



# FINAL DETAILED REPORT

## STRATEGIC ENVIRONMENTAL ASSESSMENT OF THE 11TH EDF PROGRAMME'S FOCAL SECTOR AGRICULTURE IN SWAZILAND

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StrEA of the 11<sup>th</sup> EDF in Agriculture for Swaziland  
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## Abbreviations

€	Euro
°C	Degree Celsius
ACAT	Africa Cooperative Action Trust (NGO)
AEZ	Agro-ecological Zone
AfDB	African Development Bank
AIDS	Acquired Immunity Deficiency Syndrome
AIPs	Alien Invasive Plants
AMIS	Agricultural Market Information System
ARD	Agricultural Research Division – MOA
ART	Antiretroviral therapy
BADEA	Arab Bank for Economic Development in Africa
BIA	Biodiversity Impact Assessment
CAADP	Comprehensive Africa Agricultural Development Programme
CANGO	Coordination Assembly of Non-governmental Organizations
CASP	Comprehensive Agricultural Sector Policy
CBD	Convention on Biological Diversity
CBO	Community Based Organizations
CBS	Central Bank Swaziland
CC	Climate change
CCA	Climate Change Adaptation
CCARDESA	Centre for Coordination of Agricultural Research & Development in Southern Africa
CCD	Convention to Combat Desertification
CDM	Clean Development Mechanism
CDPs	Chiefdom Development Plans
CEDAW	Convention on the Elimination of all Forms of Discrimination Against Women
CFC	Chlorofluorocarbons
CH <sub>4</sub>	Methane
CMA	Common Monetary Area (members: Namibia, Lesotho, Swaziland, & South Africa)
CO	Carbon monoxide
CO <sub>2</sub>	Carbon dioxide
COMESA	Common Market for Eastern and Southern Africa
COP	Conference of Parties
CPS	Country Partnership Strategy
CRA	Climate Risk Assessment (usually project level)
CSO	Central Statistical Office
DAE	Department of Agriculture and Extension
DARE	(new proposed) Directorate of Agricultural and Rural Extension
DDRR	Drought Disaster Risk Reduction
DFI	Development Financial Institutions
DJF	December–January–February
DNA	Designated National Authority
DPMO	Deputy Prime Minister's Office
DRR	Disaster Risk Reduction
DVLS	Department of Veterinary and Livestock Services



DWA	Department of Water Affairs (in MNRE)
E	Emalangen
EAC	East African Community
EC	European Commission
EDF	European Development Fund
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIDHR	European Instrument for Democracy and Human Rights
ESCR	Environment, Social, and Climate-Risk
ESIA	Environmental and Social Impact Assessment
EU	European Union
EWS	Early Warning System
FAO	Food and Agriculture Organization of the United Nations
FC	Farmer Companies
FNC	First National Communication
G.A.P.	(Global) Good Agricultural Practice (certification)
GDP	Gross Domestic Product
GEF	Global Environment Facility
Gg	Gigagrams
GHG	Greenhouse gas
GIS	Geographic Information System
GNI	Gross National Income
GOS	Government of Swaziland
GPA	Government Programme of Action
GW	Gigawatts
GWh	Gigawatt-hour
GWP	Global warming potential
GWP	Global Water Partnership
Ha	Hectare
HACCP	Hazard analysis and critical control points (certification)
HCFC	Hydrochlorofluorocarbons
HDI	Human Development Index
HFC	Hydrofluorocarbons (used as refrigerants, aerosol propellants, solvents, and fire retardants) (replacing CFCs & HCFCs)
HIV	Human Immunodeficiency Virus
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
INC (2000)	Initial National Communication
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IRBM	Integrated River Basin Management
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
JJA	June–July–August
KDDP	Komati Downstream Development Project
KOBWA	Komati Basin Water Authority
LAN	Limestone ammonium nitrate (fertilizer)
LUSIP	The Lower Usuthu Smallholder Irrigation Project (EU support)
LUSLM	Lower Usuthu Sustainable Land Management Project (GEF & IFAD) -climate

	smart agriculture
M&E	Monitoring and Evaluation
MAM	March–April–May
masl	Metres above sea level
MDGs	Millennium Development Goals
MEA	Multilateral Environment Agreement
MEPD	Ministry of Economic Planning & Development (its ACMS performs the role of NAO)
MET	Department of Meteorology
MHUD	Ministry of Housing & Urban Development
MICT	Ministry of Information, Communications and Technology
MIF	Marketing Investment Fund
mm	millimetre
MNRE	Ministry of Natural Resources & Energy
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOF	Ministry of Finance
MOV	Means of Verification
MPWT	Ministry of Public Works and Transport
MTEA	Ministry of Tourism and Environmental Affairs
MW	Megawatt
MWh	Megawatt-hour
NLP	National Land Policy
NMC	National Maize Corporation
NOx	Nitrogen oxides
NPDP	National Physical Development Plan
OVC	Orphaned and Vulnerable Children
OVI	Objectively Verifiable Indicators
PE	Programme estimates
PRSAP	Poverty Reduction Strategy and Action Plan
RDA	Rural Development Area level
REDD+	Reduced Emission from Deforestation and Forest Degradation – Plus
RSA	Republic of South Africa
RSSC	Royal Swaziland Sugar Corporation
RWSB	Rural Water Supply Branch (in MNRE)
SACU	Southern African Customs Union (Members: CMA – Namibia, Lesotho, Swaziland, South Africa + Botswana).
SADC	Southern African Development Community
SADP	EU/FAO Swaziland Agricultural Development Programme
SBNFSAD	Strategic Brief for National Food Security and Agricultural Development
SCCF	Special Climate Change Fund
SDB	Swaziland Dairy Board
SDRRNAP	Swaziland Disaster Risk Reduction National Action Plan
SEA	Swaziland Environment Authority
SEAP	Swaziland Environment Action Plan
SEC	Swaziland Electricity Company
SEDCO	Small Enterprise Development Company
SFDF	Swaziland Farmers Development Foundation

SHIES	Swaziland Household Income and Expenditure Survey
SMI	Swaziland Meat Industries
SNAIP	Swaziland National Agricultural Investment Plan (2015)
SNARA	Swaziland National Agricultural Research Agency
SNAU	Swaziland National Agricultural Union
SNC 2012	Second National Communications
SNDMP	Swaziland National Disaster Management Plan
SNL	Swazi Nation Land
SNPAS	Strengthening National Protected Areas Systems (project)
SNTC	Swaziland National Trust Commission
SOE	State of the Environment (Report)
SON	September–October–November
SOV	Source of Verification
StrEA	Strategic Environmental Assessment
SWADE	Swaziland Water and Agricultural Development Enterprise (parastatal under MOA)
SWAp	Sector Wide Approach (e.g., for Health)
SZL	Swaziland lilangeni (plural E–emalangeni)
tCO <sub>2</sub> e	Ton of carbon dioxide equivalent
TDL	Title Deed Land
TNC	Third National Communication
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNISWA	University of Swaziland
V&A	Vulnerability Assessment
WFP	World Food Programme
WRB	Water Resources Branch (MNRE)
WTO	World Trade Organization

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# Executive Summary of the Strategic Environmental Assessment of the 11<sup>th</sup> EDF–Agriculture

## Chapter 1: Scope

The Government of Swaziland (GOS) and stakeholders in the agricultural sector are implementing the 11<sup>th</sup> EDF (2014–2020), with financial support from the European Union. A Strategic Environmental Assessment (StrEA) was commissioned under the National Indicative Programme (NIP) ‘to better understand the most relevant environmental parameters integrating as well the climate change dimension’. In short, the StrEA report is expected to help integrate environmental and social mitigation and climate change adaptation measures into the preparation, implementation, and monitoring of the 11<sup>th</sup> EDF–Agriculture and its three core projects.

## Chapter 2: Approach, Methodology, Assumptions, Uncertainties, and Constraints

**Approach and methodology:** The StrEA was conducted in three phases: a scoping phase (January – February 2016), a detailed study phase (March–April 2016), and a review and finalisation phase (May–June 2016). The *scoping-period* methodology comprised 17 stakeholder sessions, extensive document review, and four field visits to help identify a long list of stakeholders (+100), a long list of policy instruments (+110), the five strategic issues (1. habitats, 2. land, 3. climate, 4. water, and 5. pollution), the sustainability evaluation framework, the alternatives to be studied during the detailed study, and the work plan for the detailed study.

The *detailed-study* methodology entailed the following: in-depth analysis of the agricultural sector; extensive baseline data collection, analysis, and summarization to identify trends and constraints; six (6) more stakeholder consultative sessions; the design and conduct of four (4) types of impact assessments; an analysis of the logical framework; and a capacity assessment. Based on the 4 analyses, all stakeholder inputs, and the extensive literature review, an extensive list of assessments and strategies that are needed and a long list of mitigation and enhancement measures were identified and presented in a (draft) Management Plan. The stakeholders at the validation workshop held April 19, 2016 reviewed and provided input to the draft Management Plan.

The *review and finalisation* phase was initiated at the April 19 validation workshop. Comments from the stakeholders attending the validation workshop were integrated into the Draft StrEA, which was disseminated April 25<sup>th</sup>, 2016. The review period was from April 25–May 25 2016. This final report integrates the comments of the review period.

**Assumptions, uncertainties, and constraints:** Key assumptions, uncertainties, constraints, limitations, and risks were identified, including uncertainties related to climate change, time constraints to conduct the StrEA, limitations related to poor data quality, and constraints related to the inadequate capacity to implement the StrEA.

## Chapter 3: Description of the 11<sup>th</sup> EDF Programme – Agriculture

Chapter 3 starts with a **Background: Overview of the Agricultural Sector**, emphasizing first the economic potential to expand and improve vegetable and livestock production and processing. It is mentioned that the amount of irrigation infrastructure has slowly increased over time, but it is still mainly located on Title Deed Land (TDL) and serving the sugar sector. The constraints and challenges within the smallholder agricultural sector are discussed to set the context for this work. Key issues include the low agricultural productivity, especially on Swazi Nation Land (SNL), where there are land security issues. Opportunities to improve productivity and competitiveness (e.g., through conservation agriculture, expanded use of

inputs, and better access to markets) and opportunities to increase public sector capacity to deliver services (e.g., through revitalised public institutions, a modern approach to agricultural research and extension services, and information management) are highlighted. It is mentioned that climate change, and especially the more frequent droughts, have already exacerbated poverty, reduced agricultural production, crop yields, incomes, food security, water availability, grazing quality, and livestock disease outbreaks.

The 11<sup>th</sup> EDF programme is introduced after the overview of the agricultural sector. The overall objective of the 11<sup>th</sup> EDF for agriculture and its three core projects is to reduce food insecurity and contribute to sustainable economic growth. As a synopsis, the **Water Harvesting, Small and Medium Dams Project (WHDP)** aims to increase water storage capacity through small water storage structures (e.g., dams, weirs, and rooftop water harvesting), enhance the production capacity of smallholders through small downstream farms and producer groups, and strengthen institutional capacity, especially related to the use and management of water data.

The **High Value Crop and Horticulture Project (HVCHP)** aims to identify and supply national and international markets with high quality produce (including supporting infrastructure such as 3 cold stores and extension packages), develop land and strengthen farmer companies to profitably produce high value commodities in the LUSIP I area (includes community planning, farmer companies, irrigation equipment, and extension), and develop 3 packhouse hub-based zones (with some support to water user associations, community planning, and water supply and irrigation works).

The **Livestock Development Project (LDP)** is still under formulation, but it will likely improve livestock productivity through: formulating a breeding policy; supporting livestock research and health surveillance; rangeland management; investing in two government beef farms; strengthening smallholders' access to livestock markets through upgraded mini feedlots, market facilities, standards, and market information; and further developing the smallholder dairy herd, local dairy processing, and Gege dairy farm.

Chapter 3 ends by showing the geographical scope of the 11<sup>th</sup> EDF (the whole country, with some project-specific focal points). It also identifies up to 3 alternatives to be evaluated during the StrEA:

Alternative 1: Evaluate the no-plan alternative;

Alternative 2: Evaluate the implementation of the 11<sup>th</sup> EDF in full;

Alternative 3: Evaluate various technology scenarios under the WHDP.

Alternatives 1 and 2 are mandatory.

#### **Chapter 4: The Policy, Legal, and Institutional Framework for the Agricultural Sector and for Environmental Management**

The policy, legal, and institutional framework review was initiated during the scoping period to help identify stakeholders and key issues and to help develop the evaluation framework. Chapter 4.1 lists the 68 instruments (out of the 110+ policy/legal instruments identified during the scoping period) that were subjected to a compatibility assessment. (The compatibility assessment is presented in Chapter 6.2). It is noted that Swaziland's policy and legal framework is quite extensive, but poorly implemented.

Chapter 4.2 presents the *Framework for Environmental Management*. Chapter 4.3 presents the *Roles and Responsibilities of the Institutions Most Relevant to the 11<sup>th</sup> EDF Programme*, including: Ministry of Economic Planning and Development (MEPD), Ministry of Agriculture (MOA), National Water Authority (NWA), Department of Water Affairs (DWA), Swaziland National Trust Commission (SNTC), Meteorological Department (MET), Swaziland Environment Authority (SEA), National Agricultural Marketing Board (NAMBoard), and Swaziland Water and Agricultural Development Enterprise (SWADE).



## Chapter 5: Baseline Study: Risks, Constraints, Trends, and Opportunities

### ***The StrEA objectives / evaluation framework***

Five key issues were identified during the scoping period:

1. Land: Challenges associated with land use change and land degradation;
2. Climate and climate change: Potential negative impacts of climate change on ecosystems, water supply, crop and livestock productivity, and infrastructure;
3. Water: Challenges associated with increased water demand from stressed basins;
4. Pollution: Potential for increased risk of agro-chemical pollution;
5. Ecosystems and biodiversity: Biodiversity loss from land conversion, including impact of invasive species; also, ecosystem shifts as a result of climate change.

Issues related to the social-cultural dimension (e.g., health and gender impacts), socio-economic resilience, and weak institutional support (e.g., from extension officers) were also identified. The above issues reflect the key concerns of the policy-and-legal framework **and** the concerns of stakeholders, and were therefore integrated into the evaluation framework for this StrEA.

### ***Risks, Constraints, Trends, and Opportunities***

Data was compiled for the five key issues, as well as some important socio-cultural, socio-economic, and institutional matters. In general, the baseline, risks, constraints, trends, and opportunities suggest that the implementation of the EDF core projects could (if implemented without mitigation measures) negatively contribute the degradation of biophysical assets and some social aspects, as described below.

**Land:** Most of the land in Swaziland is used for extensive grazing (70%). Only 10% of the land was allocated to arable land in 2010. Projected change in agricultural land use to 2050 show an expansion in the spatial extent for sugarcane, dairy cattle, pigs, and built environment, with other land uses remaining relatively stable or with a slight decrease in extent (e.g., cotton, plantations, maize, and cattle). Land degradation on rangelands due to large livestock numbers, overgrazing, and poor habitat and fire management is a significant issue. Without explicit land management measures, land degradation and soil erosion are expected to increase in the future, due to population growth, more irrigated and intensive agriculture, high livestock stocking rates, and climate change. Land use planning for agriculture, issues related to access to land and security of tenure on SNL, veld fires, and waste management practices also need to be improved for sustainable land management.

**Habitats and Biodiversity:** Swaziland has four ecosystems: 1. Montane grasslands; 2. Savanna-woodland mosaic; 3. Forests; and 4. Aquatic systems. The savanna-woodland mosaic and the montane grasslands are the dominant ecosystems, and are home to many of Swaziland's endemic, rare, or threatened flora and fauna species. The four ecosystems are currently threatened by agricultural expansion, alien invasive plant species, grazing pressure, and high rates of resource harvesting. Fragmentation of habitat and conversion of natural habitats to other uses are increasing, which altogether are significant causes of biodiversity loss. Climate change is expected to have significant impacts on land cover and ecosystems by 2050. The Montane grasslands and savanna-woodland mosaic are likely to shrink and shift westwards. A very dry tropical forest type will move into the eastern part of the country. The incidence and severity of fires may also increase. Combined with the effects of habitat destruction, land use change, and over-harvesting, a significant increase in the number of critically endangered species is likely. The conservation and expansion of the protected-area network is a key to managing Swaziland's ecosystem and biodiversity in the future.

**Climate:** The mean, minimum, and maximum temperatures have increased in Swaziland

over the last few decades. This trend is expected to continue in the short and medium term. Most climate models suggest that the expected annual total rainfall will remain the same or decrease, but there will be high variation in individual storm events with more frequent flooding in the summer and more prolonged droughts in the winter.

The expected future higher temperatures and overall drier conditions suggest that growing conditions for ecosystems, fodder, crops, and livestock will change (e.g. the distribution and timing of crops may change; dairy cattle prefer cooler climate). Maize production in the east is already failing more regularly due to lower rainfall. Successful crop production is likely to gradually shift westwards, where rainfall is higher. Irrigated production will also face challenges as rainfall and runoff decrease, threatening the country's successful cane producing areas. Overall, crop yields are likely to suffer, and the cost of doing agriculture will increase.

Indications are that there is insufficient integration of climate change mitigation and adaptation in development initiatives.

**Water availability, use, & management:** About 40–50% of Swaziland's water comes from South Africa and is shared with Mozambique. Various treaties and protocols between Swaziland, South Africa, and Mozambique control water use. Swaziland is not currently a water-stressed country at national level, but many water users face high levels of water stress, given the water allocation system and the distribution of natural and human-made water storage points. Of note, some 95% of the surface water that is used in Swaziland is used for irrigation, especially to produce irrigated cane.

There is potential to store more water in Swaziland, given that its runoff is about 18% of total annual rainfall.

Water demand is expected to increase in the future, as a result of population growth and economic development. Water supply is likely to decline (e.g., mean annual river flows) due to climate change impacts. Economic development is negatively impacting water quality, e.g., from urban pollution or agro-chemical contamination. Increasingly scarce water supplies from a rapidly changing climate and increased demand is likely to create competition among water-using sectors and could generate conflict between the countries that share the international basins.

Trends show increasingly oversubscribed water allocations from rivers, weak management of water, weak catchment management, and increasingly poor water quality.

**Socio-cultural:** The level of social unrest is increasing, with unions demanding wage increases and pro-poor budgets and some segments of society calling for a constitutional monarchy to enhance accountability. Given that the medium age was 21 years in 2014, the population could potentially grow very quickly in the near future and with a large number of people hoping to enter the work force. The literacy rate has improved significantly, but this masks some significant rural issues where the illiteracy rate may be quite high. Poverty declined from 69 to 63% during 2001–2010 (but a more detailed analysis shows that this poverty reduction was less significant for the *extremely* poor layer). It is estimated that about 50% of rural households spend about 50% of their income on food, which increases their vulnerability to climate-influenced reduced yields or increased food prices; there are many children who are undernourished and underweight. Poverty, food insecurity, hunger, and under-nutrition can be expected to remain important issues going into the future, and as the climate becomes more erratic. There are high levels of HIV/AIDS. HIV/AIDs will continue to have a dramatic effect on Swaziland's development over the medium-and-long term, through its severe institutional and household-level impacts. The 2014 Human Development Report ranked Swaziland very poorly on the gender inequality index – 115 out of 148 countries.

Under the future climate change scenarios, negative impacts related to governance, insufficient education and capacity issues, health, incidence of vector diseases, food



insecurity, hunger, gender, and vulnerable groups (e.g., orphans and the elderly) are likely to increase. Health impacts resulting from crop failures and outbreaks of disease will impact most on the poorly-equipped rural poor.

**Socio-economic:** GDP somewhat recovered from the very low in 2012, hovering between 1.7 and 2.8% in 2012–2014. The projected GDP growth rate looks pretty flat to 2020. The service sector and the transportation sector are growing. The GDP performance of the agricultural sector has decreased over time, and will remain tied to the vagaries of the climate, even under higher levels of irrigation. An FAO/WFP 2015 survey found that even though 70% of the households were ‘farming households’, only 10% of the households derived their main source of income from agriculture or agro-pastoralism. Salaried work is the most common source of livelihood. Farming has been more about growing one’s own food than being the primary source of income.

National policy considers agriculture a growth sector with an increasing focus on creating commercial production by small and medium enterprises, but this will require support, e.g., capacity building, access to finance, and security of land tenure. More skills and more capital are needed to address unemployment. Investments in skills development and job creation are needed to absorb the additional number of people entering the labour force. Labour-intensive investments are needed to absorb the largely rural-based, youthful, less-skilled workforce.

There are a number of economic constraints. There is a low level of private sector growth and a high level of unemployment (29%). Youth, women, and the least educated suffer the most unemployment. Population growth is outstripping the rate of job creation. More and more people will be looking for gainful employment in the future. Rural incomes are particularly poor. Swaziland is vulnerable to economic shocks, given its reliance on customs revenues. Its private sector is still weak. There are still some issues related to corruption.

There is scope to increase domestic food production, and reduce food imports.

Energy use in all sectors will likely increase with economic development. Regionally, energy production is constrained, but there is potential to improve energy efficiency within all sectors.

**Institutional:** Agricultural institutional issues include: inadequate institutional capacity, conflicting mandates of government ministries and departments, poor monitoring and evaluation of projects, and poor inter-sectoral coordination for agricultural development.

## Chapter 6: Impact Identification and Evaluation

**Introduction:** The impact identification and evaluation work of this StrEA comprised four exercises:

1. Internal consistency analysis;
2. Compatibility analysis;
3. Impact assessment against a sustainability framework (identified during the scoping period);
4. Spatial analysis, using map overlays.

There is some overlap in the results of the various analyses, which is as it should be. This helps confirm the output of the various analyses.

**Internal Consistency Analysis:** A matrix was developed to conduct the consistency analysis. The objectives of the three 11<sup>th</sup> EDF projects were shown along the columns and along the rows of the matrix, such that 55 cells were created to help analyse each possible interaction. This analysis generally found that the 11<sup>th</sup> EDF is internally consistent. However, as impacts generally arise based on how activities are actually implemented (rather than on how activities are envisioned in a concept paper), most interactions were listed as

**‘consistent (✓) but’.** That means that various environmental, social, and climate-risk (ESCR) mitigation measures are recommended to ensure that the planned activities yield the intended benefits.

Key recommendations for the HVCHP include the need to analyse the economic viability of the HVC activities, including the need to clarify the management, ownership, operation, and use of the packhouses and cold storage units. Recommendations for the WHDP focus on ensuring the application of integrated land and water use planning and the need to build the capacity to monitor and measure water use and abstraction at each project site. The cumulative impacts of all projects on each river basin will also need to be assessed during the Environmental and Social Impact Assessment (ESIA). Key recommendations for the LDP include the need to fully evaluate the economic viability and the location of the proposed activities, bearing in mind the future climate (e.g., dairy cattle prefer a cooler climate). It is also suggested to provide an explicit nutrition support programme for the very poor farmers, who may not be able to participate in commercial agriculture.

**Compatibility of the 11<sup>th</sup> EDF with Various Policies / Legal Instruments:** A matrix was developed to conduct the compatibility analysis. The objectives of the 11<sup>th</sup> EDF’s three projects were placed along the columns. The 68 policy instruments selected for further study were placed along the rows. This created 68 (instruments) X 3 (projects) or 204 interacting cells for evaluation.

As mentioned in the Chapter 4 summary of the policy instruments, Swaziland’s policy/legal framework is extensive, but poorly implemented. The conclusion is that the 11<sup>th</sup> EDF project concepts are in general compatible with the policy and legal framework, but to enhance the compatibility and to strengthen the detailed project design phase, key relevant objectives and policy statements were extracted from the 68 policy instruments to serve as 11<sup>th</sup> EDF mitigation or enhancement measures.

As an example, the need to evaluate various irrigation technologies (e.g., drip irrigation) was extracted from the *2005 National Irrigation Policy*. In evaluating the compatibility between 11<sup>th</sup> EDF and the *2009/2010 Integrated Water Resources Master (IWRM) Plan*, these mitigation measures were extracted or inspired by the IWRM plan:

- Evaluate whether the EDF project location and the water allocations will be sufficient, given other development activities and given climate change projections;
- Promote water conservation and water efficiency.

N.B. The extensive list of measures extracted from or inspired by the policy framework are integrated into the Chapter-7 management plan.

**Qualitative Impact Analysis:** To evaluate the impacts, the consultants considered the characteristics and importance of the predicted impacts. Impact characteristics include whether the impact is: positive / negative; reversible / irreversible; long term / short term; probable / improbable; frequent / infrequent; small / large; local / international; cumulative; and whether the impact is transboundary.

**The Impact of the HVCHP on the Environment, Social, and Climate-Risk (ESCR) Components:** The analysis generally found that the implementation of the HVCHP project within the LUSIP area would negatively impact on existing biodiversity. In terms of climate change, the analysis suggests that the project will strengthen local community resilience to the changing climate and reduce their vulnerability. On land and land management, the analysis suggests that the project will strengthen local communities by helping to secure land management and land use. In terms of water and pollution, the analysis suggests that the project will negatively affect available water and increase the risk of agro-chemical pollution of land and water.

In terms of the HVCHP impact on the socio-cultural and socio-economic components, the

HVCHP does offer some valuable benefits to communities that are currently focused on subsistence. Improvements in food security, health and well-being, and private sector participation are desired outcomes of the EDF investment. On the institutional landscape, the analysis suggests that in general the project will strengthen the capacity of key institutions, including strengthening community development planning.

***The Impact of the WHDP on ESCR Components:*** The analysis generally found that the implementation of the WHDP project could negatively impact existing biodiversity. The provision of land for water storage and land for irrigated crops will require the conversion of habitat. In terms of climate change, the analysis suggests that the project will strengthen local community resilience to the changing climate and reduce vulnerability. The introduction of stored water for irrigation and crop production (at a small local scale) would be expected to produce positive impacts on the community's ability to cope with the predicted future climate (i.e., a climate with reduced rainfall and higher temperatures).

On land and land management, the analysis suggests that local communities can benefit from improved land management and land use only if traditional leaders and communities work together to allocate land. On the availability of water, the analysis suggests that the project could negatively affect the availability of water downstream of the project. Of note, water for storage in rural areas with low-flowing seasonal streams is susceptible to misuse and misallocation.

The WHDP does offer some valuable socio-cultural and socio-economic benefits to communities that are currently focused on subsistence. Improvements in food security, health, and well-being are desired outcomes of the EDF investment. In terms of the institutional landscape, the analysis suggests that the project will strengthen institutional capacity, especially in the project area.

***The Impact of the LDP on ESCR Components:*** The analysis generally found that the implementation of the LDP project in specific, but currently unspecified locations, will negatively impact existing biodiversity. However, this could be mitigated by adopting a landscape approach to land and biodiversity management, in collaboration with the SNTC. In terms of climate change, the analysis suggests that the project could strengthen local community resilience to the changing climate and reduce vulnerability. On land and land management, the analysis suggests formulating community-developed rangeland improvement strategies that are acceptable to the affected communities to avoid negative impacts. Regarding the water component, the analysis suggests that the project is highly susceptible to drought, which would negatively affect rangelands and reduce the availability of surface water for livestock. The LDP does offer some valuable socio-cultural and socio-economic benefits to communities by supporting food security, health, and well-being and private sector participation. In general, the project will strengthen the capacity of key institutions, including strengthening the capacity for community development planning.

***Spatial Analysis of WHDP and HVCHP Project Sites:*** A rapid analysis of the already-identified WHDP and HVCHP project sites was conducted using mapping software and a variety of digital spatial data. The spatial analysis, including the analysis of Google Earth imagery, allowed the consultants to confirm or exclude potential issues e.g., whether a project site was in or near areas of high conservation value or whether the proposed projects were encroaching into grazing areas. The analysis identified that some EDF projects could result in some indirect impacts e.g., the displacement of some existing practices, such as rangeland grazing, to new areas.

***Spatial Impacts from WHDP:*** At the time of this consultancy, 12 water-storage sites were undergoing further review. Based on the spatial data, the existing land use at the proposed sites is rainfed agriculture. The participation and support of the local farmers will be needed, as well as institutional arrangements to make this land available for the project assets and gardens. The spatial analysis also indicates that the downstream water users could be negatively affected, if the project activities contaminated the water source with agro-

chemicals. The extension support will need to highlight the *responsible* use of agro-chemicals. Project implementers will need to assess the security of the water supply. Water supply in general may become more erratic, given the changing rainfall pattern (i.e., both drought and flood events may become more frequent). The design of the water storage infrastructure must fully integrate climate change and climate variability to ensure longevity and function.

***Spatial Impacts from HVCHP:*** The spatial data highlights that the HVC production areas and packhouse hubs will be located in the Lowveld – an area not normally considered suitable for commercial high value vegetable production. The heavy reliance on irrigation water in what are water-stressed basins is a risk to the long-term sustainability of the production hubs. Climate change towards a drier climate in the future is another risk. The technology that will need to be applied to develop a conducive growing environment for temperature-sensitive high-value crops could increase the production costs, when compared to producing the vegetables in a cooler region, e.g., Upper Middleveld and Highveld.

On a positive note, land is available in the Lusip area, assuming that land use agreements can be secured between the traditional leadership and the communities.

Project activities could result in some general loss of biodiversity, habitat, ecosystem services, and soil, but the spatial analysis indicates that the proposed packhouse locations will not directly impact areas of high conservation value.

## Chapter 7: Environmental, Social, and Climate-Risk (ESCR) Management Plan and Logical Framework Indicators

The ESCR management plan organises the Chapter-6 results for use in the subsequent more detailed project design and for use in all subsequent ESIs under the EIA regulation (i.e., all projects requiring EIA will use this ESCR Management Plan framework to guide the project level impact assessment). The ESCR Management Plan is structured as follows:

- *Preliminary Programme-level ESCR Management Plan:*
  - *Preliminary General Programme-level ESCR Management;*
  - *Preliminary ESCR Management by Component.*
- *Three Preliminary Project-specific ESCR Management Plans:*
  - *Preliminary ESCR Management Plan for the WHDP;*
  - *Preliminary ESCR Management Plan for the HVCDP;*
  - *Preliminary ESCR Management Plan for the LDP.*

Typically, the assessments and strategies that need to be completed and various mitigation and enhancement measures are identified in each section of the ESCR Management Plan.

**N.B. The ESCR Management Plan is fully summarised under Chapter 9 (Conclusions and Recommendations) of this Executive Summary.**

***Analysis of the Logical Framework:*** Tables 37 to 40 of this StrEA show the logical framework of the 11<sup>th</sup> EDF and its 3 projects. This StrEA provides some recommendations to strengthen the logical framework, in light of this StrEA. The suggested changes are provided ***within*** the existing tables, in ***bold italic***. One example of a recommended change to the logical framework is that the framework assumes that there will be no serious droughts during project implementation. This StrEA recommends that it should be assumed that ***there will be*** a serious drought, and to include a contingency plan to manage accordingly.

The analysis of the logical framework also highlights that the overall objective of the LDP is ‘*improved livelihood of smallholder livestock producers on SNL*’, whereas some key activities focus on government farms (beef and dairy). The project purpose is ‘*to enhance market-oriented smallholders’ livestock production and improve human nutrition in project areas*’. Although the project purpose is well reflected in the logical framework, it needs to be detailed in terms of activities (i.e., provide more focus on smallholder’s livestock production’.

In contrast, the focus on government farms is not yet well integrated into the results listed in the logical framework.

## **Chapter 8: Stakeholder Capacity Assessment to Manage Environmental, Social, and Climate-related Challenges**

Stakeholder consultation identified that ESCR management capacity across all key implementers of this StrEA is limited. Although there is some the technical capacity to address issues of ESCR management as envisaged under the 11th EDF, this capacity needs to be acknowledged, supported, and strengthened through sustained, strategic interventions.

A lack of coordination is undermining systemic capacity. Also, the failure of many stakeholder institutions to manage their ESCR impacts is related to specific capacity constraints within these institutions, e.g., inadequate financial resources, limited knowledge and limited number of human resources, and a shortage of available time. Knowledge gaps within the implementing institutions and relevant staff (i.e., extension workers) on ESCR management were identified as challenges.

Facilitation and maximising the opportunities afforded by the 11th EDF for strengthening ESCR management and responsibility across all relevant stakeholders requires an integrated approach for capacity development and a shared common vision.

## **Chapter 9: Conclusions and Recommendations**

The overall objective of the *ESCR Management Plan* is to contribute to delivering more sustainable and climate-proofed investments that support national sustainable development. The sections of the ESCR Management Plan are summarised below, to highlight the next steps.

### **ESCR Management Plan:**

#### **Preliminary Programme-level ESCR Management Plan + Three Preliminary Project-level ESCR Management Plans**

#### ***Preliminary Programme-level ESCR Management Plan:***

The *General Programme-level ESCR Management* section recommends that the EU in partnership with the GOS:

- Conduct ESCR policy dialogue (with key stakeholders);
- Integrate ESCR into the programme management;
- Develop and implement an *ESCR Communications Strategy*;
- Develop and implement an *ESCR Coordination Mechanism*;
- Integrate ESCR into the programme monitoring and evaluation;
- Green the programme-level procurement;
- Implement the Programme-level ESCR capacity development plan;
- Conduct all project-specific ESIA / CRA, as required by law.

The *Preliminary ESCR Management by Component* section identifies the various assessments that need to be completed within each component. In brief, the following assessments / strategies need to be completed:

- Biodiversity Management Plan;
- Land use, Land Suitability, and Land Management Plan;
- Water Resource Management (WRM) Plan;
- Climate Change Management Plan;
- Integrated Waste Management and Waste Minimization Plan;
- Socio-cultural Plan;
- Socio-economic Plan;

- Institutional Capacity Development Plan.

**Three Preliminary Project-level ESCR Management Plans:**

The *Preliminary ESCR Management Plan for the WHDP* recommends that the WHDP project team formulate Sub-basin Water Resources Plans.

The *Preliminary ESCR Management Plan for the HVCDP* recommends that the *HVCDP* project team conduct the following project-specific and location-specific assessments or apply these mitigation and enhancement measures:

- Land and Crop Suitability Assessment;
- Assessment of the Options for Land Rehabilitation and Soil and Nutrient Management;
- Development of a Policy Framework to Institutionalise Conservation Agriculture (CA);
- Hydrological Impact Assessment to ensure water availability;
- Assessment of water-saving technologies and practices;
- Research to improve, climate proof, and modernize farming practices and to identify location-specific climate-change adaptation measures;
- Application of various climate-change adaptation measures;
- Integrated Pest Management strategy to reduce the need for synthetic pesticides;
- Activities to support the most vulnerable, who may not be able to commercialise;
- Location-specific Sustainability Assessment and Local Planning for Sustainability;
- Packhouse Sustainability Assessment;
- Packhouse Mitigation and Enhancement Measures;
- Coordination of the Development of the Marketing Information System;
- Project-specific Capacity Development;
- Monitoring of the Commercialisation Process to Ensure Intended Benefits.

The *Preliminary ESCR Management Plan for the LDP* recommends that the *LDP* project team conduct the following project-specific and location-specific assessments or apply these mitigation and enhancement measures:

- Secure biodiversity hotspots from livestock development activities and forbid ranches from using fire to control bush encroachment;
- Identification of Suitable Rangelands;
- Development of the Rangeland Management and Improvement Strategy, including the Management of Fire;
- Implementation of the Rangeland Management Strategy in Collaboration with the Local Community and SNTC;
- Livestock Waste Management Strategy to Manage all Livestock Wastes;
- Assessment of the Potential to Expand Small Livestock in the Project Area;
- Further development of activities focused on food security and nutrition for LDP sites;
- Sustainability Assessment and Planning for Sustainability for the LDP;
- Sustainability Strategy for Cattle Beef Farms;
- Economic Assessment of Gege Farm to Assess its Suitability as a Demonstration Site for Commercial Dairy;
- Needs Assessment Focussed on Smallholder Dairy Farmers;
- Application of Good Hygiene and Good Animal Welfare Practices;
- Capacity to Manage Rangelands at the Community Level.



# The Strategic Environmental Assessment of the 11<sup>th</sup> EDF, Swaziland

## 1 Scope and Introduction to the Assessment

Agriculture continues to serve a critical and indispensable role in food security, rural development, employment creation, and poverty reduction in Swaziland. Agriculture, including livestock production, uses the most land and water of all human activities and it is also an important source of greenhouse gas (GHG) emissions. Agriculture is seen as having a large potential in Swaziland because of the favourable climate and favourable soils, but its potential has not been realized. Environmental, social, and climate-risk management is critical to agriculture's continued productivity, to food security, to increasing rural incomes, and to ensuring that agricultural systems are resilient enough to adapt to our changing climate (EU 2016).

The Government of Swaziland (GOS) and stakeholders in the agricultural sector are implementing the 11<sup>th</sup> EDF<sup>1</sup> Programme for agriculture, with financial support from the European Union (EU). The 11<sup>th</sup> EDF covers the 2014–2020 period. It was foreseen under the National Indicative Programme (NIP) that a Strategic Environmental Assessment (**StrEA**) be conducted '*to better understand the most relevant environmental parameters integrating as well the climate change dimension*'. Given that the 11<sup>th</sup> EDF and its three core projects rely on scarce land and water resources, a StrEA is also recommended based on the EU's *Guidelines on the Integration of Environment and Climate Change in Development Cooperation*.

In brief, this StrEA is expected to help integrate environmental, social, and climate change mitigation and adaptation measures in the preparation, implementation, and monitoring of the 11<sup>th</sup> EDF–Agriculture and its three core projects. The specific objectives of the StrEA are to:

- Describe, identify, and assess the likely significant effects on the environment of implementing the 11<sup>th</sup> EDF–Agriculture and its three projects;
- Describe, identify, and assess the most important environmental and natural resource constraints bearing on the Programme implementation;
- Provide decision-makers of the GOS and the EU with relevant information to identify and assess the adequacy of environmental management and climate change adaptation measures in the Programme and in the projects under preparation;
- Provide concrete recommendations on mitigation or adaptation measures to be integrated in the Programme and projects so that potential negative effects can be minimized and positive effects can be optimized.

In compliance with the TORs, this *StrEA Report* integrates the results of the literature review, the above listed analyses, fieldwork, stakeholder discussions, and workshop inputs. The report structure reflects the requirements of the TOR, as follows:

- Chapter 1: Scope and Introduction to the StrEA;
- Chapter 2: Approach, Methodology, Assumptions, Uncertainties, and Constraints;
- Chapter 3: Description of the 11<sup>th</sup> EDF Programme;
- Chapter 4: The Policy, Legal, and Institutional Framework;
- Chapter 5: Baseline study: Risks, Constraints, Trends, and Opportunities;

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<sup>1</sup> The European Development Fund (EDF) is the EU's main instrument to provide development aid to African, Caribbean, and Pacific countries. The EDF is financed by EU Member States.

Chapter 6:	Impact Identification and Evaluation;
Chapter 7:	ESCR Management Plan and Logical Framework Indicators;
Chapter 8:	Stakeholder Capacity Assessment;
Chapter 9:	Conclusions and Recommendations.

## 2 Approach, Methodology, Assumptions, Uncertainties, and Constraints

### 2.1 Approach, Methodology, and Key Outputs

The StrEA was organized in three parts: a scoping phase (January – February 2016), a detailed-study phase (March–April 2016), and a review and finalisation phase (May–June 2016).

#### 2.1.1 Scoping-Period Approach, Methodology, and Key Outputs

In compliance with the TORs, the *scoping study* provided:

- A description of the Programme and projects and the selected alternatives;
- A brief description of the institutional and legislative framework of the agricultural sector;
- A brief presentation of the relevant environmental policies and objectives;
- An identification of the key stakeholders and their concerns;
- An identification of the key Programme – environment interactions (including climate);
- A description of the scope of the environmental baseline to be prepared;
- An identification of the methodologies to be used in the StrEA study;
- An estimation of the time frame, costs, and resources needed to carry out the StrEA.

The main approach, methodology, activities, and key outputs of the scoping period included:

- The 11<sup>th</sup> EDF – Agriculture was described;
- An information handout about the StrEA exercise was developed for stakeholders;
- Some 17 consultative sessions were held with government, parastatals, and civil society;
- More than 100 stakeholders were identified through interviews and literature review;
- The importance / influence of the stakeholders was analysed to focus the detailed study;
- Four (4) field visits were conducted (e.g., 1. Sand dam; 2. Cattle dipping point; 3. One dam and irrigation location; 4. Pack house (not yet operational);
- Five (5) key strategic issues were identified for further study during the StrEA: 1. Habitat and biodiversity; 2. Climate change; 3. Land use & land degradation; 4. Water; and 5. Pollution;
- As this StrEA used a *sustainability framework*, biological-, physical-, socio-cultural-, socio-economic-, and institutional-sustainability goals were integrated into the assessment framework, providing 16 evaluation criteria in all (see Table 11);
- Three (3) alternatives were identified for the detailed StrEA, based on the assessment of key documents and stakeholder concerns;
- The policy, legal, and institutional framework was outlined;
- The data needs, methodologies, and work plan for the detailed study were outlined;
- The Draft Scoping Report was prepared and presented to the EU Delegation (January 27, 2016);
- The StrEA Scoping Report was finalized based on received comments in February 2016.

#### 2.1.2 Approach, Methodology, and Results of the Detailed Study

The TORs stipulated that the *detailed StrEA study* should cover the following results:



- An environmental baseline study, showing trends and pressures;
- Identification of environmental and climate risks, constraints, and opportunities;
- Identification and assessment of the potential environmental impacts;
- Consistency analysis against partner government's and EC's environmental objectives;
- Analysis of the suitability of the logical framework indicators;
- Assessment of the institutional capacities to address environmental challenges;
- Conclusions and recommendations.

The main approach, activities, and outputs of the detailed study phase included:

- The 11th EDF – Agriculture was described in more detail;
- Extensive baseline data was analysed and summarized to identify trends and constraints;
- Six more stakeholder interviews / discussions were held;
- The StrEA tools were developed (e.g., various matrices to conduct various analyses);
- Four different impact analyses were conducted and the results were summarised;
- The suitability of the logical framework indicators was analysed;
- The capacity assessment was conducted;
- The mitigation and enhancement measures were identified based on all inputs (document review & analysis, and stakeholder inputs), and presented in a 3-part management plan;
- Key conclusions and recommendations were extracted from the lengthy Environmental, Social, and Climate-Risk Management Plan, for priority attention by EU;
- The StrEA validation workshop was designed and conducted Tuesday, April 19, 2016;
- The full Draft StrEA Report was distributed to stakeholders April 25, 2016.

### 2.1.3 Review of Draft Report and Final Report

The draft StrEA entered the review phase during the Validation Workshop conducted April 19, 2016. The participants to the validation workshop provided important comments, which were integrated into the Draft StrEA submitted April 25, 2016. The formal review period was from April 25 to May 25, 2016. Although the draft StrEA report was circulated to a wide set of stakeholders, only the EU Delegation provided comments by end of the review period. This final report integrates the EU comments on the draft.

## 2.2 Assumptions, Uncertainties, Constraints, and Limitations

The various assumptions, uncertainties, constraints, and limitations encountered in the conduct of this StrEA are listed below.

### Assumptions:

- The StrEA takes as given some of the assumptions and previous analyses conducted on Swaziland's agricultural sector (e.g., low productivity on SNL and poverty levels);
- It assumes that the three (3) concept notes / project summaries (each about 15 pages) provided by the EU at the start of this assignment form the basis around which to develop 3 more detailed projects for implementation.

**Uncertainties:** With regards to the future, the following uncertainties are noteworthy:

- Land tenure and overall land management, especially on Swazi Nation Land (SNL), encompasses a particular challenge to project designers, as securing land use is uncertain;
- Climate change scenarios for Swaziland portray a country under constant change, with decreasing annual and seasonal rainfall, and increasing temperatures;

- Hydrological data from secondary sources show a decreasing and more irregular water flow; the projects that have an irrigation component must integrate these irregularities into the project design.

### Constraints

- A StrEA requires much time to analyse and summarize relevant documents, interview stakeholders, conduct fieldwork, undertake the various analyses, conduct a validation workshop, prepare the draft, and prepare the final StrEA document. The Consultants were quite challenged by the work load (including having 3 sub-sectors to analyse) and this required some strategic decisions on what could be achieved within the timeframe.

### Limitations of this StrEA

- Secondary data, though informative, was not always up-to-date, which resulted in having to make certain assumptions about trends and impacts;
- Very little quantitative data was available; the study relied on descriptive assessments and stakeholder inputs;
- The number of stakeholders was high and the StrEA team could not conduct very many one-on-one interviews;
- The StrEA focused on the core projects, as described in the concept documents received in January 2016. The on going technical work (e.g., detailed siting of some dams) could not be fully captured in the limited time frame of the detailed study.

### Risks

The risks to the EDF programme that may impact the StrEA objectives and implementation include:

- Macroeconomic risks (e.g., market shocks);
- Political and governance risks (e.g., political interference or policy reversals);
- Development challenges (high levels of poverty, inequality, and unemployment);
- Governance and state capacity (insufficient voice of some stakeholders, e.g., farm union; lack of accountability and transparency in the public service in general);
- Poor investment climate and private sector competitiveness (e.g., bureaucratic processes, poor service delivery, absence of competition);
- Mismatch of the formal education and required skills;
- Weak results-monitoring system;
- Data inadequacy;
- Extreme climatic events;
- Lack of actual reform to the agricultural sector in the face of fiscal constraints;
- Difficulty in managing complex projects with multiple beneficiaries.

**Implementation Capacity:** Although the skills required are well documented and relatively easy to teach and acquire, it is unclear whether there are organizations with the capacity, geographic presence, and experience to roll-out the activities listed in this StrEA.

**Finance:** Environmental, social, and climate-change management interventions typically rely on donor, grant, and government support. Identifying sources of finance may prove a challenge to implementing this StrEA

## 3 Description of the 11<sup>th</sup> EDF Programme – Agriculture

### 3.1 Background: Overview of the Agricultural Sector

#### 3.1.1 Introduction

There are 2 *main* categories of land in Swaziland: 1. Private land / freehold – *Title Deed Land (TDL)* (25%); and 2. Communal land held in trust by the King – *Swazi National Land (SNL)* (74%). *Crown land* and *concession land* are 2 other land categories, accounting for less than 1% of the land.

Table 1 provides more details on the various land categories.

**Table 1: Swaziland Land Tenure**

Land Tenure Type	km <sup>2</sup>	%
<b>Swazi Nation Land (<i>sensu stricto</i>)</b>		
Controlled by chiefs, communal	8,470	48.8
Controlled by chiefs, non-communal	140	0.8
Controlled by Tibiyo	80	0.5
Leased to companies or individuals	140	0.8
<b>Subtotal</b>	<b>8,830</b>	<b>50.9</b>
<b>Swazi Nation Land, purchased</b>		
Controlled by chiefs, communal	1,010	5.8
Controlled by Tibiyo	420	2.4
Controlled by National Trust Commission	460	2.6
Leased to companies or individuals	980	5.7
Controlled by Ministry of Agriculture	1,180	6.8
<b>Subtotal</b>	<b>4,050</b>	<b>23.3</b>
<b>Title Deed Land, urban area</b>	<b>130</b>	<b>0.7</b>
<b>Title Deed Land, rural area</b>	<b>4,240</b>	<b>24.4</b>
<b>Crown Land</b>	<b>70</b>	<b>0.4</b>
<b>Water Reservoirs</b>	<b>40</b>	<b>0.2</b>
<b>Total</b>	<b>17,360</b>	<b>100</b>

**Source:** JICA / ECS 1999

SNL is allocated to households by traditional chiefs on the King's behalf. It is used for settlements and otherwise mainly used for communal, extensive grazing and subsistence crops. Under Swazi law and custom, access to SNL is through family lineage. SNL is only allocated to married men. Unmarried women can only access SNL through a son. SNL cannot be used as collateral, and hence SNL farmers generally have limited access to commercial finance. About 25% of the SNL is not used communally, but is controlled by government, parastatals, or companies. TDL is owned mainly by companies (e.g., sugarcane, citrus, pineapple, timber plantations, and some livestock ranches), and some individuals (FAO/WFP 2015; WB 2014 & 2011b; MTEA 2012).

#### 3.1.2 Agricultural Production Systems

Agriculture plays a key role in most people's lives, given that 70% of the population relies on agricultural output as a source of income or for food security. Many people are either small-scale producers *or* farmers employed on medium and large-scale farms and estates. The cultivated area is about 190,000 ha (178,000 ha of arable land and 12,000 ha under permanent crops) (MTEA 2012; FAO 2015). There are three main agricultural production systems:

1. **Large- and medium-scale commercial irrigated farms on TDL:** this system mainly produces sugar cane, but also other crops (e.g., citrus, pineapple, cotton, and cassava)

and livestock products (e.g., milk and meat).

2. **Small-scale rainfed smallholder farms on SNL:** this system produces maize and also some beans, groundnuts, oilseeds, and cotton on smallholdings (< 1 ha). Maize production is often combined with livestock (i.e., cattle, goats, and poultry) and some off-farm employment. About 60% of the smallholders own a few cattle. With increasing population pressure, land holdings on arable land are becoming smaller, more dispersed, and fragmented. Households having < 1 ha increased from 68% in 1997 to 92% in 2001.
3. **Small- to medium-scale farms with access to irrigation on SNL:** this system mainly produces sugar cane on 2–3 ha plots, although there is potential to grow other crops (e.g., maize and vegetables). These farmers are in transition from subsistence to smallholder commercial farming, either as individual farmers or as outgrowers for a farm company managing irrigated land.

Table 2 shows the GDP contribution on SNL and TDL, highlighting that the commercial TDL agriculture is generally much more productive than the SNL smallholder sector (WB 2011b).

**Table 2: Land Ownership vs. Productivity**

Land Ownership	Area (ha)	Productivity	GDP contribution of crops
SNL	214,000		6.5%
TDL	104,000	Output is 12 X greater than SNL output	80%
Other	140,000		

Source: WB 2011a.

### 3.1.3 Vegetables in General

According to COMESA (2012), there are 1,900–2,200 commercial and semi-commercial vegetable farmers in Swaziland, usually cultivating from 1–5 ha of vegetables. The farmers are either contracted to larger wholesalers / processors or selling directly to supermarkets, markets, or consumers. Only 2–6% of the farmers cultivate baby vegetables. There has been a decrease in the number of baby vegetable farmers in the last 3 years, with farmers arguing that transport costs are prohibitive (i.e., 35% of the price of the load delivered), the rejection rate is too high, and payments are generally delayed. Overall, vegetable processing is a market area that has not been sufficiently exploited in Swaziland. Table 3 shows the small area allocated to vegetable production in 2008–2010.

**Table 3: Vegetable-Farming Statistics in hectares (ha) 2008–2010**

Crop	2008 (ha)	2009 (ha)	2010 (ha)	2011 (ha)
Cabbages	305	212	155	172
Tomatoes	94	107	73	128
Green Maize	123	250	197	232
Beetroots	52	41	26	46
Spinach	82	76	54	65
Carrots	46	21	19	37
Green pepper	63	37	76	89
Lettuce	65	32	22	45
Butternut	53	41	41	57
Potatoes	6	45	57	44
Onions	32	42	30	41
Garlic	3	9	3	1
Cauliflower	15	4	3	n/a
Broccoli	13	1	2	5
<b>Total</b>	<b>958</b>	<b>956</b>	<b>756</b>	<b>962</b>

Source: COMESA. 2012

There is economic potential to expand vegetable processing to help generate employment and alleviate poverty. NAMBoard offers technical assistance to baby-vegetable farmers to help them meet market standards and consumer safety through its Marketing Extension and Quality Assurance Officers. Currently, only the Eswatini Swazi Kitchen (a commercial project with the Manzini Youth Care) addresses poverty alleviation through its vegetable-processing business. The main issue is that currently the vegetable processing industry does not have access to a large amount of vegetables and the processed vegetable industry is small in scope.

### 3.1.4 Maize

Maize is the most important crop on SNL. The maize price is regulated by government, and it does not entirely reflect market conditions. In April 2016, the National Maize Corporation (NMC) was buying maize from farmers at E3,550/t. Swaziland has never been entirely self-sufficient in maize. Commercial imports and food aid have covered the shortfall (FAO 2015). Table 4 shows maize production and imports for 1987–1998 and Table 5 shows maize production from 1999 to 2014.

**Table 4: Maize Production and Imports (1987 – 1998)**

Season	Production (1,000 tonnes)	Imports (1,000 tonnes)	Total Consumption (1,000 tonnes)	Import as % of total consumption
1987/88	86	34	119	28
1989/90	135	15	150	10
1991/92	46	64	110	58
1993/94	64	10	74	14
1995/96	136	10	146	7
1997/98	107	13	120	11

Source: FAO 2015.

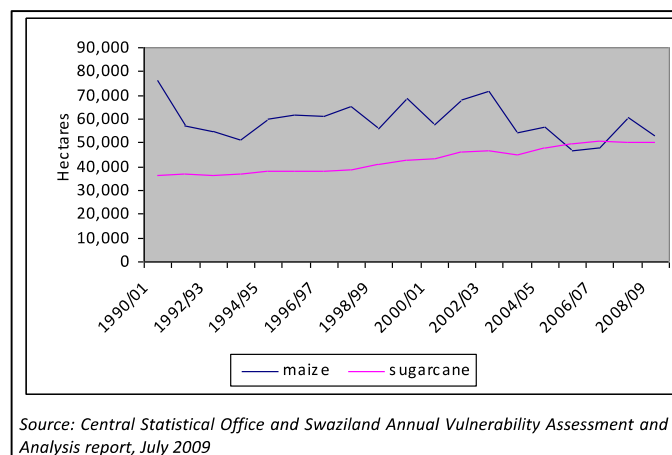
**Table 5: Maize Production (2005 – 2014)**

Year	Area Planted (ha)	Production (t)	Cost (E/t)	Imports (t)	National consumption (t)	% Self- sufficiency
2005/06	47,000	71,000	1,000	36,464	118,500	60
2006/07	51,000	77,500	1,142	25,583	118,500	65
2007/08	60,365	67,000	2,000	38,215	118,500	57
2008/09	52,460	83,090	2,000	42,041	118,500	70
2009/10	58,334	75,000	2,000	34,419	104,000	72
2010/11	70,344	84,868	1,950	28,065	113,000	75
2011/12	56,064	83,000	1,950	11,023	113,000	74
2012/13	61,260	81,934	2,435	22,765	116,418	70
2013/14	86,754	101,041	2,435	14,936	116,418	87
2014/15	87,164	81,623	2,435	30,446	131,220	62

Source: NMC 2014/1015.

