



REPUBLIC OF RWANDA

Ministry of Agriculture and Animal Resources

Strategic Plan for the Transformation of Agriculture in Rwanda Phase III

PSTA III, Draft I

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PART I. Strategic Guidelines for Transforming Rwandan Agriculture

Ch. I.1. Achievements, Challenges and Opportunities

I.1.1. Context and Achievements

Rwandan agriculture has made major advances in the last decade. Productivity and production for a number of crops have sharply increased and consequently improved rural incomes. It is therefore vital to continue this rapid progress in order to further reduce rural poverty. The primary role of this Strategic Plan is to set guidelines for scaling up recent successes in the Agricultural sector in addition to reviewing challenges and defining programmes and policies that will further increase sector growth.

In the short term, continued rapid food production increases are essential to ensure further reductions in rural poverty and mal-nutrition. In the long term, the goal is to move Rwandan agriculture from a largely subsistence sector to a more knowledge-intensive, market-oriented sector, sustaining growth and adding value to products.

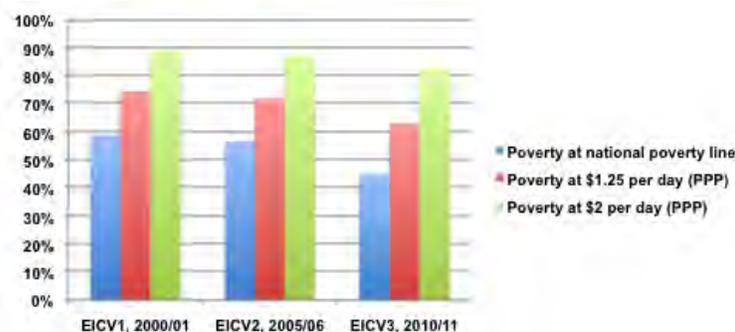
Rwandan agriculture requires intensification. Limited land availability means that yield increases of staple crops are vital to provide income for rural families. However, investing in high-value crops while also exploiting the opportunities offered by staple crops will be key for the future. In the recent past there has been significant expansion of interventions which drive productivity gains, including successful land consolidation, increased areas under irrigation and protected against soil erosion, and expansion of cultivated terraces. Access to important services including agricultural finance and proximity extension services has been improved, and farmers are now more likely to use specific crops according to agro-climatic zones. There has also been an increase in the use of inputs, including agrochemicals and improved seeds. Distribution of livestock through programs such as Girinka has expanded the animal resource sector. Since the implementation of the Crop Intensification Programme, yields have also grown significantly. Post harvest infrastructure investments and subsidised transport has improved product quality and market accessibility. As a result of these interventions, production of maize, wheat, roots and tubers, soybeans, rice and cassava as well as meat and milk, horticulture products have increased.

Overall production of export crops has also increased, as has the value of premium products on the international market. The unit value of Rwandan coffee has increased generating substantial increases in incomes among coffee smallholders even though the production volume has declined. Coffee and tea command quality premiums and are Rwanda's largest exports by a wide margin.

Production increases have had a positive impact on both sector growth and reducing

rural poverty. The overall agricultural growth rate between 2000 and 2010 was 5.8% per annum. It is also noteworthy that in 2010 68.2% of rural households had access to livestock with most rural households having goats (53%) cattle (47.3%), chickens (45.5%), and pigs (24.1%). Over the last five years, extreme rural poverty fell from 39.5% to 26.4% (EICV III) driven largely by interventions to move agriculture from subsistence to a market economy. Malnutrition also declined between 2006 and 2009, where households with food shortages or in borderline nutritional conditions declined from 34.6% of the population to 21.5%. (NISR). However, as noted in the EDPRS II Thematic Guidance Note on Rural Development, many poor Rwandans continue to live at levels very far below the poverty line. Since agriculture contributes 73% of the nation's employment, progress in reducing poverty will have to continue to come largely from the agricultural sector.

Figure 1. Percentage of the Population in Poverty, 2000/01 to 2010/11



I.1.2. The International Policy Context

African leaders have pledged to support the transformation of agriculture, as evidenced in the *Comprehensive Africa Agriculture Development Programme* (CAADP) developed under African Union auspices of the New Partnership for Africa's Development (NEPAD). At the East Africa level, the support is demonstrated by the formulation of the *Agriculture and Rural Development Strategy for the East African Community*. Trade linkages within the region will provide the basis for future opportunities for Rwandan agriculture.

Rwanda can market a number of agricultural commodities in the DRC and Burundi and currently exports wheat flour and other products. The country is currently working to improve the cross-border trade in coordination with neighbouring countries. The private sector is increasingly engaged in development forums and programmes in Africa. The most recent example is the *Grow Africa* initiative that is bringing together investors and governments to promote private investment in African agriculture. *Grow Africa* is a country-led initiative, which seeks to strengthen investor interest in agriculture by building increased trust and shared commitment. This is accomplished by sharing information, lessons and best practices drawn from existing and successful projects;

engaging all stakeholders including smallholder farmers; and addressing key issues such as gender inclusion, land tenure, climate change and resource management. Rwanda is among the first countries selected by *Grow Africa*. MINAGRI has presented an investment blueprint and proposals to its forums for an audience of private investors.

I.1.3. The National Policy Context

Rwanda's *Vision 2020* describes the development objectives of the country. It is a key socio-economic policy document on which all national and sectorial policies and strategies are based. It describes modernisation of agriculture and animal husbandry as one of the six pillars for building a diversified, integrated, competitive and dynamic economy, which will raise the country to the level of middle income countries. *Vision 2020* seeks to transform the economy by bringing about a rapid increase in growth and a significant reduction in poverty. By 2020 it is expected that the country will have reached middle-income status with per capita GDP of US\$ 1240 from US\$ 220 in 2000. Other goals include a reduction by more than one-half in the incidence of poverty and extreme poverty and improvements in a range of other standard of living indicators.

The agricultural sector is accorded a high priority in the Government's programmes and involves moving the sector from subsistence to commercial production, and to achieve that purpose attracting increased investment. Agriculture is a major engine of growth for the economy and its modernisation is one of the six components (pillars) of the *Vision*. The target for agricultural growth until 2020 has recently been revised upward to 8.5 % per year. The key national and agricultural sector-related targets of the *Vision 2020* are shown in Table 1. *Vision 2020* recognises that the private sector will drive the economy and the State's responsibility will be to initiate, pilot, co-ordinate and monitor efforts. It is worth noting that some *Vision 2020* goals, such as GDP per capita and the percentage of farmers using fertilisers, were already exceeded in 2010, and have since been revised to drive further improvements

Table 1. Selected national and agriculture-related goals in *Vision 2020*

Indicator	2000	2010	2020
Population (million)	7.7	10.1	12.71
GDP/capita (constant 2000 US\$)	220	400	1240
Poverty (%)	64	40	20
Agricultural GDP growth (%)	9	8	8.5
Agriculture as % of GDP	45	47	25
Agriculture as % total population	90	75	50
Land under "modernised" agric (%)	3	20	40
Fertiliser application (kg/ha/annum)	0.5	8	45
% banks' portfolio to agric. Sector	1	15	20
Soil erosion protection (% total)	20	80	90

land)			
Coffee exports (tonnes)	19,000	44,160	n.a.
% of coffee production fully washed	1 (2001)	63	n.a.
Coffee export earnings (US\$ m)	22.0 (2002)	117.1	n.a.
Tea export earnings (US\$ m)	26.8 (2003)	91.0	n.a.
Agricultural exports	n.a.	n.a.	"5-10 times 2000 value"

Source: Ministry of Finance & Economic Planning, Revised 2012

The Millennium Development Goals

Under the seven Millennium Development Goals (MDGs), Rwanda has set a number of targets and is committed to reach them by 2015 (NISR and MINECOFIN, 2007). Only a few of the 49 indicators that monitor the progress toward each of the goals relate specifically to the agricultural sector. However, the realisation of the MDGs depends upon agricultural growth as a dominant economic sector.

Progress towards meeting some of the MDG targets has been encouraging. The proportion of the population living in poverty was reduced from 47.5% to 44.9% between 1990 and 2011/2012. In that same period the share of underweight children under 5 was reduced from 29% to 11%. The number of girls enrolled in primary school now exceeds the number of boys, the under-five mortality rate has fallen from 141 in 1990 to 76 in 2011/12, and the maternal mortality ratio has fallen from 1,300 to 487 in the same period. The proportion of the population using an improved source of drinking water rose from 64% in 2006 to 73.6% in 2011/12, and the number of people per 100 with telephones rose from 6.2 to 45.2 in those 5+ years. These achievements illustrate Rwanda's potential to achieve the ambitious targets set by national and international policies.

The Economic Development and Poverty Reduction Strategy

In 2007 the Government of Rwanda developed an Economic Development and Poverty Reduction Strategy (EDPRS I). The EDPRS II is now under preparation and the structure and objectives of this Strategic Plan are closely coordinated with the thematic guidelines and priorities of EDPRS II. As the country's medium-term economic development plan EDPRS II establishes the framework within which the Government seeks to consolidate the process of changing the structure of the economy and to move towards achieving or surpassing the long-term targets laid down in Vision 2020 and in the Millennium Development Goals. It aims to increase the pace of economic growth and further reduce the incidence of poverty, and lay the basis for sustainable growth into the future. EDPRS II has four pillars: economic transformation, rural development, productivity and youth employment and governance. The first three are particularly of relevance to the agricultural sector.

This agricultural sector strategy, PSTA III, builds on the first two sector strategic plans, PSTA I and PSTA II. PSTA III is designed in line with the four thematic areas of the EDPRS II. The relationship between each EDPRS II thematic area and the sector is described below:

EDPRS Thematic Area 1: Economic Transformation

- Agriculture must drive diversification of the economic base with more value added. Agriculture can interact with services and industry to drive a shift from production toward services through key programs including post-harvest facilities, marketing, input distribution networks, advisory services, mechanisation services and others
- Enhanced role of the private sector in agricultural value chains

EDPRS Thematic Area 2: Rural Development

- Increased rural household incomes through agricultural diversification and closer links with the value chains
- Modernisation of agriculture to improve quality and quantity of production
- Natural resource and environmental management
- Rural infrastructure development to drive growth

EDPRS Thematic Area 3: Productivity and Youth Employment

- Education and skills development in the sector
- Entrepreneurship training focused on youths and venture capital funding for new youth-owned enterprises

EDPRS Thematic Area 4: Governance

- Institutional strengthening in the sector
- Providing a framework for a greater role for the private sector
- Mechanisms of inter-institutional coordination
- Participatory approaches to research and extension, involving farmers

Agriculture is recognised in EDPRS II as a priority sector of the economy that will both stimulate economic growth and make the greatest contribution to poverty reduction. The overriding policy objective for the sector is for rural household incomes to increase in a sustainable manner and for the sources of income to be diversified while, at the same time, household food security is strengthened. The government is expected to develop markets and to support the private sector to assume an increasingly important role. Public investments and policies will create an enabling environment in which the cost of doing business is reduced so that private sector operators can flourish.

EDPRS II also emphasizes gender equality. In the agricultural sector important steps need to be taken in programmes to promote gender equality, such as recruiting more female extension agents, taking gender preferences and requirements into account in agricultural research programmes, and including women representatives in water users associations. Women make up 53% of the population and participate in subsistence agriculture more than men and therefore gender has been integrated as an important crosscutting issue in this Strategic Plan.

EDPRS II highlights various challenges in the agricultural sector.

- Growth has trailed that of industry and services over the last decade
- Potential for further productivity gains in high value and staple crops
- Diverse constraints affect agricultural value chains:
 - Quality and quantity issues with raw materials and inputs
 - Limited rural infrastructure with high costs
 - Lack of working capital and long term credit
 - Low human capacity
 - Limited sector innovation
 - Small existing base of agro-processing
- Limited private sector investment due to perceived high risks in agriculture
- Need to ensure environmental sustainability and address soil erosion and water management concerns while increasing agricultural production

This strategy aims to tackle these challenges through continuing to adopt a dual approach of both production increases and commercialization. Further investment in relevant research, inputs and capacity building for farmers should continue to drive yield gains. Value chain development and initiatives to attract private investment should support the growth of agro-processing and value addition.

1.1.4. Sources of Growth and Agricultural Growth Targets

Rwandan agriculture in the last five years has been driven mainly by improvement in land management, irrigation, input provision, and increasing the national livestock herd. These actions have been accompanied by the strengthening of cooperatives to coordinating planting of crops on newly constructed hillside terraces, marketing, training for the improvement of coffee quality, and the rapid development of a decentralised rural finance network. However, the first four thrusts, regarding land, water, fertiliser and cattle, have increased sector's productivity and consequently improved rural incomes and reduced the incidence of poverty.

Some of the more tangible results of these programmes in these four areas have included:

- Maize yields increased almost four-fold between 2000 and 2010.
- Wheat yields increased by 2.5 times in that period.

- When the hillside terraces are put into operation, potato yields increase by 6 fold on the same land.
- The *One-Cow Programme* and other livestock developments have increased rural household living standards. Now 47% of farm households have at least one cow and 53% have at least one goat.
- Improving coffee quality and marketing have resulted in higher coffee prices.
- Legume production increased by 73% from 2005 to 2010, while cassava production registered notable increases from 2007 to 2010.

It is important to note that the acceleration of agricultural growth came about largely in production for the domestic market, in staple crops and in dairy and meat products. Coffee is a major exception to this, and also some of the increases in production of food crops have found outlets in neighbouring countries, particularly Congo and Burundi. The main products exported within the region include: dry beans, potatoes, maize, rice, cassava flour, maize flour, poultry products and live animals.

The major sources of growth will continue to be important, and new focus areas have also been added. In PSTA III, growth will be driven by key interventions:

- Continued investment in land husbandry, irrigation and capacity building for farmers.
- New approaches to aggregate production of smallholders, for both the domestic and export markets, which will improve market access and yields.
- Continued investment in CIP.
- Substantial increases in coffee yields through application of fertilisers.
- Increases in tea production through expanding the area under cultivation
- Expansion of the fisheries sub-sector, under a new management approach.
- Expansion of the *One-Cow programme* and its diversification to include other livestock species.
- Value chain development to facilitate agro-processing
- Reduction of post-harvest losses

Rice cultivation in new marshland irrigation schemes can result in increasing yields from 1.5 MT/ha to 7 MT/ha for one cropping season per year. The growth target of 8.5% per year for the next five years for the sector is ambitious but achievable based on recent experiences.

For this to happen,

- The total land area planted will have to increase by 5%, taking into account new irrigation, the double cropping permitted by irrigation and hillside terraces, and the fact that some of the terraces on especially steep land allow systematic cropping where there was virtually none before.
- The area planted for grains increases from 22% of the total area to 26% (partly because of marshland development), and grain yields increase by 80% on average.

- Post-harvest losses are reduced to 5 per cent.
- The area in horticulture increases by one-third, again partly because of marshland development but also because of opening of new market opportunities.
- The average value of horticulture output per hectare (yields plus the price advantage of shifting to more valuable crops) increases by a total of 15%.
- The average value of coffee per kg increases by 15% in total.
- With fertilisation coffee yields increase at least 30% on average.
- Fisheries production increases four-fold.
- The area planted in potatoes increases by 10%, due to expansion of the area in hillside terraces, and the national average of potato yields increases by 50%.
- Owing to the expansion of the above crops, the share of total area planted in all other crops declines by 2 percentage points, but the economic yield per hectare of those crops increases by 20%.
- The numbers of livestock increases by 40%.
- In line with its comparative advantage, the new policies for pyrethrum (see below), a crop in which Rwanda has a clear comparative advantage, increase its plantings by 20%.

I.1.5. Challenges and Opportunities

In spite of the progress in reducing the numbers of poor households, the challenge of poverty reduction remains high since 80% of the rural population consists of subsistence farm families with an average land size of 0.59 ha (EICV III).

In light of these developments the first strategic priority of this plan, is sustaining the initiatives that have increased productivity and have generated strong agricultural growth, both through agricultural and animal resource intensification and research and training of farmers. Greater volumes of production will need markets, processing facilities and value addition to create growth. Domestic production continues to be hampered by lack of post-harvest facilities. Therefore the second key strategic priority is value chain development, strengthening markets for agricultural products and attracting the private sector to add premium to productivity increases. Strengthening value chains and reducing losses through post-harvest facilities will also generate more income and employment in activities like product processing, packaging, and marketing.

There are important opportunities and scope for continued growth on the supply side (rice and wheat are examples), but for some products the strategic questions are beginning to shift toward how to increase quality and reliability of supplies and how to generate more value added from the primary products. Domestic demand should continue to grow. Higher family incomes and population growth have generated increased demand for the sector's production, and should support increases in production. Regional markets provide outlets as well as wider international markets which have absorbed coffee, tea and horticulture. However, coffee and horticulture

products face stiff international competition. Generating, identifying and tapping domestic, regional and international demand will remain a challenge.

Another fundamental challenge for Rwanda in the regional context and for wider international markets is the high cost of inputs, which affect competitiveness. Electricity prices are the highest in the region raising operating costs for agro-processing. Rural wage rates also are high compared to those in Burundi and Uganda but lower than in Tanzania and DRC. Transport costs for the broader world market are also comparatively high for Rwanda because of its distance from the sea.

Domestic demand for food products tends to follow fairly predictable paths. As families rise out of poverty, their initial income increments tend to be spent in large measure on food. As incomes grow, the additional amount spent on food declines as income increases. Over the longer run this effect means that the rate of increase of demand for food products in the domestic market will inevitably slow down and become lower than the rate of growth of GDP. Therefore, if domestic food production is to continue to grow quickly (in value as well as volume) some combination of the following four effects needs to occur:

- 1) At the margin, production shifts toward higher value and quality products (e.g., horticulture, greater variety of dairy products) and forms of products (e.g., varieties that are more acceptable for processing, better quality fresh products, and processed foods vs. fresh foods);
- 2) Sales to the regional market increase;
- 3) Sales to the international (extra-regional) market increase; and
- 4) Domestic production substitutes for some of the volume of imported products.

Care needs to be taken that the import substitution is driven by greater competitiveness of the domestic products, and not because tariffs or import barriers are imposed on the imported products. Only through improved production quality and simultaneously increased demand for agricultural production that sustainable agricultural growth can occur.

Ch. I.2. Goals and New Directions

I.2.1. Goals and Strategic Orientations for Rwandan Agriculture

The broad goals of Rwanda's Agricultural Transformation Strategy are:

SECTOR GOALS
<input type="checkbox"/> To transform Rwandan agriculture from a subsistence sector to a knowledge-based, value creating sector.
<input type="checkbox"/> To grow as rapidly as possible, both in relation to production and commercialisation, in order to increase rural incomes and reduce poverty.

The broad transformations in the sector that will result from successful implementation of the Strategy are to transform:

SECTOR TRANSFORMATIONS

- From *guaranteeing food availability* to *generating food security through economic growth*.
- From farmers as *passive recipients* to farmers as *active market players with new skills*.
- From government as a *direct provider* to government as *facilitator of the private sector*.
- From supplying the purely domestic market to *exporter to the region*.

