The National Master Plan for Agricultural Development in Suriname

Final Report

March 2016

Kaplan Planners Ltd
Regional & Environmental Planning

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Introduction by the Hon. Minister of Agriculture in Suriname

The Ministry of Agriculture, Animal Husbandry and Fisheries, on behalf of the Government of Suriname, is pleased to present the National Master Plan for Agricultural Development in Suriname.

This Master Plan lays out a new way of thinking about agriculture in our country, a "green revolution" which advances sustainable agriculture into a new era: diverse, commercial, enriched by knowledge and innovative technology, with the ability to export most of its produce. The government of Suriname places high hopes on this Plan and sees in it the potential to contribute to GDP growth, to substitute for imports and increase exports, while significantly contributing to employment, rural development and to our economy as a whole.

The Plan is being presented at a time when the exhaustive mining industry is in crisis, which negatively affects government revenues and foreign exchange earnings. On the other hand, within the renewable production sectors agriculture has the strongest capacity to ensure sustainable employment, foreign exchange earnings, economic growth and above all food security and safety, thus making a great social and economic contribution.

I would like to thank the combined teams from Israel and Suriname, who have worked in full cooperation under the guidance and steering of my Ministry and the Investment and Development Corporation Suriname N.V. (IDCS). Moti Kaplan Planners together with local experts have produced, within a relatively short time, a comprehensive policy document which contains a long-term vision, as well as detailed, operational recommendations for implementing the Plan across all districts of the country.

This Master Plan may also provide valuable instruments for the Five Year Plan 2016-2021 to be formulated by our Government in the next few months, which again will underscore our commitment to implementing recommendations of the Master Plan.

We are committed towards implementation of the viable recommendations in the Plan, which will constitute a fundamental element of our national development. It is my sincere hope that this Master Plan will sustainably contribute to prosperity and wellbeing of the people of Suriname and worldwide.

Honorable Minister of Agriculture, Animal Husbandry and Fisheries

Paramaribo, 23th of December 2015

Inleiding door Zijne Excellentie Minister van Landbouw, Veeteelt en Visserij in Suriname

Het is het Ministerie van Landbouw, Veeteelt en Visserij een genoegen om namens de regering van Suriname het Nationaal Master Plan voor de Agrarische Ontwikkeling in Suriname te presenteren.

Dit Master Plan presenteert een nieuwe manier van denken over de landbouw in ons land, en wel een 'Groene Revolutie' die duurzame landbouw in een nieuw tijdperk brengt: divers, commercieel, verrijkt door kennisvergroting, innovatieve technologie, met de mogelijkheid om de meeste producten te exporteren.

De regering van Suriname stelt hoge verwachtingen aan dit Plan en ziet daarin de potentie om bij te dragen aan de groei van het nationall inkomen, een groot deel van voedselimportnen te vervangen en exporten te verhogen. Daarnaast zal een belangrijke bijdrage worden geleverd aan de werkgelegenheid, de ontwikkeling van de landelijke gebieden en aan onze economie in zijn geheel.

Het Plan wordt gepresenteerd op een moment waarop de uitputtende mijnbouwindustrie in een crisis verkeerd, die vooral de overheidsinkomsten en verdiensten in buitenlandse valuta negatief beïnvloedt. Aan de andere kant heeft, binnen de duurzame productiesectoren, landbouw de sterkste capaciteit om duurzame werkgelegenheid te garanderen, alsook verdiensten in buitenlandse valuta, economische groei en vooral voedselzekerheid en voedselveiligheid te garanderen. En kan als zodanig een grote sociale en economische bijdrage leveren.

Ik wil graag de gecombineerde teams uit Israël en Suriname dankzeggen, voor hun volle inzet en samenwerking, onder begeleiding en sturing van het ministerie en IDCS. Binnen relatief korte tijd hebben Moti Kaplan Planners, samen met lokale experts, in dit Master Plan een alomvattend beleidsdocument geproduceerd welke een lange-termijn visie bevat alsook gedetailleerde, operationele aanbevelingen voor de uitvoering van het plan in alle districten van het land.

Dit Master Plan kan ook waardevolle mogelijkheden bieden voor het Vijf Jaren Plan 2016-2021 welke door de overheid in de komende maanden wordt geformuleerd. En deze zal, nogmaals, onze toewijding onderstrepen voor de uitvoering van de aanbevelingen van het Master Plan. Dit Plan zal ook waardevolle mogelijkheden bieden voor het Vijfjaren Plan 2016 -2021 welke door de overheid in de komende maanden wordt geformuleerd ter goedkeuring door De Nationale Assemblee, hetgeen onze toewijding zal onderstrepen voor de uitvoering van de aanbevelingen van het Master Plan.

Wij zijn toegewijd aan de uitvoering van de levensvatbare aanbevelingen in het Plan welke een fundamenteel element van onze nationale ontwikkeling zal vormen. Het is mijn oprechte hoop dat dit Master Plan duurzaam zal bijdragen aan de welvaart en het welzijn van het volk van Suriname en wereldwijd.

Z.E. Minister van Landbouw, Veeteelt en Visserij

Paramaribo, 23 december 2015

Kaplan Planners Ltd
Regional & Environmental Planning

Hon. Soeresh Algoe
Minister of Agriculture, Animal Husbandry and Fisheries
The Republic of Suriname

Mr. Winston Caldeira
Director
IDCS
The Republic of Suriname

March 3rd, 2016

National Master Plan for Agricultural Development in Suriname

Submission of Final Report

Dear Sirs,

We are pleased to submit the Final Report of The National Master Plan for Agricultural Development in Suriname. This report summarizes the in-depth work process of the last two years which has resulted in a recommended comprehensive policy for agricultural development in Suriname.

The Plan introduces a comprehensive change in the approach to agriculture – from subsistence agriculture to commercial, export-oriented and knowledge-driven modern agriculture. A change of this kind has the power to bring forth a significant improvement in the national budget, decreasing imports and creating new job opportunities in agriculture and its byproducts. The Plan emphasizes the government's role in the development of agriculture through incentivizing and assisting the private sector to pursue agricultural endeavors in the various districts.

The main report is accompanied by detailed business plans which constitute the implementation aspect of the Master Plan – the development of specific projects in several branches of the agricultural sector to be scattered across Suriname's northern districts. The report also includes an atlas containing digitized maps (GIS) that depict the existing agricultural distribution in Suriname, and the proposed focused efforts in the different districts.

These three volumes summarize in practical terms the large effort that has been made, in accordance with the work plan. The final report joins a series of intermediate reports that were submitted during the working period, which include a detailed description of current conditions, a mapping of natural resources and of

existing potential and opportunities. Many individuals have participated in this effort: Ministry of Agriculture staff, IDCS staff, and Kaplan's staff of consultants. We thank you sincerely for the warm welcome and the cordiality you have shown us throughout this process, and the opportunity that you have given us to contribute to and assist with the agricultural development in Suriname, as an important element of the country's economy and prosperity.

The Master Plan that we are submitting is only the beginning of a new and challenging direction for Surinamese agriculture. This path combines modern, specialized technological development, together with attention and care for the communities and individuals who pursue an agricultural occupation.

In the proposed course of action, the government plays an important role in eliminating obstacles and creating opportunities for the development of agricultural projects, and thereby serving as an impetus for private entrepreneurs who will subsequently follow an independent path.

We believe that by implementing the recommendations of the Plan, agriculture in Suriname will become a dominant sector and will bring the country gradually to a position of primary food provider for the region.

Yours sincerely,

Moti Kaplan

Kaplan Planners Ltd. Regional and Environmental Planning

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We would like to convey special thanks to the hard-working team behind the completion of this report for the National Master Plan for Agricultural Development.
Special thanks go to the following experts who contributed to the present report:

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The National Master Plan for Agricultural Development in Suriname

Executive Summary

1. General Introduction

Suriname is characterized by substantial water and fertile soil, a favorable climate, an educated workforce and a historic agricultural tradition, as well as an ideal location for export potential. All of these factors give the country a comparative advantage in the international agricultural market; however, agriculture in Suriname does not fulfill its potential, with large underutilized arable lands and limited commercial agriculture.

The economy of Suriname today relies mainly on gold, petroleum and alumina exports; however, low export prices and depletion of mineral resources have led to serious setbacks. Meanwhile, in the past decade the direct agricultural share of the GDP has decreased from 11% to 5.8%. The mining sector is subject to fluctuations and risks, as presently evident, whereas agriculture is a sustainable sector, investment in which could have a great impact on Suriname's economy.

The challenge and the vision of the Master Plan is to improve the condition and stability of the national economy through agricultural production for import replacement and for export, transforming Suriname into the primary food supplier for the region and a major player in CARICOM and even in the European market. Simultaneously, the Plan aims to integrate agriculture and society in a manner which contributes to employment and maintains the stability of social structures.

The Master Plan is structured on two planes: design of a comprehensive national policy, and its implementation through specific regional projects. It is rooted in two main values:

1. **Agriculture and Population:** Improving the welfare of the people of Suriname, through the generation of employment, food and economic security; increasing individual and communal prosperity and combating poverty.

2. **Sustainable Agriculture:** Agriculture is deeply intertwined with environment and ecology. Suriname is one of the world's richest countries in natural resources. The Plan will facilitate growth of agricultural lands, while preserving the environment.

The Master Plan seeks to position the government to alleviate the biggest challenges to agricultural investments: uncertainty, long periods of return (especially for perennial crops), high costs of credit and limited accessibility to small farmers, relatively high indirect and direct corporate taxation, relatively high labor costs compared to labor productivity; high costs and poor quality control of imported inputs (namely agro-chemicals and seeds), poor research and extension services, and lack of agricultural school and mid-level training courses. With government assistance and support in certain basic investments, the private sector will be better equipped to develop farms, processing facilities, and market channels.

2. Main Objectives

Realization of agriculture's potential in Suriname means:

- Transition from **subsistence agriculture** to a modern, industrialized, knowledge-intensive **commercial agricultural system** open to global markets.
- Significant agricultural contributions to macro-economic improvements, including the gross domestic product, trade balance, employment, and food

The specific practical expressions of the advancement of the agriculture sector will be:

1. Substitution of imports to supply fresh and processed agricultural produce to the local market and improve the agricultural balance of payments.
2. Increasing profits and value added by developing an agricultural industry which is capable of processing produce and lengthening its shelf life.
3. Developing the capacity for export of select fresh and processed agricultural produce in which Suriname has a relative advantage, to the Caribbean, EU and other markets.
4. Creation of challenging employment opportunities in agriculture for the younger generation and for women, particularly through adoption of technology and advanced farming methods.
5. Controlled development of agriculture and creation of job opportunities in the Interior through rural processing industries, agro-tourism and other agro-services, balanced with preservation and nurture of the traditional communal social fabric.

   Special attention should be given to the use of forested land in the southern Interior, with careful studies on the soil suitability and sustainable cultivation of lands in the interior areas, while moving from shifting cultivation (slash and burn) to permanent cultivation of the lands.

6. Transitioning agricultural activity to large business units, relatively large land areas, and increasing the use of greenhouses and advanced technology, while simultaneously maintaining specialized family-based farming and integrating it into industrialized commercial entities in order to achieve economies of scale.
7. Adding and diversifying additional high value-added crops, alongside rice and bananas: (citrus, vegetables, root crops, cacao, coconuts, palm oil, meat and dairy products)
8. Improvements to and coordination with the transportation sector in order to solve existing problems of maritime and air transport facilities, especially to regional CARICOM markets.

Development of Knowledge, Research and Professional Training

Initiating a flow of professional knowledge, creating centers for training and research, and developing channels for the transfer and implementation of farming knowledge:

a. Establishment of a special Chamber for the agricultural sector in Suriname. This designated body will be the main platform for small independent farmers and small-farmer cooperatives/groups, addressing relevant aspects from primary production to marketing, organized according to specific product category. The poor organizational structure of small farmers, the malfunctioning of existing farmers' cooperatives, and the absence of large farmers and processing units makes specialized extension services to small farmers particularly necessary; see Chapter 16 in the full report.
b. Introduction of specialized Agricultural Education (up to 2 years) at the secondary and tertiary level, resulting in the continuous provision of skilled farmers and laborers for the sector. In addition specialized (per product) short training courses (1-3 months) for young farmers are recommended.
c. The establishment of a “Platform for Applied Agricultural Research” is essential to ensure effective and efficient integration of the efforts of all relevant institutions involved: the Ministry of Agriculture, CELOS, STIPRIS, ADRON, ADEK University, as well as the relevant private sector efforts and international cooperation (bilateral and multilateral). This Platform should be a Public-Private undertaking.
d. Reinforcement and improvement to human resource capacities by means of adequate recruitment, payment and motivation of qualified staff at the Ministry of Agriculture and related institutions, especially for research, extension, and planning functions.

3. Approach

The National Master Plan for Agricultural Development in Suriname has been created under the guidance of LVV and IDCS, who have been partners in all stages of preparation of the Plan and its recommendations.

The research for the Plan included a comprehensive survey of all the existing conditions: extent of agricultural land, distribution of crops, methods of cultivation, soil quality, hydrology, condition of infrastructure, and state of agricultural employment, as well as an analysis of social conditions and market research both in Suriname and internationally, with an emphasis on Caribbean nations.

Preparation of the Plan also included joint discussions and extensive field trips with members of government departments, representatives of the individual districts, and officials of other agencies, as part of a full and fruitful cooperative effort. In addition, a nationwide stakeholders' meeting was hosted at the Ministry of Agriculture to gather input.

The resulting findings are consolidated according to topic – outlines for comprehensive national agricultural policy and for focused development efforts in the different districts, including stimuli for the private sector and a series of business plans for specific industries.

