grain exports from traditional supplier countries exacerbated the food crisis, causing an agro-inflation of 27% in food prices. This new emphasis on the agriculture sector was reflected in the "*10 Points Plan 2011-15*", which called for the development of a business oriented agriculture in addition to the traditional household-based agriculture. In 2010 the Government adopted the program "*United Georgia without Poverty*", including short-term priorities requiring high advanced technologies, such as development of infrastructure (energy, road and water supply), village development towards agriculture, minimizing the risk of natural catastrophes through early warning (10). The State budget allocated to the agriculture sector for the following years has significantly increased, from GEL 75.16 million in 2011 (80% higher than 2010) to GEL 241 million in 2013. Investments focus on the following priorities: irrigation and drainage rehabilitation; mechanization and farm input services; extension and information services; cheap agro-credit programme; food safety (monitoring and inspection, vaccination campaign, etc).

32. The Government of Georgia has embarked on a program to address the key rural issues within the Strategy for Agriculture Development in Georgia (SADG, 2012-2022) approved in March 2012. The SADG recognises as important preconditions for poverty reduction in rural areas the promotion of small on-farm and off-farm business development and employment generation, improved use of natural resources, increased access to and quality of public infrastructure including irrigation systems. The main priorities identified by the SADG include:

- Ensure equitable increases in rural incomes to enable sustainable livelihoods and food security for all income groups;
- Maintain the safety of food supplies to protect the public and to improve access to domestic and international markets;
- Increase the competitiveness of agricultural production;
- Promote environmental sustainability to protect natural resources for the future.

33. The Government's renewed interest in the revitalization of irrigated agriculture and improved water resource management is demonstrated by the institutional reorganization and the funds earmarked for structural rehabilitation in 2012 and 2013 (GEL 10.0 million and GEL 26.0 million respectively). Consultations between the Government and major donor institutions are ongoing for investment programmes in the irrigation and drainage sectors. The strategy of the Government includes the gradual adoption of more efficient irrigation systems such as drip irrigation and pivots, which could dramatically increase productivity and margins. At the same time water-user organisations are being initiated in parts of the country, with mixed results.

34. Based on the new strategy, the Ministry of Food and Agriculture (MoA) is ready to support sound agricultural practices to ensure effective and sustainable agricultural production, maintain and improve soil quality and reduce land degradation. The Government will also support an awareness and training programme of good agricultural practices (crop rotations, effective use of chemicals and fertilizers, use of organics, water use etc.) for farmers, advisers and policy makers. The potential for organic production will be considered, including the possibility to adopt an accreditation system in line with international standards.

35. The Georgian Agriculture Corporation (GAC) is a state-owned organization established by the MoA in 2010 to develop the agriculture sector and boost commercial agriculture in the country. GAC regroups 5 distinct subsidiary companies and covers most of the agriculture sectors through demonstration plots, irrigation projects, food processing, mechanization (farm machinery/service centres), grain storage facilities and pilot projects for corn, wheat, blueberries and potatoes. The government recently created the Agriculture Development Fund (ADF) to allow companies to draw funding from different sources (equity funding, joint ventures, grants, and foreign direct investments).

36. In July 2013, the parliament adopted the New Law on Agricultural Cooperatives, as well as the related draft law on amendments to the Tax Code, the law on Entrepreneurs and the law on Grants. The new legislation will address the problems caused by the fragmentation of lands during the land reform, and will bring the following advantages to the farmers: (i) the properties that will be included in a cooperative will be tax free; (ii) the agricultural produce of cooperatives will be free from income tax; and (iii) if a cooperative obtains a grant, this financial resource will be also free from taxes. According to Law on Agricultural Cooperatives, the minimum number of farmers for establishing a cooperative is 3 in mountain regions and 5 in lowlands. The support to farmers' cooperatives is one of the EU recommendations, and the new law was prepared with the participation of FAO and EU experts.

37. Additional key changes in agriculture legislation were recently implemented in an effort to remove unnecessary burdens and stimulate the development of Georgia's agriculture sector. These include: a Georgian Code on Food/Feed Safety, Veterinary and Plant Protection embracing EU standards has been prepared in 2012; a Decree on Bio-Production has been completed and the law will enter into force in 2014; a new Law on Vine and Wine has been prepared along with the Georgian National Wine Agency.

38. At present, Georgia is in the process of elaborating a new Law on Water. The law introduces the principles of integrated river basin management plans, covering both water quantity and quality considerations, and incorporates legal requirements from the EU Water Framework Directive and other related directives. Water resources are planned at the national (state water resources management programs covering a 15-year time horizon) and river basin levels. The national agency responsible for coordination of water resources management (presumably within the Ministry of Environment) will develop the river basin plans in consultation with river basin advisory councils. River basin plans should include the classification of water bodies in accordance with their ecological parameters, environmental quality objectives for different types of waters, water quality standards and minimum water quality requirements, effluent discharge limits, etc. In addition, programs for the prevention or reduction of adverse effects of water (e.g. floods, mudflows, landslides, erosion, etc) should be developed as an integral part of river basin plans. Territorial units for river basin planning are to be defined by the coordinating agency and approved by the government.

39. The main institutions involved in water resources management are: (i) the Ministry of Food and Agriculture (MoA), through its Department of Melioration and Water Resources (planning, monitoring, and promoting irrigated agriculture), the Hydraulic Design Institute (irrigation, drainage, flood control, land reclamation, hydroelectric and water supply schemes design), and the Georgian Scientific Research Institute of Water Management and Engineering Ecology (research into all issues related to water); (ii) the Ministry of Environment Protection and Natural Resources (MENR), through the Centre for Monitoring and Prognostication (assessment and monitoring of surface and groundwater quantity and quality) and its branches (Department of Hydrometeorology, Department of Monitoring of Environmental Pollution). The Department of Hydrometeorology keeps the hydrometeorological records from 90 stations for 90 years (1906-96), however, the number of stations is currently reduced to 14.

40. The Constitution of Georgia recognises the right to property and prohibits restrictions on the right to acquire, alienate, and inherit property, with a few exceptions. There are a number of laws governing land ownership and administration legal frameworks (e.g. the 1992 Land Privatization Decree; the 2010 Law on State Property; the 2010 amended Law on Recognition of Title of the Land Plots Possessed/Used by Individuals and Legal Entities; the 2002 Law on Promotion of Leasing Activities; the 2007 amended Law on Agriculture Land Ownership; the 2010 amended Law on Public Registry).

41. The National Agency of Public Registry (NAPR), under the Ministry of Justice, provides registry services for immovable and movable property, as well as areal estate cadastre. The Ministry of Economy and Sustainable Development is in charge of the privatisation of agriculture land, and oversees the leasing of state-owned agriculture land, with technical support from NAPR.

42. The Ministry of Environment and Natural resources (MENR) is responsible for environmental protection and the regulation of natural resources. The State Forestry Department was recently incorporated in this ministry. MENR hosts the National Focal Points for implementation of the UNFCCC and Kyoto Protocol, the CBD and the UNCCD.

43. The issues of land resources management and conservation, including protection against desertification/degradation, are mainly regulated by the following legal acts: Law on Soil Protection (1994),

Law on Conservation of Soils and Restoration/Improvement of their Fertility (2003), Law on Ownership of the Agricultural Lands (1996), Law on Compensation for Damage and Costs of Reclamation of New Lands Instead of the Agricultural Lands Transferred to Non-Agricultural Activities (1997), and Tax Code (2010).

44. The Georgian Laws on Environment Protection and Air Protection only feature broad statements calling for the reduction of Green House Gas (GHG) emissions, with no separate legal act regulating climate change, including mitigation and adaptation. Since the ratification of UNFCCC in 1994, Georgia developed and submitted two national communications (INC[4] submitted to the CoP5 in 1999, and SNC[5] submitted to the CoP 15 in 2009) to the UNFCCC secretariat and launched the preparation of the third communication (TNC). While the INC was mainly oriented towards mitigation and the preparation of the GHGs mitigation proposals, the SNC focused on adaptation priorities, selecting 3 most vulnerable regions: Dedoplistskaro in East Georgia with land degradation and desertification problems, the Black Sea coastal zone with sea level rise high storm and beach washing problems, and the Kvemo Svaneti mountain region, with fragile ecosystems. The impact of climate change on water resources was assessed in the Alazani and Iori rivers crossing the Dedoplistskaro region, and the Tskhenistskali river in Kvemo Svaneti, in terms of water availability for population and irrigation. Draft adaptation strategies for the 3 regions were prepared and various adaptation proposals were developed, some of which obtained donors supports, while others were included in the National Environmental Action Plan (NEAP). The SNC has strengthened the capacities of universities and the National Environmental Agency to run regional downscaling models for the assessment of future climate change scenarios on water, crops and pastures. Several advanced adaptation technologies for different development sectors and action plans are recommended in the Technology Needs Assessment and Technology Action Plan for CC Adaptation (TNA).

45. The TNC project proposal was developed with stakeholder consultation (governmental institutions, research centres, NGOs, and Aid Agencies) and is based on the self-assessment of the SNC results and lessons learned (e.g. good technical data generated with top experts; ability to assist in setting national priorities and in developing concrete proposals for the priorities and vulnerable areas that helped mobilize financial resources). In parallel to the TNC, the Georgian Government is planning to produce and implement NAPA (National Action Plan of Adaptation) and NAMA (National Appropriate Mitigation Actions) documents.

46. Transnational cooperation is a critical issue to address water protection and integrated water resource management under a climate change scenario in the Southern Caucasus. The lack of cooperation among Southern Caucasus states and the missing hydrological data on water quantity and quality, in particular concerning groundwater, are major obstacles to improved transboundary river Management (5). Existing regional conflicts are another major barrier to increased cooperation on water resources. Major donors including the European Union, German Cooperation, UNDP, NATO and OSCE have been very active in tackling this issue through several transboundary projects.

II. Threats and root causes analysis

A. Threats

Anthropogenic

47. Land degradation is one of the most acute problems in Georgia. The main anthropogenic causes of land degradation are: overgrazing, uncontrolled wood cutting and logging, pastures and stubble burning, conversion of pastures and forests into agriculture land, and poor use of water resources. The main consequences of land degradation are soil erosion and soil and water quality loss, including depletion of soil organic matter, soil nutrients and soil water storage; salinization, pollution caused by the lack of water treatment in urban and industrial areas, and the increased use of chemical fertilizers, pesticides, and herbicide). Desertification processes are acquiring alarming proportions both in the East and the West of the country (4).

48. In West Georgia, due to the predominant mountain relief and abundant precipitation, unsustainable forestry and agriculture practices are the main cause of land degradation through soil water erosion

[4] Initial National Communication
[5] Second National Communication

processes (10). The felling of forests, largely practiced over the last two decades, has caused an increase in the frequency and intensity of landslides[6], floods, mud torrents, and snow avalanches, damaging agriculture land, forests, infrastructures, buildings, and causing significant decreases in the standard of life and the acceleration of migration processes. About 23,2% of the total arable lands in this region (186,800 ha) are located at water erosion prone slopes over 50º of tilt, and 33,7% are classified as eroded lands.

49. In East Georgia, a region with a much drier climate and violent winds in winter and early spring (30-40 m/s), serious degradation of farmland through water and wind erosion has occurred due to uncontrolled felling of trees, pasture overload[7], the cutting down of windbreaks[8] in agriculture land, and the incorrect exploitation of irrigation systems. Approx. 21% of the total arable land in this region (486,400 ha) is classified as eroded land. Overgrazing affects 80% of the pastures in Dedoplistskaro (Kakheti region), with a productivity reduction of 40-70%. The depth of humus in many agricultural lands in the Kakheti region has significantly decreased, leading to a sharp decline in the productivity of the main crops (10). The improper use for agriculture of natural soils with saline and alkaline content, which are common in the plains of eastern Georgia, has exacerbated salinity problems. The inappropriate and excessive use of water through flood irrigation has contributed to dissolve soluble salts stored in the subsoil, raising the water table, and bringing salty water into the reach of plant roots and the soil surface.

Climate Change

50. Climate change is already having a significant impact on nature and people in Georgia, through increasing temperatures, shrinking glaciers, decreasing snowfall and an upward shift of the snowline, redistribution of river flows, and sea level rise (1). The CC trend will bring an extra burden on development sectoral policies, which still struggle to embark on a more sustainable path, including eradicating widespread poverty. Climate change also poses an additional risk for the political stability of the region.

51. The Second National Communication to the UNFCCC (SNC) revealed increasing trends in both mean annual temperature and annual precipitation from the period 1955-1970 to the period 1990-2005 in all three assessed regions[9]. The higher temperatures were coupled with a decrease in hydro-thermal coefficient (HTC) in the Dedoplistskaro region, and an increase in HTC in the other two priority regions. The analysis of changes in T absolute minima and T absolute maxima indicates a warming trend in the three regions both in winter and summer.

Table 3. Change of climatic elements in 3 priority regions, 1955-2005 (SNC, 2009)

Priority region (meteorological station)	Average values of mean annual air temperature for respective periods (°C)			Average values of annual sums of precipitation by period (mm)				Average value of air temperature absolute minima (°C)			Average value of air temperature absolute maxima (°C)			HTC
	I	II	II - I	I	II	II - I	II-I (%)	I	II	II-I	I	II	II-I (%)	II-I (%)
The Black Sea coastal zone (Poti)	14.4	14.6	0.2	1837	2078	241	13	-13.0	-10.0	3.0	33.8	35.4	1.6	+0.6 (20%)
Kvemo Svaneti Lentekhi)	9.6	10.0	0.4	1256	1360	104	8	-14.5	-13.8	0.7	34.7	35.2	0.5	+0.6 (28%)
Dedoplistskaro region (Dedoplistskaro)	10.6	11.2	0.6	586	622	36	6	-11.5	-11.5	0.0	32.7	34.8	2.1	-0.2 (-15%)

Designation of periods: I – (1955-1970); II – (1990-2005).

52. In the last decade, Georgia has suffered from increasingly frequent extreme weather events, leading to serious drought, flooding, landslides, forest fires and coastal erosion with significant economic losses and

[6] In Georgia, 58% of the country is prone to landslides with 3.5 million hectares of land at risk of mudflow and landslides and 987,000 people located in hazard area (7).
[7] The interruption of transhumance to winter pastures at the Caspian seashore, has caused the overstocked (sheep livestock exceeds by 2-3 times the normal value believed to be 3-4 sheep per ha) and overgrazing of winter pastures in the eastern lowlands.
[8] Windbreakers played a significant role in moderating the microclimate of fields and vineyards, and protecting soil from wind erosion in the eastern semiarid regions prone to wind erosion and desertification, such as Dedoplistskaro. Unfortunately, during the 1990s, these belts almost completely were cut down, as a result of which the productivity of the land has significantly decreased (e.g. from 3-4 t/ha of winter wheat to a little less than 2 t/ha after the cutting of windbreaks, according to MENR).
[9] Dedoplistskaro (Kakheti region) in the Eastern half of Georgia, and the Black Sea coastal and the Kvemo Svaneti in the Western half of Georgia.

human casualties (1). The share of snow alimentation has rapidly decreased and the seasonal snow line has risen from 1,300-1,500 meters to 1,800-2,000 meters (1). A recent study shows that the Greater Caucasus glaciers have declined by 50%, with a current retreat by 5 to 10 metres per year, and a maximum value of 25 m/year (1).

53. Torrential rainfall and floods: Rainfall has shown a far more recurrent pattern with heavy downpour, with frequent flooding and large economic losses. Over the past 30 years, major floods have hit Georgia:

- In Kvemo Svaneti the recurrence of floods has doubled or more in the period 1967-89, compared with the period 1937-66. The maximum discharge has increased by 9% and the duration of floods has decreased by 25%, which could explain the growth in intensity and severity of floods. The sum of precipitation in the months with heavy showers has increased by about 12% in the period 2000-2005. Devastating floods in the late 1980s caused the displacement of almost 1,000 families from this region, with subsequent population decrease from 14,580 residents in 1987 to 8,760 in 2003.
- The 2007 floods in Georgia resulted in losses and damages of USD 246 million.
- An extreme hail, windstorm and flash flood in July 2012 caused an estimated economic loss of over USD 123 million, seriously affecting 20,000 families in Kakheti region and causing damage to 5,255 residential houses and the municipal water, gas and electricity distribution systems. In Kakheti, 11,000 ha of vineyards (10% of total) were completely destroyed - with no harvest expected in the next two years – and serious damages were reported in peach orchards, vegetable and maize fields.

54. Drought: The severity of drought has markedly increased in the past 50 years, especially in the regions of East Georgia. Its average duration has extended from 54 to 72 days and the frequency of occurrence has risen twice (10). The frequency of high-speed winds (>30 m/s) has multiplied fivefold since the beginning of 1980s (10).

- In 2000, drought impacted 696,000 people and caused USD 200 million in losses and damage (7).
- In the period 1980-2007 the average duration of drought increased by 22% in Dedoplistskaro region. The annual frequency of high winds for the period of 1963-2006 has risen from 0.28/yr to 1.44/yr.
- In Kvemo Svaneti, the average number of days with drought increased from 34 (period 1956-1972) to 47 (period 1991-2006), corresponding to a rise of 38%.

55. The combined effect of heat weaves, uncontrolled pasture and stubble burning and absence of a fire prevention and fighting capacity led to an increased impact of forest fires: 1,586 and 688 ha of forests burned in 2006 and 2007, respectively.

Climate Change Prediction

56. All available scenarios predict a gradual increase of temperatures from the current baseline, following a trend that is consistent with the historical data. Although there remains uncertainty on the actual degree of warming, average warming for the next 50 years for the Medium Impact Scenario is of about 2.3 ºC (58). According to the SNC, if the climate change scenarios obtained under all available methodologies are compared with the baseline period 1961-1990, both in Western and Eastern Georgia, by the year 2100 the mean annual temperature will increase 3.5ºC and 4.1ºC respectively, and the precipitation will decrease by between 6% and 14% respectively (Table 4). This process will be especially sharp in summer, when both the temperature increase and precipitation decrease trends are higher, causing a major impact on the evapotranspiration and hydrological regime.

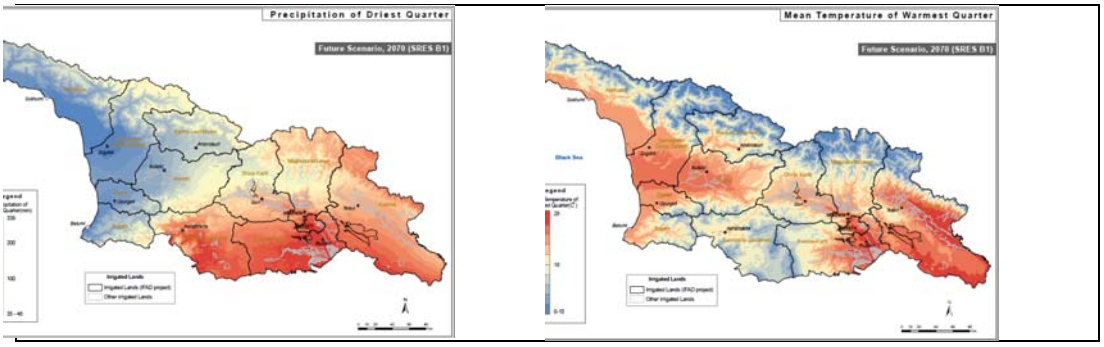
Table 4. Average values of 2100 temperature and precipitation scenarios for Western and Eastern Georgia, based on three models (HadAM3P, ECHAM4, MAGICC/SCENGEN (SNC, 2009)

Region	Season	Spring		Summer		Autumn		Winter		Annual	
	Parameter	T ^{0}C	Q mm	T ^{0}C	Q mm	T ^{0}C	Q mm	T ^{0}C	Q mm	T ^{0}C	Q mm
Western Georgia	Baseline period	7.9	281	18.5	348	9.7	391	-2.3	377	9.1	1197
	Anticipated change Δ	4.6	-40	5.6	-88	3.4	-52.7	3.6	104	3.5	-70.0
	2100	12.4	241	24.1	260	13.0	338	1.4	481	12.6	1127
Eastern Georgia	Baseline period	9.3	158	20.5	170	11.6	126	1.0	85	11.3	570
	Anticipated change Δ	4.6	-65	5.9	-72	4.1	-45	4.5	-289	4.1	-83
	2100	13.9	93	26.4	98	15.7	81	5.5	56	15.4	487

57. When it comes to precipitation, all scenarios indicate uncertainty in the direction of effects as well as magnitude of the changes. The range of precipitation outcomes across the Low and High Impact scenarios is large, from a modest increase under the Low Impact scenario to a 24% decline under the High Impact scenario (58).

58. By 2070, the mean temperature of the warmest quarter will increase up to 2.3 ºC in/around the lower areas of Central and Eastern Georgia, especially in the region of Kakheti, Kvemo Kartli, and the south-eastern extreme of Sida Kartli, which also happen to be the areas where most irrigation schemes are located (Figure 1). The precipitation of the driest quarter will reduce by half or one third in almost all the territory of the Kakheti, Kvemo Kartli and Samchke Javakheti regions, and in significant part of the lower parts of Sida Kartli, and Mtskheta Mtianeti (Figure 1). Increased temperatures and evaporation will contribute to exacerbate the water deficit for crops.

Figure 1. Predicted mean temperature for the warmest quarter, and predicted precipitation for the driest quarter in Georgia



59. *CC predictions on agriculture*: The agricultural sector is highly climate sensitive and potential adverse changes in temperature, precipitation and the frequency of extreme events - e.g. droughts, heat waves, floods, forest fires - are likely to increase the vulnerability of poor rural communities.

60. The yields of most crops, both irrigated and rainfed are expected to decrease in the eastern and western lowlands of Georgia. The effect of climate change on crop yields in the 2040-2050 period under medium climate forecast scenarios predict yield reductions of -4% for corn and between -5% and -6% for wheat, grapes and mandarin under both irrigated and rainfed; between -5% (irrigated) and -10% (rainfed) for potatoes; and between -6% (irrigated) and -11% (rainfed) for tomatoes (58)[10].

61. In East Georgia, the projected changes in climate will bring an alteration in the wetting regime by the end of current century, with a reduction of the Hydrothermal Coefficient (HTC) by 0.4 (from its present value of 1.1 down to 0.7). This will mean a considerable aridification trend in an already arid region, with major consequences in agriculture. Although the increase of temperature during the warm period (April-October) will cause the prolongation of the vegetative period on average by 39-44 days, the strong winds and the lack of rainfall will hamper the development of the agricultural sector in the region. The demand for irrigation water during summer is expected to increase with up to 20% by 2050, while overall water availability will

[10] IEc (2013) Reducing vulnerability of Georgia's agriculture systems to climate change. Impact assessment and adaptation options. The World Bank.

decline by an average of 30-40%, resulting in a significant reduction in water availability for irrigation (58). In the absence of windbreakers, the impact of strong winds on the productivity of crops will become increasingly evident.

62. In Western Georgia (Black sea region) it is predicted (PRECIS Regional Climate Model) an increase in annual T by 1.2 ºC and a precipitation decrease of 8-10% by 2050. Under these conditions, it should be expected better conditions for the production of oranges and lemons that may gradually supplant the less profitable tangerine trees. This change would provide a doubling of income from citrus growing. Accounting for the anticipated decrease in precipitation, the application of modern irrigation systems would be required in April-May and partially even in summer months as well (SNC, 2009).

63. In the central and western mountains areas it is predicted higher amount of precipitation with heavy showers in the warm period (mainly spring) of the year, with an increase in the frequency and intensity of extreme phenomena – floods, landslides, mud torrents, and snow avalanches – damaging agriculture, forests, buildings and infrastructures. Although a significant runoff reduction may occur during summer, the feeding from glacier melting – not considered in the model- may bring some corrections. The anticipated increase in temperature by 3-4 ºC and the 5% decrease in precipitation could provoke a breach of the natural equilibrium in the forests. However, the anticipated prolongation of the vegetative period from the present 185 days up to 210-215 days should expand opportunities in crop diversification, and positively affect livestock raising by an increase in the productivity of pastures and hayfields.

64. The SNC indicates several priority adaption actions to overcome climate change impacts on agriculture, most notably the use of advanced micro-irrigation methods to conserve water (above), investments in drought-tolerant crops and varieties, the cultivation of less water-intensive and higher-valued crops (e.g. fruits and vegetables), measures to increase soil fertility and soil water conservation to reduce productivity losses, and the diversification of cropping systems. All of these measures require significant investments in agricultural research and extension services, as well as the availability of long-term and interest-low financial services for farmers to adopt climate-proof technologies and agriculture systems.

B. Root causes of agriculture decline

65. The weight of agriculture in Georgia's economy has declined in the past two decades. Without the subsidies and guaranteed access to the market enjoyed in the Soviet period, the sector has seen its production shrink, together with its share of GDP and the total labour force. From 1994 to 2006 the agriculture sector registered one of the most dramatic declines of output of all CIS and CEE countries. This negative trend exacerbated the migration trend from rural areas to urban centres or abroad.

66. The main root-causes of the decline of the agriculture sector include: land tenure problems; incomplete sectoral reform; political instability; unsustainable use of natural resources; lack of knowledge and technology transfer; high costs of agriculture inputs and expensive financial resources; absence of modern and appropriate machinery services for sustainable agronomic practices, and suitable for current predominant plot sizes; poor connectivity to markets loss of traditional agricultural commodities markets and a Russian trade embargo; and a generally degraded rural infrastructure. An increasing share of agricultural land is left unused, mainly in the eastern part of Georgia, and many land owners have moved away from the area, leaving their properties fallow.

Land tenure problems

67. Poor agro-environmental management is largely due to inadequate property rights and tenure insecurity. The process of privatization and distribution of the agricultural land resulted in the creation of very small and fragmented holdings that are not suitable for commercial agriculture. These small and fragmented plots have become a constraint to the development of a functional land market that can effectively alleviate rural poverty. The 2005 law on privatization of the agriculture land that was still owned by the state aimed to promote viable private plots of no less than 3 ha to enable commercial farming.

68. Lack of tenure security is also a major constraint for the return of internally displaced people. Procedures for the leasing of public land do not result in expected levels of marketed production due to inadequate leasing conditions (e.g. most contracts are short-term of 3 to 6 years in spite of the fact that the law contemplates leases up to 49 years) and corruption. Holders of large land-leases (50 ha or more) represent 8% of the total number of leases, but control 56% of leased cropland.

69. Despite the progress made in recent years11, women are still under-represented at decision-making levels and disempowered economically. According to the Gender Inequality Index, Georgia is placed 71 of the 137 countries surveyed. Women also tend to have little involvement in economic decision-making within the family and have limited access to credits.

Incomplete sectoral reform

70. The failure of Georgian agriculture to modernize is one of the root causes for the persistence of high poverty levels in the country. The total area planted reduced by 57% between 2000 and 2012, and average production per hectare decreased accordingly. Agriculture remains an important, albeit declining sector in terms of GDP contribution, net foreign exchange earnings, employment generation and poverty reduction.

