REPUBLIC OF SOUTH SUDAN

MINSITRY OF AGRICULTURE, FORESTRY, COOPERATIVES & RURAL DEVELOPMENT

HORTICULTURE DEVELOPMENT POLICY (2012 – 2017)

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PREFACE

South Sudan has enormous potential to effectively contribute to household food security and income and generate substantial foreign reserves through horticulture production and trade within and outside the African Region. This concept is in line with the overarching objective of the Republic of South Sudan (RSS) to guarantee "Food for All" by 2015 through increased agricultural productivity including increasing cereal production from 800,000 to 2 million metric tonnes per annum. The country is richly endowed with considerable natural resources, including vast fertile lands, extensive hardwood forests, large amounts of fresh water and minerals, and a wide variety of livestock, as well as native flora and fauna. These endowments have made South Sudan suitable for a wide range of agricultural and natural resource-based production activities, including horticulture. However, there are a number of constraints and challenges undermining the country to sustainably enhance and invigorate the horticulture value chain to meet national and international demand for a variety of fresh fruits and vegetables (FFV). Low availability of improved inputs and inadequate skills and knowledge among farmers couples with low institutional capacity in the public and private sectors have undermined the horticulture potential in this country. Furthermore, inadequate and low quality infrastructures, including climate change and gender disparities are some of the challenges constraining the development of the horticulture industry.

In spite of all these constraints and challenges the Republic of South Sudan is determined to establish a vibrant and sustainable horticulture value chain system in the country to create produce high quality FFV for local and international markets. One of the strategies is to engage the donor community, development

partners and the private sector to effectively contribute to the development of this sub-sector through technical and financial support. International Horticulture Organizations will also be involved in research and capacity development in terms of knowledge and skills among farmers and personnel in the public and private sectors to promote effective implementation of the value chain. Before these strategies are implemented, RSS has engaged the MAF Policy Working Group and the FARM Project to formulate a Horticulture Development Policy which will guide engagement of various actors from within and outside the country to contribute towards the success of this agenda.

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EXECUTIVE SUMMARY

South Sudan has a considerable unrealized potential to produce and supply horticultural products to national and external markets. Currently, Uganda is the biggest trading partner to South Sudan, earning approximately SSP620 million annually (Womakuyu 2011), some of which are earned from horticultural products. Because market demand for fresh fruits and vegetables (FFV) is income elastic[1], rapid on-going and continuing urbanization and non-farm income growth have generated and will continue to generate increasing internal demand for marketed FFV. For various reasons, national production has not been able to compete with imports in this expanding internal market.

Lack of competitiveness in the national horticulture produce market is a reflection of the severely under-developed and dysfunctional national horticulture value chain. Major constraints include limited access to agricultural inputs and financial resources, low utilisation of modern technologies, high prevalence of pests and diseases, post-harvest losses; and knowledge, skills and market information to facilitate decision making. Limited availability and use of modern inputs such as improved seed, plant protection products, organic and inorganic fertilizers, coupled with low knowledge and skills, limit production levels. Procurement of inputs is affected by access to financial resources, especially among women. High disease and pest infestation reduces quantity and quality of horticultural produce and therefore shrinks marketable surplus. In addition, postharvest losses contribute to the reduction of market supply. Market information is important in decision making in terms of choice of what to produce and supply the market. Unfortunately, South Sudan has inadequate horticulture information and communication mechanisms among members of the value chain and this undermines planning and forecasting transactions in the industry.

There are also challenges affecting the horticulture industry and these include low institutional capacity, inadequate human capacity, limited and low quality infrastructure, unpredictable climatic conditions, prevalence of HIV/AIDS and gender disparities. Low institutional capacity limits the sub-sector's ability to develop and review policies, legislation, regulations, guidelines and administrative structures and practices to promote the horticulture value chain; whereas inadequate human capacity limits farmers' opportunity to acquire knowledge and skills to enhance productivity in public and private institutional institutions to perform effectively in service delivery in the horticulture value chain. Limited and low quality infrastructure is an obstacle to access input and output markets and

[1]That is, demand rises as incomes increase. In the case of urban FFV demand in South Sudan, it is likely that under current conditions, income elasticity of demand is greater than 1, i.e., the percentage increase in FFV demand exceeds the percentage increase in urban incomes.

contributes to harvest and post-harvest losses due to inadequate and poor storage facilities. Poor packaging and handling practices and high transport costs diminish competitiveness. In addition, low level of horticulture productivity result from underdeveloped irrigation facilities.

Unpredictable climatic conditions in South Sudan such as floods and drought, physically contribute to damage of horticulture produce in terms of quantity and quality. Low horticulture production is also exacerbated by inadequate availability of labour due to sickness and deaths resulting from HIV/AIDS and other diseases. Furthermore, limited knowledge and skills and poor access to financial resources to purchase inputs, caused by gender disparities, reduce marketable surplus and profitability of horticulture among women.

The constraints, when combined with these challenges throughout the value chain, for example, inadequate physical infrastructure, all conspire to depress farm-gate prices and engender low returns to producers, especially for those not located close to urban markets. However, although there are numerous constraints and challenges limiting the performance of the horticulture value chain, opportunities which can address some of these issues exist. Government willingness and financial support from donors and development partners can contribute to the development of infrastructure and procurement of required inputs. Support from donors and development partners can also facilitate human capacity development in terms of skills and entrepreneurship in horticulture. On the other hand, increased local and foreign demand for horticulture produce is also an opportunity which can effectively provide significant potential to improve South Sudan's rural household livelihoods and national income. For example, the EU is the world's largest importer of FFV, with imports totaling 11.1 million MT of fruits (worth over € 8.8 billion) and 1.8 billion MT of vegetables (worth € 1.7 billion) in 2009. Apart from exotic horticulture species exported to foreign countries, there is also potential local demand for indigenous species such as jewsmelon, eggplant, tomatoes, cowpea leaves, cassava leaves, giri giri, regilla, bean leaves, pumpkin leaves, dodo (amaranthus) bong leaves and onions.

Availability of horticulture greenhouse "kits" which are already successfully being used by FBOs in the Green Belt (McKinsey and Company, 2011), are capable of generating US$500-$1000/yearper horticulture-growing household. Anecdotal evidence from McKinsey and Company, for example, shows that revenue from one horticulture kit ranges between US$12 to $14k per group with 30% to the trader and remainder split among 10 households from minimal income to US$800 to $1000 per household. If there were 1500 kits, the total contribution to GDP would be between US$18 million to $20 million per annum.

Horticulture provides potential employment opportunities along the value chain. However, most youth in South Sudan do not consider horticulture production as an attractive gainful employment and only get into it as a last resort. This can be

attributed to the drudgery of manual labour, low returns to labour under current agricultural production conditions, inadequate financing for improving technology and mechanization and lack of access to productive land. If the horticulture value chain addresses issues of mechanization, training and access to funding, youth are most likely to be gainfully engaged in horticulture industry.

This document is an initial effort to describe the current state of the horticulture industry in South Sudan and to develop a South Sudan Horticulture Development Policy (SSHDP). The SSHDP seeks to stimulate a favourable economic and business environment that facilitates and encourages private sector investments and entrepreneurial initiatives to address the numerous constraints and challenges described herein. Appropriate policies are the key to creating conditions that permit and encourage continuing improvements in functionalities and operating efficiencies of the various segments of the entire horticulture value chain. A dynamic and sustainable horticulture industry will contribute to increased incomes and well-being of the rural poor, while improving consumer health and nutritional status.

The major objective of the Horticulture Policy is to improve sustainable horticulture productivity and expand marketed output from both rain-fed and irrigated areas in the country. The following policy statements provide a basis for ensuring that South Sudan Horticulture Industry becomes a vibrant and sustainable business entity, capable of generating abundant foreign exchange and contributing enormously to food security and household incomes to the majority of South Sudanese involved in the horticulture value chain:

Policy Statement No1

> **MAF/RSS will create an enabling policy and business environment for horticultural producers (small, medium and large scale) to effectively access improved agricultural inputs and know-how.**

Policy Statement No 2

> **MAF/RSS will develop an aggressive and sustainable national and international marketing and trade strategy for South Sudan horticultural products in an effort to boost horticultural demand and profitability, and consolidate existing markets and growth of emerging markets.**

Policy Statement No 3

> **MAF/RSS in collaboration with the Department of Plant Protection in the Directorate of Agriculture Production will coordinate the reduction of physical losses and quality deterioration in horticulture output caused by pests, diseases and environmental factors.**

Policy Statement No 4

MAF/RSS will improve efficient and timely access to information at national, regional and international markets.

Policy Statement No 5

MAF/RSS will enhance knowledge and skills in horticulture production, value addition and marketing through short, medium and long term technology transfer training and continuing education programmes.

Policy Statement No 6

MAF/RSS will facilitate improvement of infrastructure and transport system for moving horticultural products from producers to consumers and to enhance horticultural value chains.