As part of the research for this Plan the varied agricultural land in Suriname was photographed and mapped. These photos display different characteristic phenomena of local agriculture. Clockwise from top left: small cultivated family plots in Saramacca, large rice paddies in Nickerie, a typical village south of the Nickerie River, and abandoned rice paddies in Nickerie.

The reports of this process are concentrated in a series of documents: a current state analysis, a set of policy guidelines, an action plan, an atlas which presents in great detail the distribution of agriculture throughout the different districts, and proposals for specific projects in each district.

4. Expectations of Growth of the Agriculture Sector

The presently cultivated land area in Suriname is approximated at 40,000 hectares, 31,000 of which are dedicated to rice paddies − almost all in Nickerie. However, due to a bi-annual crop cycle for rice, the effective cultivated area is upwards of 65,000 hectares. The agriculture sector employs about 12,000 full-time employees, as well as several thousand more who work part-time, seasonally, or in related industries.

Agriculture's gross domestic product (not including fishery) is 260 M USD. Fresh agricultural exports without fishery are valued at 91 M USD, consisting mostly of rice, bananas and vegetables; fish contribute an additional 37 million to a sum of 128 million USD.

Import of fresh and processed produce adds up to about 243 M USD, made up particularly of cereals, meat, dairy products and processed food. It is significant to note that the value of imported agricultural products is nearly equal to the value of that produced in the country. Moreover, the food balance (exports less imports, including fishery) is -116 million USD, and that is without taking into account approximately 80 million USD of imported agricultural inputs such as equipment, machinery, fertilizers, pesticides, and the like. However, the potential for increased exports and for import substitution is high, especially for fruits, edible oils, vegetables and root crops.

Table A: The current state of Suriname's agriculture in 2014 on a macro level. See the tables at the end of this section for further detail.

	Local Production			Export Value		Import Value	
Branch	**Quantity**	**Value**	**Value**	**Value**	**Value**	**Value**	**Value**
	(1,000 tons)	**(M SRD)**	**(M USD)**	**(M SRD)**	**(M USD)**	**(M SRD)**	**(M USD)**
Crops	457	633	195	295	91	120	37
Livestock & Byproducts*	20	210	65	ī	ī	191	59
Fishery	*	**	**	119	37	ī	ī
Processed Foods	ī	ī	ī	ī	ī	477	147
Total	**477**	**843**	**260**	**414**	**128**	**788**	**243**

* Fishery production quantity is 595,000 tons according to IMF data.
**Fishery production value not available

Agriculture's current share of Suriname's total GDP is 5.8% (including hunting and forestry but not including fishery), although it is significantly higher when accounting for associated industries and services which depend upon agriculture for their existence. The proportion has decreased in recent years, however, thus the Plan's objective is to raise it to at least 8%, including such related industries. Assuming an average of 3% growth per year, the total GDP will increase from 5,200 M USD to at least 7,000 M USD in the next ten years. During that period, the Plan aspires to an average growth of 6% per year of the agricultural gross production value, i.e. an increase from 260 M USD in 2014 to 470 M USD in 2025, with a corresponding increase in the sector's contribution to the GDP. This can be achieved in the next decade if the government prioritizes the sector by promoting agricultural activity. The Plan therefore recommends an investment of 40 million USD per year by the government, which will stimulate additional private investments by local farmers and entrepreneurs as well as direct foreign investments in cacao, oil palm, coconut, poultry, etc.

Suriname's agricultural production today consists mainly of rice, banana and fish, for local consumption and export, and vegetables, meat, poultry and eggs solely for local consumption. With the implementation of these recommendations, significant growth can be expected in all branches of agriculture with gradual increases in the following fields as follows:

- Fresh produce of permanent crops: from 145,000 to 300,000 tons.
- Vegetable, root, and legume production: from 37,000 to 60,000 tons.
- Dairy production: from 6,000 tons of raw milk to 20,000 tons.
- Meat and poultry production, especially broilers, from 13,000 to 50,000 tons.
- Gradual increase from today's rice production of 276,000 tons, conditioned upon infrastructure solutions to the existing salinity and drainage problems.

Similarly, further branches will be added which will provide a substantial contribution to the national economy, in particular: cacao, oil palm, spices, and animal feed for local use. All of this development is dependent on the suitability of infrastructure and the opening of export bottlenecks. Therefore, the investments and the increased cultivation must be gradual, according to the commercial success of export companies.

A special emphasis will be given to economically valuable crops with a high export potential. As such, extensive cultivation of cacao is proposed. Cacao prices are currently above 3,200 USD per ton, and both price and demand are continually increasing. Suriname has suitable conditions for cacao cultivation and has grown it in the past. Today, it is possible with advanced technologies to reach yields of three tons

per hectare, contributing to employment and constituting an important component of Suriname's agricultural exports.

The two tables below present the production, export and import data for Suriname's main agricultural commodities:

Table B: Suriname's Local Agricultural Production, For Local Consumption & Export, 2014 (Data and calculations from LVV Annual Report)

Category	Item	Local Production		Export	
		Tons / Year	Value M SRD/ Yr	Tons / Year	Value M SRD/ Yr
Annual Crops	Dried Paddy	275,900	196	103,800	180
	Vegetables	24,600	95	2,800	5
	Cassava & Other Roots	9,500	30		
	Other Annual Crops (including watermelon, peanuts, other legumes)	2,580	16		
Annual Crops Subtotal		312,580	337	106,600	185
Permanent and Semi-Permanent Crops	Banana and Plantain	101,700	135	75,300	109
	Citrus	22,100	55	30	0
	Coconut	12,900	36	430	1
	Other Fruits	8,100	70		
Perm & Semi-Perm Subtotal		144,800	296	75,760	110
CROPS SUBTOTAL		457,380	633	182,360	295
Livestock	Beef	1,700	35		
	Poultry	8,900	99		
	Pork, Sheep & Goats	2,220	24		
Livestock Subtotal		12,820	158		
Animal Byproducts	Milk (in 1,000 liters/yr)	4,100	10		
	Eggs (58.5 grams/egg)	3,100	42		
Animal Products Subtotal		7,200	52		
MEAT & ANIMAL PRODUCTS SUBTOTAL		20,020	210		
TOTAL		477,400	843	182,360	295

Table C: Suriname's Agricultural Imports, 2014 (Data from LVV Annual Report)

Category	Item	Import	
		Tons / Year	Value M SRD/ Yr
Field Crops	Vegetables	18,300	34.3
	Cassava & Other Roots		
	Peanuts & Other Legumes	190	0.91
Fruits	Other Fruits	3,000	16.9
Grain Products	Cereals	45,700	46.0
	Flour, Starch, Wheat	11,500	21.3
CROPS SUBTOTAL		75,990	119.4
Meat	Beef	19,100	97.8
	Poultry		
	Pork		
	Sheep and Goats		
Fish	Fish & Seafood, Including Preparations*	4,100	30.4
Animal Byproducts	Milk (in tons equivalent - including milk powder and cheese)	4,300	62.9
	Eggs (58.5 grams/egg)		
	Honey (in 1,000 liters/yr)		
ANIMAL PRODUCTS		27,500	191.1
Processed Foods	Coffee, Tea and Spices	890	8.5
	Cacao and Cacao Products	820	7.4
	Sugar and Sugar Products	25,400	61.7
	Products for Human Consumption: Extract, Essences, Concentrate, Sauce, Soup Ingredients, etc.	8,900	96.4
	Vegetable Fats and Oils and Preparations of Veg, Fruits and Plant	27,800	114.7
	Oleaginous Seeds and Fruits	1,400	5.3
	Preparation of Grains, Flour, Starch	7,100	57.1
	Drinks, Alcoholic Liquids and Vinegar	34,000	126.0
PROCESSED FOODS		106,310	477.1
TOTAL			787.6

*Includes meat preparations

5. Action Plan

5.1 Main Policy Guidelines

The Fundamental Principles of the Plan:

A. The government will **attract entrepreneurs and investors from the private sector** to invest in local agriculture by emphasizing Suriname's comparative advantage. A large portion of the government's investments will go towards incentives to encourage and support private agricultural businesses.

B. **Government Support:** Suriname's government will support the advancement of modern agriculture with a budget of approximately 40 million USD per year during the coming decade.

C. **Financial Yield:** The return on governmental investments will increase agriculture's share of the GDP from **5.8**% to **8**%, significant reduction in import, and improvement to the national food trade balance**.**

D. **Employment:** Gradually over the next ten years, the Plan will add 10,000 new jobs to Suriname's existing 12,000, in the agriculture sector and its derivative fields.

E. **Expansion of Labor Force:** The plan proposes to overcome the shortage of labor by way of incentives, adequate pay, and attracting young people to engage in advanced agriculture through technology and wealth of information. In parallel, agricultural employment should be opened to foreign workers, on a scale suitable to the conditions and absorption capacity of Suriname.

5.2 Investment Incentives

The government of Suriname sees agriculture as a leading sector for the industry and economy of the nation. It therefore aims to encourage local and foreign investors to initiate and invest in agricultural projects, by creating a healthy platform and an enabling environment for agricultural businesses. The government thus will support private sector agricultural activities using the following direct and indirect financial benefits, especially for new enterprises:

- Supportive assistance (credit, research & development, extension) towards market and product development.
- Insurance and other means to alleviate the uncertainty characteristic of agriculture and mitigate its risk.
- Special tax incentives to aid growth in the first years of a business and promote stability even in less successful years, including reduced duties on the import of agricultural equipment and industrial machinery.

- Improvement of infrastructure such as transport, drainage, irrigation, etc. to allow the expansion of agricultural land across geographical areas.
- Incentives for the recruitment of agricultural labor, training assistance, and provision of attractive conditions for workers, as well as permission to import foreign workers for labor-intensive projects.
- Convenient terms for leasing land for agricultural purposes

5.3 Main Government Tasks

The total budget for government support will be about 40 million USD annually in each of the years 2016-2025. The specific priorities are as follows:

1. **Development of agricultural risk insurance solutions:** These will be administered by a designated agricultural insurance company to protect farmers from damages by natural causes and especially from price fluctuation. The insurance will be allocated at the year end, and according to regional sectoral success factors. The Bank will be assisted by staff from LVV who will advise and provide data and evaluation services as needed. The mechanism is to be administered according to the following principles:
    - The insurance company will be established in cooperation with the Ministry of Agriculture and with an arbitration commission to resolve potential disputes over compensation.
    - Risk premium calculations will be made separately for each crop and each method of cultivation, relying on the historic results of each cultivar. Discounts will be calculated according to the absence of claims.
    - Recompense for the farmers in case of damage will be at most the value of the production costs, with a deduction (policyholder's participation).

    Estimated budget allocation: 5 million USD annually.

2. **Credit for Disadvantaged Small Farmers:** The problem of scarcity of credit for small farmers, even for minor sums, obstructs their success and advancement. The Plan proposes focused government assistance by way of collateral-free microcredit allocations to small farmers or to limited agricultural activities. The farmer would have to complete a simple form detailing how he/she meets the criteria:
    - Full-time occupation as a farmer, or at least confirmation of substantial part-time agricultural work.
    - Convincing considerations regarding the barriers limiting development of the specific agricultural activity, and the possibilities of overcoming them with the assistance of credit.

- A partial work plan and business plan, including a commitment to repaying the entire grant within a defined period of time.

These credit services will be administered by an LVV committee according to criteria approved by the government. The opportunity will be advertised to the public in 2016.

Estimated budget allocation: 8 million USD annually. This will provide average loans of 18,000 USD each to nearly 450 small farmers.

3. **Construction of infrastructure** instrumental to agriculture such as roads, power and communication lines, and especially improvement of drainage infrastructure and construction of irrigation networks.

   Estimated budget allocation: 4 million USD annually. That will enable rehabilitation of 1,250 hectares annually.

4. **Establishment of an extension framework**: Training of guidance personnel, exposure to extension methods, acquisition of equipment and computerized tools, field supervision through remote sensing and GIS. Training in the implementation of advanced technologies for irrigation, mechanization, fertilization, etc., for all areas of agriculture.

   Estimated budget allocation: 4 million USD annually.

5. **The Agricultural Service & Training Center (ASTC)** concept is a Public-Private-Partnership model (cooperation between private investors and the government) as a regional "one-stop shop" providing solutions across the entire value chain for supporting farming communities throughout the region, with the goal of providing farmers with modern farming technology and technical know-how to exponentially improve crop and livestock production levels and overall quality.

   The ASTC provides farmers with all of the necessary farming inputs such as seeds, chemicals, irrigation, fertilization and cultivation equipment as well as suitable technology, micro-finance and practical knowledge to local smallholder farmers, in order to support their activities and ensure that they will significantly improve their farming operation and crop yields.

   The crops and livestock produced by the local farmers are then brought to the ASTC which also provides the post-harvest facilities, packaging, cold storage and marketing services of the fresh produce to local and regional markets. The ASTC will also add value to some of the produce using processing plants and other agro-industries.

   In order to ensure economies of scale and sustainability of the ASTC, it should also include a commercial farm of about 1000-2000 ha on governmental or private land that will produce crops and livestock to be processed, packaged, etc.

alongside the goods produced by the smallholders. The commercial farm further contributes to the profitability of the project ensuring return on investments made by the government and the private investor.

Each ASTC will be established on an area of 20 ha of land and will serve about 1,000 farmers on an area of 5,000 ha. The concept is to establish an ASTC in each district, designed in accordance with the region's specific conditions, agricultural crops, and population requirements. The development of the ASTC will be gradual over a few years.

Estimated budget allocation: 4 million USD for each ASTC including its commercial farm. (This amount is the government's contribution, which will be matched by a similar investment from the private sector.)