For this to happen, it is essential that the private sector play an expanded role, and that management capabilities be strengthened in all areas, from farms to producer organisations to marketing programmes. Accordingly, strengthening of entrepreneurship and business skills and the promotion of private investment in the sector is an important strategic orientation

BENEFITS OF PRIVATE SECTOR LEADERSHIP IN THE SECTOR

- Economic and managerial sustainability of agricultural enterprises and value chains.
- Access to and timely provision of the specialised expertise that the sector will increasingly need.
- Access to resources required for investments in productive facilities.
- Pricing of inputs and outputs based on market criteria and creating greater efficiency.

With a greater role for the private sector, the role of government shifts to more of a supporting role and public expenditure allocations change. Government also needs to ensure the regulatory framework is conducive to investment in the sector.

PUBLIC EXPENDITURE PRIORITIES IN AGRICULTURE

- Development of basic growth factors (physical infrastructure, human capital);
- Programmes to catalyse innovation and modernisation in products and product handling, processing and marketing;
- Encouragement of entrepreneurial initiatives in the sector; and
- Sharing investment costs in key facilities with the private sector, always under an exit strategy for the public sector.

Food security will be enhanced by rapid growth because household income levels are the principal determinants of household food security.

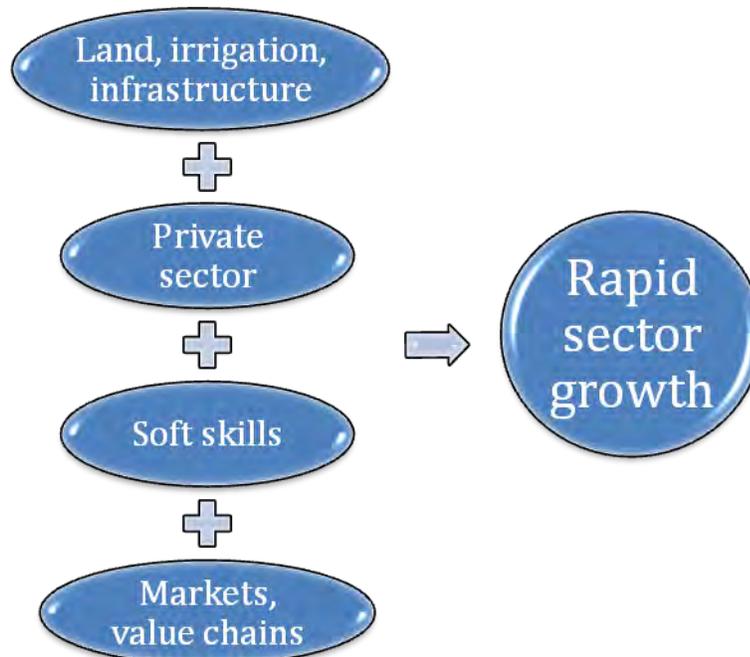
BASIC FOOD SECURITY POLICIES

- ❑ The overriding objective is to increase rural household incomes and reduce poverty. Household food security follows from that, and is enhanced further by education and health care.
- ❑ Food stocks are advisable under appropriate operational guidelines in light of fluctuating world grain production.
- ❑ Targeted support should assist undernourished families to improve their nutritional status.

I.2.2. New Directions for Rwandan Agriculture

Rwandan agriculture is entering a new era. As discussed, rapid growth in recent years has been achieved by government interventions. While most of these physical interventions need to be continued, continued progress will also depend on increasing soft skills in the sector, on raising the technological and skill level among farmers and attracting entrepreneurs who have those skills. Private sector investment will also be necessary to improve efficiency and orient the sector to a more sustainable paradigm which accesses and responds to market demands.

Therefore, in addition to the original formula of land, water and infrastructure development, three other principal pillars are added to the Strategy for moving the sector forward:



Supporting these strategic pillars are cross-cutting programmes, particularly in the areas of institutional strengthening, gender equity, and environmental sustainability.

I.2.3. Public and Private Sector Roles

Implementing the Strategy requires a different approach. In the past decade, the Government has made enormous strides in improving the physical environment for agricultural growth, has created a dairy sector in which very large numbers of farm families participate, has created a fertiliser distribution network, has laid foundations for stronger cooperation among farmers for the purpose of bulking up output, and has initiated the development of modern post-harvest infrastructure with investments like packing plants, the cold storage facility at the airport, the cassava and soybean processing plants, and milk cooling centres.

Nevertheless, continuing agricultural development will require a progressive shift in the roles of the public and private sectors. The latter needs to take greater responsibility for value chain improvements including investment, management of facilities, quality control, farmer advisory services, input marketing and other tasks. At the same time, the public sector needs to play a strong monitoring and regulatory role and act as a facilitator for partnerships and key actions.

Often the private sector is better placed to assess markets and to commit resources on the basis of those assessments. It is hard to overstate the importance of catalysing a leading role for the private sector in agriculture and inculcating a business attitude in farmers. The public sector will continue to play a role in:

- Training programmes in small-scale entrepreneurship and cooperative management;
- Establishing a venture capital fund for new enterprises and market development in agriculture;
- Risk-reducing guarantees for contract farming relationships;
- Sharing the cost of agricultural advisory services, which although in many cases contracted by farmer organisations, will be at least partially supported financially by the government in the medium term;
- Public-private partnerships for additional new post-harvest facilities;
- Investment in irrigation schemes;
- Support for agricultural research;
- During a (possibly long) transitional period, continuing support for vouchers for input purchase by poorer farm households.

Given these important demands on public sector resources, the development of partnerships with the private sector takes on increasing urgency. Equally, it is important that public resources are channelled to the sector in ways that are designed to promote efficiency. This means targeting support on actions that have sector-wide reach, such as infrastructure development (including irrigation and terracing), strengthening of human capital, and interventions that catalyse private sector commitment of resources, rather than selecting individual crops to support.

The Government will also present to the private sector opportunities for building irrigation schemes and for leasing non-irrigated land, with full benefits to farmers on the

land in all cases. This kind of participation from the private sector could accelerate the construction of needed infrastructure in the sector, introduce new production technologies, and increase production while ensuring that farm incomes reflect the benefits of the projects.

For the sector to continue to experience rapid growth, it needs to exploit its comparative advantage in crops, varieties and livestock development, and market signals are the most reliable indicators of comparative advantage. As an example, it will be desirable for the public sector to phase down its selective support of specific crops (like maize and wheat), and in its place institute a programme of generalised support for input purchase (via vouchers) independent of the crops chosen by farmers. This will enable the programme to promote greater input use in crops like coffee, bananas and oilseeds as well as grains.

Equally, the private sector can become directly involved in aggregating production for markets. Rapid growth in a sector of smallholders raises questions of aggregation as smallholders need to combine their efforts and output for marketing as well as other purposes. The traditional approach to bulking up has been to form cooperatives of farmers that agree to plant their contiguous plots in the same crop for a given season. That has worked well in irrigation schemes and on hillside terraces, but the approach needs to be complemented with technical assistance on production and marketing, as well as management training for cooperatives, and with marketing assistance. Hence it is demands resources. For this reason, and given the vital role of bulking up production in order to link small farmers with markets, this strategy posits alternative models for bulking up and land use. All of them can be implemented in the sector, with the choice depending on the crop and farmers' preferences.

With the drive to decentralise policy implementation, the public sector must also consider what responsibility lies at which level of government. Development of policy, budget allocation and overall monitoring will be implemented at the national level, in addition to efforts to lever private sector investment and remove value chain constraints. Districts will have increasing responsibility for extension, production gains and short term evaluation of programs. Therefore at multiple levels the public and private sector have different responsibilities in the implementation of PSTA III.

I.2.4. What Is New in PSTA III?

- Markets and value chains: PSTA III emphasizes, putting markets and value chains first (coffee, dairy, horticulture, cereals, others);
- Quality: Strong emphasis is put on product quality through PHHS and improved production technologies (wheat, potatoes, maize, coffee, fruit and vegetables);
- Increased scale: New arrangements for bulking up production of small farmers and utilizing land –vital for linking smallholders into better markets;
- Increased exports: An export support programme including certifications;
- Increased role of private sector:

- A programme for private sector irrigation development;
- Active support for other forms of private sector involvement in agriculture (risk guarantees, venture capital fund, PPPs; supportive legislative frameworks);
- Professionalization of farmers: Reorientation of incentives in agricultural extension (to respond better to farmers) and privatizing a large part it and extending it to cover business advisory services and marketing assistance;
- New research orientations: market requirements (packaging for milk, coffee quality, preferred rice varieties, oil seeds, etc.), livestock feed, fisheries;
- Develop new value chains: Power up the fisheries sector for its large untapped potential;
- Expand targeted poverty reduction programmes: Extending Girinka to small ruminants, poultry, rabbits and swine;
- Modernization: Promote mechanisation appropriate for small farmers;
- Access to finance: Restructure rural finance to make it more resistant to shocks.

These activities are explained in the following pages of the Strategic plan and if implemented, will increase production per hectare generating income and food security for rural households. Agro-processing will create non-farm employment, and value chain development and private investment will drive economic transformation. In this way PSTA III will facilitate realisation of EDPRS II and the goals of Vision 2020.

PART II. Strategic Programmes

Programme 1: Agriculture and animal resource intensification
Programme 2: Research, technology transfer and professionalisation of farmers
Programme 3: Value chain development and private sector investment
Programme 4: Institutional development and agricultural cross-cutting issues

Each of the four Programmes is expressed in a set of actions for operational purposes. This part of the Strategy describes those actions and the reasons behind them. The overall guiding principle has been to select **actions that will release bottlenecks to further development in the respective areas** and thus will contribute to higher incomes and reduced poverty. A few of the actions have the long-term purpose of promoting sustainability or efficient use of resources in the sector, while others have been selected for their potential to increase production, incomes and nutrition levels in a relatively short span of time.

There are many synergies among programmes. The cooperative development program, for example, supports other strategic thrusts including land consolidation, providing products for markets, developing private agricultural advisory services that respond to farmers' priorities and watershed management programmes. Agricultural research can support a number of value chains with more market-oriented research and other vital

areas such as livestock feeding strategies. The development of entrepreneurship and the creation of more opportunities for the private sector support quality enhancement and bulking up quantities as well as aiding in the penetration of higher value markets.

Ch. II.1. Programme 1: Agriculture and Animal Resource Intensification

SP 1.1. Soil Conservation and Land Husbandry

Since 90% of domestic cropland is on slopes ranging from 5% to 55%, investing in land management structures and training are central to improving productivity. The actions under this programme involve scaling up the successes of both PSTA I and PSTA II with progressive and radical terraces, accompanied by soil fertility management and soil erosion control.

Through substantial investment in soil erosion protection under PSTA II, the 2010 target of 80% of the land area under soil erosion protection was achieved. More than 45,700 hectares of hillsides with slopes up to 40% have been terraced. Water management infrastructure has been built, lime and organic fertiliser applied, water users associations formed and farmers trained in irrigation. For less steep slopes progressive terracing and agroforestry have proven successful in reducing erosion and increasing the economic returns from the land.

However, there is still a lack of information on soil fertility and erosion rate. Furthermore, in addition to construction of terraces, a systematic programme of soil conservation needs to be implemented throughout the country. Soils are easily degraded and lost and good soils are the basis of successful agriculture. Soil erosion results in decreased soil depth and loss of plant nutrients and therefore this strategy proposes soil protection and management programs at the watershed level which encompass both cultivated and uncultivated lands. Seven pilot projects of integrated watershed management have already been implemented, and these must be scaled up. Soil testing capabilities also need to be expanded and the nutrient levels of inputs monitored. This strategy shall address these needs, to both improve information around soil management and continue to develop a sustainable approach to land husbandry and soil protection.

Lines of action

SP 1.1.1. Land Protection Structures.

The objective of SP1.1.1 is to scale up the terracing projects to an additional 69 sites covering 3,500 hectares in 2013 and 2014 and 6,000 additional hectares in the next two years. Sites will be selected according to improved criteria that have been developed, taking into account social, economic and technical watershed factors. Best practice developed from experiences gained in infrastructure development, working with farmers' cooperatives, marketing information and crop selection will be applied.

Training will be provided in liming, use of manure as fertiliser and mulching, and fertiliser test plots will be instituted as per SP 1.1.4 below.

SP 1.1.2. Training on Crop Residue Management.

Training on crop residue management will be provided prior to the fallow season to encourage composting. Extension staff will train farmers and district agronomists, and the subject should be included in Farmer Field Schools (FFS).

SP 1.1.3. Agroforestry.

An agroforestry program will be developed in coordination with agricultural research, marketing and the provision of technical advisors for tree crops (including leguminous trees). Farmers will receive advice on agroforestry packages. The implementation of these activities will be coordinated with the IWM projects. There will also be an analysis of how the Crop Intensification Programme (CIP) and Land Use Consolidation (LUC) can be harmonised with the country's need to promote permanent soil-cover and agroforestry. Protocols will be established and issued to farmers and land users in Kinyarwanda.

SP 1.1.4. Improve the Understanding of Rwanda's Soils.

This sub-programme will include several related activities:

1. ***Establish provincial level soil and plant testing laboratories and rehabilitate existing*** ones to test nutrient and chemical characteristics and provide staff with appropriate training
2. ***Test fertilisers in different agro-ecological zones:*** Testing will be carried out to determine nutrient levels and the appropriate application rates for each zone. When the testing is finalised, agronomists will be informed of the appropriate rates for their local areas.
3. ***Recalibrate soil loss models and re-estimate soil loss rates*** in major project areas, and evaluate soil erosion control effects of alternative control measures, and disseminate results among farmer cooperatives and project staff
4. ***Design a soil database questionnaire for erosion control assessment***
5. ***Develop a GIS tool for the automation of the interpretation of ortho-photo imagery or satellite imagery***
6. ***Establish a GIS Unit an active Soil Information System (SIS)*** that would incorporate historical soil data, new soil information and storage and manage data from the erosion control assessments.

SP 1.2. Irrigation and Water Management

Irrigation was identified as a key strategic activity in PSTA II. Rwanda signed the CAADP compact which establishes in its Pillar I on Land and Water management that the Government should allocate at least 2% of public funds for irrigation development. Irrigation is important to increase agricultural productivity through allowing multiple cropping and reducing vulnerability to weather shocks. This plan therefore proposes

continued investment in irrigated agriculture, to harness Rwanda's fresh water resources and increase production, and provide security to rural households.

The total area under irrigation was just over 24,000 ha in 2012, including 1,442 ha of hillside irrigation, 22,554 ha of marshland irrigation and around 100 ha of small scale irrigation (garden plots with rainwater harvesting). MINAGRI has a Mid-Term (2011-2017) plan with a development target of a total of 100,000 ha area under irrigation of which 65,000ha will be Marshland and 35,000 ha Hillside.

This irrigation development will take place in line with the National Irrigation Policy, the law on Water Users Associations and the Irrigation Master Plan. The lines of action in this strategy will reinforce implementation of these key documents.

Lines of action

SP 1.2.1. Public Sector Irrigation Development.

By the end of 2016 MINAGRI will develop 60,000 additional Ha of irrigated land, two-thirds in marshlands and one-third on hillsides. This effort will continue to develop small-scale irrigation based on water catchments where feasible, and train farmer organisations in developing such systems. It will be important to construct the systems in such a way that irrigation is available for two or three cropping seasons per year. As part of this activity, MINAGRI will work with Districts to develop District Master Plans for Irrigation. Efforts will be made to get youth cooperatives involved in planning for irrigation projects and implementing them, especially small-scale systems.

SP 1.2.2. Private Sector Irrigation Development.

Earmark 20,000 hectares of land for private sector irrigation development, and in 2020 evaluate the effectiveness of the private schemes vs. the public sector schemes. Private schemes would operate in the following way:

1. Their size would range from a minimum of 25 ha to a maximum of 500 ha.
2. The Government would define eligible areas for irrigation in consultation with farmers who own the land. .
3. In agreement with farmers, the consolidated land for a scheme would be offered to private investors in the form of a long term lease. Investors would submit bids for the right to construct and operate the scheme. Lease contracts would cover all farmers on the land in a given area, and the monies for each year's lease payments to farmers would be deposited in advance of the year in a trust fund that in turn would make disbursements to the farmers at agreed intervals during the year.
4. The leases would be tradable assets at a freely negotiated price between private parties. Leases could be renewed upon satisfactory performance and agreement of the farmers.
5. The leaseholder would agree to pay farmers an annual fee at least equal to what the farmers normally received from working the land.
6. The leaseholder would design, in consultation with farmers, construct, operate

and maintain the scheme, and would give priority to the participating farm families in hiring labour to cultivate and harvest the fields and to work in post-harvest activities. The leaseholder will also rehabilitate the scheme in the event that normal maintenance proves insufficient to forestall system degradation in the future.

7. In the event the leaseholder failed to respect terms of the lease, s/he would be given a period to remedy the problems and, lacking a remedy, the Government would repossess the scheme with compensation to the leaseholder for investment costs and operate it or auction it to a new leaseholder.

SP 1.2.3. Irrigation extension and capacity building.

Extension programmes will accompany irrigation development to ensure effective and sustainable system management. WUA will also be established and members trained on key issues including schistosomiasis control.

SP 1.2.4. Applying Lessons from Integrated Watershed Management Experiences and Development of IWM in Additional Watersheds.

The steps will include reviewing the experiences of the seven integrated watershed management projects, extracting the lessons, and deciding what modifications are needed in the approach to make it successful and economically sustainable in other areas;

SP 1.2.5. Develop Hydrological Information for Watershed Management.

Collaborate with MINIRENA to improve hydrological monitoring networks that better predict seasonal flows including droughts, floods and small-scale shortages. Key activities are:

1. *Develop a permanent network of collection stations for hydrologic, physiographic, hydrometeorology, and water quality data*, along with systems for storage, retrieval, sharing and analysis of the data.
2. *Develop water balances for all key watersheds.*
3. *Develop models and capacities for assessing and forecasting important events related to water*, including flood and drought prediction, effects of climate change and water quality.

SP 1.3. Agricultural Mechanisation

Currently there are relatively low levels of domestic mechanisation and manufacturing of the required tools. However, agricultural mechanisation has many benefits. It contributes to improving productivity of cultivated land and facilitates expansion of cropping areas, improving overall food security. Mechanisation also eases labour constraints including seasonal shortages, and reduces the requirement for physical drudgery, leading to both improved production and lifestyles for farmers. Agro-processing and value addition through mechanised equipment can also generate employment and raise rural incomes.

Certain interventions are already facilitating the mechanisation process. A Power Tiller Assembly Line in the SEZ is under construction, to assemble and improve distribution of power tillers. MINAGRI has also set up a workshop facility in Kafue, Kigali where new imported machinery is stored in the workshop, and then sold through a lease agreement with farmers where the machine serves as collateral. When the farmer has made the full capital and interest payment, they will own the machinery. A mobile workshop has also been established to install and service farm machinery. This strategy aims to accelerate the mechanisation process, through further provision of necessary equipment, tools and training.