Outdated and failing infrastructure for water supply, sewage and wastewater treatment

71. Almost all irrigation systems require rehabilitation. Their reconstruction and improvement in the semi-arid and arid part of the country must be coupled with the introduction of innovative watering techniques, especially inner soil, under-root, drip and high-dispersion methods that can significantly abate water consumption per unit of produce - consumption is 7-8 times lower for drip irrigation, and 3 times lower with high-dispersion. There is an urgent need to train highly skilled experts and specialists in watering, which can adjust the irrigation technologies, specified norms and watering regimes to the needs of each specific region according to crop demands.

72. The current Government recognizes the lack of water users' trust in irrigation institutions and the need to re-establish a basic level of service delivery before water users can be encouraged to participate in on-farm irrigation management. The government has substantially increased the UASCG budget to help achieve this and expects that the off-farm and on-farm infrastructure will be managed by UASCG during a period of transition towards greater water users' involvement in the management of on-farm systems.

Abandonment of sustainable management practices

73. After land privatization, the new land owners faced problems that were difficult to overcome individually, including lack of experience in cultivating and managing agricultural land and pastures, poor knowledge on effective agricultural techniques for land cultivation, the lack of investment capacity, the absence of extension and Meteo-information systems, etc. As a result of this, the methods used in the past to protect cropping systems (e.g. windbreaks) and increase water availability (e.g. irrigation schemes) under climate constraints were abandoned or destroyed. Moreover, the abandonment of transhumance systems, the permanent overstocking of pastures and the conversion of fragile pasture systems into agriculture land all contributed to pastureland degradation.

Insufficient capacity and awareness to implement sustainable agriculture practices

74. Georgia is near the bottom in terms of yield per hectare for almost every crop (e.g. vegetables, potatoes, grains, oil seeds, fruits, nuts, citrus, and berries) when compared with other neighbouring and important producing countries. A fundamental underlying reason is the fact that small farmers do not have access to the necessary advise with respect to modern production and post-harvest handling practices, including info on fertilization, IPM, irrigation, marketing, etc.

75. The absence of a functioning agriculture research-education-extension system in Georgia is a fundamental barrier to the development of a modern agriculture in the country. As a consequence, more than 685,000 households with 5 ha or less operate in ways that result in very low productivity for the agriculture sector overall. There is virtually no comprehensive extension system in Georgia that provides information on production alternatives, optimal input utilization, farm management, post-harvesting and marketing, and other factors critical to a farmer's success in a market oriented economy. Agriculture research and educational centres are under-equipped, with few research projects on modern agriculture technologies and very limited formal educational opportunities for professional development in the agriculture sphere.

76. The availability of machinery services is insufficient and costs are often prohibited to small farmers. The type of machinery implements available in most service centres is often inadequate for the needs of farmers (e.g. availability of too expensive larger machines while less expensive smaller equipment best suited to small farm holdings do not exist at the centres) and for the development of a modern, CC-adapted agriculture system.

[11] In March 2010 the Government of Georgia adopted the law "On Gender Equality" and elaborated a National Action Plan. The Parliamentary Council on Gender Equality, initially a temporary advisory structure, became a standing body in March 2010.

Difficult access to financial services

77. The lack of access to affordable, long-term credit is a significant hurdle to the development of the agriculture land sales market. According to the statistical data of the National Bank of Georgia, only 1.9% of the credits issued in 2009 were earmarked for agriculture. Only short-term, high-interest credit is generally available, as banks do not accept agriculture land as collateral for mortgage because of the land's low market value. Agriculture financial institutions and agriculture insurance services are very scarce.

Political instability and conflicts

78. The unsolved conflicts in South Ossetia and Abkhazia continue to jeopardize the population's ability to maintain their livelihoods, and disputes over land are common in these areas. The massive displacement of people due to political conflicts and natural disasters has put an additional burden on internally displaced people, contributing to both food insecurity and poverty, and to land degradation - illegal wood cutting, poaching, overgrazing and land conversion to agriculture in unsuitable and biodiversity valuable places.

III. Baseline Analysis

79. The increasingly negative social and economic impact caused by the exacerbation of extreme weather events and associated natural disasters has pushed the Government of Georgia to engage in a number of policy reforms aimed at turning agriculture into a priority sector for the country's development. The grain exports restrictions from traditional supplier countries in 2007 and the consequent inflation of food prices (27% inflation in 2010), as well as the growing climate-risk restrictions (drought, floods and hailstorms) to agriculture production, represented a turning point. This new emphasis is reflected in the "10 points Plan 2011/2015", which proposes the development of a business-oriented agriculture in addition to the traditional household-based agriculture.

80. The Government, with the support of UNDP, has engaged in the identification of specific climate change adaptation priority measures and technologies, in the framework of the Second National Communications to the UNFCCC (SNC), and following the recommendations of the Technology Needs Assessment and Technology Action Plans for CC Adaptation (TNA). Three types of land management technologies are recommended by the TNA process: (i) protection of arable lands from water erosion, (ii) protection of arable lands and irrigation infrastructure from wind erosion and (iii) sustainable irrigation technologies.

81. The main CC adaptation priorities identified in the SNC for the agriculture sector are (8):

(i) The restoration of pastures and windbreaks to reduce wind and water erosion, siltation problems in irrigation canals, as well as to improve microclimate conditions – lower evapotranspiration – and soil fertility in agriculture land. This will be achieved through the mobilization of farmers and village communities to implement pilot projects, and the use of multipurpose plant species to promote the environmental services of windbreaks (e.g. crop pollination; economically valuable products such as wild fruits, MAP, honey, etc).

(ii) Water conservation and water use efficiency, by rehabilitating and improving irrigation schemes and employing advanced irrigation methods such as micro-irrigation technologies - e.g. sprinklers and drip irrigation that can reduce water consumption by 30 to 70% - based on integrated water management planning at the basin level;

(iii) Soil conservation cropping systems and technologies, such as conservation agriculture (combination of no/reduced till, mulching, crop rotation, organic fertilization and integrated pest management), to improve soil structure, soil fertility and soil water retention;

(iv) The selection of more water-efficient crops, such as drought-resistant varieties of higher-valued fruit and vegetable crops;

(v) The diversification of landscapes and income - e.g. integrating trees, livestock, horticulture and specialized agriculture in agro-silvo-pastoral systems - to help buffering against climate impacts through a diversified on-farm production and eco-agriculture techniques that improve environmental services and resilience to natural disasters and soil erosion;

(vi) Effective storage and processing technologies for the diversification of less perishable agriculture products to address increased variability and shortfalls in high demand months (i.e. summer);

(vii) The amelioration of soil fertility through the use of gypsum in alkali soils and chemical fertilizers (nitrogen, sulphur, phosphorus, etc.) in saline soils.

(viii) The improvement of agricultural research and extension capacity, which are critical for the adaptation to climate change in the agricultural sector;
(ix) The development of early warning systems for natural disasters and seasonal forecasting.

82. Under the new *Strategy for Agricultural Development in Georgia* (SADG) for 2012-22, the Ministry of Agriculture intends to revitalize irrigated agriculture through the rehabilitation, reconstruction and modernization of irrigation and drainage systems, and the support for efficient irrigation systems (e.g. drip irrigation, pivots, etc) and good agricultural practices (e.g. conservation agriculture principles through permanent soil cover, crop rotations, effective use of water and fertilizers, etc.) to ensure sustainable production, promote environmental sustainability, improve soil quality and reduce land degradation. The potential for organic production will be considered, including the set up of an accreditation system in line with international standards.

83. The European Neighbourhood Program for Agriculture and Rural Development (ENPARD) (2013-2016) of the EU has a total envelope of €40 million to boost the production of food in Georgia and to reduce rural poverty. Expected results include the strengthening of co-operation amongst small farmers through the establishment of small farmers' business-oriented organizations, and improved performance of the institutions engaged in agriculture. The process of supporting water-user organizations (WUOs) is part of this programme.

84. Several recently adopted new laws and strategies (Law on Agriculture Cooperatives; amendments to the Tax Code, to the Law on Entrepreneurs and to the Law on Grants; Food Safety Strategy of Georgia) create favourable conditions to the set-up of farmers' cooperatives, bringing significant fiscal exemptions, and facilitating land consolidation for commercial agriculture.

85. An important ongoing development is the strengthening of Georgia-EU relations, with the initialling in Nov 2013 of the Association Agreement including the Deep and Comprehensive Free Trade Agreement (DCFTA) which is expected to come into force no later than 2015. This creates new market opportunities in many higher value markets - yet Georgian producers and exporters will have to make significant progress on quality and productivity if they are to successfully compete in these attractive markets.

86. The IFAD Agriculture Supported Project (ASP) (2010-2016), managed and implemented under the responsibility of DPMMD/MoA, is supporting: (i) rural leasing to increase assets and incomes among poor rural women and men willing to move towards commercial agriculture and associated rural enterprises, and (ii) small-scale rural infrastructure rehabilitation to overcome bottlenecks that inhibit participation of economically active rural poor in the rural economy.

87. The recently approved "Agriculture Modernization, Market Access and Resilience" (AMMAR) (2015-2018) project of the Government of Georgia, with IFAD funding, aims to raise incomes of smallholder farmers and increase climate resilience through public and private investments in upgrading climate-proof productive infrastructure, enterprises and smallholder farmer production systems and technologies in support of inclusive growth of climate smart agricultural value chains[12]. AMMAR will also establish partnerships with Banks and MFIs to help create a conducive environment and facilitate contact between the creditors and bankable clients to deliver credit to small farmers and to tailor their products to agricultural lending. AMMAR is part of the Ministry of Agriculture (MOA's) substantial ongoing investments to modernize agriculture in Georgia and is fully aligned to the Strategy for Agriculture Development (2014-2020) and supporting action plan.

88. AMMAR is organized into two mutually supportive components to accelerate the development of up to six priority climate smart agricultural value chains, initiated in two batches over the first two years of the project. AMMAR Component 1 (Irrigation and Agricultural Value Chain Investment) shall support investment in secondary/tertiary irrigation and value chain infrastructure, and shall stimulate private investment by smallholder farmers and agribusinesses in crop production and value chain activities through a partial matching grant scheme. Through a multi-stakeholder process (MSP) of systematic value chain facilitation, involving producers, agribusinesses, input/service providers and other VC stakeholders, AMMAR Component 2 (agricultural and value chain development) will help identify critical constraints along each of the value chains and to address them jointly with the value chain stakeholders. Such constraints are

[12] Climate smart value chain - for the purposes of this report is taken to mean an agricultural value chain that sources its primary produce from climate smart agriculture

expected to include, for example: marketing, processing, storage, post-harvest, aggregation or primary production as well as intra-chain linkages and the provision of key services to producers and agri-businesses. Main activity areas under the Component will include: an initial value chain screening and prioritization process involving multiple stakeholders; an ongoing multi-stakeholder process of value chain facilitation in each value chain and associated production cluster areas, and; agricultural practices and technology transfer, training and promotion including practical field training at small scale technology plots. Specific "hard" investments by the project to address the identified constraints in each value chain will be primarily financed through the instruments under Component 1.

89. AMMAR, will support up to six priority climate smart value chains and address critical constraints along the value chains, for example in marketing, processing, storage, post-harvest, primary production or the provision of key services to producers and agri-businesses. As identified during appraisal, there is potential and based on farmer interviews, demand, for developing at least 9 value chains, for: (i) Stone fruits (peaches, plums, cherries, sour cherries); (ii) Pip fruits (apples, pear); (iii) Berries (strawberries, blueberries); (iv) Vegetables (v) Potatoes; (vi) Honey; (vii) Herbs; (viii) Beans & pulses (chickpea, lentils - as part of crop rotation); and (ix) Nuts.

90. AMMAR targeting will give priority to the poorest regions of Central and Eastern Georgia, with emphasis on the areas where there is agriculture and irrigation development potentials. The primary target groups are smallholder farmers, including active poor farmers , in targeted value chains, while secondary target groups are other value chain actors (agribusinesses, cooperatives, service providers). Targeting of direct beneficiaries' households, agribusinesses and other value chain participants will be on the basis of their active involvement in the prioritized value chains and their interest in participating in the project activities. In addition, to ensure the adequate distribution of benefits and more inclusive growth, the production technologies promoted will focus on those most relevant to the scale and resources of smallholder farmers, including active poor farmers. The multi-stakeholder processes in each value chain will also be organized at the local level to enable the full participation of smallholders and active poor farmers alongside agribusinesses and other value chain participants and stakeholders.

91. AMMAR will scale up ASP investments in the rehabilitation of public irrigation infrastructure and the enhancement of commercial farming in poor rural areas. AMMAR will also complement the WB project "Georgian Irrigation and Land Market Development" (GILMD), responding to the governmental renewed interest in irrigated agriculture, with a focus on rehabilitating the irrigation capacity of the country, promoting effective users' participation in the organization and management of water services, and supporting the governmental land registration reform that will clarify land tenure rights and help farmers participate in the land consolidation market.

92. ERASIG project will help mainstream a climate-resilient approach into the IFAD baseline interventions - AMMAR project. This will include: screening and prioritization of product value chains that are expected to have sustainable comparative advantages under future climate change scenarios, especially at the primary production level; promoting investment in climate-proof efficient irrigation technologies, conservation agriculture systems and targeted landscape restoration and soil erosion control measures alongside sensitive farmland areas and the rehabilitated irrigation schemes to create sustainable improvements in water-efficient irrigated production, and; promoting the widespread adoption of climate-resilient agronomic practices and technologies at the farm level.

93. ERASIG will also incorporate climate-resilience into the development of individual/institutional capacity of smallholder farmers, extension agents/organizations, researchers and other relevant actors to:

(i) increase the understanding of smallholders on modern water and land conservation approaches;
(ii) develop the capacity of farmers and farmer organisations on commercial productive and market oriented farming practices;
(iii) improve the relevance and the quality of the services provided by extension units;
(iv) build the smallholders resilience to overcome economic and climate shocks.

94. While driven by farmer demand, the ERASIG supported climate-resilient agricultural technologies that are expected to be most relevant will likely be for improved water, soil and nutrition management. At the village level, the approach to technology transfer and promotion will be through a combination of practical CSA technology plots, promotion events, short and longer duration practical field training (for example through a series of half day practical field training session at critical points in the production cycle) and systematic follow-up with farmers by the local service providers delivering the training. CSA technology plots will act as sites for farmers to directly access know-how, training and networks of

services and credit providers to facilitate easier adoption of the promoted technologies. They will also create the opportunity for interested farmers to get an objective farmer-to-farmer perspective on the technologies from the progressive farmers on whose land the CSA technology plots are established.

IV. Stakeholders Analysis, target group and project area

A. Stakeholders analysis

95. The rural population involved in agriculture practices can be divided in the following categories:

- Small-scale households: families holding 0.8 hectares on average, living and working solely on the farm, families living in villages but working in nearby cities, or families living and working in cities who were able to secure smallholdings in the land reform process.
- Privately owned or leased larger individual farms: families or group of families with about 6 ha of partly owned land and partly leased land from the state.
- Corporate farms on leased land: agriculture enterprises or corporate structures (e.g. cooperatives, limited-liability companies, etc. that are the successors of former state farms or lease state land, averaging 93 ha per enterprise.

96. Farmers' organizations (e-g- farmers' cooperatives, Water Users Associations, etc) are slowly developing in Georgia. There are roughly 150 farmer cooperatives or associations in the country, involving only 5-10% of the total number of farmers. Many analysts believe that Georgian agribusiness can never become efficient until land is consolidated in larger plots, a trend that can be encouraged by supporting the set up of more cooperatives. The creation of farmers' cooperatives is a top priority for the EU, which is investing a significant portion of its 40 million EUR agriculture package to stimulate farmers' cooperation.

97. The United Amelioration Services Company of Georgia (UASCG) is responsible for on-farm water delivery and maintenance. UASCG requires capacity building support in system operation and maintenance, integrated watershed management approaches, as well as disaster risk management and CC adaptation. Social mobilization through groups of representatives of water users representing farmers' interests should be created to interact with UASCG, and participate in planning management and maintenance work.

98. Agriculture support services are granted by a complex array of crosscutting service delivery organizations that provide agriculture inputs - development organizations like Merci Corps, CARE, UNDP, private companies and governmental agencies. The Millennium Challenge Georgia and the USAID have supported the creation and strengthening of private farm and machinery service centres that offer a full range of goods and services to farmers. In 2009 the MoA and MESD set up the Meqanizatori Company, which claims to hold 30% of the agriculture service provider market. The Georgian-owned Agriculture Corporation provides high quality seeds, fertilizers and pesticides to help upgrade in the quality of these products, and support for the reconstruction of the grain storage facilities.

99. Agriculture extension services are mainly provided by the MoA, the Centre of Scientific and Technical Information (TECHINFORM), the Academy of Agriculture Science of Georgia, the industry-wide SRIs, the Farmers' Union of Georgia, NGO "Elkana", and the House of Georgian Farmers, through training, on-farm demonstration plots in collaboration with farmers, newsletters, publications and web information. The private Farm Service Centres (FSC) that are distributed all over the country, in some cases, also provide extension support to farmers.

100. Agro-environmental and social NGOs have a key role in the training of trainers and farmers through the implementation of pilot projects on sustainable agriculture, CC risk reduction and landscape restoration. These organizations include CENN, REC, WWF, Elkana, among others.

101. Higher agrarian education is provided by the Georgian Agrarian University (GAU), the Georgian Zoo-Veterinary Institute, the Georgian Subtropical Institute, the Agriculture Institute of Batumi, the Institute of Horticulture, Viticulture and Wine-making, and the GAU branches in Telavi and Marneuli. It is customary for large commercial farms to also make use of international expertise.

102. Georgia suffers of a lack of cutting-edge, coherent information, human and technical resources, and local skills in climate-proof efficient irrigation technologies and sustainable agriculture systems such as conservation agriculture and organic agriculture. This gap hampers the effectiveness of consulting or advice services to farmers and other practitioners. Moreover, there is little applied research and sharing of know-how among farmers and researchers to make the most of best practices from the application of adaptation technologies.

B. Target Group

103. In line with IFAD's mandate and based on the fact that it is the poorest people in societies who will be most affected by climate change impacts, the main beneficiaries of the project will be the current beneficiaries of the IFAD country programme: (i) the primary target group that consists of smallholder farmers, including active poor farmers and (ii) the secondary target group that consists of small- to medium-scale surplus farmers, including agribusiness, cooperatives and service providers. The precise target groups would be defined by those communities/ farmers that demonstrate agricultural production potential in higher value commodities, are accessible to marketing channels, and show clear interest and commitment.

104. ERASIG will target all stakeholders who play a major role in the agriculture sector, including all beneficiaries of the IFAD country programme:

- Asset-poor, food-insecure and labour deficient farm households. These actors will be the most severely affected by climate-induced risks. Climate change risks could lead to the loss of their critical means of survival and would compromise their ability to invest in next season's production and animal feed in order to sustain their livelihoods, with very limited chances to access bank credits.
- Small- to medium-scale local entrepreneurs who have invested important resources to cultivate large areas, including leading farmers and farmers' organizations – including farm service centres - who provide employment opportunities and access to inputs, and are willing to adopt innovation and a business-oriented approach. The withdrawal of these farm entrepreneurs due to climate change impacts would significantly affect the agriculture sector and the rural areas in general.
- Central and municipal level governmental agents, including policy makers, rural planners, UASCG staff, and rural extension' agents.
- Researchers and academic staff from agronomic and environmental research and educational centres, agro-environmental and social NGOs, and private extension organizations.
- The financial sector (financial service institutions).

105. Targeting of direct beneficiaries' households, agribusinesses and other value chain participants will be on the basis of their active involvement in the prioritized value chains and their interest in participating in the project activities. In addition, to ensure the adequate distribution of benefits and more inclusive growth, the production technologies promoted will focus on those most relevant to the scale and resources of smallholder farmers, including active poor farmers. The multi-stakeholder processes in each value chain will also be organized at the local level to enable the full participation of smallholders and active poor farmers alongside agribusinesses and other value chain participants and stakeholders.

106. ERASIG will follow IFAD's "Gender Equality and Women's Empowerment policy" to increase its gender impact – e.g. improve gender rating for grants' design and the proportion of matching grants for women organizations or households headed by women; gender consideration in hiring project staff. Poor rural women will be expected to be participants in AMMAR Annual Stakeholder Review and Planning Workshops. A benchmark of 30% minimum representation of women across AMMAR activities has been set, although satisfaction of the targeting criteria described above may mean a much higher percentage of representation, given rural women's longstanding roles in vegetable and livestock production and associated processing both at home and as wage labour in agro-processing companies. AMMAR Annual Work Plans and Budgets would be expected to be gender-sensitive as would employment patterns and levels of remuneration in project-supported investments and selection of project infrastructure. Project monitoring and reporting data will be disaggregated by gender.

107. The project will build capacity to incorporate climate change adaptation needs into the daily work of all these stakeholders, so they can become co-generators of knowledge, trainers, and disseminators of

adaptation methodologies and tools for the vulnerable rural population. The project will put special emphasis in the need to harmonize concepts, approaches and recommendations about adaptive agriculture principles and practices among all stakeholders in Georgia.

108. The project will provide the additional support needed to increase awareness, build capacity to reduce CC-risks affecting farmers' production systems and livelihoods, and adopt/invest in agriculture adaptation technologies and management practices resilient to climate change. Leader entrepreneurs, research institutions, public and private extension organizations, farm and machinery service centres, farmers' organizations, and NGO, will play a major role in the provision of services and on-farm learning opportunities. This will facilitate a participatory process through which target farmers will use their own best practices and the available scientific knowledge to jointly identify and apply climate change adaptation measures in the selection of crop varieties and production techniques, and the soil and water management practices that suit best the different agro-climatic conditions of the country.

109. Target villages and farmers will be selected in a participatory way at the project start-up. The targeting will be consistent with that of AMMAR, which comprises geographical targeting, self-targeting and direct-targeting. Project targeting seeks to combine a demand-driven modality with self-targeting parameters of Project benefits and pro-poor eligibility criteria. The principle of a demand-driven modality is important in at least three respects. First, self-motivation is the single most important ingredient in any development process. Secondly, when combined with comprehensive participatory project implementation measures, it assures project responsiveness. Thirdly, when combined with self-targeting parameters of project benefits and pro-poor eligibility criteria it achieves growth with poverty reduction targets while avoiding a potentially socially divisive top-down allocative methodology.

110. Certain modifications and refinements are proposed in order to align the strategy with the specific characteristics and requirements arising from the nature of the proposed investment ensuring that all technical and economic parameters are satisfied, in particular that where irrigation schemes have been prioritized, these are aligned to the priorities identified through the participatory multi-stakeholder processes in each value chain.

111. Women and unemployed youth will be the primary beneficiaries of ERASIG project because their higher vulnerability. The project will strengthen women's involvement in capacity development activities – i.e. through the identification of women farmer leaders to support demonstration trials in their farm plots; the definition of gender criteria for the selection of participants to training activities and women's access to climate resilient investments and post-harvesting and marketing support. The promotion of labour saving conservation agriculture technologies will help reduce women's workload and allow them to engage in new income generating activities – i.e. local nurseries for plant production and the production of medicinal and aromatic plant, wild-fruits, honey, etc.

C. Project Area

112. Targeting will be nationwide, with the actual geographical focus determined by its climate change vulnerability and the supported crop value chains. Priority will be given to the poorest regions with emphasis on the areas where there is agriculture and irrigation development potentials.

113. Through a multi-stakeholder process (MSP) involving producers, agribusiness, input/service providers and other value chain stakeholders, the project will identify and select up to 10 crop value chains vulnerable to climate change impacts in areas with high potential for agriculture and irrigation development and seriously affected by rural poverty. The rational for selecting these crop value chains and associated production cluster areas is based on the following climate change criteria:

i. Climate change scenarios[13] predict significant impacts on water availability and agriculture production in the value chains and associated production areas:

- Reduction in soil moisture: crops in/around irrigation schemes and watersheds that urgently require adaptation measures to secure additional soil water input (e.g. to increase soil moisture storage through mulching, zero-tillage or irrigation);

[13] Considering the importance of the availability of water for agriculture in general, and to the sustainability of the irrigation schemes and irrigated agriculture in the country, IFAD undertook an assessment of CC predictions and impacts on water availability in the target areas and basins, included in Annex 5.

- Agriculture areas/irrigation schemes with significant runoff and water recharge reduction: runoff reduction means less water resources for crop irrigation. Less precipitation concentrated in shorter rainfall events or storms will increase the intensity of floods with higher water erosion risk, and will reduce the water infiltration capacity of soils;
- Agriculture areas with high to medium risk of windstorms: this coupled with intense deforestation of the riverbanks and floodplains upstream and downstream the irrigation schemes and watersheds, will exacerbate the impacts of floods, soil erosion, and siltation of irrigation canals and reservoir;
- Agriculture mountain areas with high risk of torrential rainfall impacts exacerbating the risk of landslides, mud torrents, floods and snow avalanches.

ii. ERASIG targeting will include areas that to the urgent request by the Government of Georgia to develop a recovery framework after the heavy damages caused by the devastating hailstorms, combined with strong winds and heavy rainfall, that hit Eastern Georgia in July 2012;

iii. ERASIG will provide guidance to incorporate CC adaptation measures at the basin level, in/around the baseline targeted irrigation schemes and at the farm level through climate-resilient efficient irrigation, sustainable agriculture practices and landscape restoration actions. The CC adaptation measures tested by the project will eventually be transferred to other river basins/irrigation schemes of Georgia where MoA is active.

V. Project Strategy

A. Project Rationale

114. The agricultural sector in Georgia is highly climate sensitive. Climate change is already showing major impacts, with increased vulnerability of poor rural communities. Since agriculture is the economic and social safety net of the rural poor in the country, any poverty reduction strategy has to incorporate CC risk reduction objectives.

115. The predicted future climate conditions will significantly reduce water availability in the spring/summer periods critical for crop production, causing marked reduction in runoff relative to input precipitation, increased evapotranspiration, decreased soil moisture, and increased soil erosion risk due to the higher concentration of rainfall in short periods of heavy showers. The projected high to medium risk of windstorms in the target areas together with an intense upstream and downstream deforestation of the riverbanks and floodplains will exacerbate the impacts of floods and soil erosion. Because these changes will turn into less water available for agriculture and higher soil degradation, it will be necessary to:

(v) Avoid irrigation water losses – rehabilitated and modernized irrigation schemes - and adopt efficient on-farm irrigation and soil and water conservation technologies, so they can minimize irrigation water needs, increase soil water storing capacity, and secure water availability to cover the ecosystems and human needs;

(vi) Increase soil cover and soil stability (e.g. enhancement of permanent soil cover and mulching in agriculture land; vegetation restoration in degraded land, in between crop land and along irrigation channels; plantation of suitable fruit trees such as hazelnuts, and restoration of pastures and forests in steep slopes to prevent landslides; implementation of flood/erosion control measures at the watershed level to stabilize farmland and irrigation schemes, making use of bio-engineering technologies) as a way to minimize the CC exacerbation of soil erosion risks. The restoration of degraded land will be paramount to ensure the environmental services needed for agriculture, and minimize climate risk.