The map at the end of this section illustrates the ASTCs that are planned nationwide.

6. **Stimuli to encourage agricultural occupations**, including: incentives and improved conditions for local workers who turn to agriculture, particularly for women and young workers who will commit themselves long-term to agricultural employment; and creation of opportunities for controlled integration of foreign agricultural workers.

   Estimated budget allocation: 3 million USD annually. The support will be given only to full-time employees in sustainable projects. Incentives will concentrate on health insurance and pension mechanisms as well as direct salary support.

7. **Quality assurance and adherence to international standards:** Establishment of a quality control center, which will conduct inspections of agricultural produce according to international standards and ease the export process.

   Estimated budget allocation: 2 million USD annually for construction of the center, employee training and equipment purchases.

8. **Export Policy:** The government of Suriname has signed trade agreements which create potential markets for Surinamese exports; however, the branches of agriculture in Suriname do not cater to demand in the export markets.

   Estimated budget allocation: 3 million USD annually for the period 2016-2025, intended to support operation expenses of export development

9. **Construction of factories and production lines for the processing of agricultural produce:** Support and joint venture with private entrepreneurs

   Estimated budget allocation: 4 million USD annually. It is estimated that for each 1 USD invested in agriculture production, there is a need for 0.3 USD to be invested in processing facilities.

10. **Applied research**, with a focus on Suriname's unique conditions.

    Estimated budget allocation: 3 million USD annually. The budget will focus on implementing research to adapt knowledge and technology from relevant countries, to select a suitable variety of crops for local conditions. At least 0.25 of the budget will focus on export-enabling applied research.

Table D: An overview of the scope of allocations for government investment

	Project	**Annual Budget (M USD)**	**Rationale**
1	Development of **insurance** solutions for farmers against natural damages	5	Establish agricultural sustainability for farmers by reducing uncertainty and ensuring socio-economic security
2	Development of **micro-credit** loans to facilitate investments by small farmers	8	Assistance to small farmers is a cornerstone of the Plan.
3	Construction of **infrastructure**	4	Infrastructure is necessary to allow rehabilitation of previously abandoned lands for cultivation.
4	Establishment of an **extension** framework	4	Extension methods are the Plan's main tool for implementing advanced, industrial agriculture amongst Suriname's farmers and including them in the strategic development process.
5	Agro-industry Service & Training Centers (ASTC)	4	Regional modern, industrialized agricultural farms which will be models and resource centers for surrounding farmers
6	Stimuli to encourage **agricultural occupations**	3	Betterment of farmers and improvement to their profits; encouragement to women and young people to engage in agriculture
7	**Quality control center**	2	Maintenance of international standards for export of Suriname's agricultural produce
8	Support for operational costs in **export development**	3	Development of export markets
9	Support for investment in factories for the **processing** of agricultural produce	4	Development of processing industries will provide an additional channel for agricultural product sales and will bring increased income stability to farmers.
10	**Applied research**, with a focus on Suriname's unique conditions	3	Research and development that will focus efforts on importing existing information and adapting it to Suriname's needs
	Annual Total	40	

The following projects have not been assigned a specific budget, as the government investment is in the form of temporarily reduced income to stimulate subsequent revenue.

11. Elimination of customs duties on imported agricultural equipment and agro-industrial machinery: **No budget allocation.**

12. Reduction of corporate tax from 36% to 20% for the first ten years for new investments that undertake agricultural activity according to government criteria. This tax abatement will improve profitability and attract investments to agriculture, which will bring increased tax income to the country. Therefore, tax reductions during the first decade of operations will bring short-term as well as medium- and long-term benefits.

No budget allocation: An average investment of 1 USD in modern industrialized farms will raise long-term income tax by 0.15 USD annually. The Plan stipulates that the government reduce its tax income over the course of a decade to 0.08 USD per 1 USD invested in agriculture.

13. The trade agreements that were designed to create export markets for Suriname also limit the possibility of customs protections for fresh agricultural produce. Local agriculture therefore has heavy competition from imports, in which it struggles because of the following factors:

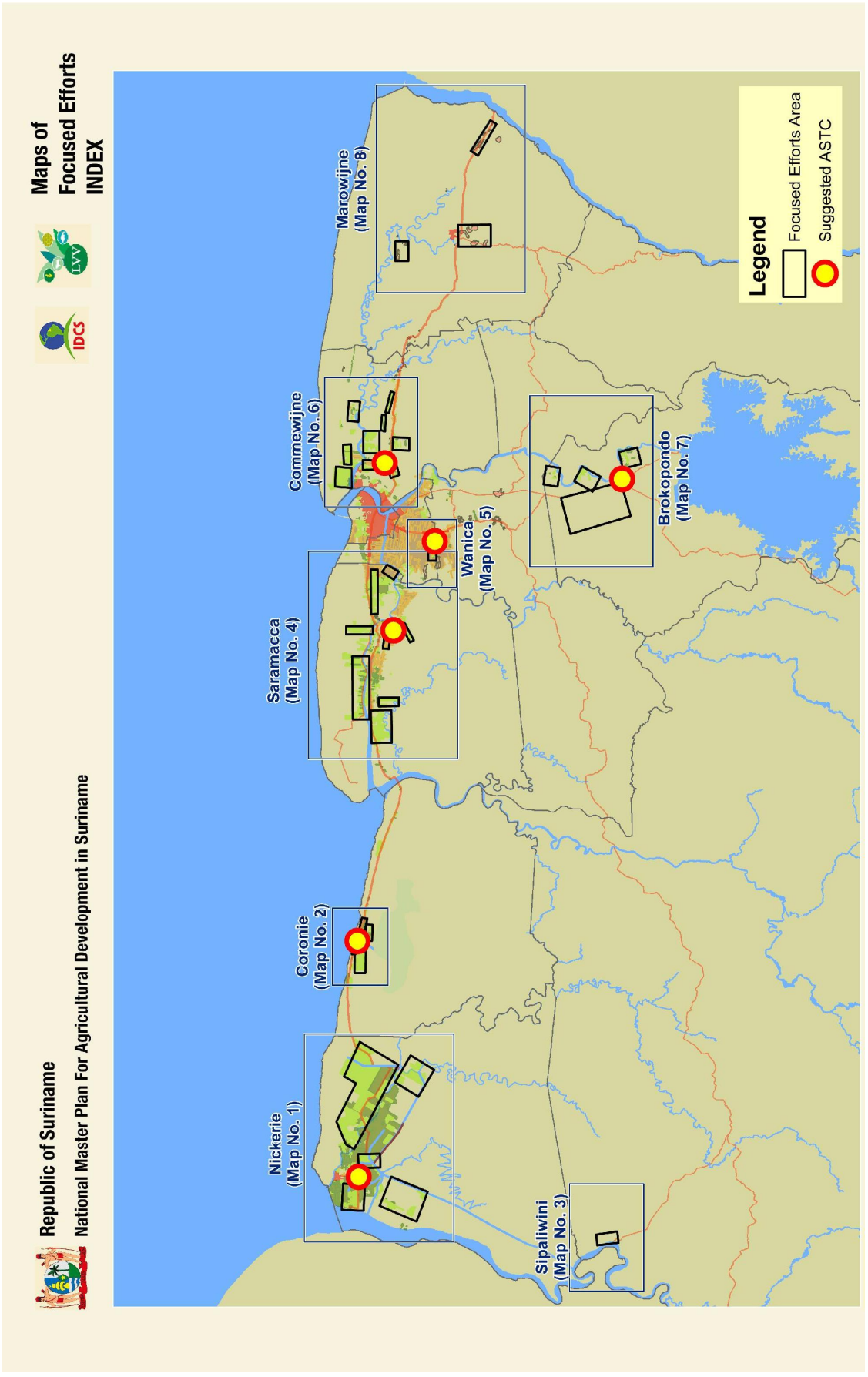
- There is a lack of standardization in local agricultural production, giving a relative benefit to imported produce.
- Because of uncertainty and extreme seasonal changes in Suriname's market, farmers are not committed to producing a continuous supply.
- Difficulty producing cereals for livestock feed locally creates a double benefit from the importation of dairy products and of poultry.

No budget allocation: Adoption of measures to protect local produce and monitor the market power of importers.

Focused Efforts and ASTC Locations

The map on the following page illustrates the ASTCs that are planned nationwide. Each one is located within an area designated for regional focused efforts. These are the most attractive areas in each district, in which it is suggested to establish and nurture advanced agriculture in various sectors.

These plots are largely available for development. They have been previously deforested and have existing road, irrigation, drainage and energy infrastructure. They are mostly in close proximity to settled areas, and in many cases have hosted agricultural activity in the past. Currently, the plots are either traditionally cultivated, abandoned, or used as pasture areas. The combination of these circumstances allows for the rehabilitation and development of agricultural lands, with relatively small costs. The plot size varies between a few thousand square meters to tens of thousands of hectares. They were chosen to prevent undesired interference with surrounding natural areas, especially the rainforests. The focused effort areas therefore have an environmental and ecological significance, in addition to agricultural and business potential.



Map of focused efforts and ASTC locations nationwide

5.4 Intermediate Evaluation

The government will decide precisely how much to invest in each field according to considerations of job creation, district development, export demand, and economic feasibility. The majority of the increase in agricultural product resulting from these investments will go towards export, with the remainder substituting for import.

After 5 years, the investments made so far will be examined for effectiveness in reaching their goals, and a decision will be made whether to accelerate the pace of investments and/or to change their amounts. This study will be performed by a joint staff from LVV and the Treasury Ministry.

6. Specific Initiatives: Business Plans

As part of an effort to stimulate the growth of the joint public-private framework and improve conditions for further export-oriented development, the Plan proposes the establishment of several strategic enterprises which are ready for immediate private or joint-venture investment. These projects could function as models (pilots) and could be implemented in additional locations.

- **Aquaculture:** A governmental unit is recommended, to be the center for the entire national aquaculture industry. It will provide facilities for brood stock, production, grow-out, storage, packaging and shipping, as well as technological, extension and veterinary services. Family farms will be responsible for the fish breeding process, using juveniles purchased from the production center.

- **Phedra Estate Agricultural Production Farm in Brokopondo** (PPP-J.V. between LR Group and the Government of Suriname): This farm will entail a social component, which is an agro-village accommodating 150 families, homes, service facilities, community infrastructure, and family farm allotments of 3 ha for cacao, vegetable production and poultry. There will also be a commercial component consists of a commercial production farm and an agro-industrial center, with a focus on broiler farming and cacao farming. Total cultivated over 750 ha.

- **Victoria Estate Agricultural Production Farm in Brokopondo** (PPP-J.V. between LR Group and the Government of Suriname): The facilities and activities of this farm will be similar to those on the Phedra Estate except with a narrower focus on cacao. Total cultivated 1300 ha.

- **Babunhol Estate Dairy Farm in Brokopondo** (PPP-J.V. between LR Group and the Government of Suriname): This farm entails a commercial component that

consists of 1000 milking cows, silage and feed production, sheds, feed center, feed storage, milking parlor, administrative and other buildings. It also includes a social component providing training, inputs and support services to local farmers and the general population of dairy farmers. Estimated production: 9 million liter/year.

- **Citrus Orchards in Commewijne:** A rehabilitation of the Alliance farm is planned, entailing the replanting of all existing citrus limes and oranges. The Plan also stipulates investments related to post-harvest handling, including a local processing unit for juice extraction.

- **Vegetables and Covered Crops in Wanica and Saramacca**: Two model farms will grow open-field vegetables and covered crops, half for the local market and half for export. As self-sufficient entities, they will have the potential to expand and will also serve as archetypes for similar enterprises elsewhere in the country.

- **Rice Paddies in Nickerie:** The Plan proposes reorganization, rehabilitation and renewal of the rice paddies across Nickerie, especially in abandoned areas in the autonomous region south of the Nickerie River. Beyond the scope of this project, there is the potential to fully double the cultivated area while reclaiming water resources, treating salinated soil, and improving irrigation and drainage infrastructure.

7. Environmental Considerations

The Master Plan seeks to protect ecological values through three central strategies:

1. Concentrating expansion of cultivation within previously abandoned agricultural areas, so as not to harm the surrounding natural forests.
2. Adopting environmentally-friendly cultivation methods, in order to protect the surrounding natural ecology.

3. Defining the coastal strip as a shield for the entire coastal plain of Suriname against the penetration of seawater. Natural growth in this strip, particularly the mangrove forests, will be preserved in order to protect the development strip just south of it as well as the natural habitat of several endangered species. Meanwhile, development will be directed southward.

8. Summary

The Master Plan appears at an important crossroads for Suriname. The country must expand its sources of income and sustenance, not exclusively depend on the mining industry, and develop new prospects, the foremost of which is agriculture.

The Plan proposes a revolution in the approach to the agriculture sector in Suriname, from a subsistence agriculture that is comprised of only a few main products, to a modern, commercial, export-oriented agriculture which is driven by knowledge and technology.

On the basis of Suriname's comparative advantages in agriculture, the government will offer opportunities and stimuli to the private sector, as well as improving conditions for business growth through infrastructure development, good credit terms, and professional guidance and support services. Private entrepreneurs will then have ideal conditions as well as incentive to bring about a long-overdue change in Suriname's agricultural industry.

The Plan's recommendations include innovative agricultural projects in all of the country's districts. These initiatives involve the local farming population and emphasize the importance of communal-family agriculture, while bolstering corporate commercial agriculture and promoting private investments to further the industry's economic sustainability.

The Plan focuses efforts in the areas that were identified as having developmental potential. This strategy will use existing infrastructure in order to avoid damaging natural areas as much as possible, while utilizing extensive areas of land that meet all of the developmental demands.