Lines of Action

SP 1.3.1. Assessment and Development of Mechanisation Options.

This activity will assess the performance and profitability of mechanisation options in the different terrains, and identify the most appropriate solutions. Efforts can then be made to facilitate the mechanisation of different areas. Power tillers can serve as an entry point for mechanisation as they are relatively cheap (costing approximately \$1500) and are efficient, versatile and manoeuvrable on small farms.

SP 1.3.2. Facilitating Investment and Financing for Mechanisation.

There is scope for enterprises of different scales to invest in mechanisation, and development of local hire services will provide mechanisation options to the small-scale farmers. MINAGRI will develop pre-feasibility, feasibility and ROI studies on these enterprises and make the information known to stakeholders. Investors can choose PPP frameworks or purely private investments. Currently there are few actors engaged in leasing farm machinery to farmers and co-operatives. The Government will work to expand the sources of credit facilities through other banks that have good reach in rural areas. Since the machinery itself is used as collateral for loans, the Government can motivate and engage a range of financial institutions, including microfinance, in providing mechanisation loans to farmers.

In order to establish efficient and effective distribution channels for equipment, spare parts and repair services, as well as other supplies such as fuel and oil MINAGRI will help establish service centres through business ventures with co-operatives or private entrepreneurs (with PPP models) in Eastern province. The public sector will then gradually withdraw and promote local business in rural areas by encouraging local entrepreneurs to set up centres for machinery services and spare parts themselves in other parts of the country.

MINAGRI will work with the Rwanda Bureau of Standards (RBS) to establish standards and safety regulations for spare parts, implements and machinery, and to certify machinery.

SP 1.3.3. Incorporating Mechanisation in Irrigation Schemes.

The versatility of engines fitted on tractors and power tillers to pump water and deliver it through hoses makes it easier for smallholders to utilize mechanisation for irrigation

on a small scale. Fertilizer application can be done more efficiently on small and medium size farms if applied using motorised pumping of water.

SP 1.3.4. Training for Mechanisation.

During off-seasons, trainers will be sent at regular intervals to run training sessions for farmers. The trainers will teach basic operations and safety issues of power tillers, tractors and other equipment. Driving schools in each sector will be authorised to teach and license driving of tractors and power tillers. Special emphasis will be given to training women in appropriate kinds of machinery. Training and upgrading sessions for artisans and automobile mechanics will also be conducted in each sector. Farmers and service providers will also receive training on how to make the integrated use of farm machinery with other inputs more efficient. Such courses will be offered and sponsored at educational institutions such as ISAE.

SP 1.4. Agrochemical Use and Markets

There has been an increase in fertilizer use since 2007. The fertiliser application rate in CIP areas has reached an annual average of 29 kg/ha/year in 2011-2012 compared to a national average of 2 kg/ha/year from 1969-1993 and of 4.2 kg/ha/year from 1998-2005. This has increased crop yields, especially for maize and wheat. Maize yields increased from 0.65 MT/ha in 2000 to 2.5 MT/ha in 2010, while wheat yields increased by 2.5 times during the same period.

Fertiliser has been used primarily on maize, wheat, rice, potatoes, coffee and tea. These crops are among the strongest in market linkages, which gives farmers a better chance to recover the fertiliser expenditures plus profits. However, application rates are still below recommended levels for these crops and for other crops it will be profitable to begin to apply fertilisers. Increasing the volume of production will require demonstration to farmers of the benefits of fertiliser use and widening the input subsidy programme. Increasing fertiliser use is the first strategic focus of this sub-program.

Fertiliser distribution and sales is also a key focus area. Subsidizing the international transport of fertiliser from Dar Es Salaam is expensive, and there have been difficulties in the printing and distributing of subsidy vouchers and monitoring their use. There is also a lack of profitability in the distribution chain, which results in high default rates on fertiliser loans among farmers and agro-dealers. The second strategic goal is therefore to establish a private distribution and sales network for fertiliser and other agro-inputs, without losing the incentives for farmers to apply inputs. Fertiliser will also be better matched to different soil conditions and cropping patterns. A strategic drive for improvement and privatisation of the distribution system for fertiliser and other agro-inputs must support input demand among the farmers.

Lines of Action

SP 1.4.1. Policy for Successful Privatisation of Input Markets.

To create a policy environment favourable for privatisation of the fertiliser distribution system the following options must be considered, and those most appropriate will be implemented: 1) End the price controls on fertilisers, and allow the price to vary. 2) Take measures to end the monopoly of an agro dealer working with one distributor. 3) Encourage distributors and dealers from the region. 4) Phase down the transport subsidy over four years, apply it to private imports of fertilisers, and at the end of that period eliminate Government import of fertilisers. 5) Continue for at least six more years the subsidy on fertilisers and make it applicable to all inputs including seeds, and to all crops. 6) Introduce a smart card system in place of the vouchers.

SP 1.4.2. Improve the input distribution network

Strengthen the network of private agro dealers and distributors through training and policy measures that increase the profitability of firms in the network. Scale up fertiliser and seed distribution by combining advisory services with input distribution and use of microfinance to recover costs. Phase down the transport subsidy on fertilisers and encourage fertiliser imports by the private sector.

SP 1.4.3. Improve the infrastructure for fertiliser distribution.

Conduct a feasibility study for a fertiliser blending plant and encourage private investment, or a PPP to build one. Construct additional fertiliser storage capacity under PPPs.

SP 1.5. Seed Development

Sufficient quantities of quality seed are a critical resource for agricultural development. In Rwanda, there is strong public sector involvement in all seed sector components and further private sector involvement is needed. There have already been significant achievements in regards to the legal framework concerning seeds, increased production, and the building up of basic infrastructure for reinforcing production and quality control. Under PSTA II, farmers received both high quality seed varieties and advisory services in seed and crop production.

However, challenges remains, which this strategy will tackle. These challenges include:

- Inadequate quantities of seeds produced nationally for some crops which forces the Government to import seeds particularly for maize and wheat.
- Poor quality of internally produced seed; quality deterioration has occurred during seed production and storage.
- Poor sanitary status of seed; the prevalence of crop pests and diseases.
- Poor germination of seeds distributed under the CIP to date.
- Limited effective distribution

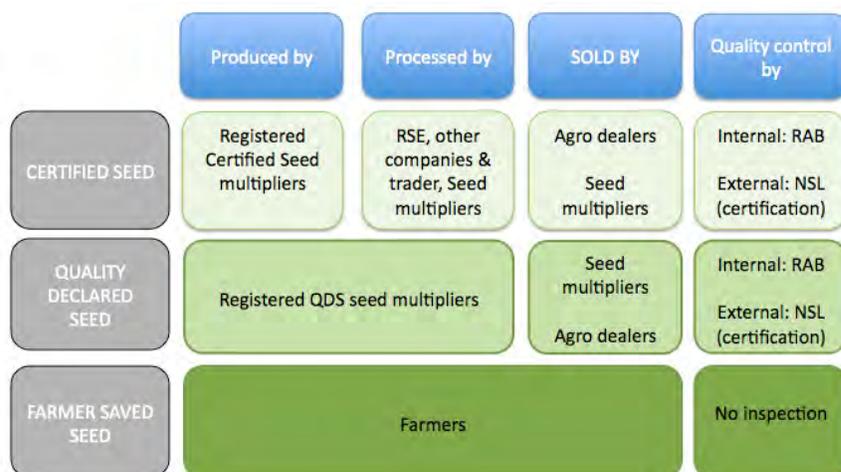
Therefore, this strategy has two key orientations, to both develop production, quality and maintenance of seeds, and to establish demand for high quality seed and ensure that demand is met and maintained through effective distribution and capacity building in relation to seed use.

Lines of Action:

SP 1.5.1. Implement a Formal Seed System. The objectives of a formal seed system are to: (1) provide appropriate seed varieties to farmers, (2) develop and identify new and more productive varieties, (3) multiply and distribute these on a timely basis and at an acceptable price for farmers and (4) maintain quality control through training and regulatory systems.

Rwandan farmers are exposed to the three different seed grades (Figure 2):

Figure 2. Production, Processing, Sales and Quality Control of Seeds by Grade



Certified Seed is the highest quality, most expensive and produced by certified actors. RAB and the National Seed Laboratory are responsible for quality control, and the Rwanda Seed Enterprise buys, processes and sells the seed through a network of private agro-dealers. MINAGRI will work with RSE to produce and distributed certified seeds for CIP crops.

Quality declared seeds are a high quality formal seed grade locally produced by private QDS seed multipliers, with lower levels of quality control than certified seed. Currently, the demand for quality seeds in crops such as maize, wheat and potatoes is greater than supply.

To increase the amount of certified seed that reaches farmers, the professional seed chain need to be improved through the steps below. Emphasis should be on specific crops that represent the most promising markets for growth of the private seed sector.

- Increased public sector research and production of breeder, pre-basic and basic seed
- Improved support for private seed multipliers through provision of technical and business skills training, facilitating links with relevant bodies and ensuring access to inputs including seeds, fertilisers, pesticides and finance

- Reinforced internal (RAB) and external (National Seed Laboratory) quality control procedures and sensitization delivered on importance of quality control
- Revision and implementation of the national legislative framework for seeds.
- Expansion of the National Gene Bank to collect and conserve germplasm to ensure genetic variability
- Implementation of initiatives to encourage farmer demand through demonstration plots and farmer training on available varieties and characteristics.
- Facilitation of improved links between farmers, small traders, agro-dealers and microfinance institutions

SP 1.5.2. Facilitate the Import of Seeds and Planting Materials subject to sanitary regulations, and develop and disseminate regulations and guidelines. The development of a national seed industry will concentrate only on a few crops, and quality seeds will be needed for many others, including high-value horticulture crops. Seed imports should be allowed while building local capacity.

SP 1.6. Livestock Development

Livestock development to increase the quantity and quality of animal products (milk, meat, eggs, fish and honey) will have two important benefits. First, it will improve nutrition levels through consumption of animal protein. Second, animal resource sector development has the potential to increase rural incomes through processing and sales. The One-Cow (Girinka) programme has been successful in raising rural household incomes and also in increasing milk production in the country. Since the beginning of the programme in 2006, a total of 134,548 cows have been distributed to poor families by June 2012 and 40,352 cows have been “passed on to other families”. Milk production has also increased from 50,000 MT in 2000 to 450,000 MT in 2012. The corresponding ‘One Cup of Milk per Child’ school feeding program has contributed to reducing malnutrition levels. The national goal is to double milk production and consumption by 2017, targeting consumption rates of 80 litres per person per year.

For efficient milk production, it is important to consider access to feed and water for cattle. This strategy targets feed and other aspects of milk production and handling. Milk sheds support dairy development, but their specifications will differ according to location. Producers in the Kigali milk shed have a larger numbers of improved dairy cows and receive a higher price for their milk because of their proximity to the large urban market. There is potential to increase milk production in this milk shed and in the Gishwati plateau where rainfall is high and land is suitable for forage production. The Eastern Province has 60% of the cattle population, but experiences long dry seasons and therefore conserved fodder will be necessary.

The One Cow program will also be developed. There are four key intervention areas. First, different ownership models like joint ownership of cows will allow more poor families to benefit from the milk produced. Second, communal grazing areas for families with very little land will facilitate improved delivery of extension services including

insemination and disease control. This re-shaping of the program will be combine with improved follow up training for current beneficiaries will ensure the cows continue to be a productive resource and that the poorest families have access to the program. The final initiative will be expansion of the programme through provision of small ruminants, rabbits, swine and poultry to the poorest families. The animal resource sector development supported by this strategy will therefore increase milk and meat production and reduce poverty and malnutrition.

Lines of Action

SP 1.6.1. Improve milk quality, seasonality and productivity in line with the Dairy Strategy.

To increase milk production and improve the dairy value chain, the Dairy Strategy will be implemented. Dairy specialists will be trained at Masaka and vocational centres for jobs in milk handling, transport, testing, processing and merchandising. A specialised course of extension agents will work will livestock farmers and milk collectors. Also, in order to increase milk production, cattle feed and water regimes will be improved.

SP.1.6.2. Improved Animal Nutrition.

Assess current and future fodder requirements against current availability, identify gaps and develop a strategy to increase fodder production through fodder plots at community level and distribution of fodder seeds, combined with extension work to promote adequate feeding and provision of water to livestock. The provision of dry season feed through the use of fodder banking and agricultural by-products will be discussed. Farmers will also be trained on the use of salt blocks and supplying other nutrients. Conduct research into optimal feeding and appropriate fodder species for different agro-ecological zones. Support the development of the compound feeds industry and quality control.

SP 1.6.3. Improve Animal Genetics in line with the 2012 Animal Genetics Improvement Strategy.

Low livestock productivity is often attributed to low genetic potential and improving livestock genetics is a key intervention to increase animal productivity. Both cattle and small livestock will be targeted for genetic research and improvement through implementing the 2012 Animal Genetics Improvement Strategy. The following interventions shall also support genetic improvement:

1. ***Develop the capacity of Masaka Bull Station***, turn over and upgrade the current bull team and develop a national herdbook
2. ***Develop a cow identification programme*** for the crossbred and purebred dairy cows and carry out productivity trials by breed and cross under actual field conditions. Cow production information could be recorded and uploaded through the MCCs
3. ***Expand farm level artificial insemination of cows and pigs***
4. ***Develop and enhance research programs around small livestock***, including a genetic enhancement program for goats, sheep, poultry, rabbits and pigs,

5. *Establish genetic research initiatives around emerging livestock sectors* including fisheries and apiculture

SP 1.6.4. Develop Diversified Smallholder Meat Production in line with the 2012 Meat Industry Strategy.

The animal intensification programme will include goats, chicken, pigs and rabbits. The rationale is to increase meat production. In addition, meat production processes at both the commercial and smallholder level needs to be improved. For poultry, swine, small ruminants and rabbit production, there is a need for a project, similar in scope as PADEBL, aimed at improving the small stock industry. Implementation of the 2012 Poultry Strategy will be the first step. Development of intensive semi-commercial (smallholder) and commercial poultry and pig industries to meet increasing meat demand, and enhancing the growth of the compounded feed industry is a priority for improving meat production. Feasibility studies on concentrate and by-product feed production, transportation, and utilisation will be conducted as and the scale and strength of the poultry and swine industries are based on the availability of quality animal feed.

To promote dissemination of quality breeds for smaller animals, it will be important to put in place nuclei centres for multiplication in rabbits, goats, sheep, pigs and poultry.

For promoting beef production, one option is to utilize the consolidated land leasing option that is spelled out in SP 3.1.1 below, in order to aggregate land for feedlots, while providing increased incomes to the smallholder owners of the land. The bull calves that result from breeding on the farms (and that become steers) can be most productively managed in feedlots where their weight gain can be greater because of use of better feed regimes, watering practices and other forms of management.

SP 1.6.5. Extension of the Girinka programme.

Girinka will be expanded. First to speed up poor family access to the programme, communal areas should be promoted (Ibikumba by'umudugudu). This will allow poor families to keep their cows in one place and share feeding and watering. This will also facilitate better delivery of veterinary services including insemination and disease control. Second, in the case of very poor households, joint ownership models of productive cows should be promoted, so that more households can benefit from milk production. In order to ensure the program is continuing to deliver, beneficiaries should receive follow up training on care for their cows and how to make use of their asset. Finally, to encourage the development of the small stock sector, the model shall be replicated to distribute small animals including goats, sheep, rabbits, pigs and poultry.

SP 1.6.6. Strengthen the Veterinary Service Network.

Existing veterinary provisions are promising. Veterinary drugs and equipment are in adequate supply, there is one government agro-vet in each sector, and RAB has well equipped animal disease testing laboratories in Rubirizi and is developing an extra laboratory at Nyagatare for testing for major animal diseases. However, there are challenges in skills and access of vets and in the management of certain diseases such as

mastitis, which affects milk quality. Disease management and animal health will be improved through the following:

1. ***Expansion and promotion of the Animal Health Workers programme***, and training of farmers in key diseases, including mastitis prevention
2. ***Increased training of para-vets*** within RAB and development and upgrading of post-secondary training for para-vets
3. ***Increased access to veterinary services*** through provision of vet stations at MCCs and increased availability of transportation for veterinarians and agro-vets to reach their clients.
4. ***Encouragement of private veterinary practice*** through training community animal health workers who can provide basic health services under the guidance of an agro-vet or veterinarian.
5. ***Develop and implement a program of mastitis prevention***
6. ***Develop and disseminate materials on best practice in disease management***

SP 1.7. Nutrition and Household Vulnerability

Progress has been made to address malnutrition but more needs to be accomplished. Malnutrition is the direct result of an inadequate diet and/or infection and manifests through acute malnutrition or wasting, chronic malnutrition or stunting and micronutrient deficiencies. Chronic malnutrition is due to long term inadequate nutrition of children and leads to stunting where an individual is too short for his/her age. Stunting is also related to poor sanitary conditions, repeated infections, diarrhoea and inadequate care. Hence, stunting is an indicator of poverty, chronic malnutrition and a marker of poor health status and poor micronutrient intake. Children under the age of five are particularly affected and the prevalence of stunting among children under five in Rwanda is 43%.

Iron deficiency, or anaemia, is the most common nutritional deficiency and it affects particularly women of reproductive age and children, due to their high requirement of iron. It can impair cognitive and physical development, and Rwanda is now facing a mild to moderate public health threat as 38% children under five and 17% of non-pregnant women are anaemic.

Taken together, stunting and anaemia impose economic costs and contribute increased risk of infection and mortality, delays in physical and mental development, and decreased work capacity.

Improving nutrition faces multiple challenges, including limited knowledge of basic nutritional practices and inadequate feeding, with insufficiently diverse diets and inappropriate infant feeding. Food security also relates to the stability of rural incomes, and events including crop failures and seasonal scarcities can reduce access to food. In Rwanda, poor rural households which farm small plots of land are the most food insecure, and a multi-sectoral framework of integrated interventions is required to

tackle this, in line with the Nutrition Action Plan 2013-17. However, this part of the strategy highlights direct interventions which can make a significant positive impact.

Lines of Action

SP 1.7.1. Develop a Programme of Bio-fortified Foods,

This programme will especially focus on beans fortified in iron, and through the extension service and with student volunteers conduct a nutritional education programme, in alignment with a concerted approach with MINASANTE on the nutrition education strategy. There will be a promotion campaign for planting and consuming bio-fortified foods, in all rural ubudehe categories, especially the lowest where high levels of food security have been identified (CFSVA 2012).

SP 1.7.2. Develop a Programme of Training in Kitchen Gardens

This will include with donations of seeds and other inputs to vulnerable families. These gardens are especially effective in helping poor families overcome micro-nutrient deficiencies. However, specialised training of trainers is required to develop a corps of agents who can effectively promote kitchen gardens. Gardens, like smallholder farming, are part of social systems. It is best to develop home gardens that meet family needs and resources rather than the ideals of specialists in agriculture, health or land-use planning.