116. ERASIG project will address the CC adaptation priorities identified by the Georgian government for the agriculture sector by testing and promoting climate-resilient irrigation and agriculture management practices and technologies, implementing landscape restoration measures to prevent climate-related risks, and by building capacity and supporting institutional development for the upscaling of results at both policy and local implementation levels.

117. ERASIG project is complementary with the baseline interventions (the IFAD-supported projects and other MoA policy reforms and rehabilitation of irrigation infrastructure interventions), which together address in an integrated way the root causes (Chapter VIII, Section B) of agriculture decline and rural poverty in

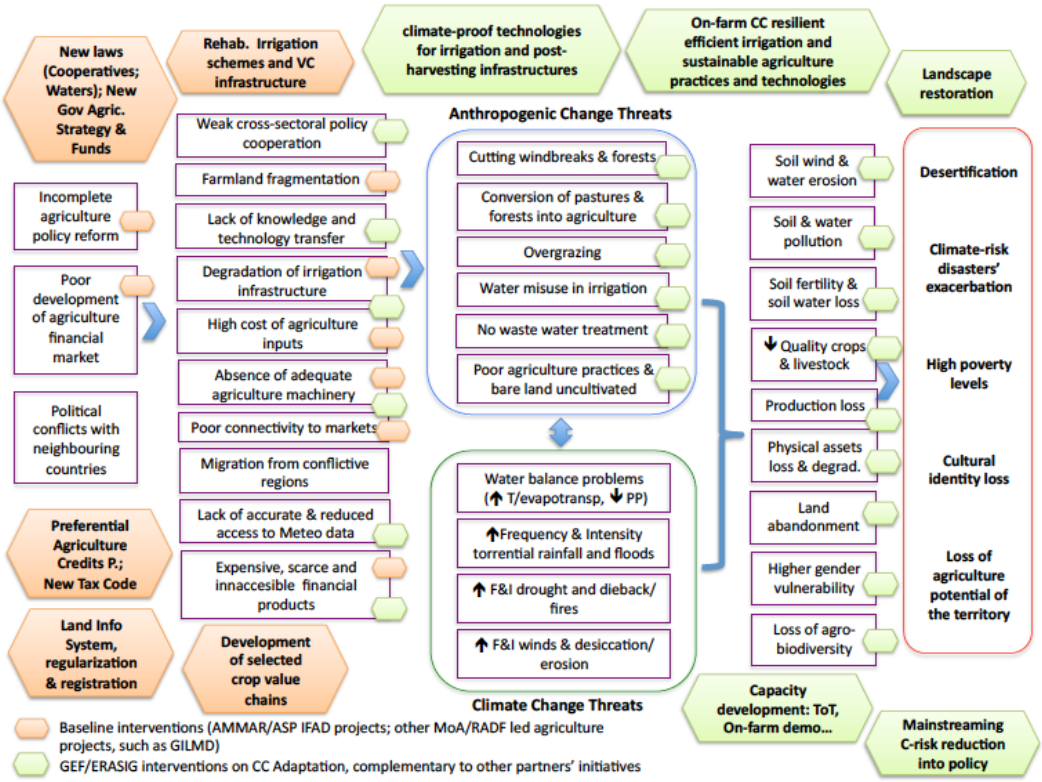
Georgia (Figure 6). The current agriculture policy reform[14] aims to create an enabling environment that will facilitate the development of farmers' adaptive capacity through: (i) increased access to and quality of public infrastructure including irrigation schemes; (ii) the regularization of land registration to help reduce land fragmentation and activate a land consolidation market; (iii) the organization of farmers in associations or cooperatives to organize water irrigation quotas, improve access to agriculture machinery and inputs, finance and training, increase marketing opportunities, and share knowhow to improve irrigation and agronomic management practices; (iv) the availability of more suitable finance products to access machinery and inputs for efficient irrigation and sustainable agronomic practices.

118. AMMAR will support the governmental policy reform through investments in selected value chains to increase incomes and strengthen resilience of small farmers and the rehabilitation and modernization of value chain infrastructure – including irrigation schemes - in the CC vulnerable poorest agriculture areas of Georgia, supporting the identification and validation of efficient farmers' organization and water service institutions.

119. ERASIG project will become a platform for individual farmers, farmers' organizations, policy-makers, civil servants, agribusiness, cooperatives, service providers, researchers, NGO, and the financial sector (insurance companies, credit agencies, commercial companies), to work jointly on agriculture adaptation to climate change and implement effective adaptation measures. ERASIG project will help incorporate CC adaptation objectives and measures into AMMAR and MoA baseline activities through: (i) the incorporation of climate-proof technologies in the rehabilitation and modernization of irrigation schemes and post-harvesting infrastructures; (ii) a policy dialogue to help mainstream CC risk reduction into agriculture policies and regulations affecting soil and water conservation; (ii) improved access to suitable financial services, facilitating the acquisition of equipment and inputs for the adoption of climate-resilient efficient irrigation and sustainable agronomic technologies and practices for selected crops; (iii) capacity development of providers of services, individual farmers and farmers' organizations to help them shift from conventional to climate-adapted agriculture production, and improve farmers' post-harvesting marketing skills, specially looking at gender and youth unemployed problems.

[14] Among others, the new laws on water, farmers' cooperatives, tax code, as well as on water use; new agriculture strategy; new land information system; the Preferential Agriculture Credits programme and other funding schemes.

Figure 2. Root-causes analysis framework for the agriculture sector decline in Georgia showing ERASIG (in green colour) and Baseline (in orange colour) responses [15]



120. ERASIG will test new approaches and technologies in the Georgian agriculture context that can eventually be up-scaled and replicated elsewhere in the country. The input of ERASIG funding will translate into: (i) more sustainable land management, higher yields and more diversified production through efficient irrigation and sustainable agriculture systems and technologies, better adapted crop types and varieties, and the ecological restoration of functional agrolandscapes in the target areas; (ii) improved access to CC-resilient technologies and knowhow thanks to the facilitated access to improved services, inputs, and credit for producers through partner financial institutions (FI) and service centres, the positive impact of targeted technical and institutional capacity development, and the implementation of on-the ground activities, including farm demonstration plots and research trials; and (iii) the adoption and implementation of climate-proof technologies in value chain infrastructures. Efficient irrigation technologies will also represent an important tool to prevent salinization problems arising from the excessive use of irrigation water (e.g. drip irrigation effects in reducing root-zone soil salinity and drainage), as has been demonstrated in numerous agriculture development projects in arid, semi-arid and sub-humid zones worldwide. In some areas with salt-affected soils the project will analyse the possibility to promote the use of more salt-tolerant crop and forage species and varieties.

121. ERASIG adaptation measures will also have a mitigation value. Humus losses will reduce from the 1.48 t/ha of baseline scenario to 0.22 t/ha as a result of CA, while ecosystem restoration will contribute to carbon sequestration. The project will provide a holistic and comprehensive approach to the various adaptation and mitigation roles of agriculture and agro-forestry.

[15] From right to left, the framework includes: (i) first column with the main problems of the agricultural sector (desertification, exacerbation of disaster and climate risks, rural poverty, loss of cultural identity and loss of productivity of the territory) in eastern Georgia; (ii) second column with a set of direct causes (white rectangles); (iii) third column with the intermediate causes, including interacting anthropogenic and climate change threats; (iv) fourth and fifth columns with the ultimate political and economic drivers. The Framework also represents GEF/ERASIG intervention lines (hexagonal boxes in green colour) and baseline intervention lines (hexagonal boxes in orange colour) that in an integrated way aim to help reverse the root-causes for agriculture decline in Georgia. The small green and orange hexagons located in the right side of the root-causes indicate the areas addressed by ERASIG and the baseline intervention respectively.

B. Project consistency with requirements for the SCCF funding

122. In line with the SCCF criteria, the project was developed in compliance with the principles of country ownership and driveness. The formulation team engaged in extensive consultations with Governmental agencies, International Cooperation, NGO, agriculture organizations and local farmers to ensure that their views were fully taken into account. The activities supported through the project have been identified among the governmental CC adaptation priorities for the agriculture sector included in the SNC and the TNA. The GEF and SCCF criteria for project design and financing have been respected: project management costs represent less than 10% of the total budget requested and co-financing ratio fulfils SCCF criteria. Finally, the project was developed in coordination with other ongoing and planned IFAD initiatives in the country (ASP and AMMAR baseline project).

123. **SCCF Added Value Compared to the baseline**: Given the importance of the agriculture sector in the Georgian economy and its high vulnerability to climate change, the national goals of economic growth and poverty reduction will only be met if a climate-resilient, modern and competitive agricultural sector is in place. The Government of Georgia, with the support of national and international partners, is engaged in a wide range of development projects and programmes supporting policy reforms and investments in agriculture irrigation infrastructure. However, both subsistence and surplus farmers are highly vulnerable to the impact generated by climate change. Climate change is acting as a “multiplier” of existing socio-economic and environmental barriers to sustainable development. The promotion of resilient agriculture systems and technologies for efficient water use, more stable and higher yields and diversified crop production together with climate-proof infrastructure modernization and landscape restoration measures for reducing vulnerability to climate risks and improving key environmental services for agriculture production will represent a major contribution of the SCCF/ERASIG project to the adaptation of the agriculture sector in Georgia, in line with the governmental CC adaptation priorities in agriculture.

124. Numerous national strategies and international development programmes worldwide propose efficient irrigation technologies (EIT) and conservation agriculture (CA) systems for soil conservation and sustainable water use and management as a key CC adaptation strategy that reduces environmental risks, increases agriculture productivity and secures food security. ERASIG proposes the adaptation technologies featured in the GEF/UNEP Guidebook for CC Adaptation in Agriculture, among which the use of pressurised irrigation systems (sprinkler or drip) to improve water management and efficiency, and the adoption of CA systems (the combined use of reduce/no till, soil mulching, crops rotation and diversification, and integrated nutrient and pest management) to improve soil fertility and soil carbon and water storage.

125. Drip and sprinkler irrigation can help farmers by improving the efficiency of water use and achieving a more even application of water to agriculture land, thereby promoting steady crop growth. In areas subject to climate aridification, pressurised irrigation reduces demand for water, reduces water evaporation losses, and helps prevent salinization problems. The drip technology uses even less water than sprinkler irrigation and is not affected by wind, which represent a major problem in the project areas (sprinkler irrigation will strongly depend on the restoration of tree shelterbelts to reduce the impact of wind in the farmland plots). Scheduled water application will provide the necessary water resources directly to the plant, and when required. Furthermore, fertiliser application is more efficient since these can be supplied through the pipes. Additionally, sprinkler irrigation can reduce the risk of hail.

126. Conservation agriculture (CA) systems have a higher adaptability to climate change because of: (i) a more effective water infiltration and greater soil moisture-holding capacity, that help minimise the impact of extreme weather events such as water stress during drought, and run off erosion and flooding during torrential rain events; (ii) the reduction of surface soil extreme temperatures and fluctuations help minimise the effect of heat weaves and frost periods; (iii) the higher soil resilience increase productivity and crop diversification, with a positive effect on food security; (iv) the reduced use of fossil fuel and the increase of soil carbon has an important mitigation effect.

C. Country eligibility, ownership and driveness

127. **Country Eligibility**: The Government of Georgia has ratified all the three global environment conventions (UNCCD, CBD and UNFCCC).

Table 5 - UN Environmental Conventions signed and Ratified by Georgia

UN Convention	Signed	Ratified	Enter into Force
UNFCCC	-	29/07/1994	27/11/1994
UNCCD	-	23/07/1999	21/11/1999
CBD	-	02/06/1994	31/08/1994

128. National reporting for the implementation of the three conventions is in line with the priorities addressed by ERASIG project: (i) improvement of legislation and mainstreaming of climate change adaptation and desertification issues into sectoral policies; (ii) assessment and monitoring of CC-impacts, with special attention to drought and floods and elaboration of early warning systems; (iii) on-farm conservation and sustainable use of agro-biodiversity; (iv) introduction of sustainable agriculture management systems, focusing on conservation agriculture (CA) and organic agriculture (OA); (v) ecological restoration of depleted soils, degraded forests/floodplains, grasslands and agro-ecosystems to reverse desertification and soil erosion trends while improving the conservation status of agro-ecosystems, soil fertility, and other environmental services. In line with the national objective for an integrated implementation of the Rio conventions, ERASIG project stresses the linkages and benefits of synergetic agriculture development and agro-landscape restoration.

129. The Republic of Georgia ratified the Kyoto Protocol in 1997, and is eligible for activities under the Clean Development Mechanism (CDM). The Government of Georgia further demonstrates its full commitment to environmental protection by joining numerous international environmental conventions, protocols and agreements, among which: Convention on Persistent Organic Pollutants (2006); Convention on the Protection of the Black Sea against Pollution (1994); Cartagena Protocol on Biosafety (2008); CITES convention (1996); RAMSAR convention on wetlands (1997); Convention on the Protection and Use of Transboundary Watercourses and International Lakes; Aarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (2000); Convention on the Conservation of European Wildlife and Natural Habitats (2000); European Landscape Convention (2000); Protocol on Strategic Environmental Assessment (2003).

130. **Country Ownership and Driveness**: It is commonly accepted that the support to agriculture production is of vital importance to the economic growth of Georgia and represents the most reliable way for alleviating poverty, given the high potential for increased agriculture productivity. However, the high vulnerability of agriculture and rural population towards climate risks may eventually undercut or even reverse governmental efforts for alleviating poverty if adaptation measures are not adopted, as shown in the aftermath of last years' droughts and floods[16].

131. The SCCF project follows the approach of country ownership and a focus on results, supporting investments that reflect governmental priorities for poverty reduction and climate change adaptation in agriculture. These investments seek to increase agriculture resilience to CC risks, boost rural income by improving agriculture productivity and access to markets, and enhance food security by expanding local food supply and creating new income opportunities.

132. The project is designed to support the implementation of governmental priorities on CC adaptation for the agriculture sector included in several official documents (SNC and the Technology Needs Assessment and Technology Action Plans for CC Adaptation in Georgia). These priorities include: (i) efficient irrigation technologies, agronomic technologies for soil conservation, fertility, and water storage capacity, and land and water management systems and technologies for the protection of arable land against wind and water erosion; (ii) more water-efficient crops, drought-resistant varieties of higher-valued fruit, vegetables, legumes

[16] For example, the severe drought of 2000 caused wheat yields to decline by 56% compared to 1999, with a severe impact on household food security of 700,000 people in affected areas and on the efforts of rural communities to escape from poverty, and caused damages of 5.6% of GDP due to its effects on agriculture and on hydro-power generation.

and cereals, diversified on-farm production, and storage and processing technologies for the diversification of less perishable agriculture goods to face demand under extreme weather periods and increase market opportunities; (iii) improved agricultural extension and research capacity and services, to elaborate and validate recommendations for farmers in each particular agro-climatic zone; (iv) support farmers through the provision of technical guidance and instruments to help the shift to climate-resilient agriculture systems and technologies; (v) awareness raising on CC impacts and the environmental and socio-economic efficiency of proposed CC adaptation technologies; (vi) institutional capacity for mainstreaming CC adaptation into legal/regulatory frameworks and financial services for farmers to adjust rural development strategies and action plans to the new CC reality.

D. Project goals and objectives

Project Goal

133. Enhance the adaptive capacity of farmers to climate risks through resilient agricultural systems.

Project Objective

134. Improve water availability, farmland productivity and smallholders' income through investments in climate-resilient farming systems and technologies.

135. The SCCF project (ERASIG) is fully embedded in the IFAD country programme in a synergetic fashion that will ensure that ERASIG funding covers the additional costs associated with adaptation needs of the baseline AMMAR project, in line with the governmental priorities on climate change. ERASIG will be articulated around four components: (i) On-farm efficient irrigation and soil and water conservation for sustainable agriculture production; (ii) Landscape restoration to prevent climate risks; (iii) Enabling environment for climate-risk reduction in agriculture; (iv) Project management.

136. The planned duration of the project is 4 years starting in 2015. The time frame of ERASIG has been designed in order to guarantee full overlapping with the IFAD baseline programme AMMAR, and take advantage of its institutional and management framework.

E. Project components

Component 1: On-farm efficient irrigation, and soil and water conservation for climate-resilient agriculture production (GEF budget: USD 3,102,000)

137. This component aims to generate farmers' knowhow and support investments in climate change adaptation technologies, including suitable equipment and inputs for efficient irrigation and for sustainable on-farm agronomic systems, in line with the priorities of the Georgian government. The introduction of innovative technologies will help compensate the predicted decrease of water recharge and soil moisture due to CC, favouring better soil moisture storage and retention capacity and optimal use of irrigation water, while ensuring a more stable and improved production, and preventing environmental problems such as soil erosion and salinization.

138. The adaptation technologies introduced through ERASIG will be complementary to AMMAR's efforts to stimulate private investment by smallholders and agribusinesses to upgrade priority value chains through a coordinated use of matching grants for innovative "early adopter" investments combined with partnerships with mainstream financial institutions (FIs) to expand lending to agriculture for follow-on and replication investments.

139. The project will support adaptive production and post-harvesting technologies for up to six priority climate smart value chains. As identified during appraisal, there is potential and based on farmer interviews, demand, for developing at least 9 value chains, for: (i) Stone fruits (peaches, plums, cherries, sour cherries); (ii) Pip fruits (apples, pear); (iii) Berries (strawberries, blueberries); (iv) Vegetables (v) Potatoes; (vi) Honey; (vii) Herbs; (viii) Beans & pulses (chickpea, lentils - as part of CSA crop rotation); and (ix) Nuts. ERASIG will complement AMMAR efforts to address critical constraints along the value chains, for example in marketing,

processing, storage, post-harvest, primary production or the provision of key services to producers and agri-businesses.

140. ERASIG will benefit from the governmental policy reforms on land tenure, cooperatives, taxes and preferential agriculture credits for farmers' investments in agriculture technologies and land consolidation.

OT 1.1 *On-farm water efficiency and farming practices in irrigated and rainfed crop production systems are improved.*

141. ERASIG will identify, demonstrate, validate and disseminate options for efficient pressurised irrigation technologies and conservation agriculture management systems and technologies, focusing on fruit trees, berries, vegetables, potatoes, honey, herbs, beans & pulses, nuts and pastures. This will lead to significant water savings thanks to the reduction of water loss and water needs, while allowing farmers to obtain higher and more stable annual yields, cultivate higher-value crops, and improve production and market opportunities. Avoiding the current overuse of irrigation water will also have a positive effect on reducing the risk of salinization. The project will support the identification of more water efficient crop species and varieties with higher transpiration efficiency that will better respond to limited water availability and will require lower water quantities under irrigation.

142. The use of pressurised irrigation technologies – drip and sprinkler irrigation - is globally recognized as one of the most important pathways to optimize and adapt irrigation to CC. The Technology Needs Assessment (TNA) report for climate change adaptation prepared by the Georgian Ministry of Environment recommends both sprinkler and drip irrigation for the optimization of irrigation under climate change predictions. Surface and sub-surface drip irrigation technologies are well suited for high-value crops, including vegetables, melons, grapes and fruit trees: If properly managed, these systems ensure better water control, improved plant nutrition and reduced labour requirements. Sprinkler irrigation is considered a convenient system for potatoes, carrots, leafy vegetables, alfalfa and other densely planted crops. In the case of fruit trees, mini-sprinklers and bubbler irrigation are also recommended.

143. Both sprinkler and drip irrigation have a demonstrated effect in the washing down of salt from soils, and are appropriate in areas where soils with saline and alkali content coexist with over-irrigation (e.g. improper use of flood irrigation) This is the case of many areas of Eastern Georgia. ERASIG will promote these technologies wherever the soil analysis prior to the implementation of the field activities suggest such investment. ERASIG will also analyse the possible use of salt-tolerant crop and fodder species in farmland areas with salt-affected soils.

144. High winds are a frequent extreme weather event in the project target areas, and represent a major constraint for sprinkler irrigation. Within Component 2, ERASIG will support the restoration of vegetation shelterbelts as a measure to prevent soil desiccation and improve soil water retention and microclimate conditions, which in turn has a positive effect on the use of sprinkler technologies.

145. Conservation agriculture (CA) is considered a major contribution to CC adaptation and mitigation, which also ensures soil health and productive capacity at lower production costs. The CC adaptation and mitigation benefits include: (i) increased infiltration and soil moisture storage and availability, leading to more stable yields under climate variability and drought stress; (ii) reduced risks of runoff erosion by about 60-90%; (iii) increased accumulation of organic matter, which is intrinsically linked to soil water retention and soil fertility; (iv) reduced risk of water pollution due to lower requirements of fertilizers and pesticides; (v) reduced emissions due to 60-70% lower fuel use, 20-50% lower fertilizer and pesticides use, 0.2-0.7 t/ha/y sequestered carbon and no CO2 release as a result of no burning of residues.

146. ERASIG will support research and on-farm trials to test CA systems that are suitable for the specific agro-environmental conditions of the target areas. The research will address crops rotation methods, soil fertility management, crop residue and mulch management, the selection of suitable crop varieties, germplasm selection, and integrated pest management. ERASIG will also encourage the combination of CA and organic agriculture (OA) principles to minimize the negative environmental effects of agrochemicals.

147. ERASIG will build on the lessons learned from pilot projects implemented in the target areas, which have yielded successful results. The following experiences are particularly interesting for upscaling and replication:

- The EU-funded project “Sustainable Land Management for Mitigating Land Degradation an Reducing Poverty in the South Caucasus Region” on the promotion of drip irrigation in Kakheti region that obtained good results with 90% reduction of water needed for irrigation and decreased water erosion. The project enabled target farmers to double their yields and selling prices in the local market;
- The GIZ project “Management of agro-biodiversity in the South Caucasus” successfully introduced Conservation Agriculture (CA) in Dedoplistkaro (Kakheti region). The farmers’ organizations supported by the project almost doubled their wheat yields, reduced of 20-30% in the amount of seeds sown per unit area, and adopted an effective integrated pest control systems. The project promoted the cessation of stubble burning– a major problem in the Georgian agro-ecosystems - which is now partly used for soil mulching;
- The GEF/UNDP project for the recovery, conservation and sustainable use of Georgia’s agro-biodiversity that has successfully strengthened the capacity of farmers on the organic production and marketing of several indigenous crop varieties with high market potential and well adapted to local soil and climate conditions. By 2010, a seed multiplication and demonstration plot of selected indigenous crop varieties was established for research, education and extension purposes, and 200 families were directly involved in the production and sale of organic crops.

OP 1.1.1 *At least 4,750 ha in the project areas are managed using efficient irrigation technologies (EIT) and/or conservation agriculture (CA) systems that enhance yield and water use efficiency for selected crop value chains.*

148. Crop value chain screening and prioritization will be among the very first activity initiated under the project. AMMAR value chain staff will lead the process, in coordination with the smallholder producers, and in collaboration with MoA Policy Group (responsible for MoA strategic action plan), prospective partner FIs, and other key stakeholders.

149. Value chain screening and prioritization criteria will focus on assessing:
(i) Credible market opportunities, with confirmed interest and demand from buyers/agri-businesses to collaborate with the project on VC upgrading.
(ii) Competitiveness potential against market requirements (including basic benchmarking against main competitors).
(iii) Potential scale and coverage, including identification of viable production clusters with interested farmers as initial VC upgrading entry points.
(iv) Main constraints in the value chain and production clusters and feasibility/cost of addressing these.
(v) Indicative typical ROI (return on investment) for farmers and agribusinesses.
(vi) Identification of local production constraints especially those affected by climate change, in interested production clusters and feasibility to address these constraints (either through the project's instruments or external means).

150. Priority crop value chains will be selected and intervention initiated in two batches in order to facilitate a rapid project start-up while allowing time to build the capacity of the project implementation teams and refine the project processes. The first batch of 2-4 value chains will be identified and interventions started in Project Year 1 (PY1). The second batch identification and interventions will begin once satisfactory progress is made on the first batch, expected to begin in PY2. The process should take not more than 4 months in total to identify the first batch of 2-4 priority value chains and will involve direct discussions with value chain actors and technical experts (e.g. on climate smart production opportunities) as well as desk research, market and data analysis. The second batch of priority value chains will be identified once satisfactory implementation progress has been made in the initial batch of value chains.

151. After value chain prioritization, the project team will carry out a participatory assessment of the selected crops in the target areas. The assessment will look at issues such as: (i) farmers’ crop production preferences and cropping systems; (ii) amount of land that is irrigated/rainfed, and for what crops; (iii) available extension services for irrigation and rainfed agriculture; (iv) current irrigation methods; (v) irrigation water supply-demand organization; (vi) production and marketing mechanisms for different crops; (vii) cost/benefits and access to financial services; (viii) environmental issues and risk reduction measures; and (ix) baseline capacity for the introduction of sustainable irrigation (capacity, financial assistance, land tenure, legislation, etc). The assessment will disaggregate information in terms of gender, age and farmland size. The local experts will also meet the providers of services of the target areas (farm and technology service

centres, public extension centres, farmers' organizations, NGO, development agencies, public and private research and academic centres) to understand how they operate, and enquire about possible collaboration in the framework of ERASIG.

152. Meanwhile, the Climate Change Adaptation Specialist (ERASIG Coordinator) will evaluate options for climate-resilient on-farm irrigation technologies (e.g. drip irrigation and micro sprinkler equipment and management systems) and sustainable agronomic practices (focusing on the combination of CA and OA systems and technologies), based on available climate change projections and the forecasted impacts on crops and varieties. The resulting report will identify advantages and constraints of the options considered, suitability for the socio-economic and agro-climatic conditions, and for the type of crops in the target areas, and will analyse implementation requirements in terms of capacity, supportive policies, land tenure issues, types of equipment and supplier firms, and operational/maintenance costs.

153. Over the following months, the project management team will organise information events in each target area to raise the awareness of national and local stakeholders about the impact of CC on water and agriculture production, and on the importance of addressing the challenge through climate-resilient efficient irrigation and agronomic practices. The assessment results will be introduced through local information sessions, where the participants' perceptions of CC impacts will be debated, and where brainstorming will be facilitated on local adaptation experiences, and on the opportunities to introduce or expand efficient irrigation and sustainable agronomic practices. Participating farmers will also be informed on the conditions to become eligible for project support.

154. Climate-resilient technology transfer for farmers in target value chain clusters is expected to be a critical element for sustainably raising primary productivity and, hence, the competitiveness of most of the prioritized value chains and farmers' incomes.