The World Bank notes that maize production has declined from an average of 100,000 tons / year during 1979–2000, to 70,000 tons / year since 2000. Average maize yields range from 1–1.5 tons/ha. The production decline is correlated with various factors (e.g., droughts, high soil acidity, poor extension to farmers, lack of investment and credit, decreased availability of labour due to the HIV/AIDs epidemic, and reduced profits). In addition, some farmers have switched to growing the more profitable sugar cane, especially where there is irrigation. Figure 1 shows a decline in the area planted with maize and an increase in the area planted to sugarcane during 1990–2009 (WB 2011b).

**Figure 1: Area Planted to Maize and Sugarcane 1990–2009**



**Source:** WB 2011b.

### 3.1.5 Maize Production and Fertilizer Application

Maize production can vary considerably between agro-ecological areas. Where rainfall is less erratic and more abundant (i.e., Highveld and Middleveld), applying the recommended fertilizer is not too risky<sup>2</sup>, good yields can be achieved (i.e., 2–4 tons/ha), margins can be competitive with other crops, and returns-to-labour can be adequate (E 20–25 / day or USD 2.5–3 / day). In the drier eastern part of the country, where rainfall is lower and unreliable, average maize yields range from 0.8–1.5 t/ha. Especially in the drier eastern part of the country, using hybrid seeds and the recommended amount of fertilizer is costly and risky for the farmer. In addition, poor farmers generally have little access to credit to purchase fertilizer. Overall, farmers use organic and chemical fertilizers on maize crops. Farmyard or kraal manure (FYM) is either broadcast before ploughing or mixed with chemical fertilizer. MOA estimates that 60% of SNL farmers use FYM (WB 2011b). Table 6 shows some fertilizer sales from 2003 to 2007.

**Table 6: Maize Fertilizer Sales by the Main Supplier (2003 – 2007) (in tonnes)**

Fertilizer type	2003/04	2004/05	2005/06	2006/07	2007/08
2:3:2 (22)	3 477	2 150	2 687	4 185	3 652
2:3:2 (38)	1 860	858	2 352	2 612	1 530
LAN (28)	3 598	2 346	3 000	4 135	3 369
<b>Total</b>	<b>8 935</b>	<b>5 354</b>	<b>8 039</b>	<b>10 932</b>	<b>8 551</b>

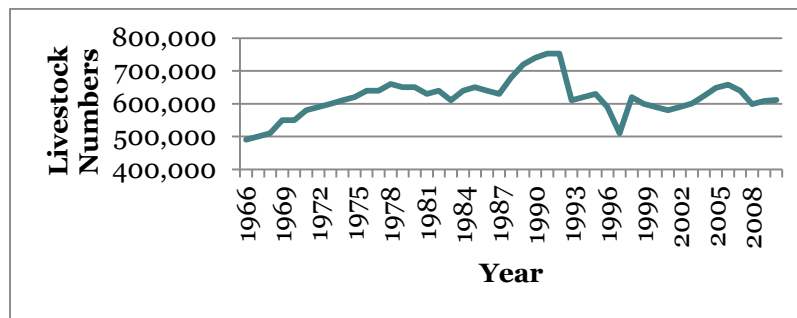
**Source:** WB 2011b.

### 3.1.6 Livestock

Livestock production is a major agricultural activity in Swaziland. There are two livestock production systems: the commercial system and the traditional system. The traditional SNL system manages about 86% of the cattle and 95% of the small stock. Smallholders own about 77% of the total cattle population. The stocking rate on SNL is two times larger than on TDL. Figure 2 shows the cattle population 1966–2010 and Table 7 shows the cattle population as of 2014.

<sup>2</sup> The recommended fertilizer use is 300 kg/ha NPK and 200 kg/ha of LAN (28%) (WB 2011b).

**Figure 2: Cattle population (1966–2010)**



**Source:** SEA 2012

**Table 7: Livestock Census (2014)**

Livestock Type	Number
Dairy Cattle	4,919
Beef Cattle	620,032
	15,983
Goats	441,137
Pigs	39,808
Poultry	2,546,343
<b>Total</b>	<b>2,658,660</b>

**Source:** MOA, DVLS 2014 Annual Report

Cattle production is a significant component of Swaziland's livestock sector. The number of cattle is prone to increases and decreases, decreasing in drought years when many animals are lost. SNL smallholder farmers are generally reluctant to sell their cattle, unless forced by economic or climatic conditions. The Government policy of commercialising the national herd, supported by the private sector, is slowly improving the situation and more farmers are selling their animals at the ideal age, instead of keeping them long after they have lost their commercial value.

Swaziland does not produce sufficient dairy products to meet consumer needs. Presently, the local demand is about 67 million litres of milk equivalents per year, but the country only produces about 37 million litres. The deficit has been met through imports, valued at USD 15 million (SDB 2002).

The livestock sub-sector contributes about 4% to the agricultural sector GDP. Beef and other livestock products contribute about 1% to total exports. Swaziland exports beef to the European Union (EU), South Africa, and Mozambique through the Swaziland Meat Industries (SMI) – the only licensed export abattoir for beef in the country.

The main constraints to livestock production were identified as diseases, breeds and breeding practices, water shortages, inadequate feed resources and range management, under-use of market infrastructure, insufficient adaptive research, inadequate livestock census, and insufficient capital to use improved technologies. Opportunities to improve the livestock sub-sector include to: 1. Increase the off-take of cattle and increase poultry and dairy production to meet market demand and reduce imports; 2. Improve range management to prevent overgrazing and to control land degradation; 3. Improve livestock quality and condition through good breeding and selection and through adequate feed supplements; 4. Improve livestock marketing through better market facilities and information; 5. Strengthen livestock extension activities; and 6. Enhance the control of tick-borne and other diseases (GOS-MOAC / FAO 2005).

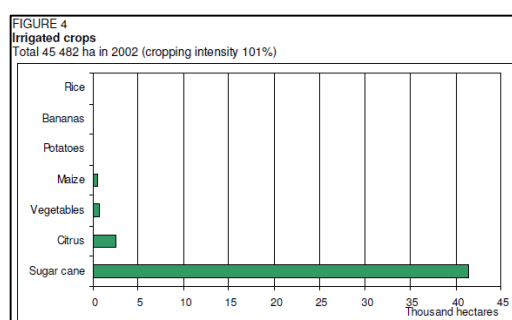
The Swaziland Dairy Board, a public enterprise owned by Government, attributes the underdevelopment of the Swazi dairy industry to a number of factors, including unavailability of dairy cows and inaccessibility to timely services for artificial insemination. Furthermore, there are no formal markets for farmers in remote areas and the related technical and business dairy skills are weak. On a positive note, Old Mutual and the Swaziland National Provident Fund announced plans to establish a E90 million dairy business with over 200 milking cows (Times newspaper, March 18, 2016). At full scale, 2,500 dairy cattle will be kept at the farm, along with an investment in a dairy-processing plant.

The *Livestock Development Policy* guides the sub-sector. Swaziland does not have an animal breeding policy or a national policy to guide the conservation and sustainable use of livestock genetic resources. The absence of a breeding policy has resulted in the introduction of exotic high-grade genotypes, which has eroded the indigenous gene pool, particularly in the smallholder traditional system.

### 3.1.7 Irrigation Potential and Ongoing Irrigation Projects

The irrigation potential during 2000–2005 was about 93,000 ha, of which, 50,000 ha was developed. Sugar cane used 40,000–44,000 ha or 90% of the irrigated land and citrus fruits used 6%. Figure 3 shows the small amount of vegetables, cotton, bananas, and rice grown under irrigation in 2002.

**Figure 3: Irrigated Crops in 2002**



**Source:** FAO 2005.

About 97% of the irrigation infrastructure is on TDL. Some 80–84% of the irrigation takes place in the Lowveld, being the driest part of the country. Only 15% of the irrigation takes place in the Middleveld. Without irrigation in the Lowveld, crop failures are frequent due to the often late, short rains, and dry spells. In 2000, 10 large irrigation schemes (> 500 ha) accounted for 67% of the irrigated land. Medium-sized (50–500 ha) and small (< 50 ha) irrigation schemes accounted for 20% and 13% of the irrigated land, respectively. There are also a number of micro-irrigation schemes on about 1,500 ha of land across the country i.e., communal projects funded by NGOs and IFAD. Large irrigation schemes are predominantly on TDL and small schemes, on SNL. Various irrigation techniques are used in Swaziland: surface irrigation (52%), overhead irrigation (42%), and localized irrigation (6%). (MTEA 2012; WB 2011b; FAO 2005).



The irrigation sub-sector has focused on estate style commercial farming, but there have been some small projects to introduce smallholders to commercially-oriented irrigated production systems. Recent important public sector irrigation projects include:

- Maguga Dam;
- Komati Downstream Development Project (KDDP);
- Lower Usuthu Smallholder Irrigation Project (LUSIP I);
- Smallholder Agricultural Development Project (SADP).

The area under irrigation was expected to increase by 14,500 ha by 2015, when most of the KDDP (3,000 ha) and LUSIP I (11,500 ha) would come into production (WB 2011b). The irrigation projects are discussed below.

**Maguga Dam:** The AfDB-financed Maguga dam project was completed in 2001; the dam irrigates 6,000 ha of land, benefiting 30,000 households<sup>3</sup>.

**Komati Downstream Development Project (KDDP):** The construction of the Maguga Dam on the Komati River in northern Swaziland significantly expanded irrigation capacity. The reservoir water is shared with South Africa, with Swaziland's share being 40%. Swaziland's portion of the water is to irrigate 6,000 ha downstream in the Lowveld – land previously used for extensive grazing and rainfed cultivation. The expansion is being implemented by SWADE, a government parastatal company. The new irrigated land directly benefits 16 farmer organisations, comprising about 2,300 homesteads and 16,000 people. To date around 3,500 ha have been developed, almost entirely for the production of sugar cane. The aim is for the entire irrigated area to be farmed by the local households. Farmers in contiguous areas are forming associations or farmer companies to operate a communal irrigation scheme. These associations elect a management committee to operate most of the scheme as a commercial sugar farm. In addition to having a management role, the association members provide some labour. Once the association repays its loan (incurred to establish the sugar cane fields), the profits will be shared with members through dividends.

**The Lower Usuthu Smallholder Irrigation Project (LUSIP):** The LUSIP has two phases. LUSIP I (supported by GEF) started in 2008 and was implemented by SWADE. It aimed to reduce poverty and enhance the living standards of the Lower Usuthu Basin farmers by commercializing farming activities and enabling farmers to shift to high-value, sustainable crop production. It increased the area under irrigation by 6,500 ha. Farmers were organised into cooperatives, facilitating the provision of extension services. Phase 1 provided large-scale irrigation systems – a network of dams, water reservoirs, and canals to meet the farmers' demand for water in a cost-efficient way. Three dams were constructed to store water diverted from the Great Usuthu River's wet season flood flows. More than 50% of the farm plots are under production and the rest of the plots were to be completed by March 2014 with some additional EU financing. LUSIP 2 will extend the irrigation system by 5,000 ha, with co-financing from AfDB, EU, European Investment Bank, and the Arab Bank for Economic Development in Africa (BADEA). Expected outcomes are: 1. The commercialization of smallholder farming; 2. Enhanced productivity, agricultural diversification, and food security; 3. Broader economic participation of rural communities; and 4. Reduced poverty (AfDB 2013).

**Smallholder Agricultural Development Project (SADP):** The EU-funded SADP was launched in 2009 to improve smallholder production and marketing systems for sustainable food security and improved quality of life for rural households. The targeted outcomes were:

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<sup>3</sup> Despite the many positive aspects, the relocation as a result of the Maguga Dam interfered with traditional life because people are no longer allowed to cultivate traditional crops for subsistence. In addition, local people were allocated only a small piece of land for vegetable gardening. The affected families now live in a clustered settlement, as opposed to the scattered pattern they were used to. These aspects, however, appear to be outweighed by the gains made (Keatimilwe 2002).

1. Improvements to smallholder agricultural practices identified, tested, and documented (e.g., through development of guidelines, demonstration plots, and farmers' workshops);
2. MOA's capacity to undertake field activities, research, and deliver services reoriented, strengthened, and improved (e.g., extension and research systems assessed);
3. Smallholder links to markets increased (e.g., market linkages for marula);
4. Analysis and capacity building related to M&E in MOA (FAO 2011).

The SADP focused on the most vulnerable, including the young and the elderly. Over 800 backyard vegetable gardens were established for poor rural households to grow vegetables for own consumption or to sell within the community. Sixty (60) youth groups were formed and provided with funds to set up small businesses (e.g., poultry, pig, or vegetable production). The SADP established the *Swaziland Livestock Identification and Traceability System* (SLITS) to ensure that individual animals are traceable for life. Some 20,000 smallholder farmers were supported in conservation agriculture, agro-forestry, and seed multiplication to grow higher-quality produce using good agricultural practices. To facilitate access to water, the SADP oversaw the building of one earth dam, two weirs, and one borehole, the rehabilitation of two earth dams, and the development of five irrigation schemes. Climate change adaptation activities included conservation agriculture<sup>4</sup>, strengthening the agricultural extension system, crop diversification, and market linkages. The SADP helped smallholder farmers to move from subsistence farming towards commercial agriculture. A €1 million *Marketing Investment Fund* was established to strengthen the link between farmers and the market (e.g., producers were linked to food processing factories)<sup>5</sup>.

*N.B. At time of writing this StrEA, the final SADP evaluation report was not available. This is unfortunate, as the lessons learnt from the SADP could have further informed this work.*

### 3.1.8 Smallholder Agricultural Issues & Challenges:

Key points that summarize smallholder agriculture in Swaziland include (WB 2011b):

- The agricultural sector has low productivity overall (in part due to droughts, chronic underinvestment, and the HIV/AIDS epidemic);
- Smallholder farm productivity and production is declining;
- Food production has failed to keep pace with population growth;
- Food insecurity is increasing (especially in rural areas);
- Commercial estates generate >88% of agricultural output and employ 25% of the rural population;
- Smallholder farms, producing maize and livestock, provide 7% of agricultural output, and are the livelihood base of 70% of the rural population;
- Agricultural products account for about 75% of total export revenues<sup>6</sup>;
- The direct contribution of agriculture to GDP is declining, while industrial manufacturing, which uses primary inputs from agriculture, has increased<sup>7</sup>.

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<sup>4</sup> Conservation agriculture advocates: 1. Reduced tilling; 2. Maintaining year-round soil cover; and 3. Cultivating diverse commercial & cover crops. These practices improve / maintain soil health and soil carbon, and help regulate water flow, improve water filtration, minimize water runoff / erosion, and help retain soil moisture. Conservation agriculture requires a change in tillage equipment (which is an obstacle to farmers who have invested in conventional equipment). The climate benefits of applying conservation agriculture in Swaziland still need to be clearly demonstrated to change ingrained practices and to ensure large-scale uptake (ERC 2015).

<sup>5</sup> Source: <http://www.fao.org/in-action/swaziland-looks-to-a-revitalized-agriculture-sector/en/>

<sup>6</sup> The main agricultural exports in 2008 were sugar, edible concentrate, wood pulp, pineapple, & citrus fruits.

<sup>7</sup> The agricultural sector's share of GDP has steadily decreased from about 30% in the late 1960s to 10% in 2009. Of note, agriculture is still very important to Swaziland's population and economic development, as agricultural output is also the raw material for about 1/3 of the value added goods within the manufacturing sector. Agriculture also significantly contributes to export earnings. The contribution of agriculture to GDP

SNL households produce crops under rain-fed conditions, using basic technology and SNL farmers generally have limited access to credit. Various other factors inhibit a more efficient land use and a greater investment in SNL smallholder agriculture, including:

- Lack of clarity and lack of documentation for SNL<sup>8</sup>;
- Land fragmentation affects the viability of commercially-oriented agriculture;
- Lack of clarity in the legal framework governing commercial investors' access to land reduces investment in commercial agriculture;
- Government SNL could attract private sector investment, but large areas of government land are occupied by informal settlements; many of the farms are in poor condition due to long periods of disuse and underinvestment;
- There is insufficient coordination and overlapping mandates across the 3 key ministries (MOA, MNRE, and MEPD) and the Land Management Board (i.e., the traditional and constitutional structures that govern land management and administration) (WB 2014).

According to the World Bank (2011b), SNL smallholder agriculture has three main constraints:

- A. Productivity and competitiveness;
- B. Policy implementation and expenditure management;
- C. Public capacity to deliver essential goods and services. These three (3) constraints, along with potential improvements, are discussed below.

## **A. Productivity and Competitiveness**

Productivity and competitiveness aspects are discussed below.

- i. *Old technology*: Most smallholder farmers have not adopted new technologies. Crop production has declined and the area planted to crops has decreased. The carrying capacity of communal grazing areas has declined, with signs of soil erosion and land degradation.
- ii. *Low availability and high cost of inputs*: Smallholder farmers have limited access to credit and often cannot afford to buy fertilizers and other inputs. Most agricultural inputs are supplied by a very few companies, linked to parent companies in South Africa. The agricultural inputs are not priced competitively.
- iii. *Absence of value-adding activities*: The constraints to value addition include:
  - Limited value addition (e.g., limited agro-processing & packaging, and few value chains);
  - Lack of established producer–market linkages and partnerships;
  - Sub-optimal environment to promote local investment in agro-industry;
  - Weak producer organizations;
  - Weak technical, business, and marketing skills of rural entrepreneurs;
  - Limited access to market information;
  - Insufficient number of qualified service providers.

### **Potential to Improve the Productivity and Competitiveness of the Smallholder**

Eight points are highlighted to improve the productivity and competitiveness of the smallholder.

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typically fluctuates because of the variable rainfall, which results in poor harvests in certain years. The overall decrease in agriculture's GDP is partly due to a weakened economy, a large variation in rainfall, and a series of droughts (MTEA 2012; FAO 2005).

<sup>8</sup> Smallholders don't have land security. There is therefore little incentive to invest in productivity-enhancing technology and little ability to negotiate more effective use of SNL land through renting or leasing. This land insecurity encourages inefficient use of resources, especially the land-grazing resource, which leads to land degradation.

- i. *Promote labour-saving technologies:* The sharp decline in the on-farm labour supply due to HIV/AIDs means that smallholder farmers need labour-saving technologies to facilitate farm operations and to reduce the household work burden<sup>9</sup>.
- ii. *Make efficient use of water resources:* To reduce the vulnerability of rainfed agriculture, increase the water available for crops and livestock through irrigation, water-storing facilities, and on-the-field water harvesting techniques. Water conservation and water efficiency are also relevant.
- iii. *Integrate crops and livestock:* The integration of crops and livestock<sup>10</sup> could play a key role in Swaziland's sustainable intensification of agriculture, given the large livestock population, extensive communal grazing land, and limited availability of arable land.
- iv. *Adopt and adapt conservation agriculture:* In addition to integrating crop–livestock systems, conservation agriculture needs to be further adapted to the conditions in Swaziland.
- v. *Expand use of improved inputs:* Farmers need to make greater use of improved inputs (e.g., seed varieties and fertilizer), but demand and supply issues need to be addressed<sup>11</sup>.
- vi. *Facilitate access to markets and further develop agricultural marketing strategies:*
  - There are few rural roads and few physical markets meaning that farmers often have to travel long distances to sell their produce, which increases production costs;
  - Domestic markets are often inundated with imported, lower-priced RSA products.
  - Various institutions were established to support marketing: NAMBoard, the National Maize Corporation (NMC), the Swaziland Dairy Development Board (SDDDB), and the Swaziland Cotton Board (SCB). However, the institutions don't reach most farmers and some may have some conflicts of interest.
- vii. *Strengthen farmers' organizations:* Strong Farmers' Organizations could:
  - Increase the farmers' negotiating power to obtain better input-and-output prices;
  - Allow farmers to fully participate in the formulation of agricultural policy;
  - Facilitate access to important information (e.g., climate, prices, pests, and markets).
- viii. *Develop quality and safety standards:* Swaziland needs to develop its own standards for local and imported agricultural products. Currently, small-scale farmers cannot meet some of the high standards in international markets, whereas imports are not subject to adequate standards.

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<sup>9</sup> Given the HIV/AIDS epidemic, many households are now headed by women, who also take care of children, the sick, and the elderly. Labour-saving agricultural tools, farm implements, and household technologies, such as fuel efficient stoves, domestic roof water harvesters, animal carts, and basic food processing equipment – *smallholder-oriented farm technologies (SFT)* – need to be promoted.

<sup>10</sup> Examples of integrated crop–livestock systems include: zero-grazing/contained feeding, improved natural pastures, cultivating fodder resources in rotation with food crops, and use of manure as fertilizer.

<sup>11</sup> Experience suggests that “starter packs” or “mini-kits” can be used to promote the uptake of improved seeds and fertilizer and to address lack of knowledge or financial resources.

## B. Policy Implementation and Expenditure Management

Two points are highlighted below on policy implementation and expenditure management.

- i. *Weak policy implementation:* Important policies (e.g., land policy) remain in draft and other policies await approval. MOA needs to provide more strategic guidance, leadership, and coordination to implement existing agricultural policies. Budget spending must be aligned with policies and programs. National and donor support to agriculture has been fragmented, poorly coordinated, and implemented through projects.
- ii. *Weak absorption capacity:* GOS has increased the agricultural sector budget, but MOA's absorption capacity may be insufficient.

### **Potential to Improve Policy Implementation and Expenditure Management**

Two points are highlighted to improve policy implementation and expenditure management.

- i. *Improve coordination in planning and implementation:* The comprehensive agricultural sector development policy and strategy framework needs to be supported through better coordination and through a medium-to-long-term support 'programme', not projects.
- ii. *Increase quantity and improve quality of public funding:* Some activities critical to increasing agricultural productivity are underfunded. MOA should identify opportunities to increase productivity / efficiency. Institutional bottlenecks that limit the sector's absorption capacity should be identified and rectified. Critical functions to improve competitiveness should be carried out.

## C. Public Capacity to Deliver Essential Goods and Services

Four points are highlighted on government capacity to deliver essential goods and services.

- i. *Institutional weaknesses* can be attributed to: Ineffective administrative systems; Poor inter-departmental linkages; Under-qualified staff; Inadequate performance incentives; High staff turnover; Limited capacity to manage information and knowledge; and Limited capacity to plan and monitor activities and to evaluate agricultural activities.
- ii. *The declining effectiveness of public agricultural research* can be attributed to: Chronic underfunding; Difficulty to attract and maintain high quality researchers; Poor linkages between national and international agricultural research institutions; A poorly structured information management system, which hampers dissemination; and Centrally set research priorities, with little participation of end-users in setting priorities.
- iii. *The poor links between research and extension* can be attributed to: Infrequent contact between farmers and extension agents (e.g., not enough agents); Ineffective contact between farmers and extension agents, when contact does occur; Insufficient capacity of extension agents (skills and hardware, e.g., transportation); and Prescriptive / out-of-date technical packages disseminated through extension<sup>12</sup>.
- iv. *Lack of reliable data for decision-making:* There is little reliable data to inform decisions, making it difficult to respond to changing markets or changes in performance of the system.

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<sup>12</sup> The GEF–LUSIP and EU–SADP have supported conservation farming. Government extension services could further focus on the benefits and practice of conservation agriculture and be tailored to farmer demographics, geographic location, size, crop type, and the latest science to ensure a net positive carbon benefit (ERC 2015).

### **Potential to Improve Public Capacity to Deliver Goods and Services**

Four points are highlighted to improve public capacity to deliver essential goods and services.

- i. *Revitalize public institutions, starting with MOA:* The ability of public institutions, including MOA, to prepare strategic plans, collect accurate up-to-date data, prepare analyses to inform policy, share knowledge, and establish results-oriented monitoring and evaluation systems needs to be strengthened. Stronger links are needed between agricultural stakeholders (i.e., Ministries, parastatals, universities, and NGOs). The role of public agencies and parastatals needs to be clarified. A parastatal can perform multiple functions (e.g., as buyer of locally produced commodities, regulator of imports and exports, and direct importer in times of scarcity). Earning income from import levies creates a conflict of interest between the parastatal, local farmers, and other market operators.
- ii. *Modernize public agricultural research:* Key elements include to: set demand-driven priorities to ensure that research responds to needs; focus on adapting imported technologies; and provide adequate funds to researchers to carry out meaningful research.
- iii. *Reorient agricultural extension services:* Key elements could include: move the best technologies from laboratories and research plots to farmers' fields; move away from the traditional top-down extension models; empower farmers to engage in markets and gain access to modern technology and credit; decentralize extension services to maximize local participation; use a demand-driven priority-setting mechanism to match extension services to needs; and promote extension strategies tailored to the needs of *different* smallholders.
- iv. *Strengthen agricultural information systems:* Stronger agricultural information systems are needed to routinely collect, store, and disseminate information on crop-and-livestock production, market conditions for inputs and outputs, and improved technologies.

## **3.2 Agriculture and Droughts**

Most Swazi farmers rely on subsistence farming for their livelihoods. Droughts have exacerbated poverty, reduced agricultural production, crop yields, incomes, food security, water availability, grazing quality, and increased livestock disease outbreaks. Communities have resorted to reactive planning to respond to drought. The extension support services related to drought issues have been inadequate. According to Mlenga (2015), the uptake of mitigation programs has been slow, perhaps due to poor beneficiary targeting, high food-aid dependency syndrome<sup>13</sup>, top-down approach, and insufficient sustainability planning when providing drought relief assistance. GOS and NGOs have implemented various types of response programmes e.g., water supply, conservation agriculture, and food aid. In general, a study found that local beneficiaries were not consulted in the programme design. This same study also found that the most sustainable projects were hardware projects (e.g., water supply), where the role of the beneficiaries was to use and maintain the infrastructure. Projects requiring a change in attitudes and practices were generally less sustainable. To prepare for the next drought, this study highlighted that more early warning information and more appropriate extension services were needed. (See Chapter 5 for more information on climate change and agriculture).

## **3.3 The 11th EDF National Indicative Programme (NIP)**

The EU's 11<sup>th</sup> EDF is informed by the above problem analysis, the *Aid Effectiveness*

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<sup>13</sup> Study respondents (84%) indicated that they just expected to receive food aid in the event of a drought.

*Principles, Swaziland's Poverty Reduction Strategy and Action Plan (PRSAP), the EU Agenda for Change, and the existing EU sector focus*<sup>14</sup>. The indicative allocation is €62 million: Agriculture (€40 million), Social Protection (€15 million)<sup>15</sup>, and Support measures (€7 million)<sup>16</sup>. The 11<sup>th</sup> EDF builds on previous agricultural-sector experiences and successes, including:

- The *Accompanying Measures for Sugar Protocol Countries* to support Swaziland's *National Adaptation Strategy (NAS)*;
- The support to LUSIP I (*Lower Usuthu Smallholder Irrigation Project*);
- The EU/FAO – SADP (*Swaziland Agricultural Development Programme*).

The EU contributed €120 million to support the NAS. The NAS focused on increasing the productivity of small-scale sugarcane growers, developing irrigation infrastructure, establishing farmer companies, and improving road infrastructure to reduce production costs. Some of the lessons learnt in the sugar sector can be transferred to non-sugar commodity chains. The EU supported the development of the LUSIP under the 8<sup>th</sup> EDF, which helped to optimize the NAS irrigation scheme, developing about 2,500 ha. As mentioned in Chapter 3.1.7, the €14.2 million EU/FAO–SADP improved household farming practices through earth dam rehabilitation, demonstration sites for good agricultural practices, and food and nutrition gardens. The 11<sup>th</sup> EDF–Agriculture will continue some of the SADP activities.

To focus the project planning, the NIP summarizes the smallholder agricultural issues discussed in Chapter 3.1.8 under three main constraints:

1. Institutional;
2. Production;
3. Marketing.

The NIP lists these institutional constraints in the agricultural sector:

- Capacity constraints at the Ministry of Agriculture (MOA);
- A low proportion of the national budget allocated to agricultural development (4% in 2013–2014, which is below the 10% stated in the Maputo Declaration);
- Insecure land tenure system and weak land allocation mechanism.

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<sup>14</sup> EU has or is providing support to the following activities:

- *Aid effectiveness*: through the recruitment of a M&E officer at MEDP;
- *SWAp*: through a SWAp coordinator in the education sector; EU will also support the Sector Working Group for agriculture;
- *Governance*: €8.2 million was allocated to the governance programme starting in 2014;
- *Water and Sanitation*: €19 million supports an on going program. €7 million was added to the EU–MDG Initiative in 2012, to further improve access to safe drinking water and sanitation facilities;
- *Health*: There is an €12.5 million administrative agreement with the World Bank;
- *Education*: There is €12.5 for the *Support to Education and Training Programme*; €4 million was added to help complete the roll out of the *Free Primary Education programme* by 2015.

In line with the Cotonou Agreement, the EU supports Non-State Actors (NSAs) in Swaziland as follows:

- NSAs programme (€4.5 million);
- Civil society through the *European Instrument for Democracy and Human Rights* (€1 million);
- Capacity Building Programme for NSAs, under the 10<sup>th</sup> EDF (€1 million);
- NSAs will also be mainstreamed into the 11<sup>th</sup> EDF sectors.

<sup>15</sup> The objective of EU's 11<sup>th</sup> EDF *Social Protection* programme is to provide more social security and access to essential services. It will help overcome challenges / inadequacies within the social sector related to the vision, national social protection strategy, coordination between different stakeholder, and implementation capacity.

<sup>16</sup> A Technical Cooperation Facility is foreseen for about €3.5 million. About €3.5 million is foreseen to support the National Authorizing Office (NAO).

The NIP highlights these production challenges:

- Extreme weather events (floods and drought), land degradation, erosion, and uncontrolled bushfires increase the vulnerability of the farming systems;
- High costs of agricultural inputs;
- Lack of market information to inform production;
- Increasing pressure on and degradation of rangelands;
- Dependence on rain-fed agriculture;
- Dependence on poorly designed or maintained earth dam infrastructure;
- Inadequate and poorly resourced government extension service;
- Other weak or poorly resourced support services (e.g., GOS tractor-hire service);
- Weakened labour force (e.g., the HIV/AIDS epidemic has decreased productivity).

The NIP focuses on two marketing constraints:

- Weak national marketing bodies;
- Limited access to markets (e.g., smallholders can't establish economies of scale).

The 11<sup>th</sup> EDF–Agriculture will:

- Address the institutional, production, and marketing challenges;
- Promote environmentally sound agricultural practices to mitigate and adapt to climate change;
- Focus on commodity chains (1,500 ha allocated to non-sugar crops in LUSIP-1 area)
- Continue, where possible, the earth dam and production activities initiated under SADP, linking these to the commodity chains and to efforts to reduce the food insecurity.

### 3.3.1 The National Indicative Programme (NIP)

The overall objective of the 11<sup>th</sup> EDF–Agriculture is to eradicate food insecurity and contribute to sustainable economic growth. Specifically, the NIP aims to reduce food insecurity from 29% to 15%. The specific objectives (SO) and expected results (R) are:

*SO1: Strengthen institutional capacities:*

- R1.1: Develop and implement a Sector Action Plan (CAADP);
- R1.2: Restructure the Ministry of Agriculture;
- R1.3: Review and implement a regulatory framework for land and water access.

*SO2: Establish environmentally sound high-impact commodity chains to build resilience to climate risks:*

- R2.1: Increase sustainable diversified production (not sugar cane);
- R2.2: Establish storage and collection points;
- R2.3: Improve marketing systems including access to fair trade and/or organic market.

*SO3: Improve food security of subsistence farmers:*

- R3.1: Improve access to agricultural land & water, avoiding deforestation & land degradation;
- R3.2: Improve production and nutrition through good agriculture practices.

The NIP presents three (3) projects to achieve the stated objectives and results:

- The Water Harvesting, Small and Medium Dams Project (WHDP);
- The High Value Crop and Horticulture Project (HVCHP);
- The Livestock Development Project (LDP).

The WHDP, HVHP, and LDP are outlined below.

Source: EU 2014 – NIP



### 3.3.2 The Water Harvesting Dams Project (WHDP)

The WHDP (€15 million) supports the NIP by improving access to water throughout the year. It falls under the MOA's Sector Strategic Plan and the Swaziland National Agricultural Investment Plan (SNAIP), and it supports Swaziland's CAADP process. The purpose is to sustainably enhance smallholders' irrigated crops and livestock production, reduce climate risks through improved water resource management, and promote access to markets. The additional water will improve crop production, and possibly livestock production, allowing subsistence farmers to become more food secure. It will also allow farmers to engage in small-to-medium-scale commercial farming. The MOA will provide oversight and project management. TAs will be based at MOA (Mbabane). MEPD (ACMS) and MOA will jointly monitor the progress. The Steering Committee will conduct the strategic monitoring. The expected results and indicative activities are listed below.

#### 1. Increase water storage capacity (+1.09 million m<sup>3</sup> of storage):

- Plan, design, and construct environmentally and economically sustainable new water storage infrastructure<sup>17</sup> (64 new bulk-water structures on 402 ha);
- Rehabilitate existing schemes<sup>18</sup> (11 rehabilitated schemes on 137 ha);
- Supervise to ensure good quality construction of water infrastructure;
- Develop an appropriate water infrastructure maintenance system;
- (Install) rooftop water harvesting units<sup>19</sup> (50 units at public facilities);
- Identify and implement appropriate climate change adaptation measures<sup>20</sup>.

#### 2. Enhance the production capacity of smallholders:

- Adopt participatory planning approaches to ensure effective participation of project beneficiaries; mobilize the community, based on the CDP approach;
- Form and train smallholder producer groups (75 business groups; 37 female-headed);
- Develop downstream farms (e.g., develop land and establish sustainable, viable farm irrigation systems in the dam areas<sup>21</sup>; provide small watering points for cattle; and consider environmental and health aspects) (539 ha irrigated; 40 cattle water points installed);
- Provide effective extension services to the farmer groups<sup>22</sup>;
- Strengthen market linkages by adopting a value chain approach to include analysis of the demand side, market links, and private sector participation<sup>23</sup>;
- Form Water User Groups (WUG) and provide training.

#### 3. Strengthen institutional capacity:

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<sup>17</sup> Examples of new bulk-water structures are: small & medium dams (& spillways), weirs (diversion dams), and off-stream water harvesting reservoirs. Location: mostly in the moist Middleveld area.

<sup>18</sup> The existing schemes may have a sub-optimal design, or have become dysfunctional due to siltation.

<sup>19</sup> Building on the experience of the MOA, SWADE, and NGOs, public facilities (e.g., schools and health centres) will be targeted for the rooftop water harvesting units, using a grant mechanism (< €100,000).

<sup>20</sup> This will entail the review and analysis of the available agro-climatic data, hydro-meteorological data, and projected changes to identify and prepare irrigation schemes. Climate change adaptation (CCA) measures will include watershed management to reduce run-off.

<sup>21</sup> Irrigation will be gravity fed, avoiding the use of pumps. The work will be implemented through using small contracts under the programme estimates; MOA and project staff will conduct supervision.

<sup>22</sup> The extension services will cover all identified needs, including environmental aspects (e.g., climate-smart farming practices and the sustainable use of fertilisers and pesticides).

<sup>23</sup> The project will collaborate with the HVCHP zones to ensure that successful approaches are incorporated.

- Adopt land use planning approaches based on community-based CDP planning (including basic principles of watershed management);
- Improve access to and use of available water-related data resources;
- Develop capacity and skills to use water resource databases and computer-based planning;
- Conduct a baseline survey;
- Establish appropriate consultation mechanisms on water resources development;
- Provide technical assistance to support project management by 2018 and TA for rural engineering by 2017<sup>24</sup>;
- Develop manuals on design, operation, and maintenance of small-to-medium-sized irrigation schemes and on project management (~ 75 O & M plans).

The WHDP will be nationwide, but with a focus on the moist Middleveld. Table 8 below provides a tentative list of scheme types.

**Table 8: Summary of the WHDP Schemes**

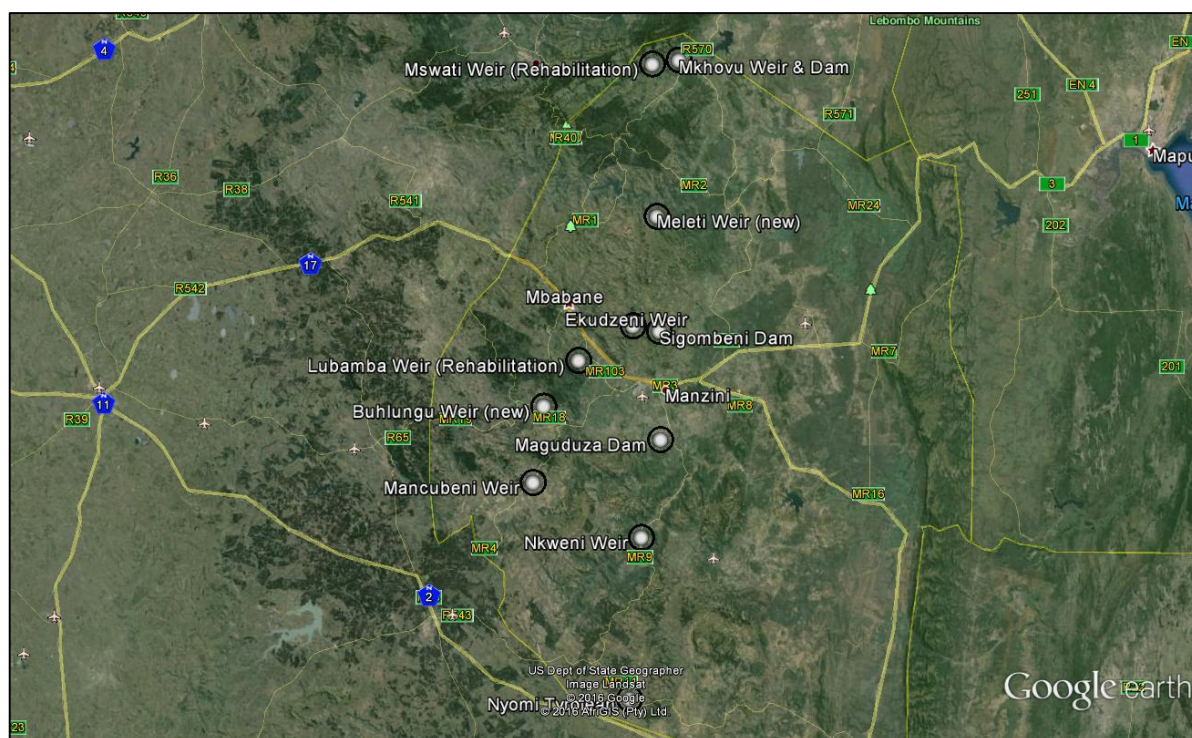
Irrigation Scheme			Number of Schemes		Area Irrigated (ha)		Number of Households		Number of Population	
Type	ha	Structure	New	Rehab	New	Rehab	New	Rehab	New	Rehab
Micro Systems	< 5 ha	Dam	5	2	24	12	14	10	98	70
		Weir	4	3	20	11	16	9	112	63
		Reservoir (H)*	17	-	17	-	26	-	182	-
		Reservoir (L)*	18	-	11	-	17	-	119	-
		Sub-total	44	5	72	23	73	19	511	133
Small Systems	5 to 15 ha	Dam	8	2	90	28	72	22	504	154
		Weir	4	1	50	10	40	8	280	56
		Sub-total	12	3	140	38	112	30	784	210
Medium Systems	15 to 50 ha	Dam	5	2	120	60	96	48	672	336
		Weir	3	1	70	16	56	13	392	91
		Sub-total	8	3	190	76	152	61	1064	427
Totals			64	11	402	137	337	110	2,359	770
TOTALS			75		539		447		3,129	

**Source:** EU 2015f – WHDP. **Note:** \* (H)=Highveld; \* (L)=Lowveld.

*N.B. The WHDP was about to be signed during this consultancy, and preparatory activities (e.g., site selection) were on going. The StrEA in this case could provide some input to project formulation. See the footnote<sup>25</sup>. Figure 4 shows the location of the first batch of dams identified for the WHDP.*

<sup>24</sup> The WHDP will take over the TA of the EU-funded Accompanying Measures for Sugar Protocol countries.

<sup>25</sup> The StrEA team reviewed some of the proposed dam sites and has identified some risks. The potential climate change impacts on the sustainability of the dam and related agriculture may not be sufficiently integrated into the dam designs. The designs use long-series historical climate data (50 years), rather than more recent climate data. Recent data is more variable, as climate change and climate variability become more evident. Long-series data decreases the extent and significance of this new, more recent reality. The overall impression is that the engineering decisions for the EDF dams should more fully integrate



**Source:** Compiled by authors.

The HVCHP (€13.850 million) supports Swaziland's Comprehensive Africa Agricultural Development Programme (CAADP) and falls within the MOA's Strategic Development Plan. The HVCHP supports PRSAP by empowering the poor to generate income; it supports the national agricultural policies, strategies, and action plans by reducing dependence on rain-fed agriculture through expansion of smallholder irrigation schemes. It will build on previously supported EU projects in the sugar-, irrigation-, and water-harvesting sub-sectors (e.g., LUSIP I and SADP). It will build on the established mandates and capacities of the SWADE (e.g., irrigation schemes development and extension services) and NAMBoard (e.g., facilitation of trade, transport, and storage).

The HVCHP aims to improve security of land tenure, access to credit, technical know-how, and markets to improve the horticulture value chain. Gender aspects will be integrated into the project implementation, notably by ensuring women's access to land and water. The HVCHP will provide some strategic support to MOA, but TA support will be based at decentralised offices. The MEPD (NAO) is the contracting authority; MoA will supervise and SWADE will manage and implement the HVCHP. The HVCHP objective is: '*to contribute to the reduction of poverty by creating pro-poor growth, securing livelihoods of smallholder farmers and providing locally produced diversified food on the market*'. The HVCHP will establish commercial high-impact horticultural commodity chains by strengthening market findings, production planning, production, packing, and product collection<sup>26</sup>.

projected climate change effects (e.g., increased storm run-off). It is also noted that community mobilisation modalities need to fully recognise local needs and circumstances.

<sup>26</sup> Challenges specific to Swaziland's horticulture value chain include: 1. Nascent value chain not providing reliable markets; 2. Information not systematically available on market demand and prices; 3. Scattered / limited production near some water harvesting projects and diseconomies of size; 4. Limited extension services that are not matching the level of support needed; 5. Absence of the private sector service industry at the production level; and 6. Limited logistical capacities (e.g., transport and storage).

The expected results and indicative activities are listed below.

1. *Identify and supply national, regional, and international markets with high quality produce:*

- Supervise and regulate the commodity chains (MOA);
- Update 10 extension packages e.g., irrigation maintenance, and HACCP<sup>27</sup> and GAP certification<sup>28</sup>;
- Establish an Agriculture Marketing Information System;
- Provide Agriculture Marketing Information (NAMBoard);
- Provide trucks for NAMBoard;
- Establish three (3) cold stores at national markets (e.g., Mbabane, Manzini, and Mhlanya).

The location is nationwide, with oversight from Mbabane. The NAMBoard head office is in Manzini, and the extension services will cover the regions.

2. *Develop land and strengthen farmer companies (FCs) to profitably produce a range of high value commodities<sup>29</sup> in the LUSIP I area:*

- Facilitate a community planning process that results in Chiefdom Development Plans (CDPs);
- Form and train Farmer Companies (FCs) (to facilitate) business planning (20 by 2018);
- Develop land (e.g., bush clearing and land preparation) (1,150 ha by 2018);
- Install irrigation equipment on new land;
- Install small-scale equipment (e.g., cropping tunnels and refrigerated sheds);
- Develop FC business plans;
- Provide market information to inform crop selection and marketing (NAMBoard);
- Provide extension services and training to FCs on agricultural and horticultural techniques, post-harvest technology, and marketing;
- Support SWADE and NAMBoard in providing high-quality extension, business development support to FCs, and support for HACCP and GLOBAL GAP certification.

<sup>27</sup> Hazard Analysis and Critical Control Points (HACCP) certification is a management system that addresses food safety through the analysis and control of biological, chemical, and physical hazards – from raw material production to consumption of the final product.

<sup>28</sup> FAO has a summary of GAP practices (Good Agricultural Practices).

<sup>29</sup> The definition of a 'high value crop' was unclear during the scoping period, but was clarified in Feb. 2016. For this StrEA, 'high value crops' are defined as listed in the below table.

High Value Crops		Important Crops
Conventional Vegetables and Fruits with High Demand	Baby vegetables, herbs, and spices (usually for export)	Crops that are important due to demand or scarcity
Potatoes; onions; carrots; beetroot; Peppers (green, red, & yellow); Tomatoes (esp. long-shelf life); Banana; mangoes; * stone fruits (plum, peach, & nectarine).	Cucurbits (baby marrow, patty pan, & baby gem); Baby corn & sweet corn; Baby cabbages (green & red); Baby beans and peas.	** Sweet potatoes; Taro; Other root crops.

**Notes:** \* Stone fruits are better suited to the higher lying areas of the country. \*\* Sweet potato is a key export crop. The list of 'high value crops' can change, based on market and/or farmer preference.

Source: Feb. 2, 2016 email communication with Mr. Tammy Dlamini, NAMBoard.



Targets include producing 7,000 tons (mt) of high value crops annually by 2018 and to market

6,000 mt – up from the 2,800 mt marketed in 2013. The location of this activity is the LUSIP I area. The project will be managed by SWADE's Siphofaneni office in Lubombo Region.

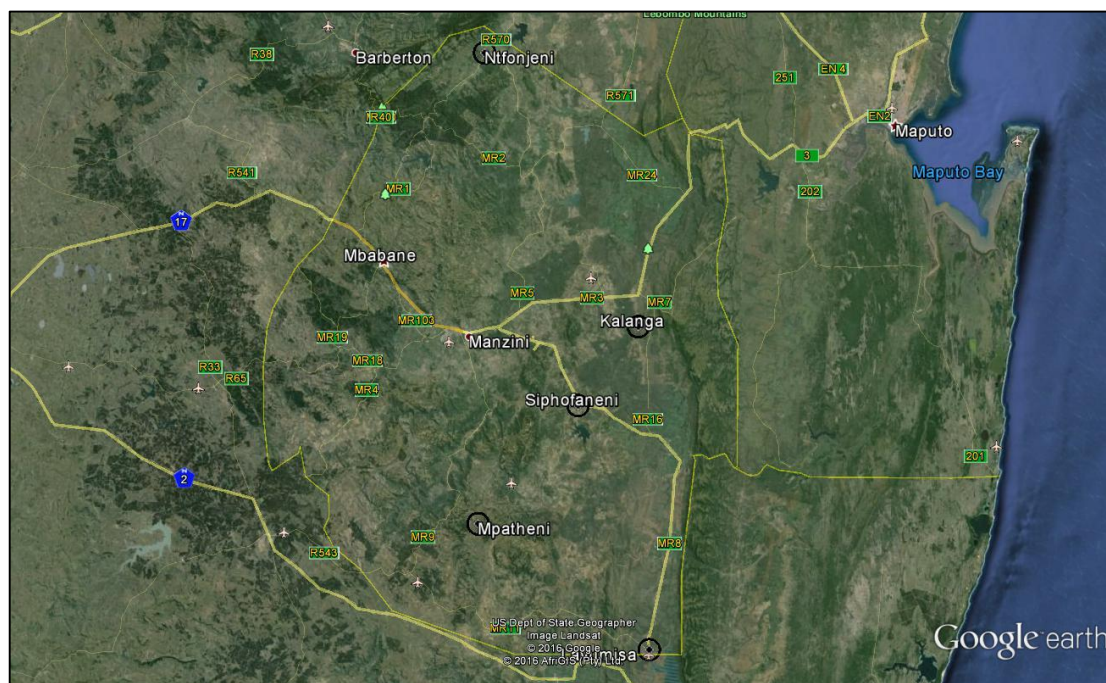
3. *Develop pack house hub-based zones (in areas of water seasonality):*

- (Facilitate) community planning, resulting in CDPs;
- Form Farmer Organisations / water user associations;
- Establish access to finance through linkages made with Development Finance Institutions;
- Plan the pack house zones (*3 pack house zone plans by 2015*);
- Build the pack houses (to collect, store, refrigerate, and market produce) (*3 pack houses built and operational by 2016*); there are 2 existing packhouses: one in LUSIP and another in Matsapha;
- (Provide) pack houses with processing equipment and infield refrigerated sheds;
- Establish a management system structure for pack houses (pilot different approaches);
- Design / construct / upgrade / rehabilitate / de-silt water supply systems for irrigation, as required (SWADE) (*12 small dams rehabilitated / built by 2018*);
- Provide training (e.g., on business and governance) and monitor Farmer groups (SWADE);
- Provide Agriculture Marketing Information (NAMBoard).

Targets include having 150 ha under production at each hub, producing 3,000 tons, of which 2,400 tons will be marketed (up from a national total of 200 ha outside LUSIP in 2013). The pack house hubs will provide farmers with various technical, financial, marketing, and business-support services. The potential pack house locations include Lavumisa, Mpatheni, Ntfontjeni, and Kalanga (EU 2015a –HVCHP) (see Figure 5).

*Of note, the HVCHP has started implementation. The role of this StrEA in this case was limited to greening the planned activities, where possible. The StrEA team could not assess location alternatives.*

**Figure 5: The Location of the Packhouse Hubs**



**Source:** Compiled by authors.

### 3.3.4 Livestock Development Project (LDP)

The overall objective of the LDP (€11.15 million) is to improve the livelihood of smallholder livestock producers on Swazi Nation Land (SNL). The LDP will enhance market-oriented smallholders' livestock production and will improve human nutrition in the project areas. The expected results and indicative activities of the LDP are listed below (EU 2015c – LDP).

#### 1. *Improve Livestock Productivity:*

- Develop a livestock breeding policy and breeding support activities for small producers;
- Improve livestock husbandry support services and applied research<sup>30</sup>;
- Improve livestock productive health through strengthening animal health surveillance and associated preventative management regimes;
- Improve rangeland management, based on the adoption of community-based approaches (including group ranching);
- Promote fodder trees and shrubs in the rangelands, including rangeland site selection with access to perennial water points;
- Invest in the operation and development of two government beef farms under new tenure arrangements.

#### 2. *Strengthen smallholders' access to the livestock market:*

- (Provide) ICT-based market information in collaboration with NAMBoard;
- Establish "dip-tank"-based marketing organisations;
- Up-scale mini feedlots;
- Improve local market facilities (PPP);
- Review and up-grade products and market standards.

#### 3. *Develop smallholder dairy herd, human diet, and local processing and marketing capability:*

- Supply appropriate dairy livestock to targeted smallholders;
- Invest in the Gege farm, as a viable dairy breeding and commercial dairy demonstration farm;
- Invest in local smallholder enterprises to process and market smallholder dairy produce;
- Support improved diet diversity.

*Of note*, the LDF is currently under identification. The StrEA in this case can assist with formulation.

## 3.4 Alternatives

The NIP aims to introduce improved methodologies and approaches to:

- Increase the contribution of agriculture to economic development;
- Reduce rural poverty;
- Improve food and nutrition security.

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<sup>30</sup> According to the project concept paper, this will be undertaken by the Swaziland National Agricultural Research Agency (SNARA) (still to be formally established) in collaboration with the Centre for Coordination of Agricultural Research and Development in Southern Africa (CCARDESA).

The NIP seeks to achieve the above-listed goals by implementing three core projects:

- The High Value Chain and Horticulture Project (HVCHP);
- The Water Harvesting Small and Medium Scale Earth Dam Project (WHDP);
- The Livestock Development Project (LDP).

Based on the analysis of the TORs and the scoping-period results, the Consultants proposed during the scoping period to analyse up to 3 alternatives during the detailed StrEA. The 3 proposed alternatives are briefly described below. Alternatives 1 and 2 are mandatory within any strategic environmental assessment process. It should be noted that given that the HVCHP is already under implementation, this StrEA could *not* evaluate location alternatives for the HVCHP. Instead, it was proposed, time allowing, that Alternative 3 would evaluate various technology scenarios under the WHDP project.

***Alternative 1: Evaluate the no-plan alternative***

This no-plan alternative will evaluate the biophysical, social, and institutional impacts of the current agricultural practices on the existing environmental and social trends. That is, it will look at the impacts of continuing with the existing situation, without the 11<sup>th</sup> EDF–Agriculture. It serves as the baseline.

***Alternative 2: Evaluate the implementation of the 11<sup>th</sup> EDF in full (and its 3 projects)***

This alternative will evaluate the biophysical, social, and institutional impacts associated with the full implementation of the 11<sup>th</sup> EDF–Agriculture and all of its described activities.

***Alternative 3: Evaluate various technology scenarios under the WHDP***

This alternative (time allowing) will compare and evaluate various technology scenarios for the WHDP to maximize the benefits and minimize the impacts of the WHDP. The scenarios are:

- Implement the WHDP as planned;
- Increase the number of new bulk-water storage structures (from 64 to 80)<sup>31</sup>;
- Increase the number of rehabilitated schemes (from 11 to 22)<sup>32</sup>;
- Increase the number of rooftop water harvesting units (from 50 to 300 units)<sup>33</sup>.

There was insufficient time and resources to conduct the evaluation of Alternative 3.

Chapter 6, Impact Identification and Evaluation, shows the results of the evaluation of Alternatives 1 and 2.

### **3.5 General Geographical Scope**

The 11<sup>th</sup> EDF–Agriculture and its three core projects will be implemented across Swaziland (Figure 6). The HVCHP will however focus on the LUSIP I area (Siphofaneni in the Lowveld); the WHDP will focus on the moister Middleveld.

The LDP will have a national focus for some activities (e.g., breeding policy, strengthening health surveillance, and information systems), and some very point-specific activities (e.g., possibly the Gege farm in south west Swaziland, some rangeland management plots, and some smallholder enterprises).