SP 1.7.3. Expansion of One Cup of Milk Per Child Programme

This programme will provide demand for increased milk production and improve childhood nutrition. Households should also be sensitised to the benefits of milk consumption for both children and adults. Nutrition education is vital to ensure the success of the intervention. A coordinated approach together with MINASANTE on Behaviour Change Communication (BCC) should be adopted.

SP 1.7.4. Continue to maintain a National Strategic Food Reserve

The National Strategic Reserves (NSR) have been established to address potential shocks to food supply that the market or other government programs cannot or have not adequately addressed thus helping to improve food security. This consists of selected staples maize and beans. Care needs to be taken to not distort the functioning of markets when purchases are made and when stocks are released for renewal of the reserves. The reserve guards against extreme fluctuations in world markets for staples.

SP 1.7.5. Strengthen Rwanda's Food Security Information System.

This system will bring together quantitative information from different sources and will be processed into indicators that are related to decision-making. The information flow should be simplified and harmonised with systematic data transfer through the district that is supposed to pre-process and consolidate data to MINAGRI and its agencies for effective monitoring. The system should be rationalized and harmonized among all stakeholders. Food security services will also be carried out more regularly.

Ch. II.2. Programme 2: Research and Technology Transfer, Advisory Services and Professionalization of Farmers

SP 2.1. Research and Technology Transfer

Agricultural research has made notable advances in recent years, from virus-free cassava varieties and disease-resistant maize, to more nutrient-rich varieties to combat malnutrition (maize high in lysine and tryptophan, beans high in minerals, cassava rich in vitamin A), to higher yield beans and rice, to management techniques for plant pathogens, and other accomplishments. The scientific team in RAB has the capacity to take on diverse issues of importance for the sector, although Rwanda's agricultural research staff is still younger and less advanced in terms of postgraduate degrees when compared with staff in other countries of the region. More resources and partnerships with international agricultural research entities are required to strengthen capacity.

Research should facilitate both the production gains and commercialization which are the drivers of this strategic plan. Research should therefore focus on increasing crop and livestock productivity, improving natural resource management, meeting market requirements and responding to farmers' needs.

Lines of Action

SP 2.1.1. Market-related Research.

In addition to the on-going research in RAB, develop and support lines of research devoted to market-related issues and crops with strong market potential. Commodities like coffee, wheat, rice, soybean and horticulture present opportunities for this kind of research. For this purposes, in many instances it will be productive to enter into collaborative research agreements with agro-industries.

SP 2.1.2. Long-term Research on Multi-crop Rotations

Conduct research on multi-cropping including agroforestry systems, for yields, disease resistance and input use rates.

SP 2.1.3. Quality Planting Material.

In coordination with the private sector, establish a programme for developing quality seed and planting material for traditional and non-traditional crops.

SP 2.1.4. Research on Farmers' Fields.

Research carried out in collaboration with farmers, on their own fields, has significant benefits. In coordination with District authorities and the JAF, decentralize part of the research portfolio to conduct activities on farmers' fields that involves farmers and responds to their main priorities. The program will emphasise varietal adaptation,

fertilisation, use of lime, trace elements and organic fertilisers, cultivation practices, intercropping options, disease and pest control, and water management.

SP 2.1.5. Competitive Research Funding.

Institute a mechanism for competitive research funding under which any entity or group of entities may submit proposals for the competitive award of research funding. RAB may apply on its own or jointly with other institutions, for example with tea estates for research on high-quality tea clones. Equally, other institutions may make proposals on their own for research funding.

SP 2.1.6. Funding and International Collaboration.

Develop and implement a strategy to secure long-term funding support for public-sector agricultural research, with provision for eventual participation of the private sector in the funding, and for collaboration with international agricultural research entities, international universities and academies. Distance learning programmes and study visits will be encouraged.

SP 2.2. Extension and Proximity Services for Producers

Proximity services have made substantial progress in recent years but need further strengthening and some restructuring. This strategy is framed according to four fundamental principles. The first principle is greater involvement of the private sector to support the move to commercialised farming through improved practices and management of production, processing and marketing of products. The second principle is greater farmer participation to empower farmers and foster a knowledge intensive sector. Farmer field schools will be a central tool in this approach. The third principle is the development of institutional incentives for services to respond to farmers' needs and priorities. This includes the option that farmer groups can select and contact advisory services as required. The final principle is ensuring opportunities for farmers to share their experiences through local platforms. By embracing these four principles, farmer organisations will be market-oriented and knowledge intensive, and extension services will respond to farmers' needs. Lessons learnt will be multiplied and shared at the field level.

Lines of action

SP 2.2.1. Extending the Farmer Field Schools (FFS)

Following the 2011 "Practical Guidelines for the Establishment of a Farmer Field Schools (FFS) Programme for Rwandan Conditions", FFS will be expanded through increasing the number of trainers and facilitators. A FFS coordinating unit shall be established to guide and supervise the training of trainers and the implementation of the program. It will also be charged with ensuring channels of communication with agricultural researchers and extension agents, and trainers and facilitators.

SP 2.2.2. Facilitating relationships between cooperatives and farm advisors.

Government will act as facilitator to help cooperatives contact farm advisors for key issues. Public sector cost sharing will support the programme. Cooperatives will be able to choose and select advisor. A pilot will be established and evaluation, and if successful, the program will be expanded.

SP 2.2.3. Expansion of agricultural advisory services.

Following the guidelines of PSTA II, establish a permanent training service for extension agents, including district agronomists, which includes intensive, up-to-date training modules on relevant agricultural topics including value chain development, post harvest handling and storage and marketing. Training modules could be certified, and include contact with agricultural researchers, specialised international experts, and site visits. Provision should be made to encourage the development of female extension agents and their participation, as well as that of district agronomists, in these training programmes. A continuously updated database will be established of those advisors who have received training and been certified, and Districts and farmer groups will have access.

SP 2.2.4. Establish local forums for farmers and agricultural stakeholders.

In coordination with District authorities, support and facilitate 'platforms' at different levels where farmers and other persons involved in agriculture meet frequently in the field, exchange information and coordinate activities for agricultural development. These District Agricultural Platforms will be initiated as sub-committees of the JADF similar to the platforms piloted under the PASNVA project. The support programme will strengthen the platforms' capacities and mechanisms to host farmers and facilitate farmer-to-farmer exchanges, and to assess needs for advisory services and orient service providers. It will evaluate the results of the farmer exchanges and work to make them as productive as possible.

SP 2.3. Farmer Cooperatives and Organisations

In order to increase production and commercialization of the agricultural sector, farmer cooperatives will play a key role. This sub-program builds on the successful development of farmer cooperatives under PSTA II, and has five key objectives:

1. Develop **management and entrepreneurial** capacities in farmer cooperatives and other organisations
2. Support **farmer organisation participation in activities of higher value**, both at the farm level and in post-harvest handling and agro-processing
3. Develop farmer organisations as vehicles to **improve farmer access to inputs**, always in response to farmer initiatives
4. Develop rural **women's organisations** and groups within cooperatives
5. Promote the **growth of social capital** to provide farmer organisations with an enduring foundation for the long run.

Cooperative management has sometimes been a challenge but has improved with the support of efforts like RSSP2 and SPREAD for coffee. In many cases members now perceive significant benefits from cooperative membership, especially receiving more information, sharing knowledge, and having greater access to production finance. This strategy will further improve cooperative management and farmer engagement.

Lines of Action

SP 2.3.1. Implement a capacity building programme for agricultural organisations.

In coordination with MINICOM, develop and implement a long-term programme of capacity building in village organisations, cooperatives, rural women's organisations and other farmer organisations, with emphasis on those that are dedicated to input purchase and output marketing and those that are linked to processing facilities. Define the institutional framework and the roles of all relevant entities as well as the goals of the programme and the means of achieving them. This programme should give special attention to promoting and strengthening rural women's organisations.

The training should be tailored to the types of production of the organisations and it should cover organisation purposes and organisational forms, governance, participation and communication, building social capital, business planning, financial management, contract types and negotiations, marketing and input markets, quality controls and post-harvest management, sources of technical assistance at the farm level and other relevant topics. Training will also inform cooperatives of opportunity to access inputs in line with SP 1.4 Input Markets and SP 3.8 on post-harvest infrastructure. The most successful cooperatives will receive further training on a sustained basis, and the program will be expanded.

SP 2.3.2. Develop a Framework for Share Companies in Farming Areas,

The legal basis for share companies will be established, (this sometimes occurs under the commerce code). The approach will be discussed with groups of farmers and pilot schemes of share companies established.

Ch. II.3. Programme 3: Value Chain Development and Private Sector Investment

SP 3.1. Creating an Environment to Attract Private Investment, Encourage Entrepreneurship and Facilitate Market Access

SP 3.1.1. Bulking up Production and Associative Forms of Farming

The main requirements for successful exportation of agricultural products are market appropriate quality, quantity, and reliability. Quantity requires sufficient land devoted to a given crop, which is a challenge in a sector composed almost entirely of very small farms. Meeting this challenge and finding ways to bring small farmers together for

producing and selling high-value crops represents a major opportunity to raise incomes for rural families.

Different modalities have been developed and implemented throughout the world but experience has made it clear that the approach of aggregating production via cooperatives is slow and therefore by itself insufficient to facilitate a rapid transformation of agriculture. This strategy proposes alternatives for the concept of consolidation of landholdings. The main alternatives are as follows:

1. Facilitated Contract farming. Under this approach a marketing agent, exporter or processor makes purchases from substantial numbers of small farmers. The farms don't have to be contiguous, but the model works best if they are located in the same area, to facilitate provision of technical advice and inputs, product collection, storage and transportation. Government facilitators can work to educate both parties of the benefits of working together over the longer term, and government can also offer the risk guarantees of SP 3.1.3 to encourage the formation of the business partnerships.

2. Satellite farming. This is a variant of contract farming under which a larger farm (nucleus farm) produces a high-value product and serves as a demonstration for surrounding smaller farms (out growers), which over time agree to plant the same crop, follow the same cultivation procedures, and sell to the same buyer. The elements of the scheme include provision to out growers of high-yielding varieties and rental to them of farm machinery, plus training on post-harvest management and guaranteed purchase of the crop.

3. Consolidated land leasing. Under this approach, an agricultural entrepreneur reaches a lease agreement with a number of farmers whose lands are contiguous. The lease should be for a least 8 or 9 years, preferably 10 to 15 years, to provide enough time for the entrepreneur to realize a full return on the investment. In the start-up years, when production has not reached its peak, the lease agreement usually offers the small farmers at least the income they earned before, and then in subsequent years it is ratcheted up. In addition, small farmers and their families will be the first to be hired on the consolidated farm.

4. Cooperatives. As Rwanda's experience has shown, cooperatives can be effective in consolidating land for the purpose of cultivating larger areas of the same crop. It is important to recognize that under this model each farmer tills his or her own land, instead of working land collectively, which has not proven effective wherever tried in the world. However, by itself the cooperative model does not deliver the technology transfer that occurs under the previous three models. It needs to be complemented with the approaches on proximity services mentioned above and linked to the market.

Lines of Action

SP 3.1.1.a. Creation of a **farm management unit** responsible for facilitating land use consolidation projects such as facilitating contract negotiation and supervision of their

implementation. Promotion of cooperatives and their training takes place under existing programmes for cooperatives.

SP 3.1.2. Training for Agricultural Entrepreneurship

The agricultural setting offers opportunities for new businesses, which give rise to enterprises with potential to augment family income and free rural populations from dependence on small plots of land. Some barriers to faster development of new businesses in agriculture include lack of knowledge of market opportunities, lack of knowledge of business operations, lack of market information, technical issues, and business issues. This strategy aims to tackle these knowledge gaps.

Lines of Action

SP 3.1.2.a. Training sessions on business and marketing skills: Short term training sessions will be organized for rural farmers with a special focus on youth and women. Groups will be organized in different parts of the country on a rotational basis where training completion will involve development of a business plan. Trainees will be provided with support during training. On completion, they will be linked to SACCOs and other microfinance institutions and financing facilities to access appropriate financing for start-up enterprises, based on their business plans. The training model will be evaluated and scaled up as appropriate.

SP 3.1.2.b. Design and implement a programme for **training members of women's farming organisations in entrepreneurship**, including accounting, cost control, business planning, and marketing. The mentorship model, in which existing entrepreneurs donate time for training emerging entrepreneurs, can be used as one of the approaches for training women's organisations. Women farmers will also participate in peer learning study visits.

SP 3.1.3. Public-private Partnerships and Risk Management in Value Chains

There are many kinds of public-private partnerships (PPP). The simplest kind is an implicit partnership in which the public sector extends the network of infrastructure (electricity, roads, water and sanitation) and the private sector utilizes that infrastructure to build productive facilities. The Draft PPP Law outlines key criteria which should be referred to when developing PPP which strategic activities will be aligned to.

PPP negotiations and decisions should be made taking account of the entire value chain and systemic issues. The government can conduct market and supply chain analysis and rate of return calculations, offer different types of guarantees to the private sector and invite their participation in various projects. The government may also offer incentives and co-investments. The government can also facilitate risk management. Both sides of a value chain transaction perceive significant risk regarding compliance. Small holders

may break delivery contracts due to a more attractive spot price and buyers can default or delay payments. Government can mitigate this risk to improve partnership formation.

Lines of Action

SP 3.1.3.a. Coordinate the activities of NAEB and RDB regarding investment and export promotion in agriculture and develop capabilities relating to how the government might provide support, including the option of loan guarantees through the Credit Guarantee Fund or Agricultural Guarantee Fund or similar facility. For identifying export markets and their standards, private marketing specialists may be contracted to analyse entire value chains and identify post-harvest needs, opportunities and associated markets, and enter into conversations with the private sector regarding the views on the attractiveness of the opportunities. When conditions are found to be appropriate PPP agreements should be signed with provisions of risk management depending on the selected chain.

Value chain analysis will explore the need to provide guarantee funding in order to catalyse private sector investment. If necessary, steps should be taken to design and make a fund operational.

MINAGRI will lead this initiative while working closely with RDB, MINICOM, MINECOFIN and MININFRA to ensure coordinated implementation. The new Agriculture Investment Task Force will oversee investment mobilization and capacity development of the private sector as well as support to newly created PPPs.

SP 3.1.4. Catalytic Fund for Agricultural Entrepreneurship

The financing of agricultural enterprises, especially new ones, is always problematic. Banks typically do not have the staff expertise to evaluate agricultural project proposals well and they view agriculture as riskier than industrial and commercial investments. Microfinance meets many needs of rural families but is not well adapted to the requirements of new agricultural and agro-processing investments. However, integrating producers into value chains and reaching higher levels of quality and marketability requires significant investments.

One approach is to establish in effect a venture capital fund for agriculture, in recognition of the need for entrepreneurial innovations in the sector. The project selection criteria include projected rate of return, long-term sustainability and strength of linkages with farmers and markets. Having the funds capital deposited in a bank outside of the accounts of Government agencies may help improve the efficiency of fund disbursement. This fund could help foster investment and facilitate the Grow Africa agenda in Rwanda.

Lines of Action

SP 3.1.4.a. Feasibility and design study for a venture capital fund for agricultural investments, adapted to the main investment needs of Rwandan farmers and rural entrepreneurs, and scaled up to involve more farmers . The design should include provisions for monitoring the use of the funds and for evaluating impacts. Eligibility for the programme would be determined by an independent panel, including international experts, that reviews business plans submitted to it, but it would be mainly aimed at providing term capital for post-harvest and processing facilities, exporters and for new products and technologies.

The funding provided will generate minority shareholdings in the enterprise for the government, and regulations will establish a deadline at which the government would be obliged to sell the shares, giving first rights of purchase to the enterprise concerned (at the initial valuation). In the absence of purchase from the enterprise the shares would be sold at auction. The entrepreneurs would be required to contribute a specified percentage of the capital. Experience has shown that lack of this form of financing is a significant gap in capital markets, and banks typically are not interested in financing enterprises that involve new products or new technologies, for lack of ability to appraise such projects. While this kind of finance may not be directly aimed at the rural poor, it can improve their incomes significantly by supporting the development of value chains for their products and enterprises that will provide them technical assistance on issues like quality control. Develop the enabling legislation and regulations put the fund into operation, and monitor and evaluate its impacts at regular intervals. The Venture capital fund will be designed and operationalized, building on the experience of RIF.

SP 3.1.5. Agricultural Exports and Cross-border Trade Channels

In the coming years, expansion of markets will be key to expanding production and incomes in Rwandan agriculture. It will be important to foster expansion of agricultural trade with neighbouring countries, owing to the low transportation costs and proven acceptance of many Rwandan products in those markets. Expanding sales in neighbouring countries will give Rwandan exporters opportunities to increase volume, generate economies of scale in processing industries, and experience the quality requirements of international trade. Currently, the major part of the horticultural export trade is to EAC Member States and other neighbouring countries including the Democratic Republic of Congo. A substantial part of this trade is informal and therefore does not appear in official statistics. While key responsibility for regional trade lies with MINEAC and other institutions, this strategy emphasises the need to collaborate with these actors, particularly for the reduction and supervision of border procedures and infrastructure for small traders in agricultural products.

Lines of action

SP 3.1.5.a. Establish a liaison point in MINAGRI with initiatives to facilitate cross border trade, according to the MINICOM Cross-border trade strategy, for the

purposes of: 1) developing proposals in coordination with national and regional entities regarding storage infrastructure, sanitary regulations, and other procedures affecting agricultural border trade, and 2) developing campaigns of information for Rwandan farmers and traders about opportunities presented by cross-border trade and the reforms that are made in procedures and infrastructure.

In addition, this liaison point would work to promote the following actions: 3) work with other Ministries to mainstream cross-border trade into national feeder road programme to increase supply of goods in cross-border markets; 4) mainstream cross-border trade into producer cooperative training programmes close to cross-border markets to increase their market orientation and the supply; 5) construct market and storage infrastructure in selected border points that meets the needs of informal traders and can accommodate high volumes of trade; 6) construct small market places at three strategic locations on Lake Kivu where informal trade is high but currently illegal as it does not meet REMA standards; and 7) improve information availability for producers through cross-border trade mainstreaming into e-soko market information system and linked to COMESA Trade Information Desks.

SP 3.1.5.b. Develop an export certification programme in collaboration with Rwanda Bureau of Standards (RBS) and raise awareness of export quality standards among farmers and traders.

SP 3.1.5.c. Develop a program to protect existing organic certifications, and allow new ones to emerge. Clearly identify and map production areas of organic certified crops in Rwanda and develop rules and regulations to restrict and control input use of neighbouring farms. If necessary the government can compensate for loss of profits generated by the use of non-chemical farmers.