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LIST OF ABBREVIATION

IH	-	the institute of horticulture (IH)
AVRDC	-	The World Vegetable Center (AVRDC)
GlobalHort	-	Global Horticultural Initiative
AGOA	-	Africa growth and opportunity act
SSSC	-	South Sudan Seed Council
IPPS	-	International Plant Propagators' Society
IHC	-	International Horticultural Congress
MAF _ Development		Ministry of Agriculture, Forestry, Cooperatives & Rural
SIFSIA	-	sudan institutional capacity program: food security information for action
FAO	-	food and agriculture organization
SSPHIS	-	South Sudan plant health inspectorate service
OFDA	-	office of foreign disaster assistance
NGO	-	Non-Governmental Organization
FFV	-	Fresh Fruits And Vegetables

HORTICULTURE DEVELOPMENT POLICY

1.0 GENERAL OVERVIEW OF SOUTH SUDAN

South Sudan covers 640,000 Square kilometres in the centre of Sub-Saharan Africa. It lies within the tropical zone between latitude 3.5º and 12º North and longitude 25º to 36º East. It is sub-divided into 10 States: Central Equatoria, Eastern Equatoria, Jonglei, Unity, Upper Nile, Western Equatoria, Lakes, Northern Bahr El Ghazal, Warrap, and Western Bahr El Ghazal States. It borders Ethiopia in the East, Kenya, Uganda and the Democratic Republic of Congo in the South, the Central African Republic in the West, and North Sudan in the North. Mean annual temperatures vary between 26º C and 32º C throughout the country. Rainfall levels are erratic and intensity is significantly variable (Lupai, 2009). Since most agricultural production is rain-fed, rainfall inconsistencies often result in considerable variability in levels of horticulture output from season to season.

Approximately 30% of the country is potentially arable, while an additional estimated 40% is suitable for seasonal grazing. The remaining land area is in heavy forests, swamps and surface water. Currently, less than two per cent (1.3 million hectares) of the arable land area is actually utilized for production. Ecologically, the country is divided into Greenbelt, Ironstone Plateau, Central and South-Eastern Hills and Mountains, Flood Plains, Nile and Sobat Rivers Zone, Arid and Pastoral Zone, and Central Rain lands. The White Nile and its tributaries flow down from the highlands of Ethiopia, Uganda and Central African Republic into a low clay basin that forms the world's largest contiguous swamp. In addition, altitude belts are defined as "low belt" (less than 2000 ft a.s.l), "middle belt" (2000-4000 ft a.s.l) and "high belt" (4000-6000 ft a.s.l).

The annual rainfall pattern is zone-dependant, ranging from 500-2000 mm rainfall and 130-300 days of growing season. Agricultural performance varies in accordance with zone and annual variations in rainfall. Furthermore, temperatures are quite variable, but typically are above 25°C. During the dry months of January to April, temperatures generally remain above 35°C.Dry hot conditions trigger seasonal human, livestock and wild animal migrations to more permanent water sources.

The Country is blessed with considerable natural resources, including vast fertile lands, extensive hardwood forests, large amounts of fresh water and minerals, and a wide variety of livestock, as well as native flora and fauna. These endowments have made South Sudan suitable for a wide range of agricultural and natural resource-based production activities, including horticulture. There is considerable virgin arable land and other untapped resources. More than 80% of the population currently is dependent on subsistence agriculture for their livelihood.

1.1 OVERVIEW OF HORTICULTURE IN SOUTH SUDAN

Horticulture is a branch of agriculture focussing on cultivating fruits, vegetables, flowers, or ornamental plants. It involves six areas floriculture (production and marketing of floral crops), landscape horticulture (includes production, marketing and maintenance of landscape plants), olericulture (production and marketing of vegetables), pomology (production and marketing of fruits), arboriculture (cultivation and care of trees, shrubs and vines) and postharvest physiology which involves maintaining quality and preventing spoilage of horticultural crops.Horticultural crops are differentiated from other crops by the level of management employed in their production and by their subsequent use[2].

Horticulture is a high value sub-sector. In Kenya, for example, horticulture (mainly floriculture and fruits), is among the leading contributors to the Agricultural GDP at 33% and foreign exchange earnings, and it continues to grow at between 15 and 20% per year[3]. The industry contributes enormously to employment, household incomes and food security.

The wide range of climate, rainfall, soils and altitude provide considerable potential for growing numerous tropical, subtropical and temperate horticulture crops in South Sudan. There are three distinct ecological zones appropriate for these different types of horticulture production: the Equatorial Zone, the Flood Plains, and the Central Rain Lands, with rainfall of 900 – 1600 mm, 800 – 1000 mm, and 700 – 800 mm, respectively. Similarly, three distinct belts can be defined the low belt (less than 2000 ft a.s.l.), the middle belt (to 2400 ft a.s.l.), and the high belt (to 4600 ft a.s.l.). Vegetables that grow well in this country include potatoes, onions, garlic, tomato, eggplant, peppers, okra, cabbage, cauliflower, cucurbits, carrots, spinach, french beans, cowpeas, lettuce, leeks, turnips, broccoli, parsley and brussel sprouts. Fruits that do well include: mangoes, citrus, pineapples, bananas, guavas, passion fruit, avocado and cherimoya.

Horticulture was established in South Sudan since the early 1960s as an industry for smallholders, both in rain-fed and in irrigated areas along the river Nile. The greatest existing concentration of fruit and vegetable production is in agricultural areas surrounding the larger urban areas such as Malakal, Wau and Juba. Additionally, Western and Central Equatoria (Yei River, Kajokeji and Morobo

[2] http://www.nifa.usda.gov/funding/pdfs/definition_of_specialty_crops.pdf.
[3] Ministry of Agriculture (2010). National Horticulture Policy, Republic of Kenya.

Counties) are major producers of fruits. There is little capacity to process and add value to these fruits and vegetables. Considerable unrealized potential exists to produce and supply horticulture products to national and export markets. Since market demand for fresh fruits and vegetables (FFV) is income elastic, future economic growth and continuing urbanization in South Sudan will rapidly expand internal demand. However, rural populations in the country consume only limited quantities of fruits and vegetables, whereas these are an important part of most urban diets. As competitiveness in national fruit and vegetable production improves, there is also potential to enter export markets.

Small-scale horticulture production is dominated by female producers, who contribute two thirds of agricultural activities, but proceeds are not shared equally. Men generally provide the labour for land preparation and transportation, while women and children perform planting, weeding, harvesting, processing and marketing functions. Numerous small traders, mostly women, sell fruits and vegetables in local markets. A study on vegetable production and marketing in Juba by UN-FAO and Swedish Free Mission (2008) provides evidence that the majority of vegetable growers (64%) are men, while 60% of traders are women.

Although vegetable production is a business, a study conducted in Juba (UN-FAO and Swedish Free Mission) identified that only 5.3 % were involved in actual production and the majority, 63% were involved in petty and informal trading. One of the constraints in vegetable growing was poor access to land due to socio-economic and political recovery of the country.

As with other crops in South Sudan, yields and productivity of horticultural crops are quite low, even by African standards. Contributing factors to poor yields and low productivity include inadequate inputs, especially sees, planting materials, manure, fertilizers and pesticides, and outdated cultural practices. Poor soil and water management, and destructive harvesting and handling practices also contribute to low productivity and high unit costs of production. Other constraints to low productivity include limited capacity of horticulturalists in terms of knowledge and skills and gaps in market linkages from producers to consumers.

The combination of inadequate harvesting, handling and packaging practices, along with seriously deficient transportation infrastructure, results in very high deterioration in quality and in physical losses throughout the marketing chain. These negative factors depress farm-gate prices that result in low returns to farmers, especially those not located close to urban markets. In contrast, market value chains for imports from neighbouring countries are more efficient and functional, and transportation infrastructure via major inter-urban roads is better developed.

2.0 RATIONALE FOR HORTICULTURE DEVELOPMENT POLICY

South Sudan seeks to develop and diversify the national agricultural economies while increasing employment and productivity. Modern high-value horticulture production and marketing are considerably more labour-intensive than most other agricultural production and marketing activities. Additionally, increased horticulture productivity and output for national consumption have significant potential to gainfully employ women and youth, particularly those located in peri-urban areas. Modernizing and expanding horticulture production can contribute effectively to national economic diversification, employment generation and productivity enhancement.

A major share of horticulture products currently consumed by South Sudan urban populations is imported from neighbouring countries of Kenya and Uganda. Formulating and activating an appropriate SSHDP is an important prerequisite to establishing a favourable business environment that promotes investment and encourages entrepreneurship throughout the horticulture value chain from input supply through production activities, as well as throughout the entire post-harvest handling, processing and marketing segments. In addition, a dynamic and sustainable horticulture industry will significantly increase incomes accruing to smallholder producers and to other rural poor who participate in horticulture value chain activities, while also improving the health and nutritional status of consumers in the country.

3.0 CONSTRAINTS, CHALLENGES AND OPPORTUNITIES

As indicated in previous sections, although the horticulture industry has considerable potential to become competitive in national and export markets, it is faced with numerous constraints and challenges that must be alleviated. Major constraints and challenges being addressed by this SSHDP document are described in greater detail below.

3.1 CONSTRAINTS

3.1.1 Limited Access to Agricultural Inputs and Financial Resources

Utilization of modern inputs is critical to any competitive market-oriented agricultural production system. Modern inputs improve productivity and enhance quality and quantity of marketable output at competitive prices. For horticulture production, critical inputs include improved seeds and planting materials, organic manures and chemical fertilizers, selected plant protection products, hand tools and accessories, effective water management (including irrigation development and use), suitable handling and storage methods, facilities and equipment, and of special importance, technical and managerial know-how for utilizing these physical inputs effectively and efficiently.