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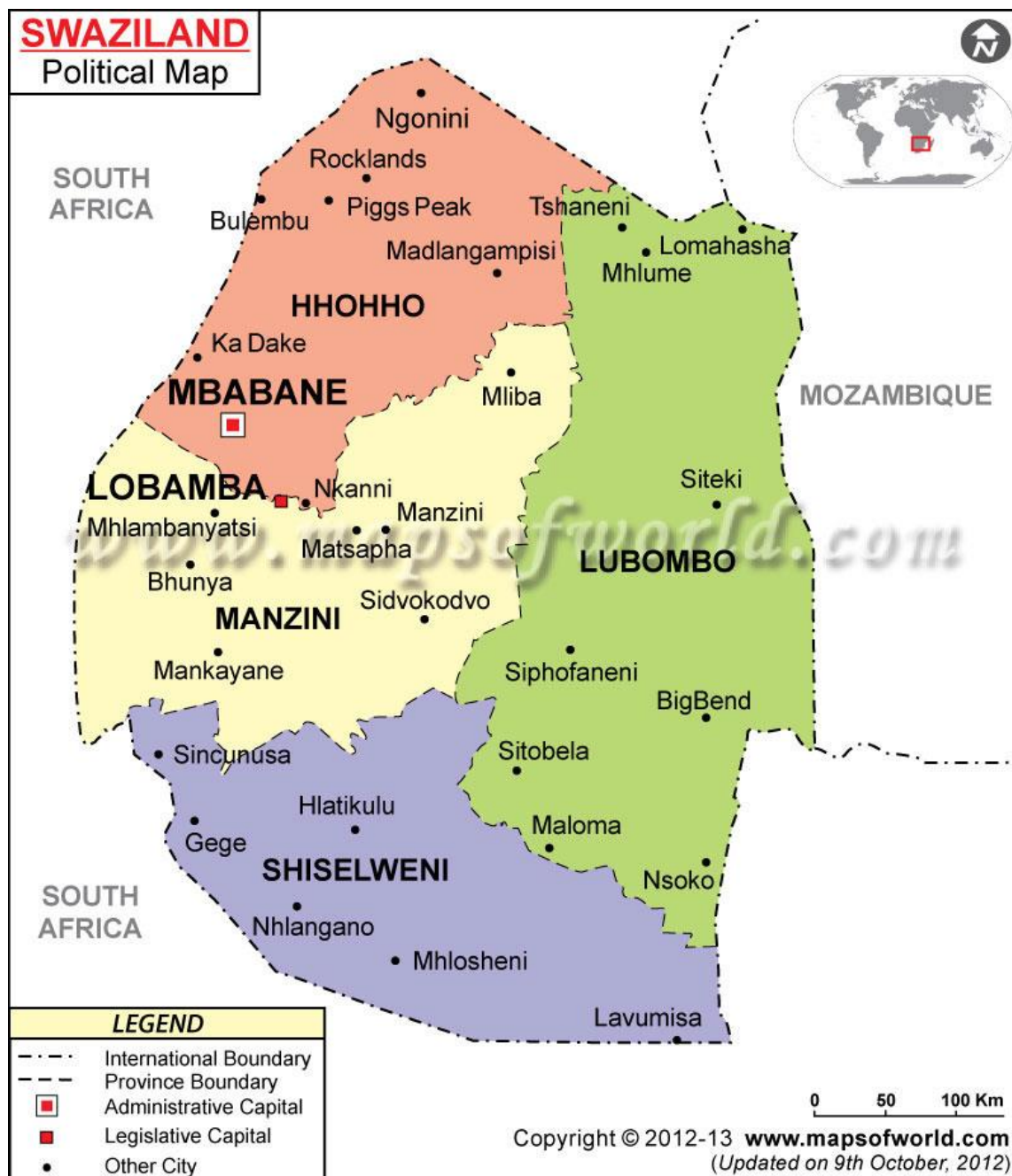
<sup>31</sup> This would decrease the number of rehabilitated schemes and water harvesting units.

<sup>32</sup> This would decrease the number of bulk-storage structures and water harvesting units.

<sup>33</sup> This would decrease the number of bulk-storage structures and rehabilitated schemes.



**Figure 6: The 11th EDF –Agriculture Programme Covers Swaziland’s Four Regions**



Source: <http://www.mapsofworld.com/swaziland/swaziland-political-map.html>

## 4 The Policy, Legal, and Institutional Framework for the Agricultural Sector and for Environmental Management

The policy, legal, and institutional framework review was initiated during the scoping period to help identify stakeholders and key issues, and to help develop the evaluation framework. Chapter 4.1 lists the 68 instruments that were selected for further detailed study. Chapter 4.2 presents the *Framework for Environmental Management* and Chapter **Error! Reference source not found.**, the *Key Institutional Responsibilities of Core Institutions*.

## 4.1 The Policy and Legal Framework for Agriculture

More than 110 policy/legal instruments and plans were identified as being relevant to this StrEA during the scoping period. Summaries of the various instruments were extracted either from existing literature (e.g., EU 2006 and WB CPS 2014) or reviewed in full by the StrEA consultants. Table 9 lists the instruments that were retained and subjected to the compatibility assessment during this StrEA. The results of that compatibility assessment (presented in *Chapter 6.2*) provide rich input to the *Environmental, Social, and Climate-Risk Management Plan* presented in *Chapter 7* and to the recommendations and conclusions presented in *Chapter 9*.

**Table 9: The Policy and Legal Instruments Reviewed in More Detail during the Detailed Study**

#	<b>National Level Instruments</b>
1	2005 National Constitution Act
2	2015 Dam Safety Regulation (Final Draft)
3	2014 Programme of Action 2013–2018: Development Unusual
4	2010 Fiscal Adjustment Roadmap (FAR) & update
5	2010 National Gender Policy
6	2010 / 2002 Tourism Policy
7	2009 Land Policy (draft)
8	2009 National Water Policy (draft)
9	2009 / 2010 Integrated Water Resources Master Plan (draft)
10	2009 The National Multi-sectoral Strategic Framework for HIV and AIDS (2009 – 2014)
11	2009 National Energy Policy Implementation Strategy
12	2008 Government Programme of Action 2008–2013 (GPA)
13	2008 Towards a Sector Wide Approach (SWAp)
14	2005 National Irrigation Policy (draft)
15	2005 Poverty Reduction Strategy and Action Plan (PRSAP)
16	2005 Decentralization Policy
17	2005 National Food Security Policy (NFSP)
18	2005 Strategic Brief for National Food Security and Agricultural Development (SBNFSAD)
19	2003 The Water Act (WA)
20	2002 National Environmental Health Policy
21	2002 The National Rural Resettlement Policy (NRRP)
22	2001 The Occupational Safety and Health Act No 9 & 1999 The Public Health Bill
23	1999 National Development Strategy / Vision 2022
24	1998 The Swaziland Administration Order
25	1997, 1985, 1980 Employment Act
26	1996–2006 National Physical Development Plan
27	1983 The Workmen's Compensation Act
28	1972 Factory, Machinery & Construction Works Act
29	1964 The Wages Act No 16
#	<b>Agricultural Sector Instruments</b>
30	2015 Swaziland National Agricultural Investment Plan (SNAIP)
31	2013 National Agricultural Extension Policy of Swaziland (NAEPS) (Draft)
32	2012 Final Agricultural Research Policy
33	2012 Scaling up Conservation Agriculture in Swaziland: A Strategic Plan 2013–2016
34	2010 Swaziland CAADP & 2003 CAADP & 2001 NEPAD programme
35	2005 Comprehensive Agricultural Sector Policy (CASP)
36	1995 The Livestock Development Strategy Policy
#	<b>Key National Environmental Management Instruments</b>
37	2012 Biosafety Act & 2009 Biosafety Bill
38	2010 The Water Pollution Control Regulations
39	2002 Environmental Management Act
40	2002 National Forest Policy & 2002 Forest Bill
41	2001 National Biodiversity Strategy and Action Plan
42	2001 Flora Protection Act

43	2000 Environment Audit, Assessment and Review Regulations
44	2000 Waste Regulations
45	1999 NAP for the Convention to Combat Desertification
46	1999 National Environment Policy (Draft)
47	1997 National Environmental Action Plan
48	1991 / 1953 The Game Act
49	1981 The Plant Control Act
50	1938 / 1937 The Protection of Fresh Water Fish Act
#	<b>Climate Change and Disaster Management Instruments</b>
51	2015 Paris Agreement; Swaziland's INDC; FNC & SNC; UNFCCC; 1997 Kyoto Protocol
52	2014 National Climate Change Policy
53	2014 National Climate Change Strategy and Action Plan 2014–2019
54	2006 Disaster Management Act (& other instruments)
#	<b>International and Regional Agreements</b>
55	EU Policy and Development Framework
56	2006 / 2002 International Treaty on Plant Genetic Resources for Food and Agriculture
57	2004 / 2001 Stockholm Convention on Persistent Organic Pollutants (POPs)
58	1996 / 1994 UN Convention to Combat Desertification
59	1993 / 1992 UN Convention on Biological Diversity
60	1992 / 1989 Basel Convention on the Transboundary Movement of Hazardous Wastes & Disposal
61	1989 / 1987 Montreal Protocol on Substances that Deplete the Ozone Layer & Vienna Convention
62	1983 / 1979 Convention on the Conservation of Migratory Species (CMS) of Wild Animals & AWEA
63	1973 Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)
64	1971 Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)
65	The Millennium Development Goals (MDGs)
66	2003, 2000, & 1998 Revised Protocol on Shared Watercourse Systems in the Southern African Development Community (SADC) Region
67	2002 Tripartite Interim Agreement between the Republic of Mozambique, Republic of South Africa, and the Kingdom of Swaziland for Co-operation on the protection and sustainable use of the water resources of the Incomati and Maputo watercourses
68	2000 Lubombo Conservancy–Global Transfrontier Conservation Area Protocol

Overall, Swaziland has an extensive, but fragmented and out dated policy and legal framework. The main issue according to EU 2006 is that the enforcement of legislation is weak, partly due to inadequate technical and human capacity and institutional coherence. Another issue is that many important instruments (e.g., the Land Policy) remain in draft.

On a positive note, *Chapter 6.2, Compatibility of the 11th EDF (Agriculture) with Various Policy and Legal Instruments*, highlights that much could be gained from implementing the existing framework: 100s of relevant mitigation measures are directly extracted from the policy and legal framework (and used to develop the management plan for this StrEA presented in Chapter 7).

## 4.2 Swaziland's Framework for Environmental Management

These four (4) key environmental-management framework documents are summarised below.

- 1997 Swaziland Environmental Action Plan (SEAP);
- 1999 National Environment Policy (Draft);
- 2000 Environmental Audit, Assessment and Review Regulations;
- 2002 Environmental Management Act.

### 1997 National Environmental Action Plan (SEAP)

The main framework objectives of the 1997 SEAP include to:

- Promote, enhance, protect, and conserve the environment;
- Make the best use of the country's natural and human resources.

### 1999 National Environment Policy (Draft)

The main focus of this *draft* policy includes to:

- Promote environmental assessment of policies, plans, and programmes;
- Promote the enhancement, protection, and conservation of the environment;
- Attain sustainable development in Swaziland.

### 2000 Environment Audit, Assessment and Review Regulations (No. 30/ 2000)

These regulations outline Swaziland's environmental assessment process. As an interim measure, the Swaziland Environment Authority (SEA) has proposed that country StrEAs closely follow the requirements of the EIA process. EIA reports (and hence, StrEA reports) must have the following chapters:

- Executive Summary;
- Introduction;
- Description of Project and Reasonable Alternatives;
- Description of Environment;
- Prediction and Evaluation of Impacts;
- Analysis of Alternatives and Selection of Preferred Option;
- Impact Management Plan;
- Consultations.

The content of this StrEA comply with the EIA chapter requirements.

### 2002 Environment Management Act

This Act, among other objectives:

- Promotes the enhancement, protection, and conservation of the environment and the sustainable management of natural resources;
- Establishes the precautionary principle, which calls for actions to address significant impacts even in the absence of absolute scientific certainty.

## 4.3 Roles and Responsibilities of the Institutions Most Relevant to the 11<sup>th</sup> EDF Programme

Table 10 lists the core ministries and institutions and a number of other ministries that have a role in coordinating and implementing policies that directly or indirectly affect the agricultural sector and the 11<sup>th</sup> EDF.

**Table 10: The Institutional Framework for Agriculture and Environmental Management**

<b><u>Government Ministries</u></b>
Ministry of Economic Planning and Development (MEPD)
Ministry of Agriculture (MOA) (various departments and sections)
Agricultural Sector Working Group
Ministry of Natural Resources and Energy (MNRE) (e.g., Department of Water Affairs and DWA)
Other Water Groups (River Basin Authorities and Transboundary Water Committees)
Ministry of Tourism and Environmental Affairs (MTEA) (e.g., Climate Change Unit and Swaziland

Meteorological Services)
National Climate Change Committee (NCCC)
National Climate Change Research Group
<b>Parastatal Organizations</b>
The National Agricultural Marketing Board (NAMBoard)
The Swaziland Water and Agricultural Development Enterprise (SWADE)
The Swaziland Dairy Board (SDB)
Swaziland Environment Authority (SEA)
Swaziland National Trust Commission (SNTC)
University of Swaziland (UNISWA)
National Disaster Management Agency (NDMA)
<b>Farmers and Farmers' Organisations</b>
Swaziland National Agricultural Union (SNAU)
Farmers' Organizations (e.g., farmers' companies and farmer groups)
Individual Farmers
Water Users' Associations (WUAs)
<b>NGOs</b>
African Cooperative Action Trust (ACAT)
World Vision (WV)
Cospe
Technoserve
<b>Regional Governments &amp; Municipalities</b>
<b>Private Sector</b>
Importers, Exporters, Transporters, Wholesalers, and Retailers
Consultants
<b>Other International Partners</b>
AfDB, UNDP, JICA, World Bank, FAO, and others
International Fund for Agricultural Development (IFAD)
The Export-Import Bank of India (Exim Bank)
Republic of China (Taiwan) (has an agricultural mission in Swaziland)

Only a few institutional roles are outlined below.

**Ministry of Agriculture (MOA):** The MOA:

- Formulates and implements agricultural policies to ensure food security and to increase sustainable agricultural production;
- Develops and implements plans and programmes for agricultural development;
- Undertakes monitoring and evaluation of agricultural programmes and projects;
- Provides technical advice to smallholders;
- Conducts some extension services;
- Provides technical support related to crops, livestock, and fisheries;
- Constructs small earthen dams;
- Assists farmers with the use and management of water resources.

**National Water Authority (NWA):** The NWA was formed in 2003 in accordance with the 2003 Water Act. The MNRE appoints up-to 15 members<sup>34</sup> to the NWA. The NWA:

- Prepares and updates the Water Resources Master Plan (WRMP);

<sup>34</sup> The 15 members of the NWA may include the following:

- Four senior officials from the MNRE, MEPD, MOAC, and MoHSW;
- Three nominated by each of the following: Swaziland Sugar Association (SSA); Swaziland Citrus Board (SCB); and Swaziland Chamber of Commerce and Industry (SCCI);
- Three members to represent Associations, Cooperatives, and individuals on Swazi Land;
- Five representatives for each of the 5 (to be established) River Basin Authorities (RBAs).

- Advises the Minister on the promulgation of regulations to set fees or charges to cover operation, cost, and maintenance of government works, application fees, fees for appeals, or charges for use of water;
- Oversees the work of and provides policy criteria and direction to the Board, Project Boards, River Basin Authorities (RBAs), and task forces; and approves their budgets;
- Advises the MNRE Minister on policy directions relating to water affairs;
- Co-ordinates the work of different boards, water sector agencies, and international water commissions;
- Recommends policy with respect to the issue, renewal, amendment, or cancellation of water permits; recommends to the Minister time limits for renewal of water permits;
- Monitors and recommends policy and guidelines to the Swaziland member of the Tripartite Permanent Technical Committee (TPTC), the Joint Water Commission (JWC), and any other international water commission;
- Reviews and considers recommendations from the TPTC, JWC, and any other international water commission and makes recommendations to the Minister;
- Determines the proper management of water works and ensures periodic safety inspections;
- Considers, approves, amends, or rejects water development proposals;
- Recommends to the Minister the adoption of water quality objectives;
- Causes to be maintained, expanded, and continued, the collection of hydrological, meteorological, or other water-related data and arranges for the collection and making available of such data to the Authority, the Board, and the public.

**Department of Water Affairs (DWA):** Established under the 2003 Water Act, the DWA:

- Provides technical support and advice to the NWA;
- Arranges for provision of technical advice and cooperation from and with other Ministries;
- Monitors surface, groundwater, and water releases from and to international borders as per international law and any agreements between Swaziland and neighbouring states;
- Monitors surface and groundwater quality to control water pollution;
- Ensures that projects that are dependent on water resources are fully supported through the provision of adequate water supplies;
- Seeks international agreements that ensure an equitable water apportionment with neighbouring states, in compliance with international law;
- Periodically reviews Swaziland's surface and groundwater balances, in light of developments that have taken place in Swaziland and upstream;
- Implements the National Water Resources Master Plan (WRMP) and other water strategies and policies, as approved by the NWA;
- Develops and implements drought and flood management strategies;
- Coordinates water management for equitable allocation, use, and sustainability of water resources by RBAs, other government departments, and NGOs.

**Swaziland National Trust Commission (SNTC):** SNTC is a body corporate established by the SNTC Act of 1972. It:

- Provides for the operation of cultural institutions and the proclamation and management of national parks, monuments, and related matters;
- Proclaims national parks and monuments;
- Controls and supervises parks and reserves;
- Prohibits activities that are destructive to the existence of parks and reserves (e.g., the killing or injuring of plants and animals or the removal of objects from a reserve);
- Promotes and conserves indigenous animals and plants and protects the natural ecology and environment of the parks or reserves.

**Meteorological Department (MET):** As the National Meteorological Authority for Swaziland, MET:



- Operates under the Meteorology Act 1992;
- Conducts climate research, including systematic observation and monitoring;
- Is Swaziland's focal point for the UNFCCC;
- Heads the Swaziland Climate Change Programme.

**Swaziland Environment Authority (SEA):** Established under the 1992 Swaziland Environment Authority Act, the SEA (a parastatal):

- Is responsible for environmental policy, legislation, planning, protection, monitoring, and enforcement, using the provisions of the Environment Management Act;
- Coordinates all national environmental responses;
- Is the official national representative at international environmental fora;
- Provides advice on environmental matters to other institutions.

**National Agricultural Marketing Board (NAMBoard):** NAMBoard, a parastatal under MOA:

- Promotes the marketing of scheduled agricultural commodities;
- Advises Government on the availability or demand for scheduled products;
- Facilitates the development of local and global markets for scheduled products;
- Regulates the import and export of scheduled agricultural products;
- Assists in training, research, promotion, and creation of awareness among producers and exporters (to understand and adhere to national and international standards);
- Provides specialized extension services in horticulture;
- Operates facilities to support agribusinesses (e.g., markets or abattoir);
- Facilitates production (e.g., through contract farming), processing, storage, transportation, distribution, and sale of scheduled products;
- Registers wholesale distributors.

**Swaziland Water and Agricultural Development Enterprise (SWADE):** SWADE is a parastatal under MOA. Its vision is to be the leading facilitator of sustainable development in rural communities, using water as the catalyst. It:

- Is controlled and monitored as a public enterprise;
- Operates under a Board of Directors;
- Was created to plan and implement large-scale irrigation projects e.g., KDDP and LUSIP;
- Facilitates the community-based development of affected communities;
- Promotes participation of smallholder farmer organisations in irrigated commercial agriculture, as part of the poverty eradication programme for rural areas;
- Enhances private sector development through the active participation of small- and medium-sized enterprises in agriculture;
- Provides business and extension support and advice to smallholder farmers on irrigation;
- Allows SNL smallholders to engage in commercial-scale production, through its farming company and by concentrating production in contiguous areas.

## 5 Baseline Study: Risks, Constraints, Trends, and Opportunities

A StrEA is based on a good understanding of the proposed programme **and** the potentially affected biophysical, social, and institutional environment. The baseline is the current state of the environment, plus its likely evolution in the absence of the programme. It sets a context and a basis for impact prediction, evaluation, and monitoring by identifying:

- Existing problems and potential conflicts;
- Environmental and sustainability trends, risks, constraints, and opportunities.



StrEA baselines rely on secondary data. Typical data sources include state of the environment reports, current sectoral or regional plans, and various maps. Discussions with sector-relevant officers, experts, and stakeholders and field observations can help triangulate the secondary data.

Five key issues were identified during the scoping period:

6. Land: Challenges associated with land use change and land degradation;
7. Climate and climate change: Potential negative impacts of climate change on ecosystems, water supply, crop and livestock productivity, and infrastructure;
8. Water: Challenges associated with increased water demand from stressed basins;
9. Pollution: Potential for increased risk of agro-chemical pollution.
10. Ecosystems and biodiversity: Biodiversity loss from land conversion, including impact of invasive species; also, ecosystem shifts as a result of climate change.

Given that this StrEA is using a sustainability framework, some data was also collected to cover the social-cultural, social-economic, and institutional baseline. Table 11 shows the *Evaluation Framework for the detailed StrEA* and the thematic focus of the baseline collection effort.

**Table 11: Evaluation Framework for the Detailed StrEA**

	Theme	Sub-theme	StrEA Objectives / Evaluation Criteria	#
1	Physical	Land	<i>Improve land use planning for agriculture</i>	1
			<i>Improve access to land &amp; security of tenure on SNL</i>	2
			<i>Manage sources of erosion and improve / rehabilitate degraded land &amp; rangelands</i>	3
		Climate	<i>Integrate climate change mitigation and adaptation into all development initiatives</i>	4
			<i>Monitor &amp; mitigate the effects of floods &amp; droughts</i>	5
		Water availability, use, & management	<i>Protect and sustainably use water resources</i>	6
			<i>Prevent adverse transboundary water impacts</i>	7
		Pollution (agrochemicals)	<i>Minimize pollution from agrochemicals</i>	8
2	Biological	Ecosystems	<i>Conserve and sustainably manage a viable set of representative ecosystems</i>	9
		Biodiversity	<i>Conserve and restore biological diversity</i>	10
3	Social Cultural	Food & nutrition security	<i>Improve food and nutrition security</i>	11
		Community health & welfare	<i>Improve the health and welfare of the community, including rural women and other vulnerable groups</i>	12
4	Social Economic	Private sector & employment	<i>Stimulate private sector growth and increase employment opportunities in agriculture</i>	13
		Health of agr. workers	<i>Protect the health &amp; welfare of agricultural workers</i>	14
5	Institutional	Institutional capacity	<i>Improve institutional capacity</i>	15
		Inter-sectoral coordination	<i>Strengthen the inter-sectoral coordination for agricultural development</i>	16

## 5.1 Land

**Location:** Swaziland falls between 25°–28° latitude south and 30°–33° longitude east. Swaziland is a small (17,364 km<sup>2</sup>) land-locked country bordered by South Africa (430 km), except in the northeast, where it borders Mozambique (105 km). The nearest ports are in Durban (at 541 km) and Maputo (at 149 km). Swaziland has 4 administrative districts: Hhohho, Lubombo, Manzini, and Shiselweni, each with a Regional Administrator (refer to Chapter 3, Figure 6). Mbabane is the capital, and Lobamba is the royal and legislative capital (CIA 2015).

**Topography, Landforms, and Landscapes:** Swaziland is situated at the transition from the South African plateau to the Mozambican coastal plain. Although small in size, it has a varied landscape. Elevation varies from 21 m above sea level (masl) (Usutu River) to 1,862 masl (Emlembe). The western part of the country is in the escarpment zone. The Lubombo mountain range is along the eastern border, separating Swaziland from Mozambique. The country is mostly mountainous and hilly, with some moderately sloping plains. Landforms include plateaus, hills, mountains, foot slopes, plains, and valleys. The diverse unique landscapes have aesthetic and cultural value, and are a valuable tourism asset (MTEA 2013a).

**Risk:** Development can have a negative impact on unique landscapes. Swaziland's unique landscapes are insufficiently protected.

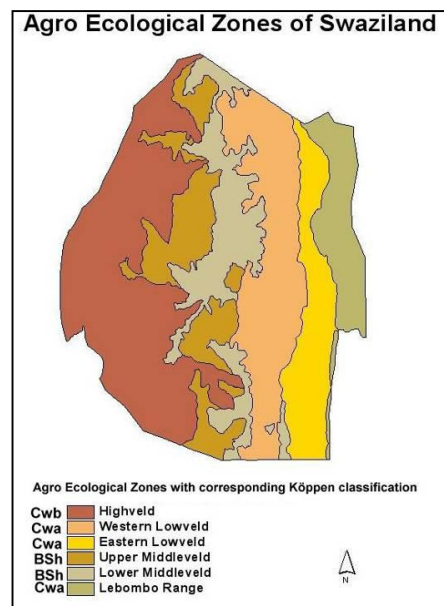
**Geology:** Geological risks are considered minor in Swaziland, with only modest seismic activities occasionally recorded. There are no signs of recent volcanic events. Overall, the geology of Swaziland is considered complex and diverse. The oldest igneous formations in the basement complex are 3.6 million years old – the oldest rocks on earth. There are some younger sedimentary formations (e.g., sandstone, claystone, basalt, and ignimbrite volcanics) intruded by gabbro and dolerite. Minerals of commercial interest include: asbestos, iron, soapstone, green chert, gold, tin, copper, nickel, chromium, and alluvial diamonds. There are coal layers of economic value (> 1 million ton of potential reserve). Maloma Colliery is the only active coal mine.

**Risk:** There is commercial interest to expand or restart mining operations for coal, green chert, diamonds, and gold. Mineral mining can compete with other land uses, including agriculture. Mining can have significant environmental consequences, especially given that site rehabilitation and ecological protection are weak in Swaziland (EU 2006).

**Agro-ecological Zones:** Swaziland has 6 agro-ecological zones (AEZs), based on elevation, landform, geology, soils, climate, and vegetation: 1. Highveld; 2. Upper Middleveld; 3. Lower Middleveld; 4. Western Lowveld; 5. Eastern Lowveld; and 6. Lubombo Range (see Figure 7).

The *Highveld* – the upper part of the escarpment, has steep slopes, dissected plateaus, plateau remnants, hills, valleys, and basins. The *Upper Middleveld* is at an intermediate level in the escarpment; it has strongly eroded plateau remnants and hills, and some structurally defined basins that are only weakly eroded e.g., the Ezulwini Valley. The *Lower Middleveld* is the piedmont of the escarpment, with some strongly eroded moderate foot slopes. The Highveld and Middleveld mostly have igneous and metamorphic rocks. The *Lowveld* plain is comprised of sedimentary and volcanic Karroo beds – mainly sandstone in the *Western Lowveld* and mainly basalt in the *Eastern Lowveld*. The *Lubombo Range* is an eroded cuesta (tilted plateau), with a steep escarpment on the western side and a gradual dip (1:20 slope) in the east. The six zones are further subdivided based on soil and terrain characteristics (MTEA 2013a).

**Figure 7: Agro Ecological Zones of Swaziland**



**Source:** EU 2006.

**Soils:** The geology and soils are intertwined. The parent material comprises acidic and basic rocks, and has given rise to nine soil types ranging from mineral to holomorphic soils. The soils tend to follow the climatic pattern. The wetter Highveld and Middleveld are underlain by acidic parent material and those soils tend to be leached and well drained. The drier Lowveld is underlain by intermediate and basic materials, and it has some poorly drained soils and some fertile, well-drained soils. The Lubombo range is also underlain by acidic parent material, and has slightly leached soils. Some valleys have rare red relict soils (e.g., Ezulwini valley)

**Land Tenure:** As mentioned in Chapter 3.1, land tenure is broadly of two types – Swazi National Lands (SNL) and Title Deed Land (TDL), which account for 74% and 25% of land area respectively. Tenure over SNL is not defined by legislation.

**Land Cover:** Swaziland has four land cover types: grassland, savanna, forest<sup>35</sup>, and water.

**Risks and Trends in Land Cover Conversion:** Keatimilwe (2002) reports that 25% of each pre-1985 land cover was converted to some new land cover or use i.e., 4,280 km<sup>2</sup> of grasslands, savanna, and forests were converted to (industrial) forests, savanna (sugarcane), or (built) urban areas. About 29 km<sup>2</sup> per year of natural land cover was converted from 1985 to 2000 (see Table 12). At this rate, an additional 870 km<sup>2</sup> of the natural land cover will be converted by 2030.

<sup>35</sup> N.B. Forests have a high density of trees; woodlands have a lower density of trees compared to forests. Savannas are grasslands with scattered trees; shrub lands are dominated by woody or herbaceous shrubs; and grasslands are dominated by grass and other herbaceous plants.

**Table 12: Land Cover and Land Conversion (km<sup>2</sup>) (1985 to 2000)**

	Grassland	%	Savanna	%	Forest	%	Aquatic	%	Total	%
<b>Extent of coverage</b>	7,990	46	8,327	48	870	5	213	1	17,400	100
<b>Area formally protected</b>	190	2	426	5	20	2	4	2	640	4
<b>Area informally protected</b>	4	0	164	2	3	0	3	1	174	1
<b>Area converted</b>										
<i>For forestry</i>	<b>1,400</b>		120		<b>210</b>		0		1,730	
<i>For sugar cane</i>	0		<b>520</b>		0		0		520	
<i>For urbanisation</i>	145		205		2		0		352	
<i>Other</i>	435		<b>1,205</b>		14		14		1,678	
<b>Total</b>	<b>1,980</b>	<b>25</b>	<b>2,060</b>	<b>25</b>	<b>226</b>	<b>26</b>	<b>14</b>	<b>7</b>	<b>4,280</b>	<b>25</b>

**Source:** Keatimilwe et al 2002.

**Land Use:** Since the 1980s, land used for rainfed production has decreased, whereas land under irrigated agriculture has increased. In the mid-2000s, the land under irrigation was increasing by 10–20 km<sup>2</sup> / year, mostly driven by the expansion of the sugar sector. Although land for timber plantations and conservation was only showing minor changes in 2005, some of the rainfed arable land and grazing land was being converted to residential use (EU 2006 and MTEA 2013a).

About 70% of the country is used solely for grazing, but an additional 14% of the cultivated land is also used for livestock during the dry season. Most of the rangeland is natural pasture, with only a small area of improved pasture for dairy production. Forest and woodlands are also used for grazing (WB 2011b; Keatimilwe 2002). Table 13 shows the main land uses in Swaziland in 1994. Table 14 shows land use change from 1990 to 2010. In 2011, arable land accounted for 10% of the land, permanent crops (1%), and other land uses (89%).

**Table 13: Main Land Use Types in 1994**

Main land use types	Km2	%	1994
<b>Grazing</b>			
Extensive communal grazing	8 670	50.0	
Ranching	3 320	19.1	
	<b>Grazing</b>		<b>69%</b>
<b>Crop Agriculture</b>			
Small-scale subsistence crop agriculture	2 140	12.3	
Large-scale commercial crop agriculture	1 040	6.0	
	<b>Crops</b>		<b>18%</b>
<b>Plantation Forestry</b>			
Plantation forestry	1 400	8.1	
	<b>Plantation Forestry</b>		<b>8%</b>
<b>Other</b>			
Parks, wildlife management	670	3.9	
Residential, industry, recreation	80	0.5	
Water reservoirs	40	0.2	
	<b>Other</b>		<b>5%</b>
<b>Total</b>	<b>17 360</b>	<b>100</b>	

**Source:** FAO / MOAC 2002.

**Table 14: Estimated Land Use by Land Use Type for 1990 to 2010**

Land Use Category	1990	2000	2010	1990–2010 Change ha / year
Industrial forestry – large scale	135,000	121,000	107,000	-1,400
Plantation forestry – small scale	26,000	28,000	30,000	200
Ranching	340,000	349,000	344,000	200
Extensive communal grazing	860,000	898,000	916,000	2,800
Conservation, Parks	58,000	69,000	84,000	1,300
Crop agriculture – irrigated	45,000	57,000	71,000	1,300
Crop agriculture – small scale rainfed	210,000	150,000	110,000	-5,000
Crop agriculture – large scale rainfed	50,000	30,000	20,000	-1,500
Residential / Industrial	8,000	12,000	16,000	400
Dams	4,000	8,000	12,000	400
Not classified	0,000	14,000	28,000	1,450
<b>Total</b>	<b>1,736,000</b>	<b>1,736,000</b>	<b>1736,000</b>	

**Source:** SEA 2012.

**Trends in Land Use:** Table 15 projects land use changes for 2020–2050 in agriculture, forestry, and other sectors, based on the trends identified in the FNC and SNC, and identified by ERC (2015). There are competing land uses: e.g., agriculture vs. residential uses in peri-urban areas, forestry vs. grazing in the Highveld, and transport, tourism, sugarcane vs. biodiversity conservation in the Lowveld.

**Table 15: Projected Change in Agricultural Land Use Type (2020–2050)**

Land Use	Future Change	Comments
<b>Sugarcane</b>	<u>Expansion</u> in the spatial extent expected	Predicted to expand to areas that are currently under indigenous forest or livestock grazing.
<b>Cotton</b>	--	There may be renewed interest in cotton due to improved pest control measures, but the increase may be offset by increased competition for land for the sugarcane industry.
<b>Commercial Plantations</b>	No expansion is expected or possible slight decrease	Wild fires and the closure of a sawmill accounts for lack of expansion. There may be a shift from pine to <i>Eucalyptus</i> plantations, but no overall change to the plantation area.
<b>Citrus orchards</b>	Slight decrease	General trend is down due production costs.
<b>Banana plantations</b>	Slight change	General trend is down due to markets and production costs.
<b>Maize</b>	Slight decrease in extent	Although maize cultivation fluctuates with rainfall and price, the decrease in available land and cheaper maize at retailers suggest a decrease in extent.
<b>Grassland &amp; rangeland degradation</b>	<u>Continued expansion of degraded areas</u>	The spatial extent of both degradation and deforestation has not been precisely measured. Conversion to other land uses reduces range areas.
<b>Cows / cattle</b>	Remain stable	Annual fluctuations in cattle numbers are due to weather, the market price of beef, and maize production, but the total number of animals is expected to remain the same.
<b>Feedlot cows</b>	Slight increase	Mini-feedlots are being introduced to counter the poor condition of the range and to improve profitability.
<b>Feedlot-based cattle</b>	Decrease in feedlots	Feedlots are expected to decrease in extent due to the high cost of feed.
<b>Dairy</b>	<u>Double</u>	Government aims to expand the dairy sector, expecting it to double in the next 10 years.
<b>Pigs</b>	<u>Double</u>	Government is promoting piggeries. The number of pigs could double in the next 10 years.

Land Use	Future Change	Comments
Rural shift	<u>Increase</u> in movement from urban to peri-urban	This is supported by the expansion of rural electrification, water, and road services.
Built environment	<u>Expand significantly</u>	Urban residential / commercial areas continue to expand.

**Source:** Modified from ERC 2015.

### **Land Degradation:**

**Erosion:** Overall, there is relatively little erosion on the *subsistence arable* land because some soil conservation techniques are applied (e.g., grass-strip terracing). Erosion is more an issue on rangelands. Cattle traffic (and also machinery traffic) can cause soil compaction / degradation, reducing the soil's permeability and water-holding capacity. Large livestock numbers, overgrazing, and poor habitat management, including poor fire regime, all exert heavy pressure on the lands. Overgrazing was already prevalent in 1998 on SNL, in the Lower Middleveld, and in the Western Lowveld: e.g., 250 t/ha of soil in some Lowveld locations. Soil erosion is also prevalent in the Highveld, especially where vegetation is removed on steep slopes. In 2006, some 30% of the country and > 55% of all communal *grazing* land was *seriously* eroded. About 45% of the communal rangeland had *poor* vegetation cover and composition, and the rest was mostly in *fair* condition (EU 2006).

**Controlled and Uncontrolled Fires:** Sugarcane is typically burnt in Swaziland just before harvest to facilitate harvesting by hand and to reduce the biomass to be transported to the mill. This contributes to air pollution and GHG emissions. The sugar industry intends to stop burning the sugar cane fields in the medium- to long-term (which would significantly reduce GHG emissions)<sup>36</sup>. Some sugar producers have switched from using coal energy to using renewable sugarcane trash to generate electricity. However, a lifecycle assessment of this practice is needed to confirm atmospheric impacts and climate benefits in Swaziland (ERC 2015).

Uncontrolled fires are common in Swaziland. On average, almost 25% of the country (or 400,000 ha) is subject to fire on an annual basis. Forest and savannah fires contribute to climate change through loss of vegetation, loss of carbon stock of soils, and the release of carbon and other GHGs emissions to the atmosphere during burning (MTEA 2015) (See Table 16).

**Table 16: Veld Fires and Area Burnt in Swaziland from 2000 to 2007 (in ha)**

Year	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	Average
Burnt Area	384,124	517,044	457,860	406,562	256,652	434,935	327,217	397,771
% Land Area	22%	30%	26%	23%	15%	25%	19%	23%

**Source:** MTEA 2013a.

**Waste Management, including Agrochemicals:** There are 3 general ways to manage wastes in Swaziland: recycling, incineration, or landfill. MOA is mandated to monitor and control the wastes generated as a result of agricultural practices and to comply with relevant regulations. A key area of responsibility is the disposal of used agrochemical containers. Where processing of agricultural products is undertaken, monitoring and control of such waste is the responsibility of one of the other ministries (e.g., Ministry of Commerce, Industry & Trade for industrial wastes and agro-products). The SEA is also responsible for waste management. Although soil and water contamination through improper waste disposal is taking place in urban and rural areas, there is no data on the extent of the contamination. There are currently few special measures to treat high-risk wastes, e.g. toxic agrochemical wastes and medical wastes).

<sup>36</sup> The international norm is to not burn sugarcane before cutting, to harvest mechanically, and to use the additional biomass to generate electricity for own use or sale to the grid, reducing GHG emissions.

### **Constraints and Future Trends related to Land Use Planning and Land Degradation:**

- The land distribution and administrative procedures are inadequate to deal with the physical planning challenges. Land use planning is generally characterised as ad hoc and uncoordinated. This has led to some poor land use in relation to the land suitability and economic potential, resulting in an increase in land degradation.
- With climate change, wild fires (hence land degradation) are expected to increase in number and intensity (with more ecosystem changes) (MTEA 2015).
- Without explicit land management measures, land degradation and soil erosion are expected to increase into the future, with population growth, more irrigated and intensive agriculture, and high livestock stocking rates. Climate change is expected to further exacerbate land degradation through loss of vegetation cover (EU 2006).
- Growing quantities of urban and rural wastes and sewage pose threats to human health and the environment. Swaziland does not have a hazardous waste facility. Some hazardous wastes may be dumped illegally, but the hazardous wastes (in theory) are exported to South Africa for treatment. As there is no rural data on waste management, it is somewhat assumed that rural wastes are generally burned in open pits (ERC 2016).

### **Opportunities:**

- About 20% (3,500 km<sup>2</sup>) of the total land is suitable for cultivation. About 2,360 km<sup>2</sup> (including fallow land) or 67% of the arable land was under cultivation in the 1980s (1,000 km<sup>2</sup> was used for timber). Some 2/3 of the arable land is on SNL (about 3.5% is irrigated); 1/3 of the arable land is on TDL (50% of the TDL is irrigated) (WB 2011b).
- Despite popular concerns that agricultural land is in short supply, some government land with agricultural potential is under-utilised or no longer used. There are fewer people to work the land, probably due to recurrent droughts, weakened labour force (HIV/AIDS), economic challenges, and land conversions. This land could be better utilised.
- The National Solid Waste Management Strategy (2001) states that MOA will develop agricultural waste collection guidelines, but this has yet to be done.
- The GEF / IFAD-funded Lower Usuthu Sustainable Land Management Project (LUSLM) aimed to reduce land degradation and biodiversity loss and to mitigate climate change through sustainable land management practices and climate smart agriculture (MTEA 2015).
- Swaziland has a NIP for the Management of Persistent Organic Pollutants (POPs) to implement its obligations under the Stockholm Convention. Targeted pollutants include POPs pesticides, PCBs, DDT, dioxins, and furans.
- There is a new 2014 *Pesticide Management Bill*, which should help regulate the management and use of pesticides in Swaziland.

## **5.2 Ecosystems and Biodiversity**

### **5.2.1 Ecosystems**

Swaziland has four ecosystems: 1. Montane grasslands; 2. Savanna-woodland mosaic; 3. Forests; and 4. Aquatic systems. Figure 8 shows the location of the four ecosystems. The savanna-woodland mosaic is the dominant ecosystem, covering the central and lower parts of the country, followed by the montane grasslands, which is predominantly in the Highveld. Forests and aquatic systems are considered minor systems. The savanna-woodland ecosystem is sub-divided into 3 habitats: 1. Sour bushveld; 2. Lowveld bushveld; and 3. Lebombo bushveld. The savanna-woodland is currently the best protected (5%), while just 2% of each of the other three ecosystems is protected. Refer to Table 12 to review the information on ecosystem conversion (generally 25% loss of the territorial ecosystems during 1985–2000 period).

The **Montane grassland** has high conservation value, as it is home to 72% of Swaziland's endemic flora, the only endemic vertebrate, and many of the country's threatened flora and



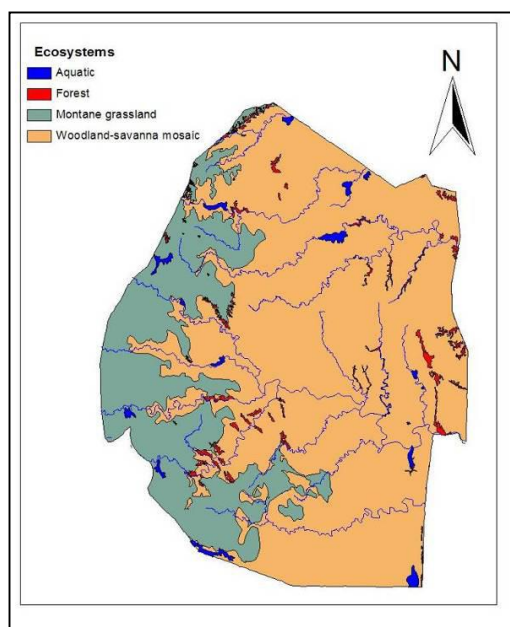
fauna (GOS–SEA 2015). It provides valuable ecosystem services (e.g., food, medicinal plants, and grazing lands); it is the upper watershed of most country rivers. The montane grassland is however very prone to erosion and is threatened by agricultural expansion, alien invasive plant species, grazing pressure, and high rates of resource harvesting.

The **Savanna–woodland mosaic** ecosystem is home to about half of the country's flora and fauna species. It has a moderate number of threatened and endemic plants and vertebrates. This ecosystem provides food, grazing, medicinal plants, timber, and fuel. It is threatened by agricultural expansion, unsustainable grazing and resource use, alien plant species, and bush encroachment.

The **Forest ecosystem** provides traditional medicine, timber, fuel, and food. It has been damaged by unsustainable resource use, urbanisation, and invasion by alien plant species.

The **Aquatic ecosystem** occupies the smallest surface area. This ecosystem provides critical services such as water, flood control, food, and other products. It is threatened by urbanisation, alien plant species, erosion, unsustainable use, and agriculture, as wetlands are drained for development or are negatively affected by changes within their catchment.

**Figure 8: Swaziland's Ecosystems**



**Source:** EU 2006.

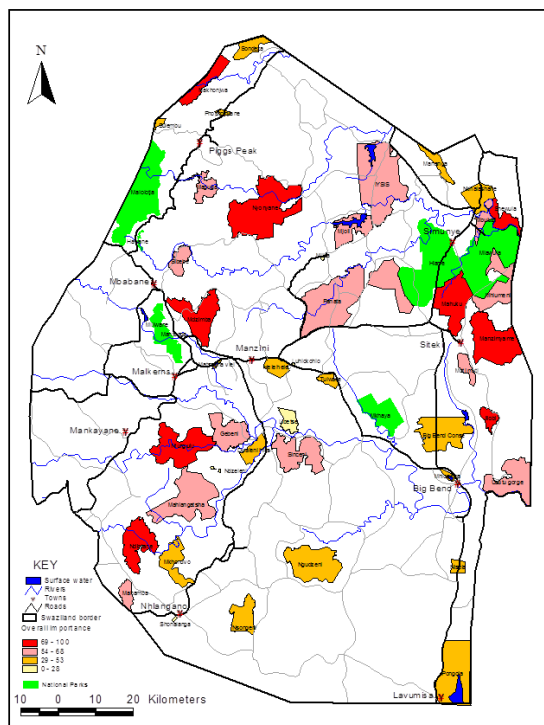
### 5.2.2 Protected Areas (PAS)

Figure 9 shows the location of the seven proclaimed reserves (in green), covering 64,100 ha (3.9% of the country). Four reserves are managed by the SNTC: 1. Malolotja; 2. Mlawula; 3. Mantenga Nature Reserve; and 4. Hawane. N.B. Three PAs are managed by Big Game Parks: 1. Mlilwane Game Reserve; 2. Hlane National Park; and 3. Mkhaya Game Reserve. The PAs are in the northern half of the country. Other protection-worthy areas have been identified and are in various stages of assessment for possible inclusion into the PA network. According to SEA (2014), about 8.3% of the country is under some form of conservation. In addition to the formally protected sites (3.9%), 2.7% of the land is protected within informal or non-gazetted areas, and 1.7% is protected within community conservation areas.

Table 17 shows the size and status of 6 protected areas. N.B. Hawane PA is not listed in Table 17.

Table 18 lists some informal protected areas – areas conserved through “*other effective means*”, but which are not gazetted under the SNTC, Game, or Flora Protection Acts.

### Figure 9: Swaziland's Protected Areas and Protection-worthy Areas



**Source:** SEA – SOE 2012/2013.

**Table 17: Size and Status of Swaziland's National Protected Areas**

NAME	Management	Perimeter (km)	Total Area (Ha)	Gazetted Area (Ha)
Hlane Royal National Park	BGP	91.4	21,735.8	13,525.8
Mkhaya Game Reserve	BGP	50.2	10,050.2	5,815.5
Mlilwane Wildlife Sanctuary	BGP	58.6	4,582.8	3,862.0
Malalotja National Park	SNTC	75.6	16,292.4	11,255.0
Mlawula Nature Reserve	SNTC	83.6	16,152.3	14,943.4
Mantenga Nature Reserve	SNTC	11.9	716.7	716.7
<b>Total</b>			<b>69,530.3</b>	<b>50,118.4</b>

**Source:** Unknown

**Table 18: Some of Swaziland's Informal Protected Areas**

StrEA of the 11<sup>th</sup> EDF in Agriculture for Swaziland  
Specific Contract 2015/362948

NAME	Management	Perimeter (km)	Area (ha)
IYSIS	Private company	71.5	20,016
Royal Jozini Big 6	Private company	50.3	12,662
Big Bend Conservancy	Private company	48.4	8,991
Mhlosinga	Private company	28.1	2,777
Mbuluzi	Private company	32.3	2,357
Libhetse	Private company	23.3	1,576
Emantini	Private company	18.1	1,381
Nisela	Private company	14.4	1,147
Panata	Private company	9.1	491
Dombeya	Private company	8.0	349
Nkonyeni	Private company	8.2	327
Rosecraft	Private company	8.8	246
Sibetsamoya	Private company	6.6	209
Phophonyane	Private individual	7.3	140
<b>Total</b>			<b>46,977</b>

**Source:** Unknown

### **Risks and Trends related to Ecosystem Conversion and Land / Habitat Degradation**

Table 12 (in Chapter 5.1) reviewed in general land cover and ecosystem conversion. Table 19 below shows the conversion of natural habitats to other uses, which is a significant cause of biodiversity loss. *Ecosystem* conversion was estimated at 2,000 ha / year for 1990–2010, which is a permanent loss of the ecosystems as the new land use is radically different and based on completely clearing / destroying the natural habitat, frequently with secondary consequences such as degradation and fragmentation of remaining habitats. Intense grazing, expansion of roads, urbanization, and agriculture have especially degraded the grasslands. It is assumed that the grassland degradation is expanding, but there are no detailed assessments on the grassland degradation.

**Table 19: Main Land Conversions (1990–2010)**

Old category	New category	1990–2010 change in ha/year
Ecosystem (grazing largely)	Irrigated agriculture, residential, dams	2,000
Crop agriculture	Grazing (ranching & communal; minor irrigation)	6,500
Ranching	Nature conservation (minor irrigation)	1,000
Industrial forestry	In reserve (destination not clear)	1,400

**Source:** SEA. 2012.

### **Forest Cover and Forest Conversion**

Table 20 shows the change in total forest area in Swaziland from 1990 to 2010 – an increase in 18,300 ha. Swazi forest statistics are often conflicting, but FAO (2014) identifies using 2010 data extensive cultivated industrial plantations and natural forests and woodlands, covering about 45% of the land area: 563,000 ha of forests and 427,000 ha of other wooded land. Forest cover is characterized as follows: indigenous forests & woodlands (83%), timber plantations (14%), and wattle/acacia forests (3%). Stakeholders have noted that the increase in '*other wooded land*' is likely the closing of open savanna ecosystems through bush encroachment (EU 2006). Overall, *degradation* of the forests and woodlands is attributed to uncontrolled veld fires, use of forest products<sup>37</sup>, and crop and livestock agriculture.

**Table 20: Changes in Swaziland's Forested Areas (in ha)**

FRA Category	1990	2000	2005	2010	Average annual change 1990–2010

<sup>37</sup> The limited capacity to manage indigenous forests allows uncontrolled extraction of timber and non-timber forest products e.g., edible plants, wood, medicinal plants, and materials for crafts and traditions.

FRA Category	1990	2000	2005	2010	Average annual change 1990–2010
Natural Forest (semi-natural)	14,000	31,000	31,000	31,000	
Natural Forest (modified)	323,000	362,000	395,000	425,000	+5,600 ha
Industrial Production Plantations	135,000	121,000	114,000	107,000	-1,400 ha
<i>Total forest (natural &amp; industrial)</i>	<i>472,000</i>	<i>514,000</i>	<i>540,000</i>	<i>563,000</i>	<i>+ 4,500 ha</i>
<i>Other Wooded Land (Bushland)</i>	<i>152,000</i>	<i>289,000</i>	<i>358,000</i>	<i>427,000</i>	<i>+13,700 ha</i>
<b>Total Forest and Bushland</b>	<b>624,000</b>	<b>790,000</b>	<b>898,000</b>	<b>990,000</b>	<b>+ 18,300 ha</b>

**Source:** SEA – SOE 2012/2013 and FAO 2014.

The harvesting of timber and fuelwood is widespread, especially on SNL, where firewood is used in cooking and heating. According to the 2007 census (GOS–CSO 2010), firewood accounts for 66% of rural household energy use (or 53% of the energy for the overall population). Table 21 shows a decrease in the use of wood fuel in rural areas from 81% to 66% in 10 years.

**Table 21: Energy Source for Cooking in Rural Households 1997 and 2007**

Energy Source for Cooking	Usage in Rural Households (1997 Census Data)	Usage in Rural Households (2007 Census Data)
Wood Fuel	81%	66%
Electricity	5%	14%
Paraffin	4%	6%
LPG	4%	12%

**Source:** GOS-CSO 2010.

**Trends related to Ecosystem Cover and Climate Change.** Climate change is expected to have significant impacts on land cover and ecosystems. The four ecosystems are predicted to be subject to redistribution, particularly after 2050. The Sour Bushveld will likely encroach into the grassland area. The area under indigenous forests and woodlands is predicted to decrease by 10% from 2000 to 2050. Specifically, the conversion of forested land to crop or farming land is expected to decrease the area under *dense* forest by 28% and the area under *woodlands* by 11% in the same time interval. The bush area is expected to decrease by 52%; an estimated 1% of bush lands will be converted to wastelands on an annual basis due to overgrazing and land degradation (MTEA 2013a).

Some global climate models predict that the montane grasslands and savanna–woodland mosaic (especially the Lebombo Bushveld) will shrink and shift westwards. A very dry tropical forest type will move into the eastern part of the country, replacing some 50% of the subtropical ecosystem (FAO 2002). This is expected to have major negative impacts on Swaziland’s biodiversity (UNDP 2012).

The expected higher temperatures and drier conditions may reduce the growth rate of plantations (e.g., pine trees currently grown in the Middleveld may not have optimum growth under the higher temperatures). New species may need to be introduced to withstand climate change. The incidence and severity of forest fires may also increase (MTEA 2013a).

**Opportunity:** Avoiding the degradation of grasslands is considered a climate change mitigation measure, as grasslands store carbon stock below ground. Barriers to the rehabilitation of grasslands are linked to land tenure concerns and the common land use practices on existing degraded grasslands. Changing entrenched activities, shifting cultural

norms to control access to grasslands, and enforcing new land-use norms to maintain grassland integrity will require *strong* stakeholder partnerships (ERC 2015).

### 5.2.3 Biodiversity

Wildlife and cultural tourism are popular in Swaziland and both depend on biodiversity. A number of cultural practices, events, and festivities rely on biodiversity<sup>38</sup>. Swaziland supports a diverse assemblage of habitats and has a significant portion of southern Africa's plant and animal species. It is part of two globally significant biodiversity hotspots: 1. *Maputaland Centre of Plant Diversity* in eastern Swaziland; and 2. *Drakensberg Escarpment Endemic Bird Area* in the western part. Swaziland has one of the largest intact altitudinal gradients of natural ecosystems in Southern Africa. According to SNTC 2014, the country has these species:

- 2,600 flowering plants;
- 121 mammals;
- 153 amphibians and reptiles;
- 350 birds;
- 60 fish (6 are exotic).

The species distribution varies between land cover types and ecosystems. About half of the 52 endemic or near endemic *bird* species are restricted to the montane grasslands, occurring only in South Africa and Swaziland (MTEA 2013a). The Montane grassland is also home to many of Swaziland's endemic and near-endemic plants. The Lebombo Bushveld has 7 plant<sup>39</sup> and 3 reptiles<sup>40</sup> that are endemic to Swaziland and to parts of South Africa and Mozambique (EU 2006).

**Constraints and Trends related to Biodiversity Loss and Invasive Species:** Many species have declining populations; some have already gone extinct (e.g., African wild dog). In general, the diversity of large mammal species and indigenous flora is declining in number, distribution, and abundance. The IUCN red data list identifies these threatened species:

- 132 vertebrates (fish, amphibian, reptile, bird species, and the mammals);
- 305 plant species (9% of the total plant species richness);
- 6 fish species (3 critically endangered, 1 endangered, and 2 vulnerable species).