SP 3.1.5.d. Provide incentives for export cargo space including the cold storage facilities at the airport. The Government can provide guarantees of a specific amount of cargo space, both by air and via climate-controlled containers, in order to allow farmers and exporters to plan for future shipments and make production and investment plans accordingly. Initially much of the guaranteed space will go unused, and it will be necessary to execute the guarantees, but eventually the space utilisation should increase and the need for the guarantees will decrease.

SP 3.1.5.e. Strengthen the sanitary, phytosanitary and food safety (SPS) system and sensitize producers to follow requirements.

SP 3.2. Development of Priority Value Chains: Food Crops

The requirements for developing priority food crop value chains are outlined below. These value chains have been selected because:

1. They are principle staple crops

2. Interventions are needed to remove critical bottlenecks in the chains

When implementing strategic actions, the whole value chain must be considered, from research, planting material, production, extension, post harvest, value addition and market analysis of supply and demand. The process should also identify key stakeholders and the business case for each value chain.

SP 3.2.1. Bananas

Banana is by far the dominant fruit crop in Rwanda in terms of value of production. Four members of the banana family are consumed or produced in Rwanda: cooking bananas, beer bananas, apple bananas (kamaramasenge) and plantains. Apple bananas are of the highest unit value as they can be exported successfully in organic form to Europe. However, this product is the most vulnerable of the banana family to *Fusarium* wilt disease (*Fusarium oxysporum f. sp. cubense*), and which has been debilitating its production. It is present in all producing areas of the country and researchers have to develop an effective approach for controlling it or moderating its effects. Apple bananas definitely have good market prospects, both domestically and externally, and so they must be considered as a major option for selected zones.

Rwanda still imports some plantain from the DRC, and produces a small amount, but in general climatic conditions in Rwanda will not permit an acceptable import substitute to be grown locally. However, for cooking bananas domestic supply falls considerably short of demand and there are substantial imports that could be replaced. If production were to increase sufficiently it would even be possible to engage in exports. This type of banana is more resistant to *Fusarium* wilt, especially when it is irrigated and farmers practice mulching.

Given the importance of bananas as a food staple as well as in the context of export opportunities, the crop merits a higher priority in policy, research, extension and work on value chain development. The following actions are designed to help realize some of the large potential in the banana sub-sector:

Lines of Action

SP 3.2.1.a. Develop additional teams of **Farm Field School (FFS) trainers for bananas**, accompanied by demonstration plots of better crop cultivation practices (mat spacing, mulching, application of manure, irrigating, and inter-cropping). Reach 50 per cent of banana growers with the FFS approach in 5 years.

SP 3.2.1.b. Include **bananas as one of the crops in new irrigation schemes**, and with small schemes based on catchment structures.

SP 3.2.1.c. Provide, through RAB, a high volume of **better quality planting materials to banana growers**.

SP 3.2.1.d. Commission an exploration of the **European markets for dried apple bananas and chips from FHIA 01 bananas**, and a study of the feasibility of working with selected banana growers cooperative to supply those markets with production carried out under new protocols designed to reduce the incidence of *Fusarium Oxysporum* and increase yields. Present these studies to potentially interested investors.

SP 3.2.2. Wheat

Wheat production in Rwanda has increased significantly over the past five years. In 2007 its production was 24 633 MT, and in 2011 it reached 114,075 MT. The main constraint for improving the production of wheat is that varieties preferred by farmers suitable for wheat porridge boiling are not appropriate for wheat mills. For this reason, wheat imports have increased from 4,603 MT in 2008 to 82,616 MT in 2011. This strategy aims to increase domestic production and processing to reduce the need for imports.

Lines of Action

SP 3.2.2.a. Improve and strengthen research into high quality wheat which is suitable for processing

SP 3.2.2.b. Facilitate contract farming relationships between wheat processors and farmers to ensure farmers have access to value addition facilities and that the wheat produced is of appropriate quality

SP 3.2.2.c. Support cooperatives through the provision of improved post-harvest machinery and procedures, including threshers, winnowers and dryers, under a PPP arrangement between processors, cooperatives and Government.

SP 3.2.3. Maize

Maize is now Rwanda's third largest crop in terms of area planted. Yields are also increasing extremely rapidly due to the diffusion of high-yielding, rapidly maturing varieties and higher rates of fertiliser application. Production also has been boosted by the introduction of farm mechanization equipment in some parts of the country, with emphasis on women farmers. The parts of the value chain that most need strengthening are post-harvest handling and marketing to reduce post harvest losses which are estimated at 22.5 per cent . The incidence of these losses can be reduced through the introduction of proper drying, shelling and storage facilities.

Lines of Action

3.2.3.a. Work with the Rwandan Grains and Cereals Corporation and maize growing cooperatives to **install post-harvest facilities and train farmers in their use**, and in the value of using them in terms of crop sales. This will cover shelling, drying and storage facilities, and other facilities as required in each case.

3.2.3.b. Utilize grants mechanisms such as MLI to endow cooperatives with appropriate post-harvest facilities for maize and other staple crops.

3.2.3.c. As the quality of post-harvest maize increases, **explore markets** in South Sudan, Kenya, the DRC and elsewhere and **identify potential marketing contacts** and contracts for Rwandan maize.

SP 3.2.4. Rice

Domestic production of rice provides about 70% of the national annual requirement. There is substantial potential to increase rice production due to the following factors:

- ***Increased area of marshlands for rice cultivation:*** currently, about 13,500 ha of marshlands are cultivated with irrigation systems, but by 2017 a total of 65,000 ha of marshlands will be developed, that will be mainly cultivated with rice;
- ***Availability of good high yielding varieties of rice;***
- ***High numbers of cooperatives already engage with the sector,*** with the potential for capacity building

To reduce the deficit for rice consumption currently met through imported milled rice, and to be self-sufficient in rice, and even a net exporter, Rwanda must focus on key sub-sector issues including quality of seeds, management of diseases, provision of seasonal irrigation, post-harvest handling infrastructure for reducing the incidence of broken grains and maintaining appropriate levels of humidity and impurities, the need for appropriate mechanisation of farming operations, improving cooperative management, establishing solid marketing linkages between producers, cooperatives and millers, and improving milling processes to reduce broken grains.

Lines of Action

SP 3.2.4.a. Accelerate the **work on rice varieties, involving experts from other countries, and involve the private sector in seed multiplication and distribution**, to ensure timely delivery to farmers of high-quality seeds of appropriate varieties. Include in the research work on more fragrant varieties, which are the types preferred by urban consumers in Rwanda.

SP 3.2.4.b. Extend the FFS system to rice producers in marshlands, and include in their work site-specific soil tests for determination of appropriate fertiliser mixes and strategies to combat pests, emphasizing IPM.

SP 3.2.4.c. Through the mechanisation initiative, **explore mechanisation options for rice in Rwanda**, starting with testing of the small tractors that have proven productive in neighbouring countries.

SP 3.2.4.d. Avail rice producers of the resources of the PHS project to **design and install appropriate post-harvest infrastructure**, paying special attention to considerations of controlling grain humidity, impurities, and the percentage of broken grains.

SP 3.2.4.e. Work with millers, cooperatives and producers to establish harvest purchase contracts that pay farmers promptly and provide needed inputs. Options include triangular relationships in which millers pay farmers for the grain and reimburse cooperatives for inputs supplied. At the same time, work with cooperatives to improve their financial management.

SP 3.2.5. Irish Potato

The Irish Potato is one of the most important and fastest growing food crops in Rwanda. From 1966 to 2010, the cultivated areas increased from 9,500 to 130,000 ha. This area increase was followed by production increase from 57,300 MT to 1,300,000 MT. Although farmers growing Irish Potato are very familiar with cultivation techniques from peak production in 2010 both the cultivated area and production have decreased due to a lack of quality seed forcing producers to adopt alternatives.

Seeds are provided mainly by the informal system (98%) and a part by the formal system (2%). The number of seed multipliers has decreased for many reasons including:

- Some ***seed multipliers prefer to sell off part of their produced seed*** as consumption, driven by lucrative spot prices or limited financial capital for storage
- ***Potato seed multiplication requires four seasons*** for crop rotation while for potato consumption two seasons are enough
- There is a ***lack of professionalism at the seed multiplier level***

To improve the Irish Potato value chain, the main intervention will focus on strengthening the seed multiplication chain from pre-basic and basic seed production to certified seeds, including quality control and certification.

Lines of Action

SP 3.2.5.a. Capacity building of seed multipliers in technical and business skills.

Theoretical and practical training will be provided to seed multipliers, including lessons in TIN registration, record keeping, cost analysis and business plan elaboration.

SP 3.2.5.b. Increase the number of seed multipliers and seed dealers by sensitizing potato growers as well as farmers in FFS groups to register and become seed growers.

SP 3.2.5.c. Facilitate the involvement of intermediaries (seed dealers/companies) in seed postharvest operations/seed conditioning and marketing: To mobilize and sensitize private sector actors to register as seed traders, to invest in buying seed from

seed multipliers after harvest of the seed and to store them until next season for sales. This will assist seed multipliers recover their investment in shorter time periods

SP 3.2.5.d. New constructions and rehabilitation of public and private aeroponic screen houses and increased production of in vitro plants to be able to supply seed to conventional screen houses.

SP 3.2.5.e. Research development of new varieties more resistant to diseases

SP 3.2.5.f. Supervise the construction of a processing plant for Irish Potato in line with SP 3.8 related to post-harvest and processing infrastructure

SP 3.2.6. Cassava

Cassava is the main crop proposed for intensification as a food security crop that is drought resistant. The main constraint to cassava promotion is mosaic disease. However, significant progress has been made in introducing resistant varieties and this activity should continue. In addition, a new cassava processing plant has been constructed and this will strengthen development of the cassava value chain.

Lines of Action

SP 3.2.6.a. Continue and expand research on new varieties of cassava resistant to disease

SP 3.2.6.b. Set up a network of cassava cuttings multipliers to ensure the diffusion of healthy planting material

SP 3.2.6.c. Work with the private sector to further expand cassava processing and value addition activities

SP 3.2.7. Soya beans

Soya beans represent an important source of protein for local consumption. In addition, soya can generate significant incomes due to its processing potentialities including soya oil and animal feeds. Driven by a private company initiative, an edible oil processing complex is currently under construction in Kayonza District. Current actual production of soya is estimated at 38,400 MT with a yield of 0.8 MT /ha. However, to meet the full capacity of the plant of 45,000 MT per year, in season 2013 A soya was incorporated in the CIP to increase its productivity to at least 1.3 MT /ha.

Lines of Action

SP 3.2.7.a. Strengthen research on soya beans to introduce high yielding and disease resistant varieties and to be supplied to farmers.

SP 3.2.7.b. Increase production capacity of Rhizobium to be supplied to farmers

SP 3.2.7.c. Promote soya as a CIP crop

SP 3.2.8. Beans

Beans are an important source of protein in Rwandan meals. Bean production also has a comparative advantage in the region. As farmers are already familiar with good practice in bean cultivation, the strategic intervention shall focus on research to introduce a good variety of nutritious and bio-fortified beans, in line with SP 1.7 Nutrition.

Lines of Action

3.2.8.a. Continue and strengthen research in order to introduce new bean varieties appropriate for each agro ecological zone of Rwanda.

3.2.8.b. Support cooperatives through the provision of **improved post-harvest** procedures, through providing machinery and training farmers.

SP 3.3. Development of Priority Value Chains: Export Crops

SP 3.3.1. The Coffee Value Chain

The coffee value chain deserves strategic emphasis, as Rwanda's primary export crop. Coffee is a cash crop for about 450,000 families and export receipts over the last decade have averaged USD 58 million. In the 1990s price falls led farmers to neglect coffee plantations, but coordinated efforts of value chain stakeholders have prompted dramatic growth since 2002, with receipts growing at an average of 30% per year, although that has come mainly from higher prices and a higher-value product. Despite the still limited quantity of fully washed coffee (29% of the total in 2011), Rwanda's coffee industry has gained a positive international image. If it can maintain and enhance quality it will bring about increasing demand for its high quality Bourbon Arabica coffee with higher and more stable prices.

Although the production has substantially increased in recent years, the recent price fluctuations and quality constraints mean revenue targets have not been achieved. However, there is potential to increase yields 2-3 times simply through improved crop and soil management. Equally, better practices in the field, washing stations, storage facilities and shipping procedures will lead to improved quality and yet higher prices in international markets. A strong joint production, logistics and marketing strategy for Rwandan coffee will place it in higher-end niche markets with buyers. To achieve this, all stages of the value chain, ranging from research, training and capacity building, to processing, logistics and marketing, will be targeted. The policy environment should also

be reviewed to ensure it is supportive to value chain development, including export taxes and fees, selling requirements and price setting for cherries.

Lines of Action

SP 3.3.1.a. Research support for coffee.

The coffee sub-sector is characterised by a variety of complex technical issues and targeted research will be conducted, particularly the following areas:

- *Fertiliser absorption*
- *Control of the antestia bug, which causes the 'potato taste'*
- *Control of coffee leaf rust and other diseases*
- *Adaptive research on coffee varieties*

SP 3.3.1.b. Enhancing quality management throughout the value chain.

Greater quality consciousness will be fostered throughout the value chain through establishing a quality monitoring and advisory unit, which will contract with international experts to oversee, identify and analyse quality issues throughout the value chain and work with other entities in both the public and private sector to address them. Training will be provided to actors along the value chain to tackle quality constraints. Efforts will focus on improved moisture monitoring, identifying berries affected by the 'potato taste', implementing procedures for separating lots in the washing process, classifying coffee in warehouses and establishing inventory monitoring systems.

SP 3.3.1.c. Improved management of coffee on farms.

This sub-programme will expand and strengthen FFS to improve management of coffee crops through education in pest management including use of domestically produced pyrethrum, input use including fertiliser and high quality seeds, the potential for intercropping (particularly to tackle the antestia bug) and different composting approaches. Farmers will also receive advice on the management of nurseries for coffee seedlings. This activity will also work with smallholders in areas that were not planted in coffee before, to link them with entrepreneurial larger farmers who will provide technical assistance and facilitate the sale of the product for all the farmers in each zone.

SP 3.3.1.d. Strengthening coffee cooperatives and rehabilitating washing stations.

A Turnaround Programme for coffee washing stations started in 2010 has made processing economically viable and sustainable. This programme will be expanded and strengthened. Business advisories will work with each cooperative to develop a business plan, strengthen organisation and governance in the cooperative, and build linkages with buyers and financial institutions. The washing stations also will receive training in processing techniques, quality control and management practices, and they will be assisted to set up a coffee traceability system. In addition, this activity will promote the installation and operation of well-managed eco-friendly mini-washing stations in appropriate locations, and water recycling systems. Coffee farmers will also receive

support to establish cooperatives and join the Rwandan Coffee Cooperatives Federation (RCCF), and this support will be sustained over time to ensure the group develops sufficient management capacity to be able to operate effectively.

SP 3.3.1.e. Improving coffee marketing

The following action areas are key to improve the marketing of Rwandan coffee:

1. ***Developing the appellation program.*** This programme has been under consideration and some of the producing areas suitable for appellations have been identified. However, for the programme to succeed it is essential that appellation (of location) be strictly linked to a unique taste profile through linking to specific producers and only accepting appropriate product. Specific training will be provided for the relevant producers, cooperatives, washing stations, and marketing agents in development of the appellation program.
2. ***Promotion of the Cup of Excellence.*** Cupping events will be held in collaboration with international experts and buyers.
3. ***Assisting cooperatives in accessing certification programmes,*** based on a preliminary study to assess which programmes (Fair Trade, organic, Rainforest Alliance, Utz Kapeh) will have the highest impact on farmers' income, and collaborate with the regional programme for building capacity for coffee certification and verification of the Eastern African Fine Coffees Association (EAFCA)
4. ***Support the development of a Rwanda coffee branding strategy*** to promote both national and regional origins, also building on certification. New origins will be advertised through the dissemination of promotional material and marketing tours supported to visit international buyers or participate in trade fairs. Training will be provided in coffee marketing and in project management.
5. ***Target high-end buyers that reward quality and provide higher returns to farmers.*** Work with high-end buyers like Starbucks and Marks & Spencer, and link up with rapidly growing coffee markets such South Korea and China. It will be necessary to differentiate quality and take note of market feedback, for example the potential for vacuum-packed product for Japan.

SP 3.3.1.f. Strengthen coffee value chain logistics particularly shipping

Implement capacity building to support cooperatives and processors to improve planning around shipping and filling containers, and ensure appropriate packing methods are used to maintain product quality in shipping. This may require research into alternative methods such as insulated (grainpro) bags or vacuum packing. This programme will also support improved communication with buyers around delivery times. Finally, it will be ensure that feeder road programmes consider coffee producing areas.

SP 3.3.2. The Tea Value Chain

Similar to coffee, for tea increasing sales and income will depend upon improving quality and marketing to move up the value scale. As a whole, growth of the global market is slow, but trends within the market favour locations like Rwanda that deliver high-end products at competitive prices. Bulk black tea prices are projected to decline, but the opposite trend is expected for quality teas, for which Rwanda has great potential. Other favourable factors for the domestic tea industry include the fact that major world producers are constrained by land and labour shortages, tea consumption in Africa is growing, and Rwanda is well placed to access key markets under EBA/EPA, AGOA, EAC, and other agreements. Rwanda's tea is consistently quoted at a high price in the Mombasa auctions, just below Kenya. The tea sector is therefore another important strategic value chain to increase export revenues and drive growth.

Under PSTA II major progress was achieved in the sector through privatizing tea factories. Now, in collaboration with RDB, a prospectus has been developed to attract private investors for five new greenfield factories. Strategic emphasis shall focus on both the production side, through improving yields and management of tea cooperatives, but also the need to access higher value markets.

Lines of Action

SP 3.3.2.a. Improving yields and the quality of tea leaves at the farm level. Using the results of research, expand FFS programmes in tea producing areas, emphasizing better techniques of plucking and pruning. Forge consensus on measures to ensure that farmers receive some of the benefits of higher quality leaves. Undertake soil and leaf analysis to identify fertiliser needs and work through FFS to promote application of appropriate fertiliser formulations in adequate doses. Sensitization of cooperatives and individual farmers to purchase fertilizers will also continue through tea factories with efforts to strengthen the tea fertilizer fund.

SP 3.3.2.d. Expand the area under tea cultivation

Working through land consolidation and in collaboration with growers, the area under production will expand by 18,000 ha over the next five years

SP 3.3.2.c. Improve management of tea cooperatives and integrate producers more closely into the value chain.

This activity will work to improve cooperative management and business practices, with emphasis on developing business plans. It will collaborate with the unions and FERWACOTHE in this undertaking. At the same time, the activity will promote closer relations between cooperatives and tea factories, so that data and issues can be shared and farmers can eventually receive a better price for their tea. As marketing efforts and quality improve, the economics of the industry should be able to support higher prices to producers and improve farmer returns. This programme will also facilitate coordinated efforts in the sub-sector to improve quality.

SP 3.3.2.b. Placing Rwanda's tea in higher value markets.