155. The choice of efficient irrigation technologies (EIT) will respond to the following needs: (i) coping with the effect of CC on runoff and water supply reduction, and meet environmental and users' needs in terms of outflow requirement; (ii) effective reduction of conveyance losses and salinization risk; and (iii) cost-effectiveness.

156. The choice of technologies for improved soil and nutrition management will focus on conservation agriculture (CA) systems and techniques such as crop rotation and intercropping methods, soil fertility management, crop residue and mulch management, zero tillage, selection of suitable varieties, and integrated pest management. Organic farming principles will be mainstreamed into CA and EIT.

157. The approach to technology transfer and promotion will be through a combination of practical CSA technology plots, promotion events, short and longer duration practical field training (for example through a series of half day practical field training session at critical points in the production cycle) and systematic follow-up with farmers, which are described in Project Component 3.

158. Multi-Stakeholder Processes of value chain facilitation for development of each VC cluster area[17] will begin informally through the value chain screening exercise and then continue through the duration of the project, with an initial more intensive process over the 1-2 years. The multi-stakeholder process (MSP) for each VC serves several critical purposes:

(i) oversee delivery of a joint action plan developed with the main VC stakeholders in each cluster (producer, agri-businesses and service providers), the project and other development partners.
(ii) identify specific bottlenecks in the VC that can be tackled with the support of the project - through matching grants to stimulate private investment on critical issue and/or investment in public good infrastructure.
(iii) to facilitate meetings between groups of buyers/agribusinesses and farmers/producer and other service providers (banks, nurseries, input suppliers, service centres, technical production consultancy providers etc.) to deepen mutual understanding and identify win-win opportunities for greater collaboration.
(iv) identification of main bottlenecks and development of cluster upgrading road-map and immediate priorities - including who will do what and who will pay for what.

[17] Value chain cluster areas, for the purpose of AMMAR, are defined as physical zones that encompass a sufficient concentration of existing or potential primary production for the agricultural commodity to sustainably attract competing buyers, agricultural service providers and input suppliers to operate in the cluster area.

(v) VC actors (via MSP strategy and action plan) set priority areas for project support - e.g. main "types" of post-harvest/marketing investments to be prioritized for matching grant/TA support, critical public and market infrastructure for project investment, types of technical support needed (Note that VC actors do not identify individual beneficiary businesses/farmers but the "types" of investments that should be prioritized for support).

159. MSP facilitation will be one of the key responsibilities of the AMMAR Value Chain team. The team will be supported by the MOA District Staff in each VC cluster area. International technical assistance will be provided to the ARDF VC team for a total of approximately 10 months over the first 2 years of the project to build their capacity in VC facilitation.

160. Local service providers in each cluster area will be encouraged to actively participate in the initial intensive stages of the MSP in each value chain, to better understand the needs of the farmers and agribusiness as well as raise awareness among farmers and agribusiness of the services and opportunities available. Through this process the project team will also identify interested local service providers to act as potential partners in the project implementation - especially for the transfer of technologies on climate-resilient efficient irrigation and conservation agriculture systems. Where private service providers are interested to invest to improve or expand their service delivery, they will be eligible to apply for matching grants.

161. The project will stimulate private investment by small farmers and producers and agribusinesses to upgrade production and post-harvesting technologies through a coordinated use of matching grants for innovative "early adopter" investments combined with partnerships with mainstream financial institutions (FIs) to expand lending to agriculture for follow-on and replication investments.

162. By offering matching grants to incentivize early adopter investments, the project will help to demonstrate profitable investment opportunities within the target value chains that can then be replicated and scaled-up by other farmers and businesses with greater confidence and a better understanding of likely risks and returns. In parallel, partnerships with the banks and MFI can deepen the understanding of their credit officers, managers and credit systems in assessing the real risks and lending opportunities to different types of investment in the priority value chains so that they can profitably increase lending for such investments.

163. Matching grants will be made for "early adopter" and/or innovation investment in primary production and post-harvesting technologies by small farmers and producers, or critical agricultural services. In line with IFAD recommended practice (IFAD, 2012), grants will only be made to early adopter and innovative investments that would also be profitable if financed through mainstream credit sources, but where investments has not yet been forthcoming under current market conditions. In the current Georgian rural context, the near complete absence of functional farmers' groups and extremely limited coverage of farmers' cooperatives and associations (estimated to cover <5% of farmers) means that in order to achieve the desired demonstration effects on small farmers and producers production from the matching grant, the grants need to be made to individual small farmers and producers rather than via groups.

164. The main principles of the matching grants comprise: (i) matching of costs and risk commensurate with the respective risk bearing and leverage capacity of farmers and agribusinesses; (ii) facilitating access to credit for those who do not have sufficient capital for their matching contribution; (iii) accurate record keeping of the results, costs, inputs and outputs, and the technical and organizational viability of the investments made; (iv) analysis of data and experiences made and their presentation to stakeholders, other interested farmers, and the financial sector; (v) learning about relevant techniques, tools, instruments and implements during the demonstrations, training sessions and implementation process arranged for under the project; (vi) application of the new techniques in a mutual learning context among peers, technically supported by experts, advisors and extension agents.

165. Matching grant fund for climate-resilient production technologies will be targeted towards private investment in innovation and/or early adopter investment in targeted value chains. The types of investment to be prioritized for support should be endorsed through the multi-stakeholder process by the wider network of primary VC actors (i.e. producers, producer groups and agribusinesses) in the VC cluster as being a priority for grant-supported investment to address recognized bottlenecks and VC constraints.

166. Grant proposal will be sourced through periodic public calls for proposals and by invitation from the project or referral from project partners at any time (e.g. banks, MFIs). Grants must form part of a sound overall investment plan for the concerned business or farm and grant disbursement will be subject to financing being secured for the overall investment plan (not just the elements financed by the grant). Only private entities (businesses, co-operatives, registered producer groups, individuals) are eligible to receive matching grants. State-owned companies, agencies and similar entities are not eligible for grants.

167. The main characteristics of matching grants18 available for climate-resilient production technologies (Window 1) are:

- Eligible investments: farm investment plans related to climate smart primary production, landscape restoration and initial farm-level post-harvest management in target value chain cluster areas. Examples include: introduction of EIT (drip irrigation), CA technologies or greenhouses.
- Eligible grantees and criteria:
- individual small farmers with not more than 10 ha total land-holding of which a maximum of 4 ha of irrigated land. (Landholding may be owned or rented).
- cooperatives, associations and legally registered farmer groups, where more than 70% of the expected benefits from the investment flow to small farmers and producers meeting criteria (i).
- the project will aim to have at least 30% of grants going to women applicants
- Number of grants expected: 1000 grants (or equivalent in co-operative/association grants)
- Grant size:
- Individual small farmers and producers: max= USD 1,500
- Cooperatives & associations: max= USD 15,000, with maximum per benefiting member not to exceed limit for individual farmers.
- Max % grant: 40% of investment plan value (excluding working capital)
- Eligible costs for grant financing: equipment for improved irrigation and soil management technologies; landscape restoration costs.
- Grantee contribution may be cash (including loan funds) or in-kind. Grantee contribution from own funds (not including loans) must be at least 20% of total investment costs.

168. The main characteristics of matching grants19 available for climate-resilient value chain development production (excl. primary production) under Window 2:

- Eligible investments: private investment to tackle identified value chain constraints and/or demonstrate replicable innovations not related to primary production aligned to each value chain strategy and action plan developed jointly with the value chain stakeholders. Examples include: improved storage, handling, processing, treatment and marketing.
- Eligibility grantee and criteria:
- agribusinesses, registered cooperatives and associations
- at least 2 years operation as a legally registered entity by the grant applicant or majority shareholders/members
- verifiable evidence of profitable business record
- Relevant agri-business experience of management team as assessed by RADF Number of grants expected: 37 grants
- Grant size: average = USD75,000, max.= USD100,000
- Max % grant: 40% of total investment (to harmonize with GoG scheme)

[18] These may be adjusted, subject to GoG and IFAD approval, from time to time based on the growing experience of the project on what is necessary and appropriate to achieve the project objectives.
[19] These may be adjusted, subject to GoG and IFAD approval, from time to time based on the growing experience of the project on what is necessary and appropriate to achieve the project objectives.

- Eligible costs: all reasonable costs of investment plan except working capital
- Grantee contribution must be cash (including loan funds). Grantee contribution from own funds (not including loans) must be at least 20% of total investment costs. Contribution of existing assets (e.g. building, vehicles, materials, stock) is not eligible as grantee contribution.

169. Examples of adaptation technologies eligible under the project matching grants are:
    a. Small scale pressurized irrigation equipment such as: piped hand-move sprinklers and micro-sprinklers for full coverage crops such as fodder (alfalfa), maize, potatoes, leafy vegetables and carrots; mini-sprinklers and bubbler irrigation for fruit trees; drip irrigation for grapes, vegetables, melons, fruit trees, strawberries, etc; low cost hose irrigation equipment; fertigation injectors; solar pumping equipment and water tank in case elevation is not enough for pressurize irrigation.
    b. Establishment of nurseries for seeds and seedlings: the project will give preference to applications for the production of water-efficient or drought tolerant crop species and varieties, with a special focus on the broad agro-biodiversity of Georgia; salt-tolerant crop and fodder species will also be considered for salt-affected soils.
    c. Conservation agriculture: no-tillage seeders, residue management equipment, ripper planters, etc;
    d. Post-harvest and value-addition facilities: solar drying and dehydrator equipment; cold stores; mechanical harvesting equipment; quick-freeze equipment; etc.

170. Special efforts will be made to encourage women and youth to join ERASIG and benefit of the project's support. Youth and women groups will be given priority over other applicants. Each grantee will receive support for the implementation of soil analysis (e.g. laboratory test for soil moisture-holding ability, soil texture, soil organic matter, soil chemical conditions, etc) to better plan soil management measures and irrigation requirements.

171. The main terms and conditions of the matching grants will be included in a Project Implementation Manual (PIM), which will be finalized during the first half of Y1.

172. During the ERASIG formulation phase, IFAD met several potential partners involved in efficient irrigation and sustainable agronomic practices in Georgia, who expressed interest to collaborate with the project, and replicate/upscale its lessons learned. These include GiZ, the EU, UNDP and USAID. The project will also seek collaboration with NGOs active on efficient irrigation and sustainable cropping systems, such as Elkana – an Organic Agriculture Association with experience in organic production and marketing of indigenous crop varieties with field demonstration trials, and CENN – a pilot project on efficient irrigation techniques in Eastern Georgia.

173. The lessons learned from the project will be published and disseminated in the form of guidelines and procedures for efficient on-farm irrigation and sustainable agronomic practices. The lessons learned through ERASIG will be fed into AMMAR, and will be promoted among beneficiary farmers that will be targeted in the RADF projects – AMMAR and GILMD - and other agriculture development programmes lead by the Ministry of Agriculture.

Component 2: Landscape Restoration to prevent climate-related risks (USD 1,400,000)

OT 2.1 *Landscape restoration plans developed and implemented to prevent climate-related risks (soil erosion, siltation and flooding).*

174. Three types of adaptation technologies for soil erosion prevention are prioritized in the TNA and SNC governmental reports: (i) the adoption of conservation agriculture system in crop farming; (ii) the restoration of natural vegetation at the landscape level to prevent soil erosion upstream and downstream agriculture land, as well as avoid siltation in irrigation canals; (iii) to modernize irrigation infrastructure incorporating climate-proof engineering and bio-engineering interventions in a number of soil erosion hotspots affecting the targeted irrigation schemes. While CA is being addressed in Project Component 1, natural vegetation restoration – both vegetation shelterbelts and pastures – and the rehabilitation of climate-proof modern irrigation infrastructures will be the objective of Project Component 2.

175. The restoration of vegetation cover and natural productivity in degraded lands contributes to a higher climate resilience of rural communities, farmland and agro-landscape ecosystems. The restoration of on-farm non-crop habitats – mainly natural vegetation shelterbelts and grassland strips in tree orchards and

vineyards – increases key environmental services for agriculture production[20]. The restoration of vegetation shelterbelts along irrigation canals, riverbeds, and along the boundaries of farm plots creates a favourable microclimate for crops, increases soil fertility and water infiltration, prevents the negative effects of strong winds (e.g. higher evapotranspiration and wind erosion, water evaporation and mobilization of soil particles, and siltation of water reservoirs and canals), and reduces runoff erosion and flooding risk. Moreover, the restoration of vegetation shelterbelts has a positive effect on sprinkler irrigation, preventing the evaporation of droplets caused by the wind.

176. An irrigation scheme is one element of an overall river basin or watershed system, with multiple objectives competing for limited land and water resources. Therefore, technology choices in irrigation infrastructure design and investment, particularly in regards to alternatives for water delivery and control, should respond simultaneously to different needs: (i) coping with the effect of CC on runoff and water supply reduction, and outflow requirements to meet ecosystems and other uses' needs; (ii) effective reduction of conveyance losses; (iii) Farmers' requirements for agriculture production and how selected technologies will be operated and maintained reliably, efficiently and equitably; (iv) cost-effectiveness of selected technologies.

177. Moreover, achieving the desired "service approach" to irrigation systems requires that water users participate fully during the design stage and that their continued engagement throughout the CC-resilient irrigation needs assessment, infrastructure rehabilitation and irrigation management and maintenance is an integral part of the project. Such an approach is essential to gaining the user buy-in and satisfaction on which sustainability depends.

178. Through this outcome, the project intends to: (i) demonstrate good practices on ecosystem-based restoration at the watershed level of protective shelterbelts in marginal land and along irrigation canals, riverbanks and farmland plots, and restoration of grasslands and strips of grasses in vulnerable farmland such as orchards and vineyards; (ii) demonstrate good practices on climate-proof irrigation infrastructures to improve water use efficiency, and reduce flood erosion risk and siltation problems; (iii) provide beneficiaries with the necessary knowhow about LR implementation and maintenance techniques, and about the economic opportunities and business skills to help diversify their income, based on the sustainable use of complementary wood and non-wood products, and the water-efficient use of irrigation infrastructure.

179. ERASIG Component 2 will be complementary of the AMMAR sub-component on demand-driven irrigation and value chain infrastructure rehabilitation and construction in selected value chain cluster[21] areas (AMMAR will not work in cluster areas requiring investment in drainage). ERASIG investments will contribute to achieving climate-resilient infrastructures, including the associated landscape restoration (LR) activities linked to the supported infrastructure schemes where such restoration is beneficial in reducing the risk of erosion jeopardizing the proper functioning of the supported infrastructure schemes and the protection of agricultural land in the target VC cluster areas. At least 50% of the selection of infrastructure will be determined on the basis of the value chain choices. AMMAR Investments are expected to primarily include rehabilitation of irrigation (limited secondary and tertiary) and a smaller number of value chain-related infrastructure requiring public investment (such as certified testing laboratories, rentable wholesale storage facilities, etc.).

OP 2.1.1 *150 Landscape restoration plans, incorporating climate-resilient infrastructures and vegetation restoration interventions in erosion-risk vulnerable areas, are developed and implemented*

180. The implementation of complementary landscape restoration (LR) actions is a critical measure to ensure stable irrigation infrastructure and water supply, and a sustainable agricultural production in the target areas. However, these landscape restoration measures are often not well understood by water providers and users, who tend to be reluctant to allocate part of their farmland to a vegetation cover that apparently does not bring direct economic benefits.

[20] Natural vegetation in agriculture landscapes provides the following environmental services: (i) habitat and food for natural enemies to agriculture pests and provide biological control services to farmers thereby reducing the need for pesticides; (ii) pollination services; (iii) regulation of the capture, infiltration, storage and flow of water across the landscape, improving quantity and quality of water, and reducing runoff erosion, peak flows and floods; (iv) improvement of soil structure and fertility; (v) provision of favourable micro-climate conditions for crops in terms of temperatures, humidity and wind; (vi) higher provisioning services, such as complementary income opportunities based on the production, processing and marketing of non-timber forest products –raw and processed - such as medicinal and aromatic plants, wild fruits, mushrooms, honey, firewood, fodder, etc.

[21] Value chain cluster areas, for the purpose of AMMAR, are defined as physical zones that encompass a sufficient concentration of existing or potential primary production for the agricultural commodity to sustainably attract competing buyers, agricultural service providers and input suppliers to operate in the cluster area.

181. During the first 6 months of the project, the management team will undertake a research on landscape restoration (LR) approaches, methodologies and tools applied to CC adaptation in agro-landscapes in Georgia and elsewhere in Europe and Western Asia. The research will address all the technical, institutional, policy/legislation and socio-economic aspects that contribute to successful landscape restoration actions. It will include a comprehensive review of ecological and technical considerations for the use of plants in ecological restoration, as well as a review of bioengineering[22] methods for stream bank stabilization and land erosion control. The direct and indirect economic benefits of LR will be identified and demonstrated with concrete examples that are relevant to the Georgian context. Case studies from Georgia and abroad highlighting best practices will be prepared.

182. Meanwhile, the project team will undertake a participatory field survey and a mapping of vulnerable areas to CC risks in each target watershed, analysing root causes and CC adaptation needs, and identifying suitable restoration measures to increase landscape resilience in the targeted irrigation schemes. The survey will focus on the current status and restoration needs of:

- Shelterbelts traditionally used for the protection of arable land, pastures and irrigation canals, mainly in Georgia. The methodology for designing shelterbelts (species selection, planting pattern of trees, orientation in relation to wind direction, spacing between trees, width of tree strips) will integrate ecological and climatic parameters.
- The riverbanks and riparian vegetation upstream and downstream the targeted irrigation schemes. The methodology for restoring degraded riparian sections will take into consideration “soft” bioengineering technologies and structures to help mitigate runoff erosion and flood intensity, and at the same time increase the environmental services needed for agriculture production and the effective functioning of the irrigation schemes. These technologies and structures include: geo-textiles for soil stabilization and seed germination in slopes with high erosion risk; fascines of sprouting material placed in ditches for soil stabilization; wicker fences; vegetated stone walls; vegetated gabions; vegetated palisades; and branch layers or wood check dams in gullies.
- Degraded farmland and meadows/pastures, with a special focus on mitigating the effects of CC while increasing environmental services for agriculture and livestock production and providing complementary income generation opportunities (wood biomass, wild fruits, medicinal and aromatic plants, etc). The project will support: (i) seed sowing restoration, enclosure and sustainable management procedures in degraded pastures and vulnerable strips of land in between tree orchards and vineyards; (ii) the planting of tree and shrub seedlings in degraded/marginal agriculture land to protect soil against erosion while favouring the production and marketing of complementary non-crop products, such as wild fruits, medicinal/aromatic plants, wood, etc.

183. LR actions will be in many cases complementary of the AMMAR component on the modernization and rehabilitation of irrigation infrastructure – namely tertiary and limited secondary - in selected areas. AMMAR will invest in demand-driven irrigation and value chain infrastructure in target value chain cluster areas. The project team will carry out a multi-stakeholder process for the identification of irrigation infrastructure investments in a participatory and demand-driven manner. The participatory assessment will look at issues such as on farmers’ crop production preferences, water supply-demand for irrigation and other uses, and pre-conditions to adopt sustainable irrigation (capacities, financial assistance, land tenure, legislation, etc). It will also identify efficient and cost-effective technological options (e.g. underground conveyance systems; lining canal with concrete smart ditches; gated pipes; etc) for the rehabilitation of the tertiary canals and the water conveyance network to farmland plots that meet CC-adaptation and water users’ needs in the target basins. The assessment will include the identification of case studies with good practices from Georgia and abroad (mainly from neighbouring countries sharing watersheds and similar agro-climatic conditions).

- Through this participatory process, the project will also help incorporate climate change adaptation technologies in the rehabilitation plans of irrigation infrastructure – namely tertiary and limited secondary – performed by RADF in the framework of AMMAR and GILMD. The irrigation schemes to be rehabilitated and modernized will need to:
- ensure sufficient supply of water is readily accessible and main/primary canals are in functional state and/or recently rehabilitated, as well as guarantee adequate supply of water (at least by the time the

[22] Biotechnical engineering techniques rely on biological knowledge to build geotechnical and hydraulic structures and to secure unstable slopes and banks. Whole plants or their parts are used as construction materials to secure unstable sites, in combination with other construction material (e.g. stones, wood). Thus, biotechnical engineering does not replace traditional hydraulic or geotechnical engineering (e.g. geo-textiles, or concrete blocks), but complements and improves other technical engineering methods.

project supported rehabilitation works are completed), to meet on-farm demand by responding simultaneously to: (i) CC predictions on runoff and water supply reduction; (ii) effective reduction of conveyance losses;

- be technically and financially feasible to rehabilitate within the resources of AMMAR and ERASIG to ensure the achievement of the planned water delivery to the farmers' fields;
- have an inclusive distribution of benefits among farmers, in the form of actual water supply to fields, consistent with the project priorities of equitable benefits to active farmers who are poor or near poor.
- be identified by smallholder farmers jointly with UASCG within targeted VC cluster areas as a priority constraint in expanding/improving their production of the targeted product and endorsed as such by the wider multi-stakeholder process (Component 2).

184. The project will award competitive grants for investments in public (for common use) irrigation infrastructure and landscape restoration works that would enable and enhance private sector investments and activities in target value chain areas. Investment priorities for schemes and works to be supported will be determined for each of the value chains and cluster areas to tackle specific value chain constraints identified through the multi-stakeholder processes.

185. Request for funding from infrastructure grants (VC based approach) would come from communities based on thorough consultation with farmers' interest groups, formal producers' associations, other associations, village authorities and local entrepreneurs/businesses through the multi-stakeholder process. The application would be done in writing and should consist of required information and data for decision-making.

186. For both LR and irrigation infrastructure, appropriate cost-sharing (in cash or kind) will be applied wherever possible; the level of cost sharing should be appropriate to the relative balance of public good vs private benefit from the investment. It is foreseen that for public goods, the contribution will be at least 5% while private investments will be at least 60%.

187. Each investment must have its own techno-feasibility studies and/ or cost-benefit analysis, as necessary. These must have clearly defined objectives, costs and timeline (i.e. an internal sub-project proposal) that can be reviewed by RADF Value Chain Project management team and also shared with value chain stakeholders. Final approval on small investments <USD 20,000 will be provided by MOA based on recommendations made by a three person Small Grants Committee including the Project Manager, RADF Value Chain Coordinator and Project Accountant, and include a representative from UASCG for irrigation infrastructure. Investments of >USD 20,000 will require the approval of MOA-led Large Grants Committee including MOA staff and external members (to be elaborated in the project Implementation Manual).

188. Based on recent on-farm restoration experiences under ASP, the average cost per hectare ranges between USD 1,000-1,500.

189. Sound operation and maintenance (O&M) frameworks will be a mandatory pre-requisite before implementation of any infrastructure works begins on the ground. Under the component, the project will invest in establishment and/or strengthening of credible water user O&M arrangements as part of its irrigation investments. Initially, it is expected that the UASCG will be responsible for all aspects of the operation and maintenance of supported schemes from primary through to tertiary, to the point of delivery of water to the "field gate", as mandated by Government decree in 2012[23]. Water users willingness to pay and sign contracts with UASCG for water supply will be key criteria in prioritizing schemes to be supported.

190. However, to respond to concerns about the longer term viability of existing approaches to O&M management, the recently approved WB financed project GILMD will support the preparation of a National Irrigation and Drainage Strategy which will primarily define the Government's long term vision for: regulation and monitoring of irrigation water delivery including environment monitoring; institutional arrangements for on-farm and off-farm irrigation and drainage services; water pricing and cost recovery; as well as rehabilitation and modernization. The GILMD has set out a structured approach to institutional strengthening both for, the UASCG and water users themselves. It will support a phased transition to improved arrangements for on-farm irrigation service delivery involving greater water user participation. The project will build on the improved arrangements for O&M management, learning from the experience under the

[23] The UASCG was assigned the full responsibility of irrigation and drainage operation activities (Government decree N 672, dated 12 April, 2012).

forthcoming GILMD project. Specifically, during the first two years, the project will design and test improved arrangements for O&M management of the supported irrigation schemes.

191. Among the requirements to access grant funding will be the need that restoration plans have a strong economic focus and approach, so as to secure the buy in of farmers, and the emphasis on the use of native species that provide short-term economic benefits - i.e. fruit trees/shrubs species and varieties of *Malus, Juglans, Rosa, Rubus, Crataegus, Prunus*, and *Hippophae rhamnoides,* as well as aromatic and medicinal plants.

192. Gender criteria will be taken into account in the selections of farmers' organizations, such as women associations or cooperatives willing to produce in marginal agriculture land plots and commercialize non-wood-forest products. Besides the hiring of workers for the set up and maintenance of the restoration sites, the restoration actions promoted by the project are expected to generate extra employment for the local communities, through the creation of local cooperatives or enterprises – with a gender focus - based on NWFPs value chains (e.g. berries, herbs, honey).

193. The grant beneficiaries will have access to services providers for the implementation and monitoring of the modernized irrigation schemes and landscape restoration works. Procurement of services and works would be carried out in accordance with the IFAD Procurement Guidelines, and Sample Bidding Documents and procedures developed under the ASP. Procurement of services for feasibility studies and engineering designs, and civil works, including bid announcement, evaluation, contract award and management would be carried out by AMMAR on a centralized manner.

194. The project will link the ecological restoration actions with the promotion of conservation agriculture and the use of stubble for soil mulching, in order to avoid the problem of agriculture burning, which represents a major cause of forest fires – destroying tree shelterbelts and natural vegetation cover around agriculture land, and causing soil erosion and landslides problems.

195. ERASIG will build on the lessons learned from previous LR experiences in Georgia - such as the GIZ project on the rehabilitation of windbreakers in Dedoplistskaro region; the WWF floodplain forests restoration work; the CENN pilot project on the use of bio-engineering techniques for landscape restoration, etc.

Component 3: Enabling environment for climate-risk reduction in agriculture (USD 548,000)

196. This component of the ERASIG will lay the basis for the development of a more conducive environment to achieve the project objective and guarantee replication, upscaling, and sustainability through contributing to the improvement of the policy framework for adaptation and risk reduction in the agriculture and water management sector in Georgia.

197. Experience shows that the main ingredients for a successful adoption of sustainable agriculture practices and technologies are: (i) a close collaboration since the very early stages among farmers and qualified researchers, extension agents, civil servants and agro-environmental NGO; (ii) the institutional development of farmers' organizations; (iii) the establishment of on-farm trials supported by strong local champions – leading farmers and/or pioneer research/academic/NGO; (iv) participatory technology development, education and training; (v) the design of a sound implementation strategy incorporating environmental and social concerns; (vi) the existence of a supportive policy framework, rural finance, marketing and value-chain development.