Currently, South Sudan depends on imported and "recycled" seed for horticulture production. Major seed supply sources are limited: a few NGOs, small petty traders, and farmers who produce recycled seed (which has little or no potential to improve yields and productivity). Lack of availability of inputs is a major factor constraining the number of smallholders growing horticulture crops, and in turn, the production of most smallholders does not meet minimum quality standards to elicit reasonable prices in major urban markets. Promotion of indigenous varieties is limited due to lack of selected clean seed and planting materials.

The existing land tenure system is an obstacle to expanding horticulture growing areas, especially along water sources. In certain rural areas, cultural norms and traditional customs limit the ability of many persons to access land (in large scale) for agriculture, including for horticulture production. Other limitations include low natural fertility of soils and limited access to water for supplemental irrigation. Access to land for cultivation is especially difficult in peri-urban areas. Associated with this problem is the lack of an orderly system of land use planning, zoning and demarcation in urban and peri-urban areas.

Up to the present, most farming activities in South Sudan are carried out using manual labour supplied by unpaid family members. More recently, family labour availability has been diminishing as farm youth migrate to urban areas to escape the drudgery and low productivity of smallholder agriculture. As a result, a

growing number of smallholder producers must hire non-family workers, thereby increasing labour costs.

Mechanizing the labour intensive tasks such as land tillage and seedbed preparation reduces the drudgery of smallholder agriculture. When combined with utilization of productivity-enhancing inputs and cultural practices, labour productivity and profitability will increase. Less drudgery and improved earnings may encourage young farm household members to continue in agriculture.

Modernized production and value addition in horticulture value chain enterprises require considerable capital investment. Due to limited (or no) access to credit, smallholders are unable to procure modern inputs required to become competitive. Additionally, there are no risk management programs (such as crop insurance) available to agricultural producers.

3.1.2 Low Utilization of Modern Technologies

Utilization of modern technologies (improved inputs and cultural practices) can be expected to increase horticultural productivity and output sufficiently to compete with imports from neighbouring countries, and to respond to growing national urban demand. The current low level and rate of technology adoption in agriculture in South Sudan is in large part because of lack of exposure to knowledge and skills, low propensity to innovate, culture-based resistance to change, and limited institutional capacity and coverage to transfer relevant know-how. Appropriate packaging technologies are largely unknown and there is no significant in-country agro-processing capacity.

Relatively high capital requirements limit the ability of most smallholders to access and adopt improved technologies. Absence of backward and forward linkages[4] between smallholders and other value chain segments and actors discourages them from seeking out and adopting improved technologies.

Existing agricultural research capacity in South Sudan is quite limited, resulting in low levels of technology generation and adaptation to local production conditions. Breeding programmes to select and multiply improved seeds and planting materials are constrained by financial, human and physical resource limitations. Similar limitations restrain agricultural technology transfer and farmer training services. Likewise, because most agricultural training institutions were destroyed, ceased operations or were severely debilitated during the war, there is little national institutional capacity to train farmers or agricultural technical personnel.

3.1.3 Prevalence of Pests and Diseases

[4]Backward and forward linkages are descriptive measures of economic interdependence of firms and industries in terms of the magnitude of transactions. Industries with strong backward and forward linkages are termed as key sectors and play an important role in the development strategy of a country.

Absence of capacity to manage pests and diseases negatively affects marketable quantities and quality of horticulture produce. Numerous pests attack horticulture crops during production and throughout the marketing value chain, e.g., aphids, fruit fly, beetles, stem-borers, leaf-minors, loopers, bud-worm, pin-worm, sting-bug, locusts, army-worms, spider-mites, nematodes, slug and mealy-bug, to name a few. Fruits and vegetables also are damaged or destroyed by animals (e.g., rodents, monkeys and birds) and by human incursions. Pests and diseases often are spread through contaminated seed stocks, are wind or water-borne, and/or are dispersed by migrating humans and animals. Insect pest infestations also are facilitated through decomposing biomass and crop residues, while other pests migrate on their own (e.g., locusts). Under hot and humid South Sudan climatic conditions, insect pests and diseases multiply rapidly. Poor storage conditions, lack of sanitation and poor drainage also facilitate rapid pest multiplication.

Bacterial, fungal and viral infections all proliferate in South Sudan and damage or destroy horticulture products. The most damaging diseases in horticulture include bacterial blight, bacterial spot, black smut and rust. Control of pest and disease infestations is quite limited due to failure to use appropriate plant protection methods and products, usually due to lack of knowledge and financial resources.

3.1.4 Inadequate Market Information

Domestic trade in horticulture produce can be an important source of livelihood for actors throughout the horticulture value chain. Major marketing actors include petty traders, middlemen, transporters and retail vendors. A number of market-related limitations negatively affect returns to horticulture producers. These include difficult access to urban markets due to undeveloped feeder roads, inadequate market information, high transportation costs, low product quality, and poor storage conditions, all of which impact negatively on farm-gate prices. Margins between farm-gate prices and retail consumer prices in South Sudan are relatively too wide as a result of inefficiencies and lack of competitiveness throughout the horticulture value chain.

Horticulture producers tend to plant and harvest at the same time, often causing a harvest-time glut in the market place for a particular crop. This results in low prices for fresh produce that must clear the market within a relatively short time to avoid spoilage and loss. With adequate and appropriate market information, the more business-savvy producers can change planting and harvesting times in order to enter the market outside the general harvest window glut. In such cases, prices received will be more attractive. Additionally, adequate market information can inform traders of market locations that temporarily are over-supplied or under-supplied. With this information, traders can send products to under-supplied markets and avoid over-supplied markets, thereby commanding better prices.

Currently, in South Sudan, the limited market information is a major factor contributing to wide seasonal price variations in horticulture products (and major

variations in different markets at a given time). The Sudan Institutional Capacity Program: Food Security Information for Action (SIFSIA) has developed a market information system for covering a wide range of agricultural produce. However, this information often does not reach producers or traders in South Sudan, and/or smallholders and traders do not understand how to apply the information to their planting, harvesting and marketing decisions. High levels of illiteracy among producers and petty traders also limit their ability to effectively incorporate market information into production and marketing decisions.

Radio is the most common channel for communicating with farmers in South Sudan. However, agricultural information is not readily available in a farmer-friendly form. As the horticulture value chain develops, electronic communication will become increasingly important for development of a vibrant and dynamic industry. There currently are limited forms of electronic communication via mobile telephone, TV and the internet. Most producers and petty traders do not yet have access to these forms of communication.

3.1.5 Post-Harvest Losses

Generally, huge losses occur in horticulture crops due to improper harvesting methods and poor handling practices at and after harvest. The damage is also caused by improper physical handling, inadequate field cooling, poor packaging and bulking, absence of processing facilities, lack of proper storage facilities (including access to temperature controlled storage) and inappropriate transportation equipment.

Physical losses from improper harvest and post-harvest product treatment are estimated at 30% - 40% of the marketable quantity produced These losses not only negatively impact producers and marketing value chain actors, but also have a negative impact on the national economy in terms of loss of value-added.

3.2 CHALLENGES

3.2.1 Low Institutional Capacity

Currently, the country lacks an appropriate policy and institutional framework to coordinate and facilitate development of the horticulture industry. Weak inter-agency and public-private coordination leads to poor and inconsistent delivery of facilitating and regulatory services. Poor application and enforcement of food safety and hygiene standards in local public markets, and inadequate and erratic enforcement of phytosanitary measures, environmental standards and public health guidelines, compromise national and international food security standards.

The existing Department of Horticulture is embedded within the Directorate of Agriculture of MAF. Institutional capacity relative to other sub-sectors is weak. There are inadequate public and private sector institutions or organizations to support coordination and development of the horticulture value chain. Of special

concern, South Sudan has no system for producing and distributing high-quality organic or conventional planting materials to facilitate development of an effective market-oriented horticulture sub-sector. Some of the factors contributing to these issues include weak research and training institutions in horticulture.

3.2.2 Limited and Low-Quality Infrastructure

Horticulture produce is highly perishable, requiring proper storage/handling and timely transport to market outlets. The few roads in horticulture production areas are difficult to transit and often are impassable during the rainy season. Market linkages between areas of production and consumers are impeded by poorly developed and limited networks of feeder roads. This results in heavy product losses due to delivery delays or failures. In addition, the poor state of roads significantly affects the quality of the produce that arrives in the marketplace, due to the rough ride during transit. Poor conditions of roads, vehicles and equipment all contribute to high transport charges and severely impede cost-effective marketing and national value chain competitiveness with imported produce. These high charges are exacerbated through imposition of taxes and fees by state and county governments (and at times by unauthorized "highway bandits"). The authorized and unauthorized taxes and fees are imposed on products that move across state and/or county boundaries.

Unregulated management of taxes and fees collected by local authorities limit public sector improvements to horticulture market infrastructure. Furthermore, there is no appropriate policy and capital framework for the private sector to participate in developing market place infrastructure. Potential new entrants into wholesaling and retailing are largely excluded by existing traders from physical access to wholesale or retail market place facilities. This undermines competitiveness in the industry.