This will be achieved through a set of coordinated actions including:

1. ***Increasing and improving diversified teas:*** Working with producers, cooperatives and factories to produce and label more diversified teas.
2. ***Develop a Rwanda brand:*** with logo and corresponding packaging, and test a marketing campaign with buyers; and then refine it and implement it.
3. ***Develop a quality mark and certification of Rwandan teas.***
4. ***Strengthen quality control:*** Improve the training of tea tasters and factory quality management
5. ***Identify new distribution channels and buyers for direct sales:*** Send samples and build relationships.
6. ***Strengthen the profile of Rwandan tea on the world market:*** Carry out promotional and advertising activities and support attendance by Rwanda producers and processors at international tea fairs.

SP 3.3.3. The Pyrethrum Value Chain

Pyrethrum is a natural pesticide that Rwanda is uniquely well placed to produce. Considerable progress has been made in consolidating and improving the cooperatives of pyrethrum producers, and in improving processing. However, pyrethrum's domestic and international market potential has not yet been fully realised and there is significant growth potential. The sole pyrethrum factor, SOPYRWA, is currently functioning below capacity due to insufficient raw material. However, the factory has potential to produce all products extracted from pyrethrum including crude extract, pale extract and insecticide. There is market demand throughout the world, including the USA and Europe.

It is therefore key to tackle to supply constraints which limit production. These include:

- ***Limited land availability in the Northern province***, where pyrethrum is grown in volcanic soils
- ***High population density of subsistence farmers in the key growing area.*** Farmers prefer fast growing food crops over pyrethrum
- ***Limited availability of planting materials***

This strategy will increase production through providing improved planting materials and supporting growers. Coordination with SOPYRWA can also facilitate activities to encourage production through training in good practice and crop management.

Lines of Action

SP3.3.3.a. Provide financial support for farmers to incentivise pyrethrum planting and increase the area under production.

Work with SOPYRWA and SACCOs in producing areas to develop and implement contract farming relationship. These will facilitate loans for farmers to purchase food for their families while awaiting the new pyrethrum harvest. Growers will also be supported in the provision of solar dryers to improve the product at farm level.

SP3.3.3.b. Support research to develop and disseminate high quality planting material with high pyrethrin content. This will be distributed to farmers as part of the contractual arrangements for purchase of pyrethrum harvests.

SP3.3.3.c. Support private actors such as SOPYRWA to train growers. Training material will be developed and sessions conducted related to good crop growing protocols for cooperatives and private growers.

SP3.3.3.e. Development of export markets for high value distillates. A move to higher quality will increase and maintain market shares and revenue. Specialised technical assistance will be used to focus on export market development.

SP 3.3.4. Horticulture, Floriculture and Other Emerging Value Chains

Several studies on horticulture, floriculture and essential oils in Rwanda, all concluded that the potential is considerable for a viable export sector in these products, but that important obstacles have to be overcome in order to realize that potential. Despite having a favorable climate and good soils for horticulture production, Rwanda faces some key constraints compared to its direct regional competitors. Because of its landlocked location, Rwanda's potential for exports exists in carefully selected segments and markets. Advantages should be based on a niche appeal of high value added products, not on volume or price. Perhaps more important than product identification is to add-value and build the vertical and horizontal value chains for non-traditional export products. Successful development of horticulture will require an integrated supply chain approach focusing not only on production but also processing, transportation, and direct marketing through dedicated contracting arrangements with external buyers. This will include attracting investors for commercial production schemes, establishing linkages and relationships between stakeholders at all stages of the chain. Downstream in the export market, international partners will have to be identified, products promoted and markets tested.

Lines of Action

SP 3.3.4. a. Develop vegetables with export potential.

This will include earmarking horticulture growth poles for export vegetables, which are specific zones with agro-climatic, market accessibility and private sector willingness/demand potentials. Value chains will be selected according to market potential, but will include French bean, snow peas, tomato, onion, fresh and dried chili, spices and other Asian vegetables, among others.

SP 3.3.4. b. Develop fruits value chain with high potential:

The whole fruit value chain will be considered. Local research will be supported to produce quality planting material and varietal trials. Farmers will also receive training in the development of mother gardens and nurseries, and other production areas including inputs, pest management and harvesting. Priority chains to be developed will include:

- **Avocado:** avocados have export potential and good prices in the international markets which can increase farmers' revenues. Actions required include development of avocado for exports on a large scale (Hass and Fuerte), general improvement of quality through introduction of GLOBALGAP procedures and improvement of farmers' revenue through contract farming arrangements.
- **Pineapple:** The focus should be production of required varieties and quality. Due to its bulky nature, intervention will focus on processing pineapple through drying, jam and concentrates. Actions for this chain will focus on organic certified production, development of organic high value-added products to penetrate niche markets and general improvement of processing through improved mechanization of processing facilities
- **Macadamia Nuts:** Due to the high quality of Rwandan nuts grown in Rwanda, the potential for macadamia nuts is substantial. So far trade has occurred mostly in local and regional markets. Actions will focus on expanding the land area under macadamia cultivation, improving agricultural practices and establishing a roasting plant
- **Passion fruits:** Rwandan passion fruit has a superior flavor that is well received in the European and regional markets. The limiting factors are production, which has been devastated in some areas by diseases, and post-harvest handling. The main pests are passion fruit woodiness virus (PWV) and the *Septoria* spot fungus. The plant is also vulnerable to less serious diseases such as anthracnose (*Colletotrichum gloeosporioides*), brown spot (*Alternaria spp.*) and the cucumber mosaic virus. Actions for this fruit will focus on finding clean planting material through research and promotion of contract farming with processing factories.
- **Apples:** Trials on tropical varieties of this fruit have started and have shown promising results that it can grow well in many parts of the country. Currently seedlings are imported from neighboring countries at high cost. Activities under this will include: introduction of more tropical varieties and development of local capacity to produce seedlings. Farmers' capacity building in raising apples and other temperate fruits will be essential.

SP 3.3.4.c. Develop essential oils

Essential oils are a natural plant product which can be used for culinary applications, natural dyes, medicinal, health, flavor and fragrance purposes. This is an area which is not yet fully developed but has potential to generate export and farmer income. Plants currently used include Geranium, Patchouli, *Eucalyptus globulis*, and lemon grass. Activities to improve essential oil production will include supporting growers to acquire clean planting materials, increasing oil processing capacity and mobilizing new farmers to grow raw materials of essential oil plants through provision of training and input support.

SP 3.3.4.d. Develop floriculture industry including cut flowers, foliage and ornamentals

Efforts will be made to find more innovations to grow flowers without compromising food security. Since Rwanda has the required altitude for growing the large bud roses (Tea hybrids and Intermediate) which fetch more in the market than the small buds (Sweethearts) more land will be mobilized for rose production in the high and middle altitudes of the country. Production activities will include improved production techniques for roses and summer flowers that can reach export markets. Small flower growers will be facilitated to acquire high yielding cut summer flower and clean cuttings and seedlings for foliage and other ornamentals. Capacity building of flower producers will be reinforced and they will be supported to acquire inputs to boost the production.

SP 3.3.4.e. Facilitate communication among non-traditional export crop value chain actors.

The Government will develop closer coordination and joint action teams to facilitate improvement of entire value chains for non-traditional export products, involving investor, exporter, processor, cooperatives, farmers, and financial institution in each case. A technical coordinating body with all those agencies should be set up, and the operational plan should be established along the lines recommended by the investor, exporter and (when relevant) processor. The financial institutions will be expected to assist with bridge funding for producers, to enable them to await the harvests, and with export finance. Risk management support should be offered by the Government to both producers and exporters, when appropriate, along the lines suggested elsewhere in this Strategy.

SP 3.4. Development of Priority Value Chains: Dairy and Meat

SP 3.4.1. The Dairy Value Chain

This strategy aims to double milk consumption over the next five years. This increase will be driven by expanding the One Cup of Milk per Child programme and by stimulating domestic demand through sensitization and provision of more diverse dairy products. Currently, raw, unpasteurised milk represents the largest share of domestic milk consumption due to greater profit margins for traders, and competition in the processed milk market from regional neighbours with lower costs. The country's milk processing plants are therefore operating below capacity, and some milk collection centres (MCC) in the East have closed. There is a risk that unless demand, including for processed milk, increases a surplus will result.

Therefore, the dairy value chain requires attention at all steps in the process. The entire supply chain should be modernised, to develop the processing industry, improve distribution channels and improve sanitary control. Also, to increase demand, milk consumption habits must be increased.

Lines of Action

SP 3.4.1.a. Developing Dairy Markets.

Increase milk consumption through raising consumer awareness of the benefits of milk consumption and making milk more consistently available to consumers. Develop and market innovative dairy products such as cheese, yoghurt etc., explore regional and international markets for these and work with processors to develop strategies for those markets.

SP 3.4.1.b. Improving Quality in the Milk Value Chain.

Processors need quality milk to make and market pasteurised and UHT whole and skim milk. Poor quality milk can be used to produce sour milk and yoghurt. This line of action focuses on the provision of safe and diverse dairy products for the domestic and regional market. In order to strengthen quality, the dairy supply chain must be modernised. Support to milk processing plants and collection centres will be provided to increase utilisation and productivity, including facilitating relationships linking MCCs to cooperatives (in a shareholding arrangement) and improving connections between MCCs and processors. Explore the potential for PPPs in the dairy sub-sector to improve efficiency.

SP 3.4.1.c. Institutional Development and Coordination in the Dairy Sub-sector.

However, coordination among private sector actors in needs strengthening, especially for quality issues. To do this, actors throughout the value chain will become members of the Rwanda National Dairy Board, and relationships between producers, MCCs and processors will be encouraged. MINAGRI will also facilitate the process of developing cooperatives or farmer shareholding institutions as owners of the MCC.

SP 3.4.2. The Meat Value Chain

Livestock products:

There is considerable scope for expanding production of small ruminants, swine and poultry. The related processing industries can also expand, since rising incomes are increasing consumption of meat products. Current constraints include insufficient modern slaughterhouses and inadequate management of tanneries. The limitation of slaughterhouse capacity is being overcome by the construction of new facilities that are placed under local management. In this strategy, the focus shall be on modernising the meat supply chain, improving sanitary quality and developing and strengthening the cutting and processing industry for hides and skins. To facilitate sector growth, it will also be necessary to focus on developing the value chain for small ruminants, swine and poultry.

Meat Products, hides and skins: Lines of Action

SP 3.4.2.a. Modernise the meat supply chain

Develop a business plan for the establishment of feedlots and support their implementation. Rehabilitate existing slaughter houses and establish new modern pig and poultry slaughterhouses. Conduct training programmes for poultry, pig and small ruminant farmers and agents in control of slaughterhouses. Also rehabilitate livestock markets in each province.

SP 3.4.2.b. Improve sanitary control

In line with the above, strengthen the development of hygienic slaughterhouse facilities and training technical staff in their proper operation. Develop and disseminate guidelines for good hygiene practices for meat for slaughter.

SP 3.4.2.c. Development of the cutting and processing industry

Develop a modernisation program for tanneries including rehabilitating facilities and training skin processors. Produce guidelines for skins and the handling of effluent in line with environmental standards. To further develop the sector, use technical advisory services to support potential investors in tanneries, with the aim of reaching international quality standards and markets.

SP 3.4.2.d. Improve promotion and processing of meat product

Implement a programme to promote and better process meat sub-products, including the development of a meat processing plant in Kigali under PPP. Quality standards for livestock products should be harmonised with the EAC region, and if necessary, producers will be subsidised to obtain quality certifications. Labels for Rwandan meat products will be promoted and consumer associations supported. Finally, a livestock statistic desk will be established with real-time market information on livestock and livestock products in order to improve understanding of market dynamics.

SP 3.5. Development of Priority Value Chains: Fisheries

In the fisheries sector demand has outpaced production, with consequent depletion of resources. Nevertheless, the sector has great potential and with improved management is capable of meeting demand sustainably and of producing regional exports, leading to improved rural incomes. Fish are also a nutritious addition to daily diets.

Lines of Action

SP 3.5.1. Research and technology development for fish and fish products

Conduct research to improve the freshness, colour, flavour, texture, taste, nutritional characteristics, and shelf-life of cultivated fish as well as new or improved value-added products. Research and technology development can also improve packaging, accessibility, and ease of preparation of fish products for consumers.

SP 3.5.2. Strengthen existing fish supply chain

The current fish market will be modified to include a section for live fish to improve quality and hygiene. Quality standards will be developed, in harmonisation with EAC

regulations, and adopted throughout the aquaculture industry as an assurance of product safety and to improve consumer confidence, and consumers and retailers will be educated about safe handling of aquaculture products. The market information system will be improved and expanded for producers, processors and consumers. In order to develop exports, exports enhancement programmes and international trade missions for aquaculture will be supported, and trade barriers identified and resolved.

SP 3.5.3. Implement a System of Cage Aquaculture.

It will be necessary to create awareness of cage culture as a viable fish production system through demonstrations, hands on training and sensitisation of profitability for farm managers and potential investors, production of promotion materials and cage investment and input support packages.

SP 3.5.4. Implement a System of Tank Aquaculture.

Fish production in tanks represents a move towards intensification and needs investment in technology and management. Water quality management is key, which is closely related to quality feeding and water treatment. To establish this type of production it will be necessary to create technology uptake pathways via a PPP model. Technical assistance will be required to provide advisory services to pioneer investors in the system. A tank based production unit will be established in each province, and pilot and demonstration plots established, starting with tilapia and catfish. Results including productivity and profitability of the system will be presented to the private sector and partnerships established.

SP 3.5.5. Implement a System of Aquaculture Parks.

The aquaculture park system can be a model for transformation of small-scale subsistence fish farms that are scattered all over the country into commercial units. . Government and development partners will identify the area, collaborate with local communities, and support the construction and establishment of the production units and rent them out to individual producers at a nominal fee. Incentives will be developed to attract private sector investors.

SP 3.5.6. Establish industry to process fish waste into animal feeds and fertilisers

SP 3.6. Development of Priority Value Chains: Apiculture

Beekeeping is a small activity on the national scale but is important for the communities involved, representing a significant source of additional income for poor families with marginal land for agriculture. There is particularly true in forested areas in the Southwest.

Lines of Action

SP 3.6.1. Strengthen Beekeeping

Expand and strengthen Community Development services, the provision of beekeeping equipment and technical assistance. Support will be provided to apex organisations and service providers including honey collection centres, and demonstration apiaries promoted. Facilitate cost sharing on processing equipment, packing and labelling materials, and obtaining certification.

SP 3.6.2. Conduct market research and develop a promotion campaign

The domestic retail sector requires analysis and sensitisation. A market survey will be conducted to document the volume of bee products actually sold in the formal market by producers, traders and buyers, existing value addition processes, volumes of bulk and value added products in the retail markets, domestic market share, export and consumer interest. The results will be used to develop a programme of promotion based on geographic specialities.

SP 3.6.3. Increase and harmonise quality standards

In collaboration with RBS bee keepers will be trained in international norms and standards of honey production, to facilitate both national and international certification and enforcement of standards for both honey and beeswax. For organic honey, measures will be taken to prevent pesticide contamination of plants the bees pollinate.

SP 3.7. Agricultural Finance

There has been considerable recent progress in the development of agricultural finance. National programmes that specifically improve financial services in rural areas include the campaign to improve national financial literacy, the training of staff of financial institutions and increasing use of the technology of mobile money transfers (MMT). In addition, at the sector level bank supervision authorities are monitoring closely the performance of the growing number of savings and credit cooperatives (SACCOs), and the Government's Agricultural Guarantee Fund (AGF) continues to encourage bank lending to agriculture. The Rural Investment Facility (RIF), now in its second phase, has boosted rural incomes. This strategy aims to strengthen, expand and introduce new agricultural finance instruments.

Lines of Action

SP 3.7.1. Strengthen and consolidate SACCOs at the District level under an Agricultural Cooperative Bank

Strengthen SACCOs by consolidating them under umbrella district-level SACCOs and linking them to an apex organisation, such as an Agricultural Cooperative Bank, to reduce risk for individual SACCOs and strengthen governance. Strengthen the mobilisation programme for creation of SACCOs and undertake sensitisation and training campaigns to improve SACCO governance.

SP 3.7.2. Establish a warehouse receipts system

In coordination with MINECOFIN and BNR, develop conditions for a viable a system of warehouse receipts that will enable farmers to obtain financing based on harvests stored in certified facilities, along with a set of enabling regulations.

SP 3.7.3. Facilitate value chain finance relationships

Encourage value chain finance (triangular finance) involving a financial institution and two agents in the sector, such as a product wholesaler and a processor, or a cooperative and an exporter. The financial institution lends to one of the agents and is repaid by the other, who receives the agricultural product. The first agent lends to the other one, sometimes in the form of inputs.

SP 3.7.4. Expand agricultural insurance and rural financial instruments.

Following the recommendations of the July 2012 Agriculture, Crop and Livestock Insurance Feasibility Study expand and strengthen agricultural insurance programme and other financial instruments such as RIF.

SP 3.8. Market-oriented Infrastructure for Post-harvest Management Systems

Post harvest handling and storage is a crucially important consideration across all value chains. In relation to the strategic intervention regarding value chains, specific interventions have been developed. Cooperatives will also receive post-harvest capacity training under program two.

The 2011 National Post Harvest Crop Strategy is a detailed, step-by-step plan for improving post-harvest infrastructure for staple crops and road access to markets. The plan identifies procedures for identifying priority post harvest interventions and developing technologies and skills to support implementation. The Post-Harvest Strategy will engage the private sector through dialogues on the opportunities in the value chains and encouraging development of financial instruments to support private sector involvement in post-harvest investments and operations.

Lines of Action

SP 3.8.1. Provide efficient and equitable transport systems across crop producing areas.

This will involve providing an efficient and equitable transport system across staple food producing areas with an overall target outcome of reducing transport cost. Developing efficient and equitable transport systems across staple food producing areas will greatly contribute to competitiveness, economic growth and improved resource use. With this in mind, reducing road transport costs between production and secondary aggregation points in high potential staple production areas will positively impact food security objectives. This strategic line has three components:

- 1. Investigating the transport component of staple and high value crop marketing costs***

2. **Reducing road transport costs** between production and secondary aggregation points in high potential areas through feeder road development
3. **Addressing prioritized 'soft' constraints**

SP 3.8.2. Reduce staple crop post-harvest losses at producer and first aggregator level.

Cutting down post-harvest losses and increasing storage capacity and efficiency is important to expand value chain profitability. Adequate drying, storage and processing facilities are needed to increase and stabilise farmers' incomes, and to preserve the quality of products.