OT 3.1 *Concerned institutions are empowered through capacity building to develop a more conducive policy environment for climate-resilient agriculture and water and soil conservation.*

198. Adequate institutional support and policies can speed up considerably the process to adopt and disseminate climate-resilient efficient irrigation and sustainable agriculture systems, mainly by removing existing constraints and providing farmers with the required services, incentives and credit programmes for technological investments. This action builds on the firm governmental commitment to promote the development of drip/sprinkler irrigation and conservation agriculture as priority CC adaptation measures in Georgia.

OP 3.1.1 *A policy dialogue is triggered to mainstream CC risk reduction into water and soil conservation in agriculture.*

199. In the second half of Y1, the project team will carry out an assessment and gap analysis of current policies and regulations, with the aim of identifying bottlenecks, and formulating recommendations for improvements that may facilitate sustainable agriculture and rural development, improved food security, and the development and transfer of efficient irrigation and sustainable agronomic practices incorporating CC

adaptation needs. The assessment will look at specific laws, regulations and incentives supporting agriculture development. The team will also look at cross-cutting environmental policy frameworks such as climate change, disaster risk reduction, water, land management, the use of herbicides, pesticides or other chemicals, land tenure, insurance policies, etc. The policy review will also analyse coordination mechanisms and institutional capacities across national, regional and local agriculture public institutions, and will formulate recommendations to mainstream CC adaptation into agriculture development.

200. The results of this review will be presented in the context of meetings at the central and local levels, and through the web during the first months of Y2, targeting 120 policy-makers, civil servants, research/academia, extension organizations, farmer organizations, private sector, and NGOs. The debate and inputs generated during meeting discussions will be gathered by the project team, and used to prepare a set of recommendations for the achievement of a conductive policy framework to boost climate-proof efficient irrigation and sustainable agriculture systems in the country. The recommendations will be included in a report that the project will produce and submit to the MoA. Subsequently, the project will engage in a dialogue with the MoA to facilitate the preparation of a road map to guide the policy reform process beyond the timeframe of the project.

201. The project team will also support the dialogue between MoA and the private sector (financial institutions and insurance companies) to identify opportunities for public-private collaboration on accessible agriculture insurance and financial services for small farmers with limited economic resources. ERASIG will facilitate contacts between farmers willing to invest in climate-proof agriculture technologies and financial institutions and insurance companies operating in the project areas and interested in the type of investments.

202. In order to further back up the policy development process, the project will produce, publish and disseminate awareness materials on policy issues - e.g. existing opportunities and policy frameworks, financial mechanisms and regulations, supporting CC adaptation measures in agriculture development. Information and short training sessions will also be organised for central and local administration officials.

203. The policy work of ERASIG will be coordinated with RADF interventions on land registration reform, national irrigation policies, and the institutional arranges for irrigation water services. The project will also collaborate with other partners supporting the reform of relevant policy frameworks – including the EU support programme to the governmental regulations on cooperatives, and the USAID funded program "Institutionalization of Climate Change Adaptation and Mitigation in Georgian Regions" in collaboration with the National Association of Local Authorities of Georgia-NALAG.

OT 3.2 *The adaptive capacity of key agriculture practitioners on climate-resilient soil and water management practices in agriculture is developed and applied in the value chain cluster areas.*

204. The absence of a functioning agriculture research-education-extension system in Georgia is a critical barrier to the development of a modern agriculture in the country. Subsistence and semi-commercial farmers require support to gain adequate professional skills on key production, post-harvest and market issues, and to reach a good level of awareness on techniques to improve production, and market opportunities and benefits. Some pioneer work was carried out by UNDP, which supported the set up of an Extension Centre in the Kakheti region, providing services to approx. 2,000 farmers. The experience was successful and helped farmers increase productivity and farm gross margins by over 40%.

205. The project will build the adaptive capacity of key agriculture practitioners – farmers, extension agents, agro-environmental NGOs, research and academia - to acquire a more professional profile for sustainable agriculture production and adopt proactive measures towards the adaptation of agronomic systems to CC forecasts in Georgia. The process will start with a baseline inventory of existing and ongoing experiences on climate-resilient irrigation and sustainable agriculture systems and techniques in Georgia, neighbouring countries and elsewhere. The learning programme will include three consecutive stages: (i) training of trainers (ToT) programme; (ii) learning programme for farmers, based on on-farm demonstration and applied research actions, and exchanges with available local/international experience; (iii) elaboration and dissemination of findings and recommendations addressing prospects for efficient irrigation and CA/OA in Georgia in the long-term.

OP 3.2.1 *A training programme is designed and implemented to build the capacity of service providers on efficient irrigation, sustainable soil and water management, and landscape restoration.*

206. The project will provide training to increase the capacity of public and private extension agents to transfer advice to small subsistence, semi-commercial and commercial farmers on key technical, post-harvest and market issues. Researchers and higher education teachers, and agro-environmental NGO staff will also be invited to participate in the training programme. The participants will be empowered to effectively guide farmers in the process of shifting from conventional agriculture to efficient irrigation and conservation agriculture systems that integrate organic agriculture principles.

207. The first half of Y1 will be devoted to:

(i) Designing and development of three Training-of-Trainers (TOT) programmes: (a) technical knowledge on efficient irrigation and sustainable agronomic practices, (b) post-harvest and market (c) agro-landscape restoration. The programmes will draw on the results from the experts' surveys and recommendations described in Component 1 and Component 2, and will incorporate CC adaptation requirements;
(ii) Identification of potential participants, and provision of information about the project objectives and requirements to become eligible for training support and participate in the TOT programme;
(iii) Production of teaching materials to inform the training programme.

208. The TOT programmes will: (i) broaden the pool of qualified trainers on sustainable irrigation and land management practices and its CC adaptation benefits; (ii) spread efficient irrigation and CA/OA methods and techniques applicable to the Georgian context; (iii) increase the ability of practitioners to boost efficient irrigation and CA/OA by developing applied research initiatives, and extension programmes and tools.

209. The TOT programmes will provide training courses throughout the life of the project, on an annual basis, and will be aimed at enhancing the capacity of at least 50 public and private extension agents, researchers, higher education teachers, and agro-environmental NGO staff. The project will identify both public extension agents with limited capacity and extension agents who have already received support from other projects in order to reinforce existing knowledge and incorporate CC adaptation approaches in agriculture development.

210. The first training courses will take place in the second half of Y1, in Tbilisi, in the premises of a partner organization with facilities for agriculture learning activities. Each course will last a maximum of 10 days, and will include theoretical and practical sessions. The national and international experts hired in Component 1 and Component 2 will lead the designing of the course modules and will conduct part of the training sessions. Training will not only provide technical knowledge but also about teaching techniques that are suitable to the Georgian farmers.

211. As part of the learning process, participants will be required to apply the theoretical knowledge received in the on-farm demonstrations that are described in OP.3.2.2. These practical assignments will enable trainees to put in practice the knowledge gained, exchange knowledge with the farmers, and strengthen their facilitation skills.

212. The TOT programme for sustainable agriculture technologies and agronomic systems will address issues such as: (i) Technologies and management systems for efficient water irrigation and CA; (ii) Improved cultivars, based on local varieties suitable for CC aridification predictions in Georgia, and development of appropriate crop rotation systems; (iii) Weed control following OA principles; (iv) Fertility management for optimum production based on organic fertilizers and a minimal use of chemicals; (v) Alternative pest control techniques, including the use of IPM, and techniques for plant protection based on OA principles; (vi) the role of farmers' organizations to improve production.

213. The TOT programme for post-harvest and market opportunities will be organized according to the following modules: (i) Introductory information about the role of a marketing plan in the farm business; (ii) The marketing plan; (iii) Markets and marketing; (iv) The role of cooperatives and other group-based enterprises to improve marketing; (v) Post-harvest handling and value adding; (vi) The use and interpretation of market information; (vii) Managing risk; (viii) Exercise: applying learning to value chains in the target areas.

214. The TOT programme for agro-landscape restoration will look at: (i) Introducing sound ecological restoration approaches and technologies (species selection criteria; provenance and quality of the plant material; innovative technologies for plant production in nurseries and field planting techniques; bio-engineering construction of restoration structures; post-restoration maintenance and monitoring), (ii)

Assessing the economic value and exploring business opportunities for farmers from protective shelterbelts and grasslands, and (iii) Measures to foster a supportive policy framework and incentives for climate-proof restoring riverbanks, and creating protective shelterbelts, grass cover and bio-engineering structures in degraded land, farm holdings and along irrigation canals.

215. The participants will evaluate the different training courses, so these can incorporate their suggestions and feedback in the following years. In the last year, the project team will produce and disseminate a training manual, collecting the experiences acquired throughout the training programmes.

OP 3.2.2 *At least 3,000 farmers participate in 30 on-farm demonstrations where new efficient irrigation and CA production systems and technologies are tested and validated.*

216. Small farmers will need external support to cover the costs of adequate extension services until they can reach an adequate level of production and accumulate sufficient savings. The experience in other countries with comparable similar farm size demonstrates that enduring change requires a combination of comprehensive extension service, on-farm demonstrations and applied research of new technologies, and incentives to affect this change. ERASIG will support the set-up of a number of on-farm demonstration plots, where small farmers can be exposed to innovative technologies through a learning by doing process, compare results with conventional agriculture practices, and receive the required extension support.

217. In many cases worldwide, the shift towards sustainable soil and water management was made possible by pioneer farmers who adopted these practices and demonstrated their agronomic, environmental, financial, and livelihood benefits. The project will follow the same approach, seeking and supporting strong local champions – leading farmers and/or pioneer farm service centres. Pioneers are not necessarily farmers that have consolidated part of their land and adopted a market-oriented approach, but also small farmers who have organized themselves to adopt novel agronomic technologies and practices for a more sustainable production. ERASIG will work with pioneer farmers with consolidated land, small farmers groups, and farm service centres willing to lead the implementation of on-farm demonstration plots that will become learning hubs throughout the project life and beyond.

218. On-farm demonstration trials will become “learning-by-doing” fora where poor-asset small farmers from neighbouring areas can interchange ideas and experiences and learn new production systems and techniques that can be successful replicated. The set-up of a network of 30 on-farm trials, covering farmlands with annual and perennial crops as well as pastureland, will facilitate the access of poor smallholders to their nearest node of learning and practice.

219. Following this approach, on the first half of Y1, ERASIG will identify a pool of “Farm Leaders” (FL) and service providers who are already engaged in successful, though often random practices of sustainable water and soil management using suitable technologies. The project will help turn these leaders and their farms into learning hubs, creating a representative network of centres of good practice where sustainable irrigation and CA/OA systems and technologies are tested and applied in a structured and comprehensive fashion. The selection of the FL will be based on criteria such as the experience and willingness to adopt climate-resilient agriculture practices, the commitment to become training hubs, and the willingness to invest in the acquisition of the necessary equipment through the SCCF matching grants.

220. Once the FL are selected, the project will create a capacity building framework, which shall include: (i) the acquisition through matching grants (similar procedure as the one described in Component 1) of the equipment and materials needed to carry out the training work; (ii) the formalisation of arrangements between the farmers and the extension agents, researchers and NGOs involved in the previous TOT process, for the design and implementation of the learning-by-doing programme. As an incentive, the co-funding required from leader farmers for the acquisition of the equipment will be reduced upon fulfilment of their commitment to the training programmes. All the agreements will be finalised by the second half of Y1, so that the field demonstration work can start at the beginning of Y2 and continue throughout the following years.

221. As a whole, the project’s target is the set-up of 30 demonstration trials. The on-farm capacity building actions will last 3 years, benefitting approx. 3,000 farmers (with a special focus on women and youth) and involving about 30 public and private extension agents from the administration and farmers associations and 10 researchers previously trained through the TOT programme. The modules will include a mix of thematic workshops, group discussions, and fieldwork. The programme will also feature horizontal learning with exchanges between different demonstration plots. The project will monitor and evaluate the process, through

the production/use of monitoring/evaluation tools and by collecting feedback from all trainees. The quantitative and qualitative expansion of sustainable agriculture initiatives beyond the demonstration plots will also be used as an indicator to evaluate the effectiveness of the CB process.

222. ERASIG will provide financial and technical support for public and private research centres willing to establish experimental research plots on efficient irrigation technologies (EIT), conservation agriculture (CA), organic agriculture (OA) and the conservation and use of indigenous crop varieties. This will help generate scientific data that strengthen the arguments in favour of climate-proof soil and water management technologies and help adapt them to the agro-climatic conditions of Georgia. In the case of CA, the project will also support the research work of agro-service centres with the capacity to adapt existing machinery and produce modified equipment that suit the CA specificities, as an alternative to buying new expensive equipment.

223. While working on the on-farm demonstration plots, the project will organize a number of vocational training courses for farmers, where the professionals trained through TOT will act as teachers. These courses will focus on women and young unemployed of the target areas, to raise awareness and promote post-harvesting and marketing opportunities for the goods produced in the framework of the project. ERASIG will build on successful experiences from NGOs (e.g. Women cooperatives and rural women councils supported by CENN) and aid agencies to create new economic opportunities for women based on the processing of dry fruits, mushrooms and berries, *churchkhela* from grapes and walnuts, cheese, spices and sauces, honey, and organic vegetables from green houses, with a link to local markets and rural tourism.

224. Awareness raising, consultations with farmers, and training will also tackle the institutional development of farmers' organizations, associations and cooperatives. ERASIG will support GILMD interventions for the assessment of suitable options for on-farm irrigation service provision, including the support of Water Users Organization (WUO) for each on-farm irrigation sub-system that would constitute the body of the water users. The project will highlight the important role of farmers' organizations to facilitate an effective use of resources, reduce production, processing and marketing costs, guarantee the quality of the products, and facilitate market contacts and negotiations for better prices and the access to new markets. Farmers' organizations that become beneficiaries of the project grants will receive continued support to strengthen their organizational and operational skills.

225. Local service providers in each cluster area will be encouraged to actively participate in the initial intensive stages of the MSP in each value chain, to better understand the needs of the farmers and agribusiness as well as raise awareness among farmers and agribusiness of the services and opportunities available. Through this process the project team will also identify interested local service providers to act as potential partners in the project implementation - especially for activities on Climate Smart EIT and CA technology transfer. Where private service providers are interested to invest to improve or expand their service delivery, they will be eligible to apply for matching grants under the standard procedures.

226. Through this pro-active engagement of local service providers and input suppliers it is expected that some of them, such as the more advanced tree nursery businesses met by the design mission, are likely to be interested in working with the project in the role of Local Service Providers, to establish technology plots and delivery training to farmers on climate smart agriculture as they see the long term benefit to their business of a growing and vibrant sector. Whenever possible, the project will also agree with selected research institutions the establishment of research trials. In other cases, input suppliers may be more reactive, and through participating in the MSP seeing opportunities through to begin selling new products and equipment, such as micro sprinklers or drip irrigation systems, for which there is a growing demand generated by the project's promotion activities. For these input suppliers, AMMAR will be able to help connect them to suitable wholesale suppliers, as well as providing technical advice to input suppliers on how the various technologies should be used by farmers - advice which they can pass on to their customer.

Component 4. Project management (USD 250,000)

227. Effective project management, oversight and coordination, as well as mechanisms to monitor, evaluate, capture and disseminate lessons-learned and best practices are an essential component of the proposed project. RADF will be the project implementing agency and will be assigned project management responsibility to manage the baseline project AMMAR and project[24]. It is foreseen that operating costs would be cost-shared amongst active projects implemented by RADF, irrespective of financier.

[24] RADF will also manage the WB-financed Georgia Irrigation and Land Market Development (GILMD).

228. This component would finance project management, coordination and technical supervision of the implementation of the various activities of the fully blended AMMAR and ERASIG projects including, financial management, procurement, monitoring and evaluation. In addition to the provision of staff and operating costs for the project, specific provision has been made for financing of baseline survey, interim and final impact evaluation surveys, workshops and staff training in specialised areas related to overall project management.

229. The significant weight of the capacity building component - with 30 demonstration trials distributed in the target areas - will require the frequent presence of the project staff in the field, to provide adequate technical support and monitor the implementation of the training and demonstration activities. Additionally, the project will establish collaboration agreements with service providers to support the project surveys, capacity building and field implementation work. Project reporting of all outputs, as well as regular reviews of work plans and budgets and formal project evaluation will follow normative IFAD and GEF requirements with particular emphasis placed on ensuring that both qualitative and quantitative indicators demonstrate satisfactory progress, sustainability and replicability.

230. The dissemination of lessons learned and results will be an important mean to ensure the upscaling and replication of successful experiences. For this purpose, linkages will be established with a number of national and international networks (e.g. The Central Asia and the Caucasus Regional Forum – CACAARI – to foster agriculture research partnerships in the framework of ICARDA; the Global Restoration Network, European CA Network; UNFCCC-related programs) and platforms (e.g. the Adaptation Learning Mechanisms).

F. Additionality and adaptation benefits

231. The SCCF funding represents an opportunity to increase the scope of the objectives pursued through IFAD in light of the expected negative impact of climate change on the agricultural sector in Georgia. Without SCCF additional funding, the IFAD-supported baseline interventions could turn out to be a business as usual investment, which fails to tackle the root causes of the constraints facing agriculture and rural development in Georgia.

WITHOUT SCCF FUNDING	WITH SCCF FUNDING
Irrigation infrastructure rehabilitation with no consideration of future water availability and water use efficiency needs.	Climate-proof irrigation infrastructure that favours water saving and optimal use of water.
Lack of consideration of soil erosion problems affecting irrigation schemes and farmland due to climate-related risks exacerbated by CC	Landscape restoration measures integrating the restoration of protective vegetation shelterbelts and bio-engineering technologies to prevent soil erosion, siltation and flooding impacts at the watershed level (upstream and downstream irrigation schemes and farmland)
Enhance crop productivity without considering the CC exacerbation of drought events, strong winds and torrential rainfall.	Promotion of soil and water conservation farming systems and technologies (e.g. EIT and CA) based on existing CC downscaling modelling of selected crops, that enhance the resilience and productivity of crop value chains.
Service providers (extension and mechanization centres) are unable to address farmers' knowhow, inputs and equipment needs to reduce CC impacts on agriculture production and post-harvesting.	ToT programmes and grant schemes facilitate the access and dissemination of knowhow, inputs and technologies to VC actors, improving their capacity to deal with CC impacts.

232. The implementation of measures to increase the availability of water for irrigation and crop production cannot achieve alone that farmers get higher yields and better quality of production if complementary measures that minimize the water needed for crops, increase the fertility and capacity of soils to store water,

and avoid the negative effects of poor agronomic practices (e.g. overuse of water and salinization problems; the cutting windbreaks and soil desiccation and erosion) are not implemented. CC predictions in terms of rainfall and runoff decrease, and higher evapotranspiration, make even more necessary to incorporate adaptation measures in the water collection and distribution systems, in the regulation of water provision services, and in the efficient on-farm water conservation and use.

233. The SCCF financing will enhance the adaptive capacity of rural people to address CC and its potential impact on the agriculture sector by focusing on measures that promote the improved management of scarce/threatened key resources such as water and soil fertility, reduce environmental risks, increase yields and create opportunities for marketing higher value products. Complementary to the activities carried out by AMMAR, the GEF will aim at covering the additional costs associated with: (i) the investments in management systems and technologies for climate-resilient efficient irrigation and conservation agriculture; (ii) the adoption of climate-proof methods and technologies for the rehabilitation and modernization of infrastructures and landscape restoration, (ii) the training of trainers and on-farm demonstration trials to raise awareness and build the capacity of farmers on adaptive agricultural production, post-harvesting and marketing, and (iii) the institutional development of policy makers for mainstreaming CC adaptation.

234. A synergistic approach will be adopted between ERASIG and AMMAR by identifying opportunities to introduce climate-resilient, modern technologies such as more efficient distribution and application equipment to reduce conveyance water losses between the channels and the farmland plots, modern low cost technologies for water measurement and new pumping technology, etc. Synergies will also occur in the fields of policy reforms, capacity building and stakeholders' participation to jointly identify and demonstrate suitable adaptation measures and technologies, regulatory and operation solutions - such as the options to involve water users' organizations in irrigation water services - and collective actions improving stakeholders' coordination in the value chains that help guarantee product quality and safety, reduce transaction costs, and enhance the design of marketing strategies and sales operations.

235. The core target group will be the same as that of IFAD baseline: agriculture producers, particularly poor rural women and men with one ha or less of land, who are willing to move towards more commercial production. Leader entrepreneurs, public and private service and mechanization centres, farmer associations, cooperatives, NGOs, and research institutions, will play a major role in the testing of climate-resilient farming systems and technologies and the provision of services and on-farm learning opportunities. Due to the inclusive nature of the proposed irrigation rehabilitation and land improvement, other farmers in the target areas and other agriculture areas of Georgia where MoA/RADF is implementing projects may also benefit.

236. The incremental value of the GEF/SCCF funding will substantially expand the scope of AMMAR investments. ERASIG pilot actions will become models for replication and upscaling in the agriculture areas that will benefit water provided by other irrigation schemes that MoA/RADF will rehabilitate/modernize across other regions in Georgia.

237. The table 6 below summarizes the added value of the GEF intervention in comparison to the baseline.

Table 6. Added value of GEF/ERASIG interventions in comparison to the baseline

	AMMAR BASELINE PROJECT	**ADDITIONAL BENEFITS OF GEF INTERVENTION**
COMPONENT 1: **On-farm efficient irrigation, and soil and water conservation for sustainable agriculture production**	• AMMAR, will support up to six priority value chains and address critical constraints along the value chains, for example in marketing, processing, storage, post-harvest, primary production or the provision of key services to producers and agri-businesses. • The tactic objective is to *increase the aggregate value* created within each value chains as the basis for increased profits for farmers	• The support to small farmers for climate-proof efficient irrigation, CA/OA systems and technologies, and better adapted crop varieties, shall increase soil water content and reduce 30-80% of water requirements for crops in the converted farmlands. Soil organic matter, soil texture and soil fertility shall significantly improve leading to higher and more stable crop yields under climate variability in drought affected years. • Expected up to 50% yield increases, and higher quality goods with increased market sales. • Soil erosion shall decrease between 60-90% in farmland under CA and restored with shelterbelts and grass cover.

	and agri-businesses alike and to thereby create the incentives for wider replication and "crowding-in".	• Potential salinization problems will be prevented through adequate drip and/or sprinkler irrigation equipment and scheduling for suitable crops. • Water quality shall improve in farmland under CA due to 20-50% lower use of fertilizers and pesticides. • EIT and CA technology successfully tested and disseminated over 4,750 ha. • Reduction in machinery, fuel and labour requirements for CA will increase profits and available time, mainly for poor-asset women and youth, to diversify income opportunities through multipurpose shelterbelts producing MAP, wild fruits, and honey. • Reduced emissions due to 60-70% lower fuel use, 20-50% lower fertilizer and pesticides use, 0.2-0.7 t/ha/y sequestered carbon and no CO2 release as a result of no burning of residues
COMPONENT 2: Landscape restoration to prevent climate-related risks	• Rehabilitation of irrigation schemes to improve water availability, and value chain infrastructure to improve quality and marketing opportunities. The baseline will improve farmers' capacity to create workable WUOs for a well-organized use of irrigation. • Irrigation development could be badly affected by wind soil erosion, canal siltation, higher evapotranspiration, and production losses due to CC-risks. Moreover, subsidies and credits supporting maladapted technologies might exacerbate development barriers.	• Irrigation infrastructure will be designed and restored using CC vulnerability assessments and adaptation measures. • Quantification of the benefits deriving from the improvement of value chain-related infrastructure, such as cold storage facilities and certified testing facilities, suggested that it will result in about USD 700,000 of incremental annual benefits in total. Approximately 1,060 smallholder farms and households will be benefiting from the improvement of the value chain-related infrastructures with increase of their annual income from 1.4% to 5% in 20-year perspective. • The SCCF will support the use of "soft" biotechnologies and ecological restoration measures to prevent environmental risks, improve environmental services, and generate complementary income opportunities from wood and non-wood forest products and pastures (e.g. increase of household benefits from beekeeping by at least USD 1,206 per year with the project). • "Soft" biotechnologies help restore water flow regime with beneficial hydro-mechanical effects and protection against soil erosion. • The restoration of vegetation shelterbelts will help reduce about 20% of soil evaporative losses in summer, reduce evaporation from irrigation dams and channels up to 30%, increase at least 25% of yields, and have large wind erosion control benefits.
COMPONENT 3: Enabling environment for climate-risk reduction in agriculture	• The baseline will help create an enabling policy environment for value chain development. • Partnerships among value chain actors will be promoted and training will be provided to improve practices – production, processing,	• Service providers will be trained on the adaptation benefits of climate-resilient EIT, CA/OA, and landscape restoration measures and technologies. • On-farm demonstrations will allow small farmers and farmers' organizations to exchange know-how, learn and apply climate-resilient EIT, CA/OA and LR measures and technologies, as well as collaborative frameworks (WUO,

	marketing – organizational frameworks and VC linkages. • The AMMAR project will complement the Concessional Loan Program initiated by the GoG, as well as will ensure the link between value chain development and credit schemes in the project target areas.	Farmers' organizations and cooperatives). • Target farmers' organizations will be trained on and have applied post-harvesting and marketing skills. • Guidelines to mainstream CC adaptation in selected policy frameworks and regulations developed and disseminated to policy-makers. • Information materials featuring lessons learned prepared and disseminated widely to practitioners and society in general.
COMPONENT 4: Project Management	• The baseline will cover the establishment of the RADF/AMMAR PIU that will be responsible for the overall programme coordination and implementation. The main M&E functions will be undertaken through the baseline M&E system.	• The SCCF will integrate CC expertise in the programme management and monitoring. • The SCCF will cover the additional costs for a CC Adaptation Specialist to ensure the overall implementation of the SCCF activities and effective integration in the baseline. Experts and service providers will be hired to provide technical support and guidance for the implementation of the different project components, and help integrate CC issues in the AMMAR baseline interventions and M&E system.

G. Linkages with other related initiatives

238. The SCCF project will be country-driven and it will comply with national priorities identified by in the SADG by the MoA, the NCs to the UNFCCC and in other relevant documents, such as the Technology Needs Assessment and Technology Action Plans for CC Adaptation prepared by the MENR. The project will support the implementation of the technologies recommended for CC Adaptation, with special focus on efficient irrigation – drip and sprinkler systems - conservation agriculture, climate-proof infrastructure rehabilitation and soil erosion prevention measures.

239. The project will establish synergies with relevant initiatives from International Cooperation Agencies. The largest donors contributing to CC adaptation in agriculture in Georgia are UNDP, USAID, GIZ and the EU, among others. These donors provide technical and financial support to a wide range of CC adaptation projects, including the ecological restoration, EIT, CA technologies, and the conservation and sustainable use of agro-biodiversity in Georgia. They play a major role in the implementation of Georgian governmental reforms on agriculture, such as the new law on agriculture cooperatives, and support the development of extension capacity and the creation of farmers' organizations and cooperatives.