Major constraints to access air services for transport of horticulture produce include high freight charges and under-developed handling facilities at airports and airstrips. Reliability in provision of air transport services also would need to be enhanced. Efforts are under way to reduce jet fuel and handling costs.

Electricity for processing, cold/cool storage, lighting, plant and machinery operation, transportation, packaging and irrigation through viable public-private sector partnerships can improve market access and value added accruing to both large and small scale producers. The current high cost of electricity and fuel in South Sudan makes it difficult for national horticulture production to compete at national and regional/international export markets. Frequent power rationing and blackouts make cold/cool storage unreliable for horticulture products.

Energy infrastructure is especially lacking in major horticulture production areas. The majority of rural people have no access to electricity. Even with the discovery of oil in 1978, associated huge oil revenues have not contributed to development of

electric power in South Sudan. This undermines the potential to develop the national horticulture industry through efficient value-chain development.

Lack of irrigation and drainage infrastructure also impedes modernization of horticulture production. Timely and reliable water supplementation is essential to high-value horticulture production. The Nile River has considerable potential for irrigation development. Currently, horticultural production in South Sudan is mainly under rain-fed conditions. Due to seasonality of rainfall and vagaries of weather, production varies considerably from season to season. With supplemental irrigation, optimum production can continue year-round.

3.2.3 **Meeting International Export Market Standards**.

The EU has strict production and safety standards, and requires compliance with Global GAP[5] and HACCP. EU markets are becoming increasingly differentiated, with higher quality products securing considerable price premiums. Middle-income countries tend to have high import tariffs on horticulture products.

3.2.4 Limited Human Resource Capacity

South Sudan has no effectively functioning agricultural research capacity or technology transfer services. Lack of a critical mass of qualified, motivated and committed professionals who actively support the national agricultural development agenda seriously impedes future institutionalization of effective horticulture technology generation/adaptation and transfer capabilities.

Many scientists and technicians were displaced during the war, some died in the conflict while many others migrated to escape the violence and permanently settled in other countries. Generation of effective science-based outputs and outcomes is dependent on adequate institutionalization of the skills and competencies of professional and technical staff. Human capacity development in South Sudan is greatly impeded by weak coordination and planning. There is no harmonized long-term human resource development strategy or plan for generating a critical mass of professionals trained and equipped staff to handle contemporary technological problems at national, state and local levels. Other limitations include the lack of a central database on human resources, as well as the absence of a common approach (policy framework) and consistent management tools. This makes it difficult to harness the best potential from the existing human resource base. The current situation is characterized by poor and widely varying schemes of human resource service and lack of an effective merit-based recognition and reward system. These limitations handicap both skills upgrading and staff mobility.

[5]The GlobalGAP is both the name of the standard and the organisation that administers the standard. The standard defines good agricultural practices (GAPs).

3.2.5 Highly Variable Climatic Conditions

Global climate change is expected to further destabilize local climatic conditions in the country. Periodic floods and droughts are critical variables in horticulture production both in terms of consistent supply as well as quality. Floods destroy produce through wash-away and rotting, and create transport barriers between production areas and consumer markets. Spread of pests and disease are also intensified as a result of floods. Frequent drought leads to lower quality produce and reduced yields or total crop loss. Interrelationships of temperature, rain, humidity and wind contribute to variations in production conditions, thereby reducing crop yields and product quality. Deforestation, overgrazing and soil erosion also contribute to localized climate change and poor productivity.

Scientific reports show that Africa is the continent that will suffer most from global climate change. Since most horticulture production in South Sudan is under rain-fed conditions, climate change is a major concern. There is a need to increase investments in irrigation and other water harvesting and management technologies, and to focus research on development of horticulture crops adapted to arid and semi-arid lands. Current technologies, as well as improved seeds and planting materials, are adapted primarily to medium-to-high rainfall areas.

3.2.6 Prevalence of HIV/AIDS and Other Human Diseases

Horticulture is labour intensive. Continuous loss of workforce through HIV and AIDS, TB, malaria and various other water-borne diseases is a threat to the development of the horticulture industry. Women are at greater risk of contracting HIV and AIDS due to their disadvantaged social status. According to the International HIV/AIDS Alliance in South Sudan (2011), HIV epidemic in South Sudan is categorised as a generalised epidemic, with a prevalence rate of 3% at the end of 2010. An estimated 128,000 people are living with HIV and the epidemic is worst in Western Equatoria and in the southern part of the country. Rates in these areas are as high as 10% compared with less than 1% in more rural central areas. The capital Juba has a prevalence rate of 6%. Populations most at risk of HIV infection include refugees, internally displaced people, soldiers, truckers, sex workers and tea sellers, as well as women and young girls.

Horticulture farms, especially flower farms, have not actively implemented HIV and AIDS policies. The prevalence of TB, malaria and water-borne diseases also contribute to low, productivity, poverty and result in loss of life. They are also an economic burden to employing companies and to the Government as they are major obstacles to social and economic development.

Fresh fruits and vegetables also can be a common medium for transmittal of many diseases, especially when marketed under poor sanitary conditions as often is the case in many markets.

3.2.7 **Gender Disparities**

Women constitute more than 52% of the South Sudan population and because of the country's social construct, they are disadvantaged (Nyanyang, 2011). They are less educated (high illiteracy rate of 84%) and do not own or have control over family properties and they have limited access to information. The very high functional illiteracy among women hampers them from effectively manage basic reading, writing and numeracy required to engage in agricultural production, and related monetary and commercial transactions, as well as employment tasks.

Women do most of the reproductive labour that is supporting smallholder households. Small-scale horticulture production is dominated by female producers, who contribute two thirds of agricultural activities, but proceeds are not shared equally. Due to the poor road infrastructure and the lack of transport and local market opportunities, the women depend on men to sell their produce and thus lose control over the income

Employment in the horticulture industry and working conditions discriminate against females, marginalised groups and persons with disabilities. Contributing factors to these imbalances include lack of awareness about issues related to gender, marginalised groups and persons with disabilities. Other concerns include cultural perceptions that persons with disabilities cannot excel in their duties, laxity in enforcing gender-related labour laws in the industry, and lack of facilities to meet the special needs of women, marginalised groups and persons with disabilities.

3.2.8 Youth Attitude towards agriculture

There are major challenges to be addressed. Firstly, most youth do not consider farming as attractive gainful employment and only get into it as a last resort. This can be attributed to the drudgery of much of the manual labour required, low returns to labour under current agricultural production conditions, inadequate financing sources for improving technology and mechanization, and lack of access to productive land. Even with mechanization, youth generally have a negative perception of agriculture as a lifestyle. The existing educational system and social perceptions tend to reinforce that negative perception. This has led to high rural-urban migration among youth in search of white-collar jobs and westernised lifestyles. When the horticulture value chain addresses issues of mechanization, agri-business training and access to funding, youth are most likely to be gainfully engaged in horticulture industry. In addition, there is need to inculcate knowledge and skills among youth in the school curriculum.

3.3 OPPORTUNITIES

3.3.1 Growing Market Demand

National and regional/international export markets for horticulture products provide an unrealized opportunity to improve South Sudan's rural household livelihoods and to increase national income. Economic growth and urbanization both stimulate demand for horticultural products. However with the EU is the world's largest importer of Flowers, fruits and vegetable (FFV), with imports totalling 11.1 million MT of fruits (worth over € 8.8 billion) and 1.8 billion MT of vegetables (worth € 1.7 billion) in 2009.

Fruit imports declined slightly between 2008 and 2009, due to the recession, while vegetable imports remained relatively stable. Middle Eastern countries source FFV from neighbouring suppliers (e.g., Jordan and Turkey); however, there is a potential market for East African (including South Sudanese) exports to Gulf Coast countries. In contrast, US markets are virtually inaccessible to East Africa—despite the Africa Growth and Opportunity Act (AGOA)—due to competition from Latin America (that has shorter and more competitive transportation systems). Currently, South Africa and to a lesser extent Ghana are the only countries taking advantage of AGOA to facilitate horticulture exports.

Currently South Sudan farmers also export to the EAC and SADC countries (as regional export markets). The local demand for FFVs in the country, particularly in urban areas originates from East Africa. Estimates from FAO/WFP (2006) indicate that in Central Equatoria (see Table 1), consumption of fruits and vegetables were estimated between 60,291.53 mt[6] (high level) and 40,194.35 mt (low level) while total fresh produce were estimated at 206,634.45 mt and 137,756.30 mt, respectively. However, imports of food products to South Sudan including fresh fruits and vegetables are estimated at $200-300 million per year.

Table: 1. Central Equatoria State: Estimated Annual Food Consumption for 2006

	Per Capita Annual Consumption (kg)	High Scenario Total Annual Consumption (mt)	Low Scenario Total Annual Consumption (mt)
Cereals/Grains	132.79	102,393.04	68,262.03
Fruits and Vegetables	78.19	60,291.53	40,194.35
Other Produce	65.62	43,949.88	29,299.92
Total Fresh Produce*	276.6	206,634.45	137,756.30

*Excluding milk, meat, fish and offal.
Source: FAO/WFP (2004). Population Data and Food Balance Sheet.