1. In all districts involved in maize, beans, wheat and rice production, **modest drying grounds and temporary stores** will be constructed to minimize post harvest losses
2. **Post harvest facilities will be leased by cooperatives** with sufficient management and financial expertise, and repayments credited towards eventual purchase of the facilities
3. **Modern storage facilities will be constructed**, including warehouses and metallic silos, by both the public and private sector to manage the modern needs of agricultural production
4. **Processing plants will be constructed** to promote value addition

Ch. II.4. Programme 4: Institutional Development and Agricultural Cross-Cutting Issues

SP 4.1. Institutional Capacity Building

The institutional side of the agricultural sector is at a critical juncture. In recent years it has performed well, with many successful projects and steady growth. However, institutional challenges remain, which this strategy will address through a comprehensive approach to both capacity building and institutional coordination.

In relation to Ministerial capacity building, issues such as high staff turnover, weak incentives, low levels of professional development, dependence on externally funded technical assistance and insufficient private sector engagement skills will be tackled by a new Human Resources Development Plan. This will foster long term staff development and retention through professional career advancement based on technical specialisation.

Institutional coordination in the sector is also important, both within and across MINAGRI agencies and with other Ministries driving rural development. This strategy will strengthen horizontal and vertical collaboration between these different institutions to ensure effective implementation of the EDPRS II rural development goals and other national targets.

Lines of Action

SP 4.1.1. Identify critical skills needs for Ministry staff and develop a comprehensive Human Resources Development Plan.

Skills should consider all Ministry functions, and the Development Plan should facilitate implementation of this strategy. There should be provision for staff training, opportunities for professional advancement, sufficient incentives to retain staff, and allowances for increases in staff size as required. Opportunities for professional advancement are key to tackle high staff turnover and should be a focus area.

SP 4.1.2. Develop staff incentives.

In coordination with development partners, explore mechanisms through which adequate **project design and management incentives can be provided to Ministry staff**, to facilitate the accumulation of institutional knowledge and capabilities

SP 4.1.3. Staff capacity building.

When external technical assistance is needed for the medium term, pair responsible Ministry staff with technical advisors to facilitate transfer of knowledge. Identify short-term technical training needs for Ministry staff and implement activities to meet those needs, and utilize visits to projects and programmes in neighbouring countries as part of the training process. Extend the capacity building programmes to farm leaders and small entrepreneurs in the sector.

SP 4.1.4. Strengthen and improve coordination of the Rural Development Group.

This will facilitate and improve joint decisions on cross-cutting issues and investments that are important for agricultural development. For example, improving rural roads is a priority for reducing post-harvest losses and facilitating linkages with export markets and other high-value markets, and this will require close inter-Ministerial coordination.

SP 4.2. Decentralisation in Agriculture

In line with the Decentralisation strategy and under coordination of MINALOC, efforts have been made to strengthen local levels of administration, particularly at district level. The implementation of territorial reforms and decentralisation of functions have greatly enhanced the capacities of local government. Staffing varies according to district and their financial capacities, which sometimes allows for additional staff such as seconded extension agents from specific projects, RAB and NAEB.

Currently, the district staffing for the agricultural sector includes one agronomist, one veterinarian, one sector agronomist and one cell development agent. RAB also have two specialised extension workers per district, and NAEB seconds coffee, tea and horticulture extension workers. Sector-wide projects and national entities also have a local presence to implement their initiatives and receive feedback on programme design from farmers.

District administrations have important roles, as they are in close contact with cooperatives and farmers and can build up knowledge of the districts' needs and opportunities for agricultural development. District staff can facilitate implementation of national projects and programmes, act as an interface and promote farmer-oriented extension approaches. Districts are also a channel for informing RAB and other MINAGRI units of the priority needs of farmers in their areas, and they help inform rural families of opportunities such as participating in new aquaculture programs, or linking up with investors for export crops. The role of Districts is summarized in the dispositions of Law No 29/2005 of 31st December 2005, which endorses the principle of subsidiarity, by saying that Districts are charged with local economic development and planning and coordinating the delivery of public services. In recognition of this capability at the district level, internationally funded and NGO programmes have to be approved at the district level by the Joint Action Forums (JAF). These strategy aims to strengthen and clarify the roles of Districts.

Lines of Action

SP 4.2.1. Strengthen the role of Districts in para-vet services and in human disease control programmes

Develop human and animal disease monitoring systems at the District level with reports that can be communicated to national authorities.

SP 4.2.2. Make Districts partners in all agricultural extension programmes

Districts will facilitate the provision of extension services in a participatory manner, rather than provide the services directly. Part of the role of extension is facilitating farmers' acquisition of knowledge through visits to projects in other areas and exchanges with farmers from other areas about agricultural practices and innovations. The Districts must play the lead role in facilitating these kinds of farmer interchanges, which are very valuable for increasing farming capabilities.

SP 4.2.3. Strengthen the Joint Action Forums and District feedback mechanisms

This can help identify farmers' priorities and needs. Formalize the reporting process on these and other issues to a decentralization coordination unit in MINAGRI. In a related action, strengthen the capacity of sector-level authorities to collaborate with farmers and farmer organisations in the review of problems and the formulation of proposals for programs' actions to be implemented at the district and national levels.

SP 4.2.4. Strengthen fiscal decentralisation

In relation to fiscal issues this strategy shall continue to strengthen the approach adopted under PSTA II. District level funding allocation may increase over time as district level capacity to absorb and execute funds is strengthened. Funds are transferred to Districts in order to ease the implementation of activities at local level and upgrade the Districts' Autonomy to reply to the Decentralization Policy. Those funds have been allocated so far basing on different factors like the population, cultivated area, and poverty level (where some Districts are given special attention

because of the high index of poverty); a new factor will be the District Performance, where if the Performance avails itself to be very good at the end of a said Fiscal Year, in a following one more funds can be allocated accordingly.

SP 4.3. Legal and Regulatory Framework

Laws and decrees are important for guiding actions but in general they are more effective to the extent they reflect a societal consensus on what needs to be done and how it should be done. They are most effective when they can strengthen initiatives that already have been conceived or begun. Therefore, the legal and regulatory framework continues to capture the dynamism of the sector. Thus, it is important to maintain constant communications with technical experts and project personnel in order to be aware of evolving needs for legal and administrative support. Also in the area of frameworks it can be quite useful to develop and disseminate examples of agreements, or model contracts, which can be applied in various circumstances by cooperatives and other stakeholders in the sector.

Lines of Action

SP 4.3.1. Formalise the National Irrigation Policy

Promote a dialogue on the proposed irrigation policy and formalize that policy with a Presidential decree. Develop the implementation plan for the decree and mechanisms to monitor its implementation.

SP 4.3.2. Develop regulations for organic agriculture, pesticide and limestone use

These should protect high-value organic activities, soil and water quality and micro-nutrient availability.

SP 4.3.3. Develop regulations around the value chain guarantee fund

These should consider provision of risk guarantees to both farmers and product buyers in contract farming and value chain contracts

SP 4.3.4. Develop the legal basis for an agricultural catalytic fund

There should be consideration of the Grow Africa process and the provision for overview by independent experts

SP 4.4. Agricultural Communication, Statistical Systems, M&E and Management Information Systems

Rwanda is undergoing a transformation from an agrarian subsistence economy into a sophisticated knowledge-based society. However, agriculture is characterized by insufficient use of improved local and advanced knowledge and technologies. To overcome this challenge, the agricultural sector should be deeply transformed, modernized and commercialised which will require agricultural knowledge generated from research and other sources being turned into action to build a sector that is

knowledge-based. Modernisation and transformation of agriculture requires the existence and implementation of a Knowledge Management and Communication (KMC) strategy; Management Information System (MIS) and Monitoring and Evaluation (M&E) framework and Statistical Information System managed with the objective of providing information, evidence and learning about best practice.

Lines of Action

SP 4.4.1 Agricultural communication strategy development

The objective of the communication strategy is to effectively and efficiently collect, produce, process, adapt, store, share and disseminate agricultural information sharing with a clear communication and evaluation plan for transforming agriculture through increasing the knowledge base and facilitating greater stakeholder involvement. The acquisition and dissemination of accurate information and knowledge in agriculture is necessary to meet government targets for agricultural growth. CICA will be the key focal point for this activity, and will ensure collaboration with all stakeholders and the regular collection and distribution of agricultural information.

SP 4.4.2. Improvement of the Agricultural Statistical System

To improve the agricultural statistical system skills in the statistical unit should be upgraded and tools improved, for example, through improving the sampling frame. Large scale surveys should be reviewed to ensure effectiveness. For example, it should be considered whether multi-frame crop survey should be restructured to capture reliable information on high-value crops (fruits, vegetables and nuts) which occupy small land areas, and the potential to conduct crop surveys multiple times per year to enable better and more frequent production forecasts to be developed for decision-makers. A sustainable statistical program on agriculture statistics needs to be addressed in a comprehensive plan and be aligned to the National Statistical System whose mission is to provide relevant, reliable, coherent, timely and accessible statistical information and services to various sectors of the society in a coordinated and sustainable manner.

SP 4.4.3. Collection and use of agricultural meteorology data.

Agricultural meteorology is vital to examine the effects and impacts of weather and climate on crops. MINAGRI will work closely with the Rwanda Meteorological services and other institution to collect and interpret weather and climate data and disseminate information. This will include development of an advanced bulleting to communicate agriculture meteorological information to all levels through working with extension agents and farmer promoters. A skills programme will be implemented to support the technical development of personnel in agro-meteorology expertise including data collection and analysis, modelling and information dissemination.

SP 4.4.4. Agricultural Monitoring and Evaluation and Management Information Systems.

The M&E system has been developed and main indicators identified, and these will be modified to align with EDPRS II and the revised Vision 2020 goals. Now, the relevant actions and definitive indicators from the strategy will be incorporated into a MIS.

Random field visits will verify reports and ensure the information reflects the situation on the ground. The use of ERP (Enterprise Resource Planning) for the sector will also be considered. Using an ERP solution for agriculture will help integration of data, analysis, optimization of resources and decision making. It encourages professionalization and will support other existing initiatives such as the market price information system (eSoko) developed to manage the market price information for multiple markets and commodities, and the Agricultural Management Information System (AMIS) for harmonizing different information and knowledge from across the sector. A specific unit will be designated to ensure effective knowledge management and oversee M & E and MIS.

SP 4.5 Gender and Youth in Agriculture

Gender

Rwanda has made great steps towards achieving gender quality. In addition to ratifying regional and international legal instruments to protect women's rights, Rwanda has a legal framework supporting gender equity and equality enshrined in the Constitution of 2003. The Constitution reinforces the principles of gender equality and elimination of all forms of discrimination against women and provides quotas (of at least 30%) for women in decision-making structures. Already, Rwanda is ranked highly in gender equality terms. In 2007, the country had a gender development index (GDI) value of 0.459 and ranked 16th out of the 155 countries with both HDI and GDI values and women's participation in parliament was 56% in 2008, the highest in the world.

Nevertheless, gender disparities are still prevalent in agriculture. Generally in rural areas, women spend more time engaged in farming activities and caring for the household than men. As a result, on average women have much longer working hours than men. Women's burdens are worsened by the fact that they are involved in doing activities that are labour intensive and time consuming. MINAGRI has developed a gender strategy that describes the issues in detail and sets out an agenda to address them, and which this strategy is based on.

Key gender issues in the agricultural sector include:

- Lack of gender related knowledge and skills among extension personnel:
- Few female extension personnel
- High illiteracy levels particularly among women limits training opportunity
- Limited research on gender sensitive technologies such as appropriately sized machinery
- Designing of meetings and training sessions do not consider other women's duties
- Difficulty accessing financial instruments due to lower levels of education among women
- Gender disparities in value addition and marketing of agricultural commodities

- Gender disparities among senior staff in the agricultural sector

In the long run, these challenges can be tackled through a robust legal framework and an active civil society which promotes and integrates gender equality with economic development and growth. More immediately, this strategy aims to mainstream gender within MINAGRI's institutional and operational framework.

Gender: Lines of Action

SP 4.5.1. Institutionalise Gender Equality in Sector Entities

- Review the existing human resource, operational and accountability policies, guidelines, procedures and systems and systematically mainstream gender in these. Establish Gender Focal Points in key departments and programmes and projects.
- Develop tools for engendering systems for accountability (M&E) and knowledge and information management (MIS).
- Develop guidelines for operationalising gender sensitivity in planning and implementing programmes and projects, with procedures to achieve 30% representation of women.
- Develop tools (manuals, guidelines or toolkits) on how to mainstream gender by extension personnel in planning training, meetings, workshops, and FFS
- Facilitate development of gender sensitive data collection and analysis tools for agricultural surveys and assessments.
- Develop incentives that motivate more women to undertake agricultural training and professional development.
- Following on the existing legal framework, governance structures across agricultural entities are required to have at least 30% women representation.

SP 4.5.2. Develop Capacities for Gender-sensitive Programming.

Given the limited knowledge on gender issues and skills to mainstream gender, MINAGRI staff will receive sensitization training. Decentralised extension personnel will be trained in and equipped with gender-friendly training methods. At the cell level, sensitisation will be conducted using existing grassroots structures, like *Umuganda*, *Ikibina*, *Ubudehe* or *Guhingirana (Guhekerana)*.

SP 4.5.3. Enhance Gender Responsiveness in Agricultural Service Delivery.

MINAGRI and its partners will raise awareness at the implementing levels of the opportunities to realize gender related rights and responsibilities. Gender equality can be promoted through all program areas.

SP 4.5.4. Continue to develop, strengthen and operationalize partnerships with gender focused institutions.

These partnerships within the agricultural sector and rural development related institutions will be key to implement the gender strategy and ensure gender mainstreaming across PSTA III program areas.

Youth:

In Rwanda youth is defined the 14-35 years age group, and there are 4,159,000 youths, or 39% of the total population. The largest age group within the youth is the 14–19 year olds, which comprises 14% of the total population. The main challenge for youth is providing employment opportunities and the training necessary to obtain higher-skilled jobs that help them break out of poverty. Many youth do not find traditional agriculture attractive and aspire to rural off-farm employment or urban occupations. Sensitising the youth to the opportunities of a modernising agricultural sector is important. The EDPRS II Thematic Area on Youth and Productivity highlights a number of youth targeted programmes. This strategy will further mainstream youth involvement in agriculture.

Youth: Lines of Action

SP 4.5.6. Develop a TVET Curriculum for Agricultural Specialisations.

In coordination with the food processing sector and with projects in areas such as quality control, mechanisation, post-harvest management and irrigation, curricula should be developed for TVET institutions and youth training centres that offer opportunities to youth to become technical specialists in these and other areas where there is demand for trained employees.

SP 4.5.7. Target Youth in Entrepreneurship Programmes

Quotas for youth (and women) should be established in programmes for entrepreneurship training and venture capital to provide them with opportunities to launch careers as agricultural entrepreneurs.

SP 4.5.8. Develop an Agricultural Leadership Programme for Youth. Include intensive seminars and hands-on experiences in modern agriculture and visits to selected sites in neighbouring countries

SP 4.6. Environmental Mainstreaming in Agriculture

Agriculture and the environment affect each other and must be considered together. In order to foster sustainable agricultural sector in the long term, sound environmental management must be mainstreamed in agricultural practices. Key areas include soil conservation, soil nutrient management and the use of chemical fertilisers, use of pesticides, water management, and the construction of rural feeder roads. This strategy already addresses most of these areas, but this section systematically addresses environmental interventions. In addition, agriculture must be prepared to adapt to climate change and consider mitigation activities, both to assist adaptation of rural communities, and perhaps to generate for carbon credits. The 2011 National Climate

Change Strategy and Low Carbon Development will also be considered in agricultural planning.

Lines of Action

SP 4.6.1. Soil Conservation Mainstreaming.

The watershed management programmes (SP 1.2.4) and agroforestry (SP 1.1.6) should be made an integral part of the crop intensification and hillside terracing efforts. Cropping plans for newly terraced areas should incorporate intercropping options and agroforestry. Soil protection should be emphasised and implemented, including living barriers (progressive terraces) and leaving crop residues on the fields.

SP 4.6.2. Fertilisation from a Plant Nutrient Viewpoint.

Fertilizer promotion should focus on both crop yields and satisfying plant nutrient requirements, and both organic and chemical fertilisers should be used. While there is still scope for wider use of chemical fertilisers, appropriate dosages should be emphasized in promotion programmes. Training sessions should also educate farmers in relation to the damage to water supplies of excess application.

SP 4.6.3. Reducing Pesticide Hazards.

The multiple issues regarding pesticide use are explained in detail in the Strategic Environmental Assessment (SEA) Study Report, European Development Fund, February 27, 2012. A wide-ranging programme for pesticide management will be developed which will include:

1. Training farmers in integrated pest and crop management through FFS.
2. IPM and Pest Risk Analysis (PRA) protocols developed for all major crops and translated in Kinyarwanda.
3. Regular publication of approved and banned agro-chemicals based on international norms.
4. Authorized distributors periodically licensed and certified.
5. All agro-chemical products plastic-tagged with Kinyarwanda instructions.
6. Pest and disease trials for crops documented and best practice issued
7. Crop-specific protocols for farmer adoption of specific pesticides
8. Pest and disease certification of public and private extension staff completed.
9. Verification that production systems (including distributors and on-farm practices) are chemically safe.
10. Pesticide leachate content of surface and ground water monitored and reported.

SP 4.6.4. Environmentally Sound Water Management.

Climate change projections predict more extreme climate events, which may damage farms and structures, and reduce water availability in dry seasons. For these reasons, it will be increasingly important to develop the hydrological information systems, including water balances, laid out in SP 1.2.6. In addition:

1. Water use efficiency considerations should be taken into account in planning and operating irrigation systems.
2. Marshland development should be consistent with the hydrology of the corresponding watersheds. The capacity of marshlands to store water and reduce flood hazards can be compromised by irrigation development if this concern is not addressed in the design stage.
3. Develop a system of allocations of water use rights based on the water balances calculated for each watershed, to encourage responsible use of water resources

SP 4.6.5. Environmental Considerations in Rural Road Design.

Under PSTA II Rwanda has made significant progress in the construction of rural roads. Rural roads, especially unpaved, are a hazard to soils, crops and water supplies when extreme climate events wash the road away and onto neighbouring farm fields. This hazard is likely to be exacerbated under climate change. To tackle this, region-specific climate-proofed feeder road standards and specifications will be developed and applied.

SP 4.6.6. Planning for Climate Change.

Rwanda's climate is complex, showing wide variations across the country and with a strong seasonality. Climate variability gives rise to disasters, such as flooding, landslides and droughts, resulting in decreased agricultural productivity or crop failure. The impacts and economic costs of current climate variability and events are already significant on food production (*e.g.*, coffee reduction by 26% in 2009/10 and significant maize losses in eastern districts in the 2010B season due to climatic variances) and likely to increase with climate change, and predicted increasing temperatures and rainfall.