240. The project will seek collaboration with the EU country office to support the creation of small farmers' organizations, including technical assistance and provision of inputs, equipment and/or small infrastructure to increase production and improve access to markets. The project will collaborate with UNDP and USAID in strengthening the capacity of public and private providers of extension and mechanization services and in facilitating farmer's access to extension and research. ERASIG will draw on lessons learned from the GIZ supported projects on conservation agriculture development and protective vegetation shelterbelts rehabilitation in Kakheti region. The project will also build on the GIZ successful results on increasing production quality standards and reducing trade barriers, in collaboration with the organic association Elkana (e.g. organic agriculture production and marketing of products such as wine, through participation in international organic fairs).

241. The project will also seek to collaborate with and build upon the work of UNDP, SIDA, the Georgian Employers Association and USAID-supported Gender Mobilisation Groups to inform poor rural women about the project opportunities to improve women's decision-making and employment opportunities in agriculture.

242. ERASIG investments in research demonstration trials and capacity building of extension agents will draw on lessons from the CGIAR and its ICARDA Programme for Central Asia and the Caucasus with research experiences on improved production systems, new promising varieties of cereals and legumes

resistant to drought, salt soils and diseases, IPM, promising livestock management, new water saving and resource conserving agronomic practices, etc.

H. Risks and assumptions

243. Project design has taken into account the strong commitment of the Georgian MoA and MENR to urgently respond to the growing impact of climate risks through the implementation of the SNC and TNA adaptation priorities for the agriculture sector – in particular the restoration of protective shelterbelt vegetation against erosion, and the adoption of efficient irrigation and sustainable agriculture technologies.

244. The adoption of CC adaptation measures and technologies requires substantial policy backstopping. The project will build on current policy reforms supporting farmers land tenure rights and land consolidation, farmers' organizations and farmers' access to finance. The project will improve the capacity of national and local policy makers to mainstream CC adaptation into agriculture policies and regulations.

245. The SNC and TNA recognise the limited capacity of all concerned stakeholders to assess CC impacts, and identify and implement adaptation measures. This constraints needs to be seriously addressed, as experience shows that when knowledge on adaptive agriculture systems and technologies is not properly introduced and adjusted to local contexts, the level of acceptance from farmers is very low and can eventually jeopardise a successful shift to sustainable cropping systems. The SCCF project will pay adequate attention to capacity building and training as a key factor to overcome this risk. The project will engage in a permanent knowledge generation process, aimed at nurturing a critical mass of services providers, and the sharing of practical experience among stakeholders, through a continuous on-farm learning process to test and adapt efficient irrigation and sustainable agriculture principles. The project will also support informal and formal farmers' organizations to facilitate the adoption and management of efficient irrigation and resilient agriculture technologies.

246. The project will identify and support innovation-oriented leader farmers and farmers' organizations, agribusinesses, cooperatives and service providers who are willing to transform maladaptive practices and obsolete production systems into modern and more efficient ones. These champions can play a critical role in overcoming cultural barriers and convince others to shift to sustainable agronomic practices, as farmers tend to trust their peer more than other formal advisers. The project will also tackle farmers' mistrust and complains about irrigation services and conditions, following a community-based participatory approach to address local cultural, socioeconomic and ecological concerns and reach consensus about project interventions.

247. The limited access to convenient credits to invest in EIT and CA technologies for higher value-added value chains is an additional constraint, which might jeopardise the full involvement of smallholder farmers. The project will benefit from the AMMAR baseline interventions on value chain development and partnerships with financial institutions (FI), supporting multi-stakeholder processes involving all VC actors, and farmers' access to credit and investments in agriculture. Joint AMMAR/ERASIG efforts to remove infrastructure and equipment bottlenecks will facilitate access to a broader set of market opportunities, assets and inputs for the SCCF beneficiaries.

248. The project will follow the same gender approach of other IFAD country operations, aiming to break even in the participation of women and men. Components 1 and 2 have a women oriented focus through the creation of more remunerative employment opportunities mainly linked to agro-processing and marketing of greenhouse vegetable crops, medicinal and aromatic plants, wild fruits and honey, etc.

249. Risks assumptions and suggested mitigation measures are reflected in the table below.

Table 7 - Risks assessment and potential mitigation measures

Risks	Risk rating*	Risk mitigation measures
On-the-ground implementation slowed by bureaucratic	**M**	The project will adopt a participatory approach with sufficient institutional strengthening. The fact that AMMAR and ERASIG will be fully embedded within the MoA/RADF and that the projects will support the institutional strengthening of the concerned ministerial departments, such as UASCG, will ensure adequate remedial

constraints		measures to minimize this risk.
Insufficient and inadequate staffing for backstopping	**L**	The project will engage in a comprehensive training and awareness raising program targeting all concerned actors (government institutions, agribusinesses and cooperatives, service providers, financial institutions, research/academic institutions, NGO and individual farmers and farmers' associations), to ensure that its approach and objectives are fully understood and integrated. The SCCF funding will empower all stakeholders to deal with climate change adaptation.
Loss of institutional memory	**M**	The project will ensure that all achievements are well documented (soft and hard copies of all documents will be kept). Information on the project will be disseminated to practitioners. The records of the project's achievements will be publicised at national / international meetings and on websites.
Land tenure issues have a negative impact on project implementation and on sustainability of achievements.	**M**	The project will build on the MoA policy reform and RADF interventions on land tenure and consolidation issues.
Insufficient application of targeting procedures, with special attention to gender issues.	**M**	Targeting will be aligned with IFAD's policy and approach in Georgia. Effective monitoring and evaluation procedures will be established to ensure that targeting is adequate. Gender issues are already well embedded in IFAD's country programme. The project will strive to involve the maximum number of women beneficiaries, and it will pay special attention to the creation of new jobs for women through complementary, off-farm activities.
Low capacity of local service providers and partners to perform high quality services for the implementation of the specific outcomes (i.e. CA and landscapel restoration measures).	**L**	The choice of service providers will be subject to a rigorous selection process to ensure that the best providers and partners are engaged. The project will make adequate allocations for technical assistance (national and International) to ensure that all technical adaptation aspects are covered. IFAD will enhance the capacity of national service provides through the ToT programme. The project will stipulate performance-based contracts with sub-contractees on a yearly basis in order to monitor compliance with the agreed work plan.
The lack of access to financial services and the poor functioning of local markets for crop products discourage innovation and technological improvement.	**M**	Increased availability of financial means for smallholder farmers is being experienced in the baseline and in the governmental policy reform that removes some of the main bottlenecks hampering access to credits. Increased efficiency of irrigation and CA minimization of the inter-annual variation of yields might open new market opportunities, especially through exports. The improvement in the annual yields and of local irrigation infrastructures will also increase market opportunities. Partnerships with financial institutions will facilitate farmer's access to credit and other financial services to invest in climate-resilient agriculture technologies
Weak political will to streamline climate-resilient agriculture technologies, consolidate the institutional framework and enforce laws.	**L**	MOA's policy reforms demonstrate commitment to support sustainable agriculture, mitigate CC-related risks, and improve the capacity of farmers to produce high quality crops. MENR is very active in CC adaptation and has developed and implemented, in close collaboration with other governmental and non-governmental organizations, agriculture adaptation measures.
Governance issues,	**L**	Based on IFAD's achievements in other countries, the project will

including "Elite capture" with the "plausible recurrent risk" of deviation and capture of the benefits accrued from the project by the "better off".		support lead farmers, agribusinesses, cooperatives and service centres to become key hubs around which neighbouring smallholder farmers can learn and hire services, with subsequent boosting of modern agriculture economic activities and wealth creation in the poor rural areas. Such benefits have a multiplying effect and will facilitate the increase in number of farmers' organizations applying sustainable agriculture practices and facilitating knowhow spreading and services provision to a large number of smallholder farmers.
Overall risk rating	**M**	
***** *Risk rating – H (high risk), S(Substantial risk), M (Moderate risk), and L (low risk). Risks refer to the possibility that assumptions, defined in the logical framework may not hold*		

I. Sustainability and replicability

250. Long-term sustainability will be sought through a broad CB programme designed to create a critical mass of efficient practitioners at the basin and national level, and among all VC actors – from institutional to grassroots. The training of trainers will be a key component of this programme. The CB process will integrate participatory elements to fully address issues that affect the long-term sustainability of natural resources and the welfare of local communities (continuous training and on-farm demonstrations to consolidate adoption of adaptation technologies and encourage replication).

251. Replicability will be ensured through the dissemination of lessons learnt in the field demonstration trials, and the locally adapted EIT and CA/OA management systems adopted by the beneficiaries. The provision of adequate equipment that is adapted to the local context will also contribute to replicability.

252. Another important element for sustainability and replicability is the achievement of policy and legislation frameworks that are conducive to the replication and dissemination of new experiences and achievements. The project will engage in a policy dialogue, and with work closely with all concerned decision makers and branches of the administration in order to reach the desired policy targets.

253. Climate-proof infrastructures and landscape restoration will contribute to reduce CC-related risks and improve environmental services needed for sustainable agriculture production. Furthermore, the economic use of non-crop vegetation – wood, wild fruits, medicinal/aromatic plants, honey - will increase economic opportunities for smallholders, and especially for women.

254. The project will seek synergies and cooperation with relevant initiatives, mainly those implemented by RADF in the framework of complementary projects such as GILMD, to ensure coherence and compliance, and avoid overlapping and competition over land uses.

255. The sustainability of the project is also guaranteed by the full involvement and empowerment of all VC actors throughout the multi-stakeholder processes in the various components of ERASIG. Smallholders and farmers' organizations (e.g. water users organizations) will be the main targets of the awareness raising and capacity building programme, and they will be the main beneficiaries of the components on production/processing improvement and the provision of new technologies. Partnerships among VC actors will strengthen each individual actor in the VC and will facilitate the investments in climate-resilient technologies, and the production, processing and marketing of high quality products.

256. ERASIG addresses the adaptation priorities identified by the SNC and TNA reports, in terms of awareness raising, capacity building, adaptation technologies, field implementation measures and mainstreaming adaptation needs into sectoral policies, namely agriculture, water, and forestry. The results of the pilot adaptation actions will be widely disseminated within and outside the project area, and beyond the scope of ERASIG in the framework of GILMD second phase and other projects supporting the implementation of the Georgian agriculture strategy.

257. The project will be linked to ongoing regional and global programmes to ensure exchanges and dissemination of information at a wider scale using the IFAD website, UNFCCC, GEF and other platforms for experience sharing.

VI. Institutional framework and management arrangements

A. Project coordination and supervision

258. MOF is the official Representative of Georgia as the Borrower/ Recipient. In this role MOF will be responsible for: (i) Providing inter-agency coordination when required; (ii) Fulfilling the government fiduciary oversight and management responsibilities; (iii) Providing sufficient counterpart contribution in a timely manner to finance the Project activities (where agreed).

259. The project will be implemented according to IFAD standard procedures, over a period of five years beginning by end 2014. The MOA will be the lead executing agency through the Rural and Agriculture Development Fund (RADF) as the fully blended AMMAR/ERASIG project' implementing agency. The RADF is a semi-autonomous non-profit (non-entrepreneurial) legal entity chaired by the Prime Minister with the Minister of Agriculture serving as the Deputy Chairman.

260. The RADF will be responsible for overall coordination and management of the project, including management and fiduciary aspects. The RADF will be substantially strengthened to manage the forthcoming projects and certain management and staff positions will be shared between AMMAR/ERASIG for efficiency and coordination reasons (especially in areas of finance, procurement and administration)[25].

261. To ensure efficient and effective implementation the project will build on existing and emerging systems for rural service delivery and project management. The RADF shall select and appoint technical staff or contract local service providers, as required, to:

- provide expertise on climate smart agriculture promotion and landscape restoration;
- facilitate local multi-stakeholder processes in each value chain;
- provide monitoring and technical back-stopping for farmers' training and technology plots;
- advise farmers on farm plans;
- conduct follow-up meetings with farmers who are recipients of grants made available under the Project;
- act, or designate the Agriculture Project Management Agency (APMA) and/or any other entity(ies) acceptable to IFAD to act, as small grants administrator and manage the small grants scheme for smallholders under Window 1 (Climate Smart Primary Production) of Sub-component 1.2 of the Project;
- act, or designate APMA and/or any other entity(ies) acceptable to IFAD to act, as large grants administrator and manage the large grants scheme for agribusinesses and cooperatives under Window 2 (Value Chain Development) of Sub-component 1.2 of the Project; and
- enter into a subsidiary agreement, as appropriate, with APMA and/or any of the entities referred to in sub-paragraphs (vi) and (vii) above setting forth the terms of the implementation of the activities in respect of the Window under Sub-component 1.2 respectively assigned thereto.

262. The recently re-vitalized regional MOA district offices, typically with 4-6 technical staff, will be engaged to: (i) support the project team in the facilitation of the local multi-stakeholder processes in each value chains, (ii) providing monitoring and technical back stopping of the farmer training and technology plots, and (iii) support the project team to follow up with farmers investing using grants.

263. Local service delivery to farmers, including delivery of farmer consultancy, training and management of climate-resilient EIT and CA technology plots, will be subcontracted to local service providers operating in each of the target locations (e.g. farm service centres, mechanization centres, farmer associations, private service providers, cooperatives, NGOs). Potential candidate local service providers will be identified through the initial intensive phase of the value chain multi-stakeholder process in each value chain and encourage to submit proposals to the project for service provision following the project's approved procurement procedures. The local service providers may be provided with supplementary training to address specific

[25] The WB-funded GILMD project, managed by RADF, will also share positions with AMMAR/ERASIG as far as finance, procurement and administration is concerned.

knowledge gaps are promoted technology options where necessary.

264. Overall technical supervision and coaching of the local service providers on all aspects of Climate-resilient technologies, climate smart agriculture practices, landscape restoration and farmer consultancy and training will be the responsibility of RADF recruited experts.

265. For civil works, overall responsibility for supervision of design services and civil works would be carried out by RADF Engineers and on-site daily supervisors. For irrigation related infrastructure, representatives of the United Amelioration Service Company of Georgia (UASCG), currently mandated by Government for operation and maintenance of all irrigation infrastructures, would approve any request for payment prepared by contractors and RADF Engineers as well as the final certificate of completed services and works. Day to day supervision of civil works would be carried out by the short-term contracted on-site daily supervisors under the direct guidance of the RADF Engineers. The on-site daily supervisors would be responsible for quantity and quality of works and materials used. RADF Engineers would regularly visit sites during implementation of construction works and be responsible for monitoring quantity and quality of implemented works.

266. Performance based contracts and agreements will be applied as a principle for all recruitments and contracted service providers to assure performance is kept to a high standard.

267. AMMAR/ERASIG Management Team will include:

Project management

- Project Manager
- Planning M&E Officer26
- Finance Manager
- Accountant
- Procurement & Contracts Officer
- Administrative Assistant
- Drivers (x2)

Technical staff and Advisors

- Value Chain Coordinator / Deputy Project Manager
- Climate Change Adaptation Specialist (48 months input over PY1-2-3-4, funded by the GEF project)
- Value chain & Agri-business specialist (x2 - one staff initially, second post hired as/when workload requires)
- Engineer - Senior
- Engineer
- International Technical Advisor (10 months input over PY1-2)

268. The GEF funded CC Adaptation Specialist (ERASIG Coordinator) will have responsibility for coordination and monitoring the ERASIG project components under the supervision of the PIU Coordinator. He/she will have the responsibility to generate draft annual work plans and budgets for the ERASIG project, including the source and use of funds, and a procurement plan. The draft annual work plans will be submitted to the PSC for review and approval. The PC will also provide the necessary information to the PIU Coordinator to complete the six-monthly and annual progress reports in English to be submitted to IFAD and GEF.

269. To facilitate a quick start to project implementation, the RADF will begin the process of advertising and selection of staff and advisors using the IFAD and/or GEF grant funds so that the team is fully in place and operational as soon as the main IFAD loan becomes effective.

270. The project will hire service providers to support the capacity building component and field

[26] Cost sharing of position with WB GILMD project from 2015-2019

demonstration activities, the rehabilitation and LR works, the institutional development of farmers' organizations, and backstopping to farmers on the use of the newly acquired equipment, and with the provision of post-harvesting and marketing support.

B. Project implementation arrangements

271. A **project implementation manual** (PIM) will be prepared as part of the project start-up activities, to assist the project legal entity with guidance for planning, implementing and monitoring activities, procurement of technical assistance and services, and project investments. The manual will define procedures, criteria and procurement conditions for the project matching grants, addressing climate resilience and gender requirements. Grant funding will facilitate the generation and introduction of innovative technologies for EIT, seed/plant production nurseries, CA/OA, Post-harvesting and value addition, and LR. Grant funding will be provided through a competitive scheme for applications focused on capital investments in equipment and technologies that are aligned with the project objective and outcomes. In order to be eligible for subsidies that match the costs of equipment, applicants will have to fulfil the specific criteria defined in the project Implementation Manual (PIM). The PIU will prepare ToRs and conditions for applicants that will be published in local mass media and online. Following the current basis for IFAD's operations, the applications submitted will follow a two-step selection process of pre-qualification and qualification with field review and final scoring by an Application Evaluation Committee (AEC). All the goods shall be procured through National Competitive Bidding (NCB). Grant applicants may provide a 1:1 match. After the purchase of the goods a transfer agreement will be signed, where applicants will commit to the good maintenance of the equipment and its use during the project timeframe for the agreed objectives.

272. The Manual will be prepared in two volumes. The first volume comprises three parts: (i) the first part presents a general description of the project planning and design, its implementing partners, organizational arrangement, staffing, and their responsibilities; (ii) the second part presents implementation guidelines and procedures for implementation of each project component and preparation of Annual Work Plan and Budget; (iii) the third part presents procedures for reporting, monitoring and evaluation and supervision. The second volume presents guidelines for financing project expenditures.

273. Preparation and submittal of the draft Project Implementation Manual (PIM) for IFAD review and "No Objection" is a key condition for the project to enter-into-force. While the Project Steering Committee will adopt the PIM substantially in the form approved by IFAD, it does not replace the definitive Project Documents. Where there are inconsistencies with any provision of the Financing Agreement, the provision of the Agreement shall govern.

Table 8: Roles and Responsibilities for Matching Grant Scheme Window 1 “Climate-resilient Primary Production - Small grants for smallholders

Process step	Grant Administrator	RADF	Others
1. Promotion of grant scheme (word of mouth, advertising, other projects/partners, events and meetings)		Coordinated by RADF VC team	Local technical service provider MoA District Offices Also via Partner banks / MFI via client base
2. Briefing to interested applicants on scheme and preliminary advice	Jointly by Grant Administrator and RADF VC team RADF Grant Officer and VC team		Supported By MoA District Offices
3. Technical advice to applicants in preparation of application / farm investment plan			Local technical service provider as part of farmer training course. Additional backstopping to farmers from MOA District Offices.
4. Application receipt, checking of eligibility and completeness of applications (desk based)	Grant Administrator		Application to include bank reference confirming account details and identity
5. Technical screening & review of feasibility incl. field verification (technical and financial) and fit with project priorities in each VC	Grant Administrator	Technical guidelines on evaluating typical farm investment plans from VC team	
6. Compliance check (business and fiduciary aspects)	Grant Administrator		
7. Submission to Grant Committee	Grant Administrator		
8. Grant decision	Grant committee		
9. Loan application review and approval (if part of investment plan)			Bank/MFI own standard processes of loan appraisal
10. Contracting and agreement of milestones /disbursement schedule	Grant Administrator	RADF Grant Officer	
11. Disbursement - phased if possible		RADF	
12. Technical support to grantee during grant implementation			MOA District Offices and Local technical service providers
13. Grant monitoring, and reporting	Grant Administrator		Bank / MFI own monitoring and management of loan (where loan taken)

Table 9: Roles and Responsibilities for Matching Grant Scheme Window 2: Value Chain Development - larger grants for agribusinesses & cooperatives

Process step	RADF (plus others)	Grant Administrator (APMA)
1. Promotion of grant scheme (word of mouth, advertising, events and meetings)	Coordinated by RADF via: RADF Value chain team MoA District Offices	Local technical service providers Also via: Partner banks / MFI Regional Development Agencies (were appropriate)
2. Briefing to interested applicants on scheme and preliminary advice	RADF Value chain staff	
3. Technical advice to applicants in preparation of application	RADF Value chain team (limited) Consultants to support business plan preparation if requested.	
4. Application receipt, checking of applicants' eligibility and completeness of applications (desk based)		APMA (online submission the standard review by grant officers using same procedures as GoG scheme)
5. Technical screening & review of feasibility (technical and commercial) and fit with project priorities incl. field verification	APMA	
6. Compliance check (business and fiduciary aspects)		APMA (with partner bank/MFI if applicant is taking loan from partner bank/MFI)
7. Submission to Grant Committee	Grant Committee	APMA
8. Grant decision		APMA Grant Committee (same committee as for GoG scheme)
9. Contracting and agreement of milestones /disbursement schedule		APMA
10. Co-ordination of technical support to grantee during grant implementation	RADF Value chain team	
11. Contract monitoring, disbursement and reporting	Field verification on behalf of APMA by RADF VC team plus MOA District Offices	APMA

274. Following similar procedures as in other IFAD projects in Georgia and elsewhere, the project implementation unit may entrust a financial entity of the operational procedures for managing the ERASIG grant transfers and subsidies to beneficiaries and monitoring grant implementation. The project will support necessary capacity development and training to incorporate the climate resilience criteria in the grant schemes. The execution of the grants will also be closely monitored by the project implementation unit.

275. All international and national providers of services will have to apply for competition by fulfilling specific criteria defined in the IM. The Quality and Cost-based Selection (QCBS) procedures will be used for procuring these consulting services.

VII. Project cost and financing

A. Financing and co-financing

276. Total project costs are estimated at USD 32.8 million covering the SCCF grant of USD 5.3 and an estimated co-financing source of two IFAD soft loans of USD 26.8 million, and an two IFAD grants of USD 0.7 million. The SCCF grant is exempt from taxes and duties.

277. The following table provides the project costs by component and sub-component. The total details of co-financing are provided in the project COST TABLES.

Project components and sub-components	**SCCF**
On-farm water efficiency in irrigation and crop production systems is improved	3,102,000
Sub-total Component 1	**3,102,000**
Landscape restoration plans, identifying vulnerable areas for erosion risk reduction interventions, are developed and implemented in at least 1,000 ha within the 3 target areas	1,400,000
Sub-total Component 2	**1,400,000**
The institutional capacity and policy environment for climate-resilient irrigated agriculture and water and soil conservation is developed	150,000
The adaptive capacity of key agriculture practitioners on climate-resilient irrigation, and soil and water management practices is developed and applied in the target areas	398,000
Sub-total Component 3	**548,000**
Component 4 - Project Management	**250,000**
Total	**5,300,000**

B. Procurement

278. Procurement of goods, works and consulting services financed by the project shall be subject to IFAD's conditions and will strictly follow the established modalities in the country. The provisions of the procurement regulations of the Republic of Georgia will be used, to the extent that such are consistent with IFAD's "Procurement Guidelines" approved by the IFAD Executive Board in December 2004 (the "Procurement Guidelines") as such guidelines may be amended from time to time by IFAD.

279. To the extent possible, the goods, works and consulting services shall be bulked into sizeable bid packages to permit the optimal use of competitive bidding.

280. Before the commencement of procurement and annually thereafter, the Government shall furnish to IFAD for approval, a Procurement Plan as described in the Appendix 1, paragraph 1 of IFAD's Procurement Guidelines. The Procurement Plan shall specify, inter alia, the method of procurement for each contract to be financed from, and thresholds, ceilings and preferences to be utilized in the implementation of procurement under the Project. The Procurement Plan shall also specify any additional requirements as may be set out in the Procurement Guidelines with respect to certain methods of procurement.

281. All goods, works and services procured will be exempt from duties and taxes.

282. The following methods are recommended:

283. Works: The procurement of works will largely be carried out under National Competitive Bidding. The International Competitive Bidding will be applied for contracts estimated to cost USD 2 million equivalent and above, and National Shopping less than USD 100,000 equivalent.

284. Goods: Contracts for procurement of goods costing USD 500,000 equivalent or more will be awarded based on International Competitive Bidding; those costing USD 100,000 equivalent or more but less than

USD 500,000 equivalent will be based on National Competitive Bidding; and less than USD 100,000 equivalent will be based on National Shopping.

285. Non-consulting Services: Contracts for procurement of non-consultancy services costing USD 200,000 equivalent or more will be awarded based on International Competitive Bidding; those costing USD 20,000 equivalent or more but less than USD 200,000 equivalent will be based on National Competitive Bidding; and less than USD 20,000 equivalent will be based on National Shopping.

286. Consulting Services: The Quality and Cost Based Selection will be the standard method applied unless otherwise approved. The following processes will apply: (i) Request for Proposal – for contracts with a value of USD 100,000 equivalent and above; and (ii) Request For Quotation - for contracts with a value of less than USD 100,000 equivalent. Contracts for procurement of individual consultancy or TA services will be based on National Shopping. These financial thresholds may be adjusted as appropriate, with prior IFAD approval, depending on the nature of the assignment. For audit firms (international and national), the WB shortlist will apply.

287. Operating costs**:** These expenditures, approved by IFAD on the basis of budgets (acceptable to the Fund) will be carried out by the RADF for Project implementation, management and monitoring, including the costs of support staff salaries, communication, editing, printing and publication, translation, vehicle operation and maintenance, bank charges, local travel costs and field trip expenses, office rentals, utilities, and office supplies.

288. Specific applicability for procurement items will be clearly identified in annual procurement plans.

289. The following *Prior Review* thresholds are proposed:

- All Work, Goods and Non-Consulting Services tenders under ICB;
- All Goods and Non-Consulting Services tenders under NCB;
- Only invitation to quote (ITQ), including specifications prior to initiation of procurement process for simple goods less than USD 100,000 equivalent using government's e-procurement portal;
- The solicitation and award of any contract for consulting firms estimated to cost USD 100,000 equivalent or more and all consulting services for individuals;
- Any direct contracting or single-source selection.

290. The processes and procedures will be elaborated in the Project Implementation Manual and Letter to the Borrower.

291. Procedure: The PIU will be responsible and accountable for executing procurement in compliance with the stipulated procedures of financiers and Government. The bid evaluation committee will consist according to ministerial decree and its composition will be determined depending on the nature of the contract. The head of PIU will be the signatory of all contracts.

292. Contracting: Contracts for civil works will be based on unit costs and bills of quantities, while contracts for services will be based on achievement of deliverables and compliance with milestones rather than based on inputs, to the extent feasible.

293. Post-review: All other contracts would be subject to post-review and may be subject to procurement audit by the Fund. The project staff would maintain accurate records of all procurement activities and documents related to the project. The procurement files would be maintained for review by IFAD supervision missions and independent audits. The project staff would also consolidate procurement activities into quarterly and annual progress reports.