Apart from exotic horticulture species exported to foreign countries, there is potential local demand for indigenous species such as jews melon, eggplant,

[6]Ministry of Commerce, Trade and Supply (2008).

tomatoes, cowpea leaves, cassava leaves, giri giri, regilla, bean leaves, pumpkin leaves, dodo (amaranthus) bong leaves and onions. A number of vegetable crops are increasingly becoming important in the country and preliminary evaluation and observations have shown that there is great variability within many of these crops, which is considered a highly valuable resource for genetic improvement programmes. Incorporating indigenous species in the horticulture value chain, would significantly contribute to improved nutritional status among rural and urban communities and increased income of horticulturalists in the country.

With the support of Government development partners, as well as regional and international horticultural institutions, there is great potential for the country to accelerate development of the horticultural industry in the country.

3.3.2 Existence of Horticulture Greenhouses

Some horticulture greenhouse "kits" which are already successfully being used by the Green Belt, for capital outlays of $4000, as well as small peri-urban farms, provide a great opportunity to develop the sector. The Government provide some start-up capital and training (subject to some form of repayment and contract) to entrepreneurial traders and farmers organizations who want to set up such "kits" or peri-urban farms A case study on a 120 sq. ft. green house with drip irrigation, equivalent to 4-5 feddans of outdoor production show that, tomato production is highly profitable as shown in table 2.

Table 2: Case Study of Tomato Production in the Green Belt

REVENUE	DETAILS	AMOUNT (US$
	Sale of 5,400 kg @ USD 2.5/ kg	13,500
COST	Green House Kit	3,750
	Labour	1,650
	Seeds	140
	Fertilizer	140
PROFIT	First year	8,150
	Projected subsequent years	11,570

Source: McKinsey and Company (2011).

Based on this case study, observed that income per horticulture-growing household was between $500-$1000/year, with one horticulture kits income ranging between $12 to $14k per group with 30% to the trader and remainder split among 10 households from minimal income to $800 to $1000 per household.

3.3.3 Employment of Youth in Horticulture

Employment generation is especially important for youth where unemployment reaches in excess of 89%[7]. A recently published report by the South Sudan Centre for Census, Statistics and Evaluation (2011), indicates that more than 51% of youth are under 18 years of age and 72% of the population is under 30 years of age

[77]Needs for South Sudan Organization (2011). www.needsforsudan.org/

(Nyanyang). The report also observes that 83% of the population is rural, 51% exist below the poverty line, and 78% of households depend on crop production or animal husbandry as the primary source of livelihood. Horticulture, therefore, provides many potential employment opportunities along the various value chains.

3.3.4 Transport Network Improvement

One option to improve transport is to develop and expand the existing railway system as a potential means of rapid and reliable transport of higher volumes of horticulture commodities for both national and regional export markets (or to reach centralized processing facilities). However, economic feasibility would depend primarily on opportunities to transport large volumes of non-perishable bulk commodities (perhaps including timber products), with transport of horticulture products as an incidental service. Currently, South Sudan has 248 km (154 miles) of single-track 1,067 mm (3 ft 6 in) narrow gauge railway from the Sudanese border to the Wau terminus (Wikimedia Foundation, (2011). However, there are proposed extensions from Wau to Juba, and possible linkages with Kenyan and Ugandan railway networks.

Air transport currently is the main mode of transport for high-value perishable export produce within and outside the African Region. The horticulture industry potentially could benefit from further development of air transport infrastructure. Currently, the busiest and most developed airport in South Sudan is Juba Airport. It has regular international connections to Entebbe, Nairobi, Cairo, Addis Ababa, and Khartoum. Juba Airport also is the home base of Feeder Airlines Company. Other international airports include Malakal, with international flights to Addis Ababa and Khartoum; Wau, with weekly service to Khartoum; and Rumbek, also with weekly flights to Khartoum. South Sudan Airlines also serves Nimule and Akobo, the airstrips of which are unpaved. There are several smaller airports throughout the country, the majority of which consist of unpaved airstrips (Wikimedia Foundation).

4.0 HORTICULTURE DEVELOPMENT POLICY

The MAF strategic plan calls for a policy environment that transforms the horticulture value chain from a traditional low-input subsistence production system into a modern market-oriented value chain, able to compete with imports from neighbouring countries. The SSHDP presented in this document seeks to facilitate and achieve the following vision, mission, goal, guiding principles and objectives:

4.1 VISION, MISSION AND GOAL

A vibrant and sustainable horticulture value chain system.

4.1.1 Mission

Promote appropriate technologies and institutional social capital for sustainable horticulture productivity, production, value-addition and competitiveness.

4.1.2 Goal

Contribute to sustainable economic growth and development to improve household income and food security through a competitive horticultural industry.

4.2 GUIDING PRINCIPLES

Transparency, integrity, accountability and inclusiveness are essential to create and promote opportunities and a conducive environment for all interested stakeholders to participate in the horticulture value chain. This policy embodies the following guiding principles:

i. Capacity building and human resources development;
ii. Gender equity and mainstreaming of economic participation;
iii. Building pro-development social capital to reduce value chain transactions costs;
iv. Compliance with national and international food safety and environmental standards; (FAO terminology); and
v. Development of the horticulture value chain within a global and regional context and through open trade relationships with other countries.

4.3 MAJOR OBJECTIVE

The major objective is to improve sustainable horticulture productivity and expand marketed output from both rain-fed and irrigated areas in South Sudan.

Problem Statement No. 1
Lack of policy and business environment for horticultural producersto effectively access improved agricultural inputs and know-how.
Policy Statement No. 1

Create an enabling policy and business environment for horticultural producers (small, medium and large scale) to effectively access improved agricultural inputs and know-how.

Implementation strategies for Policy No. 1

i. Create a positive business environment to encourage private sector investment and entrepreneurship to provide integrated producer inputs and knowledge services efficiently and effectively;
ii. Facilitate access to microfinance and other financing sources by smallholder horticulture producers, especially women and youth;
iii. Promote and facilitate appropriate land allocation, ownership, titling and registration that assure equal access to farmers, especially women, youth and other disadvantaged groups, in accordance with land policy;
iv. Encourage and facilitate appropriate mechanization and other productivity-enhancing technologies and cultural practices, consistent with relative factor endowments; and
v. Undertake measures to reduce taxes and duties; cost of production, transport and processing; and moderate the cost of complying with processing requirements;
vi. Through public-private partnership investments, develop an effective scheme of services to promote value chains for rural and recently migrated urban populations, especially women, disadvantaged groups and youth.

<u>Flagship project for policy no. 1</u>
Policy and Strategy for Horticulture Development
South Sudan National Horticulture Authority (SNHA)

Problem Statement No. 2

Undeveloped sustainable national and international marketing and trade strategy for South Sudan.

Policy Statement No. 2

Develop an aggressive and sustainable national and international marketing and trade strategy for South Sudan

Implementation strategies for Policy No. 2

i. Conduct comparative and competitive advantage and value chain studies on horticulture commodities produced in South Sudan;
ii. Promote contract farming and formation of farmer organisations or groups to increase farmer bargaining power and benefits from economies of scale;
iii. Undertake coordinated development and management of markets by

Implementation strategies for Policy No. 2

concerned ministries and local authorities to ensure provision of quality services; Introduce input subsidies to low income horticulture producers to enhance their ability to adopt new technologies and improve their profitability

iv. Implement quality management standards that include food safety, environmental, occupational health to ensure consistency in production of quality produce; packaging; appropriate modes of transportation; and meeting phytosanitary requirements;
v. Brand products and produce to promote local consumption and export of horticultural produce with unique attributes, e.g., organic products;
vi. Diversify production of horticulture products including indigenous and exotic fruits, vegetables and flowers, coffee and tea, based on local and international demand of;
vii. Promote and facilitate competitive and integrated horticulture value chain agribusiness production and marketing services;
viii. Explore opportunities and develop strategies for direct flights to export destinations to expand markets;
ix. Monitor and analyse trade flows to establish South Sudanese comparative and competitive advantage; and
x. Encourage RSS embassies to aggressively promote the country's horticultural products.

<u>Flagship project for policy no. 2</u>
Horticulture Export Strategy

Problem Statement No. 3

Lack of collaboration with the Department of Plant Protection in the Directorate of Agriculture Production

Policy Statement No. 3

Coordinate the reduction of physical losses and quality deterioration in horticulture output caused by pests, diseases and environmental factors in collaboration with the Department of Plant Protection in the Directorate of Agriculture Production

Implementation Strategies for Policy no. 3

i. Collaboration with the Department of Plant Protection in the Directorate of Agriculture Production, to establish South Sudan Plant Health Inspectorate Service (SSPHIS) and other regulatory agencies to effectively strengthen and implement sanitary and phytosanitary regulations and curb imports of poor quality and cheap produce that do not conform to

Implementation Strategies for Policy no. 3

recommended standards into the country;

ii. Facilitate the introduction of disease and pest resistant varieties and cultivars and promote the Utilization biological control agents;
iii. Introduce, develop and promote safe and prudent use of appropriate chemical pesticides;
iv. Promote integrated pest and disease management (IPM) methods and practices including promotion of prudent use of appropriate chemical pesticides.
v. Identify, import and test drought and heat tolerant varieties of horticulture seeds and planting materials in collaboration with South Sudan Seed Council (SSSC).