Adoption and implementation of the Plan's recommendations will gradually transform Suriname into an agriculturally dominant nation, assuring food security for the population, replacing imports, and considerably increasing employment opportunities in the agriculture sector and related industries. Furthermore, Suriname will position itself as a major exporter to the Caribbean countries and Europe, thereby contributing to a significant improvement in the GDP.

Nationaal Masterplan voor Landbouwontwikkeling in Suriname

Executive Summary

1. Algemene inleiding

Suriname wordt gekarakteriseerd door aanzienlijke waterbronnen, vruchtbare bodem, geschoolde werkkrachten een historische landbouwtraditie alsmede een ideale ligging voor exportpotentieel. Dit alles biedt Suriname een relatief voordeel op de internationale landbouwmarkt; echter benut de landbouw in Suriname haar potentieel niet, getuige het grote onderbenutte plantareaal en de beperkte commerciele landbouw.

De Surinaamse economie is grotendeels afhankelijk van goud, aardolie en aluinaarde uitvoer, terwijl in het afgelopen decennium de bijdrage van de agrarische sector aan het BBP is afgenomen is 11% naar 5.8%. De mijnbouwsector is onderhevig aan schommelingen en risico's, hetgeen een geldige reden is om te investeren in de landbouw als duurzame sector met grote invloed op de Surinaamse economie.

De uitdaging en de visie: Het verbeteren van de conditie en de stabiliteit van de nationale economie middels landbouwproduktie voor importvervanging en export en het transformeren van Suriname tot de voornaamste voedselleverancier in de regio en een hoofdspeler in de CARICOM en zelfs op de Europese markt. Tegelijkertijd is het plan gericht op het integreren van landbouw en maatschappij op een wijze die bijdraagt aan werkgelegenheid en de handhaving van de stabiliteit van sociale structuren.

Het Nationaal Masterplan is op twee niveaus gestructureerd: ontwerpen van een alomvattende nationaal beleid en de toepassing daarvan middels specifieke regionale projecten. Het is gestoeld op twee hoofdwaarden:

1. **Landbouw en Bevolking**: het verbeteren van de welvaart van het Surinaams volk middels het scheppen van werkgelegenheid, voedsel- en economische zekerheid; toenemende individuele en gemeenschapswelvaart.

2. **Duurzame landbouw**: landbouw is diep verbonden aan het milieu en de ecologie. Suriname is van de wereld's rijkste landen aan natuurlijke hulpbronnen. Het Plan schept mogelijkheden voor een uitbreiding van landbouwgebieden en tegelijkertijd het behouden van het milieu.

Het Masterplan streeft ernaar de overheid ertoe te bewegen de grootste uitdagingen bij het investeren te verlichten: onzekerheid, lange terugverdientijden (vooral bij

meerjarige gewassen), hoge kredietkosten, beperkte toegankelijkheid voor kleine boeren; relatief hoge indirecte en directe bedrijfsbelasting; relatief hoge arbeidskosten in vergelijking met arbeidsproductiviteit; hoge kosten en slechte kwaliteit voor geimporteerde inputs (met name agrochemicalien en zaden); gebrekkig onderzoek en voorlichting en het ontbreken van een landbouw school en trainingen op middelbaar nivo. Met overheidssteun in bepaalde basisinvesteringen zal de partikuliere sector er beter aan toe zijn om landbouwbedrijven, verwerkingsfacilitieten en marktkanalen te ontwikkelen.

2. Hoofddoelen

Het realiseren van het landbouwpotentieel in Suriname betekent:

- Overgaan van **voorzieningslandbouw** naar een moderne, geindustrialiseerde, kennis-intensieve **commerciele landbouwsysteem**, opengesteld aan wereldmarkten.
- Aanzienlijke bijdrage van de landbouw aan macro-economische verbeteringen, waaronder het BBP, handelsbalans, werkgelegenheid en voedselzekerheid.

Praktische bekeken houdt het bevorderen van de landbouw in:

1. Importsubstitutie voor aanvoer van verse en verwerkte landbouwproducten voor de lokale markt en verbetering van de landbouw betalingsbalans.
2. Vergroting van winsten en toegevoegde waarde middels het ontwikkelen van een landbouwindustrie die instaat is producten te verwerken en hun houdbaarheid te verlengen.
3. Ontwikkelen van de capaciteit voor export van geselecteerde verse en verwerkte landbouwproducten waar Suriname een reatief voordeel heeft naar het Caraibisch gebied, de EU en andere markten.
4. Het scheppen van uitdagende werkgelegenheid in de landbouw voor de jongere generatie en voor vrouwen, in het bijzonder middels het aanpassen van technologie en geavanceerde landbouwmethoden.
5. Gecontroleerde ontwikkeling van landbouw en het scheppen van werkgelegenheid in het binnenland, middels rurale verwerkingsbedrijven, agro-toerisme en andere agro-diensten, in evenwicht met het behouden en verzorgen van de traditionele gemeenschaps sociale banden.

   Bijzondere aandacht moet worden besteed aan het benutten van bebost land in de zuidelijke binnenlanden, met behulp van zorgvuldige studies over de bodem geschiktheid en duurzame teelt van gronden in die gebieden, bij het overgaan zwerflandbouw (slash and burn) naar permanente teelt van het land.

6. Transformeren van landbouwactiviteit naar grote bedrijfseenheden, relatief grote percelen en toegenomen gebruik van broeikassen en geavanceerde technologie en tegelijkertijd het handhaven van de gespecialiseerde gezinslandbouw en haar integratie met industriele commerciele bedrijven om zodoende schaalvoordelen te benutten
7. Toevoegen en diversificeren van andere hoogwaardige gewassen naast rijst en bacoven: (citrus, groenten, wortelgewassen, cacao, kokosnoten, oliepalm en melkproducten).
8. Verbetering van de transport faciliteiten in coordinatie met de Transport sector, voor het oplossen van de bestaande maritieme en luchttransport problemen, in het bijzonder naar de regionale CARICOM markten

Ontwikkeling van kennis, onderzoek en beroepsopleidingen

Het initiëren van een stroom van vakkennis, het creëren van centra voor opleiding en onderzoek, en de ontwikkeling van kanalen voor de overdracht en de uitvoering van de landbouw kennis:

a. Oprichting van een Speciale kamer voor de Agrarische sector in Suriname. Deze aangewezen instantie zal het belangrijkste platform voor de kleine zelfstandige boeren en kleine boerencoöperaties / groepen zijn bij het aanpakken van relevante aspecten van de primaire productie tot marketing; georganiseerd naar productcategorie De niet toereikende organisatiestructuur van kleine boeren, het slecht functioneren van coöperaties van bestaande boeren, en de afwezigheid van grote boeren en verwerkingseenheden, maakt gespecialiseerde uitbreiding van diensten aan kleine boeren in het bijzonder noodzakelijk is; zie hoofdstuk 16 in het volledige rapport.
b. Introductie van gespecialiseerd Agrarisch Onderwijs (tot 2 jaar) op secundair en tertiair niveau, wat resulteert in de continue levering van geschoolde boeren en arbeiders voor de sector. Daarnaast worden gespecialiseerde (per product) korte opleidingen (1-3 maanden) voor jonge landbouwers aanbevolen.
c. De oprichting van een “Platform for Applied Agricultural Research " is van essentieel belang om te zorgen voor een effectieve en efficiënte integratie van alle betrokken relevante onderzoeksinstellingen: het ministerie van Landbouw, CELOS, STIPRIS, Adron, ADEK Universiteit, alsmede de betrokken private sector en Internationale samenwerking (bilateraal en multilateraal). Dit platform moet een publiek-private onderneming zijn.
d. Versterking en verbetering van human resource capaciteiten door middel van adequate werving, betaling en de motivatie van gekwalificeerde medewerkers van het ministerie van Landbouw en aanverwante instellingen, met name voor Onderzoek, Voorlichting en Planning functies.

3. Benadering

Het Nationaal Masterplan voor Landbouwontwikkeling in Suriname is opgesteld onder begeleiding van LVV en IDCS, die ook partners waren in alle stadia van dit plan en haar aanbevelingen.

Het onderzoek hield in een alomvattend onderzoek van alle bestaande landbouwcondities: omvang van landbouwarealen, gewassendistributie, plantmethoden, bodemkwaliteit, hydrologie, conditie van de infrastructuur, de situatie van de landbouwwerkgelegenheid, analyse van de sociale condities en marktonderzoek zowel in Suriname als internationaal met de nadruk op Caraibische landen.

De voorbereiding van het Plan hield ook in gezamenlijke discussie en veldbezoeken met personeel van overheidsdepartementen, vertegenwoordigers van afzonderlijke districten en functionarissen van andere instanties, dat deel uitmaakte van een volledige en vruchtbare samenwerking. Daarnaast werd een vergadering van de nationale stakeholders gehouden op het ministerie van Landbouw om feedback te krijgen.

De resulterende bevindingen zijn samengebracht naar onderwerp – contouren voor een alomvattend nationaal landbouwbeleid en toegespitste ontwikkelingsactiviteiten in de verschillendee districten, inclusief prikkels voor de partikuliere sector en een reeks businessplannen voor specifieke bedrijfstakken.

Het Afbeeldingen zijn voorbeelden van de luchtfotografie die werd gebruikt

De rapporten van dit proces zijn geconcentreerd in een serie documenten: een analyse van de huidige situatie, een serie beleidsmaatregelen, een aktieplan, een atlas die in

details de verdeling van de landbouw in de verschillende districten presenteert alsmede voorstellen voor specifieke projecten in elk district.

4. Groeiverwachtingen in de landbouwsector

Het huidig bewerkt areaal in Suriname is ongeveer 40,000 ha, waarvan 31,000 ha bestemd is voor padie, praktisch alles in Nickerie. Echter is vanwege een halfjaarlijkse gewas cyclus voor rijst , is het effectief bewerkt areaal stijgend naar 65,000 ha. De Agrarische sector bied employ aan ongeveer 12,000 voltijdse werkers, tevens zijn er enkele duizenden werkzaam als partime boer, seinzoen arbeider, of in een gerelateerde industrie.

De bijdrage van de landbouw (exclusief visserij) aan het BBP is 260 M USD. De exportwaarde van verse landbouwproducten (exclusief visserij) is 91 M USD hoofdzakelijk bestaande uit rijst, bananen en groenten; vis bedrag een extra van 37 miljoen tot een bedrag van 128 miljoen USD.

De import van verse producten bedraagt ongeveer 243 M USD, hoofdzakelijk bestaande uit vlees, melkproducten en bewerkt voedsel. Het is belangrijk om te vermelden dat the waarde van de geimporteerde agrarische producten bijna gelijk is aan de waarde van de lokale productie.

Daarnast is de voedsel balans (export min invoer,visserij inbegrepen) -116,000,000 USD, en dat is zonder rekening te houden met ongeveer 80 miljoen USD van de ingevoerde landbouwproducten, zoals gereedschap, machines, meststoffen, pesticiden en dergelijke. Echter, het potentieel voor een toegenomen export en importvervanging is hoog, vooral voor fruit, eetbare oliën, groenten en wortelgewassen.

Tabel A: De huidige staat van de Surinaamse landbouw in 2014 op een macro niveau. Meer details staan in de tabellen aan het eind van dit hoofdstuk

	Lokale Productie			Export Waarde		Import Waarde	
Branch	**Hoeveelheid**	**Waarde**	**Waarde**	**Waarde**	**Waarde**	**Waarde**	**Waarde**
	(1,000 tons)	**(M SRD)**	**(M USD)**	**(M SRD)**	**(M USD)**	**(M SRD)**	**(M USD)**
Gewassen	457	633	195	295	91	120	37
Veeteelt & Bijproducten*	20	210	65	ī	ī	191	59
Visserij	*	**	**	119	37	ī	ī
Processed Voedsel	ī	ī	ī	ī	ī	477	147
Total	**477**	**843**	**260**	**414**	**128**	**788**	**243**

* Fishery production quantity is 595,000 tons according to IMF data.
**Fishery production value not available

De huidige agrarische bijdrage aan Surinames BBP is 5.8% (inclusief jacht en bosbouw, exclusief visserij), alhoewel het significant hoger is als de aanverwante industrien en diensten die voor hun bestaan afhankelijk zijn van de Landbouw, meegerekend worden. Het aandeel is de laatste jaren afgenomen.

Het doel is de procentuele bijdrage van de landbouw te brengen naar 8%, inclusief gerelateerde landbouwindustrie en diensten. Uitgaande van een 3% algehele groei per jaar, zal het BBP de komende 10 jaren toenemen van 5,200 M USD tot 7,000 M USD, terwijl het landbouw BBP zal toenemen van 260 M USD in 2014 tot 470 M USD in 2025, overeenkomend met een gemiddelde jaarlijkse groei van 6% van de waarde van de bruto agrarische produdctie de komende 10 jaar. Deze groei kan bereikt worden in de komende 10 jaren als de overheid prioriteit geeft aan de sector door het bevorderen van agrarische activiteiten. Het Plan adviseerd een jaarlijkse investering van 40 M USD door de overheid; dit zal additionele particuliere investeringen door lokale boeren en ondernemers stimuleren; ook directe buitenlandse investeringen in cacao, oliepalm, kokos, kippenteelt, etc.