Table 22 lists some of endangered and threatened species in Swaziland.

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<sup>38</sup> Cultural practices, events, and festivities that rely on biodiversity include *umhlanga* (reed dance), *lusekwane* (sacred shrubs dance), and *incwala* (traditional national prayer). Also, most rural Swazis still construct their homes using grass, sticks, logs, and mud. With more climate-change-related droughts, the availability of such materials for building and weaving traditional handicrafts may decrease.

<sup>39</sup> The 7 endemic plant species are 4 cycads and these 3 species: *Euphorbia keithii*, *Celtis mildbraedii*, and *Aloe keithii*.

<sup>40</sup> The 3 reptiles are: *Latysaurus lebomboensis*, *Leptotyphlops telloi*, and *Cordylus warreni*.

**Table 22: Some of Swaziland's Endangered and Threatened Species**

	Scientific name	Common name
Fishes	<i>Barbus cf. neefi</i>	Sidespot barb
	<i>Chilodactylus bifurcus</i>	Incomati suckermouth/rock catlet
	<i>Astatotilapia brevis</i>	Orange fringed largemouth
	<i>Barbus brevipennis</i>	Shortfin barb
	<i>Pyxicephalus adspersus</i>	
Amphibians	<i>Hyperolius semidiscus</i>	Yellow-striped reed frog
Birds	<i>Gyps coprotheres</i>	Cape vulture
	<i>Gryps carunculata</i>	Wattled crane
	<i>Anthropoides paradisea</i>	Blue crane
	<i>Balearica regulorum</i>	Crowned crane
	<i>Ardeotis kori</i>	Kori bustard
	<i>Scotopelia peli</i>	Pels fishing owl
	<i>Buphagus africanus</i>	Yellowbilled oxpecker
	<i>Hirundo atrocaerulea</i>	Blue swallow
Mammals	<i>Sigmoceros lichtensteinii</i>	Lichtenstein's hartebeest
	<i>Acinonyx jubatus</i>	Cheetah
	<i>Lycaon pictus</i>	African wild dog
	<i>Diceros bicornis minor</i>	Hook-lipped (black) rhinoceros
	<i>Manis temminckii</i>	Pangolin
	<i>Cercopithecus mitis</i>	Samango monkey

**Source:** GEF / UNEP / GOS 2015.

The main causes for biodiversity loss are habitat destruction, over-exploitation, and invasive species. *Habitat destruction* is associated with land use change, including *agricultural expansion*, especially irrigated sugarcane, commercial plantation forestry, road construction, industry, and urban development. Deforestation and overgrazing lead to land degradation and loss of biodiversity. *Over-exploitation* of the biodiversity is associated with hunting, poaching<sup>41</sup>, lack of awareness, and weak law enforcement (EU 2006).

*Invasive alien species* are a threat to terrestrial and freshwater habitats and biodiversity because the alien species tend to replace or cause the extinction of indigenous species. The country is heavily infested with four alien invasive plants (AIPs): *Chromolaena odorata* (Sandanezwe), *Solenium mauritium* (Gwayana), *Caesalpinia decapetala* (Lugagane), and *Lantana camara* (Bukhwebeletane) (SNTC 2014; UNDP 2012). Overall, AIPs are having a significant negative impact on Swaziland's natural vegetation, ecosystems, and rangelands. According to JTK (2003), 9,957 ha (6%) of the Komati River Catchment and 18,765 ha (6%) of the Mbuluzi River Catchment are covered by alien and invasive vegetation. About 6% of the mean annual runoff in the Komati River and 11% of the Mbuluzi River Catchment is used by the alien-invader plant species.

In spite of efforts to develop a protected areas network and protect biodiversity, Swaziland's biodiversity and ecosystems are under various threats and constraints, including (SNTC 2014):

- Overlapping mandates;
- Limited financial and human resources;
- Other competing land uses and encroachment by: Human settlements (encroaching to pristine habitats); Agriculture (subsistence agriculture and sugarcane); and Bush (primarily by *Dichrostachys cinerea*, a leguminous sickle bush);
- Forest degradation and deforestation;
- Alien plant invasion;
- Unsustainable harvesting, including poaching and trafficking;
- Changing fire regimes;
- Climate change.

<sup>41</sup> Poaching contributes to species decline and could possibly lead to species extinction (e.g., rhino).

### **Future Trends related to Biodiversity, including Climate Change Impacts**

Climate change and land degradation will significantly impact biodiversity, especially of the Lebombo bushveld and montane grasslands. Simulations indicate that the habitats will decline by more than 50% of their current area. Climate change is likely to severely impact or even drive to local extinction some of the montane and Lebombo bushveld species, especially the species that have small populations or slow rates of dispersal, or species that have very specific requirements for elevation, habitat, and climate. Combined with the effects of habitat destruction, land use change, and over-harvesting, a significant increase in the number of critically endangered species is likely (MTEA 2013a).

**Opportunity:** The current protected area (PA) network *does* conserve a good number of the threatened and endemic species, as follows (SNTC 2014):

- Of the 19 globally threatened vertebrate species, 6 are extinct in Swaziland and 11 are found within gazetted PAs;
- Of the 38 nationally threatened vertebrate species, 6 are regionally extinct and 26 are found within gazetted PAs; two (2) are conserved within informal PAs;
- Of the 40 threatened plant species, 29 occur in gazetted PAs and 3 occur in informal PAs;
- Of the 11 endemic plant species, 9 occur in gazetted PAs and 2 are within potential PAs.

The conservation and expansion of the PA network is a key to managing Swaziland's ecosystem and biodiversity into the future.

## **5.3 Climate, GHG Emissions, and Climate Change**

Swaziland lies at the transition of major climates zones and is influenced by these air masses: the equatorial convergence zone, subtropical eastern continental moist maritime, dry continental tropical, and marine west Mediterranean. Overall, Swaziland's climate is sub-tropical with distinct seasons, characterised as having a dry winter with either a cool or a hot rainy summer. Due to different elevations, the local climate ranges from sub-humid and temperate in the Highveld to semi-arid and hot in the Lowveld. In general, the western part of Swaziland is mountainous and humid, with higher rainfall. Central Swaziland experiences a hotter, dryer climate. The eastern part records slightly lower temperatures and more rain than the central part (<sup>42</sup> and EU 2006).

### **5.3.1 Rainfall and Temperature**

The mean annual rainfall ranges from 550 mm on the Lowveld to 1,550 mm on the Highveld. Most (75%) of the rain falls in summer (October–March). Rainfall varies considerably from year to year. The mean *annual* zonal temperatures vary from 17°C in the Highveld to 22°C in the Lowveld. The mean, max, and min temperatures show a seasonal variation: May to August are the coldest and driest months and November to February, the warmest and wettest. Table 23 provides some climate details (MTEA 2013a; FAO 2005; Keatimilwe 2002).

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<sup>42</sup> Source: <http://www.mapsofworld.com/swaziland/information/weather.html>



**Table 23: Mean Temperature and Annual Rainfall by Agro-Ecological Zone**

Physiographic Zone	Mean Temperature (°C)			Mean Annual Rainfall (mm)	
	Annual	January	July	Mean Annual	80% Dependable
Highveld	17	20	12	850–1,500	700–1,200
Upper Middleveld	20	24	15	800–1,000	650–850
Lower Middleveld	21	25	16	650–800	500–700
Western Lowveld	22	26	18	625–725	425–550
Eastern Lowveld	22	27	17	550–625	400–500
Lubombo Ridge	21	26	17	700–825	500–750

**Source:** MTEA 2013a, quoting GOS/FAO 1994a and 1997.

### **Recent Climate Trends**

**Temperature Trends:** Available data for southern Africa shows an average warming of 0.05°C per decade over the last century, and specifically, a warming of 1°C for 1900–1980 (EU 2006). Observations for Swaziland for 1961–2000 show a significant increase in the observed annual mean temperature, with a 3°C increase in all agro-ecological zones. Most climate stations covering 1960–2005 indicate significant increases in both *mean min* and *mean max* temperatures. The temperature data of the four seasons [December–January–February (DJF), March–April–May (MAM), June–July–August (JJA), and September–October–November (SON)] also indicate a significant increase in the *mean min* and *mean max* temperatures over most of the country. The highest recorded trends for increases in temperature were > 0.12°C per year at Mbabane during JJA, resulting in an increase of about 5°C in 1961–2000. High increases of 3°C and 2.6°C were also noted for the MAM and SON seasons (MTEA 2013a). Significant increases in the *duration* of the longest *heat waves* were also noted, with the largest increases during JJA and SON at Mhlume and Ubombo in the Lowveld. The frequency of *cold nights* has *decreased* and the frequency of *hot nights* has *increased* (MTEA 2013a).

**Rainfall Trends:** The rainfall data shows significant increases in the rainfall *intensity* at specific locations and for specific periods (e.g., DJF). The timing of the *start* and *end* of the rainy season after 1980 has changed significantly, with rains starting later and ending sooner over *most* of the country. The rainfall season has decreased in length over central regions (e.g., Matsapha) and increased in length in the southeast and northwest (MTEA 2013a).

**Climate Impacts to date:** Severe droughts occurred in 1983, 1992, 2001, 2007, and 2008. GOS has declared the 2015/16 drought a national disaster: 300,000 people face acute food and water shortages. Climate change and variation is having significant impacts on agricultural yields, food security, biodiversity, and the clean water supply. The southeast Lowveld is generally the most severely affected (MTEA 2015; MTEA 2013a).

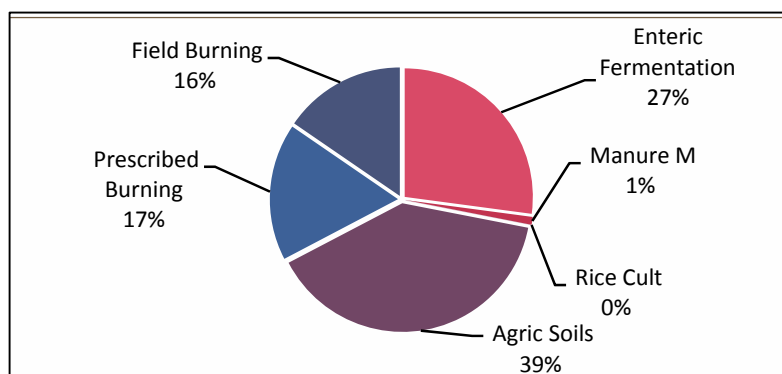
**GHG Emission Trends:** In 1994, Swaziland was a net sink for GHG emissions, but it was a net source of GHGs by 2000, emitting some 20–25 million tonnes of CO<sub>2</sub>e. In 2000, HFCs contributed 46% to the total national GHG emissions. N<sub>2</sub>O (33%), CO<sub>2</sub> (14%), and CH<sub>4</sub> (7%) made lesser contributions. Industry accounted for 46% (mostly HFCs) of the GHGs; the other sectors contributed as follows: the waste sector: 34%; agriculture: 8%; energy: 7%, and land use change and forestry: 6%. The waste sector accounts for a relatively high amount of GHG emissions mainly due to CO<sub>2</sub> emissions from open burning.

**Agriculture and GHGs:** Agriculture is the largest producer of non-CO<sub>2</sub> GHG emissions, contributing about 1,603 Gg CO<sub>2</sub>e in 2000. CH<sub>4</sub> and N<sub>2</sub>O were the major gases. The contributions by sub-sector are: Cultivation of agricultural soils: 39%; Livestock and manure management: 28% (27% from enteric fermentation and 1% from manure management); Land clearing: 33% (17% from prescribed burning and 16% from field burning).

Almost all the N<sub>2</sub>O was emitted from agricultural soils (84%) or from burning agricultural residues (11%). There was 2.5 Gg of NO<sub>x</sub> (69% from prescribed burning of savannah and

31% from manure management). Enteric fermentation (51%) and the burning of agriculture residues (27%) contributed most of the CH<sub>4</sub>. Prescribed burning of savanna contributed 101 Gg of CO (MTEA 2013a and MTEA 2015/13). See Figure 10 and Table 24.

**Figure 10: The Share of GHG Emissions by Agricultural Subsectors in 2000**



**Source:** MTEA 2013a.

**Table 24: Non-CO<sub>2</sub> GHG Emissions from Agriculture in 2000 (in Gg)**

Agriculture	CH <sub>4</sub> (Gg)	N <sub>2</sub> O (Gg)	NOx (Gg)	CO (Gg)
A. Enteric Fermentation	20.69			
B. Manure Management	0.73		0.76	
C. Rice Cultivation	0.0004			
D. Agricultural Soils		1.82		
E. Prescribed Burning of Savannas	3.85	0.05	1.72	101.12
F. Field Burning of Agricultural Residues	7.15	0.23	8.38	150.17
<b>TOTAL</b>	<b>32.43</b>	<b>2.10</b>	<b>10.86</b>	<b>251.29</b>

**Source:** SNC 2011.

**Future Climate:** Climate change and variability is expected to worsen in the future, as are the negative impacts on agricultural production, incomes, food security, water and energy supply, incidence of natural disasters, biodiversity, human health, and migration.

**Future Temperature:** The two climate projection models both indicate that temperatures will continue to rise in the near- and medium-term future (i.e., the coldest nights will get warmer; the hottest days will get hotter, especially during JJA and SON in the Lowveld zone). The models project a 3–6°C temperature increase by 2050. Temperatures are expected to rise by another 1.5–2.5°C from 2046 to 2065. The largest projected temperature increases are in the Highveld and northern Lowveld (MTEA 2013a).

**Future Rainfall:** Future projections in rainfall are heterogeneous. There are some statistically significant increases in rainfall *intensity* at specific locations and in specific time periods, and possibly no significant change in *total* annual rainfall. The two climate models don't agree in the predicted rainfall for 2046–2065: one model shows a decrease in rainfall and the other, an increase. Both models predict an increase in rainfall for 2081–2100. The *Climate Emergency Institute* estimates that the amount of rainfall will fall by 10–20% by 2050, compared to the 1961–1990 baseline. Most predictions project that the expected annual total rainfall will remain the same or decrease, however, the summer and winter season will be different and there will be greater rainfall intensity, when it does rain. It is projected that there will be more frequent flooding in the summer and more prolonged droughts in the winter to 2100. Further analysis is needed, as the climate models do not fully agree (EU 2006 and MTEA 2013a).

### **Risks, Constraints, and Trends related to Climate, Water, Agriculture, and GHG emissions:**

Current constraints related to environmental degradation, population growth, inadequate infrastructure and social services, and poverty may worsen. Climate change is likely to further negatively impact ecosystems, exacerbate land degradation, and reduce agricultural productivity and livelihoods, especially in the Lowveld and Lubombo. A further increase in the competition for water between humans, livestock, and crops could generate natural resources conflict, food insecurity, and malnutrition (MTEA 2015; MTEA 2013a).

**Crop yields:** Increasing temperatures are likely to affect the growing area of some major crops, with the traditional growing areas expected to shrink with an average temperature rise of 2°C or more. Projections indicate that the various crops will be affected differently by climate change, based on the crop type, agro-ecological zone, and period of planting. In general, crops sensitive to *water logging* will likely perform poorly when grown from November to April because of higher rainfall; crops very sensitive to *water shortages* will perform poorly when grown from April to October. A hotter Highveld may become more suited to growing tropical and subtropical crops, instead of temperate crops and trees. Overall, crop yields will likely suffer and the cost of doing agriculture will increase. The livelihood of many farmers, processors, and exporters may be negatively affected, leading to some migration and some land use change (EU 2006).

**Fodder:** Natural pastures and fodder availability is affected by weather; dry and cold weather generally inhibits forage growth. When precipitation is below normal from April to November, this can lead to poor forage growth, which affects cattle productivity and increases the risk of rangeland degradation and erosion.

**Livestock:** The projected higher temperatures for October–March may result in temperatures that are above the comfort zone for beef and dairy cattle. In the future, *dairy cows* are expected to perform better in the Highveld or wet Middleveld, especially in winter. Communal extensive grazing relies on grass biomass production, which will be affected by the predicted climate change. Land degradation is likely to increase, if current rangeland management practices are not adapted to a changing climate.

**Water and Irrigation:** The irrigable area may reach 76,000–82,000 ha by 2020, with 60,000 ha for sugarcane, 3,000 ha for fruits, 7,000 ha for cassava, and 16,500 ha unallocated (WB 2011b). With climate change, there may be less water available for irrigation, reducing the area under irrigation, and causing a shift to crops with a lower water demand (MTEA 2013a).

**GHG emissions from agriculture:** GHG emissions are expected to rise with increased population, food demand, expansion of agriculture, and poverty alleviation.

### **Opportunities / Strengths related to Climate Change:**

General efforts conducted to date to reduce climate change impacts include:

- Climate change was integrated into these policies: food security, agricultural sector; biodiversity conservation and management; natural disaster and emergency; national biofuels strategy and action plan; and national energy policy implementation strategy;
- Institutions were set up to address climate-change and green-growth issues:
  - The *Swaziland Meteorological Services* was established in 1991 (however, financial resources still limit the adequacy of the weather observation station network);
  - The *National Disaster Task Force* was established in 1992, to cope with droughts and to assist affected communities;
  - MTEA has the *Department of Meteorology (MET)*, which is the *National Climate Change Focal Point* and *Designated National Authority (DNA)*. MTEA established the *National Climate Change Committee*, to coordinate climate change programmes;
- The 2000 *National Disaster Action Plan* and 2006 *Disaster Management Act* provide the institutional mechanisms for an integrated disaster management approach, including:

- The *National Disaster Management Agency (NDMA)* in the DPMO;
- The *National Disaster Task Force* (focused on the supply of relief commodities);
- The *Komati Basin Water Authority (KOBWA)*, the MET, and the *South African Weather Services* have strengthened climate information systems in the Komati catchment, as part of developing an early warning system against floods;
- There are some systemic weaknesses, including: knowledge and information sharing, education, and training / awareness; extension and adoption of research recommendations in disaster management; applying safer construction design; and the use of financial instruments for disaster management;
- JICA strengthened the *National and Community Systems for Effective Disaster Risk Management* by conducting a national risk assessment, building an early warning system, monitoring disaster risks, and strengthening emergency preparedness;
- The 2010 *Air Quality Regulations* were promulgated to help manage air emissions;
- There has been some agricultural *technology* transfer through GOS and NGOs; given the GOS institutional capacity gaps, NGOs are increasingly involved in the development and dissemination of new and old technologies;
- The 2010 *Technology Needs Assessment* identified and evaluated climate change mitigation and adaptation technologies and measures, identifying gaps in education, training, and public awareness;
- Swaziland ratified the Kyoto protocol. The first and second *National Communications* to the UNFCCC identified sectors where climate data and information and general capacity should be improved (e.g., water resources, *agriculture*, energy, industry, waste, and health sectors); the Third National Communication is currently under preparation;
- Swaziland submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC in 2015, outlining its key actions to adapt to climate change. It committed to developing a National Adaptation Plan (NAP) to address climate issues. The INDC also outlines sector-specific adaptation actions for biodiversity and ecosystems, water, and agriculture. Though Swaziland is not a high GHG emitter, it committed to develop a robust national GHG inventory, a credible baseline, and a comprehensive measurement, reporting, and verification (MRV) system. Within the energy sector, the country intends to double its renewable energy contributions by 2030, introduce the commercial use of a 10% ethanol blend in petrol by 2030, and phase out the use of HFCs, PFCs, and SF6 gases. The implementation of Swaziland's INDC is conditional on appropriate support in the form of finance, technical assistance, and capacity building.

(Mlenga 2015; MTEA 2013; MTEA 2013a; and EU 2006).

## 5.4 Water Resources and Water Management

### 5.4.1 Groundwater Resources

The 1992 CIDA Groundwater Project estimated that Swaziland had 21 m<sup>3</sup>/s (or 0.66 km<sup>3</sup>/year) of renewable *groundwater* resources. About 6% of the groundwater resources were being used at the time. Rainwater infiltration was estimated between 2–20% of the average rainfall (UNDP 2012), with groundwater recharge rate via annual rainfall being as low as 2% in the Lowveld. The groundwater resources that have the greatest potential for exploitation are mostly in the Highveld and Middleveld. Most aquifers in the Lowveld are poor or too saline. Overall, the strongly consolidated rocks of the Archean Basement Complex and the Karoo system that underlie most of Swaziland limit the country's groundwater development potential (FAO 2005). The Integrated Water Resources Master Plan does confirm that groundwater resources have potential for exploitation, but not in sufficient quantity to allow *large-scale* abstraction. Hence, Swaziland mainly uses surface water for its agricultural, industrial, and domestic needs. Boreholes supply some domestic water needs and some livestock watering in areas where surface waters are not readily available or accessible.

#### 5.4.2 Surface Water Resources

Swaziland lies in three *international* river basins: 1. Incomati; 2. Umbeluzi; and 3. Maputo. These are shared with South Africa and Mozambique. The rivers generally rise in the highlands of South Africa, flow through Swaziland into Mozambique, and then into the Indian Ocean. Swaziland has five *major* river basins that relate to the three international basins, as summarized below (see Figure 11).

##### ***Incomati Basin (international)***

1. The *Komati River* basin;
2. The *Lomati River* basin;

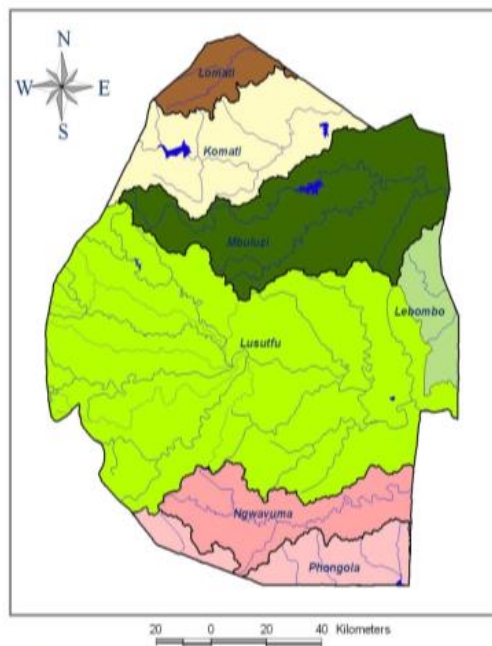
##### ***Umbeluzi Basin (international)***

3. The *Mbuluzi River* basin (rises in Swaziland and flows into Mozambique);

##### ***Maputo Basin (international)***

4. The *Usuthu River* (also called *Lusuthu*);
5. The *Ngwavuma River* (rises in southern Swaziland).

**Figure 11: Swaziland's Main River Basins**



**Source:** SEA – SOE. 2012/2013.

About 40–50% of Swaziland's water comes from South Africa. Various treaties and protocols between Swaziland, South Africa, and Mozambique control the water use, including:

- The 2002 *Tripartite Agreement between Swaziland, South Africa, and Mozambique for co-operation on the protection and sustainable use of the water resources of the Incomati and Maputo watercourses* and its *Tripartite Permanent Technical Committee (TCTP)*;
- The 2000/2003 *SADC Protocol on Shared Watercourse Systems*<sup>43</sup>;

<sup>43</sup> The SADC Protocol supports an agenda to:

- Promote and facilitate the establishment of shared watercourse agreements and institutions;
- Use the shared watercourses in a sustainable, equitable, and reasonable manner;

- The 1992 *Treaty of the Establishment and Functioning of the Joint Water Commission* and its 1992 *Joint Water Commission* (JWC)<sup>44</sup>;
- The 1992 *Treaty on the Development and Utilization of the Water Resources of the Komati River Basin* and its 1993 *Komati Basin Water Authority* (KOBWA)<sup>45</sup>.

The treaties recognize that Mozambique has a right to an equitable share of the water resources (EU 2006; FAO 2005).

## Large Dams

Given the seasonality of rainfall, Swaziland stores bulk water for domestic and industrial uses.

Table 25 lists the major dams (UNDP 2012).

**Table 25: Main Dams in Swaziland**

Name	Capacity (10 <sup>6</sup> m <sup>3</sup> )	Surface Area (Ha)	Date established	River System
Hendrick Van Eck	10.4	124.0	1969	Usutu
Lavumisa dam	0.35	27.22	1996	Pongola
Luphohlo dam	23.6	120.0	1984	Usutu
Maguga dam	332	1042.0	2001	Komati
Mnjoli dam	153	1500.0	1980	Mbuluzi
Mnkinkomo weir	3.2	-	1963	Usutu
Lubovane dam	155	1390	2009	Usutu
Nyetane dam	6.0	-	Raised 1992	Usutu
Sand River dam	50	590	1965	Komati
Sivunga dam	6.9	110	1972	Usutu
Hawane dam	2.75	70	1984	Mbuluzi

**Source:** Adapted from Mwendera 2006.

## Small- to Medium-sized Earth Dams

Small earth dams have been used for decades in rural areas, as they are relatively inexpensive to build, conserve run-off water, and can provide water for crops, livestock, and domestic use. GOS<sup>46</sup> has constructed earth dams in Lubombo, Lowveld, and lower Middleveld, but many are no longer operational (either silted up or broken). Some of the earth dams were poorly designed or constructed; some dams were sited without sufficiently engaging the communities or with insufficient attention to the catchment areas. Lessons learnt include the need to focus on watershed conservation and on an integrated dam system. There are 80 earth dams in the SNL, ranging in capacity from 5,000–360,000 m<sup>3</sup>, with a combined storage of over 2 m<sup>3</sup> x 10<sup>6</sup> (WB 2011b).

- Coordinate, develop, manage, & monitor the shared watercourses in an environmentally sound manner;
- Promote research and technology development, information exchange, capacity building, and application of appropriate technologies to manage the shared watercourses (FAO 2005).

<sup>44</sup> The 1992 JWC advises South Africa and Swaziland on technical matters e.g., the criteria to allocate the usable portion of shared water resources or how to develop and control pollution within the shared water resources.

<sup>45</sup> The 1993 KOBWA is a South African / Swazi company formed under the treaty to implement the Komati River projects 1: Driekoppes Dam (South Africa) and 2. Maguga Dam (Swaziland).

<sup>46</sup> In addition to GOS financed earth dams, an EU project in the late 1990s constructed 25 dams. The FAO/EU – SADP planned to construct or rehabilitate 10 medium-to-large earth dams, adding downstream infrastructure to store runoff water for domestic, crops, and livestock uses (FAO 2011).

## Water Use

Table 26 shows water use by sector in 1996.

**Table 26: Estimated Water Use in Swaziland in 1996**

Water use		Amount (10 <sup>6</sup> m <sup>3</sup> )	Per cent (%)
Domestic	<i>Rural</i>	9.8	0.9
	<i>Urban</i>	14.4	1.4
Livestock		12.5	1.2
Industry		12.0	1.2
Irrigation		992.7	95.3
<b>Total</b>		<b>1,041.4</b>	<b>100</b>

**Source:** Knight Piésold 1997.

In 2005, the freshwater withdrawal by all users was 1.04 km<sup>3</sup>/year, distributed as follows: rural / urban domestic (4%), industry (2%), and agriculture (94%). In 2010/2011, depending on the study quoted, irrigation was using 92–95% of the *surface* water resources; industry was using 1–5%, and urban and rural domestic uses accounted for 2–3%. The industrial timber sector uses a large amount of rainwater; hydropower uses water in a non-consumptive manner (MTEA 2013a; UNDP 2012).

Swaziland's surface water resources are 4.45 billion m<sup>3</sup>/year: 42% from RSA; 58% from within Swaziland. The average runoff in Swaziland is 2.6 billion m<sup>3</sup>/year (18% of total annual rainfall). The runoff in South African river basins is by comparison 8%. This means that there is potential to store more water in Swaziland (UNDP 2012).

Swaziland is not a water-stressed country at national level. According to UN Water, an area is considered '*water stressed*' when annual water supplies drop below 1,700 m<sup>3</sup> per person/year (<http://www.un.org/waterforlifedecade/scarcity.shtml>). Surface water generated within Swaziland (which excludes groundwater and the 42% considered 'transboundary' water) is 1,985 m<sup>3</sup> per capita per year (i.e., 58% of the total actual renewable water). However, many water users face high levels of water stress, given the water allocation system and the distribution of natural and human-made water storage points (UNDP 2014).

### 5.4.3 Constraints related to Management of Water Quality

Water pollution control is currently insufficient. Soil erosion and ensuing sediments are polluting the river systems. Inadequate sewage treatment<sup>47</sup> and run-off effluent from agricultural fields (where fertilisers are used inappropriately) result in nutrient enrichment and eutrophication. The Usuthu and other rivers receive pollutants from the irrigated sugar plantations and other cultivated lands. The rivers are increasingly susceptible to accidental release of chemical pollutants (e.g., Lindane, Dieldrin, DDT, gramoxane, or parathion). Industrialization is gradually deteriorating water quality, especially the industries in Matsapha, Bhunya (pulp), and in the Usuthu River Basin (EU 2006 and FAO 2005).

### 5.4.4 Trends: Water Demand, Water Supply, and Climate Change

Water demand will increase with population growth and economic development in the future.

In contrast, water supply could decrease. The mean annual river flows are now lower than in the past. The country now often faces water stresses during the dry seasons. The poor

<sup>47</sup> In 2005, only 59% of rural population had a pit latrine (and 33% had access to clean water).



climate performance (e.g., less total rainfall and more intensive rainfall when it does rain) could mean a decrease in the amount of available water, due to increased land degradation, soil erosion, and surface runoff (UNDP 2012). The future higher temperatures will increase the evaporation from dams and reservoirs, thereby also reducing the total available water. In addition, the frequent wetting and drying of embankments may increase the risk that piping and clay cores are damaged, also negatively affecting water availability / supply.

Overall, surface flows in rivers and streams are likely to have greater variation. More drought conditions are expected in winter due to lower flows. More flooding is expected in the rainy season due to higher flows. By 2050, river stream-flow is projected to decrease by 40%. Many smaller rivers or tributaries may permanently dry up due to the decline in precipitation. Overall, with climate change, the number of areas under water stress will increase, affecting thousands of the rural poor (MTEA 2013a).

Groundwater reserves, important to rural and urban communities, may be reduced as a result of increased rainfall intensity and concomitant increases in surface run-off, and decrease in water infiltration.

Changes to rainfall and river flow will affect cropping systems. Rainfed agriculture could be expected to fail more frequently. Irrigated agriculture will likely be adversely affected by the *overall* reduced river flows. As an example, climate change was projected to increase the irrigation demand of three sugarcane production areas (Mhlume, Simunye, and Big Bend) by 18–21%. The current irrigation capacity could fail to meet the predicted increases (MTEA 2013a). Domestic and industrial uses, and hydropower generation will also likely be adversely affected by the *overall* reduced river flows. Yields of staple food crops (maize, sorghum, and beans) are likely to decrease, threatening national food security. The Lowveld region will likely be the most affected due to the loss of perennial water sources and the limited capacity to cope with any changes in the runoff regime.

Swaziland's future climate (warmer and drier winters, wetter summers, frequent and more intense floods and droughts, and larger seasonal variations) will change stream flows and groundwater recharge rates, and will impact water quality and quantity. The water needs of the agriculture sector, which is already the dominant end user, will tend to increase, due to agricultural expansion, higher temperatures, and reduced rainfall. Climate change-induced scarcity and variability of water resources could create competition among water-using sectors within the country and conflict between the countries that share the international water resources. Current governance and planning are insufficient to the task of planning sustainable use of water resources (MTEA 2013a).

#### **5.4.5 Strengths and Opportunities related to Water Management**

##### **Water-related Policies and Legislation**

The management of water resources is addressed in various conventions, policies, acts, plans, and guidelines. Chapter 4.1 lists the water-related policies and legal framework, and institutional roles. Of note, the 2003 Water Act aims to streamline the water allocation process and increase the role played by water users in the use and management of water resources. The Act also identifies the important water institutions, as outlined below.

##### **Institutions**

- The Water Act established a *National Water Authority* (NWA). The Act aims to improve catchment management by improving stakeholder participation, decentralizing water resources management, preparing a *Water Resources Master Plan*, and establishing *River Basin Authorities* (RBAs), *Irrigation Districts* (IDs), and *Water User Associations* (WUAs). The Act also includes the private sector as a partner in water development.
- The MNRE assesses, monitors, manages, and allocates water resources. The Department of Water Affairs (DWA) (together with the RBAs) is tasked to observe stream flow, plan water resources, and control water pollution. The *Rural Water Supply Branch*

is tasked to manage water supply and sanitation in rural areas and to monitor water quality in industrial and rural areas.

- The *Swaziland Water Services Corporation* is tasked to manage and monitor water in urban areas. The *Groundwater Unit* of the Geological Surveys and Mines Branch is responsible for drilling boreholes and monitoring the abstraction of underground water.
- The *SEA* is responsible for pollution control, the establishment of air, water, and land pollution standards and guidelines, and the allocation of EIA compliance certificates to projects.
- The *MOA* constructs small earth dams and assists farmers to use water resources (EU 2006).

## 5.5 Socio-Cultural Baseline, Trends, Risks, Constraints, and Opportunities

The social baseline presented below covers the trends, risks, constraints, and opportunities related to the following themes: governance, population, culture, education, poverty, food security, health, and gender.

**Governance:** Swaziland has a dual governance system, with a modern British-styled democratic parliamentary system and a traditional, hereditary monarchy based on chiefdoms. The 2005/2006 Constitution separated the executive, legislature, and judiciary powers. Although the King holds executive, legislative, and judicial powers, he no longer rules by decree, despite being head of state and head of the traditional system. Some 55 of the 65 House of Assembly seats are *elected* based on a non-party political system. The King directly appoints the 10 remaining seats and 20 of the 30 Senate members. The King selects the prime minister from the elected members of the House of Assembly. The executive aims to balance the modern and traditional policy views.

**Constraint related to Governance:** Swaziland has the lowest score in terms of political rights, civil liberties, and freedom ratings, compared to its neighbours. Its *Global Peace Index* declined from 69 out of 153 (2011) to 88 out of 158 (2012). The level of social unrest is increasing, with unions demanding wage increases and pro-poor budgets and some segments of society calling for a constitutional monarchy to enhance accountability (CIA 2015; WB 2014; AfDB 2013).

**Population:** Table 27 provides population figures and growth rates for 1966–2007, showing an overall general decline in population growth rate, and a growth rate of only 0.9% in 2007. The mortality rate was high between 1997 and 2007, due to the high HIV/AIDS epidemic. By 2007, the male–female ratio was 47:53%; more than half of the population was less than 20 years; there was 144,000 orphans and vulnerable children (OVCs) (MTEA 2013 & 2012).

Table 27: Swaziland's Population 1966–2007

Census Year	Total	Annual Growth (%)
1966	374,697	4.8
1976	494,534	2.8
1986	681,059	3.2
1997	929,718	2.9
2007	1,018,449	0.9

**Source:** MTEA 2012, quoting GOS–CSO 2010 & Population and Housing Census 2007.

In 2014, the population was 1,419,623. The population growth rate was 1.14% (with a birth rate of 25 / 1,000 population and a death rate of 14 / 1,000). The medium age was 21 years. Only 21% of the population was urban in 2011 (CIA 2015).

**Population risk / constraint:** Given that more than half the population was less than 21 years of age in 2014, the population could potentially grow very quickly in the near future.

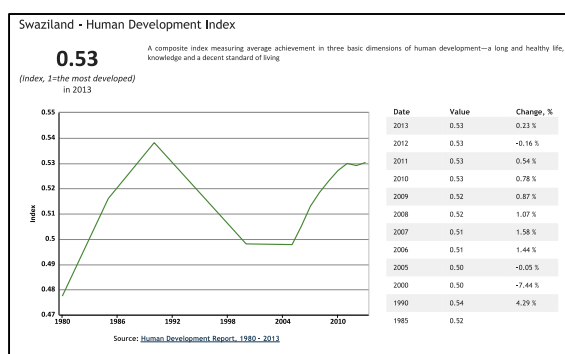
**Culture, Religion, and Art:** Some 97% of the population is African, with only 3% European. There are 70 indigenous clans; the main clans are the Nkosi, Dlamini, and the royal clan. Swaziland is home to a colourful culture, which is celebrated with ceremonial events e.g., the Reed Dance (*Umhlanga*). Many Swazis are *Zionists* (40%), who practice a mix of Christianity and ancestral worship. Other predominant faiths include Roman Catholics (20%) and Muslims (10%). Many people adhere to a traditional way of life, with '*Nguni*' as the predominant culture. The Nguni wear traditional dress (i.e., the '*Mahiya*') and carry Swazi warrior battle-axes. The local art is primarily tribal ethnic. Culture and cultural tourism are important in Swaziland<sup>48</sup>.

**Education and Literacy:** The *Free Primary Education* programme aimed to achieve universal primary education by 2015. Net school enrolment rose from 72% (2007) to 92% (2010). The primary education *completion* rate is 77%, with the completion rate for girls slightly higher than that of boys. There is a 60% gross enrolment rate for secondary school. The literacy rate in 2014 was 89%.

**Constraint related to Low Education Level:** The low productivity in Swaziland can largely be attributed to the workforce's relatively low education and insufficient training. The literacy rate has significantly improved, but this masks some significant rural issues. For example, in a recent study conducted in Shiselweni and Lubombo, 63% of the household heads were illiterate, and 34% had a low level of education. Although school enrolment ratios have improved, the quality of basic, secondary, tertiary, and vocational education still needs to be improved. Only 50% of adult women (only 46.1% of men) have reached a secondary or higher level of education (Mlenga 2015; WB 2014; AfDB 2013).

Figure 12 shows that Swaziland's Human Development Index (HDI) peaked at about 0.54 in the early 1990s, then declined to 0.50 by 2005, and rose back to 0.53 as of 2010. The 1990–2005 decline reflects the poor health indices in that period.

**Figure 12: Human Development Index**



**Source:** <http://knoema.com/atlas/Swaziland>

**Poverty:** Poverty declined from 69% to 63% during 2001–2010, based on the results of the *Swaziland Household and Expenditure Survey (SHIES)*<sup>49</sup>. Of the 63% categorized as poor in 2010, 29% are below the *extreme* poverty line. A more detailed analysis shows that the

<sup>48</sup> Swazi crafts include: hand-made candles, glassware, embroidery, beadwork, fabrics, wood and soapstone sculpture, tapestries, batik, and woven mats and baskets. <http://www.mapsofworld.com/country-profile/swaziland.html>

<sup>49</sup> The 2009/2010 SHIES survey defined extreme poverty at E 215 per capita per month, and the general poverty line at E 461 (WB 2011b).

poverty reduction from 2001 to 2010 was less significant for the *extremely* poor layer (i.e., a larger proportion of the extremely poor remain in their extremely poor condition, implying that poverty alleviation efforts more easily reach the *moderately* poor). With respect to gender and poverty, some 67% of female-headed households are poor, compared to 59% of the male-headed households. Poverty in Swaziland is also associated with households having a high burden of disease (e.g., HIV/AIDS), given the medical costs and weakened ability to participate in the labour force (WB 2016). (Health and gender issues are discussed below).

**Poverty, Food Security, Hunger, and Under Nutrition:** The links between food security and poverty are noteworthy. The FAO/WFP 2015 survey found that about 50% of the rural households spent about 50% of their income on food (and 1/3 of the households spent more than 75% of their income on food). Spending such a large proportion of the household income on food means that households have limited capacity to respond to shocks, such as reduced yields or increased food prices. These households quickly fall further into food insecurity and poverty. The WFP – *Cost of Hunger Study* in 2013 estimated that in 2009, 31% of children below 5 years were stunted due to under-nutrition. Another study indicated that some 6% of children below 5 years were underweight in 2010. The healthcare costs, low educational achievement, and lost productivity associated with child under-nutrition was considered equivalent to a loss of 3% of the GDP. (CIA 2015; Mlenga 2015 EU 2014; WB 2014; AfDB 2013).

Food security and hunger are closely tied to the climate-influenced fluctuations in agricultural production. Water stress or a dry spell at a critical point during crop development is an important determinant of agricultural production, and can cause a significant decrease in yields, an increase in import requirements, an increase in food costs, and consequently, an increase in food insecurity and hunger. Of note, one poor cropping season, such as 2015/2016, can largely reverse a recent food security gain.

**Risk and Future Trends:** With El Nino drought issues affecting agricultural output in 2015 / 2016, and a likely back-to-back second poor cropping season, many people (most dramatically in Lubombo Plateau and Shiselweni) may face true hunger in 2016. Poverty, food security, hunger, and under-nutrition can be expected to remain important issues going into the future, and as climate becomes more erratic (FAO/WFP 2015).

**Health and Disease:** *Non-communicable diseases (NCDs)* (e.g., hypertension, diabetes, and cancer) are a growing problem in Swaziland. These have a clear link to diet and lifestyle choices.

**Vector Diseases:** Based on the MDG reports, Swaziland is on course to eliminate malaria. However, health centre records show that diarrhoea, malaria, bilharzias, and malnutrition are the most common ailments. Those diseases are closely linked to access to clean water, sanitation, and nutritious food (MTEA 2012). About 91% of the urban population, but only 37% of the rural population, has access to safe water (WHO 2014).

**HIV / AIDS:** The *Demographic and Health Survey 2006–2007* showed that the HIV/AIDs adult prevalence was 26% (31% in adult women and 20% in adult men). The WB (2014) listed the HIV/AIDs prevalence rate at 31% (and a TB incidence rate of 1,320 / 1,000,000<sup>50</sup>). At either 26% or 31%, this is the highest HIV / AIDs prevalence in the world. Life expectancy dropped to 48 years in 2008. Through health sector reforms and a comprehensive response to HIV/AIDS, antiretroviral therapy (ART) coverage has reached 90%. Swaziland is showing major improvements in the health status of the population. Life expectancy has improved to 54 year (2014) (Mlenga 2015; WHO 2014; WB 2014; MTEA 2012).

**Constraints related to vector diseases:** The mainstreaming of environmental health issues needs strengthening, as does the management of food safety (including the surveillance of food-borne and zoonotic diseases).

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<sup>50</sup> The spread of TB is largely attributed to the migrant Swazi workers in South African mines.

**Constraints: Community Health and Agrochemicals:** There are no medical statistics related to health and use of agrochemicals (e.g., accidental poisoning or health impacts associated with agrochemicals entering the food chain). It is unknown whether medical clinics would recognize such incidents or be able to provide relevant treatment.

**Constraints related to HIV / AIDS:** HIV/AIDS has disproportionally affected the skilled, educated classes. About 30% of the public sector staff may be lost to AIDS over the next 30 years. The loss of human capital will continue to deepen poverty and lower growth rates by pushing people into poverty (e.g., treatment costs, income losses due to illness, and absenteeism). Having a smaller labour force (or having to continually retrain new staff) negatively affects governance capacity, private sector capacity, school enrolment and attendance, and the formation of households. HIV/AIDS will continue to have a dramatic effect on Swaziland's development over the medium- and long-term, through its severe institutional and household-level impacts.

The recent fiscal crisis constrained GOS's ability to provide life-saving ART drugs, but donors did fill the gap for HIV/AIDS prevention and treatment. Costs related to HIV/AIDS prevention and treatment are expected to remain high. Government also struggles to support orphans and the elderly, who have lost their breadwinners to HIV/AIDS (AfDB 2013). A further increase in the number of single-headed households and child-headed households (when both parents are lost to HIV/AIDS) can be expected. With respect to *HIV/AIDS and agricultural productivity*, it was estimated that AIDS-affected households experience a 54% drop in maize production and a 34% reduction in the area of land that is cultivated (WB 2014 and 2011b).

**Gender and Other Vulnerable People:** The maternal mortality rate has improved from 390 in 2005 to 320 in 2014 (deaths per 100,000 live births). The infant mortality rate improved from 100 in 2008 to 79 in 2014 and the under-five mortality rate improved from 146 to 104. Notwithstanding the improvements, these are still high mortality rates (e.g., the world average maternal mortality rate is 36 per 1,000 live births) (CIA 2015).

Some patriarchal practices are still enshrined in legal instruments: 1. Minority Status of Women in the Marriage Act (1964); 2. The Deeds Registry Act; 3. The Industrial Relations Act; and 4. Administration of Estates Act. The economic status and wellbeing of women are significantly affected by the discriminatory clauses and practices of the legal instruments. For instance, laws pertaining to the SNL limit women's access and use of land and credit (Keatimilwe 2002). There has been some progress in the political empowerment of women, but women still only had 6% of the Parliamentary seats (or 4 seats) in 2013, against a target of 30%. The proportion of women in wage employment (1990–2010) was less than 30%. In 2010, women's labour participation was 55% compared to 58% for men (Mlenga 2015).

**Constraints regarding Gender:** A lot more needs to be done to achieve the MDG 5 maternal-health goal. Despite some improvements in some gender-relevant statistics, Swaziland's gender inequality index was 0.525 in 2012. The 2014 Human Development Report ranked Swaziland 115 out of 148 countries on the gender inequality index (WB 2014).

Implementing development programmes often means extra work for women. A study in Shiselweni and Lubombo regions found that participation in development activities is biased towards women. Men seek formal work activities, and do not do much community work. Development programs have not in general used a gender-sensitive approach for implementation, nor an approach that is sensitive to gender workloads (Mlenga 2015; MTEA 2013). Furthermore, when livelihood conditions in a local area are poor, usually the men migrate for work, leaving women at home to care for the homestead, the elderly, the children, and the sick. When the men migrate, women often conduct all the extra work without an increase in decision-making power.

**Future Trends related to Social Aspects:** Under the future climate change scenarios, negative impacts related to governance, insufficient education and capacity issues, health, incidence of vector diseases<sup>51</sup>, food insecurity, hunger, gender, and vulnerable groups (e.g., orphans and the elderly) are likely to increase. Health impacts resulting from crop failures and outbreaks of disease will impact most on the poorly-equipped rural poor.

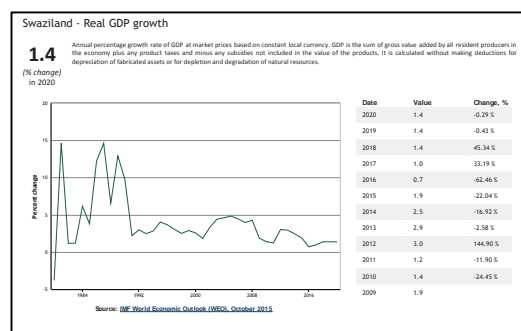
**Strengths and Opportunities:** Although much remains to be done in terms of implementation, the policy and legal framework provides guidance to the various social sectors, including education, poverty alleviation, food security, health, and vulnerable people.

The Deputy Prime Minister's Office has a Gender and Families Unit. There is an approved National Gender Policy. Swaziland has ratified the African Charter on Human Rights and People's Rights of Women in Africa and the SADC Protocol on Gender and Development. The GOS has developed a strategy to reduce the vulnerability of children through better opportunities to access education, health services, and better nutrition; a Children's Unit was to be established within the Ministry of Health and Social Welfare. GOS has made progress in providing some social protection, but many poor and vulnerable people still don't have coverage. For instance, the OVC Education Grant Programme only reaches 40% of the poorest children.

## 5.6 Socio-Economic Trends, Constraints, & Opportunities

**The Economy and GDP:** Swaziland's currency is pegged to the South African Rand. Swaziland is integrated in regional markets, being a member of the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA), the Southern African Customs Union (SACU), and the Common Monetary Area (CMA)<sup>52</sup>. GOS generates significant revenues through SACU import duties – roughly 60% of government revenues. However, SACU receipts are volatile, well exemplified during the recent economic crisis when SACU receipts fell from 21% of GDP in 2009 to 10% in 2011 (CIA 2015; WB 2011b). Swaziland has had a low growth rate for more than 2 decades. GDP growth rate fell from 7% in 1980–1992, to 2.5% in 1993–2008, to less than 1.3% in 2009–2011, and to 0.3% in 2012. GDP somewhat recovered from the very low in 2012, hovering between 1.7 and 2.8% in 2012–2014. Figure 13 shows real GDP growth to 2015, and projected growth to 2020. The projected GDP growth rate looks pretty flat to 2020.

Figure 13: Real GDP Growth 1980–2020



Source: <http://knoema.com/atlas/Swaziland>

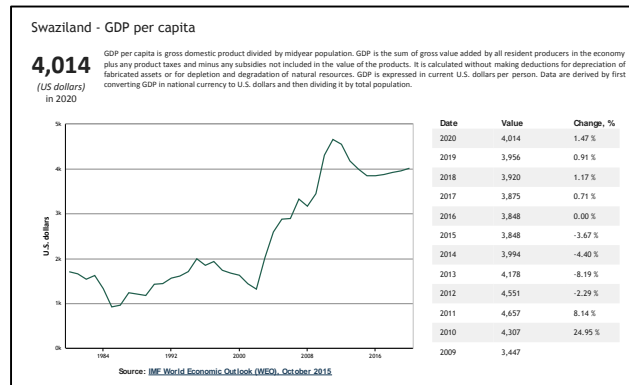
<sup>51</sup> The WHO states that outbreaks of malaria, dengue, diarrhoea, cholera, typhoid, and other vector-borne diseases coincide with extreme climate events, such as droughts and floods (MTEA 2015).

<sup>52</sup> CMA includes Namibia, Lesotho, Swaziland, and South Africa. SACU includes the CMA plus Botswana.

The GDP per capita is USD 3,800 (2015) and hence Swaziland is classified as a lower-middle-income country. However, Swaziland's socio-economic challenges and poverty level mirror a least-developed country (MTEA 2012).

**GDP per Capita Trend:** Figure 14 shows GDP per capita to 2015, and projected GDP per capita to 2020. GDP per capita to 2020 is projected to remain at about the same level.

**Figure 14: GDP per Capita (2009–2020)**



Source: <http://knoema.com/atlas/Swaziland>

**GDP of Various Sectors:** Swaziland has an abundance of natural resources and an industrial sector. The natural assets include cassiterite, asbestos, forests, coal, quarry stone, clay, gold, diamonds, hydropower, and talc. Most are exported as raw materials or as processed commodities. Some industries focus on the extraction and processing of the raw materials; some industries manufacture commodities, including sugar, mined products, refrigerators, wood pulp, soft drink concentrate, canned fruit, cotton yarn, textiles, and garments.

Table 28 shows the GDP contribution of various sectors from 2003 to 2009, and the % change in that period. Based on this time interval, the two expanding sectors are: *wholesale, retail, hotel, and restaurants* and *transport and communications*. Although *agriculture* and *manufacturing* have showed a decreasing share of GDP, the base of the economy is agriculture and agro-based manufacturing (e.g., sugar and citrus canning) (MTEA 2013). Other important economic agricultural crops include sorghum, pineapple, cotton, corn, and peanuts<sup>53</sup>). Mining has declined in GDP over time; only coal and quarry-stone mines remain active.

<sup>53</sup> <http://www.mapsofworld.com/country-profile/swaziland.html>



**Table 28: GDP Percentage Contribution by Sector 2003–2009**

Sector	2003	2004	2005	2006	2007	2008	2009	% Change
Agriculture, hunting, forestry	11.7	11.0	11.3	10.7	10.5	10.4	10.0	-17
Manufacturing	38.5	37.8	37.1	36.4	36.1	35.8	34.3	-12
Mining and quarrying	0.3	0.3	0.2	0.2	0.1	0.1	0.1	-200
Electricity, gas, and water supply	1.2	1.2	1.2	1.2	1.2	1.2	1.3	8
Construction	3.6	4.1	4.2	4.0	4.0	3.8	3.6	0
Wholesale, retail, hotel & restaurants (services)	8.9	9.4	10.0	10.8	11.5	11.7	12.2	27
Transport and communication	8.0	8.3	9.2	9.4	9.4	9.8	10.2	22
Financial intermediation	3.5	3.5	3.5	3.6	3.6	3.6	3.8	8
Real estates and renting	6.9	6.8	6.7	6.7	6.7	6.9	7.0	1
Public Administration	17.0	17.1	16.0	16.3	16.5	16.4	17.1	1
Other community / social activities	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0
<b>Total value added</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	

**Source:** MTEA 2013.

**Trends in the GDP of Various Sectors:** The GDP by sector in 2013 was *agriculture*: 7.6%; *industry*: 47.8%; and *services*: 44.6%. The agricultural sector performed relatively well in 2014 (up by 4%); outputs for sugarcane and maize were higher due to favourable weather. In contrast, the outlook for agriculture for 2015 and 2016 is not expected to be good, given the presence of El Nino. This is in spite of having the LUSIP and the MOA's Input Support Programme (ISP) to assist 22,000 small-scale farmers in the 2015/16 cropping season. The GDP performance of the agricultural sector will remain tied to the performance of the climate, even under higher levels of irrigation. The service sectors will probably continue to show an increasing share of GDP overall (CIA 2015; AfDB 2013).

**Gini Coefficient:** The Gini coefficient is 0.52, meaning that there is a wide disparity in household incomes, and that Swaziland still has one of the highest income distribution inequalities in the world: the 20% poorest account for 4.5% of the nation's income; the richest 20% account for 56% (WB 2016, 2014, & 2011b; AfDB 2013).

**Potential Trends in the Gini Coefficient:** Without more effective targeting of the extreme or moderately poor, income distribution can be expected to worsen.

**Imports and Exports:** About 85% of Swazi imports and 60% of exports are to and from South Africa. The EU is Swaziland's 2<sup>nd</sup> largest export market.

**Exports:** Swaziland's main exports are agro-based primary products. Textile exports grew by 200% and sugar exports grew by 50% from 2000 to 2005, but export performance has weakened in recent years. Swaziland's export base is quite vulnerable, as a large share of exports is or was governed by preferential market arrangements with the EU and USA (sugar and sugar derivatives, and textiles). The sugar trade preference expired in 2009. The apparel trade preference under the African Growth and Opportunity Act (AGOA) expired in January 2015. The overall impact on growth and employment was mitigated by a reallocation of textile production to regional markets (WB 2016 & 2014; AfDB. 2013).

**Imports:** Swaziland mainly imports machinery, transport equipment, food, petroleum products, and chemicals. With the closing of some of its processing plants (e.g., wood pulp plant), the current account balance is widening. Recently, GOS has had to reduce capital expenditures and limit wage increases to try to balance trade budgets. This has been unpopular, leading to some urban unrest (CIA 2015; AfDB 2013; WB 2011b).