Problem Statement No. 4

Poor timely and efficient improvement access to information and national and export market

Policy Statement No. 4

Improve efficient and timely access to information and national and export markets

Implementation strategies for Policy no. 4

i. Enhance the flow of information within the horticulture value chain;
ii. Develop a database of agro-climatic data for all agro-ecological zones; and
iii. Develop predictive models for drought and flood episodes

<u>Flagship project for policy no 4.</u>

Horticultural Market Information System

Problem Statement No. 5

Lowknowledge and skills in horticulture production.

Policy Statement No. 5

Enhance knowledge and skills in horticulture production, value addition and marketing through short, medium and long term technology transfer training and continuing education programmes.

Implementation strategies for Policy No 5.

i. Invest consistently in training and continuing education in all relevant fields, in order to create a critical mass of qualified technical staff,

innovative producers and other entrepreneurs in horticulture production and marketing;

ii. Invest in functional literacy programmes especially for women farmers to equip them with basic reading, numeracy skills needed for horticulture production and marketing;
iii. Promote change of attitude among smallholder producers, including women, disadvantaged groups and youth, to embrace market-orientated horticulture production;
iv. Organise exchange visits to create awareness to selected smallholder producer groups and decision makers;
v. Establish and out-scale farmer field schools to all horticultural production areas and markets to mitigate harvest and post-harvest losses in horticulture;
vi. Organize field days and agricultural fairs for all actors along the horticulture value chain;
vii. Adapt and disseminate know-how about appropriate soil and water management and drainage technologies; and
viii. Enhance business skills and knowledge and entrepreneurship in the horticulture industry through training and provision of continuing education and advisory services.

<u>Flagship project for policy no 5.</u>
Comprehensive Training and Extension Programme

Problem Statement No. 6

Poor infrastructure and transport system for moving horticultural products.

Policy Statement No. 6

Facilitate improvement of infrastructure and transport system for moving horticultural products from producers to consumers and to enhance horticultural value chains.

Implementation strategies for Policy No. 6

i. Promote construction and use of physical infrastructure to increase shelf life of horticultural products;
ii. Develop markets and marketing channels and physical facilities, at local, regional and international levels;
iii. Develop household, community, watershed and national level schemes

for water retention, harvesting and management;

iv. Promote greenhouse systems and technologies to South Sudan through private sector agribusiness investors;

v. Introduce "food for assets" programmes to encourage rural communities, women, disadvantaged groups and youth to contribute labour and other assets towards improvement, expansion and maintenance of rural infrastructure, including farm-to-market feeder roads;

vi. Promote development and adoption of alternative sources of energy such as wind and solar power, biogas, improved stoves and rural electrification, in partnership with the Ministry of Energy and Mining, NGO's and the private sector;

vii. Develop and operationalize water harvesting infrastructure and Irrigation to facilitate year-round expansion of horticulture production, in collaboration with the Ministry of Water Resources;

viii. Introduce and promote private sector, community-based, and other appropriate commercially viable horticulture storage and cold/cool-chain business enterprise arrangements and operations; and

ix. Advocate for increased budgetary allocations toward development and upgrading of farm-to-market feeder roads, transport systems, rural infrastructure and public utilities.

Flagship projects for policy no 6.

Horticulture Infrastructure Development Progamme

5.0 INSTITUTIONAL AND IMPLEMENTATION FRAMEWORK

Implementation of the Horticulture Development Policy requires innovative and aggressive political will, combined with public and private sector leadership, management and financial investments. Currently, South Sudan does not have a Horticulture Policy and neither does it have a governance structure to manage public and private institutions with legal and institutional mandates. Institutional challenges compromising the governance structure include weak institutional framework to coordinate the horticulture industry; weak inter-agency coordination leading to poor delivery of regulatory services including delayed response to notifications on nonconformity with plant and human health; poor enforcement of food safety and hygiene standards in the local market; inadequate enforcement of phytosanitary measures, environmental standards and public health; inadequate human and physical capacity among key regulatory agencies affecting effective monitoring and evaluation of the industry; inadequate financing of institutional operations; and weak and ineffective linkages among public, private and other regulatory, developmental and supportive institutions result in inefficiencies in the industry. It is therefore important to establish an institutional framework to guide the development of the horticulture industry and formulate legislation and regulations to effectively govern the sector.

5.1 INSTITUTIONAL ARRANGEMENTS

The South Sudan National Horticultural Authority (SSNHA) will be established as the principal institution to provide leadership in further formulation and orderly activation of the SSHDP presented in this document. Furthermore, a South Sudan Plant Health Inspectorate Service (SSPHIS) will be established within the structure of SSNHA to effectively strengthen and implement sanitary and phytosanitary regulations and curb imports of poor quality and cheap produce that do not conform to recommended standards into the country.

5.5.1 Horticulture Development Consultative Forum

Capacity building in terms of knowledge and skills among horticultural farmers and technicians requires a lot of financial resources and also takes time to develop. One strategy to reduce cost and time is to establish a forum to provide a clear and consistent view of wider horticultural research, extension and development issues. Therefore, the implementation framework will establish a Horticulture Development Consultative Forum (HDCF) which will convene annually through SSNHA to promote and encourage research, education in all branches of horticultural science and to facilitate cooperation and knowledge transfer on a global scale through its symposia and congresses, publications and scientific

structure. Membership will be open to all interested horticulturalists, researchers, extension workers, educators, students and horticultural industry professionals.

The Forum will recognise existing national and international expertise, promote skills development and the concept of professionalism as being central to horticulture business improvement; promote the industry as a professional and progressive place to work; provide RSS with a strong and influential partner to meet the challenges of the future; and support the industry as a priority sector. Furthermore, the Forum will ensure implementation of profitable, sustainable horticulture strategy, valued by society, with skills development embedded into everyday business practice.

5.5.2 National, Regional and International Collaboration

Horticultural networks for research, extension, training and industrial development at regional and international levels are numerous. For example, Africa has 17 horticultural institutions, some of which cover one or two of these areas. For example, Tanzania has a Horticulture Research and Training Institute (Horti) at Tengeru and a Global Horticulture Initiative; while Uganda has one institution comprising Horticulture Universities, Horticulture organisations, Organizers, Publishers and Registration Authorities. Zimbabwe has three institutions, Agricultural Research and Extension Services (Arex), Beadlam Enterprises (a business entity) and a Horticulture Research Centre. However, South Sudan has not yet established a specific Horticulture Institution to address issues of research, training and extension and business development although the MAF Directorate of Research, Training and Extension partially incorporates some of these issues.

In order to ensure effective linkages and collaboration with regional and international horticultural institutions, SSNHA through the Directorate of Agriculture Production will facilitate and encourage formation of national horticulture institutions in South Sudan. Following this exercise, a framework for establishing linkages with global horticulture institutions will be formulated and implemented. Some of the global horticulture institutions include the following:

The Institute of Horticulture (IH) is the authoritative organisation representing all professionals engaged in horticulture in the UK & Ireland. Its Membership comprises and represents all those involved in the management, growing and marketing of all edible and decorative horticultural crops; and the research, education and consultancy. It also includes those concerned with botanic gardens and landscaping, and the full range of horticulture within leisure industries and those working in associated supply industries. The institute offers not only recognition of status in the horticultural industry, but provides the opportunity to make a really effective contribution to the future of Horticulture, and its importance as a career.

International Society for Horticultural Science (ISHS) is the world leading independent organization of horticultural scientists. Its aim is to promote and encourage research and education in all branches of horticultural science and to facilitate cooperation and knowledge transfer on a global scale through its symposia and congresses, publications and scientific structure." Membership is open to all interested researchers, educators, students and horticultural industry professionals.

International Society for Horticultural Science (AIPH) which was founded in Switzerland in 1948 aims to stimulate international marketing of flowers, plants and landscaping services and is a coordinating body representing horticultural producers' organisations all over the world.

International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) which was founded in 1962 is an intergovernmental organisation comprising thirteen member countries from the Mediterranean Basin (Albania, Algeria, Egypt, Spain, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Tunisia and Turkey) and it pursues three central missions, education, research and cooperation**.**

International Potato Center - Centro Internacional de la Papa (CIP) seeks to reduce poverty and achieve food security on a sustained basis in developing countries through scientific research and related activities on potato, sweet potato, other root and tuber crops and on the improved management of natural resources in the Andes and other mountain areas.

Technical Centre for Agricultural and Rural Cooperation (CTA) was established in 1983 under the Lomé Convention between the ACP (African, Caribbean and Pacific) Group of States and the European Union Member States and aims at the reduction and eventual eradication of poverty while contributing to sustainable development and gradual integration of ACP countries into the world economy.

Brazilian Agricultural Research Cooperation (EMBRAPA) provides feasible solutions for the sustainable development of Brazilian agribusiness through knowledge and technology generation and transfer.

European Plant Science Organisation (EPSO) is an independent academic organization, currently representing 61 institutional members bringing together more than 204 research institutes, departments and universities from 29 countries in Europe and beyond. EPSO's mission is to improve the impact and visibility of plant science in Europe and its top priorities are to facilitate the understanding of plant science, boost funding for basic research and coordinate research activities at the national, European levels and beyond.