De huidige Surinaamse landbouwproductie bestaat hoofdzakelijk uit rijst, bacoven en vis, bestemd voor de export en groenten, vlees, pluinvee en eieren voor lokale consumptie. Indien de aanbevelingen zullen worden toegepast zal er een aanzienlijke groei worden bereikt in alle landbouwsectoren:

- Verse producten van permanente gewassen van 145,000 MT tot 300,000 MT.
- Groente, wortel en peul gewasse productie van 37,000 MT tot 60,000 MT.
- Melkproductie van 6,000 MT tot 20,000 MT.
- Vlees en pluimvee productie, in het bijzonder slachtkippen van 13,000 MT tot 50,000 MT.
- Geleidelijke toename in de huidige rijstpoductie van 276,000 MT onder voorwaarde dat er een infrastructurele oplossing komt voor de bodemverzilting en afwateringsproblemen. De toename in de padiproduktie dient te worden begeleid met investeringen in nieuwe toegevoegde waarde rijstproducten en in de rijstverwerkingsindustrie.

Op dezelfde wijze zullen er andere bedrijfstakken worden toegevoegd die een aanzienlijke bijdrage aan de nationale economie zullen brengen, in het bijzonder: oliepalm, cacao, kruiden en veevoer voor lokaal gebruik. Deze ontwikkelingen zijn afhankelijk van geschikte infrastructuur en het wegnemen van de knelpunten voor de export. Vandaar dat de investeringen en de toename van inplanting geleidelijk dienen te zijn, overeenkomstig het commercieel succes van de exportbedrijven.

De speciale nadruk zal worden gelegd op economisch waardevolle gewassen met een hoge export potentieel. Vandaar dat de extensieve cultuur van cacao is voorgesteld.

De huidige prijs van cacao ligt boven de 3,200 USD per ton en zowel de prijs als de vraag zijn continu aan het stijgen. Suriname heeft geschikte condities voor het telen van cacao en heeft dat ook gedaan in het verleden. Tegenwoordig is het mogelijk met geavanceerde technologie een opbrengst van drie ton per hectare te halen en daarmee bij te dragen aan de werkgelegenheid en een belangrijke component van de landbouwexport van Suriname.

The twee tabelen hierna tonen de productie, de export en de import gegevens van Surinamese landbouwgewassen:

Tabel B: Surinames lokale agrarische productie, voor lokale consumptive en export, 2014
(Data en berekeningen van LVV jaarrapport)

Categorie	Item	Lokaal Product		Export	
		Tons / Year	Waarde M SRD/ Jaar	Tons / Jaar	Waarde M SRD/
Eenjarige gewassen	Droge padie	275,900	196	103,800	180
	Groenten	24,600	95	2,800	5
	Root & tuber crops	9,500	30		
	Overige eenjarige gewassen (inclusief watermeloen, pinda, andere peulgewassen)	2,580	16		
Eenjarige gewassen Subtotal		312,580	337	106,600	185
Meerjarige gewassen & semi meerjarige gewassen	Bacoven & Kookbanaan	101,700	135	75,300	109
	Citrus	22,100	55	30	0
	Kokos	12,900	36	430	1
	Overig fruit	8,100	70		
Meerjarig & Semi-		144,800	296	75,760	110
CROPS SUBTOTAL		457,380	633	182,360	295
Veeteelt	Rund	1,700	35		
	Kippen	8,900	99		
	Varken, Schapen & Geiten	2,220	24		
Veeteelt Subtotal		12,820	158		
Dierlijke Bijproducten	Melk (in 1,000 liters/jaar)	4,100	10		
	Eieren (58.5 grams/ei)	3,100	42		
Dierlijke Producten		7,200	52		
Vlees & Dierlijke PRODUCTEN SUBTOTAL		20,020	210		
	TOTAAL	477,400	843	182,360	295

Tabel C: Suriname's Landbouw import, 2014 (Gegevens van het LLV Jaarlijks raport)

Categorie	Item	Import	
		Tons / Jaar	Waarde M SRD/ Yr
Gewassen	Groenten	18,300	34.3
	Root & tuber		
	Pinda *& overige peulgewassen	190	0.91
Fruit	Overig Fruit	3,000	16.9
Graan Producten	Granen	45,700	46.0
	Meel, zetmeel, tarwegluten	11,500	21.3
CROPS SUBTOTAL		75,990	119.4
Vlees	Rund	19,100	97.8
	Kip		
	Varken		
	Schapen & Geiten		
Vis	Vis & schaal en weekdieren, Inclusief bereidingen*	4,100	30.4
Dierlijke Bijproducten	Melk (in tonnen equivalent - inclusief melkpoeder en kaas)	4,300	62.9
	Eieren (58.5 grams/ei)		
	Honing (in 1,000 liters/jaar)		
DIELIJKE PRODUCTEN		27,500	191.1
Processed Foods	Koffie,thee en specerijen	890	8.5
	Cacao en cacao producten	820	7.4
	Suiker en suikerproducten	25,400	61.7
	Producten voor humane consumptie: Extract, Essences, Concentraat, Sauces, Soep Ingredienten, etc.	8,900	96.4
	Plantaardige Vetten en Olien en Bereidigen vanGroenten, fruit en andere plantedelen	27,800	114.7
	Olieachtige Zaden and Fruit	1,400	5.3
	Bereidingen van graan, meel, zetmeel	7,100	57.1
	Dranken, alcoholhoudende,vloeistoffen, azijn	34,000	126.0
PROCESSED FOODS		106,310	477.1
TOTAAL			787.6

*Inclusief vlees en bereidingen

5. Aktieplan

5.1 Hoofdbeleidsrichtlijnen

De Grondbeginselen van het Plan:

A. De overheid zal partikuliere ondernemers en investeerders aantrekken om in lokale landbouw te investeren door het benadrukken van Suriname's comparatief voordeel. Een groot deel van de overheidsinvesteringen zal bestemd worden voor prikkels om partikuliere landbouwbedrijven aan te sporen en te ondersteunen.

B. Overheidssteun: de Surinaamse overheid zal de vooruitgang van de moderne landbouw ondersteunen met een budget van ongeveer 40 miljoen USD per jaar gedurende het volgende decennium.

C. Financieel Rendement: het rendement op overheidsinvesteringen zal het aandeel van de landbouw in het BBP verhogen van 5.8% tot 8%, vermindering van de import en verbetering van de nationale voedselbalans.

D. Werkgelegenheid: Geleidelijk over de komende tien jaar zal het Plan 10,000 nieuwe arbeidsplaatsen toevoegen aan Suriname's bestaande 12,000 in de landbouw en aanverwandte sectoren.

E. Toename van Arbeidskrachten: Het plan stelt voor het tekort aan arbeid te boven te komen middels prikkels, gepast loon en het aantrekken van jonge mensen naar de landbouw door technologie en een scala van informatie. Parallel daarmee zal de werkgelegenheid in de landbouw dienen open te staan voor buitenlandse arbeidskrachten, op een schaal die geschikt is voor de condities en opnamecapaciteit van Suriname.

5.2 Investeringsprikkels

De Surinaamse overheid beschouwt landbouw als een leidende economische sector in de industrie en de economie van de natie. Het doel is daarom om lokale en buitenlandse investeerders aan te moedigen om landbouwbedrijven te initieren en in landbouwprojecten te investeren middels het scheppen van een gezond platform en een bemodigend klimaat voor landbouwbedrijven. De overheid zal derhalve de partikuliere landbouwsector steunen met de volgende directe en indirecte financiele voordelen, speciaal voor nieuwe ondernemingen:

- Ondersteunende hulp (krediet, onderzoek & ontwikkeling, voorlichting) voor markt- en productontwikkeling.
- Verzekering en andere maatregelen ter verlichting van de onzekerheid typerend voor de landbouw en om het risiko draagbaar te maken.

- Speciale belastingprikkels ter ondersteuning van groei gedurende de eerste jaren van een bedrijf en het bevorderen van stabieliteit ook in minder succesvolle jaren, waaronder verminderde heffingen op geimporteerde landbouwgereedschap en industriele machines.
- Verbetering van infrastructuur zoals, transport, afwatering, irrigatie enz. om uitbreiding vand landbouwareaal naar andere geografische gebieden mogelijk te maken.
- Prikkels voor het aanwerven van landbouwarbeidskrachten, opleidingssteun, verschaffen van aantrekkelijke voorwaarden voor arbeiders evenals toestemming voor de invoer van buitenlandse arbeiders voor arbeidsintensieve projecten
- Gunstige voorwaarden voor grondhuur voor landbouwdoeleinden.

5.3 Hoofdtaken van de overheid

Het overheidsbudget voor steun wordt geraamd op 40 miljoen USD per jaar in de periode 2016-2025. De specifieke prioriteiten zijn als volgt:

1. Ontwikkelen van **verzekerings**oplossingen beheerst door een aangestelde instelling ter bescherming van landbouwers tegen schade van natuurlijke oorzaak en in het bizonder prijsschommelingen. De verzekering wordt aan het eind van het jaar toegewezen overeenkomstig regionale en sectorale succesfactoren. De Bank wordt geassisteerd door LVV personeel met advies en benodigde gegevens. Het mechanisme wordt geadministrateerd volgens de volgende principes:
    - Het verzekeringsbedrijf wordt opgezet in samenwerking het het Ministerie van LVV en met een bemiddelingscommissie om potentiele meningsverschillen over compensatie op te lossen.
    - Risiko premie wordt apart berekend voor elk gewas en elke teeltmethode, gebaseerd op historische gegevens van elke teler. Kortingen worden berekend overeenkomstig het ontbreken van claims.
    - Uitkeringen aan de landbouwers in geval van schade zijn beperkt tot de waarde van de productiekosten met aftrek van het eigen risico van de houder van de polis.

    Geraamde budgetallocatie: 5 miljoen USD per jaar.

2. **Krediet voor achtergestelde kleine landbouwers**: Het probleem van schaarse kredieten voor kleine landbouwers, zelfs voor kleine bedragen, bemoeilijkt hun sukses en vooruitgang. Het Plan richt zich op overheidssteun door middel van micro-kredieten zonder onderpand voor kleine landbouwers of voor beperkte landbouwactiviteiten. De landbouwer zal dan een eenvoudig formulier moeten invullen dat hij/zij voldoet aan de criteria:

- Voltijdse landbouwer of op zijn minst confirmatie van aanzienlijk deeltijds landbouwwerk.
- Overtuigende uitleg omtrent de beperkingen van de specifieke landbouwactiviteit en de mogelijkheden om die te weg te maken middels kredietsteun.
- Een gedeeltelijk werkplan en businessplan alsmede een verplichting om de ondersteuning in zijn geheel binnen een gedefineerde periode terug te betalen.

Deze kredietdiensten zullen worden geadministreerd door een commissie van LVV overeenkomstig criteria door de overheid goedgekeurd. Deze mogelijkheid zal in 2016 publiekelijk worden geadverteerd.

Geraamde budgetallocatie: 8 miljoen USD per jaar. Dit zal een gemiddelde lening van elk 18,000 USD opleveren voor 450 kleine boeren.

3. **Aanleggen van landbouwinfrastructuur**, waaronder wegen, electriciteits en communicatielijnen en in het bizonder het verbeteren van onwateringsinfrastuctuur en het aanleggen van irrigatienetwerk.

   Geraamde budgetallocatie: 4 miljoen USD per jaar. Dit zal de rehabilitatie van 1,250 hectare per jaar mogelijk maken.

4. Opzetten van een **voorlichtingsraamwerk**: opleiden van instructeurs, blootstellen aan voorlichtingsmethoden, aanschaffen van gereedschap en **geautomatiseerde** apparatuur, veldbeheersing door remote sensing en GIS. Opleidingen voor het toepassen van geavanceerde irrigatie, mechanisatie, bemesting enz., voor alle landbouwsectoren.

   Geraamde budgetallocatie: 4 miljoen USD per jaar

5. Het **Landbouw Diensten & Opleidingscentrum** (LDOC) concept is een Public-Private-Partnership model (samenwerking tussen partikuliere investeerders en de overheid) als een regionale een-stap aanbieder van oplossingen langs de hele waardeketen ter ondersteuning van landbouwersgemeenschappen in het gebied, met het doel om landbouwers moderne landbouwtechnieken en technische kennis te verschaffen om hun landbouw en veeteelt productieniveaus exponentieel te verbeteren, evenals de algehele kwaliteit.

   De LDOC verstrekt landbouwers alle benodigde inputs, zoals zaden, chemicalien, irrigatie en teeltgereedschap alsmede geschikte landbouwtechnologie, micro-financiering en praktische kennis aan kleine schaal landbouwers ter ondersteuning van hun activiteiten en ter verzekering dat die hun landbouwbedrijf en gewasopbrengst aanzienlijk zullen verbeteren.

De oogst en het vee dat door de lokale landbouwers is geproduceerd wordt dan naar de LDOC gebracht die ook na-oogst faciliteiten, verpak en koelopslag en marketing diensten biedt voor verse producten voor de lokale en regionale markt. De LDOC zal daarnaast toegevoegde waarde brengen voor een deel van de producten door gebruik van verwerkingsinstallaties en andere agro-industrien.

Voor het bereiken van schaalvoordelen en voor de duurzaamheid van de LDOC zal er een commeriele boerderij van 1,000-2,000 ha. op overheids of partikuliere land worden opgezet voor productie van gewassen en vee voor verwerking, verpakking enz. naast de producten van de kleine landbouwers. Deze commerciele boerderij doet een bijdrage aan de winst van het project en het rendement van de investering die door de overheid en de partikiliere sector is gemaakt.

Elke LDOC zal worden opgezet op een perceel van 20 ha. en zal diensten bieden aan ongeveer 1.000 landbouwers op een totaal areaal van 5.000 ha. Het concept houdt in de opzet van een LDOC in elk district, ontworpen volgens de specifieke condities, landbouwgewassen en benodigdheden van de bevolkings van het gebied. Een LDOC wordt geleidelijk gedurende een paar jaar opgezet.