**Employment and Income:** The public sector is a significant employer (22% of total employment), as is the private sector (42%) and the informal sector (33%). The growth rate of formal, paid employment declined from an annual 2% in 1990–1997 to less than 1% in 1999–2002, due to a decline in foreign direct investment and the restructuring of the manufacturing sector. Employment in mining and quarrying increased from 1% to 2% within

that period (WB 2014). In general, the *growth rate* of the informal sector is higher than the formal sector, especially because of the increase in small-and medium-scale enterprises.

Agriculture and forestry provided 35% of the formal sector jobs in 1992, declining to 28% in 1997. The agricultural sector remains the main source of employment in Swaziland. Subsistence (informal sector) agriculture employs 70% of the population. An FAO/WFP 2015 survey found that even though 70% of the households were '*farming households*', only 10% of the households derived their main source of income from agriculture or agro-pastoralism. Salaried work is the most common source of livelihood. Of note, the results of this survey indicate that farming currently should be viewed as a source of *food*, rather than a source of *income*.

### **Economic Constraints and Trends:**

**Unemployment:** Swaziland's unemployment rate is high, estimated at 29% for 2007–2010. According to the World Bank (2014), if all the *discouraged* (unemployed) workers are factored in, the unemployment rate is closer to 41%. Although the employment surveys are out-of-date, indications are that this high unemployment rate is persistent, and that labor force participation continues to fall. Using the employment-to-working-age population ratio, less than 3.4 persons out of 10 were employed in 2010. Although women's participation in the labour force and access to paid employment has increased, youth, women, and the least educated suffer the most unemployment. The female unemployment rate was 46%, compared to 34% for males in 2010, with only 3 of 10 females employed in 2010. The youth – 53% of the labour force, are the most affected by unemployment (WB 2014; AfDB 2013). Population growth is outstripping the rate of job creation. The working age population (15–64) is projected to increase by 31% between 2015 and 2035.

**Vulnerability to economic shocks:** Similar to other small open economies, Swaziland is vulnerable to economic shocks. The sharp depreciation of the South African Rand in 2015/16 has led to inflationary pressures; the recent worldwide recession led to factory closures. Customs revenues plummeted due to the drop in South African imports. The resulting decline in revenue pushed Swaziland into a fiscal crisis, including having to look to other countries to meet monthly payroll obligations and to fund government programs (CIA 2015).

**Weak private sector:** Swaziland's private sector is small and weak. Domestic entrepreneurship was neglected in the past, due to heavy reliance on FDI. There is a large public sector and GOS controls 40% of the economy through the national budget. GOS also has commercial interests in various sectors (e.g., equity in banking, insurance, *sugar*, telecommunications, and property). There are many business challenges, including having an inefficient bureaucracy, corruption, poor access to finance, and high electricity costs – Swaziland lags behind its neighbours in the '*doing business*' indicators (AfDB 2013).

**Corruption:** The Anti-Corruption Commission (ACC) was re-established in 2008, after the repeal of the 1993 Prevention of Corruption Order. The ACC brought some high-profile cases to court in 2009–2010. Swaziland ranked 88 of 176 countries in the 2012 *Corruption Perception Index*, dropping seven places from its 2011 ranking (AfDB 2013).

**Rural Incomes:** The per capita income in rural areas is only ¼ of that in urban areas (and food consumption in rural areas is about ½ of the urban food consumption) (WB 2011a).

### **Opportunities: Skills, Employment, and Income**

Agriculture is expected to be a major growth sector, with the move towards commercial production and the focused attention on the development of small and medium enterprises. The manufacturing sector is expected to grow in the near future. The current decline in industry and agriculture in terms of GDP and the growing services sector mean that more skills and more capital are needed to address unemployment. Investments in skills development and job creation are needed to absorb the additional number of people

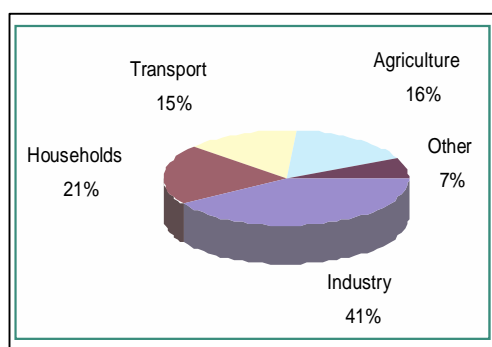
entering the labour force. Government has supported vocational and tertiary education, but engineering and science skills remain undersupplied (WB 2014). At the same time, labour-intensive investments are needed to absorb the largely rural-based, youthful, less-skilled workforce (AfDB 2013).

Swaziland has historically imported about 20% of its food. There is scope to reduce imports through strengthening domestic production. The professionalising and commercialising of agriculture should help to ensure that smart, capable youth are attracted to agricultural work. Improving farmers' income from agriculture, within a context of maintaining high standards for workers' safety (e.g., safe use of agricultural inputs) will be a key aspect.

**Energy Sector:** Swaziland imports 100% of its petroleum products; it has no proven crude oil reserves. Swaziland imports most of its electricity (80%) from South Africa's Electricity Supply Commission (ESKOM). Most rural households use local wood as their main energy. Bagasse generates a significant amount of electricity and steam for the sugar plants and nearby company towns. Swaziland's energy sources in year 2000 were coal (11%), petroleum (21%), biomass (50%), and electricity (8%) (MTEA 2012).

In 2005, industry was the largest energy consumer (41%). Other significant energy users included: transportation (15%); households (21%); and agriculture (16%). Industry was using electricity, petroleum products, coal, and biomass. Households used electricity for lighting and appliances, and LPG, paraffin, and biomass for cooking. The agricultural sector uses electricity for irrigation and appliances and it uses petroleum products for machinery and vehicles (MTEA 2012). Figure 15 shows the energy use by sector for 2005.

**Figure 15: Energy Use by Sector in 2005**



**Source:** MTEA 2012.

**Constraints and Future Trends in Energy Use:** Energy use in all sectors will likely increase, along with economic development and poverty alleviation. Energy use within the agricultural sector will increase in line with current trends to intensify and commercialise agriculture. The local generation capacity is focused on hydropower and biomass, both reliant on an increasingly erratic climate and rainfall pattern (MTEA 2013). The availability of biomass as an energy source will be affected by climate change, due to drought and/or overexploitation. Swaziland will likely experience a reduction in stream-flows and hence water for hydropower generation may be constrained, at least in some periods. The frequency and severity of storms in Swaziland will continue to cause serious damage to the electricity infrastructure and cause disruptions to energy supply.

**Strengths and Opportunities in the Energy Sector:** Swaziland imports low-grade coal from South Africa, but it has large reserves of low-volatile and low-sulphur anthracite of medium-to-high quality.

The USAID Trade Hub's Clean Energy team, the Swaziland Energy Regulatory Authority (SERA), and Independent Power Producers (IPP) are supporting clean energy through the development of a Renewable Energy and IPP Policy (MTEA 2015).

Various solar pilot projects have been initiated. The Swaziland Electricity Company has identified two possible hydropower sites: the Lower Maguduza (20 MW) and the Ngwempisi River (120 MW).

Swaziland has important sources of renewable biomass energy, such as bagasse (sugar processing industry) and wood waste (industrial timber processing). The Royal Swaziland Sugar Corporation Limited (RSSC) and Illovo in Big Bend are gradually switching from coal to bagasse for co-generation (MTEA 2014).

A *Biofuel Strategy* was prepared to identify opportunities to further exploit biomass fuel (but little else has been done to introduce biofuels).

The main sugar refineries plan to expand ethanol production to blend with petrol.

Government and NGOs have initiated programmes on more efficient use of renewable energy, in particular energy generated from biomass, including wood fuel.

There is potential to improve the energy efficiency within all sectors, but there has been little focus on this to date.

**Tourism Sector:** Tourism accounts for 2.8% of the GDP and it has the potential to be a growth sector, and a major source of jobs. Swaziland's landscapes attract vacationers. Wildlife and cultural tourism are popular and both depend on Swaziland's biodiversity (MTEA 2015). Climate change may significantly affect these resources, and due to habitat fragmentation, there are limited corridors to allow migration of biodiversity to more suitable climates.

*N.B. Institutional risks, constraints, trends, and opportunities are treated in Chapter 8.*

## 6 Impact Identification and Evaluation

The impact identification and evaluation work of this StrEA comprised several exercises:

1. Internal consistency analysis;
2. Compatibility analysis;
3. Impact assessment against a sustainability framework, also including:
  - Assessment of contributions to GHG emissions;
  - Evaluation of impacts in terms of vulnerability to climate risks;
  - Assessment of the Programme's cumulative impacts;
  - Evaluation of Alternatives 1 and 2;
4. Spatial analysis of the WHDP and HVCHP project sites, using map overlays.

Chapter 6, Sections 6.1 to 6.4 summarise the results of the above-mentioned analyses. *N.B. The environmental and social baseline, trends, risks, constraints and opportunities presented in Chapter 5 were at all times considered while completing the above exercises.*

### 6.1 Consistency Analysis of the 11th EDF Objectives

A matrix was developed to conduct the consistency analysis. The objectives of the 11<sup>th</sup> EDF and its three projects were shown along the columns and along the rows of the matrix, such that 55 cells were created to help analyse each possible interaction. The StrEA team systematically examined how each objective could interact with the other listed objectives, assessing whether the objectives were mutually consistent and identifying potential gaps that could arise during implementation.

Figure 16 shows what the consistency matrix looks like in its very summarized form. It shows an '✓' when the objectives within a cell combination were generally consistent and coherent, and it shows an 'orange / ?' where two objectives in combination could be

inconsistent.

This analysis generally found that the 11<sup>th</sup> EDF as a whole is internally consistent. There was no need to code any cell interaction as '*red* or *fully inconsistent*'. However, as impacts generally arise based on how activities are actually implemented (rather than how activities are envisioned in a concept paper), most interactions were listed as '*consistent (✓) but*'. That means that various environmental and social management conditions are recommended to ensure that the planned activities yield the intended benefits. Note that there is an '*orange / ?*' column in the matrix (the last column), indicating a higher potential to be inconsistent during implementation. This highlights that special measures will be needed to ensure that 11<sup>th</sup> EDF activities do in fact *improve nutrition* – a core objective of the 11<sup>th</sup> EDF programme.

Table 29 provides a full summary of mitigation measures to cover all the points of interactions identified using the consistency-analysis matrix.

**Figure 16: Summary Matrix of the Consistency Analysis of the 11th EDF Programme**

	<b>HVCF</b> Supply markets with high quality produce	Develop land & FCs to produce high value crops in LUSIP I	Develop 3 packhouse hub-based zones	<b>WHDP</b> : Increase water storage capacity (64 new & 11 rehab in Middledeld; rooftop)	Enhance the production capacity of smallholders (CDP, farms)	Strengthen institutional capacity (water data)	<b>LDP</b> : Improve livestock breeding, research, rangeland, beef	Strengthen smallholders' access to the livestock market & mini feedlots	Develop smallholder dairy herd, & local processing & marketing (+Gege dairy)	Improve nutrition
<b>NIP</b> : institutional capacities	1. ✓	2. ✓	3. ✓	4. ✓	5. ✓	6. ✓	7. ✓	8. ✓	9. ✓	10. ✓
<b>HVCF</b> : Identify & supply national ... international markets with high quality produce		11. ✓, but	12. ✓, but	13. ✓, but	14. ✓, but	15. ✓ but must measure water use	16. ✓	17. ✓, unless there is a land use conflict	18. ✓, unless there is a land use conflict	19. ?
Develop land & strengthen FCs to produce high value commodities in LUSIP			20. ✓, but clarify...	21. ✓, if use integrated planning	22. ✓, but...	23. ✓ but must measure water use	24. ✓	25. ✓, unless there is a land use conflict	26. ✓, unless there is a land use conflict	27. ?
Develop 3 packhouse hub-based zones				28. ✓, if use integrated planning	29. ✓	30. ✓ but must measure water use	31. N/A	32. N/A, unless can store livestock products	33. N/A, unless ..	34. ?
<b>WHDP</b> : Increase water storage capacity					35. ✓ But	36. ✓ but must measure water use & storage	37. ✓, but ensure some water for livestock under each project	38. ✓, but	39. ✓ but	40. ?
Enhance production smallholders						41. ✓, but	42. ✓, but	43. ✓, but	44. ✓, but..	45. ?
Strengthen water data							46. ✓, but.	47. ✓, but	48. ✓, but	49. ?
<b>LDP</b> : Improve livestock productivity:								50. ✓, but	51. ✓, but	52. ?
Strengthen access to livestock market									53. ✓, but	54. ?
Develop dairy, processing, +Gege										55. ?

**Notes:** ✓ = the two cells are consistent / coherent; ? = the two cells could potentially be inconsistent.

**Table 29: Summary Results of the Consistency Analysis of the 11th EDF Programme**

Some mitigation options derived from the Consistency Analysis
<p><b>WHDP, Integrated Water Resources Management, and consistency with HVCHP and LDP.</b> In general, there is insufficient attention to integrated land use and water use planning. Land suitability should be assessed to reduce land use conflicts and to optimize land use (i.e., is the land for the water storage and downstream activities most suitable for subsistence crops, market produce, mini feedlots, rangeland, conservation, <u>or</u> water storage). There should be a stronger focus on integrated water use planning for the WHDP, and also for the HVCHP and LDP project. Competing land use and competing water use are likely in some locations. One important issue is how the additional water will be shared between users (e.g., crops, livestock, enterprises, households, environmental flows, and transboundary flows) during times of water scarcity. Currently, there is very limited capacity to measure water abstraction and water use. The water used by EDF activities to grow high value crops, to water livestock, to operate enterprises (e.g., packhouses or processing units), and to supply households needs to be measured and, where required, paid for. There could be cumulative impacts on water resources, especially in times of scarcity.</p>

### Some mitigation options derived from the Consistency Analysis

There are potential issues related to the institutional arrangements to manage watersheds, dams, irrigation assets, and water allocation. With respect to all water issues, it is unclear how different parties will work together (CDP, RDA, RBA, NWA, Irrigation District, and EDF project management), to avoid confusion and conflicts.

In further detailing the WHDP, the StrEA recommends to more strictly:

- Apply integrated land and water use planning;
- Assess the land suitability of each project site;
- Assess the capacity and then build the capacity to monitor water use and abstraction at each project site;
- Identify areas where 11<sup>th</sup> EDF activities overlap (WHDP, HVCHP, and LDP) and areas where EDF activities overlap with other similar projects;
- Calculate how much water will be harvested by EDF activities in the river basin;
- Assess cumulative water use within EDF project areas, and assess cumulative impacts on basin;
- Calculate the carrying capacity of the project area, using water and climate change projections as the carrying-capacity limiting factor (e.g., during the EIA);
- Apply a '*one watershed one management*' approach;
- Ensure all EDF water-related activities:
  - Have measurement devices and means to record water use;
  - Measure their water abstraction and water use;
  - Pay water fees, where needed;
  - Use water-efficient and water-conservation technologies (e.g., modified drip irrigation, where relevant) and integrate water conservation and water efficiency into all activities;
  - Integrate livestock watering points;
  - Coordinate with various water-related parties from local to national level, as needed;
  - Integrate adaptation to climate change;
  - Safeguard environmental flows;
  - Avoid transboundary impacts.

**HVCHP and consistency with WHDP and LDP.** The HVCHP assumes that farmers will easily adapt to a commercial perspective. But other projects have shown that there can be many challenges, including that market links from the producer to the market and to the consumer may be very weak, transport costs to hubs / packhouses may be high and unreliable, prices offered to the farmer might be below expectations, and the capacity of farmers to comply with standards may be low. Producing high quality vegetables does not guarantee a market, and more attention is needed to ensure that the entire value chain is sound to ensure commercial success and benefits to all. In further detailing the HVCHP:

- Analyse the economic viability of each planned crop, hub, enterprise, and value chain to help ensure that farmers can produce commercial vegetables at profit;
- Assess the land suitability to reduce land use conflicts and to optimize land use (i.e., is the land most suitable for subsistence crops, market produce, mini feedlots, rangeland, conservation, or water storage);
- Ensure that market production grows in step with (local) market demand;
- Start the commercialization process with what farmers know, rather than aiming directly to supply the more difficult export market;
- Clarify how farmers will be selected to participate in EDF activities (hobby farmer vs. full-time farmer).

**HVCHP / packhouses / cold stores and consistency with WHDP and LDP.** There are a number of issues that need to be clarified regarding packhouses and cold stores to avoid resource conflicts or to ensure the efficient use of resources, including:

- Assess general economic viability of the packhouse and cold store locations;
- Clarify who owns and who will manage over the long-term the packhouses and cold stores (including O&M costs);
- Clarify all packhouse and cold store costs and resource needs, and who is responsible to pay the costs to ensure economic viability / affordability; also clarify whether farmers and vendors will be charged to use the packhouses or cold stores. In assessing the operational costs, the StrEA also recommends to:

<b>Some mitigation options derived from the Consistency Analysis</b>	
<ul style="list-style-type: none"> <li>○ Minimize the energy needs of each packhouse / cold store: e.g., estimate energy needs; evaluate the potential to use renewable energy; assess energy efficiency options;</li> <li>○ Evaluate the waste management options at the packhouses and cold stores, and select an environment-friendly, energy efficient, climate-friendly waste management system;</li> <li>○ Minimize the water-use needs of each packhouse or cold store and ensure a water supply for each packhouse / cold store e.g., clarify water requirements; identify the water source; assess whether the used water can be recycled; and assess whether packhouses and cold stores will have enough water during periods of scarcity;</li> <li>● Clarify if packhouses can be used to store non-EDF produce, and who can use the cold stores.</li> </ul>	
<b>LDP and consistency with HVCHP and WHDP:</b>	
<ul style="list-style-type: none"> <li>● One question is whether the poor will be able to afford to consume livestock and dairy products (or even purchase the high value vegetables). Generally, the very poor (e.g., women, children, elderly, and sick) can at best produce for own consumption. They are not likely to produce a surplus to sell or have capacity to commercialise. The high value products produced via the HVCHP or LDP cannot be assumed to be available / affordable to this segment of the population. Without careful attention, the objectives to provide food security and to improve nutrition to the poorest could get lost.</li> <li>● Climate change is increasingly affecting the economic viability of conducting certain activities in certain locations. Dairy farming may need to move to cooler areas.</li> </ul>	
In detailing the LDP, the StrEA recommends to:	
<ul style="list-style-type: none"> <li>● Locate beef and dairy activities and rangeland management activities in optimum locations, for economic viability, use, and demonstration purposes;</li> <li>● Locate activities bearing in mind the future climate (e.g., dairy cattle prefer a cooler climate; rangeland demonstration projects may also need to be carefully sited, based on the future climate);</li> <li>● Expand livestock activities into more affordable livestock, which facilitate the participation of vulnerable groups (e.g., chickens, pigs, and rabbits);</li> <li>● Provide an explicit nutrition support program, especially in drought years, for the very poor farmers, who are probably women-headed households, child-headed households, elderly, or sick.</li> </ul>	
<b>General comments on improving capacity:</b> The capacity development needs for HVCHP, WHDP, and LDP vis-à-vis watershed and water storage management, monitoring and measuring water use and abstraction, water efficiency and conservation, livestock and rangeland management, and commercial agriculture and marketing may result in a large number of ad hoc trainings. To avoid duplication of capacity development efforts and to avoid capacity gaps:	
<ul style="list-style-type: none"> <li>● Ensure GOS has capacity to evaluate the tenders for packhouses, water storage assets, and coherent training packages;</li> <li>● Ensure that training programs build strong commercial attitude and capacity;</li> <li>● Harmonize and coordinate all the EDF trainings, where relevant;</li> <li>● Harmonize, to the extent possible, with the training programs of other related development activities.</li> </ul>	

## 6.2 Compatibility of the 11th EDF (Agriculture) with Various Policy and Legal Instruments

The analysis in Chapter 6.1 focused on the internal consistency of the 11<sup>th</sup> EDF–Agriculture. The compatibility assessment in this Chapter 6.2 focuses on the relationship of the 11<sup>th</sup> EDF to its external policy and legal framework. A matrix was developed to conduct the compatibility analysis. The objectives of the 11<sup>th</sup> EDF and its three projects were shown along the columns. The 68 policy instruments (with a summary of the policy objectives and statements of each instrument) were placed along the rows. This created 68 (instruments) X 3 (projects) or 204 interacting cells to evaluate. The matrix also provided each project with a column for mitigation measures.

The StrEA team systematically examined how the 68 policy and legal instruments could interact with each of the 3 projects, assessing whether the objectives were mutually compatible and, at the same time, identifying potential gaps that could arise during implementation.



Table 30 shows a very small section of the compatibility matrix, showing the matrix row where the 3 project columns were being assessed against policy instrument #45 (*the December 2015 Paris Agreement and Swaziland's INDC*).

**Table 30: One Section of the Matrix used to conduct the Compatibility Analysis**

			1. Identify & supply national & international markets with high quality produce; 2. Develop land & FC for HV commodities in LUSIP; 3. Develop pack house zones (in areas of water seasonality);	Mitigation or Enhancement Measure	1. Increase water storage capacity: 64 new; 11 rehab; maintenance; 50 rooftop, cc adaptation 2. Enhance the production capacity of smallholders: extension, women, participatory planning; downstream farms & cattle; 3. Strengthen capacity: planning	Potential Mitigation	1. Improve Livestock Productivity (breeding, husbandry, research; health surveillance; rangeland management; promote fodder; GOS beef; 2. Strengthen smallholders' access to the livestock market: better mini lots and markets; 3. Develop small dairy; local processing, and marketing; human diet: GECE	Potential Mitigation
45	2015 Paris Agreement Swaziland's INDC FNC & SNC 1996 United Nations Framework Convention on Climate Change (UNFCCC) 1997 Kyoto Protocol	The December 2015 Paris agreement: • Envisages climate action by all nations; • Pursues efforts to limit the temperature increase to 1.5°C above pre-industrial levels; • Aims to balance anthropogenic GHG emissions by sources and the removals by sinks by the second half of the century; • Calls for global decarbonisation before the end of the century; • Aims to communicate and publically register the contributions of all countries in 5-year cycles (through a global accounting system); • Promotes all human rights when taking action to address climate change (including gender).  Swaziland's INDC (Intended Nationally Determined Contributions) targets these sectors: biodiversity and ecosystems; water, agriculture, and health. Swaziland's contribution to mitigation focuses on: • Improving the share of renewable energy in the nation's energy mix; • Increasing the ethanol blend in petrol; • Phasing out the consumption of HFCs, PFCs, and SF6 gases; • Developing synergies and co-benefits.  The Second National Communications highlights that climate change, and the warmer bio climates that it will bring, will impact the country's protected areas and fauna hotspots (through ecosystem shifts of the grasslands and Lebombo bushveld, both	Land clearing for vegetables or for new irrigation may increase CO2 emissions, especially from soils. The use of renewable energy and energy conservation / efficiency are not mentioned in the proposal, which could also further increase GHG emissions. Refrigeration units often use potent GHG substances.	• Balance CO2 emissions and removals to sinks (remove 1 tree; plant one tree); • Move towards a decarbonised future; apply EE and E conservation; • Improve the share of renewable energy during operation (e.g., buy blended petrol); • Ensure that refrigeration units minimise use of GHG gases (HFC, PFC, SF6); • Promote all human rights when taking action to address climate change (including gender); • All EDF activities to calculate CO2 emissions; • Use HFC/PFC-free cooling technologies; • Apply architectural redesign of new buildings to make use of natural ventilation, coupled with efficient insulation to eliminate or reduce the need for mechanical air conditioning and thus save energy.	?	re: develop downstream: • Balance CO2 emissions and removals (to sinks); • Decarbonise project activities, where feasible (use EE and E conservation); • Promote all human rights when taking action to address climate change (including gender); • Improve the share of renewable energy in the project's energy mix; • Consider predicted ecosystem shifts in locating project activities	?	• Balance CO2 emissions and removals (to sinks); • Decarbonise project activities, where feasible (use EE and E conservation); • Promote all human rights when taking action to address climate change (including gender); • Improve the share of renewable energy in the project's energy mix; • Consider predicted ecosystem shifts in locating livestock activities

Table 31 summarises the results of the compatibility assessment. The 11<sup>th</sup> EDF activities are in general compatible with the policy and legal framework. To enhance the compatibility of the planned activities (and to strengthen implementation), key relevant objectives and policy statements were extracted from the 68 policy instruments to serve as mitigation or enhancement measures. NB. These mitigation measures are also integrated into the management plan presented in Chapter 7.

**Table 31: Results of the Compatibility Assessment**

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
<b>National Level Policies and Instruments</b>			
1	2005 National Constitution Act	✓	
2	2015 Dam Safety Regulation	✓	The EDF projects should: <ul style="list-style-type: none"> <li>• Ensure that operators are responsible for safe operation of dams, irrigation channels, and equipment;</li> <li>• Maintain good records on all project activities (e.g., livestock, production, and water use);</li> <li>• Integrate consultative, community planning processes to select the area for dams and for how to share water resources;</li> <li>• Provide training and training manuals for work safety, dam safety, safe operation and maintenance of all assets, and training on how to keep good records;</li> <li>• Clarify the capacity of the dam to manage expectations;</li> <li>• Ensure that water storage assets also allocate some water to livestock;</li> <li>• Ensure that an EIA is conducted on all Schedule 2 dams.</li> </ul>
3	2014 Programme of Action 2013–2018: Development Unusual; The Route to the First World Kingdom	✓	The EDF projects should aim to: <ul style="list-style-type: none"> <li>• Use unused government farmland, when suitable;</li> <li>• Improve efficiency of existing irrigation systems;</li> <li>• Coordinate plans with other schemes;</li> <li>• Assess the cumulative impacts of each project's water use / water storage;</li> <li>• Safeguard the hydrological services of the project area;</li> <li>• Ensure maximum economic use of land resources;</li> <li>• Increase corn production;</li> <li>• Diversify crop production;</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
			<ul style="list-style-type: none"> <li>• Add value to primary crops;</li> <li>• Train farmers to add value to their crops, where relevant;</li> <li>• Provide livelihood activities;</li> <li>• Support diverse livelihoods to support human nutrition.</li> </ul>
4	2010 Fiscal Adjustment Roadmap (FAR) & 2012 Update (UFAR)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Clarify ownership of assets once built, and explicitly allocate O&amp;M duties and mechanisms for cost recovery during operation;</li> <li>• Strengthen the private sector's capacity to build, supply parts, and service project assets; assess potential to integrate the private sector into project activities, where feasible (e.g., could the private sector, rather than government, deliver more extension? operate the beef and dairy farms? provide services for cattle breeding? &amp; conduct agricultural research?);</li> <li>• Enhance food security by adding social safety net activities. (N.B. Commercialization may decrease the income of smallholder farmers).</li> </ul>
5	2010 National Gender Policy	✓	<p>All 11th EDF project activities are to help:</p> <ul style="list-style-type: none"> <li>• Redress the inequities between women and men (e.g., access to land);</li> <li>• Clarify water allocation to ensure that women have access to water for their crops (even in times of water scarcity);</li> <li>• Ensure equitable access by girls, boys, women, and men to education, training, health services, resources (e.g., land and credit), and entrepreneurial programmes;</li> <li>• Ensure that the livestock project also caters to livestock that women usually manage (e.g., chickens and goats);</li> <li>• Ensure fair representation and participation of women and men in all decision making positions and structures;</li> <li>• Build women's leadership capacity and capacity to develop and manage small enterprises;</li> <li>• Provide gender sensitive extension;</li> <li>• Ensure that budget is allocated to mainstream gender within all EDF projects;</li> <li>• Determine and formulate gender sensitive monitoring indicators.</li> </ul>
6	2002 / 2010 Tourism Policy	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Map the location of important tourism resources;</li> <li>• Avoid conservation areas and biodiversity corridors;</li> <li>• Apply high health standards to livestock products and horticultural products, to be able to sell the products to tourists.</li> </ul>
7	The Land Policy (LP) (1999 & 2009 drafts)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Clarify tenure of irrigation schemes;</li> <li>• Ensure that pack houses, cold stores, water storage assets, downstream farms, rangeland conservation efforts, and dairy / beef enterprises are built on land that is demarcated;</li> <li>• Ensure that the project land use is a suitable land use.</li> </ul>
8	2009 National Water Policy (draft)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Select and locate project activities based on land suitability, integrated planning, and whether the activity optimizes the use of scarce water resources.</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
9	2009 / 2010 Integrated Water Resources Master Plan (draft)	?	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Apply integrated planning framework for land and water resources development;</li> <li>• Coordinate land use, water storage development, and water use with all EDF projects (where these overlap in location) and with other nearby projects using an established mechanism;</li> <li>• Ensure that EDF project water use is based on sound research on the existing and <i>future projected</i> water quantity and quality, and safe level of abstraction;</li> <li>• Evaluate whether the EDF project location and the water allocations will be sufficient, given other development activities and given climate change projections;</li> <li>• Ensure EDF activities do not compromise water resources in any way (e.g. through water pollution or excessive withdrawals);</li> <li>• Promote water conservation and water efficiency.</li> </ul>
10	The National Multi-sectoral Strategic Framework for HIV and AIDS (2009 – 2014)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Allocate water fairly, including allocating water to vulnerable groups;</li> <li>• Provide complimentary activities to improve the diet of vulnerable households, including HIV/AIDs-affected households.</li> </ul>
11	Government Programme of Action 2008–2013 (GPA)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Continuously assess whether commercialising smallholder farms remains compatible with (household) food self-sufficiency (e.g., if a smallholder does not get a fair price for growing produce, the household's food security is put in jeopardy);</li> <li>• Assess opportunities to add more value to agricultural products.</li> </ul>
12	2008 Towards a Sector Wide Approach (SWAp)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Identify all water projects and all livestock projects within a given project area and coordinate with other projects;</li> <li>• Support a sector wide approach for the water sector <u>and</u> for the agricultural sector.</li> </ul>
13	2005 National Irrigation Policy (draft)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Assess what is the best use of water resources in a given location, (e.g., vegetables vs. rangeland);</li> <li>• Manage water for irrigation effectively to minimize competition for water (e.g., competition between crops, livestock, households, enterprises, and environmental flows);</li> <li>• Evaluate irrigation technology (e.g., drip irrigation) to optimize use of available water.</li> </ul>
14	2005 The Poverty Reduction Strategy & Action Plan	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Ensure that the value chain is robust;</li> <li>• Provide fair prices and good employment to smallholder farmers;</li> <li>• Provide programs to support the most vulnerable.</li> </ul>
15	2005 Decentralization Policy	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Ensure sound local-level participatory processes for all EDF activities.</li> </ul>
16	2005 National Food Security Policy (NFSP)	?	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Prioritize local food availability;</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
			<ul style="list-style-type: none"> <li>Investigate / safeguard indigenous food crops;</li> <li>Conserve agro-diversity;</li> <li>Use land and water according to their biophysical suitability and economic viability;</li> <li>Improve food-storage methods;</li> <li>Add value;</li> <li>Develop complimentary programs to support alternative livelihoods;</li> <li>Protect environmental health; provide sanitation;</li> <li>Assess gender impacts and develop special complimentary programmes, as needed;</li> <li>Add complimentary programs to improve food access and the nutrition of vulnerable groups.</li> </ul>
17	2005 Strategic Brief for National Food Security and Agricultural Development (SBNFSAD): Horizon 2015	?	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>Establish complimentary programs to safeguard the food security of vulnerable groups;</li> <li>Establish programmes to remove and control alien invasive species and to control bush encroachment;</li> <li>Integrate livestock, fisheries, forestry, and the environment into agriculture;</li> <li>Establish sustainable and diverse patterns of agricultural production;</li> <li>Develop an appropriate land use plan for sustainable land and water management;</li> <li>Use land and water efficiently according to the biophysical and economic viability.</li> </ul>
18	2003 The Water Act (WA)	?	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>Integrate and decentralize water management;</li> <li>Involve the necessary water stakeholders in water resources planning to harmonize the management and govern the use of water resources i.e., NWA, RBA, Irrigation Districts (IDs), and Water User Associations (WUA);</li> <li>Apply IWRM principles; implement the <i>1 watershed – 1 management</i> approach;</li> <li>Apply cost-recovery measures during implementation;</li> <li>Require Project water users to have a permit to use water (with abstraction limits);</li> <li>Ensure that all Project water users, including enterprises, respect the water permit and water allocations.</li> </ul>
19	2002 National Environmental Health Policy	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>Safeguard environmental health and workers' health;</li> <li>Integrate environmental health into all projects (i.e., safeguards and standards with respect to hazardous chemicals and sanitation);</li> <li>Apply strict safety standards to food products (e.g., hygienic handling; no residues).</li> </ul>
20	National Energy Policy Implementation Strategy (draft)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>Prioritize energy efficiency and energy conservation in irrigation, at packhouses, cold stores, in transportation, and during equipment use;</li> <li>Integrate the use of renewable energy.</li> </ul>
21	2002/2003 The National Rural Resettlement Policy (NRRP)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>Help correct existing land-use problems through participatory planning, including the relocation of sub-optimal land uses where feasible;</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
			<ul style="list-style-type: none"> <li>Prevent future land-use problems by supporting better land use planning;</li> <li>Ensure that Project decisions are made through local planning procedures (e.g., CDP);</li> <li>Confirm that affected people are compensated fairly.</li> </ul>
22	2001 The Occupational Safety and Health Act No 9	✓	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>Correctly manage agrochemicals;</li> <li>Minimize exposure of farmers to hazardous agrochemicals;</li> <li>Provide hygiene, control of hazardous waste materials, clean and healthy water supplies for workers, adequate sanitation, and occupational safety and health at Project sites;</li> <li>Investigate occupational accidents and disease (e.g., chemical spills leading to illness).</li> </ul>
23	1999 National Development Strategy (NDS) / Vision 2022	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>Ensure rational land use and the best use of the country's natural and human resources;</li> <li>Optimize the use of water;</li> <li>Apply economic efficiency and effectiveness concepts;</li> <li>Expand smallholder irrigation, <i>within a national irrigation development plan</i>.</li> </ul>
24	1998 The Swaziland Administration Order	✓	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>Ensure that the project communities are informed of issues or developments that affect them as a community;</li> <li>Work through acceptable participatory mechanisms, e.g., CDP;</li> <li>Prevent the commission of any offence related to EDF projects within Chiefdoms.</li> </ul>
25	1996–2006 National Physical Development Plan (NPDP)	?	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>Strengthen inter-sectoral coordination of development within a spatial framework;</li> <li>Review compatibility of the 11<sup>th</sup> EDF project activities against the NPDP.</li> </ul>
26	1983 The Workmen's Compensation Act	✓	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>Ensure that contractors have a compensation-and-medical-treatment policy for workers who may suffer injury or contract disease in the course of their employment.</li> </ul>
27	1980, 1985, 1997 Employment Act	✓	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>Abide by the provisions of the Employment Act (e.g., wages, recruitment, employment of women and children, and provisions related to safeguarding against forced labour).</li> </ul>
28	1972 Factory, Machinery & Construction Works Act	✓	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>Abide by the provisions of the Construction Works Act, in relation to the safety and health of construction workers.</li> </ul>
29	1964 The Wages Act No 16	✓	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>Abide by the Wages Act (e.g., minimum wage and employment conditions);</li> <li>Provide special arrangements to safeguard farmers' income during disaster years.</li> </ul>
<b>Agricultural Sector</b>			
30	2015 Swaziland	✓	All 11th EDF project activities are to:

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
	National Agricultural Investment Plan (SNAIP)		<ul style="list-style-type: none"> <li>• Reduce land degradation; apply soil conservation and soil enrichment measures;</li> <li>• Restore biodiversity; increase agro-biodiversity; ensure that rangeland management measures restore biodiversity;</li> <li>• Increase the land area under climate-smart agriculture;</li> <li>• Integrate crop–livestock systems (for manure management and soil enrichment);</li> <li>• Reduce post-harvest losses;</li> <li>• Reform the parastatals.</li> </ul>
31	2012 Final Agricultural Research Policy	✓	<p>All 11th EDF project activities are to support:</p> <ul style="list-style-type: none"> <li>• Collaborative extension-relevant research links that integrate gender sensitivity;</li> <li>• A multi-sector and multi-stakeholder research agenda;</li> <li>• Delivery of market-oriented agricultural knowledge;</li> <li>• Frameworks for linkages, collaboration, and partnership with different stakeholders;</li> <li>• Research on climate change knowledge, innovations, and practices;</li> <li>• Integration of cross-cutting issues (e.g., indigenous knowledge, gender, and HIV/AIDS);</li> <li>• Monitoring and evaluation systems.</li> </ul>
32	2013 National Agricultural Extension Policy of Swaziland (NAEPS) (Draft)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Support the transformation of extension services into a demand-led, gender-sensitive, agribusiness-oriented system;</li> <li>• Support operational linkages between central, regional, and local extension organizations;</li> <li>• Help ensure subject-matter extension specialists support local producers in key production, value addition, value chain, and marketing activities.</li> </ul>
33	2012 Scaling up Conservation Agriculture in Swaziland: A Strategic Plan 2013–2016	✓	<p>All 11th EDF project activities are to provide measures to:</p> <ul style="list-style-type: none"> <li>• Institutionalise conservation agriculture (CA);</li> <li>• Assess whether and how to apply CA within EDF project activities;</li> <li>• Develop new CA techniques to meet farmer challenges;</li> <li>• Support farmers during their transition to CA.</li> </ul> <p>N.B. Delays associated with CA research and with improving soils for CA may be at odds with quick commercialisation and farmers' need for immediate income.</p>
34	2010 Swaziland CAADP & 2003 CAADP & 2001 NEPAD programme	✓	<p>All 11th EDF project activities are to mitigate the potential negative impacts of commercialization by:</p> <ul style="list-style-type: none"> <li>• Supporting more equitable distribution of wealth (i.e., fair prices for farmers);</li> <li>• Providing complimentary activities (e.g., access to food when market prices for horticultural products are too low to make a living);</li> <li>• Diversification (e.g., growing livestock that women normally raise).</li> </ul>
35	2005 Comprehensive Agricultural Sector Policy (CASP)	✓	<p>All 11th EDF project activities are to:</p> <ul style="list-style-type: none"> <li>• Assist the agricultural sector to develop in a harmonized and coordinated manner at local and national level (e.g., provide a mechanism to coordinate the 11<sup>th</sup> EDF with the full sector);</li> <li>• Add value to agricultural products to enhance economic</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
			<p>growth;</p> <ul style="list-style-type: none"> <li>• Increase farmers' earnings through diversification and sustainable intensification.</li> </ul> <p>N.B. Commercial market prices can be low, and farmers' earnings can suffer.</p>
36	1995 The Livestock Development Strategy Policy (LDP)	✓	<p>The WHDP project should:</p> <ul style="list-style-type: none"> <li>• Ensure some water allocation for livestock, at each site.</li> </ul> <p>The LDP should:</p> <ul style="list-style-type: none"> <li>• Assess the financial sustainability of GOS farms;</li> <li>• Integrate crop–livestock efforts (e.g., horticultural waste as a food source for livestock and manure to support pasture management).</li> </ul>
<b>Environmental Instruments</b>			
37	2010 The Water Pollution Control Regulations	?	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>• Ensure that EDF project effluents and runoff comply with pollution standards;</li> <li>• Control, manage, and monitor the water quality effluents of the project sites.</li> </ul>
38	2012 Biosafety Act & 2009 Biosafety Bill	?	<p>Regarding biosafety, all 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>• Conduct a GMO risk assessment to exclude GMOs (e.g., GMO corn);</li> <li>• Minimize use of exotic breeds;</li> <li>• Minimize the use of feed containing GMOs (e.g., corn).</li> </ul>
39	2002 Environmental Management Act	✓	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>• Apply the precautionary principle for impact management.</li> </ul>
40	2002 National Forest Policy & 2002 Forest Bill (draft)	?	<p>All 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>• Provide actions to protect natural forests and woodlands;</li> <li>• Should not be located on forested land;</li> <li>• Should avoid introducing alien species and take measures to control alien species.</li> </ul>
41	2001 National Biodiversity Strategy and Action Plan (Draft)	?	<p>All 11th EDF projects should aim to:</p> <ul style="list-style-type: none"> <li>• Avoid protected areas to conserve a viable set of representative natural ecosystems;</li> <li>• Conserve the genetic base of Swaziland's crop and livestock breeds;</li> <li>• Minimize land clearing for farms and other development, to minimize biodiversity impacts, especially where projects displace natural vegetation;</li> <li>• Avoid biodiversity impacts by not conducting agriculture on steep slopes, applying slope stabilisation measures to minimize erosion and reduce run-off, and minimizing pollution of water sources by agricultural runoff.</li> </ul>
42	2001 Flora Protection Act	?	<p>All 11th EDF projects to:</p> <ul style="list-style-type: none"> <li>• Assess the scale of their impacts on indigenous flora, especially protected / endangered flora (e.g., during bush clearing and construction of dams and irrigation canals) and establish appropriate mitigation measures, as needed;</li> <li>• Prohibit plucking, gathering, cutting, or destroying of plant species listed in the Act.</li> </ul>
43	2000 Environment Audit,	✓	<p>All 11<sup>th</sup> EDF projects should:</p> <ul style="list-style-type: none"> <li>• Ensure that all 11<sup>th</sup> EDF projects that require environmental assessment follow the environmental,</li> </ul>



#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
	Assessment & Review Regulations		social, and climate-risk management framework provided in this Strategic Environmental Assessment and comply with any EIA requirement.
44	2000 Waste Regulations	?	All 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Follow correct procedures to collect, transport, sort, recover, treat, store, dispose, use, and manage agrochemicals;</li> <li>Record the use of agrochemicals;</li> <li>Minimize the activities that use hazardous agrochemicals;</li> <li>Correctly manage all other wastes to avoid negative impacts (e.g., desilting debris);</li> <li>Dispose wastes at approved waste disposal facilities;</li> <li>Develop a comprehensive Waste Management Plan.</li> </ul>
45	1999 NAP for Convention to Combat Desertification	✓	All 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Reduce land degradation and biodiversity loss through application of sustainable land management practices.</li> </ul>
46	1999 National Environment Policy (Draft)	✓	All 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Comply with any EIA requirement.</li> </ul>
47	1997 National Environmental Action Plan	?	All 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Make the best use of the country's natural and human resources by assessing the land and water suitability for the planned projects.</li> </ul>
48	1953 / 1991 The Game Act	✓	All 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Ensure that EDF project activities do not interfere with wildlife.</li> </ul>
49	1981 The Plant Control Act	?	All 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Assess local plant biodiversity before clearing land for project activities, and especially analyse for the presence of rare flora;</li> <li>Protect all trees, shrubs, and vegetation, and any living or dead portion of plants, especially those that require permission from the Minister of Agriculture before being removed (an environmentalist must supervise removals that require such permissions);</li> <li>Obtain permits when required;</li> <li>Assess the risk of introducing alien species and take necessary preventative measures;</li> <li>Control invasive species.</li> </ul>
50	1937 / 1938 The Protection of Fresh Water Fish Act	✓	All 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Protect fresh water fish, especially when developing water infrastructure;</li> <li>Ensure environmental (water) flows;</li> <li>Protect aquatic habitats against toxic agricultural effluents.</li> </ul>
<b>Climate Change and Disaster Management Instruments</b>			
51	2015 Paris Agreement Swaziland's INDC FNC & SNC 1996 United Nations Framework Convention on	✓	To harmonise with the 2015 Paris Agreement, all 11 <sup>th</sup> EDF projects should: <ul style="list-style-type: none"> <li>Balance CO<sub>2</sub> emissions and CO<sub>2</sub> removals to sinks (e.g., remove 1 tree; plant one tree);</li> <li>Calculate CO<sub>2</sub> emissions and set objectives to reduce CO<sub>2</sub> emissions;</li> <li>Apply architectural redesign to new buildings to save energy (e.g., use natural ventilation and efficient insulation to eliminate or reduce the need for air</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
	Climate Change (UNFCCC) 1997 Kyoto Protocol		<ul style="list-style-type: none"> <li>conditioning);</li> <li>Promote human rights when taking action to address climate change (e.g., gender rights);</li> <li>Consider predicted ecosystem shifts, when locating EDF project activities;</li> <li>Minimize land clearing to minimize soil carbon loss;</li> <li>De-carbonise EDF project activities, where feasible (e.g., apply energy conservation);</li> <li>Use more renewable energy during operation (e.g., buy blended petrol);</li> <li>Use HCFC/HFC-free cooling technologies;</li> <li>Apply conservation agriculture practices.</li> </ul>
52	2014 National Climate Change Policy	?	<p>To climate proof 11<sup>th</sup> EDF activities, projects should:</p> <ul style="list-style-type: none"> <li>Apply an integrated approach to climate change work (multi-sectoral, multi-level; flexible risk based) to deal with future uncertainty and provide strategies that are robust enough to cope with a range of possible local climate outcomes and variations;</li> <li>Apply green growth principles, where relevant (i.e., energy efficiency and renewable energy);</li> <li>Integrate future climate change scenarios into calculations for irrigation;</li> <li>Improve access to climate forecasting;</li> <li>Assist the agriculture sector to prepare its sectoral climate change strategy and action plan;</li> <li>Mainstream climate change into the EIA process for each project requiring an EIA.</li> </ul> <p><u>HVCHP:</u></p> <ul style="list-style-type: none"> <li><u>Fully</u> apply sustainable land management practices (e.g., climate smart agriculture and conservation agriculture);</li> <li>Assess whether the timing and location of cropping activities needs to be changed;</li> <li>Expand the use of integrated pest and pathogen management;</li> <li>Expand the use of varieties / species resistant to pests, diseases, and drought;</li> <li>Improve post-harvest and bulk-handling services;</li> <li>Improve nitrogen fertilizer management.</li> </ul>
53	2014 National Climate Change Strategy and Action Plan 2014–2019	?	<p>To support climate change mitigation, all 11<sup>th</sup> EDF projects are to support the development of:</p> <ul style="list-style-type: none"> <li>A national knowledge base on climate change impacts and adaptation strategies by agro-ecological zone and farming systems;</li> <li>Application of climate risk management tools e.g., crop weather-based insurance;</li> <li>An early warning system;</li> <li>Flood risk reduction strategies and drought monitoring systems.</li> </ul> <p>The 11<sup>th</sup> EDF activities can:</p> <ul style="list-style-type: none"> <li>Invest in post-harvest and value addition processing and storage technologies;</li> <li>Invest in agroforestry, where feasible;</li> <li>Apply energy efficiency measures, including vehicle fleet efficiency;</li> <li>Enhance efficient fertilizer application;</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
			<ul style="list-style-type: none"> <li>• Apply (modified / no pump) drip irrigation, where feasible.</li> </ul> <p><i>Regarding water use in crop agriculture:</i></p> <ul style="list-style-type: none"> <li>• Apply Integrated Water Resources Management (IWRM);</li> <li>• Undertake water resources assessment (e.g., determine resource availability and quality, and water demand trends);</li> <li>• Protect and rehabilitate catchment areas and wetlands;</li> <li>• Promote groundwater recharge and rainwater harvesting;</li> <li>• Improve irrigation techniques and water management;</li> <li>• Promote water-conserving crop varieties, and drought- and heat tolerant crops and livestock breeds;</li> <li>• Apply water saving technologies and management;</li> <li>• Facilitate and promote water recycling;</li> <li>• Provide reliable water and sanitation (in project area).</li> </ul> <p><i>Regarding use of agrochemicals and related wastes:</i></p> <ul style="list-style-type: none"> <li>• Keep good records on use of agrochemicals;</li> <li>• Minimize agrochemical use;</li> <li>• Establish a waste database on quantities and types of wastes generated;</li> <li>• Strengthen waste minimization strategies.</li> </ul> <p><i>Regarding institutional capacity:</i></p> <ul style="list-style-type: none"> <li>• Enhance linkages with other climate-related sectors (e.g. inter-ministerial committees);</li> <li>• Encourage appropriate use of the sector-wide approach to integrate climate change into agricultural activities.</li> </ul>
54	2006 Disaster Management Act (and other related instruments)	?	<p>All 11th EDF projects are to integrate disaster risk management into projects by:</p> <ul style="list-style-type: none"> <li>• Prioritising food security through intensified local <i>maize</i> production and rehabilitation of water systems during disasters periods;</li> <li>• Ensuring access to potable water;</li> <li>• Minimizing impacts on vulnerable communities through complimentary programs.</li> </ul>
<b>International Instruments</b>			
55	EU Policy and Development Framework	✓	<p>The 11th EDF projects are to:</p> <ul style="list-style-type: none"> <li>• Address the root causes of recurrent crises (e.g., changing climate);</li> <li>• Promote crops that are drought resistant;</li> <li>• Integrate future water availability and climate change into irrigation schemes;</li> <li>• Integrate longer-term benefits for socio-economic and sustainable development;</li> <li>• Apply intensification approaches that are sustainable and ecologically efficient (e.g., integrated pest management, soil and water management, and resistant crop varieties);</li> <li>• Promote win-win solutions that benefit the rural poor and the environment.</li> </ul>
56	2002 / 2006 International Treaty on Plant Genetic Resources for Food & Agriculture	?	<p>The 11th EDF project activities to:</p> <ul style="list-style-type: none"> <li>• Support the conservation, exchange, and sustainable use of Swaziland's plant genetic resources for food and agriculture;</li> <li>• Protect and document traditional knowledge relevant to plant genetic resources for food and agriculture.</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
57	2001 / 2004 Stockholm Convention on Persistent Organic Pollutants (POPs)	?	The 11th EDF project activities should help: <ul style="list-style-type: none"> <li>• Eliminate unintentionally produced POPs (e.g., use of fire to clear land);</li> <li>• Avoid the use of POPs;</li> <li>• Manage and dispose of POP wastes in an environmentally sound manner (e.g., if using aldrin, chlordane, dieldrin, endrin, heptachlor, hexachloro-<i>benzene</i>, mirex, taxaphene, PCBs, DDT, dioxins, and/or <i>endosulfan</i>).</li> </ul>
58	1994 / 1996 UN Convention to Combat Desertification (UNCCD)	✓	The 11th EDF project activities should: <ul style="list-style-type: none"> <li>• Promote sustainable development (e.g., if one tree is cut, replace it);</li> <li>• Consider the best way to use resources in the long term without exhausting supply (minimize resource use through conservation, efficiency, and recycling);</li> <li>• Support human development: 1. Education; 2. Health; and 3. Income.</li> </ul>
59	1992 / 1993 UN Convention on Biological Diversity (UNCBD)	?	The 11th EDF projects should: <ul style="list-style-type: none"> <li>• Assess the biodiversity in the EDF project areas;</li> <li>• Conserve or protect important biodiversity;</li> <li>• Apply the precautionary principle (i.e., where there is a significant threat to biodiversity, lack of full scientific certainty should not be used as a reason to postpone measures to avoid or minimize such a threat).</li> </ul>
60	1989 / 1992 Basel Convention on the Transboundary Movement of Hazardous Wastes and Disposal	✓	The 11th EDF projects should: <ul style="list-style-type: none"> <li>• Minimize the use and the toxicity of the agrochemicals it uses;</li> <li>• Minimize agrochemical wastes;</li> <li>• Apply Integrated Pest Management, where needed;</li> <li>• Develop a hazardous waste management plan for all hazardous wastes (e.g., empty pesticide packaging; spent chemicals from cattle dipping; or expired veterinary medication).</li> </ul>
61	1987 / 1989 Montreal Protocol on Substances that Deplete the Ozone Layer & Vienna Convention	✓	The 11th EDF projects should: <ul style="list-style-type: none"> <li>• Assess whether livestock and horticultural industries in Swaziland use halogenated hydrocarbons to manage pests;</li> <li>• Generally avoid the use of all ozone depleting substances, including <i>methyl bromide</i> and other insecticides that contain hydrocarbons.</li> </ul>
62	1979 / 1983 Convention on the Conservation of Migratory Species (CMS) of Wild Animals & 1996 AEWA	✓	The 11th EDF projects should: <ul style="list-style-type: none"> <li>• Assess whether EDF project locations overlap with migratory routes;</li> <li>• Avoid conducting agricultural activities near protection-worthy habitats and along migratory routes.</li> </ul>
63	1973 / 1975 Convention on the International Trade in Endangered Species of Wild Fauna and	✓	The 11th EDF projects should: <ul style="list-style-type: none"> <li>• Assess whether there are aquatic and terrestrial endangered species in or near EDF project locations, and provide additional mitigation, where needed;</li> <li>• Ensure that 11th EDF activities do not lead to any exploitation of endangered species.</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
	Flora (CITES)		
64	1971 / 1975 Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	✓	The 11th EDF projects should: <ul style="list-style-type: none"> <li>Identify the location of important wetlands, and avoid such locations;</li> <li>Not encroach on or cause the loss of wetlands now and in the future.</li> </ul>
65	The Millennium Development Goals (MDGs)	✓	11th EDF projects to comply with MDG provisions and help: <ul style="list-style-type: none"> <li>Reduce biodiversity loss;</li> <li>Support sustainable access to safe drinking water and sanitation;</li> <li>Promote gender equality;</li> <li>Improve maternal health and reduce child mortality;</li> <li>Combat HIV/AIDS and malaria.</li> </ul>
<b>Regional Instruments</b>			
66	1998, 2000, & 2003 Revised Protocol on Shared Watercourse Systems in the Southern African Development Community (SADC) Region	?	The 11th EDF projects should: <ul style="list-style-type: none"> <li>Assess EDF water use within the context of transboundary shared water resources, and especially within a scenario of drought episodes;</li> <li>Clarify how to share water during drought episodes;</li> <li>Cooperate through RBAs;</li> <li>Promote the equitable use of shared watercourses;</li> <li>Monitor the execution of development plans in shared watercourse systems to ensure continued compliance to water allocations.</li> </ul>
67	2002 Tripartite Interim Agreement between the Republic of Mozambique, Republic of South Africa, and the Kingdom of Swaziland for Co-operation on the protection and sustainable use of the water resources of the Incomati and Maputo watercourses	?	The 11th EDF projects should: <ul style="list-style-type: none"> <li>Calculate whether 11th EDF projects by themselves or in combination with other development activities could exceed water allocations or lead to transboundary impacts on a specific basin;</li> <li>Coordinate with other projects and development plans on water use;</li> <li>Ensure that water use plans are shared with other water stakeholders;</li> <li>Exchange water related information to coordinate water management plans and measures;</li> <li>Notify neighbouring communities about planned water measures;</li> <li>Verify that any new crop agriculture or irrigation programme is within country allocation, and that water flows are predicted to be reliable to sustain other water users and ecosystem flows;</li> <li>Assess EDF water quality impacts under normal and extreme climate scenarios and assess the risk of breaching the water quality guidelines;</li> <li>Apply measures to protect and preserve the aquatic environments and ecosystems;</li> <li>Identify contingency measures for water allocations and the sharing of water during drought periods.</li> </ul>
68	2000 Lubombo Conservancy–	✓	The 11th EDF activities should: <ul style="list-style-type: none"> <li>Map EDF project activities in relation to the 2 transfrontier</li> </ul>

#	Instrument	Compatible	To enhance compatibility, consider the following in compliance with the key policy statements
	Global Transfrontier Conservation Area Protocol		<p>parks: Nsubane-Pongolo (Jozini) area (South Africa &amp; Swaziland) and Lubombo Conservancy-Hlane-Mlawula/Goba area (Mozambique &amp; Swaziland);</p> <ul style="list-style-type: none"> <li>Assess whether EDF activities could impact transfrontier areas;</li> <li>Generate mitigation measures, as needed.</li> </ul>

## 6.3 Qualitative Impact Analysis of the 11th EDF and Evaluation of Alternatives

Chapter 6.3 presents the results of the *Qualitative Impact Analysis of the 11<sup>th</sup> EDF project objectives on the key sustainability components*. Of note, impact *significance* is determined by considering the characteristics and importance of a predicted impact. Impact characteristics include whether the impact is: positive / negative; reversible / irreversible; long term / short term; probable / improbable; frequent / infrequent; small / large; local / international; cumulative or not; and whether the impact is transboundary. An impact is considered 'important' if it breaches legal thresholds (e.g., environmental standards), damages human health or the health of the environment, and/or if it damages an environmental component that has 'recognition' (e.g., has international, scientific, or local value, or protection status).