It is therefore essential to implement adaptation activities for climate change. The 2011 National Strategy for Climate Change and Low Carbon Development highlights key actions including:

1. Carry out risk assessment and vulnerability mapping.
2. Broaden a programme of construction of water catchment structures, to reduce damage from flooding and increase the availability of water during drought.
3. Give increased emphasis to watershed management and soil retention measures, such as terraces, bunding, dissemination of fruit trees and agroforestry.
4. Monitor pest incidence and yields by crop, along with shifts in germination and harvest periods, and advise farmers on adaptations of cropping patterns
5. In coordination with MINIRENA, explore the options of promoting agroforestry, reforestation and afforestation projects for carbon credit markets, especially the voluntary private markets, which are currently the most active, and develop appropriate methodologies for designing and marketing such projects.

Annex I: Implementation Matrix

A. Institutional Framework

This matrix defines institutional roles and responsibilities across the four main programme areas:

- Programme 1: Agriculture and Animal Resource Intensification
- Programme 2: Research and Technology Transfer, Advisory Services and Professionalisation of Farmers
- Programme 3: Value Chain Development and Private Sector Investment
- Programme 4: Institutional Development and Agricultural Cross-Cutting Issues

Prog.	Sub-programme	Strategic Areas	Lead Agency	Roles and Responsibilities
1	SP 1.1. Soil Conservation and Land	SP 1.1.1. Land protection structures: construction of progressive and radical terraces	RAB	-RAB provides technical assistance -Districts implement terracing -SPIU works with DPs for projects

Husbandry	SP 1.1.2 Training on crop residue management	RAB	-RAB provides technical assistance -District extension workers organize training
	SP 1.1.3 Agroforestry	RAB	-RAB provides research expertise and technical support -District agronomists and extension workers develop protocols and advise farmers
	SP 1.1.4 Improve the understanding of Rwanda's soils	RAB	-RAB leads research projects -Districts support testing
SP 1.2. Irrigation and Water Management	SP 1.2.1. Public sector irrigation Development	TF I&M	-MINAGRI TF Irrigation and Mechanization leads programme -District level support -SPIU work with DPs for projects
	SP 1.2.2. Private sector irrigation development	TF I&M	-MINAGRI TF Irrigation and Mechanization collaborate with private sector actor -Coordinate with MINICOM and RDB
	SP 1.2.3. Irrigation extension and capacity building	TF I&M	-MINAGRI TF Irrigation and Mechanization designs training -District level support
	SP 1.2.4 Applying lessons from IWM and development of IWM	RAB	-RAB leads research and expansion of integrated water management approach
	SP 1.2.5. Develop hydrological information for watershed management	RAB	-RAB leads research -Collaborate with MINIRENA
SP 1.3. Agricultural Mechanization	SP 1.3.1. Assessment and Development of Mechanization Options	TF I&M	-MINAGRI TF Irrigation and Mechanization will conduct assessment -District will provide information
	SP 1.3.2. Facilitating investment and finance for mechanization	TF I&M	-MINAGRI TF Irrigation and Mechanization with collaborate with private actors and financial institutions to improve financing
	SP 1.3.3. Incorporating mechanization in irrigation schemes	TF I&M	-MINAGRI TF Irrigation and Mechanization will work with RAB, Districts, SPIU and DP projects to mechanize irrigation schemes
	SP 1.3.4. Training for Mechanization	TF I&M	-MINAGRI TF Irrigation and Mechanization will work with District extension workers
SP 1.4. Agrochemical use and Markets	SP 1.4.1. Policy for successful privatization of input markets	RAB	-RAB will lead the program to private input markets -Districts will facilitate working with agro-dealers
	SP 1.4.2. Improve the input distribution market	RAB	-RAB will lead initiatives -Districts will support implementation
	SP 1.4.3. Improve the infrastructure for fertilizer distribution	RAB/ TF PHHS	-RAB and TF Post Harvest Handling and Storage will collaborate to assess the potential of a fertilizer blending plant -Collaboration with private investors
SP 1.5. Seed Development	SP 1.5.1. Implement a formal seed system	RAB	-RAB leads the programme -Collaborate with the National Seed Laboratory and Rwanda Seed Enterprise -Districts work with farmers to improve uptake and use of seeds
	SP 1.5.2. Facilitate the import of seeds and planting material	RAB	-RAB leads the initiative -District support local capacity building
SP 1.6.	SP 1.6.1. Improve milk quality,	RAB	-RAB and the MINAGRI Livestock unit will

	Livestock Development	seasonality and productivity in line with the Dairy Strategy		lead program -District's will support training in milk handling and processing
		SP 1.6.2. Improved animal nutrition	RAB	-RAB and MINAGRI Livestock unit will collaborate to assess animal nutrition and develop strategy to improve fodder production -RAB will conduct research into optimal feeding and fodder planting
		SP 1.6.3. Improved animal genetics in line with the 2012 Animal Genetics Improvement Strategy	RAB	-RAB will lead the programme to conduct research around improved breeds and turn over Masaka bull station -RAB will collaborate with Districts to expand artificial insemination
		SP 1.6.4. Develop diversified small holder meat production in line with the 2012 Meat Industry Strategy	RAB	-RAB and MINAGRI Livestock unit will collaborate to drive animal resource intensification -Districts will support local production
		SP 1.6.5. Extension of the Girinka Programme	RAB/ District	-RAB will provide support to Districts -Districts will distribute animals and provide training and monitoring
		SP 1.6.6. Strengthen the veterinary service network	RAB/ District	-RAB will provide technical support -Districts will provide para-vets and animal health training
	SP 1.7. Nutrition and Household Vulnerability	SP 1.7.1. Develop a programme of bio-fortified foods	RAB	-RAB will lead research -Districts will support education -Collaboration with MINASANTE
		SP 1.7.2. Develop a programme of training in Kitchen Gardens	RAB	-RAB provides input and technical support -Districts support training and monitoring
		SP 1.7.3. Expansion of One Cup of Milk Per Child programme	RAB	-RAB leads the programme -Collaboration with MINASANTE and MINEDUC for sensitization campaign
		SP 1.7.4. Continue to maintain a national strategic food reserve	TF PHHS	-MINAGRI TF Post Harvest Handling and Storage manage the reserve
		SP 1.7.5. Strengthen Rwanda's food security information system	CICA	-CICA and the Statistics unit will lead monitoring of food security information
2	SP 2.1. Research and Technology Transfer	SP 2.1.1. Market related research	RAB	-RAB leads research into crops with market potential and new market opportunities
		SP 2.1.2. Long term research on multi-crop rotations	RAB	-RAB conducts research with District level support for pilot sites
		SP 2.1.3. Quality planting material	RAB	-RAB works with the private sector to develop quality planting material
		SP 2.1.4. Research on farmer' fields	RAB	-RAB works with District level support to conduct field research
		SP 2.1.5. Competitive research funding	MINAGRI	-MINAGRI awards funding, RAB collaborates with other institutions to submit proposals
		SP 2.1.6. Funding and international collaboration	MINAGRI	-MINAGRI and RAB will collaborate with international agricultural research institutes and universities
	SP 2.2. Extension and Proximity Services for	SP 2.2.1. Extending Farmer Field Schools (FFS)	RAB/ District	-RAB provides technical support and leads the programme -District extension workers train farmer promoters

	Producers	SP 2.2.2. Facilitating relationships between cooperatives and farm advisors	RAB/ District	-RAB and Districts will work with cooperatives to facilitate relationships with extension workers
		SP 2.2.3. Establish local forums for farmers and agricultural stakeholders	District	-Districts will establish and facilitate local forums to share agricultural information
	SP 2.3. Farmer Cooperatives and Organisations	SP 2.3.1. Implement a capacity building programme for agricultural organisations	MINAGRI	-MINAGRI will work with RAB and Districts to train rural organisations in key skills -Collaborate with MINICOM to develop business and value chain skill sets
		SP 2.3.2. Develop a framework for share companies in farming areas	MINAGRI	-MINAGRI will lead the program, and collaborate with RAB and Districts to establish pilot projects
3	SP3.1. Creating an Environment to Attract Private Investment, Encourage Entrepreneurship and Facilitate Market Access	SP 3.1.1. Bulking up production and associative forms of farming	MINAGRI	-MINAGRI will lead programmes of land consolidation and facilitating contract negotiation, in collaboration with RAB and Districts
		SP 3.1.2. Training for agricultural entrepreneurship	MINAGRI	-MINAGRI will lead the program, and collaborate with RAB and Districts
		SP 3.1.3. Public private partnerships and risk management in value chains	MINAGRI	-MINAGRI will lead coordination with NAEB, MINICOM and RDB to leverage private investment and mitigate risk
		SP 3.1.4. Catalytic fund for agricultural entrepreneurship	MINAGRI	-MINAGRI will lead a feasibility and design study for a catalytic fund
		SP 3.1.5. Agricultural exports and cross border trade channels	MINAGRI / NAEB	-MINAGRI and NAEB will collaborate with MINICOM and MINEAC to expand EAC trade -Collaboration with RBS to develop export certification
	SP 3.2. Development of Priority Value Chains: Food Crops	SP 3.2.1. Bananas	RAB	-RAB leads implementation, MINAGRI provides monitoring -Collaborate with NAEB on export potential
		SP 3.2.2. Wheat	RAB	-RAB leads research and extension
		SP 3.2.3. Maize	RAB	-RAB leads production and TF Post Harvest Handling and Storage provide facilities and training
		SP 3.2.4. Rice	RAB	-RAB leads research and FFS training and collaborates with TF Post Harvest Handling and Storage and Irrigation and Mechanization to improve productivity
		SP 3.2.5. Irish Potato	RAB	-RAB leads seed development -Collaboration with TF Post Harvest Handling and Storage to construct a processing plant
		SP 3.2.6. Cassava	RAB	-RAB leads research and collaborates with private sector to expand processing
		SP 3.2.7. Soya Beans	RAB	-RAB leads research and production
		SP 3.2.8. Beans	RAB	-RAB leads research and production
	SP 3.3. Development of Priority Value Chains: Export crops	SP 3.3.1. The coffee value chain	NAEB	-NAEB leads coffee research, production improvement and marketing, working with Districts, private sector, DPs and MINICOM
		SP 3.3.2. The tea value chain	NAEB	-NAEB leads research, expansion of cultivation and marketing, working with Districts, private sector, DPs and MINICOM

		SP 3.3.3. The pyrethrum value chain	NAEB	-NAEB supports expansion of production, training and research, working with private actors like SOPYRWA
		SP 3.3.4. Horticulture, floriculture and other emerging value chains	NAEB	-NAEB leads research and product development, and collaborates with value chain actors
	SP 3.4. Development of Priority Value Chains: Dairy and Meat	SP 3.4.1. The dairy value chain	RAB	-RAB leads development of dairy products in collaboration with the Rwanda National Dairy Board, MCCs, MINAGRI livestock unit and private sector
		SP 3.4.2. The meat value chain	RAB	-RAB and MINAGRI Livestock unit will work with slaughterhouse agents, meat processors and other value chain actors
	SP 3.5. Development of Priority Value Chains: Fisheries	SP 3.5.1. Research and technology development	RAB	-RAB will lead research supported by MINAGRI livestock unit
		SP 3.5.2. Strengthen existing fish supply chain	RAB	-RAB will lead in collaboration with supply chain actors, private sector and DP projects
		SP 3.5.3. Implement a system of cage aquaculture	RAB	-RAB will lead the programme in collaboration with Districts
		SP 3.5.4. Implement a system of tank aquaculture	RAB	-RAB will lead the programme in collaboration with Districts
		SP 3.5.5. Implement a system of aquaculture parks	RAB	-RAB will lead the programme in collaboration with Districts
		SP 3.5.6. Establish industry to process fish wastes into animal feeds and fertilisers	RAB/ TF PHHS	-RAB will collaborate with TF Post Harvest Handling and Storage and private sector to establish fish waste processing facilities
	SP 3.6. Development of Priority Value Chains: Apiculture	SP 3.6.1. Strengthen beekeeping	RAB	-RAB will lead, working with Districts
		SP 3.6.2. Conduct market research and develop a promotion campaign	RAB	-RAB will lead and work with private sector actors
		SP 3.6.3. Increase and harmonise quality standards	RAB	-RAB will collaborate with RBS to align production with quality standards
	SP 3.7. Agricultural Finance	SP 3.7.1. Strengthen and consolidate SACCOs at the District Level	MINAGRI / District	-MINAGRI will collaborate with Districts to consolidate SACCOs through an Agricultural Cooperative Bank
		SP 3.7.2. Establish a warehouse receipts system	MINAGRI	-MINAGRI will collaborate with MINECOFIN and BNR to establish a system
		SP 3.7.3. Facilitate value chain finance relationships	MINAGRI	-MINAGRI will collaborate with stakeholder actors and financial institutions
		SP 3.7.4. Expand agricultural insurance and rural financial instruments	MINAGRI	-MINAGRI will collaborate with DPs and private sector to expand agricultural insurance programmes
	SP 3.8. Market-oriented Infrastructure for Post-Harvest	SP 3.8.1. Promote efficient and equitable transport systems	TF PHHS	-TF Post Harvest Handling and Storage will collaborate with MININFRA, MINICOM, DPs
		SP 3.8.2. Reduce staple crop post-harvest losses at producer and first aggregator level	TF PHHS	-TF Post Harvest Handling and Storage will lead the programme in collaboration with Districts, private sector and MINICOM
4	SP 4.1. Institutional Capacity Building	SP 4.1.1. Identify critical skills needs for Ministry staff	MINAGRI	-MINAGRI will lead the programme in collaboration with SCBI
		SP 4.1.2. Develop staff incentives	MINAGRI	-MINAGRI will lead the programme
		SP 4.1.3. Staff capacity building	MINAGRI	-MINAGRI will lead with DP support

		SP 4.1.4. Strengthen and improve coordination of the rural development group	MINAGRI	-MINAGRI will lead collaboration with rural development group actors including MINICOM, MININFRA, MINIRENA etc...
SP 4.2. Decentralisation in Agriculture		SP 4.2.1. Strengthen the role of districts in para-vet services and human disease control	District	-Districts will lead development of human and animal disease control programmes
		SP 4.2.2. Make districts partners in all ag extension programmes	District	-Districts will work with RAB, MINAGRI and NAEB to be the lead actors in extension
		SP 4.2.3. Strengthen JAF and District feedback mechanisms	District	-Districts and JAF will be developed and strengthened
		SP 4.2.4 Strengthen fiscal decentralisation	MINAGRI / District	-MINAGRI will lead in strengthening fiscal decentralization
SP 4.3. Legal and Regulatory Framework		SP 4.3.1. Formalise the national irrigation policy	MINAGRI	-MINAGRI and TF Irrigation and Mechanization will drive the process
		SP 4.3.2. Develop regulations for organic agriculture, pesticide and limestone use	MINAGRI	-MINAGRI will lead using results produced through RAB research
		SP 4.3.3. Develop regulations around the value chain guarantee fund	MINAGRI	-MINAGRI will lead in collaboration with MINICOM, private sector and financial institutions
		SP 4.3.4. Develop the legal basis on an agricultural catalytic fund	MINAGRI	-MINAGRI will lead in collaboration with MINICOM, investors and financial actors
SP 4.4. Agricultural Communication Statistical Systems, M&E and Knowledge Management		SP 4.4.1. Agricultural communication strategy development	MINAGRI / CICA	-MINAGRI / CICA will lead development and implementation in collaboration with all agricultural stakeholders
		SP 4.4.2. Improvement of the agricultural statistical system	MINAGRI / CICA	-The MINAGRI Statistics unit will lead in collaboration with NISR
		SP 4.4.3. Collection and use of agricultural meteorology data	MINAGRI / CICA	-MINAGRI will work with the Rwanda Meteorological Services
		SP 4.4.4. Agricultural M&E and MIS	MINAGRI / CICA	-MINAGRI will lead M&E in collaboration with RAB, NAEB and Districts -CICA will lead MIS development
SP 4.5. Gender and Youth in Agriculture		SP 4.5.1. Institutionalise gender equality in sector entities	MINAGRI	-MINAGRI will lead gender mainstreaming sensitization across all sector actors
		SP 4.5.2. Develop capacities for gender sensitive programming	MINAGRI	-MINAGRI will lead sensitization of staff -Districts will support extension work
		SP 4.5.3. Enhancer gender responsiveness in agricultural service delivery	MINAGRI	-MINAGRI will work with RAB, NAEB, Districts and DPs to raise awareness of gender in programme implementation
		SP 4.5.4. Strengthen gender focused partnerships	MINAGRI	-MINAGRI will develop partnerships with MIGEPROF, gender based DP's and others
		SP 4.5.5. Develop a TVET curriculum for ag specialisations	MINAGRI	-MINAGRI will collaborate with TVET and youth training centres
		SP 4.5.6. Target youth in entrepreneurship programmes	MINAGRI	-MINAGRI will target youth in funding and training opportunities
		SP 4.5.7. Develop an agricultural leadership programme for youth	MINAGRI	-MINAGRI will lead the programme
SP 4.6. Environmental Mainstreaming in Agriculture		SP 4.6.1. Soil conservation mainstreaming	RAB	-RAB will coordinate with MINAGRI environmental focal point
		SP 4.6.2. Fertilisation from a plant nutrient viewpoint	RAB	-RAB will lead research and training with District extension worker support
		SP 4.6.3. Reducing pesticide hazards	RAB	-RAB will lead in collaboration with Districts, DPs and MINIRENA

		SP 4.6.4. Environmentally sound water management	RAB	-RAB will lead in collaboration with TF I&M, Districts, DPs and MINIRENA
		SP 4.6.5. Environmental considerations in rural roads	MINAGRI	-MINAGRI will lead, together with roads sub-group, DPs, MININFRA and private sector
		SP 4.6.6. Planning for climate change	MINAGRI	-MINAGRI will lead strategic planning in collaboration with all sector actors

Annex II: Key Strategic Documents Referenced

I. Strategies

7YGP

Agriculture Gender Strategy

Animal genetic improvement strategy

Animal nutrition strategy

Climate change and low carbon strategy

Crop Intensification Programme Strategy

EDPRS I and EDPRS II

Fertilizer strategy

Meat industry strategy

Mechanization strategy

National agricultural extension strategy
National beekeeping strategic plan
National coffee strategy
National post-harvest (staple crops)
National rice development strategy
National seed strategy
Rural and Agricultural Financial Services
strategy
Rwanda horticulture strategy
Rwanda poultry strategy
Rwanda tea strategy
Rwanda Vision 2020
Small animal strategy
Strategic Environment Assessment
Surveillance des maladies animales

II. Policies

Environment Policy
Irrigation Policy
National Agricultural Policy
National Dairy Policy
National Decentralization Policy
National Forestry Policy
National Seed Policy
Rice policy
Rwanda Horticultural Policy

III. Reports

Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey (CFSV)
Crop Assessment Reports
EICVs
Feeder Road Plan and Common Framework of Engagement
Master Plan for Fisheries
MDGs report
MINAGRI Annual Report
National Agricultural Survey
Pam Booklet final

PSTA II Report

Rwanda Irrigation Master Plan

Schéma Directeur D'aménagement de Marais, de Production des Bassins Versants et de Conservation du Sol

SWaP MOU