Geraamde budgetallocatie: 4 miljoen USD per LDOC, inclusief de commerciele boerderij (Dit bedrag is de bijdrage van de overheid die dan door eenzelfde investering van de partikuliere sector wordt geevenaard.)

De kaart aan het eind van dit onderdeel illustreerd the ASTC, zoals landelijk gepland.

6. **Prikkels om landbouwberoepen** aan te moedigen waaronder: aansporing en verbeterde condities voor lokale werkkrachten die de landbouw in willen, maatregelen ter verhoging van de participatie van vrouwen en jongeren in de landbouw, initieren van mogelijkheden voor gecontroleerde integratie van buitenlandse landbouwwerkkrachten.

   Geraamde budgetallocatie: 3 miljoen USD per jaar. De steun wordt alleen gegeven aan voltijdse werkkrachten in duurzame projecten. De maatregelen worden geconcentreerd op ziekenkosten verzekering en pensioenmechanismen evenals directe salarissteun. Speciale prikkels zullen worden aangeboden aan vrouwen en jongeren die zich willen verbinden tot lange-termijnwerk in de landbouw.

7. **Kwaliteitszorg** en **naleving van internationale normen:** Oprichting van een kwaliteitscontrole centrum, dat de controles van landbouwproducten zal uitvoeren volgens internationale normen en het vereenvoudigen van de exporteren procedures.

   Geraamde budgetallocatie: 2 miljoen USD per jaar voor de construcie van het centrum, werknemers training en de aanschaf van gereedschap

8. **Export beleid**: De overheid van Suriname heeft handelsovereenkomsten getekend die potentiele markten scheppen voor Surinaamse export; de landbouwtakken in Suriname zijn niet gericht op de vraag in deze exportmarkten.

   Het voorgesteld budget beoogt steun te geven aan de bedrijfskosten van exportontwikkeling.

   Geraamde budgetallocatie: 3 miljoen USD per jaar gedurende de periode 2016-2025.

9. Steun en joint-venture met partikuliere investeerders bij het bouwen van fabrieken en productielijnen voor verwerking van landbouwprodukten.

   Geraamde budgetallocatie: 4 miljoen USD per jaar. Volgens schatting is voor elke 1 USD investring in landbouwproduktie 0.3 USD nodig voor verwerkingsfaciliteiten.

10. Toegepast onderzoek gericht op Suriname's unieke omstandigheden.

    Geraamde budgetallocatie: 3 miljoen USD per jaar. Het budget wordt toegespitst op het toepassen van onderzoek ter aanpassing van kennis en technologie van relevante landen. Tenminste 25% van het budget zal worden besteed aan export gerichte toegepast onderzoek.

Tabel D: Een overzicht van allocatie van investeringen door de overheid

	Project	Jaarlijks budget (milj.USD)	Rationaal
1	Ontwikkelen van oplossingen voor inkomen- en natuurschade **verzekering**	5	Aanleggen van duurzame landbouw voor boeren middels het verminderen van onzekerheid en verzekeren van sociaal economische veiligheid
2	Ontwikkelen van **microkrediet** leningen ten behoefte van investeringen door kleine landbouwers	8	Steun aan kleine landbouwers is een hoeksteen van het Plan
3	Aanleggen van **infrastructuur**	4	Infrastructuur is nodig om rehabilitatie van voormalige verlaten landbouwgebieden in cultuur te brengen
4	Opzetten van een **voorlichtings** raamwerk	4	Voorlichtingsmethoden vormen het hoofdgereedschap van het Plan bij de implementatie van geavanceerde industriele landbouw door Surinaamse landbouwers en bij het betrekken bij het strategisch ontwikkelingsproces
5	Landbouw Diensten & Opleidingscentrum (LDOC)	4	Regionale moderne, geindustrialiseerde landbouwbedrijven die een model en een hulpbron vormen voor landbouwers in de omgeving.
6	Stimuleren van **landbouwberoepen**	3	Verbeteren van landbouwers en verhogen van winst; aanmoedigen van vrouwen en jongeren in de landbouw
7	**Centrum voor Kwaliteits controle**	2	Onderhoud van de internationale richtlijnen voor de export van Surinaamse landbouw producten.
8	Steun bij bedrijfskosten voor **exportontwikkeling**	3	Hoofddoel: ontwikkelen van landbouwmarkten
9	Investering in fabrieken voor **verwerking** van landbouwprodukten	4	Ontwikkelen van verwerkingsindustrien vormt een extra verkoopkanaal voor landbouwprodukten en zal inkomenstabiliteit voor de landbouwers teweegbrengen
10	**Toegepast onderzoek** gericht op Suriname's unieke omstandigheden	3	Onderzoek en ontwikkeling gericht op import van bestaande informatie en aanpassen naar Surinaamse behoeften
	Totaal	40	

De volgende projecten zijn geen specifiek budget toegewezen aangezien de overheidsinvestering in de vorm van een tijdelijke gereduceerd inkomen is, dit om toekomstige inkomsten te stimuleren.

11. Eliminatie van douane heffingen op geimporteerde landbouwgereedschap en machines. **Geen budgetallocatie**.

12. Verlaging van vennootschapsbelasting van 36% naar 20% voor de eerste tien jaar op nieuwe investeringen in de landbouw overeenkomstig criteria van de overheid. Deze belastingverlaging zal winstverbeterend werken en zal investeringen in de landbouwsector aantrekken die dan de belastinginkomsten van de overheid zullen verhogen. Vandaar dat belastingverlaging gedurende de eerste tien jaar van het bedrijf zowel korte, midellange als lange termijn voordelen oplevert.

Geen budget allocatie: een gemiddelde investering van 1 USD in moderne geindustrialiseerde boerderijen zal op lange termijn de inkomstenbelasting met 0.15 USD per jaar verhogen. Volgens het Plan zal de overheid de inkomstenbelasting gedurende tien jaar tot 0.08 USD per 1 USD investering verlagen.

13. De handelsovereenkomsten die werden ontworpen voor het scheppen van exportmarkten voor Suriname beperken ook de mogelijkheden voor douane bescherming tegen verse landbouwprodukten. De lokale landbouw lijdt daarom van zware concurrentie van importen en vecht daartegen vanwege de volgende factoren:

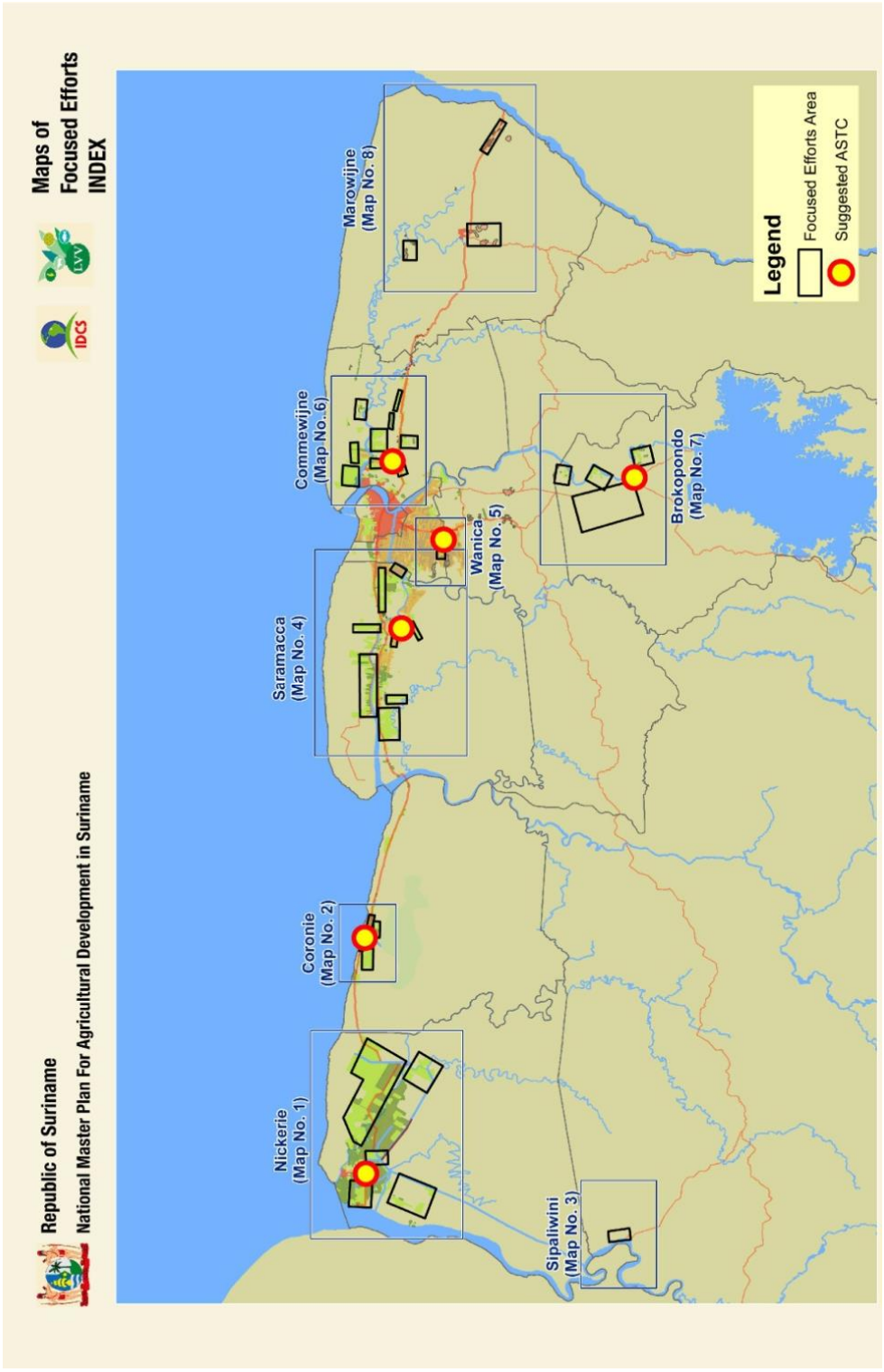
- Er is een tekort aan standaardisatie in de lokale productie waardoor geimporteerde producten een relatief voordeel genieten.
- Vanwege onzekerheid en extreme seizoensveranderingen op de Surinaamse markt hebben landbouwers geen continu leververplichtingen.
- Moeilijkheben in de lokale productie van veevoer creert een dubbel voordeel voor geimporteerde melk- en pluimveeproducten.

Geen budget allocatie: Treffen van maatregelen ter bescherming van de lokale producten en het navolgen van de marktinvloed van importeurs.

De volgende plattegrond in laat zien dat the ASTC die gepland zijn national zijn. Elke ASTC is gelegen in een aangewezen regionaal gebied. Dit zijn de meest aantrekkelijke gebieden in elke district, waar geavanceerde landbouw in diverse sectoren wordt aangeraden

Deze percelen (kavels) zijn beschikbaar voor ontwikkeling. De kavels zijn ontbost en hebben een bestaande infrastructuur met wegen, irrigatie , drainage en energie voorzieningen. Ze zijn meestal in de nabijheid van bewoonde gebieden, en in de meeste gevallen zijn ze eerder voor landbouw gebruikt.

Op dit moment zijn de percelen zijn ofwel traditioneel beteeld, verlaten, of worden gebruikt als grasland. De combinatie van deze omstandigheden zorgt voor het herstel en de ontwikkeling van landbouwgronden, met relatief kleine kosten. De kavelgrootte varieert van een paar duizend vierkante meter tot tienduizenden hectaren. Zij werden gekozen om ongewenste aanraking te voorkomen met de omliggende natuurgebieden, vooral de regenwouden. Deze gebieden hebben dan ook zowel een milieu- en ecologische waarde, als een aanvulling op de landbouw en zakelijke potentieel.



Afbeelding: illustreert de ASTCs die landelijk zijn gepland.

5.4 Tussentijdse Evaluatie

De overheid zal beslissen hoeveel er in elk vlak zal worden geinvesteerd, overeenkomstig haar overwegingen inzake het scheppen van arbeidsplaatsten, districtsontwikkeling, vraag naar export en economische haalbaarheid. Het grootste deel van de toegenomen landbouwproductie als gevolg van deze investeringen zal worden geexporteerd en de rest voor importsubstitutie. Na vijf jaren zullen de investeringen tot dan toe worden onderzocht naar hun effectiviteit in het bereiken van de gestelde doelen en zal er worden beslist of het tempo zal worden versneld en/of dat de bedragen zullen worden veranderd. Deze studie zal worden gedaan door gezamenlijk personeel van LVV en het Ministerie van Financien.

6. Specifieke Initiatieven: Businessplannen

Deeluitmakend van de inspanningen om de groei van gezamenlijke overheids en partikuliere raamwerken te stimuleren alsmede om een export georienteerde ontwikkeling te bevorderen wordt er in het Plan voorgesteld een aantal strategische ondernemingen op te zetten die reeds gereed zijn voor onmiddelijke joint-venture investering. Deze projecten kunnen tevens dienen als model (pilots) en kunnen ook worden toegepast in additionele lokaties.

- **Aquacultuur**: Een overheidsbdrijf is voorgesteld die het centrum zal worden voor de nationale aquacultuur bedrijfstak. Het bedrijf zal faciliteiten verlenen voor broed materiaal, productie, uitgroei, opslag, verpakking en verscheping zowel technologische, voorlichting en veterinaire diensten. Familie bedrijven zullen verantwoordelijk zijn voor het visbroedproces, gebruikmakend van jonge visexemplaren die bij het productiecentrum zijn gekocht.