### 6.3.1 Qualitative Impact Analysis of the Core Projects: Analysis of Alternative 1 (no project) and Alternative 2 (full implementation)

This section presents the results of the *Qualitative Impact Analysis of the 11<sup>th</sup> EDF project objectives on the key sustainability components*. It evaluates the predicted impacts using Table 11: Evaluation Framework for the Detailed StrEA, which covers the 5 key strategic issues (biodiversity, land, water, climate, and pollution), and well as social-cultural, socio-economic, and institutional aspects. This assessment also integrates a qualitative impact assessment of the:

- Contributions to GHG emissions;
- Vulnerability to climate risks;
- Assessment of the Programme's cumulative impacts.

As it assesses impacts against the baseline situation (Alternative 1), Chapter 6.3 is also considered the evaluation of alternatives.

It was mentioned in the scoping report, that time allowing, Alternative 3 would be analysed. There was insufficient time to evaluate Alternative 3 during the consultancy.

### 6.3.2 The Impact of the HVCHP on ESCR Components

The analysis generally found that the implementation of the HVCHP project within the LUSIP area would negatively impact on existing biodiversity. The LUSIP area has undergone widespread land conversions over the past 10 years and the effect of the loss of some good bushveld vegetation and habitat has reduced the occurrence of some species of flora and fauna nationally. The HVCHP will cumulatively negatively impact on the remaining biodiversity, with increasing risks to ecosystem function, increasing fragmentation of habitat, and loss of many floral services (e.g., medicinal plants). The StrEA recommends that

project-level ESIA include a *Biodiversity Impact Assessment (BIA)*<sup>54</sup>. BIAs can follow the guidelines provided by the Secretariat to the Convention on Biological Diversity.

In terms of the HVCHP and climate change impacts, the analysis suggests that in general the project outcomes strengthen local community resilience to the changing climate and reduces their vulnerability. The introduction of irrigation and commercial crops is expected to produce positive impacts on the community's ability to cope with the reduction in rainfall and with the higher temperatures. Land conversion and associated soil carbon loss do however increase GHG emissions, contributing to global warming.

The need for refrigerated cold rooms for vegetable storage does increase the demand for energy, which is currently predominantly based on coal-generated energy; this increases GHG emissions in the region. To reduce the magnitude of the impact, cold room design and operation should aim to be as energy efficient as is economically viable. In terms of the impact of climate on the HVCHP, an assessment is required to determine the significance and adaptation measures.

In terms of the HVCHP impact on land and land management, the analysis suggests that in general the project will strengthen local community benefits from an increasingly secure management of land and land use. Community-developed land use plans that also address a wide range of environmental factors, like erosion and conservation, strengthen sustainable land management. To increase the magnitude of the benefits, pro-resilience mitigation measures have to be formulated in the project EIAs.

In terms of the HVCHP impact on water availability, the analysis suggests that in general the project negatively affects the amount of available water. Water for LUSIP is sourced from a transboundary river and has many users downstream of the LUSIP site. With ever increasing demands on this water, access to it will become more challenging and costly. Irrigation and improved water management are critical to ensure a high level of productive use of the available water.

Pollution of land and water from agro-chemicals is a cumulative negative impact. Agro-chemicals are generally required to support a high level of crop productivity, but their use must be measured and appropriate. There is a range of alternatives or supplemental techniques to improve soil fertility, including climate-smart practices, mulching, and the use of organic fertilisers. Project implementers need to adopt a wide technical approach to support crop productivity, and not only the use of chemicals.

In terms of the HVCHP impact on the socio-cultural and socio-economic sphere, the HVCHP does offer some valuable benefits to communities that were previously focused on subsistence agriculture. Improvements in food security, health and well-being, and private sector participation are desired outcomes of the EDF investment. The detailed Project designers must strengthen these positive impacts by ensuring beneficiaries are appropriately capacitated in a wide range of skills that also address sustainability and environmental management.

In terms of the HVCHP impact on the institutional landscape, the analysis suggests that in general the project positively supports the strengthening of key institutions affected by this project. Community development planning for HVCHP projects will bring together all affected institutions to create a shared vision of development. Capacity weaknesses (skills and numbers) existing in some key institutions like MOA and NAMBoard will require strengthening to ensure optimum delivery of support.

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<sup>54</sup> The Convention on Biological Diversity (CBD), the Ramsar Convention, and the Convention on Migratory Species (CMS) recognize *impact assessment* as an important decision-support tool to help plan and implement development with biodiversity "in mind." The Conventions require Signatories ("Parties") to apply ESIA and StrEA to proposals that have potential negative impacts on biodiversity to help meet their objectives, so that development proposals respect mechanisms for the conservation of biodiversity, result in sustainable use of biodiversity resources, and ensure fair and equitable sharing of the benefits arising from use of biodiversity (<https://www.cbd.int/doc/decisions/cop-08-dec-28-en.pdf>).



### 6.3.3 The Impact of the WHDP on ESCR Components

The analysis generally found that the implementation of the WHDP project across the country would negatively impact on existing biodiversity. The provision of land for water storage and land for irrigated crops will require the conversion of habitat. The WHDP will cumulatively negatively impact on the remaining biodiversity nationally, with increasing risks to ecosystem functions and services. The detailed Project designers need to include some meaningful conservation measures to replace the biodiversity lost through the siting of water storage infrastructure and crop production, e.g., setting aside land for conservation and developing functional catchment management strategies that provide ecosystem benefits (including reduction of erosion). Community training in ESCR management will improve local resilience and the natural environment.

In terms of the WHDP and climate change, the analysis suggests that in general the WHDP will strengthen local community resilience to the changing climate and reduce vulnerability. The introduction of stored water for irrigation and crop production (at a small local scale) is expected to produce positive impacts on the community's ability to cope with the reduction in rainfall and higher temperatures. Land conversion and various dam activities in river courses do however increase GHG emissions, which contributes to global warming. The need to protect physical infrastructure from the damaging impacts of climate change (e.g., extreme flood events) will require engineers to integrate these increased risks. Rooftop water harvesting activities are also expected to strengthen resilience of communities and public buildings to the reduced rainfall and allow opportunities for backyard gardens.

In terms of the WHDP impact on land and land management, the analysis suggests that in general the project outcomes might weaken local community benefit from land and land use unless traditional leaders and communities work together to allocate land. Land disputes and pressure from existing land users could delay planning and implementation. The intention to develop community developed land use plans that also address a wide range of environmental factors, like erosion and conservation modalities and strengthening sustainable land management requires local visionary leadership. To increase the magnitude of the positive impacts, pro-resilience mitigation measures will need to be integrated into the ESIA's of the water-harvesting projects.

In terms of the WHDP impact on water and pollution, the analysis suggests that in general the project negatively affects available water. Water for storage in rural areas with low flowing seasonal streams is susceptible to misuse and misallocation. DWA requires abstraction and storage permits, which will need to be obtained by each WHDP project. Cumulatively, storage and use of water in sub-basins affects availability of water downstream. Water resource impact assessments could guide water use and water allocation in a manner that does not negatively affect downstream users. Pollution of land and water from agro-chemicals is a cumulative negative impact. Agro-chemical use associated with WHDP projects and its downstream farms is individually small, but with 60 dam sites, the risk of pollution increases. There are a number of alternatives or supplemental techniques to improve soil fertility, including climate smart practices, mulching, or use of locally produced organic fertilisers. Project implementers need to adopt a more technically sustainable approach to just recommending agro-chemical use, with an emphasis on organic options (which are also less costly).

In terms of the WHDP impact on the socio-cultural and socio-economic components, the WHDP does offer some valuable benefits to communities that were previously conducting subsistence agriculture. Improvements in food security, health, and well-being are desired outcomes of the EDF investment. Project designers must strengthen these positive impacts by ensuring beneficiaries are appropriately capacitated in a wide range of skills, including environmental management. The ratio between farmer and extension officer will need to be adequate.

In terms of the WHDP impact on the institutional landscape, the analysis suggests that in general the project positively supports the strengthening of key institutions. Community development planning for WHDP projects will bring together all affected institutions to create a shared vision of development. Capacity weaknesses existing in some key institutions like MOA will require strengthening to ensure optimum delivery of support.

### **6.3.4 The Impact of the LDP on ESCR Components**

The analysis generally found that the implementation of the LDP project in specific, but to be determined areas, would negatively impact on existing biodiversity. However, the LDP could adopt a landscape approach to land and biodiversity management in collaboration with the SNTC's Protected Areas Management Project. The SNTC project aims to integrate a wide range of land uses under a form of conservation management.

Livestock grazing has resulted in significantly increased levels of erosion nationally. Over grazed areas are highly susceptible to erosion and biodiversity loss. The LDP will cumulatively negatively impact on the remaining biodiversity, with increasing risks to ecosystem function, fragmentation of habitat, and loss of many floral services (e.g., fodder and medicinal plants).

In terms of the LDP and climate change impacts, the analysis suggests that in general the project outcomes strengthen local community resilience to the changing climate and reduces vulnerability. However, GHG emissions from livestock are a major contributor to global warming. Improving the health and diet of livestock will reduce GHG emissions. Rangeland improvement activities can potentially benefit climate, as carbon emissions are reduced and range condition and species composition are improved. Climate change impacts on rangeland productivity are likely to be negative due to increased temperatures and reduced rainfall. The LDP detailed project designers should assess appropriate mitigation options with rangeland ecologists and climate scientists and adopt a more resilient range improvement approach. The strong cultural connection with livestock is often a challenge when dealing with rangeland management improvement. Appropriately designed and acceptable feedlotting systems might solve some of the climate impacts on fodder and range degradation. Overall, climate change adaptation has to be fully integrated into the LDP project.

In terms of the LDP impact on land and land management, the analysis suggests that in general the project outcomes will negatively affect rangeland areas, unless community-developed range- improvement plans are acceptable to the affected communities. Community-developed land use plans that also address a wide range of environmental factors will strengthen sustainable land management. To increase the magnitude of the benefits, pro-resilience and positive range management mitigation measures will need to be integrated into the project ESIA's.

In terms of the LDP impact on the availability of water, the analysis suggests that in general the LDP is highly susceptible to drought. Access to water for livestock is already a challenge on communally grazed land. Livestock currently rely on natural streams that may dry out in the future dryer climate. The predicted decreased in rainfall translates into poorer range conditions. The increasing temperatures will increase the demand for water by livestock.

In terms of the LDP impact on the socio-cultural and socio-economic sphere, the LDP does offer some valuable benefits to subsistence communities. Improvements in food security, health and well-being, and private sector participation are desired outcomes of the EDF investment. Project designers must strengthen these positive impacts by ensuring beneficiaries are appropriately capacitated in a wide range of skills that also address sustainability and environmental management.

In terms of the LDP impact on the institutional landscape, the analysis suggests that in general the project positively supports the strengthening of key institutions. Community

development planning for LDP projects will bring together all affected institutions to create a shared vision of development. Capacity weaknesses existing in some key institutions like MOA will require strengthening to ensure optimum delivery of support.

### 6.3.5 Alternative 1 vs. Alternative 2

The discussion in *Chapter 5, Baseline Study: Risks, Constraints, Trends, and Opportunities*, highlights that Alternative 1 (no plan alternative) would mean the continuation of the negative trends described on biodiversity, land, water, climate risks, and pollution and the continued deterioration of some socio-cultural and socio-economic parameters.

Alternative 2 (full implementation of 11<sup>th</sup> EDF without being informed by the StrEA recommendations) would increase the negative biophysical trends described in Chapter 5. However, Alternative 2 (on its own) would generally support the socio-cultural, socio-economic, and institutional components through the provision of skills and infrastructure. The Project-level EIAs, a legal requirement, are expected to contribute to project-level biophysical management, but the EIAs will not address the programme level impacts, nor the cumulative, inter-sectoral, or climate-risk impacts.

When Alternative 2 (full implementation of 11<sup>th</sup> EDF) is attached to the Environmental, Social, and Climate-Risk (ESCR) Management Plan presented in Chapter 7, negative impacts could be well managed and benefits could be enhanced, with the result of contributing to a more sustainable agricultural sector overall.

## 6.4 Spatial Analysis of the WHDP and HVCHP project sites

A rapid analysis of each (already identified) site for the WHDP and HVCHP projects was conducted to identify potential conflicts or issues. Mapping software and a variety of geographic digital data (e.g., maps for land use, vegetation, rivers, catchment areas, agro-ecological regions, and protected area data) were used in this analysis. The spatial data made it possible to confirm or exclude potential issues (e.g., the map data showed whether an activity was in or near an area of high conservation value). At the same time, the Google Earth imagery facilitated the identification of potential issues based on the project location (e.g., the spatial data could highlight whether the planned location encroached into grazing areas). Chapter sections 6.4.1 and 6.4.2 provide additional details.

### 6.4.1 General Impacts of The Water Harvesting Dams Project (WHDP)

The WHDP seeks to enhance the availability of water throughout the year through the construction of storage or diversion structures. The new water supply is expected to improve crop production, and where possible, provide water for livestock. Small gardens are likely to form part of the intervention, allowing beneficiaries to produce irrigated food crops to increase their food security or income. The proposed water storage sites are generally located in areas for rainfed agriculture, and certain institutional arrangements and participatory procedures will be needed to make land available for the gardens. Figure 4 shows the location of the 1<sup>st</sup> batch of WHDP sites; these are the sites that were used in this spatial analysis.

The imagery highlights that there could be negative impacts on the downstream water users from agro-chemical use in the new gardens. Interventions and extension support to promote responsible agro-chemical use must form part of the extension services.

Project implementers will also need to investigate the security of the water supply. Rainfall patterns have changed in recent times, making rivers and other water supplies more erratic and at times, dangerous (flooding). The design of the project structures must recognise the climatic changes and be climate-proofed to ensure longevity and function (e.g., bigger spillways are needed to cater for the likely increase in frequency and intensity of flood events). Based on the spatial data, some arable areas are located in what could be flood-

prone areas, so measures may be needed to protect those areas from high-intensity storm events.

As relatively small-scale interventions, site-specific issues are limited to construction (e.g., waste management, site arrangements, or borrow areas). Otherwise, investigations and agreements will be needed to reduce the points of conflict on downstream water users during low natural flows and to improve catchment conditions to minimise sedimentation, which has been a serious problem in other similar water harvesting projects.

The spatial analysis of the WHDP highlights the following potential impacts:

- Land allocation arrangements for participants on the scheme;
- Downstream water use resource conflicts;
- Construction waste management;
- Agro-chemical contamination of water courses;
- Increased risk of erosion;
- Encroachment into a protection-worthy area;
- Catchment degradation affecting storage volumes;
- Increased flooding risks, resulting in damage to infrastructure and gardens.

#### **6.4.2 General Impacts from High Value Crop and Horticulture Project (HVCHP)**

The HVCHP seeks to increase the contribution of the agricultural sector to poverty reduction in Swaziland by creating pro-poor growth, securing livelihoods of smallholder farmers by providing them marketing opportunities, and providing locally produced diversified food on the market. The project will identify and supply national, regional, and international markets with high quality produce, develop land and strengthen farmer companies to profitably produce high value commodities in the LUSIP I area, and develop 3 packhouse hub-based zones and 3 cold stores. The project has various environmental and social challenges, particularly with regards to the sensitisation of chiefs and communities on the need to consolidate land to achieve economies of scale and to better manage scarce water resources. General findings following the mapping analysis are presented below.

- The imagery highlights that the HVC production areas and packhouse hubs will be located in the Lowveld – an area not normally considered suitable for commercial high value vegetable production. The heavy reliance on irrigation water, in what is already a water-stressed basin, is a risk to the long-term sustainability of the production hubs. The future drier climate is another risk.
- Methodologies or techniques will need to be developed to provide a conducive growing environment for the ‘high value’ crops, many of which are temperature sensitive. This will increase the cost of production, when compared to growing the same in the cooler areas of the country (e.g., Upper Middleveld and Highveld).
- Based on the map images, land availability does not appear to be a physical constraint to production, as long as agreements can be secured between the traditional leadership of these areas, the communities, and the buyers.
- Environmental issues arise from land development with loss of biodiversity, habitat, ecosystem services and soil.
- From the imagery analysis, the proposed packhouse and cold store locations will not directly impact on areas of high conservation value. Figure 5 shows the location of the proposed packhouses.

Of note, energy use by the packhouses and cold stores will be heavy under a business-as-usual approach. Long-term pricing of electricity indicates an annual 17% increase, making it more commercially viable if cold rooms are designed to the highest level of energy efficiency. Again packhouses in high elevations would appear to offer advantages in terms of lower ambient temperatures.

The spatial analysis of the HVCHP confirms the following potential impacts:

- Land allocation and utilisation arrangements for participants on the scheme;
- Loss of vegetation where land clearing is required (for crop production areas as well as physical infrastructure);
- Loss of grazing areas within the hubs where land is converted to other uses (to arable land or infrastructure);
- Construction waste management for packhouses, cold stores, and irrigation infrastructure;
- Organic waste management for crop packaging;
- Non-organic waste management (no formal landfill exists in some of the areas);
- High water use of packhouses;
- High seasonal temperatures and low rainfall could affect HVC production.

## 7 Environmental, Social, and Climate-Risk (ESCR) Management Plan and Logical Framework Indicators

The *ESCR Management Plan* is structured as follows:

- *Preliminary Programme-level ESCR Management Plan:*
  - *Preliminary General Programme-level ESCR Management;*
  - *Preliminary ESCR Management by Component.*
- *Three Preliminary Project-specific ESCR Management Plans:*
  - *Preliminary ESCR Management Plan for the WHDP;*
  - *Preliminary ESCR Management Plan for the HVCDP;*
  - *Preliminary ESCR Management Plan for the LDP.*

Chapter 7.1 presents the *Preliminary Programme-level ESCR Management Plan*.

Chapter 7.2 presents the three *Preliminary Project-specific ESCR Management Plans*. N.B. The *Preliminary Project-specific ESCR Management Plans* will need to be completed during the ESIA processes. ***Project-specific Management Plans are not required under a Strategic Environmental Assessment; the consultant completed this extra work to facilitate the subsequent ESIA work.***

Chapter 7.3 reviews the 11<sup>th</sup> EDF's logical framework indicators and makes some suggestions on how to revise the logical framework, based on this StrEA.

### 7.1 Preliminary Programme-level ESCR Management Plan

The Preliminary Programme-level ESCR Management Plan helps ensure that the 11<sup>th</sup> EDF programme as a whole integrates environmental and climate-risk management. The Plan has two sections, as described in: 7.1.1. *Preliminary General Programme-level ESCR Management* and 7.1.2. *Preliminary ESCR Management by Component*.

#### 7.1.1 Preliminary General Programme-level ESCR Management

The *Preliminary General Programme-level ESCR Management* section focuses on generic mitigation measures that help ensure that programme administration integrates

environmental and climate-risk management. Table 32 presents this section of the plan. Key activities include:

- ESCR policy dialogue
- Integration of ESCR into the programme management
- ESCR Communications strategy
- ESCR Coordination mechanism
- Integration of ESCR into the programme monitoring and evaluation
- Greening the programme-level procurement
- Implementation of the Programme-level ESCR capacity development plan
- Plan to conduct all project-specific ESIA / CRA, as required by law

**Table 32: Preliminary General Programme-level ESCR Management**

Preliminary General Programme-Level ESCR Management	Responsible Parties	Indicators to monitor
<b>Objective: Optimize the 11<sup>th</sup> EDF's administration</b>		
<b>Key Output: Preliminary General Programme-Level ESCR Management</b>		
<b>Integrate ESCR into policy dialogue:</b> <ul style="list-style-type: none"> <li>• Promote policy dialogue or exchange of experiences among stakeholders on policies related to sustainable agriculture.</li> </ul>	MOA, EU MEPD, SC, PMU	<ul style="list-style-type: none"> <li>• Number dialogues / meetings / month</li> </ul>
<b>Integrate ESCR into the programme management:</b> <ul style="list-style-type: none"> <li>• Establish a <i>Programme Management Unit</i> (PMU) to 'drive' the implementation of the 11<sup>th</sup> EDF programme;</li> <li>• Provide a <i>Focal Point</i> (FP) for the oversight of environment, social, and climate-risk aspects within the PMU;</li> <li>• Identify a <i>Steering Committee</i> (SC) member within each project-level Steering Committee to cover environment, social, and climate-risk aspects;</li> <li>• Provide a budget to implement the Programme-level and the Component ESCR Management Plans. (<i>N.B. The Project-specific ESCR Management Plans should have project-level budgets</i>).</li> </ul>	MOA EU SC, PMU	<ul style="list-style-type: none"> <li>• PMU established</li> <li>• ESCR Focal point seconded to PMU</li> <li>• Steering Committee ESCR representative</li> <li>• An adequate budget is available to implement the ESCR Management Plan</li> </ul>
<b>Develop an ESCR Communications Strategy to support good governance access to land, and security of tenure on SNL:</b> <ul style="list-style-type: none"> <li>• N.B. The 11<sup>th</sup> EDF is not likely to affect the land accessibility issue (it does not have the power to do so), so carefully select the communities to work in;</li> <li>• Develop a programme-level ESCR Communications Strategy to support good governance and community participation and to carefully select the communities to work in: <ul style="list-style-type: none"> <li>○ Introduce the 11<sup>th</sup> EDF–Agriculture programme to political and regulatory authorities;</li> <li>○ Secure cooperation and maintain collaborative relationships with political and regulatory authorities.</li> </ul> </li> </ul>	PMU Land Management Board Ministry of Tinkhundla Administration and Development Chiefs, SC, PMU	<ul style="list-style-type: none"> <li>• Programme-level Communications Strategy</li> </ul>
<b>* Support an ESCR Programme-level coordination mechanism:</b> The coordination mechanism should: <ul style="list-style-type: none"> <li>• Strengthen inter-sectoral coordination of development (especially agricultural development);</li> <li>• Enhance linkages with other climate-related sectors (e.g. inter-ministerial committee for water, crop and livestock agriculture, forestry, energy, and health);</li> <li>• Encourage appropriate use of the sector-wide approach for agriculture to coordinate the integration of climate change into agriculture;</li> <li>• Coordinate EDF stakeholders and projects;</li> <li>• Ensure that other projects don't negatively overlap with EDF activities (e.g., avoid setting up too many market information databases).</li> </ul>	PMU Consultants	<ul style="list-style-type: none"> <li>• Programme-level Coordination Mechanism</li> </ul>
<b>Integrate ESCR into the Programme Monitoring and Evaluation:</b>	EU	<ul style="list-style-type: none"> <li>• Environment, social,</li> </ul>

<ul style="list-style-type: none"> <li>• Include environment, social, and climate indicators in the agricultural sector monitoring system;</li> <li>• Ensure that adequate budget is allocated to conduct and monitor ESCR at programme level (N.B. EU, MOA, MEDP, and SEA will have ESCR programme-level monitoring roles; <i>project-level monitoring roles will be addressed under the project-level ESCR management plans</i>;</li> <li>• Integrate environment, social, and climate-change aspects into the TORs for the 11<sup>th</sup> EDF's mid-term review and final evaluation.</li> </ul>	<p>PMU SC MOA, SEA</p>	<p>and climate-risk (ESCR) indicators integrated into EDF agricultural sector monitoring system</p> <ul style="list-style-type: none"> <li>• Budgets allocated for ESCR programme monitoring</li> <li>• ESCR integrated into the TORs of reviews</li> <li>• Performance review covers ESCR aspects</li> </ul>
<p><b>Green the Programme-level procurement:</b></p> <ul style="list-style-type: none"> <li>• Select goods and services that have a higher environmental performance, when feasible e.g.: <ul style="list-style-type: none"> <li>○ Purchase/use fuel-efficient vehicles, energy-efficient lighting and appliances, recycled paper, and biodegradable cleaning products;</li> <li>○ Screen agricultural inputs for their environmental performance and select those with good environmental performance and low carbon footprint;</li> <li>○ Promote supply of goods and services from the local community.</li> </ul> </li> </ul>	<p>EU PMU</p>	<ul style="list-style-type: none"> <li>• Procurement procedures integrate environmental performance into the selection criteria for goods and services</li> </ul>
<p><b>Implement a Programme-level ESCR Capacity Development Plan</b></p> <ul style="list-style-type: none"> <li>• Undertake a capacity needs assessment of the key stakeholders and relevant staff (i.e., SWADE, MOA, NAMBoard) to identify capacity gaps in ESCR management;</li> <li>• Develop and conduct training on ESCR topics to cover identified capacity gaps for the programme-level stakeholders.</li> </ul> <p><b>Ensure training covers, among others:</b></p> <p><b>Biodiversity:</b></p> <ul style="list-style-type: none"> <li>• Biodiversity impact assessment principles; invasive alien plant identification and eradication; and GMO risk assessment approaches;</li> </ul> <p><b>Land:</b></p> <ul style="list-style-type: none"> <li>• Principles related to land use and land suitability assessment and conservation agriculture;</li> </ul> <p><b>Water:</b></p> <ul style="list-style-type: none"> <li>• Water issues (e.g., water impact assessment principles; water resources assessment principles; watershed management principles; hydrological impact assessment principles; irrigation water management principles, and irrigation efficiency).</li> </ul> <p><b>Climate:</b></p> <ul style="list-style-type: none"> <li>• Climate risk assessment principles; GHG emissions assessment principles;</li> </ul> <p><b>Resource Efficiency and Waste Management:</b></p> <ul style="list-style-type: none"> <li>• Principles of resource efficiency for energy and water conservation;</li> <li>• Waste management planning;</li> </ul> <p><b>Social-cultural and social economic issues:</b></p> <ul style="list-style-type: none"> <li>• Community mobilisation for broad-based participation;</li> <li>• Health impact assessment principles;</li> <li>• Gender impact assessment principles;</li> <li>• Principles of economic efficiency and principles to develop <i>sustainable</i> bankable business models;</li> <li>• OHS management planning;</li> <li>• ESIA principles (for application at project level).</li> </ul>	<p>PMU</p>	<ul style="list-style-type: none"> <li>• Capacity needs assessments related to ESCR</li> <li>• ESCR training courses and reports on training workshops</li> </ul>
<p><b>Conduct all project-specific ESIA / CRA, as required by law</b></p> <ul style="list-style-type: none"> <li>• Require all projects that need ESIA to complete a stand-alone ESIA report, including a Climate Risk Assessment (CRA) to comply with the Environmental Management Act and national commitments to the UNFCCC;</li> <li>• Ensure that subsequent detailed project documents allocate an</li> </ul>	<p>PMU SC</p>	<ul style="list-style-type: none"> <li>• Adequate budget to conduct all project-level ESIA/CRA</li> <li>• ESIA/CRA reports completed for projects subject to EIA</li> </ul>



<p>adequate budget to conduct the project-specific ESIA/ ESCR Management Plans;</p> <ul style="list-style-type: none"> <li>• Include an ESCR budget into each Project-specific Contract: <ul style="list-style-type: none"> <li>○ Ensure that the works contract integrates an adequate budget to implement the project-level ESCR Management Plans;</li> <li>○ Ensure that project / contract supervision includes capacity to supervise implementation of ESCR aspects;</li> <li>○ Ensure that project / contract supervision related to ESCR is conducted by an independent expert.</li> </ul> </li> </ul>		<p>regulation</p> <ul style="list-style-type: none"> <li>• ESIA/CRA requirements integrated into contract documents</li> <li>• Budget secured to implement the project-specific ESCR Management Plans</li> <li>• Contract supervision includes ESCR supervision</li> </ul>
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### 7.1.2 Preliminary ESCR management by Component

The *Preliminary ESCR Management by Component* section provides a 'preliminary plan' for each of the five key strategic issues of the StrEA, and 'preliminary plans' for some socio-cultural, socio-economic, and institutional issues, as follows:

- Biodiversity Management Plan;
- Land use, Land Suitability, and Land Management Plan;
- Water Resource Management (WRM) Plan;
- Climate Change Management Plan;
- Integrated Waste Management and Waste Minimization Plan;
- Social Cultural Plan;
- Socio-economic Plan;
- Institutional Capacity Development Plan.

Table 33 presents the *Preliminary ESCR Management by Component*, which applies to all 11<sup>th</sup> EDF activities, as relevant. Each component (e.g., biodiversity or land) lists the various assessments or strategies that need to be completed and a number of mitigation and enhancement measures.

**Table 33: Preliminary ESCR Management by Component**

<b>Objective: Biodiversity and ecosystems are protected or managed</b>
<b>Key Output: Biodiversity Management Plan</b>
<b>Responsible Parties:</b> PMU, SC, MTEC – Forestry Department (IAPs), SNTC, SEA, and Consultants
<b>Indicators to monitor:</b> Biodiversity Management Plan, and a Report on compliance to said plan
<p><b>Develop a Biodiversity Management Plan: <u>Suggested elements of the Plan:</u></b></p> <p><b>* Biodiversity Impact Assessment (BIA):</b></p> <ul style="list-style-type: none"> <li>• Assess plant and animal biodiversity;</li> <li>• Assess location of programme activities against the known distribution of aquatic and terrestrial endangered species list; ensure that activities do not interfere with wildlife / game; assess the scale of the impacts on indigenous flora, especially important protected / endangered flora;</li> <li>• Map programme sites in relation to the protected areas, protection-worthy areas, wetlands, forested areas, grasslands, and savanna-woodland.</li> </ul> <p>The BIA should enable the Programme to:</p> <ul style="list-style-type: none"> <li>• Avoid conducting activities in or near protected areas, protection-worthy habitats, along migratory routes, or along biodiversity corridors;</li> <li>• Avoid encroachment on and loss of wetlands or other aquatic habitats; <ul style="list-style-type: none"> <li>○ Make provisions to restore wetlands, where relevant;</li> </ul> </li> <li>• Avoid siting programme activities on forested land: <ul style="list-style-type: none"> <li>○ Provide actions to protect natural forests and woodlands;</li> <li>○ Increase forest cover to improve water retention, soil fertility, and habitat;</li> <li>○ Plant indigenous trees and periodically implement action plans for tree planting.</li> </ul> </li> <li>• Prohibit plucking, cutting, or destroying plant species listed in the Flora Protection Act;</li> <li>• Secure permission (permit) from the MOA if the Programme activities need to remove any listed flora cited in the Flora Protection Act;</li> </ul>

<ul style="list-style-type: none"> <li>• Apply the precautionary principle (i.e., lack of full scientific certainty should not be used as a reason to postpone measures to avoid or minimize threats to biodiversity);</li> <li>• Make general provisions to fence-off environmentally-sensitive areas or habitat for conservation;</li> <li>• Include a budget to restore protected or protection-worthy habitat if damaged by development activities;</li> <li>• Ensure that programme activities (e.g., storage areas) do not lead to the exploitation of endangered species;</li> <li>• Rehabilitate all areas disturbed by the programme;</li> <li>• Evaluate institutional capacity to implement the BIA and provide necessary training.</li> </ul> <p><b>* Invasive Alien Species Risk Assessment and Invasive Alien Species Strategy</b></p> <ul style="list-style-type: none"> <li>• Develop preventative measures against invasive species (e.g., sample for invasive species, when importing fodder or shrubs from South Africa);</li> <li>• Develop and implement a strategy to remove and control alien invasive species and to control bush encroachment, as per national IAPS strategy;</li> <li>• Build capacity to identify and destroy unwanted alien species (e.g., <i>demonia</i> species).</li> </ul> <p><b>* GMO Risk Assessment</b></p> <ul style="list-style-type: none"> <li>• Evaluate the likelihood of farmers using GMO seed for crop production;</li> <li>• Align programme activities with the Biosafety Act of 2012;</li> <li>• Increase and conserve agro-biodiversity: <ul style="list-style-type: none"> <li>○ Identify indigenous food crops (and assess use within the programme);</li> <li>○ Support the conservation, exchange, and sustainable use of Swaziland's plan genetic resources for food and agriculture.</li> </ul> </li> </ul> <p><b>* Wetland Management Strategy</b></p> <ul style="list-style-type: none"> <li>• Develop a wetland management strategy to manage water courses and wetlands, maintain habitat, and prevent pollution.</li> </ul>
<b>Objective: Land – Improve land use and land management</b>
<b>Key Output: Land use, Land Suitability, and Land Management Plan</b>
<b>Responsible Parties:</b> SC, PMU, MTEA Forestry Department, MOA, Consultants
<b>Indicators to monitor:</b> Land Use, Land Suitability, and Land Management Plan, and a Report on compliance to said plan
<p><b>Prepare a Land-Use, Land Suitability, and Land Management Plan: <u>Suggested elements of the Plan:</u></b></p> <p><b>* Land Use and Land Suitability Assessment:</b></p> <ul style="list-style-type: none"> <li>• Using community planning procedures, conduct a <i>Land Use and Land Suitability assessment</i> to foster sustainable land (and water) management and to optimise available land resources;</li> <li>• Identify lands that are currently unutilized or underutilized: <ul style="list-style-type: none"> <li>○ To the extent possible, use <i>unused</i>, but suitable land, to site activities;</li> </ul> </li> <li>• Prevent future land-use conflicts through informed and participatory land use / land suitability planning;</li> <li>• Support national efforts to reverse existing land-use problems through participatory planning, including the relocation of sub-optimal land uses where applicable;</li> <li>• Locate activities based on biophysical suitability and economic viability, integrated planning, participatory planning, and whether the activities optimise the use of scarce land (and water) resources; (e.g., arable land should be allocated to crop agriculture);</li> <li>• Develop a <i>Compensation sub-Plan</i> to ensure that people who are directly adversely affected by infrastructure are fairly compensated, in accordance with applicable laws;</li> <li>• Coordinate with other development activities on matters related to land use (&amp; water storage) (where there are overlapping activities).</li> </ul> <p><b>* Land Management, Fire Management, and Soil Improvement Strategy:</b> The Strategy should aim to:</p> <ul style="list-style-type: none"> <li>• Identify land that should not be used (e.g., land with high risk of erosion or degradation) and land that should be sustainably used for productive purposes;</li> <li>• Provide materials to support land rehabilitation (e.g., gabions, fencing, trucks to carry rocks), and allow natural re-vegetation;</li> <li>• Assess fire risks and develop a strategy to manage fire;</li> <li>• Improve the availability and uptake of water and nutrients of plants by enhancing soil biological activity, replenishing soil organic matter and soil moisture, and minimizing the loss by water erosion, runoff, and leaching of soil nutrients and agrochemicals;</li> <li>• Define a system of crop rotation planning;</li> <li>• Define manure application options;</li> <li>• Apply rational mechanical and/or conservation tillage practices;</li> </ul>

- Provide soil cover as habitat for soil biota;
- Apply organic and mineral fertilizers and other agrochemicals using amounts, timing, and methods that are appropriate to the local situation.

<b>Objective: <i>Water</i> – Protect and sustainably use water resources within basin and country allocations</b>
<b>Key Output: Water Resource Management (WRM) Plan</b>
<b>Responsible Parties:</b> SC, PMU, NWA & DWA, RBAs, key line ministries and parastatals (e.g. MTEA, MNRE, DA, MET, KOBWA, NDMA), Consultants
<b>Indicators to monitor:</b> Water Resource Management (WRM) Plan, and a Report on compliance to said plan
<p><b>Develop a Water Resource Management (WRM) Plan: <u>Suggested elements of the WRM Plan:</u></b></p> <p><b>* <i>Water Resources Impact Assessment:</i></b> Starting with any relevant national level water resources information:</p> <ul style="list-style-type: none"> <li>• Conduct additional research to support a solid foundation of knowledge on the river basins of relevance to the programme, and the natural and socio-economic forces that influence it;</li> <li>• Evaluate hydrological data to identify the gaps in information regarding the availability of water;</li> <li>• Determine resource availability and quality, and water demand trends to inform the <i>water resources impact assessment</i> that integrates basin characteristics, climate, water demands, water supply, trends, downstream use, basin impact, and water balance / water accounting;</li> <li>• Verify that the seasonal water is adequate and reliable to sustain the water requirements, the requirements of other water users, and ecosystem flows;</li> <li>• Determine the extent to which the programme water needs alone and in combination with other development activities could exceed water allocations;</li> <li>• Assess water use within a drought scenario (as defined by the Water Act);</li> <li>• Clarify how to share water during drought episodes;</li> <li>• Identify contingency measures for water allocations and the sharing of water during drought periods;</li> <li>• Verify that new water storage, and the crop agriculture and irrigation is within basin and country allocation;</li> <li>• Identify, evaluate, and promote effective basin management practices and measures to protect and rehabilitate catchment areas, wetlands, and aquatic environments;</li> <li>• Enhance the functioning of the water cycle by establishing permanent cover, or maintaining or restoring wetlands;</li> <li>• Manage water tables to prevent excessive rise or fall (i.e., prevent excessive extraction or accumulation; maximize water infiltration / promote groundwater recharge);</li> <li>• Assess applicability of groundwater recharge techniques (from percolation tanks to complex injection wells);</li> <li>• Promote rainwater harvesting at all programme sites.</li> </ul> <p><b>* <i>Water Fees:</i></b> Plan to include the following:</p> <ul style="list-style-type: none"> <li>• 'Water scarcity', 'value of water to be consumed', and climate change predictions in the feasibility studies;</li> <li>• The impact of water charges on the economic viability;</li> <li>• Measure flows and abstraction rates to improve knowledge and improve water allocation decisions;</li> <li>• Comply with all relevant legislation on water abstraction and storage (using provisions within the Water Act);</li> <li>• Provide DWA-approved water measuring devices;</li> <li>• Report water use to relevant authorities and pay for water.</li> </ul> <p><b>* <i>Water Use Efficiency:</i></b></p> <ul style="list-style-type: none"> <li>• Apply water-saving technologies and processes;</li> <li>• Facilitate and promote water recycling within all programme activities.</li> </ul> <p><b>* <i>Water Quality Management for normal and extreme climate scenarios:</i></b></p> <ul style="list-style-type: none"> <li>• Assess the risk of breaching the water quality guidelines, given activities;</li> <li>• Apply agricultural inputs using practices that avoid contamination of water resources;</li> <li>• Safeguard stored water from pollution (e.g., through fencing, when appropriate);</li> <li>• Where relevant, treat water sources or liquid effluents using wastewater treatment technologies;</li> <li>• Provide some reliable potable water and sanitation infrastructure in programme areas;</li> <li>• Provide adequate, safe, clean watering points for livestock in programme areas.</li> </ul> <p><b>* <i>Gender and Water:</i></b></p> <ul style="list-style-type: none"> <li>• Ensure that women participate fully in the leadership of Water User Associations;</li> <li>• Ensure that customary water use is not compromised as a result of irrigation development (e.g., build wash stations, diverting some water for use to wash clothes);</li> <li>• Ensure that women and youth have equal access to irrigation facilities and services, including credit services.</li> </ul> <p><b>* <i>Collaboration with relevant water stakeholders:</i></b></p> <ul style="list-style-type: none"> <li>• Seek political endorsement for an effective WRM plan [e.g., work through National Water Authority; RBAs, Irrigation Districts, SEA, SNTC, and Water User Associations (WUAs)];</li> <li>• Coordinate with other projects and development plans on water use;</li> <li>• Ensure that the WRM Plan is shared with neighbouring communities and other stakeholders;</li> <li>• Exchange water-related information to coordinate water management plans and measures;</li> <li>• Monitor other development plans in shared watercourse systems to ensure compliance to water allocation.</li> </ul>

<b>Objective: Climate – Integrate climate change mitigation and adaptation into the project</b>
<b>Key Output: Climate Change Management Plan</b>
<b>Responsible Parties:</b> SC, PMU, Consultants
<b>Indicators to monitor:</b> Climate Change Management Plan, and a Report on compliance to said plan
<p><b>Develop a Climate Change Management Plan:</b> <u>Suggested elements of the Plan:</u></p> <p><b>* Climate Risk Assessment (CRA) and contingency measures:</b></p> <ul style="list-style-type: none"> <li>• Include climate change and climate variability as a serious risk in all feasibility studies, and conduct the appropriate level of assessment, based on level of risk;</li> <li>• Apply an integrated approach to climate change risk assessment (multi-sectoral, multi-level; flexible risk based) to deal with future uncertainty;</li> <li>• Use national climate models to inform the CRA;</li> <li>• Assess the effect of climate change and variability on the existing water supply, planned water supply, conventional crops, horticulture, and livestock;</li> </ul> <p><b>* Adaptation measures:</b></p> <ul style="list-style-type: none"> <li>• Consider the predicted climate-induced ecosystem shifts when locating the activities;</li> <li>• Integrate future climate change scenarios into the calculations for irrigation and water supply;</li> <li>• Provide strategies that are robust enough to cope with a range of possible local climate outcomes and variations;</li> <li>• Climate proof all infrastructure (e.g., dams, irrigation canals, pack houses, feedlots, and production centres);</li> <li>• Ensure that drought-tolerant seeds and drought-tolerant livestock are available (where relevant);</li> <li>• Adopt climate risk management tools e.g., crop / livestock weather-based insurance;</li> <li>• Support the development of a early warning system for climate impacts;</li> <li>• Support flood risk reduction strategies and drought monitoring systems.</li> </ul> <p><b>* GHG Emissions Assessment:</b></p> <ul style="list-style-type: none"> <li>• Calculate Programme-related CO<sub>2</sub> emissions and set objectives to reduce CO<sub>2</sub> emissions.</li> </ul> <p><b>* GHG Emissions reduction measures:</b></p> <ul style="list-style-type: none"> <li>• Prioritize energy efficiency and energy conservation in construction, irrigation, packhouse/cold store operation, transportation, during equipment use, and in livestock operations; i.e., integrate energy efficiency for buildings, machinery size, maintenance, and equipment (e.g., procure high-efficiency equipment with low emissions, low running costs, and high reliability);</li> <li>• Apply architectural redesign to assets and new buildings to save energy (e.g., use natural ventilation and efficient insulation to eliminate or reduce the need for air conditioning);</li> <li>• Use HCFC/HFC-free cooling technologies;</li> <li>• Minimize land clearing to minimize soil carbon loss and loss of biodiversity;</li> <li>• Balance CO<sub>2</sub> emissions and removals to sinks (e.g., remove 1 tree; plant one tree);</li> <li>• Fully apply conservation agriculture and integrated crop–livestock systems.</li> <li>• Assess alternative energy sources (wind, solar, biofuels), and integrate renewable energy, where feasible;</li> <li>• Adopt clean technologies, low-carbon processes, and cleaner production, where relevant;</li> <li>• Integrate flexible biogas systems, where feasible.</li> </ul>

<b>Objective: <i>Pollution Control</i> – Correctly manage all wastes</b>
<b>Key Output: Integrated Waste Management and Waste Minimization Plan</b>
<b>Responsible Parties:</b> SC, PMU, Project Implementers, and Consultants
<b>Indicators to monitor:</b> Integrated Waste Management and Waste Minimization Plan, and a Report on compliance to said plan
<ul style="list-style-type: none"> <li>• <b>Develop an Integrated Waste Management and Waste Minimization Plan:</b> <u>Suggested elements of the plan:</u> <ul style="list-style-type: none"> <li>* <b>Various assessments:</b> <ul style="list-style-type: none"> <li>• Identify all waste types and quantities;</li> <li>• Establish a waste database on the quantities and types of wastes that will be generated;</li> <li>• Identify acceptable solutions to dispose all wastes.</li> </ul> </li> <li>* <b>Solid Wastes (non-toxic):</b> <ul style="list-style-type: none"> <li>• Manage all non-toxic wastes to avoid negative impacts;</li> <li>• Integrate waste minimization:</li> <li>• Recycle organic wastes and inorganic materials, where possible;</li> <li>• Use best practices to dispose of construction wastes (e.g., unwanted debris or soil);</li> <li>• Dispose of all other non-reusable wastes at approved waste disposal facilities.</li> </ul> </li> <li>* <b>Use of Agro-chemicals:</b> Consider the following: <ul style="list-style-type: none"> <li>• Minimize the use of hazardous / toxic agrochemicals (e.g., pesticides);</li> <li>• Avoid the use of POPs, halogenated hydrocarbons (e.g, certain pesticides), and ozone depleting substances (e.g, <i>methyl bromide</i> and other insecticides that contain hydrocarbons);</li> <li>• Minimize and rationalize the use of agrochemicals;</li> <li>• Use biodegradable pesticides;</li> <li>• Apply Integrated Pest Management, to the extent possible;</li> <li>• Follow correct procedures to collect, transport, and use agrochemicals;</li> <li>• Securely store fertilizers and agrochemicals in accordance with legislation;</li> <li>• Keep good records on use of agrochemicals;</li> <li>• Minimize exposure of farmers to hazardous agrochemicals and provide training in correct management and use of agrochemicals.</li> </ul> </li> <li>* <b>Agro-chemical Wastes:</b> Consider the following: <ul style="list-style-type: none"> <li>• Integrate the <i>waste minimisation</i> principle to correctly manage <u>all</u> agrochemical wastes, especially toxic wastes (e.g., empty pesticide packaging; spent chemicals from cattle dipping; expired veterinary medication);</li> <li>• Eliminate <i>unintentionally</i> produced POPs (e.g., forbid the use of fire to clear land);</li> <li>• Manage and dispose of POP wastes in a sound manner and in accordance with legislation (e.g., POPs include aldrin, chlordane, dieldrin, endrin, heptachlor, hexachloroventzene, mirex, taxaphene, PCBs, DDT, dioxins, and possibly, <i>endosulfan</i>);</li> <li>• Take measures to prevent agrochemicals from migrating into water courses.</li> </ul> </li> <li>* <b>Agricultural Effluents:</b> Consider the following: <ul style="list-style-type: none"> <li>• Control, manage, and monitor the water quality of agricultural effluents;</li> <li>• Ensure that agricultural effluents and runoff comply with national pollution laws;</li> <li>• Improve the effluent management at (programme-relevant) dip tank stations.</li> </ul> </li> </ul> </li> </ul>

**Objective: Socio-cultural – Improve food and nutrition security and the health and welfare of the community**

**Key Output: Socio-cultural Plan**

**Responsible Parties:** SC, PMU, Consultants, Project Implementers

**Indicators to monitor:** Sociocultural Plan, and a Report on compliance to said plan

• **Develop a Socio-cultural Plan:** Suggested elements of the Plan:

**\* Activities to support food and nutrition security, and to support the most vulnerable:**

- Ensure that crop growers allocate some of their land to subsistence food production;
  - Prioritize some *local* food security (and not only commercialisation of crops and livestock);
- Promote via extension the need to diversify food crops (e.g., maize, beans, rice, fish ponds), where relevant;
- Collaborate with ongoing crop diversification initiatives;
- Strengthen opportunities to improve the food security and health and welfare of other individuals, especially vulnerable groups by supporting some home gardens, small livestock schemes, and enterprises that improve access to *affordable* nutrition;
- Provide better food security or access to food to the community when market prices for horticultural or livestock products are too high through a separate activity (e.g., during drought year);
- Add social-safety-net activities to safeguard the food security and improve the diet of the most vulnerable households, including women-headed, child-headed, elderly, and HIV/AIDS-affected households in the programme area;
- Support diverse and alternative livelihoods to support access to food and human nutrition;
  - Add complimentary activities on raising local chickens, nurseries, mushrooms, bee-keeping, production of biogas, goat production, home gardens, and non-timber products;
  - Provide food-for-work, when community work is required (which tends to rely heavily on women's labour).

**\* Activities to support community health, community mobilisation, and gender equity within the programme areas:**

- Ensure access to safe drinking *water and sanitation* near programme activities;
- Support measures to combat HIV/AIDS and malaria near programme activities;
- Ensure that all relevant communities are informed about the developments that affect them;
- Build and budget for improving community leadership through CDP development;
- Develop modalities to ensure **broad-based participation** and agreement on any land use change, tenure, or land management activity stemming from the programme;
  - Integrate consultative, community planning processes to decide on the area for dams, how to share water resources, areas for livestock, rangeland activities, crop areas, and the selection of beneficiaries;
  - Secure traditional agreement to develop land;
  - Secure traditional agreement to select beneficiaries;
- Work through acceptable participatory mechanisms, e.g., CDP;
  - Work through the Inkhundla to consolidate CDP plans;
  - Integrate the identification of arable land for production into the land use plans of the CDPs;
  - Integrate ESCR and adaptation into the CDPs.
- Prevent the commission of any offence within Chiefdoms (e.g., provide a grievance mechanisms);
- Conduct a **Gender Impact Analysis** and formulate some *gender-focused activities* integrating the following:
  - Ensure fair representation and participation of women and men in all decision making structures;
  - Build women's leadership capacity and capacity to develop and manage small and medium enterprises;
  - Ensure that budget is allocated to mainstream gender;
  - Determine and formulate gender-sensitive monitoring indicators;
  - Develop special complimentary activities to enhance gender equity near programme activities.
  - Provide gender sensitive extension (e.g., tailor training initiatives to the specific needs of women);
 Ensure equitable access by girls, boys, women, and men to education, training, health services, resources (e.g., land and credit), and entrepreneurial activities.



**Objective: Socio-economic – Stimulate private sector growth & protect agricultural workers**

**Key Output: Socio-economic Plan**

**Responsible Parties:** SC, PMU, Project Implementers, and Consultants

**Indicators to monitor:** Socio-economic Plan, and a Report on compliance to said plan

- **Develop a Socio-economic Plan:** Suggested elements of the Plan:

**\* Sustainability assessment and planning for sustainability:**

- Evaluate the sustainability of the proposed activities;
- Apply economic efficiency and effectiveness concepts to select activities;
- Consider the best way to use resources in the long term without exhausting supply (and minimize resource use through conservation, efficiency, and recycling);
- Ensure that programme assets are built on land that has been demarcated and that selected activities are informed by the *Land Use and Land Suitability Assessment*;
- Integrate post-construction activities into the project plans to enhance sustainability:
  - Clarify the long-term ownership of assets, explicitly allocate O&M obligations, and clarify financial mechanisms for sustainability and cost-recovery during operation;
  - Consider wide shareholder arrangements to share the ownership of assets;
  - Develop funding mechanisms for sustainability (e.g., local revolving funds; ensure that community funding mechanisms are put into the hands of the communities);
  - Strengthen local capacity for financial management and accounting;
- Prepare generic contracts to support partnerships, farmers, and other workers;
  - Develop fair contracts to support partnerships between producers, buyers, and other workers (e.g., to avoid side selling and low prices);
  - Develop a legal instrument to address farmers' contracts and the obligations and roles of related parties;
- Quickly demonstrate the financial benefits of activities to get buy-in to new, greener techniques;
- Evaluate and apply relevant economic instruments: e.g., water user charges or effluent charges;
- Provide incentives to overcome barriers to adopt climate-smart agriculture (CSA) (e.g., tax rebates for organisations or individuals that invest in CSA);
- Strengthen the private sector's capacity to build agricultural assets, supply parts, and service programme assets;
- Assess potential to integrate the private sector into activities, where feasible (e.g., could the private sector deliver extension services or conduct research?);
- Balance market demand and supply (if there is oversupply of a crop, the selling price will be low, and could lead to insufficient profits and food insecurity);
- Support a full circle of activities from the farmers' field to the consumer (i.e., add more value, where feasible);
- Explore options to safeguard farmers' income during disaster years;
- Provide a separate activity to promote food security, when farmers receive a very low market price for their products (e.g., commercialisation may decrease the income of smallholder farmers);
- Identify opportunities to create off-farm employment and green jobs e.g., ecotourism;
- Facilitate access to adaptable and flexible credit services for small farmers.
- Establish transparent mechanisms to set the market price for produce, livestock, and even water (informed by the Market Information System);
- Integrate Corporate Social Responsibility (CSR) and Cleaner Production into all activities.

**\* Health Impact Assessment and OHS measures for agricultural workers**

- Conduct a *Health Impact Assessment* of the programme activities on agricultural workers;
- Ensure that the programme activities comply with Swaziland's legal framework to protect Swazi workers by abiding by the provisions of the Employment Act, Construction Works Act, and Wages Act;
- Inform nearby health clinics on how to identify OHS issues related to agriculture and agrochemicals;
- Ensure that operators are responsible for the safe operation of dams, irrigation channels, equipment, horticulture and livestock farms, and processing units;
- Require that all occupational accidents and disease are investigated e.g., accidental poisoning via agrochemicals;
- Educate agricultural workers on the potential health impacts of activities (e.g., risks related to agrochemicals);
- Safeguard the health of workers by providing hygiene / adequate sanitation, clean water, control of hazardous waste materials, and OHS procedures;
- Provide and ensure the use of adequate and appropriate Personal Protection Equipment (PPE).