Food and Agriculture Organization of the United Nations (FAO) leads international efforts to defeat hunger and serves both developed and developing countries. FAO acts as a neutral forum where all nations meet as equals to

negotiate agreements and debate policy and it is also a source of knowledge and information.

The World Vegetable Center (AVRDC) is the World Vegetable Center, an international nonprofit research and development institution committed to alleviating poverty and malnutrition in the developing world through the increased production and consumption of nutritious and health-promoting vegetables.

Global Horticultural Initiative (GlobalHort) is a new milestone in the fight against poverty and hunger and was set in March 2006 by the Global Horticulture Initiative (GHI). Over $2.5 million was pledged to develop horticultural systems in the world's poorest countries. The initiative will have a substantial impact on the health and prosperity of millions in Africa and other developing countries. Initiated and guided by ARVDC, the launch of this international initiative brought together funding agencies from industrial countries, and researchers and stakeholders from all over the world.

International Plant Propagators' Society (IPPS) was founded in 1951 to promote seeking and sharing of information about the art and science of plant propagation.

International Horticultural Congress (IHC) is being hosted by the Australian Society of Horticultural Science, the New Zealand Institute of Agricultural and Horticultural Science, and the Secretariat of the Pacific Community, under the auspices of the International Society for Horticultural Science. Held every four years at various sites around the world, and attracting more than 2,000 delegates, the congress is a world forum on all aspects of horticulture and horticultural science. The theme of 'Horticulture - sustaining lives, livelihoods and landscapes' - features the following sub-themes:

- Tropical fruits and vegetables
- Horticulture for human health and wellbeing
- Sustaining landscapes
- Quality of horticultural products.

The symposia and/or workshops within each sub-theme aims at exploring how innovation in science can benefit commercial and lifestyle enterprises, which are faced with ever-changing environmental influences. A major new skills strategy aimed at equipping farmers and growers with the right skills for the 21st century has been unveiled in London today.

5.2 IMPLEMENTATION PLAN

Immediately the policy is accepted by the Legislative Assembly, the SSNHA will facilitate Fertilizer Development Strategic Plan through the Directorate of Agriculture. The Horticulture Development Strategic Plan will focus on developing a vibrant and sustainable horticulture value chain system. The Strategic

Plan will embrace promotion of appropriate technologies and institutional social capital for sustainable horticulture productivity, production, value-addition and competitiveness. This strategy will be a Result-based in collaboration with public and private sectors stakeholders. The implementation of the Strategic Plan will be the responsibility of the SSNHA under the Directorate of Agriculture Production. However, monitoring and evaluation will be conducted by independent horticulture consultants, periodically. A three-phased process will be followed to establish the SSNHA and to activate the SSHDP.

Phase I comprises two steps:

i. Step 1: Immediate Activities (2012)

- Establish a semi-autonomous institution designated as the South Sudan National Horticultural Authority (SSNHA) as the principal institution responsible for managing more detailed formulation, validation and activation of the SSHDP;
- Establish a South Sudan Plant Health Inspectorate Service (SSPHIS) within the structure of SSNHA;
- Achieve appropriate consensus among stakeholders for the SSHDP herein specified, as well as for additional policy specifications formulated under SSNHA leadership;
- provide technical staff support for MAF review, final adjustments and approval;
- Provide technical leadership and guidance for securing political and legal sanction of the SSHDP as required by law; and
- Initiate a series of enabling activities to facilitate effective activation of the SSHDP.

ii. Step Two: Appointment of a Core Management Team

A Core Management Team (CMT) consisting of eleven persons including women (one from each State Government and one from MAF/RSS) will be appointed initially for two years (renewable once). The team will be provided with secretarial and administrative support by the MAF/RSS Directorate of Agriculture Production. Terms of reference for the CMT shall be prepared by the SSNHA in consultation with MAF leadership. The team shall include individuals with proven financial and administrative experience, with science and horticulture management backgrounds, and with public policy experience.

The team will be expected to manage the introduction and activation of policy changes related to both public and private sector actors. Responsibilities include engaging broad consultations with horticulture stakeholders and partners to raise greater awareness of problems and opportunities, to enhance buy-ins, and

to build consensus on implementation pathways and approaches. The consultation process shall target a broad range of interests, including:

- The implementing institutions represented within the SSNHA;
- A representative sample of senior civil servants and members of parliament with an expressed interest in horticulture research and allied sciences; and,
- Representatives of key horticulture stakeholder and partner institutions, enterprises and representative organizations;

iii. Draft Legal Dispositions for Creating SSNHA (2012-2013)

Creating and initiating operations of the SSNHA requires:

- Drafting and enacting the legal dispositions that create the SSNHA as a semi-autonomous coordinating body;
- Establishing the organs of SSNHA, and appointing the core management team;
- Developing a Code of Conduct;
- Developing and applying a system-wide planning and programming process to formulate further national horticulture development policies, and to define and guide implementation arrangements;
- Defining and establishing the National Horticulture Authority Competitive Fund;
- Establishing horticulture-related facilities in the various states according to the particular technology needs of each; and
- Piloting multi-institutional Partnership Forums based on the current Horticulture Strategies and Results Framework.

5.3 PHASE II.

The main objective of this **Medium-Term Phase II** (Jan 2013-Dec 2014) is to operationalize SSNHA as a mechanism for integrating those institutions and interest groups related to horticulture production, research, outreach and other economic activities of the horticulture value chain in South Sudan (public, private, universities and other relevant knowledge generation and transfer institutions).

5.4 PHASE III.

The objective of this **Long-Term Phase III** (Jan 2015-Dec 2020) is to double horticulture production in both rain-fed and irrigated farming areas, especially through achieving increased yields and productivity, but also, as appropriate, through expansion of cultivated areas.

5.5 RESOURCE MOBILISATION

Financial support for horticulture development in South Sudan is already being implemented through a number of organizations including USAID, JICA and Office of Foreign Disaster Assistance (OFDA) which has granted of $12.6 million to agriculture of which one component is horticulture. In addition, the Global Horticultural Initiative (GlobalHort) mobilised over $2.5 million pledges to develop horticultural systems in the world's poorest countries.

In principle, resource mobilisation for horticulture development will be based on Results-based Strategic Plans which will be linked with the national budget. Initiatives from different components of the value chain, through the support of the SSNHA, will be encouraged to develop bankable project proposals for submission to national, regional and international funding organizations.

6.0 STRATEGY MPLEMENTATION SCHEDULE AND BUDGET

Policy implementation process requires a systematic schedule of activities based on thematic areas. The following table proposes an outline of activities and timeframe to implement the Horticulture Development Policy.

Actions	Responsible	Timing
1. Formulation of Horticulture Legislation and Regulations	MAF Senior Executive	March 2012
2. Establishment of the SSNHA	MAF Senior Executive	June 2012
3. Appointment of a Core Management Team (CMT)		
4. Strategic Plan	SSNHA	March 2012
5. Horticulture Development Consultative Forum	SSNHA	Oct 2012
6. National, Regional and International Collaboration	Minister	June 2012
7. Resource Mobilisation	MAF/RSS and SSFC	June 2012
8. Monitoring the Implementation Schedule	Minister	Continuous

6.1 EFFECTIVE DATE

This Horticulture Development Policy shall be applicable when approved by the Council of Ministers, and shall apply until modified by appropriate legal dispositions. The tenets of the policy shall have long-term application, and shall continue in force indefinitely, until specifically modified by law. Any such modifications shall not change the intent or philosophy of this Horticulture Policy.

6.1.1 Applicability

All public and private stakeholders in the Agricultural sector shall respect the content and spirit of this Horticulture Development Policy. A legislative proposal and regulations shall be introduced in due course to establish the South Sudan Horticulture Development Policy.

6.1.2 Monitoring and Evaluation

To keep South Sudan Horticulture Development Policy current and applicable to changing conditions, MAF/RSS will from time to time make recommendations to the Government on relevant issues of importance to ensure achievement of vibrant and sustainable horticulture value chain system. The responsible Ministers shall consider such recommendations; discuss them with State Ministers responsible for the Agricultural Sector, consult with other stakeholders, and, in accordance with applicable laws, issue modifications to South Sudan Horticulture Development

Policy and regulations, in order to improve suitability and applicability to current conditions without changing the long-term intent or legitimacy.

Plans of action shall be prepared and updated from time to time to serve as guides to both public and private actors and stakeholders in the implementation of actionable components of this policy. The plans of action shall be based on the goals, objectives and strategies outlined in this policy and shall specify (1) outputs and activities expected from the recommended interventions, (2) implementation time frames, (3) responsible and/or implementing institutions, and costs, budgets and other resource requirements. The MAF/RSS shall oversee preparation of plans of action but all participating institutions will be invited to propose specifics relating to components for which they are responsible.