- **Plantage Phedra Landbouwproductiebedrijf in Brokopondo (PPP-J.V. tussen LR Group en de Overheid van Suriname):** Dit bedrijf bevat een sociale component, een landbouwdorp van 150 families, woningen, dienstfaciliteiten, gemeenschapsinfrstructuur en familie grondjes van 3 ha. voor cacao, groenten en pluimveeteelt. Daarnaast is er een commerciele component inhoudende commerciele landbouwproductie een agro-industrieel centrum gericht op kippenteelt en cacao. Totaal areaal van 750 ha.

- **Plantage Victoria Landbouwproductiebedrijf in Brokopondo (PPP-J.V. tussen LR Group en de Overheid van Suriname):** De faciliteiten van dit bedrijf zijn dezelfde als Plantage Phedra maar met een nauwere focus op cacao. Totaal areaal 1,300 ha.

- **Plantage Baboenhol Melkveebedrijf in Brokopondo (PPP-J.V. tussen LR Group en de Overheid van Suriname):** Dit bedrijf omvat een commerciele component waaronder 1,000 melkkoeien, kuilgras en veevoerproductie, stallen, voedingscentrum, station voor het melken van koeien, administratieve en andere gebouwen. Er is ook een sociale component inhoudende het verschaffen van training, inputs en ondersteunende diensten aan lokale landbouwers en de algemene melkveehoudersbevolking. De jaarproductie zal 9 miljoen liter melk zijn.

- **Citrusplantage in Commewijne:** De rehabilitatie van het bedrijf Alliance is gepland, inhoudende herplanting van alle citrus-, lemmetje- en sinaasappellijnen. Het Plan voorziet ook investering in aanverwandte na-oogstbehandeling, inclusief een lokale verwerkingseenheid voor sappen.

- **Groenten en Broeikasgewassen in Wanica en Saramacca:** Twee modelbedrijven zullen veld en broeikassengewassen telen, de helft voor de lokale markt en de rest voor export. Zijnde zelfvoorzienende eenheden, hebben die bedrijven het potentieel om zich uit te breiden en aartstypen te vormen voor soortgelijke bedrijven elders in het land.

- **Rijstvelden in Nickerie:** Het Plan doet het voorstel de rijstvelden in Nickerie te re-organiseren, re-habilteren en verniewen, in het bijzonder in de verlaten gebieden in de autonome regio ten zuiden van de Nickerie rivier. Hoewel buiten het kader van dit project, in potentie kan het in cultuur gebrachte areaal worden verdubbeld tezamen met het terugwinnen van waterbronnen, het behandelen van verzilte boden en het verbeteren van irrigatie en afwateringsinfrastructuur.

7. Milieuoverwegingen

Het Masterplan beoogt het beschermen van ecologische waarden middels drie centrale strategien:

1. Het concentreren van uitbreiding van landbouwcultuur op de voorheen verlaten landbouwarealen om zodoende de omringende natuurlijke bossen geen schade toe te brengen.

2. Het gebruik van milieu-vriendelijke groeimethoden om de omringende natuurlijke ecologie te beschermen.
3. Het definieren van de kuststrook als een schild voor de hele kustvlakte van Suriname tegen zeewateropdringing. Natuurlijke groei in deze strook, in het bijzonder de mangrovebossen, zal worden behouden om de ontwikkelingsstrook ten zuiden daarvan alsmede de natuurlijke habitat van enkele bedreigde diersoorten te beschermen. Intussen zal de ontwikkeling naar het zuiden worden geleid.

8. Samenvatting

Het Masterplan verschijnt op een belangrijk kruispunt voor Suriname. Het land dient haar bronnen van inkomsten en levensonderhoud te verbreden, niet uitsluitend afhankelijk zijn van de mijnbouwsector en nieuwe vooruitzichten ontwikkelen, op de eerste plaats de landbouw.

Het Plan stelt een omwenteling voor in de benadering van de landbouwsector in Suriname, van een voorzieningslandbouw bestaande uit enkele hoofdproducten naar een moderne, commerciele, exportgerichte landbouw, gedreven door kennis en technologie.

Op basis van Suriname's relatieve voordelen in de landbouw zal de overheid gelegenheden bieden en stimulerende maatregelen treffen voor de partikuliere sector evenals het verbeteren van de groei van het bedrijfsleven middels infrastructuurontwikkeling, gunstige kredietvoorwaarden, deskundige begeleiding en ondersteunende diensten. Partikuliere ondernemers zullen dan van ideale voorwaarden en prikkels genieten om de reeds lang uitgestelde verandering in de Surinaamse landbouw teweeg te brengen.

De aanbevelingen in het Plan houden onder meer in innovatieve projecten in alle districten. Deze initiatieven betrekken de lokale bevolking erbij en benadrukken het belang van de gemeenschapslandbouw terwijl ook de commerciele landbouw wordt bevorderd en partikuliere investeringen worden gestimuleerd om de economische stabiliteit van de sector te verbeteren.

Het Plan legt de nadruk op pogingen in gebieden die werden aangegeven als ontwikkelingspotentieel. Deze strategie maakt gebruik van de bestaande infrastructuur om zodoende zoveel mogelijk schade te voorkomen aan natuur arealen, terwijl die percelen die aan alle ontwikkelingseisen beantwoorden, ten volle worden benut.

Aanname en toepassing van de aanbevelingen van het Plan zullen Suriname geleidelijk transformeren tot een landbouwdominante natie die de bevolking voedselzekerheid biedt, die de import vervangt en aanzienlijke werkgelegenheid schept in de landbouw en aanverwandte sectoren. Verder zal Suriname zich plaatsen als een grote exporteur naar de Caraibische landen en Europa en daarmee bijdragen tot een aanmerkelijke verbetering van haar BBP.

Part I
General Overview

1. Introduction

1.1 The Importance of National Policy as a Basis for the Agricultural Plan

The establishment of planning principles and an overarching policy for the agricultural sector is a necessary basis for the creation of a practical development plan. Agreed-upon policy and principles will endow the Plan with stability, direction and coherence, as well as congruence with other key areas of development. Practically, this will facilitate the integration of agriculture with the advancement of social, financial and environmental conditions in Suriname.

Policy for agriculture, as for any area of life, is developed and put forward by agreed-upon representatives of relevant governmental agencies and departments such as the President's office and regional governing authorities, with the input of pertinent organizations and professional experts. The latter, as planning advisors, have participated in forming this policy in order to suggest new ideas, corrections and alternative suggestions, to expand additional related topics, and to give practical and applied input to policy which is to be owned and implemented by the government.

Update and Elaboration on Existing Government Planning Policy

The first starting point for the consolidation of a policy for the development of agriculture in Suriname was the **LVV White Paper consisting of seven strategic planning goals** (BELEIDSNOTA LVV 2010 – 2015: DE BELEIDSTRATEGEI VOOR DE AGRARISCHE SECTOR). These goals were thoroughly examined and studied in previous stages of the project, and constitute a strong foundation for articulating the renewed vision. They are presented here in their original form:

7 Strategic Goals

- To enlarge the contribution of the agricultural sector to the national economy
- Realizing and guaranteeing food security
- Guaranteeing healthy agriculture and food safety
- Developing a sustainable agricultural sector
- Developing the agricultural sector to become the food producer and supplier for the Caribbean
- Creating spatial conditions for developing a sustainable agricultural sector
- Managing the boundary conditions and risks whilst executing the agricultural policy

This Master Plan incorporates universal planning principles with specific findings and analysis of the current agricultural conditions in Suriname to update these previously-stated goals and fashion strategies for their accomplishment.

1.2 The Principle of Sustainability

Two of the existing strategic goals explicitly mention sustainability, but in essence that concept underlies the long-term success of all development objectives. Therefore, a brief discussion of the principle is warranted.

All development is founded on natural and environmental resources, which are the benefits provided by the ecological systems across the globe. On an individual level, each person's or company's rational considerations demand maximal utilization of resources, to extract every bit of benefit possible. Excessive exploitation of these resources in the aggregate, however, can lead to the depletion or even the collapse of ecological systems. In addition to the intrinsic environmental harm caused, in the long range such exploitation can have disastrous consequences to the economy, societal values and public health. Therefore there is a need for boundaries and precautions, which will allow for development while simultaneously protecting, maintaining and renewing resources. In other words, sustainable development is characterized by restraint, self-moderation, unselfishness, and consideration of the consequences of development across the dimensions of space and time.

The difficulty in defining sustainable development stems from the tension that exists between the two extremes of which it is composed: On one hand, there is the immediate benefit of development activity, which inherently involves a certain amount of destruction, and on the other, there is consideration and maintenance of environmental resources to be left behind for future generations. The power of comprehensive planning and an overarching vision, which are part of the responsibility of government policy, is a determination of the appropriate balance for the region that is the subject of the plan, taking into account its people, economy, physical conditions, and natural environment. Such is the objective of this Master Plan.

1.3 Sustainability in Agriculture: Social, Economic and Environmental Aspects

Specifically, the vision presented here integrates existing government planning policy with focused consideration of the three basic pillars of sustainability – economy, society and environment – to create a more balanced, integrated and stronger agricultural sector:

Economy

- Å Transition to a modern industrialized knowledge-intensive agriculture open to global information.
- Å Contributing to macro-economic improvements, including gross domestic product, trade balance, employment, food security.
- Å Agro-economic sustainability depends on the development and improvement of seven main topics: local market, export, food processing, vertical integration, an industrialized sector, economies of scale, and expertise.

Society

- Å Maintaining traditional social and employment fabric/patterns while bringing innovation and advancing knowledge
- Å Enabling maximum flexibility and strengthening communities
- Å Careful and controlled development of shifting cultivation in the interior of the country

Environment

- Å Intensive agriculture, concentrated in relatively few areas, which does no harm to environmental values.
- Å Guiding development to land which is already cultivated, or has been cultivated in the past and since abandoned, in order to avoid clearing natural growth in new areas
- Å Use of environmentally-friendly cultivation methods, including limited and careful use of pesticides and fertilizers
- Å Encouragement of organic agriculture

1.4 Necessary Balance Between Economy and Society

Alongside the desire to advance Suriname's agriculture through modern technological means, is the desire to preserve and strengthen the existing communal structure of the population employed with agriculture.

Socio-Economic Sphere

Most of Suriname's agricultural production derives from small family holdings, often cultivated part-time. This type of agriculture has great importance for economy, employment and society, but uses tools and methods that are not advanced, in small plots, and its effectiveness and productivity is relatively small.

This Master Plan suggests upgrading and improving agricultural methods, with the recognition that family-run agriculture has its place in the economy together with industrialized agriculture. Guidance and training, implementation of new methods, modern technologies and mechanization can all increase employment as well as production.

Examples of infrastructure needed:

- Creation of means for training and support
- Accommodations for tax abatement and obtainable credit
- Creation of centers for logistics and guidance

Agro-Technical Sphere

The main goal is to modernize agriculture in Suriname, making use of modern equipment and of new technologies across large land areas, in profitable crops, in industrialization and mechanization of agriculture, etc.

This is a revolution in outlook, since today, apart from the banana and rice crops in Nickerie, the agriculture in Suriname is traditional and limited.

Examples of infrastructure needed:

- Creation of a marketing structure
- Improvement of supporting infrastructure (roads, communications and mechanization)
- Development of agro-industry and integration of livestock farming
- Increased mechanization and focus on industrial crops

Integration

Ultimately, these two spheres will enrich one another, and will both contribute to the growth of a modern and industrialized agriculture that will rest on strong social foundations.

The Vision

The vision of agricultural development in Suriname is to improve the condition of the national economy through agricultural production for import replacement and for export, while integrating agriculture and society in a manner which contributes to employment and maintains the stability of social structures.

1.5 Goals of the Plan

The National Master Plan for Agricultural Development in Suriname rests on two foundations:

1. **Agriculture and Population:** The Master Plan's principal focus is improving the welfare of the people of Suriname, with the aim of generating employment, food and economic security for the country. The development of the agricultural sector is of great importance to Suriname, since this is a sector that could counterbalance the country's dependency on the mining industry. The plan's goal is to create a new channel through which Suriname's economy can be improved.
2. **Sustainable Agriculture:** The goal is to formulate a plan based on sustainable agriculture. Agriculture is deeply intertwined with nature, environment and ecology. Suriname is one of the world's richest countries in natural resources and agricultural development should not be allowed to undermine the country's existing and future natural resources. Through diversification, the Master Plan will facilitate the growth and expansion of agricultural lands in Suriname, while preserving the environment.

General Structure of the Master Plan

The Master Plan is structured according to two work planes: the National Level, and the Regional level.

1. **The National Level** – This level consists of a comprehensive strategic plan for agricultural development in Suriname, focusing on land resources, water resources, the agricultural potential of the different districts, and market research (local and international). This level will be fully expressed in detail in

the chapters dealing with general policy, in policy regarding specific issues and in formulating policies in different districts.

2. **The Regional Level** - This level concerns the variety of regional situations and conditions in Suriname, with the goal of shaping the agricultural development plan according to local conditions and potential. The plan has centered on local projects distributed throughout the country, focusing on different sectors, such as plantations - mainly citrus orchards and cocoa plantations - dairy, fisheries, produce processing and marketing. Some business plans are proposed in the framework of farms, others as proposals in the private sector. These projects will be conducted using the most advanced farming methods, irrigation systems, machinery and fertilization.

The Master Plan stipulates two types of projects:

1. Community- and family-based projects: These are local projects which aim to re-establish agriculture as a main source of income in the country and to ensure food security and employment for the rural population. Frameworks are suggested to establish guidance centers providing aid, knowledge and implementation of modern technology in family holdings.
2. Commercial projects: Aimed at attracting potential investors and developing separate branch of the agricultural economy that will contribute to the country's balance of payments and production. This is meant to include the establishment of modern agricultural farms, operating in accordance with an advanced economic model.