**Objective: *Institutional* – Improve institutional capacity**

**Key Output: Institutional Capacity Development Plan**

**Responsible Parties:** SC, PMU, Project implementers & contractors, Consultants

**Indicators to monitor:** Institutional Capacity Development Plan, and reports on implementation of said plan

• **Develop an Institutional Capacity Development Plan:** Suggested elements of the Plan:

**\* Organizational Development:**

- Assess the need for new organizations / new groups;
- Develop new organizations / groups only when really needed;
- Ensure that any new group formed as a result of the programme does not compete with the formal organizational structure (e.g., new groups must still be under the RBAs and Irrigation Districts);
- Clarify the roles and responsibilities of any new group (e.g., dam committee).

**\* ESCR Research:**

- Support a multi-sector and multi-stakeholder research agenda;
- Support a research framework that prioritizes linkages, collaboration, and partnerships with different stakeholders (e.g., between GOS, UNISWA, NGOs, and private sector);
- Integrate cross-cutting issues into research (e.g., indigenous knowledge, environmental and social management, gender, HIV/AIDS, non-communicable and vector diseases, energy, and market R & D);
- Provide a small number of research scholarships to support high priority ESCR research;
- Support ESCR research forums (to sustain research efforts and disseminate results).

**\* Extension Services for ESCR management**

- Conduct a *Capacity Needs Assessment* related to ESCR management within the extension services <sup>55</sup>;
- Conduct ESCR capacity development activities;
- Develop (and periodically update) an *ESCR Handbook for Extension Workers* (rather than separate pieces belonging to outside consultants);
- Harmonize extension efforts between central, regional, and local extension organizations.

**\* ESCR Capacity Building for Farmers and Farmers' Organisations:**

- Conduct a *Capacity Needs Assessment* of the various farmer categories;
- Conduct capacity development activities, based on the capacity assessment and based on farmer-identified-capacity-development-needs <sup>56</sup>;
- Develop an integrated training handbook that provides farmers with appropriate training materials, bearing in mind that many poor farmers have limited access to technology and are partially illiterate (e.g., *ESCR Agricultural Training Manual for farmers*);
- Ensure that ALL training manuals are retained in a central location (hard and soft copies);
- Monitor effectiveness of capacity building;
- Integrate field training into the capacity development;
- Coordinate to the extent possible with the training programmes of other related development activities.

**\* Monitoring and Evaluating the implementation of this ESCR management plan**

- Further assess MOA's, SWADE's, and NAMBoard's capacity to monitor and evaluate the implementation of this ESCR management plan;
- Develop capacity to monitor and evaluate ESCR management, based on identified needs;
- Ensure that each project complies with national and donor ESIA requirements and that any project that requires environmental assessment will use this ESCR management framework as a starting point;
- Maintain good records on all ESCR-related activities.

<sup>55</sup> The assessment is likely to identify the need to:

- Provide basic tools and infrastructure to support extension (e.g., internet access and mobility);
- Update the skills of the extension officers in: environmental and social management, waste management, management of hazardous materials (e.g., agrochemicals), record keeping for hazardous materials, measuring water use, control of disease and pests, climate change mitigation and adaptation, climate-smart agriculture, interpretation of weather reports, GAP, post-harvest handling, HACCP, OHS, safe operation and maintenance of all assets, water-efficient irrigation, energy efficiency and conservation, business planning and marketing, and also skills to support participatory development].

<sup>56</sup> Similar to the capacity needs of the extension services, the likely areas requiring some capacity strengthening include: environmental and social management, management of wastes and hazardous materials (e.g., agrochemicals), control of disease and pests, climate change mitigation and adaptation....

## 7.2 THREE Preliminary Project-level ESCR Management Plans

This Chapter 7.2 focuses on the preliminary project-level ESCR management plans:

- *Preliminary ESCR Management Plan for the WHDP;*
- *Preliminary ESCR Management Plan for the HVCDP;*
- *Preliminary ESCR Management Plan for the LDP.*

During the detailed project formulation and during the project-specific ESIA, it is expected that the Preliminary Project-level ESCR Management Plans shown below will be further elaborated based on detailed project-specific and location-specific information. **N.B. Providing the preliminary project-specific ESCR Management Plans goes beyond what can be expected within a Strategic Environmental Assessment. The consultant completed this extra work to facilitate the subsequent ESIA work.**

**Table 34: Preliminary ESCR Management Plan for the Water Harvesting Development Project**

Preliminary ESCR Management Plan for the Water Harvesting Project (WHDP)	
<b>Objective:</b> Mitigate the negative impacts & optimize the positive impacts of the WHDP <sup>57</sup>	
<b>Key Output:</b> Preliminary ESCR Management Plan for the WHDP.	
<b>Responsible Parties:</b> PMU, SC, Project implementers & contractors, Consultants, DWA, RBA	
<b>Indicators to monitor:</b> Completion of the ESCR Management Plan for the WHDP, and reports on implementation of said plan	
When the ESIA of the WHDP is conducted, the WHDP ESIA consultant will need to adapt and integrate the component plans listed in Chapter 7.1, integrate the results of any further assessment commissioned by the EU related to each component, <u>and</u> integrate the results of any project-specific assessment work conducted by the project team based on the recommendations provided in this <i>Preliminary ESCR Management Plan for the WHDP</i> to generate the legally-binding ESCR management plan for the WHDP. For the WHDP, particular attention is needed with respect to developing sub-basin water resources management plans, as outlined below.	
<p><b>* Sub-basin Water Resource Management Plans (WRM):</b> <u>Suggested elements of the Sub-basin WRM Plans:</u></p> <p><b>* Various assessments and mitigation measures:</b></p> <ul style="list-style-type: none"> <li>• Conduct local hydrological studies;</li> <li>• Calculate the carrying capacity of the project area, using water and climate change projections;</li> <li>• Identify all key water users in the project area (e.g., crop projects, industries, households, and environment flows);</li> <li>• Assess what is the best use of the <u>local</u> water resources (e.g., growing subsistence vegetables vs. rangeland);</li> <li>• Estimate how much water will be harvested by project activities in each river basin and watershed;</li> <li>• Ensure that project water use is based on sound research on the existing and <i>projected future</i> water quantity and quality and projected future safe abstraction of the water resource;</li> <li>• Assess the cumulative impacts of current development on water use at the watershed and sub-basin level;</li> <li>• Evaluate whether the project location and the project's water allocation will be sufficient, given other development</li> </ul>	

### <sup>57</sup> Current Infrastructure Planning Efforts:

The StrEA team was advised in April 2016 that the 1st batch (15 in all) of 11<sup>th</sup> EDF dams are mainly small, off-stream reservoirs, with no flooding of the river valley. This StrEA still assumes in its assessment that the larger dams foreseen in the WHDP concept will also be implemented. These points can be made on the 1<sup>st</sup> batch of 11<sup>th</sup> EDF water storage assets:

- The first 15 dam/weir sites will each irrigate 1–2 ha. This is of a smaller scale than what was envisaged in the WHDP concept. The TA expects that there will be some schemes large enough to irrigate up to 50 ha in the subsequent batches.
- Regarding this first batch, the StrEA team was advised that the competent water authority was approached and the paperwork for the selected sites will be submitted to obtain approval for the water storage and water abstraction.
- The dams / spillways currently being designed capture the lowest 1/4<sup>th</sup> percentile flow rates, calculated based on available records. The engineer is designing the irrigation schemes to accommodate the dependable precipitation; the spillways are being designed for peak discharges that have extremely low probability to be exceeded during the service life. The current design integrates the calculated sediment yield of the catchment area and enough 'dead' storage to accommodate the calculated sediment that will reach the dam site during its service life. Gully control structures and check dams will be installed in the catchment to reduce sediment transport.

The StrEA team has two concerns:

1. Upstream erosion control structures (e.g., check dams) tend to fail in Swaziland, due to lack of maintenance responsibility and lack of maintenance budgets;
2. The design calculations are based on long-term data, whereas the recent climate is much more erratic.

The main conclusion is that the designs need more climate proofing.

**Preliminary ESCR Management Plan for the Water Harvesting Project (WHDP)**

<p>activities and given climate change projections;</p> <ul style="list-style-type: none"> <li>• Assess the possibility to increase water storage to accommodate climate change seasonal variations;</li> <li>• Assess how to increase the use of on-farm water storage structures;</li> <li>• Support rooftop water harvesting installations, where relevant;</li> <li>• Climate-proof local water storage infrastructure;</li> <li>• Avoid erosive run-off by using bunds/pans/vegetation in erosion sensitive areas;</li> </ul> <p><b>* Water Permits and Payment for Water and Catchment-management services</b></p> <p><i>Water Permits:</i></p> <ul style="list-style-type: none"> <li>• Assist Irrigation Districts and Water User Associations to prepare water permit application(s);</li> <li>• Consider water quantity, water quality, and climate change when applying for water permits for irrigation;</li> <li>• Ensure that the permit for irrigation water is based on appropriate technical, hydrological, and economic considerations, including consideration of soil characteristics and topographic conditions;</li> <li>• Obtain a permit to use water (with abstraction limits);</li> <li>• Regulate the abstraction of irrigation water through the appropriate agencies;</li> <li>• Undertake a public information campaign to inform the irrigators of their water use rights (see the Water Act);</li> <li>• Ensure that all project water users respect the water permit;</li> <li>• Subject permit holders who fail to comply with the permit to the provisions of the 2003 Water Act.</li> </ul> <p><i>* Payments for Water Permits and Tariffs for Irrigation:</i></p> <ul style="list-style-type: none"> <li>• Establish and collect charges for administering water permits (through the RBAs);</li> <li>• Assess the operation and maintenance costs of the project infrastructure and develop, as needed, local mechanisms to collect water user fees;</li> <li>• Support the establishment of a transparent irrigation-service tariff structure in accordance with the Water Act; (user groups need to be consulted when setting tariffs);</li> <li>• Ensure that irrigation-service tariffs are disbursed in a transparent manner for the purpose that they are levied;</li> <li>• Establish and enforce a transparent system of fines and other regulatory measures to discourage the misuse of irrigation infrastructure, over-abstraction of water, and the pollution of water courses;</li> <li>• Consider the following charges to help fund integrated WRM activities: <ul style="list-style-type: none"> <li>○ <i>Catchment management charge</i>, which can be levied on all water users in a catchment, as well as on land-use activities that affect water resources;</li> <li>○ <i>Abstraction charges</i>, which can help finance water infrastructure and can influence water-use behaviour;</li> <li>○ <i>Pollution charges and fines</i> from pollution permits, effluent charges, and fines relating to non-compliance.</li> </ul> </li> </ul> <p><b>* Water Efficiency for Irrigation:</b></p> <ul style="list-style-type: none"> <li>• Evaluate irrigation technologies to optimize use of available water;</li> <li>• Evaluate the capacity of users to operate and maintain the irrigation system(s);</li> <li>• Encourage irrigators to use water more efficiently through changes in their irrigation equipment and practices (move from surface irrigation to low-head sprinkler technology, and to low-head drip irrigation);</li> <li>• Avoid pumped-irrigation technologies because of high installation, operational, and maintenance costs;</li> <li>• Apply other measures to improve efficiency of existing irrigation systems: <ul style="list-style-type: none"> <li>○ Improve the distribution of water (e.g., line the unlined irrigation canals);</li> <li>○ Improve the scheduling of irrigation with site-specific recommendations;</li> <li>○ Enforce soil conservation measures in irrigated areas;</li> <li>○ Require that irrigated areas are properly drained to avoid salinization;</li> <li>○ Proactively identify ways and means to encourage farmers to engage in water saving methods.</li> </ul> </li> </ul> <p><b>* Community Participation in Irrigation and/or Water Storage Development:</b></p> <ul style="list-style-type: none"> <li>• Improve community participation in the identification, planning, implementation, financing, operation, and maintenance of their irrigation schemes;</li> <li>• Start the community planning for any water asset as soon as possible, to give communities time to provide input into the design of the dam and of the downstream assets;</li> <li>• Ensure that the community consents to any restrictions put on land use to better manage the catchment;</li> <li>• Support the communities to fence the water storage structure (if done by MOA, people tend to remove the fence);</li> <li>• Clearly inform the communities on the capacity of the water storage asset e.g., expected water quantity / quality;</li> <li>• Strengthen the community's capacity to manage the water storage asset or irrigation works from the onset;</li> <li>• Transfer the operation and maintenance of water facilities to the users, except where the scale is too large;</li> <li>• Clarify the rights and obligations of irrigators and rights and obligations of service providers;</li> <li>• Clarify options for the downstream activities e.g., homestead gardens vs. commercial vegetables;</li> </ul>
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**Preliminary ESCR Management Plan for the Water Harvesting Project (WHDP)**

- Facilitate the formation and strengthening of *Water User Associations*;
  - Support the communities to establish dam committee(s) <sup>58</sup>;
  - Clarify roles and responsibilities for the dam committee and other stakeholders; and clarify how association members are to be selected;
  - Outline an equitable way to share the benefits of the water storage asset;
  - Assess whether dams in the Lowveld need a different approach, as the main interest there is to provide water for livestock.
- \* Small Programme to Fix Slightly 'Broken' Existing Water Schemes:**
- Integrate the lessons learnt in other earth dam projects (e.g., evaluate why the FAO/EU SADP project only achieved a portion of its programme during its project life);
  - Assess whether the scale of the WHDP is realistic, given the recent achievements;
  - Assess whether to locate some WHDP activities in all 4 regions;
  - Identify and assess some of the existing malfunctioning rural water schemes;
  - Select a good number of 'broken' schemes (especially in the case that there is a small problem, such as a broken pipe) to be fixed through project funds (this is in addition to the already planned 'rehabilitation' works').
- \* Capacity Development:**
- Capacity to monitor and measure water:*
- Budget for the monitoring of water use and abstraction at each project site;
  - Ensure all water-using activities:
    - Have water measurement devices;
    - Have the capacity to measure their water abstraction and water use.
- Capacity of local water institutions to manage water*
- Involve the necessary water stakeholders in water resources planning [i.e., NWA, DWA, RBAs, Irrigation Districts (IDs), and Water User Associations (WUA)];
  - Assist RBAs and the DWA to improve the data on water use and to report on water abstraction.
- Training manual:*
- Develop a *Dam Operation and Maintenance Manual*;
  - Conduct the community training through the correct channels;
  - Adjust training materials and training manual to the level of literacy in each community.

<sup>58</sup> The membership usually depends on the area of land to be irrigated; if there are too many farmers, and too little amount of irrigated area, this may entail rotating the association membership so that various farmers can benefit over time (e.g., provide a 5-year rotation membership).

**Table 35: Preliminary ESCR Management Plan for the High Value Crop Horticulture Project**

Preliminary ESCR Management Plan for the High Value Crop Horticultural Project (HVCHP)
<p><b>There are various risks related to crop agriculture and climate change including:</b></p> <ul style="list-style-type: none"> <li>Declining crop yields due to erosion or declining soil fertility;</li> <li>Declining water availability for irrigation due to hydrological disruption (e.g., due to deforestation &amp; climate change);</li> <li>Pest outbreaks due to loss of natural predators and climate change;</li> <li>Crop loss due to increasing frequency and magnitude of extreme weather events (e.g. droughts);</li> <li>Reduced agricultural productivity due to long-term change in local climate (e.g. drier, hotter climate);</li> <li>Shorter, more unpredictable, erratic rainy seasons.</li> </ul>
<p><b>There are various impacts associated with cultivation, horticulture, plantations, and irrigation, including:</b></p> <ul style="list-style-type: none"> <li>Deforestation and loss of wildlife and biodiversity from land use change / conversion of natural habitats;</li> <li>Loss of biodiversity due to introduction of alien invasive species;</li> <li>Erosion and declining soil fertility from cultivation of slopes, tillage, soils being left uncovered, and mono-cropping;</li> <li>Disruption of hydrological flows and water bodies due to clearance of vegetation in upper catchments and over-abstraction of surface and groundwater for irrigation;</li> <li>Soil and water pollution, eutrophication, and loss of biodiversity or soil fauna due to use of pesticides and fertilisers;</li> <li>Air pollution from burning biomass during land clearance or from burning crop residues;</li> <li>Soil salinization due to accumulation of salts from irrigation water;</li> <li>GHG emissions from clearing forests, burning crop residues, methane emissions (manure), and fertiliser use.</li> </ul>
<p><b>Objective: Mitigate the negative risks and impacts &amp; optimize the positive impacts of the HVCHP</b> <b>Key Output:</b> Preliminary ESCR Management Plan for the HVCHP</p>
<p><b>Responsible Parties:</b> PMU, SC, Project implementers &amp; contractors, Consultants, and SNTC</p>
<p><b>Indicators to monitor:</b> Completion of the ESCR Management Plan for the HVCHP, and reports on implementation of said plan</p>
<p>This <i>Preliminary HVCHP ESCR Management Plan</i> provides a number of recommendations on how to adapt the programme-level components in a project-specific manner. When the ESIA of the HVCHP is commissioned, the ESIA consultant will need to adapt and integrate the component plans listed in Chapter 7.1, integrate the results of any further assessment commissioned by the EU related to each component, <u>and</u> integrate the results of any project-specific assessment work conducted by the project team based on the recommendations provided in this <i>Preliminary ESCR Management Plan for the HVCHP</i> to generate the legally-binding ESCR management plan for the HVCHP.</p>
<p><b>Biodiversity Management Plan:</b> <u>Suggested element to focus on when adapting the programme plan to the project:</u></p> <ul style="list-style-type: none"> <li>Ensure that crops are not grown in the buffer zones near protected or protection-worthy habitats.</li> </ul>
<p><b>Land use, Land Suitability, and Land Management Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p>
<p><b>* Land and Crop Suitability Assessment (in more detail than at the programme level)</b></p> <ul style="list-style-type: none"> <li>Assess in <i>more detail</i> the land suitability at project level to reduce land use conflicts and to optimize land use (i.e., is the land most suitable for market produce vs. rangeland);</li> <li>Conduct a crop suitability analysis for Lowveld areas; identify high value crops that match the location and climate;</li> <li>Critically assess the opportunities to spread the HVCHP to other Agro-ecological zones (AEZs) (not just to the LUSIP area);</li> <li>Address the location-specific impacts of any land use change related to water storage or crop agriculture and provide project / site specific mitigation measures (e.g., if livestock must shift to neighbouring area because of the project, this will have an impact on the neighbouring area).</li> </ul> <p><b>* Assessment of the Options for Land Rehabilitation and Soil and Nutrient Management</b></p> <ul style="list-style-type: none"> <li>Evaluate and select project-specific land-rehabilitation options. Options include: <ul style="list-style-type: none"> <li>Agroforestry;</li> <li>Conservation agriculture (i.e., permanent soil cover, minimal soil disturbance, and crop rotation);</li> <li>Soil erosion control measures (e.g. terracing);</li> <li>Extension training (with manuals) on the above approaches and techniques.</li> </ul> </li> <li>Evaluate and select project-specific soil fertility management options. Options include: <ul style="list-style-type: none"> <li>Erosion control e.g., gabions, terracing, or tree barriers;</li> <li>Mulching;</li> <li>Organic manure;</li> <li>Promotion of farmer investments in soil conservation.</li> <li>Inter-cropping with nitrogen-fixing plants;</li> <li>Composting manure and crop residues;</li> <li>Site-specific research on nutrient needs;</li> <li>Matching fertiliser application to soil nutrient needs.</li> </ul> </li> </ul>

<b>Preliminary ESCR Management Plan for the High Value Crop Horticultural Project (HVCHP)</b>
<p><b>* Development of a Policy Framework to Institutionalise Conservation Agriculture (CA)</b></p> <ul style="list-style-type: none"> <li>Consider and critically evaluate the success of the CA demonstration sites in Shewula and Kambhoke community (e.g., COSPE and LUSLM projects);</li> <li>Assess to what extent CA can be applied at each new location;</li> <li>Generate awareness on CA;</li> <li>Adapt CA techniques to meet farmer challenges;</li> <li>Support farmers during their transition to CA; support the initial CA investment costs and the costs in the early years; N.B. Delays associated with CA research or with improving soils may be at odds with quick commercialization and farmers' need for immediate income;</li> <li>Purchase community-owned specialized planters to support CA in the project area;</li> <li>Build local capacity to manufacture and repair climate-smart equipment.</li> </ul>
<p><b>Water Resource Management (WRM) Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <p><b>* Location-specific Hydrological Impact Assessment to ensure water availability;</b></p> <p><b>* Assessment of water-saving technologies and practices:</b></p> <ul style="list-style-type: none"> <li>Apply incentives and charges to promote water saving, metering, and communal management;</li> <li>Promote water-conserving crop varieties, and drought-and-heat tolerant crops;</li> <li>Promote water-efficient irrigation to increase crop yields and contribute to climate change adaptation;             <ul style="list-style-type: none"> <li>Adopt low-head drip and sprinkle irrigation and other low-water / low-pressure irrigation schemes;</li> <li>Adopt techniques to monitor crop and soil water status to more precisely schedule irrigation;</li> <li>Apply efficient irrigation technologies and management to minimize waste of water and to avoid excessive leaching and salinization;</li> <li>Prevent soil salinization by adopting water-saving measures and water re-cycling where possible;</li> </ul> </li> <li>Install project-level water-measuring devices and report to relevant authorities on the water used to grow market vegetables.</li> </ul>
<p><b>Climate Change Management Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <p><b>* Research to improve, climate proof, and modernize farming practices and to identify location-specific climate-change adaptation measures.</b> Relevant research topics include:</p> <ul style="list-style-type: none"> <li>Influence of climate change on HVCHP production;</li> <li>Integration of medium-and long-term climatic conditions expected under climate change in the design of drainage systems;</li> <li>Modifications to the future irrigation schemes, based on future water availability and climate change, e.g.:             <ul style="list-style-type: none"> <li>Applying low-head drip irrigation, where feasible;</li> <li>Applying low-head drip irrigation <i>with</i> fertilizers, to optimize fertilizer use and water use;</li> <li>Assessing suitability of gravity fed irrigation in all locations;</li> </ul> </li> <li>Changes to the farming calendar / assess whether the timing and location of cropping activities needs to be changed;</li> <li>Introduction of new crops;</li> <li>Development and introduction of drought-resistant crop varieties;</li> <li>Pest and disease dynamics expected under climate change;</li> </ul> <p><b>* Application of various climate-change adaptation measures</b></p> <ul style="list-style-type: none"> <li>Increase the land area under climate-smart agriculture, including conservation agriculture, agroforestry, planting drought tolerant varieties, integrated crop management, intercropping, improved grazing land management, improved seeds and fertilizer management, and use of kraal manure and green manure crops;</li> <li>Select cultivars and varieties based on an understanding of their characteristics, including response to sowing or planting time, productivity, market acceptability, nutritional value, disease and stress resistance, soil requirements, adaptability, and response to fertilizers and agrochemicals;</li> <li>Expand the use of varieties, and species resistant to pests, diseases, and drought;</li> <li>Increase production and uptake of drought and heat tolerant seeds in the riskier areas (e.g., review progress of <i>Harmonised Seed Security Project</i>, supported by FARNPAN);</li> <li>Plant some perennial crops to provide long-term production options and opportunities for intercropping;</li> <li>Plant annual crops in sequences, including those for pasture, to maximize the biological benefits of interactions between species and to maintain productivity;</li> <li>Diversify crops to help reduce water demand;</li> <li>Grow drought resistant varieties, along with the usual crops;</li> <li>Promote good seed storage (to protect product, quality, and quantity of seeds and to ensure seed stock is available in the event of poor harvests due to drought);</li> <li>Apply fertilizers in a balanced fashion, with appropriate methods and equipment and at adequate intervals to replace nutrients extracted by harvest or lost during production;</li> <li>Improve nitrogen fertilizer management;</li> <li>Enhance efficient fertilizer application;</li> </ul>



<b>Preliminary ESCR Management Plan for the High Value Crop Horticultural Project (HVCHP)</b>
<ul style="list-style-type: none"> <li>• Recycle crop and other organic residues to increase soil and nutrient stability;</li> <li>• Integrate livestock into crop rotations and use manure to benefit the fertility of the entire farm;</li> <li>• Rotate livestock on pastures to allow for healthy re-growth of pasture;</li> <li>• Raise farmers' awareness of climate change and adaptation through extension services, farmer field schools, or radio programmes;</li> <li>• Expand the use of integrated pest and pathogen management.</li> </ul>
<p><b>Integrated Waste Management and Waste Minimization Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <ul style="list-style-type: none"> <li>• A schedule of approved agro-chemicals and refer only to the approved chemicals;</li> <li>• An <i>Integrated Pest Management strategy</i> to reduce the need for synthetic pesticides.</li> </ul>
<p><b>Socio-cultural Plan:</b> <u>Suggested element to focus on when adapting the programme plan to the project:</u></p> <ul style="list-style-type: none"> <li>• Activities to support the most vulnerable, who may not be able to commercialise.</li> </ul>
<p><b>Socio-economic Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <p><b>* Location-specific Sustainability Assessment and Local Planning for Sustainability:</b></p> <ul style="list-style-type: none"> <li>• Conduct an location-specific <i>Economic Viability and Sustainability Assessment</i> on the planned crops, hubs, enterprises, cold stores / packhouses, and value chain to help ensure that farmers can produce commercial vegetables at a profit;</li> <li>• Conduct baseline surveys in the <i>project area</i> before the start of project activities to facilitate the monitoring of the commercialization process (e.g., baseline for poverty level, # of food insecure, income level, and number of smallholders already selling to agro-processors all disaggregated by gender);</li> <li>• Identify real location-specific commercial opportunities, using sound evidence.</li> </ul> <p><b>* Packhouse Sustainability Assessment:</b> this assessment should:</p> <ul style="list-style-type: none"> <li>• Evaluate how many packhouses are needed to support a realistic number of productive hectares;</li> <li>• Assess the economic viability of each packhouse / cold store location, to ensure profit making and viability (e.g., assess whether a packhouse in Kalanga is viable);</li> <li>• Assess the feasibility of establishing collection points and transporting produce to <u>one</u> strategically-located efficient international standard packhouse; review Malkerns' experience (Rhodes) on this matter, before proceeding;</li> <li>• Assess whether collection centres rather than packhouses are more feasible in the Lowveld;</li> <li>• Assess whether using shipping containers with a cooling facility is sufficient initially to store and grade vegetables, which allows time to test whether a marketing scheme will work; expand storage to the level of a packhouse when there is real demand to do so;</li> <li>• Assess whether charcoal coolers with refrigerated trucks rather than a full packhouse would be sufficient at collection centres;</li> <li>• Assess whether NAMBoard could use ICT to coordinate the pick-up of market produce in a timely manner (e.g., farmers could know the location of the pick-up trucks, and then harvest at the correct time);</li> <li>• Critically evaluate who should manage / operate the packhouses and cold stores and who has the management capacity to do so (e.g., NAMBoard, farmers, or a private agent);</li> <li>• Evaluate the opportunities and implications of including existing and potential vegetable farmers around the LUSIP area in the project (and not only the LUSIP farmers);</li> </ul> <p><b>* Packhouse Mitigation and Enhancement Measures:</b></p> <ul style="list-style-type: none"> <li>• Carefully select the packhouse managers, to ensure operational and financial success; recruit very experienced and qualified personnel to run each packhouse / cold store;</li> <li>• (Further) Capacitate potential packhouse managers on packhouse management;</li> <li>• Clarify all packhouse and cold store costs and resource needs, and who is responsible to pay the costs to ensure economic viability / affordability;</li> <li>• Clarify whether famers will be charged to use the packhouses and cold stores;</li> <li>• Design the packhouses to be highly efficient in terms of energy and water use. Options include to:             <ul style="list-style-type: none"> <li>○ Minimize energy needs: e.g., estimate energy needs; evaluate the potential to use renewable energy; assess energy conservation and efficiency options;</li> <li>○ Confirm a stable water supply: e.g., clarify water requirements; identify the water source; adopt water efficiency and water conservation measures, where feasible;</li> <li>○ Assess whether the used water can be recycled;</li> <li>○ Assess whether packhouses will have enough water during periods of scarcity;</li> <li>○ Provide a contingency plan for water;</li> </ul> </li> <li>• Clarify how farmers will be selected to participate in the activities (the projects should probably select full-time, competent farmers);</li> <li>• Coordinate HVCP activities with other nearby vegetable production activities (e.g., Old Mutual has been investing in vegetable production in the same area);</li> <li>• Ensure that market production grows in step with market demand;</li> <li>• Start the commercialization process with what famers know, rather than aiming immediately for the more difficult export market;</li> <li>• Ensure that the value chain for vegetables is robust, provides fair prices, and good employment to smallholder</li> </ul>

<b>Preliminary ESCR Management Plan for the High Value Crop Horticultural Project (HVCHP)</b>
<p>farmers;</p> <ul style="list-style-type: none"> <li>• Select crops to commercialize based on market assessment;</li> <li>• Provide a mechanism to deal with the price fluctuations of market vegetables.</li> </ul> <p><b>* Coordination of the Development of the Marketing Information System</b></p> <ul style="list-style-type: none"> <li>• Asses the previous attempts to establish an Agricultural Marketing Information System (e.g. under SADP);</li> <li>• Assess whether other projects (e.g., IFAD) are also developing a similar information system;</li> <li>• Collaborate with similar initiatives to ensure that ONE agricultural Marketing Information System is developed;</li> <li>• Analyse which stakeholder would be most effective in improving the marketing system of smallholders (NAMBoard can have conflicting goals: e.g., import goal to obtain levies vs. buying vegetables at the lowest price).</li> </ul>
<p><b>Institutional Development Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <p><b>*Capacity Development</b></p> <ul style="list-style-type: none"> <li>• Assess SWADE's capacity to manage another LUSIP-focused project; assess whether additional staff are needed;</li> <li>• Enhance local collaboration and links with MOA RDA;</li> <li>• Support linkages or mentoring relationships between established commercial farmers and new farmers;</li> <li>• Train selected farmers to grow conventional vegetables well first, and then move to higher value, more competitive crops.</li> </ul> <p><b>* Monitoring of the commercialisation process to ensure intended benefits:</b></p> <ul style="list-style-type: none"> <li>• Monitor to ensure that farmers are in fact improving their income by commercialising;</li> <li>• Continuously assess whether commercialising smallholder farms remains compatible with household food self-sufficiency (e.g., if a smallholder does not get a fair price for produce, the household's food security is in jeopardy).</li> </ul>

**Table 36: Preliminary ESCR Management Plan for the Livestock Development Project**

<b>Preliminary ESCR Management Plan for the Livestock Development Project (LDP)</b>
<p><b>Risks associated with the livestock sector include:</b></p> <ul style="list-style-type: none"> <li>• Reduced productive potential and carrying capacity of rangelands due to erosion, declining soil fertility, and long-term change in local climate (e.g., drier, hotter climate; shorter, more unpredictable / erratic rainy seasons);</li> <li>• Loss of livestock due to increasing frequency and magnitude of extreme weather events and climate change;</li> <li>• Onset of new diseases / increased frequency of known diseases due to climate change;</li> <li>• Competition with crop agriculture, leading to reduced availability of rangeland and increased pressure on remaining grazing lands.</li> </ul> <p><b>Biophysical impacts associated with the livestock sector include:</b></p> <ul style="list-style-type: none"> <li>• Deforestation and loss of wildlife and biodiversity due to converting forests and other natural vegetation to pastures;</li> <li>• Erosion and loss of soil fertility due to overgrazing;</li> <li>• Pollution of water bodies and groundwater and transfer of diseases from animal waste;</li> <li>• GHG emissions from clearing forests or burning pastures;</li> <li>• Methane emissions from ruminant metabolism.</li> </ul>
<p><b>Objective:</b> <i>Mitigate the negative risks and impacts and optimize the positive impacts of the LDP</i></p>
<p><b>Key Output:</b> Preliminary ESCR Management Plan for the LDP</p>
<p><b>Responsible Parties:</b> PMU, SC, Project implementers &amp; contractors, Consultants, MTEA Forestry Department MOA Rangeland Ecologist (or consultant)</p>
<p><b>Indicators to monitor:</b> Completion of the ESCR Management Plan for the LDP, and reports on implementation of said plan</p>
<p>This <i>Preliminary ESCR Management Plan for the LDP</i> provides a number of recommendations on how to adapt the programme-level components in a project-specific manner. When the ESIA of the LDP is commissioned, the ESIA consultant will need to adapt and integrate the component plans listed in Chapter 7.1, integrate the results of any further assessment commissioned by the EU related to each component, <u>and</u> integrate the results of any project-specific assessment work conducted by the project team based on the recommendations provided in this <i>Preliminary ESCR Management Plan for the LDP</i> to generate the legally-binding ESCR management plan for the LDP.</p>
<p><b>Biodiversity Management Plan:</b> <u>Suggested element to focus on when adapting the programme plan to the project:</u></p> <ul style="list-style-type: none"> <li>• Secure biodiversity hotspots from livestock development activities and forbid ranches from using fire to control bush encroachment.</li> </ul>
<p><b>Land use, Land Suitability, and Land Management Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p>
<p><b>* Identification of Suitable Rangelands:</b></p> <ul style="list-style-type: none"> <li>• Assess whether to focus rangeland improvement projects on the Middleveld and Highveld, given the predicted climate change (the Lowveld may only be suitable for game in the future);</li> <li>• Select rangeland projects, based on future climate scenarios, land use, and other environmental factors;</li> <li>• Using participatory methods, prepare a map of the proposed rangeland area identifying critical issues such as carrying capacity potential, species composition, soil type, flora, and natural features (water courses);</li> </ul> <p><b>* Development of the Rangeland Management and Improvement Strategy, including the Management of Fire:</b> Elements to include are:</p> <ul style="list-style-type: none"> <li>• Review the experience of other groups who have conducted rangeland projects (review whether simple support, such as providing fencing / barbed wire) is relevant;</li> <li>• Promote proven rangeland management techniques, as listed below;</li> <li>• Improve carrying capacity of rangeland through plant nutrition and livestock nutrition;</li> <li>• Clearly demonstrate the benefits of rangeland improvement (e.g., select Chiefdoms that are already willing to apply the concept, as pilot areas);</li> <li>• Assess the potential to implement rotational grazing and grazing control (i.e., restrict access to ensure that grazing is not exceeding the carrying capacity);</li> <li>• Integrate afforestation and reforestation into rangeland planning;</li> <li>• Construct erosion control structures and contour ridges to manage runoff erosion from rangelands (e.g., gabions, terracing, or tree barriers; plant grasses to reduce erosion);</li> <li>• Apply periodic bans on grazing to allow regeneration;</li> <li>• Reverse pasture degradation and protect pastures by removing mobility on common pastures or through controlled exclusion from sensitive areas;</li> <li>• Enrich grazing land, by planting palatable species;</li> <li>• Promote silvo-pastoralism (i.e., forest–livestock systems), which can also enhance soil protection and water conservation and generate carbon sinks;</li> <li>• Improve the diets of the livestock to reduce enteric fermentation, and reduce GHG emissions.</li> <li>• Promote haymaking (to reduce pressure on grazing land);</li> <li>• Increase the number of watering points to reduce pressure on land near water sources during the dry season;</li> <li>• Reduce the imperative to maintain large herds by enhancing productivity per animal;</li> </ul>

<b>Preliminary ESCR Management Plan for the Livestock Development Project (LDP)</b>
<ul style="list-style-type: none"> <li>• Improve animal husbandry and veterinary services to improve livestock health and reduce livestock losses;</li> <li>• Integrate a <i>fire management</i> (in compliance with the Forest Bill) into the rangeland management strategy;</li> <li>• Integrate rangeland management with catchment management;</li> <li>• Integrate rangeland management into the CDPs.</li> </ul> <p><b>* Implementation of the Rangeland Management Strategy in Collaboration with the Local Community and SNTC</b> to manage the project-level biophysical impacts of the livestock sector, to keep the project rangelands under their determined carrying capacities, and to harmonize with the new legislation on mixed use protected areas;</p> <ul style="list-style-type: none"> <li>• Undertake a <i>Capacity Needs Assessment</i> of the project beneficiaries to identify gaps in knowledge and understanding on rangeland management, agro-forestry, and fire management;             <ul style="list-style-type: none"> <li>◦ Build the capacity of stakeholders to sustainably manage rangelands;</li> </ul> </li> <li>• Involve a rangeland ecologist in the rehabilitation of rangelands (to understand grassland ecology/species change).</li> </ul>
<b>Water Resource Management (WRM) Plan:</b> <u>Adapt the programme plan to the project. No specific comments provided here.</u>
<b>Climate Change Management Plan:</b> <u>Adapt the programme plan to the project. No specific comments provided here.</u>
<p><b>Integrated Waste Management and Waste Minimization Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <p><b>* Development of a Livestock Waste Management Strategy to Manage all Livestock Wastes:</b></p> <ul style="list-style-type: none"> <li>• Integrate livestock and agriculture for efficient recycling of nutrients and to avoid problems of waste removal, nutrient loss, and greenhouse gas emissions.</li> <li>• Prevent residues from veterinary medications and feed chemicals from entering the food chain;</li> <li>• Minimise the non-therapeutic use of antibiotics.</li> </ul>
<p><b>Socio-Cultural Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <p><b>* Assessment of the Potential to Expand Small Livestock in the Project Area:</b></p> <ul style="list-style-type: none"> <li>• Expand activities into smaller livestock (e.g., chickens, pigs, and rabbits) to involve more vulnerable groups;</li> <li>• Assess the opportunities to have regional slaughterhouses for small livestock.</li> </ul> <p><b>* Further development of the activities focused on food security and nutrition for LDP sites</b></p> <ul style="list-style-type: none"> <li>• More clearly separate the project activities to commercialize the livestock sector and activities to improve nutrition, so that both types of activities can be more clearly planned;</li> <li>• Support home gardens to improve nutrition;</li> <li>• Provide an explicit nutrition support program, especially in drought years, for the very poor farmers and other poor community members (e.g. women-headed households, child-headed households, elderly, or sick).</li> </ul>
<p><b>Socio-Economic Plan:</b> <u>Suggested elements to focus on when adapting the programme plan to the project:</u></p> <p><b>* Further Development of the Sustainability Assessment and Planning for Sustainability for the LDP:</b></p> <ul style="list-style-type: none"> <li>• Conduct an economic assessment to select the location of beef and dairy project activities and to select breeds;</li> <li>• Locate beef and dairy activities and rangeland management activities in best available locations, for economic viability, environmental sustainability, and demonstration purposes;</li> <li>• Locate activities bearing in mind the future climate (e.g., dairy cattle prefer a cooler climate);</li> <li>• Identify local dairy and cattle breeds that are already adapted to the climate and integrate them into a local selective-breeding programme;</li> <li>• Introduce improved, more productive breeds, which are adapted to local conditions;</li> <li>• Develop business models around preferred livestock breeds;</li> <li>• Link any government farm project (beef or dairy) to research initiatives;</li> <li>• Review UNISWA's farm demonstration proposal and collaborate, where relevant;</li> <li>• Assess as a complimentary activity whether to rehabilitate the dip tanks in selected areas.</li> </ul> <p><b>* Development of a Sustainability Strategy for Cattle Beef Farms to ensure that Project Assets and Activities are Maintained in the Future (e.g., markets and mini feedlots);</b></p> <ul style="list-style-type: none"> <li>• Integrate major operational and maintenance costs into feasibility budgets, e.g., maintenance of fences;</li> <li>• Provide regulation, weigh scales, fair prices, and information on beef prices;</li> <li>• Take measures to ensure that commercializing the smallholder livestock industry does not just result in smallholders adding more cattle stock, but in fact does improve the quality and productivity of the livestock;</li> <li>• Prepare locally appropriate <i>guidelines for feedlots</i>, based on the local situation;</li> <li>• If mini-feedlots have more than 30 cattle, apply for a water permit.</li> </ul> <p><b>* Economic Assessment of Gege Farm to Assess its Suitability as a Demonstration Site for Commercial Dairy:</b></p> <ul style="list-style-type: none"> <li>• Evaluate whether to support Gege dairy farm vs. supporting a few small (more-conveniently located) dairy farmers in each region, to demonstrate commercial dairy;</li> <li>• If Gege is retained as an activity, prepare a robust business plan.</li> </ul>

**Preliminary ESCR Management Plan for the Livestock Development Project (LDP)**

**\* Needs Assessment Focussed on Smallholder Dairy Farmers**

- Define what is 'appropriate dairy livestock', before project implementation (e.g., exotic breeds vs. local breeds);
- Assess what milk producers actually need (dairy farmers are likely to need small infrastructure such as milk sheds, feed stores, fencing, artificial insemination, cooler tanks at community level, assistance to purchase fodder during winter, and quality inspections);
- Assess whether to directly support small milk producers, creating a viable model in each region;
- Consider re-establishing the Swaziland Milk Producers Association to build technical networks;
- Coordinate with other dairy projects (e.g., FAO and Old Mutual are also building dairy-sector capacity);
- Collaborate with the Dairy Board to ensure high-level approval of new activities.

**\* Application of Good Hygiene and Good Animal Welfare Practices**

- Site livestock units appropriately to avoid negative effects on the landscape, environment, and animal welfare;
- Minimize risk of infection and disease by good pasture management, safe feeding, appropriate stocking rates, and good housing conditions;
- Keep livestock, livestock buildings, and feed facilities clean and provide adequate, clean bedding where livestock is housed;
- Provide adequate and appropriate feed and clean water at all times;
- Ensure good hygiene standards in livestock housing by proper cleansing and disinfection;
- Ensure staff are properly trained in the handling and treatment of animals;
- Seek appropriate veterinary advice to avoid disease and health problems;
- Treat sick or injured animals promptly in consultation with a veterinarian;
- Purchase, store, and use only approved veterinary products in accordance with regulations and directions;
- Handle animals with appropriate care and avoid the use of instruments such as electric goads;
- Maintain animals in appropriate social groupings, where possible;
- Discourage isolation of animals (e.g., solitary sow stalls), except when animals are injured or sick;
- Conform to recommendations related to space allowances and stocking densities;
- Frequently monitor the condition of the livestock and adjust stocking rates, feeding, and water supply accordingly;
- Design, construct, choose, use, and maintain equipment, structures, and handling facilities to avoid injury and loss of livestock;
- Adhere to safety regulations and observe established safety standards for the operation of installations, equipment, and machinery for animal production;
- Avoid biological, chemical, and physical contamination of pasture, feed, water, and the atmosphere;
- Maintain records of stock acquisitions, breeding, losses, sales, feeding plans, and feed acquisitions;
- Minimise transport of live animals (by foot, rail or road) to minimize stress on the animals.

**Institutional Capacity Development Plan:** Suggested elements to focus on when adapting the programme plan to the project:

**\* Development of Capacity to Manage Rangelands at the Community Level**

- Raise community awareness to overcome the perception that farmers will automatically have to pay a fee to use the improved grazing areas;
- Prepare *training materials on rangeland conservation* (for extension workers and for communities);
- Train extension workers in rangeland ecology;
- Train farmers and the community in what trees are good for firewood and which should be conserved;
- Train farmers and the community to identify invasive species and what local plants are more suitable for the rangeland and for use as fodder;
- Enhance the capacity of farmers to grow good fodder through research and demonstration;
- Conduct research and trials focused on:
  - (Re-) Introducing more palatable grass species to rangelands;
  - Diversifying fodder sources, including:
    - Conventional cattle feed;
    - Non-conventional agricultural by-products;
    - Fodder conservation (silage and hay);
    - Herbaceous legumes;
    - Crop residues;
  - Confirming that the trees and shrubs identified as fodder are not invasive species;
  - Developing pastures;
  - Integrating the use of fodder trees into rangeland rehabilitation (fodder trees can be used as winter fodder);
- Document and disseminate the success stories.

## 7.3 The 11<sup>th</sup> EDF Logical Framework Indicators

Tables 37 to 40 show the logical framework of the 11<sup>th</sup> EDF and its 3 projects. This StrEA provides some recommendations to strengthen the logical framework, in light of this StrEA. The suggested changes are provided **within** the existing tables, in ***bold italic***.

**Table 37: Logical Framework: 11<sup>th</sup> EDF Sector Intervention Framework (Agriculture)**

Expected Results	Indicators	Means of Verification
<b><u>Overall Objective:</u></b> <ul style="list-style-type: none"> <li>To eradicate food insecurity while contributing to sustainable economic growth</li> </ul>	<ul style="list-style-type: none"> <li>% of population who is food insecure reduced from 29% in 2009/10 to 15% by 2020</li> </ul>	<ul style="list-style-type: none"> <li>Annual Vulnerability Assessment &amp; Analysis (VAC) Report</li> </ul>
<b><i>Specific Objective 1: Strengthen institutional capacities</i></b>		
R1.1 Sector Action Plan (CAADP) developed and implemented	<ul style="list-style-type: none"> <li>Implementation status of CAADP</li> </ul> <u>Target:</u> <ul style="list-style-type: none"> <li>Costed Sector Action Plan and related M&amp;E system <b><i>(including a budget allocated to monitor and evaluate the implementation of the StrEA management plan)</i></b> approved by 2016</li> </ul>	<ul style="list-style-type: none"> <li>Implementation reports on the sector plan</li> <li>Reports from the M&amp;E system</li> </ul>
R1.2 Ministry of Agriculture (MOA) restructured	<ul style="list-style-type: none"> <li>Implementation status of restructuring of MOA</li> </ul> <u>Targets:</u> <ul style="list-style-type: none"> <li>Organogram of MoA approved</li> <li>Departmental roles and mandates defined and implemented by 2018</li> </ul>	<ul style="list-style-type: none"> <li>MoA reports</li> </ul>
R1.3 Regulatory framework for land and water access reviewed and implemented	<ul style="list-style-type: none"> <li>Implementation status of regulatory framework for land and water access</li> </ul> <u>Targets:</u> <ul style="list-style-type: none"> <li>Land Policy approved by 2018</li> <li>Regulatory framework for land and water access implemented by 2020</li> </ul>	<ul style="list-style-type: none"> <li>Land Policy and Act</li> <li>Water use statistics (DWA, NWA)</li> <li>Ministry of Natural Resources and Energy (MNRE) reports</li> <li>Land Management Board (LMB) reports</li> </ul>
<b><i>Strategic Objective 2: Support environmentally sound 'high-impact' commodity chains building resilience to climate risks established</i></b>		
R2.1 Sustainable diversified production increased (not sugar cane)	<ul style="list-style-type: none"> <li>Number of efficiently run <b><i>and ESCR compliant</i></b> non-sugar-cane (NSC) farmer associations and cooperatives</li> </ul>	<ul style="list-style-type: none"> <li>Farmer Company reports</li> <li>MOA and other reports</li> </ul>
R2.2 Storage and collection points established	<ul style="list-style-type: none"> <li>Number of storage and collection points established <b><i>(and being sustainably operated using water- and energy-efficient designs)</i></b></li> </ul> <u>Target for vegetables:</u> <ul style="list-style-type: none"> <li>From 1 in 2013 to 5 by 2020</li> </ul>	<ul style="list-style-type: none"> <li>NAMBOARD and other marketing institution reports</li> </ul>
R.2.3 Marketing systems improved including access to fair trade and/or organic market	<ul style="list-style-type: none"> <li>Number of smallholders selling to agro-processors <b><i>and making a fair, sustainable wage from their agricultural production</i></b></li> </ul> <u>Target for fresh produce:</u> <ul style="list-style-type: none"> <li>7,000 tons produced annually by 2018 from &lt;1,000 tons in 2011</li> <li>Farmer numbers increased from 400 in 2013 to 1,000 by 2020</li> </ul>	<ul style="list-style-type: none"> <li>NAMBOARD and other marketing institution reports</li> <li>Farm surveys</li> <li>Farmer company annual reports</li> </ul>

Expected Results	Indicators	Means of Verification
<b>Strategic Objective 3: Improve food security of subsistence farmers</b>		
R3.1 Access to land and water improved avoiding deforestation and land degradation	<ul style="list-style-type: none"> <li>Number of functioning earth dams <u><b>showing good catchment management practices</b></u> (baseline to be established, as 86 have been built but no official number on the functioning ones)* with downstream land use plans <u><b>showing good ESCR management in the downstream area (e.g., good agrochemical management)</b></u></li> <li>Number of access points to water for human and cattle consumption</li> <li>Ha of agricultural SNL with formal land allocation documentation</li> <li><u><b>Ha of agricultural land on previously underutilised SNL (and not in protection worthy habitats).</b></u></li> </ul>	<ul style="list-style-type: none"> <li>Farm surveys</li> <li>MOA reports</li> <li>MNRE reports</li> <li>LMB reports</li> </ul>
R3.2 Production and nutrition improved through good agriculture practices	<ul style="list-style-type: none"> <li><del>Number of smallholder farmers employing good agricultural practices</del></li> <li><u><b>Ha of agricultural land under climate-smart or conservation agriculture</b></u></li> <li>Yield for maize (t/ha) increased (<u><b>target:</b></u> from 1.17 t/ha in 2013 to 2 t/ha in 2018)</li> <li>Number of <u><b>additional</b></u> households <u><b>now</b></u> growing nutritious crops, trees*, producing milk, <u><b>or raising small livestock</b></u></li> </ul>	<ul style="list-style-type: none"> <li>Farm surveys</li> <li>MOA and other reports</li> <li>VAC reports</li> <li>CSO reports</li> <li>Swaziland National Nutrition Council reports</li> <li>National Maize Corporation annual reports</li> </ul>

**Table 38: Logical Framework: High Value Crop and Horticultural Project (HVCHP)**

	Intervention Matrix & Activities	Objectively Verifiable Indicators (OVIs)	Verification (SOVs)	Assumptions, risks & means
<b>Overall objectives</b>	<ul style="list-style-type: none"> <li>To contribute to the reduction of poverty by creating pro-poor growth, securing livelihoods of smallholder farmers and providing locally produced diversified food on the market</li> </ul>	<ul style="list-style-type: none"> <li>Percentage of LUSIP I and hub populations (males, females) living below the poverty line (national baseline is 63% in 2010)</li> <li>Percentage of LUSIP I and hub populations (males, females) who are food insecure (national baseline is 29% in 2010)</li> </ul>	<ul style="list-style-type: none"> <li>Baseline survey in the target areas</li> </ul>	
<b>Project purpose</b>	<ul style="list-style-type: none"> <li>To contribute to the reduction of poverty by creating pro-poor growth, securing livelihoods of smallholder farmers and providing locally produced diversified food on the market</li> </ul>	<ul style="list-style-type: none"> <li>Local produce grown <u><b>under environmentally sustainable agricultural practices</b></u> sold on local market increased from 3,500 mt in 2014 to 10,200 mt in 2019</li> <li>Increased incomes of 1,000 smallholders (baseline to be established by the baseline survey)</li> <li>Volume of produce imported for local market reduced from 22,000 mt in 2014 to 15,300 mt</li> <li>Produce sold on international market</li> </ul>	<ul style="list-style-type: none"> <li>NAMBOARD annual reports</li> <li>MoA statistics</li> </ul>	<p><b>Assumptions:</b></p> <ul style="list-style-type: none"> <li>Political stability in Swaziland</li> <li>The investment climate remains positive</li> <li><del>Swaziland does not experience prolonged drought</del></li> <li><u><b>Assume that there WILL be a drought</b></u></li> </ul>



	Intervention Matrix & Activities	Objectively Verifiable Indicators (OVIs)	Verification (SOVs)	Assumptions, risks & means
		<p>increased from 150 mt in 2014 to 1,730 mt in 2019</p> <ul style="list-style-type: none"> <li>Number of smallholders (males, females) selling to agro-processors <b><u>and making a fair wage from their agricultural production</u></b> increased from 400 in 2013 to 1,000 by 2020</li> </ul>		<p><b><u>during the programme period, and develop supportive contingency measures to cope with drought</u></b></p> <ul style="list-style-type: none"> <li>Entrepreneurial entities will invest in value adding activities at or near the pack-houses (transport, agro-processing, etc.).</li> </ul>
<b>Result 1</b>	<ul style="list-style-type: none"> <li>To contribute to the reduction of poverty by creating pro-poor growth, securing livelihoods of smallholder farmers and providing locally produced diversified food on the market.</li> </ul>	<ul style="list-style-type: none"> <li>AMIS operational in 2016</li> <li>International market strategy developed and operational in 2016</li> <li>An additional 8,400 mt transported by NAMBOARD to local markets (baseline in 2,200 mt in 2013)</li> <li>3 local market cold stores operational by 2016 (baseline is 0) <b><u>and sustainable with cost recovery by 2018</u></b></li> <li>10 extension packages updated and extension staff trained</li> <li><b><u>ESCR extension package developed and extension staff trained in ESCR</u></b></li> </ul>	<ul style="list-style-type: none"> <li>AMIS weekly reports</li> <li>Market strategy report</li> </ul>	
	<p><b><u>Indicative Activities:</u></b></p> <ul style="list-style-type: none"> <li>Supervision and regulation of the commodity chains by the MoA</li> <li>Extension packages are updated (agronomic, business, governance, irrigation maintenance, HACCP, GAP certification, <b><u>and ESCR management</u></b>)</li> <li>Development and launch of an Agriculture Marketing Information System</li> <li>Provision of Agriculture Marketing Information by NAMBOARD</li> <li>Provision of <b><u>energy-efficient</u></b> trucks for NAMBOARD</li> <li>Establishment of <b><u>energy efficient</u></b> cold stores at several national markets (indicatively: Mbabane, Manzini &amp; Mhlanya)</li> </ul>		<p><b><u>Means:</u></b></p> <ul style="list-style-type: none"> <li>TA services: 1) To MoA for extension and value chain supervision, 2) To NAMBOARD for market information and international linkages; also includes supplies for the AMIS</li> <li><b><u>TA for environmental, social, and climate-risk management</u></b></li> <li>Supplies for NAMBOARD (<b><u>energy-efficient refrigerated</u></b> trucks and vehicles; both likely to be under a Programme Estimate with SWADE)</li> <li>Works: <b><u>energy efficient</u></b> cold stores in the market</li> </ul>	
<b>Result 2</b>	<ul style="list-style-type: none"> <li>Land developed and farmer companies strengthened to profitably <b><u>and sustainably</u></b> produce a range of high value commodities in the</li> </ul>	<ul style="list-style-type: none"> <li>1,150 additional ha developed by 2018 (bush clearing to installation of irrigation equipment)</li> <li><b><u>Number of additional ha of farms under climate smart or conservation agriculture</u></b></li> </ul>	<ul style="list-style-type: none"> <li>Works / supply contracts awarded; provisional and final acceptance</li> </ul>	<ul style="list-style-type: none"> <li>Financial institutions continue to engage FCs</li> <li>Financial institutions are reluctant to</li> </ul>