294. Ex post review: The Project would retain all documentation up to five years after the closing date of the financing for examination by IFAD or by independent auditors. This documentation includes, but not be limited to, the signed original contract, the evaluation of the respective proposals and recommendation of award. IFAD does not finance expenditures for goods, works or consulting services that have not been procured in accordance with the procedures specified in the financing agreement. In such cases, IFAD may, in addition, exercise other remedies under the financing agreement, including cancellation of the amount in question from the financing. Even if the contract was awarded after obtaining a "no objection" from IFAD,

IFAD may still declare mis-procurement if it concludes that the “no objection” was issued on the basis of incomplete, inaccurate or misleading information furnished by the Project or the terms and conditions of the contract had been modified without IFAD’s approval.

295. Register of Contracts: Procurement carried out at project level would be recorded and registered against the Procurement Plan. The sample form to be used and instructions are detailed in *Annex 6 of IFAD’s Loan Disbursement Handbook*. It would also be necessary that the RADF prepare annual statistics disaggregated by type and methods of procurement, for the overall procurement transactions carried out for the project.

296. Eighteen Months Procurement Plan (PP): The PP will be updated and approved by IFAD at least annually. A preliminary 18-Month Procurement Plan has been prepared and presented in Table 17.

ANNEXES

ANNEX 1. MONITORING AND EVALUATION

MONITORING AND REPORTING

Project monitoring and evaluation will be conducted in accordance with established IFAD and GEF procedures. The Strategic Results Framework provides indicators for project implementation along with their corresponding *means of verification*. These will form the basis on which the project's Monitoring and Evaluation system will be built. In line with the GEF/SCCF operational principles, the SCCF M&E activities will be country driven and will provide for consultation and participation.

The main objective of the IFAD/SCCF project will be to lessen the impact of climate change on vulnerable rural groups as well as on natural resources critical for sustaining agricultural production and increase food security. The project will undertake a baseline survey to define the status prevalent before the initiation of the project activities, particularly in the target areas and in/around the selected irrigation schemes. Basic data and information relevant to the project will be collected, and project indicators will be measured at this stage.

Day to day monitoring of implementation progress will be the a responsibility of the project team, based on the annual work plan and its indicators. ERASIG intervention will be fully blended with AMMAR operations and monitoring and evaluation system. The project will include gender expertise, and will adopt a gender-sensitive monitoring and evaluation system, providing disaggregated information by gender and age.

The project team will fine-tune the progress and performance/impact indicators of the project during an inception workshop, where specific targets for the first year of implementation, progress indicators, and their means of verification will be agreed. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the annual work plan. Targets and indicators for subsequent years would be defined annually as part of the internal evaluation and planning processes undertaken by the project team.

Measurement of impact indicators related to adaptation benefits will occur according to the schedules defined in the inception workshop. The measurement of these will be undertaken through subcontracts or retainers with relevant institutions, or through specific studies that are to form part of the projects activities, or periodic sampling.

Periodic monitoring of implementation progress will be undertaken by IFAD. This will allow parties to take stock and to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.

In line with GEF requirements, the IFAD/SCCF project will adopt criteria for its monitoring systems, which are SMART - Specific, Measurable, Achievable and Attributable, Relevant and Realistic, Time-Bound, Timely, Traceable and Targeted. These are duly reflected in the project logical framework. A part of the participatory M&E will be devoted to ascertain the extent of women's participation in programme activities, constraints faced, benefits gained, aspirations met and impact on women's status in the family, their involvement in community affairs and the climate-proofing of their agriculture.

Project Indicators: Well-defined sets of indicators have been identified, which will be used for both project monitoring and evaluation. Inputs, process, outputs, and outcomes indicators for each component are defined to ensure adequate monitoring. Where possible, all indicators should be measured annually, although cost constraints and availability of data may limit the frequency possible for some indicators.

REPORTING

A Project Inception Workshop (IW) will be conducted with the full project team, MoA and relevant government counterparts – MENR, MoF, etc - co-financing partners, IFAD and representation from the GEF as appropriate. A fundamental objective of the IW will be to help the project team understand and take ownership of the project’s goals and objectives, as well as finalize preparation of the first annual work plan on the basis of the project's strategic results framework (SRF). This will include reviewing the SRF (indicators, means of verification…), imparting additional detail as needed, and finalizing the Annual Work

Plan (AWP) with precise and measurable performance indicators, and in a manner consistent with the expected outcomes for the project.

Additionally, the purpose and objective of the Inception Workshop (IW) will be to: (i) detail the roles, support services and complementary responsibilities vis à vis the project team; (ii) provide a detailed overview of IFAD-GEF reporting and monitoring and evaluation (M&E) requirements, with particular emphasis on the Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), as well as mid-term and final evaluations. Equally, the IW will provide an opportunity to inform the project team on IFAD project related budgetary planning, budget reviews, and mandatory budget rephasings.

The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff and decision-making structures will be discussed again, as needed, in order to clarify each party's responsibilities during the implementation phase.

A Project Inception Report will be prepared immediately following the IW, including a detailed First Year/Annual Work Plan divided in quarterly time-frames detailing the activities and progress indicators that will guide implementation during the first year. This Work Plan will include the dates of specific field visits, support missions by IFAD or consultants, as well as time-frames for meetings of the project's decision making structures. The Report will also include the detailed project budget for the first full year of implementation, prepared on the basis of the Annual Work Plan, and including any monitoring and evaluation requirements to effectively measure project performance during the targeted 12 months time-frame.

The Inception Report will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of all partners. A section will be included on progress to date on project establishment and start-up activities and an update of any changed external conditions that may effect project implementation.

The Annual Project Report (APR) is an IFAD requirement and part of central oversight, monitoring, and project management, to reflect progress achieved in meeting the Annual Work Plan and assess performance of the project in contributing to intended outcomes through outputs and partnership work. The format of the APR is flexible but should include the following:

- An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome
- The constraints experienced in the progress towards results and the reasons for these
- The three (at most) major constraints to achievement of results
- AWP and other expenditure reports
- Lessons learned
- Clear recommendations for future orientation in addressing key problems in lack of progress

The PIR is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. Once the project has been under implementation for a year, a Project Implementation Report must be completed by IFAD together with the project. The individual PIRs are collected, reviewed and analysed by the steering committee (PSC) prior to sending them to the focal point at IFAD headquarters. The PIRs are then discussed in the GEF Interagency Focal Area Task Forces in or around November each year and consolidated reports by focal area are collated by the GEF Independent M&E Unit based on the Task Force findings.

As and when called for by IFAD, the project team will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the project team in written form by IFAD and will clearly state the issue or activities that need to be reported on. These reports can be used as a form of lessons learned exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered. IFAD is requested to minimize its requests for special Thematic Reports (given that there are some of these already included in the workplan), and when such are necessary, will allow reasonable timeframes for their preparation by the project team.

PROJECT PUBLICATIONS

The project will support the preparation of a number of awareness raising printed materials, scientific publications and tecnhical reports that will be available online and/or as hard copies. Printed copies will be disseminated during field work, conferences, through mailing, etc, and will also be available at the PIU and MoA.

EVALUATION

Mid-term Evaluation: An independent Mid-Term Evaluation will be undertaken at the end of the second year of implementation. The Mid-Term Evaluation will take the form of a qualitative study to determine the progress being made towards the achievement of outcomes and will identify course correction if needed. It will focus on: (i) the effectiveness, efficiency and timeliness of project implementation; (ii) will highlight issues requiring decisions and actions; and (iii) will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term, including the revision of indicators if needed. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The ToR for this Mid-term evaluation will be prepared by IFAD.

Final Evaluation: An independent Final Evaluation will take place three months prior to the terminal review meeting, and will focus on the same issues as the mid-term evaluation. The final evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The ToR for this final evaluation will be prepared by IFAD.

Table 1. Monitoring and evaluation plan and budget

Type of M&E activity	Responsible Parties	Budget USD (SCCF contribution) excluding project team staff time	Time frame
Inception Workshop (IW) and report	Project Coordinator/IFAD	USD 8,500	Within first two months of start up
Baseline survey	Project Team/IFAD	USD 25,400	Within first six months of start up
APR and PIR	Project Team/IFAD		Annually
TPR and TPR report	Project team/IFAD		Every year, upon receipt of APR
Mid-term Evaluation	Project team/IFAD External Consultants (i.e. evaluation team)	USD 21,500	At the mid-point of project implementation
Final External Evaluation	Project team, IFAD External Consultants	USD 27,700	At the end of project implementation
Terminal Report	Project team IFAD/External Consultant		At least one month before end of project

ANNEX 2: RESULTS FRAMEWORK (PROJECT LOGFRAME)

Output	Key Indicators	Means of Verification	Assumptions and Risks
SCCF Goal Enhancing the adaptive capacity of farmers to climate risks through resilient agricultural systems.	- Trends in integrity and degree of resilience of agriculture systems - 10,000 supported households increase their asset index by at least 10%	- Project M&E system - Household income and expenditure surveys - RIMS impact survey questionnaire (baseline and final)	- Political and economic stability in the country - Macro-economic conditions remain stable or improve to promote investment - Commitment of all concerned actors
SCCF Objective Improve water availability, farmland productivity, and smallholders' income through investments in climate-resilient farming systems and VC technologies.	- Increase of >20% of real net household farm income for at least 80% of the 10,000 supported households. - More than 20% increase in total value (relative to reference market price) of surplus agriculture production of targeted VCs sold by participating producers, traders and agribusinesses (disaggregated by gender and age). - Climate-resilient agriculture production practices are adopted by at least 50% of trained smallholder farmers (disaggregated by gender and age).	- Project M&E reports - Government data - Value chain interviews/focus groups - RIMS surveys	- Concerned Ministries, local institutions, and VC actors are strongly committed to project objectives - Agriculture policies and programmes and rural finance allow to operate efficiently - Appropriate technology and means available in a timely fashion - Local capacity can be built adequately
Component 1. On-farm efficient irrigation and soil and water conservation for sustainable agriculture production **Total Budget: USD 3,102,000**			
Outcome 1.1: **On-farm water efficiency and farming practices in irrigation and rainfed crop production systems are improved /** ***Contributes to CCA-1***			
1.2.1. At least 4,750 ha in the project areas are managed using efficient	- At least 4,750 farmers have improved on-farm soil and water conditions through	- Baseline and impact surveys	- Local farmers and other key actors are willing to

irrigation technologies (EIT) and conservation agriculture (CA) systems that enhance yield and water use efficiency for selected crop value chains.	climate-resilient EIT and/or CA. - At least 3,000 farmers report diversification of farming systems with higher economic and environmental benefits from the deployment of EIT and/or CA (disaggregated by gender). - Up to 1,000 small grants made to farmers and at least 30 grants made to agribusinesses and processors in target value chains	- Interviews/focus groups - Studies and surveys - M&E reports Government data	become involved - The project can secure the required technical capacity - Suitable irrigation and CA equipment, crop varieties and inputs are available in the country
Component 2. Landscape Restoration to prevent climate-related risks **Total Budget: USD 1,400,000**			
Outcome 2.1: **Landscape restoration plans developed and implemented to prevent climate-related risks (soil erosion, siltation and flooding)/** ***Contributes to CCA-1***			
2.1.1. 150 Landscape restoration (LR) plans incorporating climate-resilient infrastructures and vegetation restoration interventions in erosion-risk vulnerable areas are developed and implemented.	- At least 4,750 ha receiving reliable irrigation water supply from climate-proof rehabilitated and properly maintained irrigation schemes - Up to 150 Landscape restoration plans implemented	- Infrastructure completion/status reports - Restoration documents and monitoring reports - Interviews/focus groups - Supervision mission reports	- All concerned local actors are willing to participate - Planning is carried out effectively and timely - Lack of funding to operate and maintain public rural infrastructure
Component 3. Enabling environment for climate-risk reduction in agriculture **Total Budget: USD 548,000**			
Outcome 3.1: **Concerned institutions are empowered through capacity building to develop a more conducive policy environment for climate-resilient agriculture and water and soil conservation/** ***Contributes to CCA-2***			
3.1.1. A policy dialogue is triggered to mainstream CC risk reduction into water and soil conservation in agriculture	- Number of civil servants, farmers, NGO members, extension agents and researchers reporting good knowledge on CC risk reduction measures in irrigated agriculture,	- Policy assessment report - Interviews/focus groups - Materials produced	- Firm commitment and cooperation of relevant governmental bodies

	and soil and water management		
Outcome 3.2: The adaptive capacity of key agriculture practitioners on climate-resilient soil and water management practices in agriculture* is developed and applied in the value chain cluster areas/ *Contributes to CCA-3			
3.2.1 A training programme is designed and implemented to build the capacity of service providers on efficient irrigation, sustainable soil & water management, and landscape restoration.	- At least 50 staff of service providers and regional MoA officers receive ToT on climate-resiliente EIT/CA for target VC production - The volume of services and inputs related to climate-resilient technologies from service providers and used by farmers in target VC cluster areas increases by 20% over current levels	- Training modules - Agendas and evaluation forms of training programmes - Tools produced	- All concerned actors are willing to participate - The project is able to provide relevant TA and identify best practices
3.2.2 At least 3,000 farmers participate in 30 on-farm demonstrations where new irrigation and CA production systems and technologies are tested and validated	- At least 3,000 smallholder farmers trained in climate-resilient farming systems and technologies - 30 demonstration plots on EIT and CA technologies and farming systems provide successful results in soil and water improvements and higher yields from selected VC crops	- Contracts and agreements with farm leaders, research centres and NGO - Field monitoring data - Reports from learning tours and feedback from participants	- Commitment from relevant governmental bodies is secured - All concerned local actors are willing to participate - The project is able to provide relevant TA and identify best practices

ANNEX 3: PROJECT COST TABLES

	GEF Grant	IFAD Loan AMMAR	IFAD Loan ASP	IFAD Grant AMMAR	IFAD Grant ASP	Total
Component	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**
C-1						
Matching grants in climate-resilient technologies						
Window 1: EIT and CA equipment	1588.70	529.60				2118.30
Window 2: Extension & mechanization centres and agribusiness	504.70	3490.30				3995.00
VC Investment capital			3894.00			3894.00
Multi-stakeholder processes	22.80					22.80
Technical assistance for Grantees on VC production, processing and marketing	390.00		480.90			870.90
Grant Management						
Window 1 - Grant administration	400.00					400.00
Window 2 - Grant administration	99.80					99.80
Grants Promotion	96.00					96.00
Sub-total C-1	**3102.00**	**4019.90**	**4374.90**	**0.00**		**11496.80**
C-2						
Irrigation infrastructure construction		7921.30	7562.30			15483.60
Landscape Restoration Works	1200.00					1200.00
Value chain infrastructure construction	200.00	602.80				802.80
TA - Engineers		168.00	1318.70			1486.70
Travel & logistics for engineering supervision		82.00				82.00
Sub-total C-2	**1400.00**	**8774.10**	**8881.00**	**0.00**	**0.00**	**19055.10**
C-3						
OT 3.1 Policy support (TA and logistics)	150.00					150.00
OT 3.2 Adaptive capacity of practitioners						
Trainers	19.20			44.90	141.50	205.60
Transport and lunches for trainees	10.30			24.00		34.30
Training course organization				45.70	58.50	104.20
Publications	39.80					39.80
On-farm climate-resilient technologies demo plots	276.00			324.00		600.00
EIT & CA Technical assistance	52.70			61.40		114.10
Sub-total C-3	**548.00**	**0.00**	**0.00**	**500.00**	**200.00**	**1248.00**

Cont.	GEF Grant	IFAD Loan AMMAR	IFAD Loan ASP	IFAD Grant AMMAR	IFAD Grant ASP	Total
Component	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**	**Amount (*000)**
C-4 (Project management)						
Vehicle (4x4)	66.00		33.40			99.40
Office equipment and furniture (desk computer, laptop, printer, photocopy, minor equipment)		46.00	15.50			61.50
Survey baseline	25.40					25.40
Mid-term Evaluation	21.50					21.50
Final impact assessment	27.70					27.70
Audit		69.60				69.60
Inception/completion workshops	8.50					8.50
Overall Project Manager (AMMAR/ERASIG)		96.00				96.00
CC Adaptation Specialist (GEF Coordinator)	86.40					86.40
Finance Manager		43.20	43.20			86.40
Accountant		38.40	38.40			76.80
Procurement & Contracts Officer		33.60	33.60			67.20
Planning, M&E Officer		19.20	60.00			79.20
Drivers		58.80				58.80
PIM Consultant		17.50	20.00			37.50
Travel and perdiem	9.40	38.50				47.90
Vehicle O&M	5.10	12.90				18.00
Other operating costs		32.30				32.30
Sub-total C-4	**250.00**	**506.00**	**244.10**	**0.00**	**0.00**	**1000.10**
Total	**5300.00**	**13300.00**	**13500.00**	**500.00**	**200.00**	**32800.00**

ANNEX 4: TERMS OF REFERENCE OF THE SCCF PROJECT STAFF

1. ERASIG Project Coordinator (Climate Change Adaptation Specialist)

The IFAD/GEF initiative will recruit a full time national expert, with a strong background on rural development and sustainable management of natural resources, to undertake the duties of Project Coordinator. S/he will be based in the PIU under the premises of the MoA. S/he will take lead and responsibility for the delivery of the IFAD/GEF initiative under the overall supervision of the PIU Coordinator and will ensure direct coordination with the stakeholders of the overall IFAD programme at the central and community level. Her/his specific duties will include:

- Take overall responsibility and leadership on the planning, implementation and monitoring of the IFAD/GEF project. This entails the preparation and monitoring of AWPB, and the supervision of all the other staff recruited by the project.
- Manage the project in accordance with its annual work plans, coordinate the IFAD/GEF project activities on a regular basis, and ensure complementarities with IFAD baseline interventions in the country.
- Propose selection criteria and supervise national and international consultants/subcontractors, maintaining strong quality control and providing advisory support as required.
- Maintain close coordination/linkages with all technical implementation partners (ministries and governmental agencies, private service providers, NGOs, etc).
- Oversee the design and establishment of channels for regular project information dissemination, sharing, and networking among stakeholders' communities (from local to national levels).
- Facilitate, monitor and supervise the process of selection of Farm Leaders, and the set up of key project outputs and tools, including the Training of Trainers programme, the field demonstration trials, and the landscape restoration plots.
- Supervise the procurement and maintenance of project equipment and development of infrastructure. Prepare ToRs and conditions for grant applicants and ensure publication in local media. Lead the selection process of the grant applications through field review and final scoring by the Application Evaluation Committee. Make sure that the goods acquired by the project are procured through a National Competitive Bidding process.
- Lead, coordinate and monitor the project's restoration work, in close coordination with beneficiaries and supportive experts, including field interventions and small-scale value chains for aromatic/medicinal plants, wild fruits, and honey as a by-product of the restoration work.
- Maintain close coordination/linkages with the participating Ministries (MoA, MENR, MoF, MRDI). Work closely with PIU staff, and key stakeholders (NGOs, community associations, private sector) to coordinate the overall implementation of project activities.
- Oversee the needs assessment and provision of required training and capacity building of involved government officials and key stakeholders; coordinate and facilitate all the steps of the mainstreaming process and monitor progress in legislation and governance improvement.
- Lead responsibility for the organization of project-related meetings, conferences, and workshops.
- Act as a Secretary to the Technical Support and Advisory Working Groups and the Application Evaluation Committee set up through the project, call and facilitate meetings, and make sure that inputs from the SAGs are properly channelled and delivered to project stakeholders and beneficiaries.
- Facilitate, in collaboration with relevant institutional actors, the process for the production of the reports and papers on climate-proof EIT, CA/OA, LR, WII, and the monitor and supervise the quality of all documents.
- Monitor and supervise the quality of the awareness raising publications and the guidelines on best practices produced through the IFAD/GEF initiative.
- Provide support and guidance for the gathering of data and information needed to undertake an effective monitoring and evaluation of all the activities included in the IFAD/GEF initiative.

The candidate should have a minimum of 10 years of experience with the following skills and knowledge:

- A first degree in a discipline related to Agriculture or Natural Resource Management. A postgraduate degree would be an advantage.
- A strong background in and experience working on sustainable rural development and/or climate change adaptation is an asset.
- A good knowledge of agriculture and development-related policies and legislation in Georgia is an asset.
- Familiarity and strong proven experience in the implementation of development projects (Project management, M&E, good managerial and technical skills).
- Good knowledge of the different national and local stakeholders concerned with agriculture, resources management, rural development, and climate change, including government and administration, private sector, civil society and international development partner agencies, and strong ability and readiness to communicate, and work with them.
- Demonstrated ability to take initiatives, to synthesize, to conceptualize complex issues and to write reporting documents.
- Results-oriented, team player, with demonstrated ability to work in a multi-sectoral context and communicate effectively with other disciplinary specialists.
- Have the ability to supervise team members and service providers.
- Oral and written fluency in English is required.

ANNEX 5: Analysis of Climate Change Impacts in the in the Main Irrigation Regions of Eastern Georgia

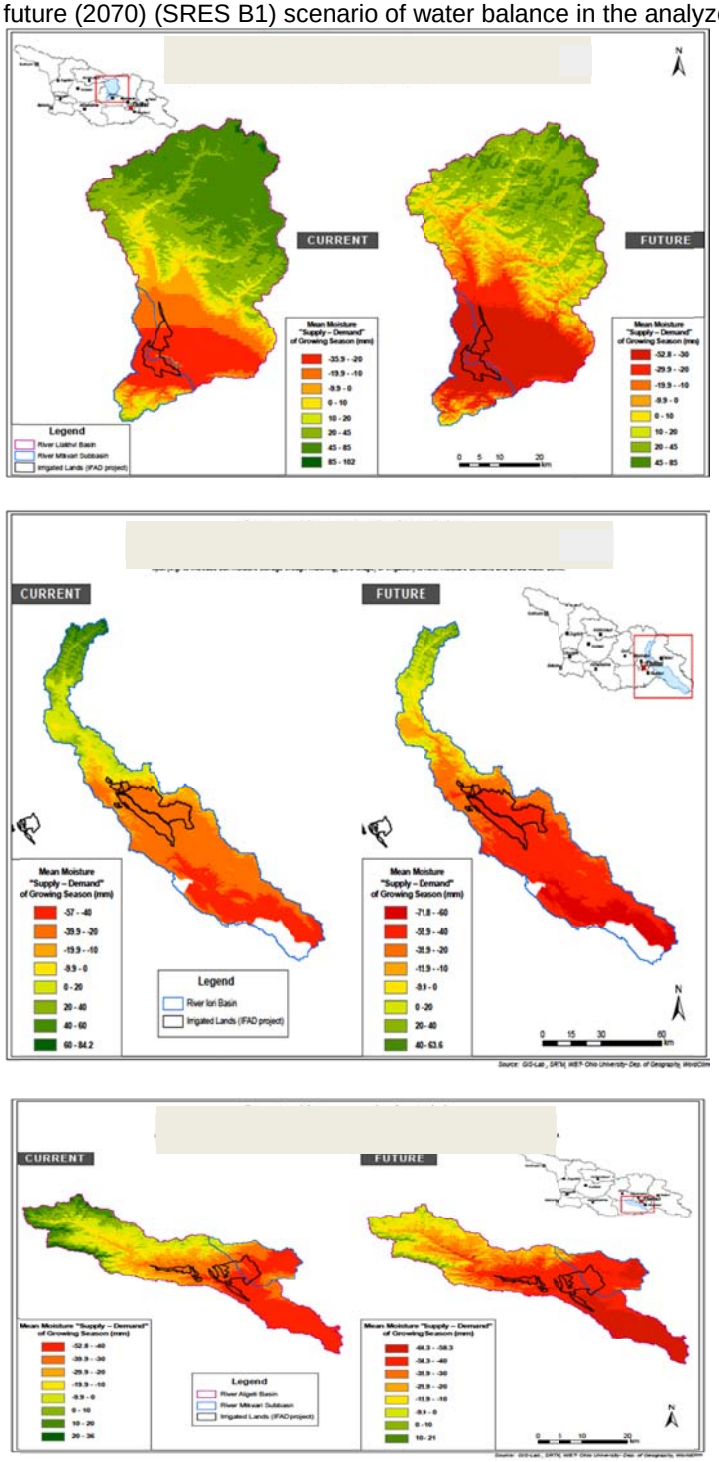
Considering the importance of the availability of water for agriculture in general, and to the sustainability of the irrigation schemes and irrigated agriculture in the country, IFAD undertook an assessment of CC predictions and impacts on water availability in the target areas. The methodology used GIS-based modelling to predict changes between current and future scenario in precipitation and temperature in the driest and warmest quarter of the year, which is the most important one for crop production, and to evaluate current and future water balance and runoff changes in the target areas, to help analyse and guide project design and implementation. Additionally, IFAD undertook GIS analysis of land uses, wind erosion potential, and forest degradation in the target areas, in order to understand their vulnerability to climate risks, and identify suitable adaptation measures to improve climate resilience, minimize risk and maximize potential benefits.

By 2070, the mean temperature of the warmest quarter will increase up to 2.3 ºC in/around the lower areas of the Eastern Georgia, especially in the region of Kakheti, Kvemo Kartli, and the south-eastern extreme of Sida Kartli, overlapping with the target areas and irrigation schemes are located (Figure 6). The precipitation of the driest quarter will be reduced by half or to one third in almost all the territory of the Kakheti, Kvemo Kartli and Samchke Javakheti regions, and in significant part of the lower parts of Sida Kartli, and Mtskheta Mtianeti (Figure 6). Although it may not seem like a very important reduction in some cases, increased temperatures and evaporation will contribute to exacerbate the water deficit for crops.

The predicted climate conditions will significantly impact the water balance in the target areas, causing up to 34%, 36% and 48% reduction in soil moisture by 2070 in the lower Liakhvi, Iori and Algeti basins respectively (Figure 1). This means that crops in/around the target irrigation schemes and in between half to two thirds of the river basins will urgently require the adoption of adaptation measures to secure additional soil water input (e.g. to increase soil moisture storage through mulching, zero-tillage or irrigation).