APPENDIX 1

INDIGENOUS HORTICULTURE SPECIES

Table 1: Wild plants used as vegetables

Scientific name	Family	Parts of plant used
Abelmoschus spp.	Malvaceae	Fruits, leaves
Amaranthus graecizans	Amaranthaceae	Leaves
Amaranthus sp.	Amaranthaceae	Leaves
Cleome gynandra	Capparidaceae	Leaves
Corchorus fascicularis	Tiliaceae	Leaves
Corchorus olitorius	Tiliaceae	Leaves
Cucumis melo var. *agrestis*	Cucurbitacaeae	Fruits
Portulaca oleracea	Portulacaceae	Leaves, stems
Sonchus carnutus	Astercaceae	Leaves (green salad)
Sonchus oleraceus	Asteraceae	Leaves

Table 2: Indigenous vegetables cultivated

Scientific name	Family	Parts of plant used
Abelmoschus esculentus	Malvaceae	Fruit
Allium cepa	Anarylidaeae	Bulbs
Capsicum frutescens	Solanaceae	Fruit
Citrullus vulgaris	Cucurbitaceae	Fruit
Corchorus olitorius	Tiliaceae	Leaves
Cucumis melo	Cucurbitaceae	Fruit
Cucumis melo var. *agrestis*	Cucurbitaceae	Fruit
Cucumis sativus var. *flexusus*	Cucurbitaceae	Fruit
Cucurbita maxima	Cucurbitaceae	Fruit
Eruca sativa	Crufiferaea	Leaves
Portulaca oleracea	Portulacaceae	Leaves, stems
Vigna unguiculata	Leguminosae	Leaves

TIMEFRAME AND BUDGET FOR THE STRATEGY

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
1. Output 1: Create an enabling policy and business environment for horticultural producers															
1.1 Create positive business environment to encourage private sector investment **Activities**:															
1.1.1															
1.1.2															
1.1.3															
1.1.4															
1.2 Facilitate access to microfinance and other financing source by smallholder horticulture producers. **Activities:**															
1.2.1															
1.2.1															
1.2.3															
1.2.4															
1.3Promote and facilitate appropriate land allocation.															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
Activities.															
1.3.1															
1.3.2															
1.3.3															
1.3.4															
1.4 Encourage ad facilitate appropriate mechanization and other productivity **Activities:**															
1.4.1															
1.4.2															
1.4.3															
1.4.4															
1.5 To undertake measures to reduce taxes and duties. **Activities:**															
1.5.1															
1.5.2															
1.5.3															
1.5.4															
1.6 Through PPP investment develop and effective scheme of service															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
Activities:															
1.6.1															
1.6.2															
1.6.3															
1.6.4															
2. Output 2: Develop an aggressive and sustainable national and international marketing and trade strategy for South Sudan horticultural															
2.1 Conduct comparative and competitive advantage and value chain studies on horticulture commodities produced in South Sudan. **Activities :**															
2.1.1															
2.1.2															
2.1.3															
2.1.4															
2.2 Promote contract farming and formation of farmer organisations or groups to increase farmer bargaining power and benefits from economies of scale.															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
Activities:															
2.2.1															
2.2.2															
2.2.3															
2.2.4															
2.3 Undertake coordinated development and management of markets by concerned ministries and local authorities. **Activities:**															
2.3.1															
2.3.2															
2.3.3															
2.3.4															
2.4 Farmers, processors and exporters will be encouraged to make South Sudan horticulture produce more competitive. **Activities:**															
2.4.1															
2.4.2															
2.4.3															
2.4.4															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
2.5 Implement quality management standards that include food safety, environmental, occupational health. **Activities:**															
2.5.1															
2.5.2															
2.5.3															
2.5.4															
2.6 Brand products and produce to promote local consumption and export of horticultural produce with unique attributes, e.g., organic products. **Activities**															
2.6.1															
2.6.2															
2.6.3															
2.6.4															
2.7 Diversity production of horticulture product including indigenous and exotic fruits, vegetables and flowers, coffee and tea based on local and international demand.															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
Activities:															
2.7.1															
2.7.2															
2.7.3															
2.7.4															
2.8 Promote and facilitate competitive and integrated horticulture value chain agribusiness production and marketing services. **Activities:**															
2.8.1															
2.8.2															
2.8.3															
2.8.4															
2.9 Monitor and analyze trade flow to establish South Sudanese comparative and competitive advantage. **Activities:**															
2.9.1															
2.9.2															
2.9.3															
2.9.4															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
2.10 Encourage RSS embassies to aggressively promote the country's horticultural products. **Activities:**															
2.10.1															
2.10.2															
2.10.3															
2.10.4															
3. Output 3: Collaboration with the Department of Plant Protection in Directorate of Agriculture Production.															
3.1 Collaboration with the Department of Plant Protection in the Directorate of Agriculture Production, establish South Sudan Plant Health Inspectorate Service and other regulatory agencies. **Activities:**															
3.1.1															
3.1.2															
3.1.3															
3.1.4															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
3.2 Facilitate the introduction of disease and pest resistant varieties and cultivars. **Activities:**															
3.2.1															
3.2.2															
3.2.3															
3.2.4															
3.3 Effectively utilise biological control agents. **Activities:**															
3.3.1															
3.3.2															
3.3.3															
3.3.4															
3.4 Introduce, develop and promote safe and prudent use of appropriate chemical pesticides. **Activities:**															
3.4.1															
3.4.2															
3.4.3															
3.4.4															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
3.5 Promote integrated pest and disease management (IPM) methods and practices. **Activities:**															
3.5.1															
3.5.2															
3.5.3															
3.5.4															
3.6 Identify, import and test drought and heat tolerant varieties of horticulture seeds and planting materials in collaboration with South Sudan Seed Council (SSSC). **Activities:**															
3.6.1															
3.6.2															
3.6.3															
3.6.4															
4. Output 4: Improve efficient and timely access to information and national and export market															
4.1 Enhance the flow of information within the horticulture value chain.															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
Activities															
4.1.1															
4.1.2															
4.1.3															
4.1.4															
4.2 Develop predictive models for drought and flood episodes. **Activities:**															
4.2.1															
4.2.2															
4.2.3															
4.2.4															
4.3 Develop a database of agro-climatic data for all agro-ecological zones. **Activities:**															
4.3.1															
4.3.2															
4.3.3															
4.3.4															
5 Output 5: Enhance knowledge and skills in horticulture production, value addition and marketing															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
through short, medium and long term technology transfer training and continuing education programmes.															
5.1 Invest consistently in training and continuing education in all relevant fields. **Activities:**															
5.1.1															
5.1.2															
5.1.3															
5.1.4															
5.2 Invest in functional literacy programmes especially for women farmers to equip them with basic reading, numeracy skills needed for horticulture production and marketing. **Activities:**															
5.2.1															
5.2.2															
5.2.3															
5.2.4															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
5.3 Promote change of attitude among smallholder producers; including women disadvantaged groups and youth. **Activities:**															
5.3.1															
5.3.2															
5.3.3															
5.3.4															
5.4 Organize exchange visits to create awareness to selected smallholder producer groups and decision makers. **Activities:**															
5.4.1															
5.4.2															
5.4.3															
5.4.4															
5.5 Establish and out-scale farmer field schools to all horticultural production areas and markets to mitigate harvest and post-harvest losses in horticulture.															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
Activities:															
5.5.1															
5.5.2															
5.5.3															
5.5.4															
5.6 Adapt and disseminate know-how about appropriate soil and water management and drainage technologies. **Activities:**															
5.6.1															
5.6.2															
5.6.3															
5.6.4															
5.7 Enhance business skills and knowledge and entrepreneurship in the horticulture industry through training and provision of continuing education and advisory services. **Activities:**															
5.7.1															
5.7.2															
5.7.3															
5.7.4															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
6 Output 6: Facilitate improvement of infrastructure and transport system for moving horticultural products from producers to consumers.															
6.1 Promote construction and use of physical infrastructure to increase shelf life of horticultural products. **Activities:**															
6.1.1															
6.1.2															
6.1.3															
6.1.4															
6.2 Develop market and marketing channels and physical facilities at local regional and international levels. **Activities:**															
6.2.1															
6.2.2															
6.2.3															
6.2.4															
6.3 Develop household, community,															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
watershed and national level schemes for water retention, harvesting and management. **Activities**															
6.3.1															
6.3.2															
6.3.4															
6.3.5															
6.4 Promote greenhouse systems and technologies to South Sudan through private sector agribusiness investors. **Activities:**															
6.4.1															
6.4.2															
6.4.3															
6.4.4															
6.5 Introduce food for asset programmes **Activities:**															
6.5.1															
6.5.2															
6.5.3															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
6.5.4															
6.6 Promote development and adoption of alternative sources of energy such as wind and solar power, biogas. **Activities:**															
6.6.1															
6.6.2															
6.6.3															
6.6.4															
6.7 Develop and operationalize water harvesting infrastructure and irrigation to facilitate year-round expansion of horticulture production in collaboration with the Ministry of Water Resources. **Activities:**															
6.7.1															
6.7.2															
6.7.3															
6.7.4															
6.8 Introduce and promote private sector, community-based, and other appropriate commercially viable horticulture storage and cold/cool-															

Output and Activities	Budget	PHASE I						PHASE II							
	US$	2012		2013				2014		2015		2016		2017	
		Q1	Q2	Q1	Q2	Q3	Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4	Q1-Q2	Q3-Q4
chain business enterprise arrangements and operations. **Activities**															
6.8.1															
6.8.2															
6.8.3															
6.8.4															
6.9 Advocate for increased budgetary allocations toward development and upgrading of farm-to-market feeder roads, transport systems, rural infrastructure and public utilities. **Activities:**															
6.9.1															
6.9.2															
6.9.3															
6.9.4															