	Intervention Matrix & Activities	Objectively Verifiable Indicators (OVIs)	Verification (SOVs)	Assumptions, risks & means
	LUSIP I area.	<p><b><u>producing the high value commodities;</u></b></p> <ul style="list-style-type: none"> <li>• 20 FCs operating viably by 2018 (likely key performance indicators - KPI - are turnover, operating costs and indebtedness) (baseline is 5 in operation and viable as of 2014)</li> <li>• 7,000 tons of high value crops are annually produced by 2018 of which 6,000 is marketed internationally (baseline is 2,800 mt in 2013)</li> <li>• <b><u>Amount of profits made by farmers through commercial selling of vegetables compared to the incomes made before commercialisation</u></b></li> </ul>	<ul style="list-style-type: none"> <li>• FC <b><u>Sustainable</u></b> Business plans</li> <li>• Annual surveys on KPIs</li> <li>• Pack-house records</li> </ul>	<ul style="list-style-type: none"> <li>invest in infrastructure development for horticulture</li> <li>• Buying contract default by buyers</li> <li>• Production contract default by farmers</li> <li>• The FCs do not take responsibility for and develop the capacity to maintain the on-field irrigation and other infrastructure</li> </ul>
	<p><b><u>Indicative Activities:</u></b></p> <ul style="list-style-type: none"> <li>• Community planning resulting in Chieftaincy Development Plans (CDPs)</li> <li>• Farmer group formation, training and business planning (<b><u>including training in ESCR</u></b>)</li> <li>• Land development (bush clearing and land preparation)</li> <li>• Installation of <b><u>water efficient / energy efficient</u></b> irrigation equipment on <b><u>underutilised SNL, where feasible; new land</u></b></li> <li>• Installation of small scale <b><u>energy-efficient, water-saving, low-cost</u></b> equipment (cropping tunnels, refrigerated sheds for temporary post-harvest storage, appropriate technology for agro-processing where required)</li> <li>• Development of FC <b><u>sustainable</u></b> business plans <b><u>and bankable project briefs</u></b></li> <li>• Provision of <b><u>agricultural</u></b> market information by NAMBOARD to inform crop selection and marketing</li> <li>• Provision of extension services and training on agricultural and horticultural techniques, <b><u>ESCR management</u></b>, post-harvest technology and marketing to FCs</li> <li>• Support SWADE / NAMBOARD in provision of high quality extension and business development support to FCs and to obtain HACCP and/or GLOBAL G.A.P certification</li> </ul>		<p><b><u>Means:</u></b></p> <ul style="list-style-type: none"> <li>• Works contracts for land clearing and irrigation installation, cropping tunnels, appropriate technology</li> <li>• TA services to SWADE especially: 1) <b><u>Land and Water</u></b> Engineering and 2) Finance &amp; contracts; also on extension, GAP, and HACCP, <b><u>and ESCR Management</u></b></li> <li>• Programme Estimate with SWADE: operation costs, <b><u>including costs related to ESCR implementation and monitoring</u></b></li> <li>• Supply contracts for equipment likely to be under the Programme Estimate</li> </ul>	
Result 3	<ul style="list-style-type: none"> <li>• Pack-house hub-based zones developed</li> </ul>	<ul style="list-style-type: none"> <li>• Pack-house zone plans by 2015</li> <li>• <b><u>Energy-efficient and water-efficient</u></b> pack-houses built and operational by 2016;</li> <li>• Pack houses <b><u>economically viable and showing good ESCR practice (e.g., waste management)</u></b> by 2019 (2 existing packhouses: LUSIP and Matsapha);</li> </ul>	<ul style="list-style-type: none"> <li>• Works / supply contracts awarded; provisional and final acceptance</li> <li>• Farmer groups surveys</li> <li>• Pack-house records</li> </ul>	<ul style="list-style-type: none"> <li>• Increased volumes of production does not <del>match</del> <b><u>cover</u></b> operating costs of pack houses</li> <li>• Buying contract default by buyers</li> <li>• Production contract default by farmers</li> <li>• Access to</li> </ul>

	Intervention Matrix & Activities	Objectively Verifiable Indicators (OVIs)	Verification (SOVs)	Assumptions, risks & means
		<ul style="list-style-type: none"> <li>12 small dams rehabilitated / built (<b><u>and related catchment management issues corrected</u></b>) by 2018</li> <li>150 ha under production for each hub, producing 3,000 tons in total of which 2,400 is marketed <b><u>at profit to the farmers</u></b> (baseline is 200 ha nationally in 2013 - outside of Lusip)</li> </ul>		<b><u>affordable</u></b> finance by farmers <ul style="list-style-type: none"> <li>Difficulty to maintain quality of produce</li> </ul>
	<b><u>Indicative Activities:</u></b> <ul style="list-style-type: none"> <li>Community planning resulting in Chieftaincy Development Plans (CDPs), <b><u>which also integrate ESCR management;</u></b></li> <li>Farmer organisations / water user associations formation</li> <li>Establish access to finance through linkages made with Development Finance Institutions</li> <li>Packhouse zone planning</li> <li>Building of the <b><u>water and energy efficient</u></b> packhouses (focus for collection depots, storage, refrigeration, market)</li> <li>Packhouses are complemented with <b><u>energy-efficient</u></b> processing equipment and in-field refrigerated sheds <b><u>or other appropriate cooling equipment;</u></b></li> <li>Management system structure established for the packhouses (piloting different approaches) (<b><u>at minimum clarifying ownership, responsibilities of stakeholders, operational costs, and any fees that need to be paid;</u></b></li> <li>Design and construction / upgrading / rehabilitation / de-silting of water supply systems for irrigation as required (SWADE)</li> <li>Provision of training (business, governance, <b><u>ESCR management</u></b> etc.) and monitoring of Farmer groups by SWADE</li> <li>Provision of Agriculture Marketing Information by NAMBOARD</li> </ul>		<b><u>Means:</u></b> <ul style="list-style-type: none"> <li>Works construction of packhouses</li> <li>Works &amp; supplies small irrigation improvement projects (likely to be under the SWADE Programme Estimate)</li> <li>Programme Estimate with SWADE: operation costs for SWADE and NAMBOARD, <b><u>energy-efficient</u></b> vehicles for SWADE and NAMBOARD</li> </ul>	

**Table 39: Logical Framework: Water Harvesting, Small and Medium Dams Project (WHDP)**

Objectives	Narrative	Indicators (OVI)	Baseline	Target	Means of Verification (MOV)	Assumptions
<b>Overall Objective</b>	NIP: Food insecurity eradicated while contributing to sustainable economic growth	% of food insecure population reduced (NIP)	29%	15%	Vulnerability Assessment reports (Poverty Unit MEPD) MOA records	
<b>Project purpose</b>	Smallholder irrigated crop production in project areas are sustainably enhanced	Increase in volumes of crop in project areas	Tbd*	+ %	MOA statistics	<del>No extreme climatic events</del> <b><u>Assume occurrence of severe climate events and develop appropriate contingency plan</u></b>
<b>Result 1</b>	Water storage capacity increased	Additional number of functioning bulk-water structures (NIP)	N/A	+ 75	Records of the Land Use Planning Department <b><u>Land Use Planning and Development section</u></b> <b><u>Water Permits for dams issued by DWA</u></b>	Candidate sites meet selection criteria, <b><u>including ESCR mitigation criteria</u></b>
		Additional volume of storage established (million m <sup>3</sup> ) ( <b><u>with storage volume within the basin allocation</u></b> )	N/A	+ 1.09		
		Volume of diverted water (in m <sup>3</sup> ) ( <b><u>with storage volume within the basin allocation</u></b> )	N/A	+ 1.24		
<b>Result 2</b>	Production capacity for smallholders enhanced	Additional hectares <b><u>of land irrigated (NIP) with water-efficient technology</u></b>	N/A	+ 539		
		Number of cattle watering points established (NIP) <b><u>using good ESCR practice</u></b>	N/A	+ 40		
		Number of farmer business groups with business plans adhering to good agricultural	N/A	+ 75		

		practices (NIP)				
		Number female headed producer groups	N/A	+ 37		
		Number of roof water harvesting units installed	N/A	+ 50		
		Increase in volume of quality produce marketed (NIP) <b><u>at a fair price to safeguard farmers' livelihoods</u></b>	N/A	+ % tonnes	NAMBoard & <b><u>National</u></b> Maize Board <b><u>Corporation</u></b> records <b><u>Annual Reports</u></b>	
<b>Result 3</b>	Institutional capacity strengthened	Number of Operation & Maintenance plans, <b><u>integrating ESCR management</u></b> , implemented	N/A	+ 75	Records of the MOA	

**TBD:** To be determined on the basis of a baseline survey.

**Table 40: (Preliminary) Logical Framework: Livestock Development Project**

Objectives	Narrative	Indicators (OVI)	Means of Verification (MOV)	Assumptions
<b>Overall Objective</b>	Improved livelihood of smallholder livestock producers on SNL	<ul style="list-style-type: none"> <li>No. of food insecure households in project areas</li> <li>Value of household incomes from livestock production</li> </ul>	Baseline and impact surveys  DVLS Annual Reports	
<b>Project purpose</b>	The enhancement of market-oriented smallholders' livestock production, as well as improving human nutrition in project areas	<ul style="list-style-type: none"> <li>Cattle off-take rates increased</li> <li>Milk production volumes increased</li> <li><b><u>Increase in consumption of sustainable, locally-produced, affordable meat and dairy</u></b></li> <li>Prevalence of stunting amongst children aged &lt;5 years</li> </ul>	Baseline survey and impact surveys	Social and political stability  Profitable market available for livestock and livestock products
<b>Result 1</b>	Livestock productivity improved	<ul style="list-style-type: none"> <li>Age of first calving</li> <li>Calving interval</li> <li>Off-take rates</li> <li>Carcass size increased and quality improved</li> <li>Reduced mortality</li> </ul>	Dip tank records	Government able to access knowledge and technology to improve productivity  <b><u>N.B. The focus on government farms is</u></b>

		<ul style="list-style-type: none"> <li><u><b>Improved quality of rangelands and improved rangeland management practices</b></u></li> </ul>		<p><u><b>not yet well integrated into the results listed in the logical framework.</b></u></p> <p>Chiefdom development (rangeland) planning effectively applied</p>
<b>Result 2</b>	Smallholder livestock market access strengthened	<ul style="list-style-type: none"> <li>No. of livestock auctions</li> <li>No. of farmer business groups formed, functioning, <u><b>and knowledgeable about ESCR management)</b></u></li> <li>No. of mini feedlots operating <u><b>in a sustainable manner (economic and ESCR aspects considered)</b></u></li> <li>No. of <u><b>healthy, well fed</b></u> animals sold</li> </ul>	<p>Livestock market records</p> <p>Abattoir records</p> <p>DVLS reports</p>	<p>Smallholders willingness to change attitude &amp; behaviour</p> <p>Interest of butchers and abattoirs to use this market mechanism</p> <p>Access to appropriate financial products</p>
<b>Result 3</b>	Smallholder Dairy production base, improved individual diet and local marketing capacity strengthened	<ul style="list-style-type: none"> <li>No. of smallholder dairy groups formed and operating</li> <li>Daily milk production, <u><b>using good ESCR management;</b></u></li> <li>Increase in dairy sales <u><b>to the local population, resulting in an improved local diet;</b></u></li> <li>Calving intervals</li> <li>No. of dairy marketing organisations functioning</li> <li>Individual dietary diversity (or food consumption) score</li> </ul>	SDB reports	Market conditions continue to be favourable for dairy production

## 8 Stakeholder Capacity Assessment to Manage Environmental, Social, & Climate-related Challenges

### 8.1 Stakeholder Consultations

The Consultants conducted **17** interviews during the scoping period, **6** discussions during the detailed study, and the Stakeholder Validation workshop (the key stakeholder event of this StrEA). Table 41 lists the interviews / discussions conducted during the scoping and detailed study period process. **Appendix 5a** shows the list of stakeholders invited to the workshop and **Appendices 5b** and **5c** show the list of participants who attended the workshop.

**Table 41: Schedule of Interviews Conducted during this Strategic Environmental Assessment**

Date	Day	Description of Activity
Jan. 12	Tuesday	<b>EU Coordination meeting</b> , 08:00, Mbabane Alice, Ariane, Bhekani
Jan. 19	Tuesday	<b>SEA</b> 14:30, SEA Office, Mbabane; Gcina Dladla 7661 3773 gdladla@sea.org.sz
Jan. 20	Wednesday	<b>SNTC</b> , 09:00, Lobamba; <b>MOA Veterinary and Livestock Services</b> ; <b>MOA Agriculture &amp; Extension Promotion Services</b> ; <b>NAMBOARD</b> , 14:30, Matsapha;
Jan. 21	Thursday	<b>EU Coordination meeting</b> , 08:00, Mbabane; Alice and Ariane <b>SANU</b> 10:00 MOA Crop Protection Office, Manzini; <b>MOA Agribusiness</b> 14:30; MOA HQ, Mbabane; <b>TechnoServe</b> , 16:00, Mbabane;
Jan. 22	Friday	<b>MOA Land Use Planning &amp; Development Section</b> , 09:00, Matsapha; <b>SWADE</b> 14:00, Siphofaneni;
Jan. 26	Tuesday	<b>Department of Water Affairs</b> ; 0900–10:15 <b>Swaziland National Meteorological Service (NMS)</b> : 15:00–17:00
Jan. 27	Wednesday	<b>EU Scoping Report Presentation</b> , 11:00, Mbabane; EU Delegation
Jan. 28	Thursday	<b>UNISWA (Faculty of Agriculture)</b> , 11:00, Luyengo
Feb. 1	Monday	<b>UNISWA (Department of Animal Science)</b> , 14: 30, Luyengo
March 7	Monday	<b>Kick-off meeting for detailed study</b> <b>EU meeting</b> room, 08:00–09:00
March 17	Thursday,	<b>Meeting with EU TA NAS</b> , Mbabane MOA
March 22	Tuesday	<b>Meeting with SEA</b> , Mbabane
March 29	Tuesday	<b>EU meeting</b> room, Mbabane; 08:30–09:00
March 29	Tuesday	<b>Surveyor General's Department, Land Surveying &amp; Mapping</b>
March 23	Wednesday,	<b>Meeting with UNDP</b> , 14:30:17:00
April 19	Tuesday	<b>Validation workshop (with 55 invited stakeholders)</b>

Table 42 provides a summary of the stakeholder concerns and how the concerns were addressed during the detailed study.



**Table 42: A Summary of the Stakeholder Concerns and how the Concerns were Addressed during the Detailed Study**

EDF & EDF Projects	Stakeholder Concerns Identified during the Scoping-period Interviews & Discussions	Addressed
<b>High Value Crop and Horticulture Project (HVCHP)</b>	<p><b>Biological:</b></p> <ul style="list-style-type: none"> <li>Unclear definition of what is a High Value Crop</li> </ul> <p><b>Climate:</b></p> <ul style="list-style-type: none"> <li>Climatic suitability for economically sustainable HVC not specified</li> <li>Climate change impacts poorly recognised - Project should undertake a climate change impact assessment process</li> </ul> <p><b>Water availability, use, &amp; management, and water pollution</b></p> <ul style="list-style-type: none"> <li>Individual production areas to obtain water permits</li> <li>Inadequate attention to waste and water management</li> <li>Potential to increase agro-chemical pollution of land and water</li> </ul> <p><b>Socio-economic:</b></p> <ul style="list-style-type: none"> <li>Unclear commodity pricing mechanisms</li> </ul> <p><b>Institutional:</b></p> <ul style="list-style-type: none"> <li>Inadequate local area (chiefdom level) land use and resource planning</li> <li>Institutional arrangement of NAMBoard as regulator, player, buyer, and producer results in uneven playing field</li> <li>Capacity of NAMBoard to deliver quality extension and collection services</li> <li>Utilisation of modern communication technologies to deliver messages and information</li> </ul>	<p><b>Biological:</b></p> <ul style="list-style-type: none"> <li>MOA clarified that all vegetables can, at certain times based on demand and supply, be high value<sup>59</sup>.</li> </ul> <p><b>Climate: the StrEA recommends:</b></p> <ul style="list-style-type: none"> <li>A climate impact / risk assessment for each project, using national climate models will be undertaken and project opportunities to reduce vulnerability will be assessed</li> <li>An Economic Viability Assessment of each planned crop, hub, enterprise, and value chain to help ensure that farmers can produce commercial vegetables at a profit. Opportunities to reduce vulnerability and risks will be assessed</li> </ul> <p><b>Water availability, use, &amp; management and water pollution: The StrEA recommends:</b></p> <ul style="list-style-type: none"> <li>Each project where natural water will be abstracted for use, will be required to obtain a water permit from the DWA/RBA</li> <li>A Program-level Integrated Waste Management Plan will be undertaken, and revised at project level (this is in compliance with Waste Regulations, 2000)</li> <li>An Agrochemical Use and Agrochemical Management Strategy will be prepared, and adapted to for each Project</li> </ul> <p><b>Socio-economic:</b></p> <ul style="list-style-type: none"> <li>A transparent mechanism to set market price for produce will be developed. An agricultural marketing information system will be developed that can assist buyers and sellers to set commodity prices that reflect demand and supply</li> </ul> <p><b>Institutional:</b></p> <ul style="list-style-type: none"> <li>Land utilisation planning for HVCH sites will be carried out using the SWADE developed Chiefdom Development Planning process. CDP is a participatory planning approach which ensures effective participation of project beneficiaries and mobilization of the community</li> <li>A Capacity Needs Assessment of the key stakeholders and their relevant staff (i.e. SWADE, MOA, NAMBoard) will be undertaken to identify capacity gaps and make recommendations</li> <li>The agricultural marketing information system should include mechanisms to deliver messages and information</li> </ul>
<b>Water Harvesting, Small and Medium Dams Project (WHDP)</b>	<p><b>Biological:</b></p> <ul style="list-style-type: none"> <li>Inadequate integration of natural resource management in catchments</li> </ul> <p><b>Land:</b></p> <ul style="list-style-type: none"> <li>Earth dams prone to siltation</li> </ul> <p><b>Climate:</b></p> <ul style="list-style-type: none"> <li>Climate change impacts</li> </ul>	<p><b>Biological:</b></p> <ul style="list-style-type: none"> <li>A Programme-level Catchment Management Plan will be prepared, in which NRM measures would be included. Projects will develop lower-level catchment plans, based on the programme-level plan</li> </ul> <p><b>Land:</b></p> <ul style="list-style-type: none"> <li>An effective Catchment Management Plan for each dam should reduce quantities of eroded material in the water course and reservoir</li> </ul>

<sup>59</sup> The conventional and baby vegetables and fruit with high demand as indicated by the import levels into the country. These mainly include: potatoes, onions, carrots, peppers (green, red and yellow), tomatoes (especially long-shelf life), beetroot, banana, stone fruit (plum, peach, nectarine), mangoes and cucurbits (baby marrow, patty pan, baby gem), baby corn, and sweet corn, baby cabbages (green and red), baby beans and peas (different variants).

EDF & EDF Projects	Stakeholder Concerns Identified during the Scoping-period Interviews & Discussions	Addressed
	<p>poorly recognised, including the need to climate-proof infrastructure</p> <ul style="list-style-type: none"> <li>Project should undertake a climate change impact assessment process and a hydrological impact assessment</li> </ul> <p><b>Water availability, use, &amp; management:</b></p> <ul style="list-style-type: none"> <li>Dam operation and maintenance procedures not available</li> <li>Establishment of trained and resourced Water User Associations (WUAs)</li> <li>Inclusion of Water and Sanitation and Health (WASH) and livestock watering</li> <li>Water-related data difficult to find and access</li> <li>Role of River Basin Authorities not identified</li> </ul> <p><b>Socio-economic:</b></p> <ul style="list-style-type: none"> <li>Inadequate recognition of community participation in planning</li> </ul> <p><b>Institutional:</b></p> <ul style="list-style-type: none"> <li>Ensuring the economic potential of downstream development</li> <li>Capacity of line ministries to deliver quality extension services</li> <li>Lack of capacity in line ministries on environmental and catchment management</li> </ul>	<p><b>Climate:</b></p> <ul style="list-style-type: none"> <li>A Climate Change Impact Assessment for each project would be prepared and project opportunities to reduce vulnerability will be assessed. Climate-proofing infrastructure would form part of the recommendations if required</li> <li>A Climate Change Impact Assessment for each project would be prepared. An Hydrological Impact Assessment would be prepared</li> </ul> <p><b>Water availability, use, &amp; management:</b></p> <ul style="list-style-type: none"> <li>Dam Operation and Maintenance Manuals will be prepared</li> <li>The Capacity Needs Assessment would identify a gap in capacity of farmers to effectively manage their water and establishing and providing detailed roles and responsibilities of members of the association and where capacity gaps exist, capacity building activities would be designed to address them</li> <li>Water and Sanitation and Health (WASH) and livestock watering would form part of the Catchment Management Plan</li> <li>The preparation of a Catchment Management Plan would yield relevant water-related and make it available</li> <li>River Basin Authorities are legally established entities with clear mandates and responsibilities. Applicable RBAs would form a part of the various water use planning assessments and such assessments would be informed by their information needs</li> </ul> <p><b>Socio-economic:</b></p> <ul style="list-style-type: none"> <li>Community participation in planning is integral in the SWADE developed Chiefdom Development Planning process. CDP is a participatory planning approach which ensures effective participation of project beneficiaries and mobilization of the community</li> </ul> <p><b>Institutional:</b></p> <ul style="list-style-type: none"> <li>Impacts on downstream development from inappropriate abstraction would be addressed in Water Impact Assessment for each site</li> <li>A Capacity Needs Assessment of stakeholders will be undertaken to identify capacity gaps and make recommendations</li> </ul>
Livestock Development Project (LDP)	<p><b>Biological:</b></p> <ul style="list-style-type: none"> <li>Biodiversity and habitat degradation on rangelands</li> <li>Biodiverse areas are decreasing from uncoordinated agricultural development</li> <li>Carrying capacity of the available range not linked to herd numbers</li> <li>Integration of rangeland planning activities with other complimentary activities supported by government</li> </ul> <p><b>Climate:</b></p> <ul style="list-style-type: none"> <li>CC mitigation through emissions reductions from livestock, e.g., bio-digesters</li> <li>Project should undertake a climate change impact assessment process</li> </ul> <p><b>Water availability, use, &amp;</b></p>	<p><b>Biological:</b></p> <ul style="list-style-type: none"> <li>Pasture Management Guidelines, Rangeland Management Plan and Grazing Land Management Systems for each applicable area will be prepared and these would address range management issues</li> <li>The national trend in biodiversity loss from development projects is a national concern and project activities would avoid, where practically possible, areas of high conservation value, protected areas and protection-worthy areas to conserve a viable set of representative natural ecosystems</li> <li>Carrying capacity assessments will be undertaken for each LDP site and this would inform the Pasture Management Guidelines, Rangeland Management Plans and Grazing Land Management System design</li> <li>To the extent applicable, Rangeland Management Plans will be prepared in consultation with the SNTC's SNPAS</li> </ul> <p><b>Climate:</b></p> <ul style="list-style-type: none"> <li>A GHG Emissions Assessment will be undertaken and project opportunities to reduce CO<sub>2</sub> emissions will be assessed</li> <li>An Environmental-Climate Assessment will be undertake</li> </ul>

EDF & EDF Projects	Stakeholder Concerns Identified during the Scoping-period Interviews & Discussions	Addressed
	<p><b>management:</b></p> <ul style="list-style-type: none"> <li>Erosion in grazing areas causing sedimentation of water courses</li> </ul> <p><b>Socio-economic:</b></p> <ul style="list-style-type: none"> <li>Inappropriate breeding, husbandry, reproductive health, and rangeland management practices</li> </ul> <p><b>Institutional:</b></p> <ul style="list-style-type: none"> <li>Shortage of capacity across line ministries in natural resource management and environmental management</li> <li>Capacity of line ministries to deliver quality extension services</li> </ul>	<p>for each LDP site and project opportunities to reduce vulnerability will be assessed</p> <p><b>Water availability, use, &amp; management:</b></p> <ul style="list-style-type: none"> <li>Rangelands are a major source of degrading land due to inappropriate grazing regimes combined with biological and climate factors. Erosion is often high. Sedimentation of water bodies is a result of this widespread erosion. A Grazing Land Management System, to manage the project-level biophysical impacts of the livestock sector, would address some of the causes of degradation resulting in reduced erosion from project supported sites</li> </ul> <p><b>Socio-economic:</b></p> <ul style="list-style-type: none"> <li>One of the main objectives of the LDP is to address challenges around breeding, husbandry, reproductive health, and rangeland management practices. A range of assessment and strategies will be developed under the mitigation plan including, for example, a Livestock Management and Monitoring Strategy</li> </ul> <p><b>Institutional:</b></p> <ul style="list-style-type: none"> <li>A Capacity Needs Assessment of the key stakeholders and their relevant staff (i.e. SWADE, MOA, and NAMBoard) will be undertaken to identify capacity gaps and make recommendations including the skill requirements and numbers of affiliated extension officers</li> </ul>
<b>General concerns</b>	<ul style="list-style-type: none"> <li>Poor integration of national goals and objectives on biodiversity, land degradation and climate change</li> <li>Poor integration and recognition of international conventions and strategies on biodiversity, land degradation and climate change</li> <li>Legislative compliance with national laws, e.g., requirements of the Water Act (e.g., Water Abstraction Permits), the Environmental Management Act (e.g., EIAs) and other relevant legislation</li> <li>Environmental capacity of implementers inadequate</li> </ul>	<ul style="list-style-type: none"> <li>Through the various assessments recommended in the Environmental and Social Management Plan and Climate-Risk Management Plan, improvements in inter-sectoral coordination, planning and implementation are expected</li> <li>All legally obligated permissions required, e.g., Water Abstraction Permits and project level EIAs, will be secured</li> <li>The Capacity Needs Assessment of the key stakeholders and their relevant staff (i.e., SWADE, MOA, and NAMBoard) will be undertaken to identify capacity gaps and make recommendations particularly addressing environmental management in relation to project activities</li> </ul>
EDF & EDF Projects	Stakeholder Concerns Identified during the Validation Workshop	Addressed
	<ul style="list-style-type: none"> <li>Institutional capacity constraints to coordinate and implement projects</li> <li>Traditional land management by Chiefs makes implementing potentially valuable projects difficult</li> <li>Interventions are more top down, than driven by demand</li> <li>Feasibility of the LDP is questionable, due to ingrained cultural views on livestock management; the sustainability of the HVCHP is questioned, given the high temperatures of the Lowveld that could make vegetable production very costly</li> </ul>	<ul style="list-style-type: none"> <li>A Capacity Needs Assessment of the key stakeholders and their relevant staff (i.e., SWADE, MOA, NAMBoard) will be undertaken to identify capacity gaps and make recommendations including the skill requirements and numbers of affiliated extension officers</li> <li>Chiefdom Development Plans, tested by SWADE, appear to work but are costly and time consuming. However the final outcome does result in improved land use management.</li> <li>CDP tools will be used on all projects to capacitate stakeholders and secure productive access to land</li> <li>Economic Viability and Sustainability Assessment of each planned crop, hub, enterprise, and value chain will help ensure that farmers can produce commercial vegetables at a profit and that the proposed project is viable and climate-proofed.</li> </ul>

## 8.2 Stakeholder Capacity Review

### 8.2.1 Capacity Assessment for Environmental, Social, and Climate-Risk (ESCR) Management

An organisation's capacity is its ability to perform its functions efficiently, effectively, and sustainably. (*Effectiveness = do the right thing and efficiency = do the thing right!*). This StrEA capacity assessment framework appraises the 3 pillars of capacity, as defined below:

1. **Policy capacity**, which comprises issues related to whether an organisation has the mandate, instruments, and procedures (e.g., manuals) to do a function;
2. **Human resources capacity**, including not only having the right skilled people in adequate numbers, but also the related databases and laboratories to do a function;
3. **Institutional capacity**, which comprises having adequate budgets, networks, and organisational structures to do the function (e.g., alliances between national and local authorities, and multi-sectoral forums).

Achieving the 11<sup>th</sup> EDF objectives and, specifically, improving environmental, social, and climate-risk management is fundamentally about strengthening the capacity of the implementers to efficiently and effectively implement the StrEA Management Plan. Swaziland has developed a comprehensive legal and policy framework around environmental management with specific environmental laws aimed at protecting the environment from harm. Stakeholder consultations identified that environmental, social, and climate-risk (**ESCR**) management capacity across all key implementers is limited, with heavy reliance on the Swaziland Environment Authority (SEA) to review and approve project-specific ESIAs and to some extent monitor the ESIA Management Plans.

The ESCR knowledge gaps within individual implementing institutions were identified as challenges during the scoping period, whereby stakeholders confirmed their limited capacity to design, implement and monitor ESCR mitigation measures.

The StrEA of the 11<sup>th</sup> EDF incorporates several activities to address some of the identified cross cutting issues (e.g., community level capacity, traditional structures, institutional management, technical training, sectoral policies and legislation, data information, and political will).

There is limited awareness and clarity on the institutional arrangements to implement the 11<sup>th</sup> EDF responsibilities for ESCR management issues. Understanding of the 'environment' is still typically associated with specific physical issues, such as soil erosion.

It is generally recognized that Swaziland has the technical capacity to address ESCR issues as envisaged under the 11<sup>th</sup> EDF. However, this capacity needs to be acknowledged, supported, and strengthened through sustained, strategic interventions. Such support needs to come from the relevant institutions mandated to address ESCR issues i.e., the SEA, whilst at the same time using dedicated ESCR experts within or attached to the Programme Management Unit and Project Steering Committees.

The failure of many stakeholder institutions to manage their ESCR impacts is related to specific capacity constraints within these institutions. Commonly cited problems include inadequate financial resources, limited knowledge, limited number of human resources, and a shortage of time to deal with ESCR management.

The relatively small size of Swaziland presents an additional dimension to many of these common capacity constraints. The small size of the country limits the human resources available in any particular field of expertise, resulting in very little institutional redundancy and often creating problems associated with institutional memory.

A lack of coordination is undermining systemic capacity with regard to harmonization of the policy and legislative framework. Persistent sectoral approaches to the development and

implementation of national policies undermine efforts to integrate holistic international, regional and decentralized initiatives (as called for in the Environment Policy). This is resulting in a failure to properly integrate environmental management into national policies, strategies and programmes.

Facilitating and maximising the opportunities afforded by the 11<sup>th</sup> EDF for strengthening ESCR management and responsibility across all relevant stakeholders will require an integrated and coordinated approach and a shared common vision.

The implementation of the 11<sup>th</sup> EDF projects highlights the need to improve the efficacy of synergies in relation to the three core projects. There is a need to ensure that while implementing the core projects, budgets are provided to address legally required activities, e.g., undertaking project specific EIAs as well as budgets to develop ESCR capacity of the officers tasked with implementing and monitoring the project. This responsibility needs to be translated into the allocation of appropriate resources to achieve these requirements.

Institutional capacity needs to be developed to ensure improved resources are made available to meet the national ESCR obligations (as enshrined in the Environmental Policy). Information collation and dissemination needs to be enhanced and improved through appropriate interventions at the institutional and individual levels. Information management systems need to be put in place and a central system developed for collation and dissemination. This will assist stakeholders in meeting their national obligations with respect to limiting or improving the natural environment in which the core projects are being implemented and assist in the development and implementation of appropriate feedback mechanisms.

Individual capacity also needs to be strengthened within and across all implementing partners and beneficiaries. Individual capacity constraints identified during scoping are related to lack of knowledge and awareness of the ESCR obligations. Focused ESCR management training for each unique project activity and location is needed to create awareness and impart practical skills amongst all implementers and beneficiaries. Opportunities for the development and enhancement of individual capacity are often undermined by the inability to translate and transmit expert knowledge to local communities, professional counterparts and the limited opportunities for networking across the various government agencies involved in implementing the 11<sup>th</sup> EDF core projects.

## 8.3 Implementing Agents

The implementation of the three core projects under the 11<sup>th</sup> EDF will be carried out by the stakeholders identified in the concept notes.

### 8.3.1 The Water Harvesting, Small and Medium Dams Project

The Water Harvesting, Small and Medium Dams Project (WHDP) seeks to contribute to alleviating food insecurity in Swaziland in supporting economic growth by enhancing the availability of water throughout the year in a context of very limited access to irrigation for smallholders. This additional water supply will improve agricultural production for crops and where possible livestock, thereby allowing subsistence farmers to overcome food insecurity as well as engage in small to medium scale commercial farming. The key implementers are SWADE and NAMBoard.

The NAMBoard was created in 1985 by the NAMBoard Act. NAMBoard's core activities include (i) regulate imports and exports of scheduled agricultural products and goods in transit (ii) facilitate production, processing, storage, transport and sale of scheduled agricultural products (iii) advise Government in all matters related to the availability and demand for scheduled products and (iv) facilitate the establishment of markets and marketing of locally-produced scheduled products in domestic and international markets. The SWADE is responsible for overall policy direction to facilitate the planning and

implementation of the Komati Project and the Lower Usuthu Project and any other large water-resources projects that Government may assign from time to time.

Stakeholders include:

- SWADE;
- NAMBoard, for market information and control of the import of scheduled products;
- The MOA (as project supervisor);
- MOA [specifically the Department of Land Use Planning and Development (DLUPD), Department of Agriculture and Extension (DAE), and Economic Planning and Analysis (DAPA)];
- The Swaziland Dairy Board (responsible for developing and regulating the dairy industry);
- Ministry of Economic Planning and Development (MEPD) (formulation, co-ordination and implementation of economic policies and interventions);
- Ministry of Natural Resources and Energy (MNRE), (water rights and cadastral services);
- Ministry of Commerce, Industry and Trade (cooperative development and company registration);
- Traditional Authorities, Tinkhundla, and local chiefs (in whose chiefdoms the project will be implemented);
- The direct beneficiaries of the project (hundreds of rural households in dam site locations engaged in cattle keeping and small-scale crop production on SNL).

### **ESCR Management Capacity Within the WHDP**

The implementation of the 11<sup>th</sup> EDF core project on water harvesting requires that the ESCR environment is not adversely harmed by the project, but the project benefits the environment in some way.

A review of some ESCR capacity issues common across government ministries indicates that for the most part this is lacking. Within SWADE, there is existing capacity with dedicated ESCR experts on the staff. Within NAMBoard, there are no dedicated staff addressing ESCR issues.

Possible ESCR impacts arising from the implementation of the WHDP, e.g., management of construction wastes, or catchment management, all require institutional capacity on ESCR management in order to minimise negative impacts whilst promoting positive impacts.

The level of awareness and knowledge within and across all stakeholders (with SWADE being an exception), according to a review of their mandates, is low requiring that specific capacity building activities are developed to capacitate the relevant stakeholders with tools and knowledge relevant to the project.

Training through workshops presented by SEA or contracted trainer, addressing the very project specific impacts with specific tools and approaches that build on the individuals' knowledge and understanding, will be required.

The Action Document that describes broadly the WHDP identifies that the project will have a positive ESCR dimension by improving water and food security.

The focus of capacity initiatives has to be determined through a capacity needs assessment covering all the stakeholders at the start of the project.

### 8.3.2 The High Value Crop and Horticulture Project

The High Value Crop and Horticulture Project (HVCHP) seeks to increase the contribution of the agricultural sector to poverty reduction in Swaziland by creating pro-poor growth, securing livelihoods of small holder farmers by providing them marketing opportunities, and providing locally produced diversified food on the market. The project builds on numerous opportunities, such as: (i) the availability of surplus water and adequate land in LUSIP; (ii) the already established, or in the process of being established, Farmer Companies; (iii) the already committed Development Finance Institutions; (iv) the leadership of SWADE; (v) localised vegetable production areas developed around earth dams or with boreholes and small water harvesting, which have contracts with NAMBoard; and (vi) the local organisational capacity and know-how combining efforts of SWADE and NAMBoard to establish an enabling environment for market expansion. The stakeholders involved include:

- SWADE (the further development of its support to FC managers and in its business development services as well as its irrigation system design services);
- NAMBOARD (the further development of its transport logistics and in the development of cold storage at market places);
- MOA (project oversight and extension support functions);
- Traditional Authorities, Tinkhundla, and local chiefs (in whose chiefdoms the project will be implemented);
- The direct beneficiaries of the project (hundreds of rural households in the LUSIP area).

#### ESCR Management Capacity Within the HVCHP

The implementation of the 11<sup>th</sup> EDF core project on high value crop production requires that the environment is not adversely harmed by the project, but the project benefits the environment in some way.

A review of some ESCR capacity issues common across government ministries indicates that for the most part this is lacking. Within SWADE there is existing capacity with dedicated environmental experts on the staff. Within NAMBoard there is no dedicated staff addressing environmental issues.

The intended beneficiaries have little or no practical capacity on or around ESCR management. Some LUSIP beneficiaries, if they are also engaged in the commercial cane production businesses, will have received some environmental training (perhaps limited to the biophysical environment), but new beneficiaries will likely have very limited knowledge.

The traditional leadership, particularly within the LUSIP area, will have had some exposure to environmental management through the LUSIP cane projects and planning.

Possible environmental impacts arising from the implementation of the WHDP, e.g., management of agro-chemicals, or sustainable land management, all require institutional capacity on ESCR management in order to minimise negative impacts whilst promoting positive impacts.

The level of awareness and knowledge within and across all stakeholders (with SWADE being an exception), according to a review of their mandates, is low requiring that specific capacity building activities are developed to capacitate the relevant stakeholders with tools and knowledge relevant to the project.

Training through workshops presented by SEA or contracted trainer, addressing the very project specific impacts with specific tools and approaches that build on the individuals' knowledge and understanding, will be required.

The Action Document that describes broadly the HVCHP identifies that the project will have a positive ESCR dimension by improving water and food security and reducing poverty through the production of commercially valuable produce. Managing these impacts for the

better, will require imparting particular skills and knowledge to the beneficiaries and implementers to ensure the ESCR impacts are generally positive.

The focus of capacity initiatives has to be determined through a capacity needs assessment covering all the stakeholders at the start of the project.

### **8.3.3 The Livestock Development Project**

The purpose of the Livestock Development Project (LDP) is to enhance market-oriented smallholder livestock production in project areas in order to reduce food insecurity in Swaziland while supporting economic growth. The project purpose will be attained by improving smallholder livestock productivity, strengthening of smallholder livestock market access and by strengthening the smallholder dairy production base and local marketing capacity.

Stakeholders involved include:

- The direct beneficiaries of the project (tens of thousands of rural households engaged in grazing their livestock on SNL);
- MOA [specifically the Department of Agriculture and Extension (DAE), Economic Planning and Analysis (DAPA), and Department of Veterinary and Livestock Services (DVLS)];
- The Swaziland Dairy Board (responsible for developing and regulating the dairy industry);
- National Agricultural Marketing Board (NAMBoard for market information and control of the import of scheduled products);
- The Ministry of Economic Planning and Development MEPD (formulation, co-ordination and implementation of economic policies and interventions);
- The Ministry of Natural Resources and Energy MNRE (for water rights and cadastral services);
- The Ministry of Commerce, Industry and Trade (cooperative development and company registration);
- Traditional Authorities, Tinkhundla, and local chiefs (in whose chiefdoms the project will be implemented).

### **ESCR Management Capacity Within the LDP**

The implementation of the 11<sup>th</sup> EDF core project on livestock requires that the environment is not adversely harmed by the project, but the project benefits the environment in some way.

A review of some environmental capacity issues common across government ministries indicates that for the most part this is lacking.

Possible ESCR impacts arising from the implementation of the LDP, e.g., management of animal wastes in feedlots or improved rangeland management, based on the adoption of community-based approaches (including group ranching), all require institutional capacity on ESCR management in order to minimise negative impacts whilst promoting positive impacts.

The level of awareness and knowledge within and across all stakeholders, according to a review of their mandates, is low requiring that specific activities are developed to capacitate the relevant stakeholders with tools and knowledge relevant to the project.

Training through workshops presented by SEA or contracted trainers, addressing the very project specific impacts with specific tools and approaches that build on the individuals' knowledge and understanding, will be required.



The Action Document that describes broadly the LDP identifies that the project will have a positive environmental dimension by improving rangeland management including livestock grazing intensity and methods. It will also have an impact on young men and boys, as in Swazi society young men spend a considerable amount of time in managing livestock grazing and care.

The focus of capacity initiatives has to be determined through a capacity needs assessment at the start of the project.

**Table 43: Summary of the Capacity for ESCR Management and for Implementing the Recommendations of this StrEA**

Institution	Policy (mandate, regulatory instruments, guidelines)	Human resources (skills and hardware)			Institutional (finances, network, organisational mechanism)
		1. Skilled staff	2. # of staff	3. Hardware (database, equipment)	
MOA	√ Has environmental mandate, but the agricultural monitoring system (including for environmental quality) is insufficient	1. √ Has skilled staff, but MOA staff may not necessarily know the details of the ESCR management options 2. √ Has a good # of staff, but not generally assigned to ESCR management 3. √ Has some scattered agricultural monitoring data, but insufficient system to monitor ESCR impacts of agriculture			√ GOS financed  It is unclear whether its mechanisms to coordinate on ESCR management in the agricultural sector are sufficient
SEA	√ Has some environmental monitoring mandate, but insufficient for monitor this holistic StrEA	1. √ Has skilled staff for environmental management 2. Insufficient # of staff for comprehensive monitoring 3. Insufficient data and equipment to monitor ESCR indicators			Insufficient finances  Insufficient contacts/network to coordinate with other project players
SWADE	√ Has some environmental monitoring mandate, but insufficient to monitor this holistic StrEA (which cover ESCR management)	1. √ has skilled staff for environmental management 2. Insufficient # of staff for comprehensive ESCR monitoring 3. Insufficient data and equipment to monitor ESCR indicators			Insufficient finances  Good institutional contacts particularly within the traditional governance structures and farmers  Has prior experience in environmental monitoring
NAMBoard	√ Has no ESCR monitoring mandate.  Has some guidelines on agro best practice and agro-chemical management	1. √ has no skilled staff but NAMBoard staff (including extension officers) may not necessarily know the details of the ESCR management options 2. Insufficient # of staff for comprehensive ESCR monitoring 3. Sufficient data and equipment to monitor ESCR indicators			Sufficient finances  Good institutional contacts particularly within the traditional governance structures and farmers
Project beneficiaries	X Have no ESCR monitoring mandate beyond constitutional obligations (citizens must protect the environment).	1. Has no (or very limited) skills in ESCR management 2. Sufficient data and equipment to monitor ESCR indicators			Insufficient finances  Good institutional contacts particularly within MOA and NAMBoard

## 9 Conclusions and Recommended & Prioritized List of Mitigation and Optimizing Support Measures

Based on an analysis of the legal and policy framework, a review of baseline data on the natural and social environment, and consultation with key stakeholders, the StrEA indicates that the 11<sup>th</sup> EDF could have some negative impacts on Swaziland's environmental and social components and could negatively be affected by climate variability and climate change. To manage the predicted impacts, various environmental, social, and climate-risk (ESCR) mitigation measures are recommended to ensure that the planned activities yield the intended benefits and achieve the overall objective of the NIP, which is to eradicate food insecurity while contributing to sustainable economic growth.

The overall objective of the ESCR Management Plan is to contribute to delivering more sustainable and climate-proofed investments that support national sustainable development, as enshrined in key policies and in the National Development Strategy. Chapter 7 is structured as follows:

### ESCR Management Plan

- *Programme-level ESCR Management Plan:*
- *Preliminary General Programme-level ESCR Management;*
- *Preliminary ESCR Management by Component;*
- *Three Preliminary Project-level ESCR Management Plans:*
- *Preliminary ESCR Management Plan for the WHDP;*
- *Preliminary ESCR Management Plan for the HVCDP;*
- *Preliminary ESCR Management Plan for the LDP.*

The various parts of the ESCR Management Plan are summarized below to highlight the key subsequent steps to green the 11<sup>th</sup> EDF–Agriculture programme. As this StrEA was conducted on 'concept' documents that did not provide very much detail, the various parts of the ESCR Management Plan will need to integrate the results of the further assessments

### 9.1 Programme-level ESCR Management Plan

The *Programme-level ESCR Management Plan* has two parts: 1. *General Programme-level ESCR Management* and 2. *Preliminary ESCR Management by Component*.

The *General Programme-level ESCR Management* section recommends that the EU in partnership with the GOS:

- Conduct ESCR policy dialogue (with key stakeholders);
- Integrate ESCR into the programme management;
- Develop and implement an *ESCR Communications Strategy*;
- Develop and implement an *ESCR Coordination Mechanism*;
- Integrate ESCR into the programme monitoring and evaluation;
- Green the programme-level procurement;
- Implement the Programme-level ESCR capacity development plan;
- Conduct all project-specific ESIA / CRA, as required by law.

The *Preliminary ESCR Management by Component* section (see Table 33) identifies the various assessments that need to be completed within each component (i.e., for the biodiversity, land, water, climate, pollution, socio-cultural, socio-economic, and institutional components), before each of the component plans can be finalized. Table 33: Preliminary ESCR Management by Component also provides an extensive list of mitigation and enhancement measures. The key assessments to be completed and the mitigation and enhancement measures are summarised below by component to highlight the key follow-on steps.

**Biodiversity Management Plan:** Assessments and strategies to be further elaborated to finalise the biodiversity component plan:

- Biodiversity Impact Assessment;
- Invasive Alien Species Risk Assessment and Invasive Species Management Strategy;
- GMO Risk Assessment;
- Wetland Management Strategy.

**Land use, Land Suitability, and Land Management Plan:** Assessment and strategy to be further elaborated to finalise the land component plan:

- Land Use and Land Suitability Assessment;
- Land Management, Fire Management, and Soil Improvement Strategy.

**Water Resource Management (WRM) Plan:** Assessments and strategies to be further elaborated to finalise the water resources management plan:

- Water Resources Impact Assessment;
- Water Fees;
- Water Use Efficiency;
- Water Quality Management for Normal and Extreme Climate Scenarios;
- Gender and Water;
- Collaboration with Relevant Water Stakeholders.

**Climate Change Management Plan:** Assessments and strategies to be further elaborated to finalise the climate change management plan:

- Climate Risk Assessment (CRA) and Contingency Measures;
- Adaptation Measures;
- GHG Emissions Assessment;
- GHG Emissions Reduction Measures.

**Pollution: Integrated Waste Management and Waste Minimization Plan:** Assessments and strategies to be further elaborated to finalise the waste management plan:

- Various assessments;
- Solid Wastes (Non-toxic):
- Use of Agro-chemicals;
- Agro-chemical Wastes;
- Agricultural Effluents.

**Socio-cultural Plan:** Assessments / strategies to be elaborated to finalise the socio-cultural plan:

- Activities to Support Food and Nutrition Security, and to Support the Most Vulnerable;
- Activities to Support Community Health, Community Mobilisation, and Gender Equity within the Programme Areas.

**Socio-economic Plan:** Assessments needed to finalise the socio-economic plan:

- Sustainability assessment and planning for sustainability:
- Health Impact Assessment and OHS measures for agricultural workers.

**Institutional Capacity Development Plan:** Assessments / strategies to be elaborated to finalise the institutional capacity development plan:

- Organizational Development;
- ESCR Research:
- Extension Services for ESCR management;
- ESCR Capacity Building for Farmers and Farmers' Organisations;
- Monitoring and Evaluating the Implementation of this ESCR management plan.

## 9.2 Three Preliminary Project-level ESCR Management Plans

When the ESIA of the WHDP, HVCDP, and LDP are conducted in the future, the ESIA consultants will need to:

- Adapt and integrate the *Programme-level ESCR Management Plan*<sup>60</sup>;
- Integrate the results of any further assessments commissioned by the EU on the Programme components<sup>61</sup>;
- Integrate the results of any further project-specific assessment work conducted by the project teams based on the recommendations provided in the project-specific *Preliminary ESCR Management Plans*<sup>62</sup>;
- Conduct the project-specific ESIA, taking as a starting point, the above.

The below paragraphs summarize the content of the Project-specific Preliminary ESCR Management Plans, and repeat the guidance on how to conduct the project ESIA.

### 9.2.1 Preliminary ESCR Management Plan for the Water Harvesting Development Project (WHDP)

- Specifically, for the water component, it is recommended that the WHDP project team:
  - Formulate Sub-basin Water Resources Plans, focusing on:
    - Various listed assessments and mitigation measures;
    - Water Permits and Payment for Water and Catchment-management Services;
    - Water Efficiency for Irrigation;
    - Community Participation in Irrigation and/or Water Storage Development;
    - Small Programme to Fix Slightly 'Broken' Existing Water Schemes;
    - Capacity Development.

When the ESIA of the WHDP is conducted, the ESIA consultant is to:

- Adapt and integrate the *Programme-level ESCR Management Plan* (see *Footnote 60*);
- Integrate the results of any further assessments commissioned by the EU on the Programme components (see *Footnote 61*);
- Integrate the results of any further project-specific assessment work conducted by the project team based on the recommendations provided in the *Preliminary ESCR Management Plan for the WHDP* shown in Table 34 (also summarized in the above paragraph);
- Conduct the project-specific ESIA, taking as a starting point, the above.

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<sup>60</sup> The *Programme-level ESCR Management Plan* is shown in full in Chapter 7.1 and summarized in Chapter 9.1.

<sup>61</sup> The needed component assessments are detailed in Chapter 7.1 and summarized in Chapter 9.1.

<sup>62</sup> Chapter 7.2 presents the project-specific *Preliminary ESCR Management Plans*, which are also summarised in Chapter 9.2.1 to 9.2.3.

### 9.2.2 Preliminary ESCR Management Plan for the High Value Crop Horticultural Project (HVCHP)

- Specifically, it is recommended that the HVCHP project team complete the following assessments or elaborate the following strategies to green the HVCHP:
  - For the land component, conduct project-specific and location-specific:
    - Land and Crop Suitability Assessment;
    - Assessment of the Options for Land Rehabilitation and Soil and Nutrient Management;
    - Development of a Policy Framework to Institutionalise Conservation Agriculture (CA);
  - For the water component, conduct project-specific and location-specific:
    - Hydrological Impact Assessment to ensure water availability;
    - Assessment of water-saving technologies and practices;
  - For the climate change component, conduct project-specific and location-specific:
    - Research to improve, climate proof, and modernize farming practices and to identify location-specific climate-change adaptation measures;
    - Application of various climate-change adaptation measures;
  - For the waste management component, develop a project-specific:
    - Integrated Pest Management strategy to reduce the need for synthetic pesticides;
  - For the socio-cultural component, incorporate:
    - Activities to support the most vulnerable, who may not be able to commercialise;
  - For the socio-economic component, conduct or apply:
    - Location-specific Sustainability Assessment and Local Planning for Sustainability;
    - Packhouse Sustainability Assessment;
    - Packhouse Mitigation and Enhancement Measures;
    - Coordination of the Development of the Marketing Information System;
  - For the institutional component, conduct:
    - Project-specific Capacity Development;
    - Monitoring of the Commercialisation Process to Ensure Intended Benefits.

When the ESIA of the HVCHP is conducted, the ESIA consultant is to:

- Adapt and integrate the *Programme-level ESCR Management Plan* (see *Footnote 60*);
- Integrate the results of any further assessments commissioned by the EU on the Programme components (see *Footnote 61*);
- Integrate the results of any further project-specific assessment work conducted by the project team based on the recommendations provided in the project-specific *Preliminary ESCR Management Plan for the HVCHP* shown in Table 35 (also summarized in the above paragraphs);
- Conduct the project-specific ESIA, taking as a starting point, the above.

### 9.2.3 Preliminary ESCR Management Plan for the Livestock Development Project (LDP)

- Specifically, it is recommended that the LDP project team complete the following assessments or elaborate the following strategies to green the LDP:
  - For the biodiversity component:
    - Secure biodiversity hotspots from livestock development activities and forbid ranches from using fire to control bush encroachment;
  - For the land component, conduct project-specific and location-specific:
    - Identification of Suitable Rangelands;
    - Development of the Rangeland Management and Improvement Strategy, including the Management of Fire;
    - Implementation of the Rangeland Management Strategy in Collaboration with the Local Community and SNTC.
  - For the water component: *No specific comments provided;*
  - For the climate change component: *No specific comments provided;*
  - For the waste management component, develop a project-specific:
    - Livestock Waste Management Strategy to Manage all Livestock Wastes;
  - For the socio-cultural component, incorporate:
    - Assessment of the Potential to Expand Small Livestock in the Project Area;
    - Further development of activities focused on food security and nutrition for LDP sites;
  - For the socio-economic component, conduct / incorporate / further develop:
    - Sustainability Assessment and Planning for Sustainability for the LDP;
    - Sustainability Strategy for Cattle Beef Farms;
    - Economic Assessment of Gege Farm to Assess its Suitability as a Demonstration Site for Commercial Dairy;
    - Needs Assessment Focussed on Smallholder Dairy Farmers;
    - Application of Good Hygiene and Good Animal Welfare Practices.
  - For the institutional component, develop:
    - Capacity to Manage Rangelands at the Community Level

When the ESIA of the LDP is conducted, the ESIA consultant is to:

- Adapt and integrate the *Programme-level ESCR Management Plan* (see *Footnote 60*);
- Integrate the results of any further assessments commissioned by the EU on the Programme components (see *Footnote 61*);
- Integrate the results of any further project-specific assessment work conducted by the project team based on the recommendations provided in the project-specific *Preliminary ESCR Management Plan for the LDP* shown in Table 36 (also summarized in the above paragraphs);
- Conduct the project-specific ESIA, taking as a starting point, the above.