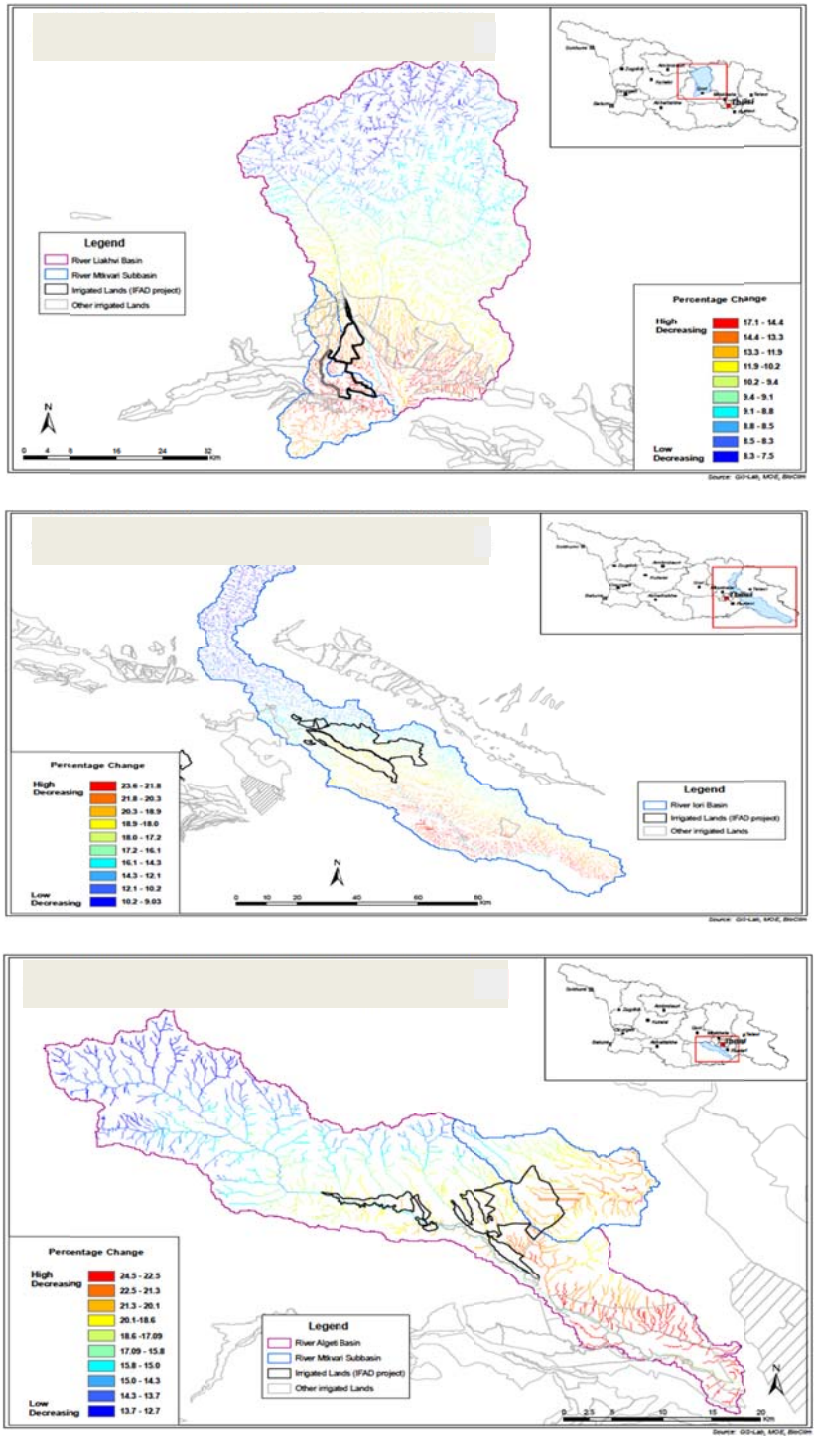
The territories around the irrigation schemes - especially downstream areas – will suffer significant runoff and water recharge reduction (up to 17% in Liakhvi basin, up to 23.6% in Iori basin and up to 24% in Algeti basin) relative to input precipitation due to climate change (Figure 8). Runoff reduction will turn into less water resources for crop irrigation. In addition to this, less precipitation concentrated in shorter rainfall events or storms will not only increase the intensity of floods with higher water erosion risk, but will also reduce the water infiltration capacity of soils.

Figure 1. Current and future (2070) (SRES B1) scenario of water balance in the analyzed river basins[27]



[27] Maps show current and future balance conditions, based on digital elevation model, monthly temperature, monthly precipitation, solar radiation, soil available water capacity and relative humidity. Positive values indicate that plants are able to meet moisture needs through precipitation, while negative values indicate that plants require additional soil water input to meet moisture demand and avoid water deficits.

Figure 2. Annual runoff change between current and future (2070) scenario (SRES B1) in the analyzed target basins[28]

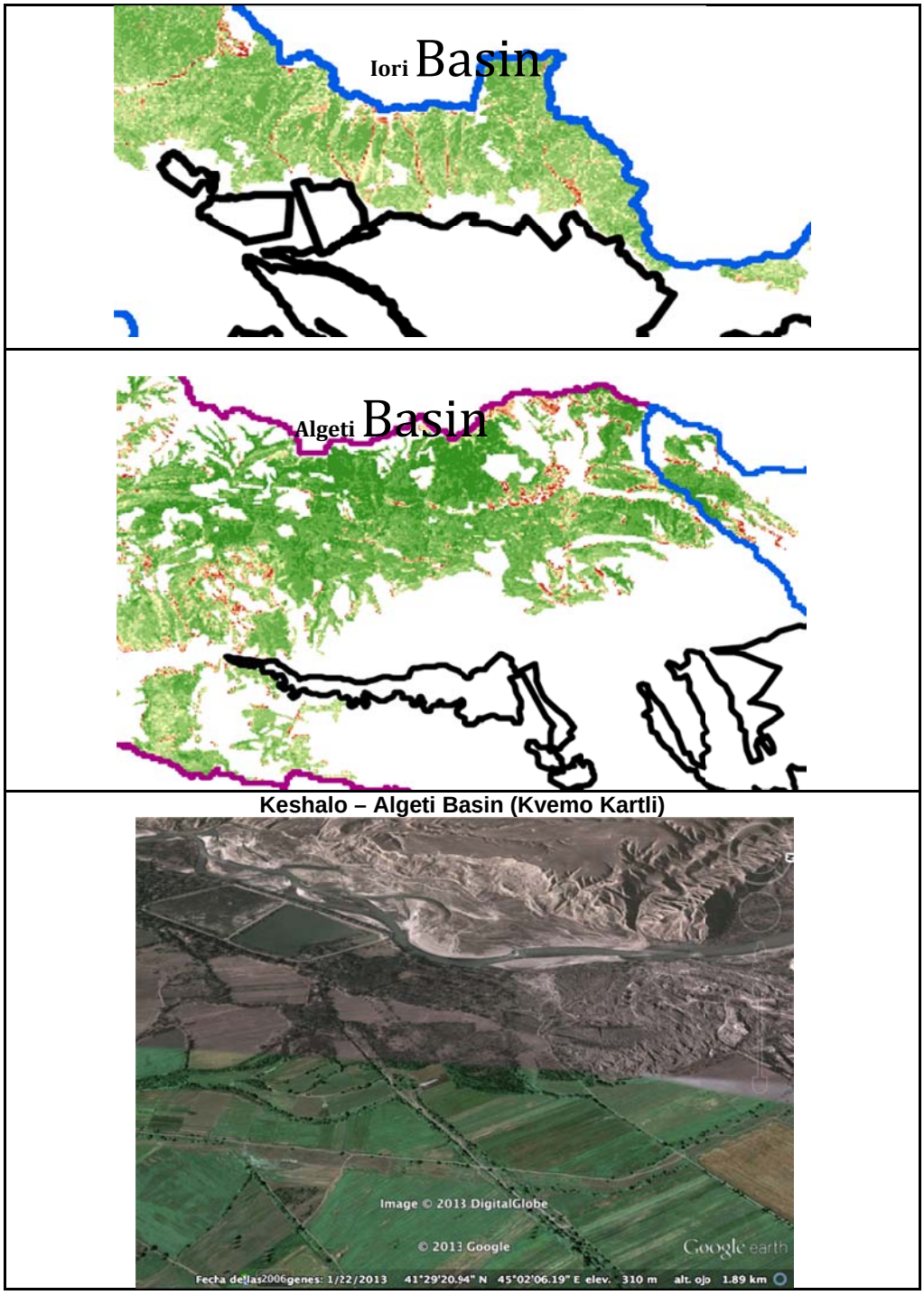


Degradation of vegetation cover is a major issue in the analyzed basins, especially as far as the riverbanks and terraces are concerned (Figure 9). The projected high to medium risk of windstorms in the basins together with an intense deforestation of the riverbanks and floodplains upstream and downstream the

[28] Runoff maps show the accumulation and infiltration of rainfall units per pixel, based on elevation model and soil data. A simple runoff analysis accumulates or infiltrates rainfall on a per pixel basis as if one unit of rainfall was dropped on every location. Values on the legend show percentage of runoff differences between current and future scenario.

irrigation schemes in the analyzed basins will exacerbate the impacts of floods, soil erosion, and siltation of irrigation canals and reservoirs.

Figure 3. Forest degradation in river banks, river terraces and hills in/around the irrigation schemes of Kvemo Samgori (Iori Basin) and Tbisi-Kumisi (Algeti basin)[29]



[29] The forest degradation maps show level on Normalized Difference Vegetation Index (NDVI), which is a measurement of the balance between energy received and energy emitted by objects on Earth. When applied to plant communities, this index establishes a value regarding how green the area is, corresponding to the quality of vegetation in a given area. NDVI is an indicator of vegetation health or vigour state: red colour corresponds very degraded vegetation, yellow colour corresponds to medium degraded vegetation, and green colour to healthy vegetation.

From the analysis, it becomes clear the priority given to the selected areas in addressing the urgent rehabilitation of irrigation systems, both in response to the recent disasters and as a way to increase their resilience to the current and future changes in climate. It is essential that climate-proof irrigation projects be planned and managed in the spatial domain of the river basin - including both the upstream and downstream areas of the irrigation schemes – in order to consider the environmental, social and economic implications and requirements to become climate resilient.

Figure 4. Current and Future Scenario (2070, SRES B1) – Precipitation Driest Month and Driest Quarter

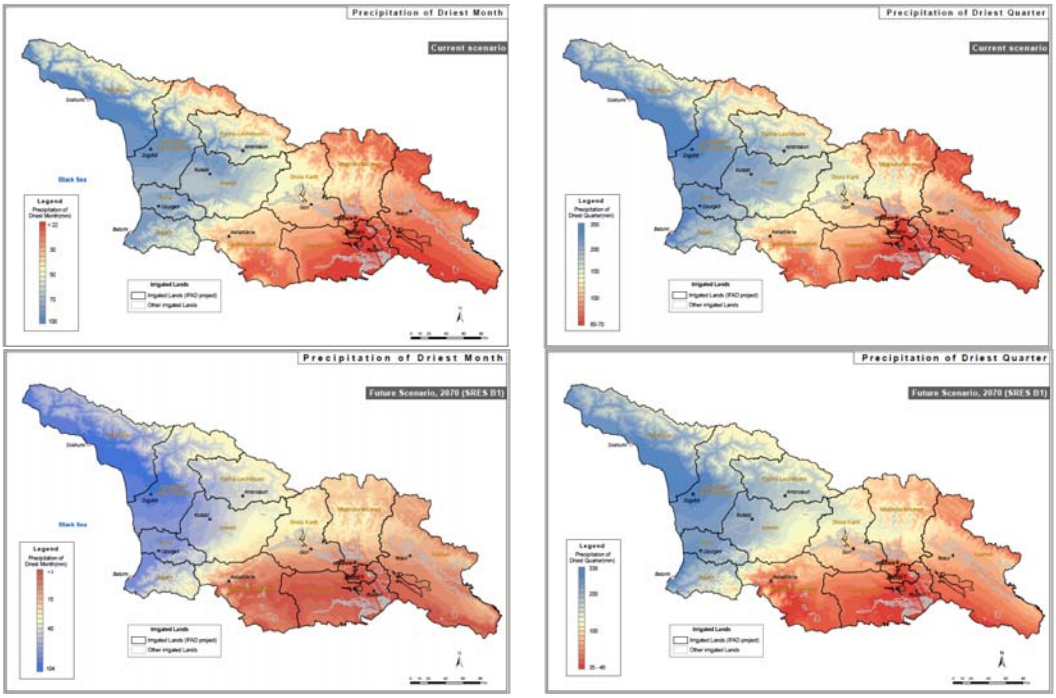
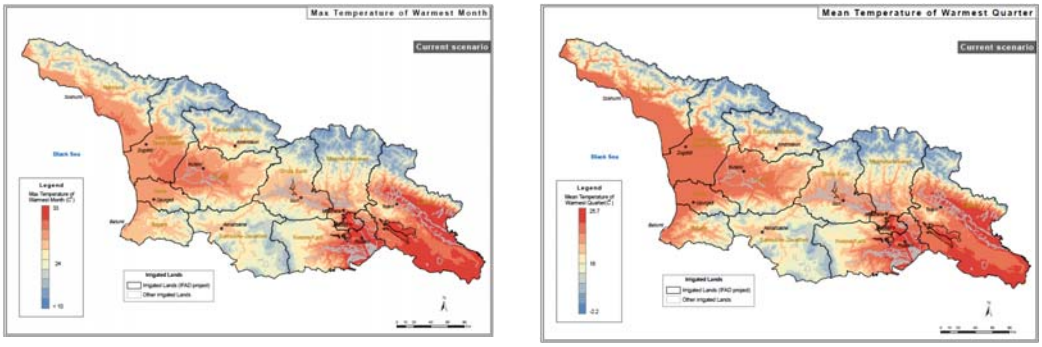


Figure 5. Current and Future Scenario (2070, SRES B1) – Temperature Warmest Month and Warmest Quarter



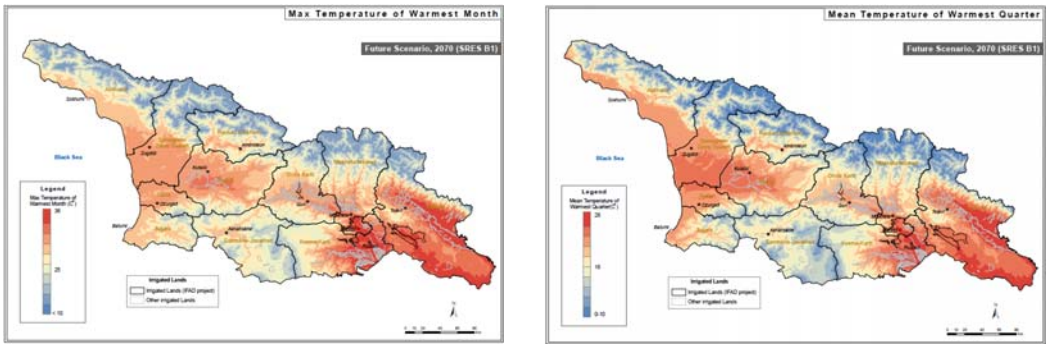
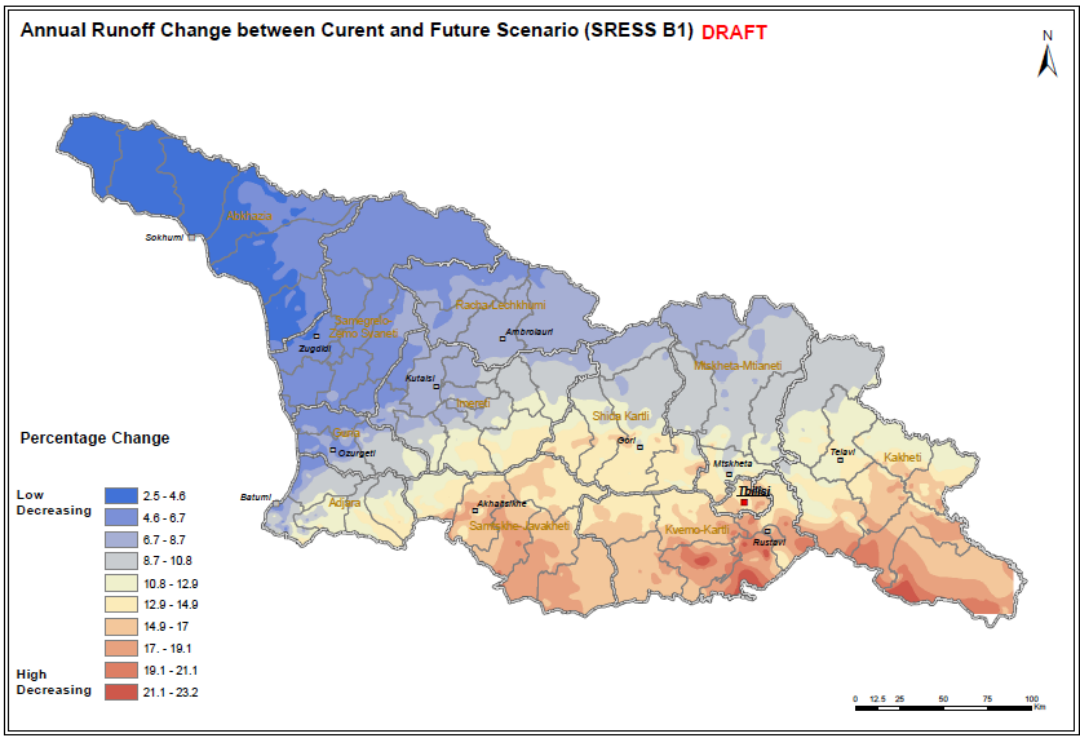


Figure 6. Annual Runoff Changes between Current and Future Scenario (2070, SRES B1)



ANNEX 7: REFERENCES

(1) Sylven, M. et al (2008) Climate Change in Southern Caucasus: Impacts on nature, people and society. WWF Caucasus Programme.
(2) Droogers, P. & J. Hunink (2012) Assessment of Impact of Climate Change on Wheat in Armenia, Azerbaijan and Georgia. WB
(3) Ministry of Environment Protection and Natural Resources of Georgia and UNDP (2009) Georgia's Second National Communication to the UNFCCC
(4) Ölund Wingqvist, G. (2009) Georgia Environmental and Climate Change Policy Brief. SIDA. University of Gothemburg.
(5) Kerres, M. (2010) Adaptation to Climate Change in the Kura-Aras River Basin. BMZ & KfW
(6) Charkviani, D., E. Shatberashvili & T. Chincharauli (2010) Agriculture credit and insurance study results: current status and future prospects in Georgia. Elkana
(7) Pollner, J., J. Kryspin-Watson & S. Nieuwejaar (2010) Disaster Risk Management and Climate Change Adaptation in Europe and Central Asia. WB-GFDRR
(8) Westphal, M.I. et al (2011) Regional Climate Change Impacts Study for the South Caucasus Region. UNDP
(9) Bertelsmann Stiftung, BTI 2012 — Georgia Country Report. Gutersloh: Bertelsmann Stiftung, 2012.
(10) Ministry of Environment Protection of Georgia (2012) Technology needs assessment and technology action plans for climate change adaptation in Georgia. UNEP-Asia Institute of Technology
(11) Forth National Report to the UN CBD: Georgia
(12) Batello, C. & Al. (2010) Gardens of Biodiversity: Conservation of genetic resources and their use in traditional food production systems by small farmers of the Southern Caucasus. FAO
(13) FAO (2008) Aquastat survey: Georgia
(14) Siebert, S., V. Henrich, K. Frenken & J. Burke (2013) Update of the Digital Global Map of Irrigation Areas (GMIA) to Version 5. *FAO/Inst. Of Crop Science and Resource Conservation Rheinische Friedrich-Wilhelms-Univ. of Bonn*.
(15) Westphal, M.I. et al (2011) Regional Climate Change Impacts Study for the Southern Caucasus Region. UNDP.
(16) Droogers P. & J. Hunink (2012) Assessment of impacts of climate change on wheat in Armenia, Azerbaijan and Georgia. WB.
(17) Pollner, J. et al (2010) Disaster Risk Management and Climate Change Adaptation in Europe and Central Asia. WB.
(18) CENN (2012) Atlas of Natural Hazards and Risks in Georgia.
(19) Reynolds, T. et al (2013) Rapid assessment of disaster affected communities in Kakheti. CARE & WorldVision.
(20) Industrial Economics Incorporated (2013) Reducing the vulnerability of Georgia's agriculture systems to climate change: impact assessment and adaptation options (draft report). WB.
(21) MENR (2006) Third National Report on the Implementation of the UNCCD.
(22) MENR (2012) Fourth National Report to the UN Convention on Biological Diversity: Georgia.
(23) MENR (2011) National Report on the State of the Environment of Georgia.
(24) MENR (2012) National Environmental Action Programme of Georgia 2012-2016.
(25) UNDP (2008) Georgia Human Development Report 2008. The Reforms and Beyond.
(26) Jashi, C. & M. Tokmazishvili (2009) Gender dimension of the financial policy of Georgia. SIDA & UNDP.
(27) Gassman F. et al (2013) Economics and social vulnerability in Georgia. UNDP.
(28) OECD (2011), Development in Eastern Europe and the South Caucasus: Armenia, Azerbaijan, Georgia, Republic of Moldova and Ukraine. http://dx.doi.org/10.1787/9789264113039-en
(29) FAO (2012) Assessment of the agriculture and rural development sectors in the Eastern Partnership Countries. Georgia. EU.
(30) European Commission (2013) Joint Staff Working Document. Implementation of the European Neighbourhood Policy in Georgia: Progress in 2012 and Recommendations for Action.
(31) FAO (2008) Georgia agriculture-based livelihoods assessment and rehabilitation programme formulation mission. USAID & FAO.
(32) BIO Intelligence Service (2012), Water saving potential in agriculture in Europe: findings from the existing studies and application to case studies, Final report prepared for. European Commission DG ENV.
(33) Inocencio, A.; Kikuchi, M.; Tonosaki, M.; Maruyama, A.; Merrey, D.; Sally, H.; de Jong, I. 2007. Costs and performance of irrigation projects: A comparison of sub-Saharan Africa and other developing regions. Colombo, Sri Lanka: International Water Management Institute. 81 pp. (IWMI Research Report 109)

(34) Improving Water-use Efficiency in Irrigation Conveyance Systems: a Study of Investment Strategies, Marsden Jacob Associates, Land & Water Australia, 2003. Product Number PR030516
(35) Hamdy A. (2007) Water us e efficiency in irrigated agriculture: an analytical review. In: Lamaddalena N. (ed.) , Shatanawi M. (ed.) , Todorovic M. (ed.) , Bogliotti C. (ed.) , Albrizio R. (ed.): Water use efficiency and water productivity: WASAMED project. CIHEAM Options Méditerranéennes : Série B. Etudes et Recherches; n. 57 2007 pages 9- 19.
(36) Svenden, M. et al (2004) Reinventing irrigation. IWMI, Part 4, Chapt. 8-16.
(37) Barrett, K.R. 1999. Ecological engineering in water resources: The benefit of collaborating with nature. Water International, 24(3):182-188.
(38) Donat, M. (1995) Bio-Technology for Streambank Restoration. A review of Central European Practices. Forest Renewal BC.
(39) Verhulst, N., B. Govaerts, K.D. Sayre, K.D., K. Sonder, R. Romero- Perezgrovas, M. Mezzalama, L. Dendooven (2012) Conservation agriculture as a means to mitigate and adapt to climate change, a case study from Mexico. In: Wollenberg, E., Nihart, A., Tapio-Bistrom, M.-L., Grieg- Gran, M. (Eds.), Climate Change Mitigation and Agriculture. Earthscan, Oxon, ISBN: 9781849713924, pp. 287- 300.
(40) Tourdonnet, S., B. Triomphe, E. Scopel (2010) Ecological, technical and social innovation processes in conservation agriculture. *ISDA*
(41) Power, A.G. (2010) Ecosystem services and agriculture: tradeoffs and synergies. Phil.Trans.R.Soc.B 365.
(42) Lengyel, S. et al (2012) Grassland restoration to conserve landscape-level biodiversity: a synthesis of early results from a large-scale project. *Applied Vegetation Science*
(43) Lahmar, R. (2010) Adoption of conservation agriculture in Europe: lessons of the KASSA project. *Land Use Policy, Vol. 27, Issue 1, Jan. 2010*
(44) Kassam, A. & T. Friedrich (2010) Conservation agriculture in the 21st century: a paradigm of sustainable agriculture. *European Congress on Conservation Agriculture, Madrid, October 2010.*
(45) Kassam, A. & T. Friedrich (2010) Conservation Agriculture: Concepts and Worldwide Experience, and Lessons for Success of CA-Based Systems in the Semi-Arid Mediterranean Environments. *4th Mediterranean Meeting on No-Till, Setif, Algeria, 3-5 May 2010*
(46) Fredenburg, P. (2012) Conservation agriculture: opportunities for intensified farming and environmental conservation in dry areas. *ICARDA, Research to Action 2*.
(47) Friedrich, T., A. Kassam & F. Shaxson (2009) Agriculture technologies for developing countries: conservation agriculture. *STOA Project, European Technology Assessment Group*.
(48) Friedrich, T., A. Kassam & F. Taher (2009) Adoption of conservation agriculture and the role of policy and institutional support. *International Consultation on "No-Till with Soil Cover and Crop Rotation: A basis for policy support to conservation agriculture for sustainable production intensification", Astana & Shortandy, Kazakhstan*.
(49) IRI Technical Report 07-03 Working Paper - Poverty Traps and Climate Risk: Limitations and Opportunities of Index-Based Risk Financing, Barrett, C.B.; B.J. Barnett; M.R. Carter; S. Chantarat; J.W. Hansen; A.G. Mude ; D.E. Osgood; J.R. Skees; C.G. Turvey; M.N. Ward, 2007.
(50) Hellmuth M.E., Osgood D.E., Hess U., Moorhead A. and Bhojwani H. (eds) 2009. Index insurance and climate risk: Prospects for development and disaster management. Climate and Society No. 2. International Research Institute for Climate and Society (IRI), Columbia University, New York, USA.
(51) Collier, B. Et al (2009) Weather Index Insurance and Climate Change: Opportunities and Challenges in Lower Income Countries. The Geneva Papers, 2009, 34, (401–424). The International Association for the Study of Insurance Economics 1018-5895/09
(52) Charkviani, D. et al (2012) Agriculture credit and insurance study results: current status and future prospects in Georgia. ELKANA.
(53) Dick, W. et al. (2010) Weather Index-based insurance in agriculture development: a technical guide. IFAD/WFP.
(54) Rutten, L. (2012) Innovative agriculture finance and risk management: strengthening food production and trade in the transition region. FAO/EBRD.
(55) Dyer, J.M. (2009) Assessing topographic patterns in moisture use and stress using a water balance approach, Landscape Ecology 24: 391-403.
(56) Heidelberg, A. et al (2011) Forest restoration guidelines. Restoration of forest landscapes in the Southern Caucasus. WWF.
(57) Gassmann, F. et Al (2013) Economic and Social Vulnerability in Georgia. UNDP.
(58) IEc (2013) Reducing vulnerability of Georgia's agriculture systems to climate change: impact assessment and adaptation options. The World Bank.
(59) Sommerville, P., R.E. Lee, R. Shavgulidze & I. Kvitaishvili (2011) Analytica foundations assessment: agriculture (rural productivity) final sector report. USAID-Georgia