The Master Plan provides relevant information on agricultural production and indicates potential opportunities and consequential benefits. In addition the Plan discusses constraints to overcome and recommended solutions, setting goals and initiating structures for monitoring and in favor of the follow-up activities.

The purpose and vision of this Master Plan is to turn Suriname into the primary food supplier for the region and a major player in CARICOM by utilizing the country’s advantages in the agricultural sector.

Implementation

All implementation projects follow the following guidelines:

- Improve the welfare of the people of Suriname
- Optimize productivity through development and use of new technologies
- Link primary production to agro-processing for value adding and additional benefits
- Engage in capacity building and knowledge transfer
- Follow GAP standards

- Create the optimal balance between the values of agricultural development and environmental conservation

The success of the National Master Plan for Agricultural Development in Suriname ultimately lies in its practical implementation. This is not simply a theoretical document but a comprehensive strategy which serves to facilitate the development of concrete and feasible projects. The Plan deals with changes in agricultural practices with visible benefits for the people of Suriname.

1.6 Plan Preparation and Process

Work Stages

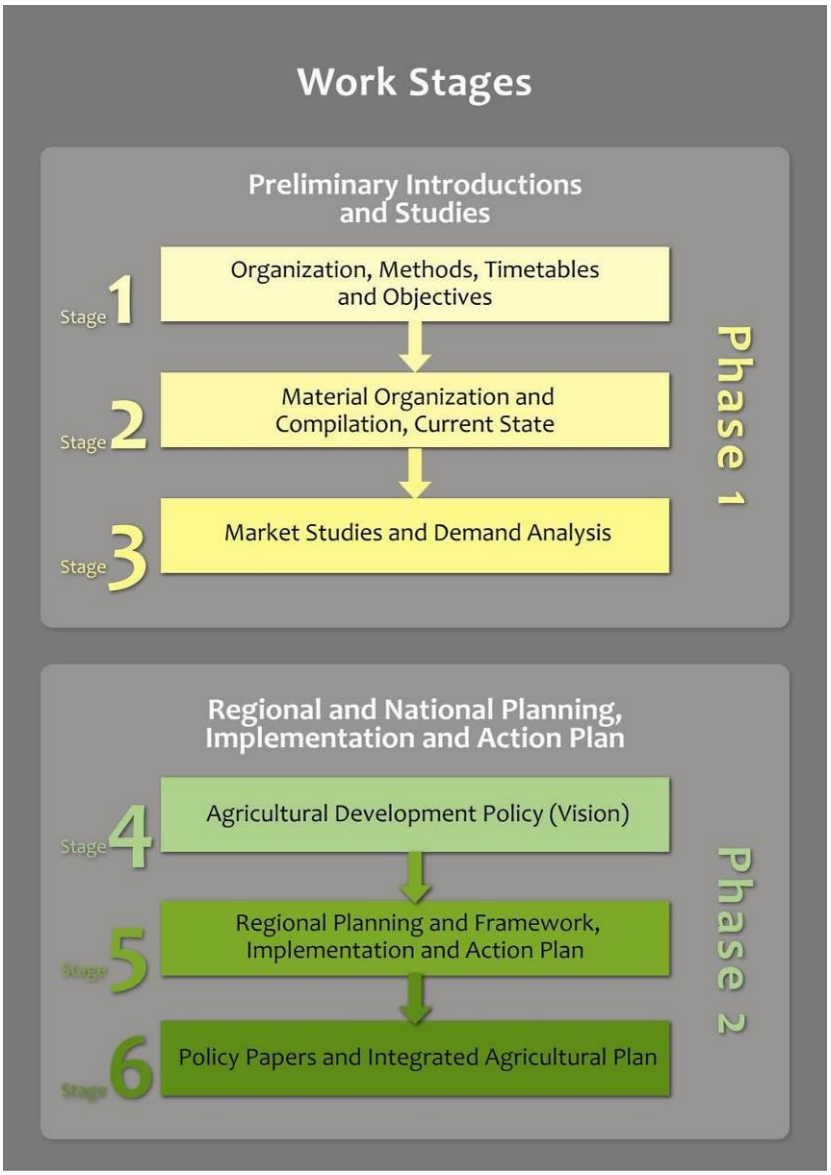
The plan was carried out over two main phases, each divided into three work stages. The first phase was meant to for gathering of materials while the second phase consisted of planning according to said material.

Phase I was dedicated to organization and studying of the existing material: objectives were decided upon, timetables set, materials were collected and organized and market studies were conducted.

Phase II comprised of the planning process itself, including implementation and composing action plans. Within this phase the vision was consolidated, recommendations were established and policy papers were composed.

See detailed description below.

Figure 1: The work plan, divided into the 6 different stages, in a two-phase framework



Steering Committee

The Master Plan is an integral part of the country's national planning strategy. The Master Plan was consistently conducted under the guidance of a steering committee appointed by LVV and IDCS, in two central aspects:

1. Oversight, monitoring and guidance for every part of the Master Plan, including stage summaries, the approval of each work stage, and monitoring and guidance for the work's final conclusions and recommendations.
2. Integration of the Master Plan's recommendations and conclusions into the country's national planning scheme to prevent conflicts and integrate the proposed agricultural programs into various other national programs.

The steering committee has fulfilled the following functions:

- Reviewed existing policies in national planning
- Formulated national agriculture policies
- Worked in collaboration with LVV, IDCS and Anton de Kom University
- Worked in collaboration with foreign bodies
- Ensured integration of development issues on a national level
- Emphasized privatization after rehabilitation of abandoned state farms
- Composed business plans with a focus on economic development, particularly investments
- Integrated various plan stages and parts
- Coordinated between experts and decision-makers

2. Current Agricultural Economy

2.1 The Organizational Structure of Suriname's Agriculture

Current Situation

There is a dichotomy in Suriname's agricultural system as it exists today. Types of agricultural activity as well as distribution of cultivated land are divided in an extreme manner into two distinct units:

1. Most of the agriculture in Nickerie is **corporate**, growing rice and bananas only. It consists of large plantations which use modern technological methods, and it can be described as industrial and organized. In Wanica and Commewijne as well there are several large corporate farms.
2. The vast majority of the remaining agriculture in Suriname takes place on small **family holdings** of 1-5 hectares, on which farmers grow various crops such as vegetables and fruits and raise livestock, often on a part-time basis.

Analysis and Evaluation

Business as usual will severely limit the options of Suriname’s farmers to develop for export markets and to replace import. The small farmers' produce is used to supply the food needs of their own families and sold in small local markets. These farmers use simple methods of cultivation, and lack professional expertise and efficiency.

Recommendations

The Master Plan proposes to moderate the dichotomy between the two existing prototypes by creating advanced industrial agriculture while also nurturing the traditional agricultural communities, and by creating reciprocal relationships between the two systems.

Private family agriculture would benefit from centers for technology and equipment, the availability of affordable small loans and insurance plans, and ongoing guidance from sources of training and professional knowledge. Farmers with experience on small private plots can also participate as workers or as skilled specialists in the establishment of a wider system of corporate industrial agriculture (see a further description of the Suriname Farmer's Products cooperative below). The government should support the corporate entities, on the condition that they also contribute to the maintenance of traditional agriculture.

2.2 Current Agricultural Production in Suriname

Suriname provides a large portion of its own agricultural consumption, and even exports agricultural products. Nevertheless, the country also imports a large quantity of agricultural products, both fresh and processed. Table 1 summarizes the main agricultural items produced in Suriname, and their annual value, as well as the quantity and value of exported products:

Table 1: Suriname's Local Agricultural Production, For Local Consumption & Export, 2014 (Data and calculations from LVV Annual Report)

Category	Item	Local Production		Export	
		Tons / Year	Value M SRD/ Yr	Tons / Year	Value M SRD/ Yr
Annual Crops	Dried Paddy	275,900	196	103,800	180
	Vegetables	24,600	95	2,800	5
	Cassava & Other Roots	9,500	30		
	Other Annual Crops (including watermelon, peanuts, other legumes)	2,580	16		
Annual Crops Subtotal		312,580	337	106,600	185
Permanent and Semi-Permanent Crops	Banana and Plantain	101,700	135	75,300	109
	Citrus	22,100	55	30	0
	Coconut	12,900	36	430	1
	Other Fruits	8,100	70		
Perm & Semi-Perm Subtotal		144,800	296	75,760	110
CROPS SUBTOTAL		457,380	633	182,360	295
Livestock	Beef	1,700	35		
	Poultry	8,900	99		
	Pork, Sheep & Goats	2,220	24		
Livestock Subtotal		12,820	158		
Animal Byproducts	Milk (in 1,000 liters/yr)	4,100	10		
	Eggs (58.5 grams/egg)	3,100	42		
Animal Products Subtotal		7,200	52		
MEAT & ANIMAL PRODUCTS SUBTOTAL		20,020	210		
TOTAL		477,400	843	182,360	295

Suriname produces mainly rice, bananas, plantains, citrus fruits, vegetables and cassava. The total value of its agricultural products is approximately 843 M SRD (260 M USD). The country's primary exports are rice, bananas and plantains, vegetables, citrus. The total value of these exports is 415 M SRD (130 M USD). Agriculture's share of Surname's GDP is 5.8%.

2.3 Suriname's Agricultural Imports

Suriname depends heavily on imported agricultural products. Table 2 presents the country's main agricultural imports and their annual value:

Table 2: Suriname's Agricultural Imports, 2014 (Data from LVV Annual Report)

Category	Item	Import	
		Tons / Year	Value M SRD/ Yr
Field Crops	Vegetables	18,300	34.3
	Cassava & Other Roots		
	Peanuts & Other Legumes	190	0.91
Fruits	Other Fruits	3,000	16.9
Grain Products	Cereals	45,700	46.0
	Flour, Starch, Wheat	11,500	21.3
CROPS SUBTOTAL		75,990	119.4
Meat	Beef	19,100	97.8
	Poultry		
	Pork		
	Sheep and Goats		
Fish	Fish & Seafood, Including Preparations*	4,100	30.4
Animal Byproducts	Milk (in tons equivalent - including milk powder and cheese)	4,300	62.9
	Eggs (58.5 grams/egg)		
	Honey (in 1,000 liters/yr)		
ANIMAL PRODUCTS		27,500	191.1
Processed Foods	Coffee, Tea and Spices	890	8.5
	Cacao and Cacao Products	820	7.4
	Sugar and Sugar Products	25,400	61.7
	Products for Human Consumption: Extract, Essences, Concentrate, Sauce, Soup Ingredients, etc.	8,900	96.4
	Vegetable Fats and Oils and Preparations of Veg, Fruits and Plant	27,800	114.7
	Oleaginous Seeds and Fruits	1,400	5.3
	Preparation of Grains, Flour, Starch	7,100	57.1
	Drinks, Alcoholic Liquids and Vinegar	34,000	126.0
PROCESSED FOODS		106,310	477.1
TOTAL			787.6

*Includes meat preparations

It is clear from the table that Suriname imports a large proportion of its agricultural consumption, especially processed products. The total value of these imports is 787.6 M SRD (240 M USD), which is nearly twice the value of agricultural exports.

Analysis

Suriname is currently dependent on an external food supply, including for basic food items such as grains, dairy products, eggs, and meat, as well as processed products such as sugar, coffee, cacao, juices, preserved foods, and more. This dependence is a large burden on the national balance of payments, and this negative balance has socio-economic consequences – the prices of imported foods are high, and unemployment replaces agricultural occupations. There is a particularly negative impact on rural areas, in which budgets that could otherwise be directed towards social welfare and development, are used for purchasing food which could, with relatively small effort, be grown in Suriname.

Recommendations

Suriname has the ability and potential to supply a large portion of its consumption needs, and to free itself of the burdensome dependence on imports. The Plan advises particular focus on the following fields:

1. Supply of all local consumption – and therefore import replacement – of dairy products, meat (beef, poultry, pork), vegetables, fish and local fruits, by using the existing frameworks of agricultural knowledge, labor, and infrastructure. All that is needed is introduction of new technologies and governmental encouragement to attract workers to the agriculture sector.
2. Cultivation of agricultural products which are not currently produced in Suriname at all, but have been in the recent past, such as cacao and oil palm. This involves the construction of new infrastructure and the configuration of a base of labor and knowledge, including appropriate technologies and cultivation methods.
3. Establishment of a modern food industry, which will be capable of processing local produce for local supply and for export. Suriname's existing food processing industry is very small, and operates mainly in the fields of dairy, vegetables, fruit juice and coffee. It cannot rely on a consistent, high-quality local supply of raw materials, and therefore most of the raw materials for processing are imported.

The importance of agricultural export: Suriname today has a small population, providing too limited a market for large farms and an expansive industry which would likely not be profitable at a small production volume. Therefore, recommendations point to building a large production industry whose output will be beyond the needs of the local market and can be directed to export. This will bring the following advantages:

1. Significantly improving the national balance of payments
2. Creating employment opportunities

3. Facilitating the establishment of large, efficient production units

Summary

Expansion of agricultural production in Suriname will be directed towards supply of local consumption to replace import, as well as for export. At later stages processing industries may be developed, which will be able to preserve and extend the shelf life of products, contributing to improved export.

3. Trends and Distribution in Agricultural Production

3.1 Trends Over Time

Agriculture's share in Suriname's GDP has decreased in recent years, mainly due to the dominance of the mining industry. Additionally, the service sector has become more prominent, on the account of the agriculture sector. An examination of the past decade reveals certain trends in Suriname's agricultural production:

Growth

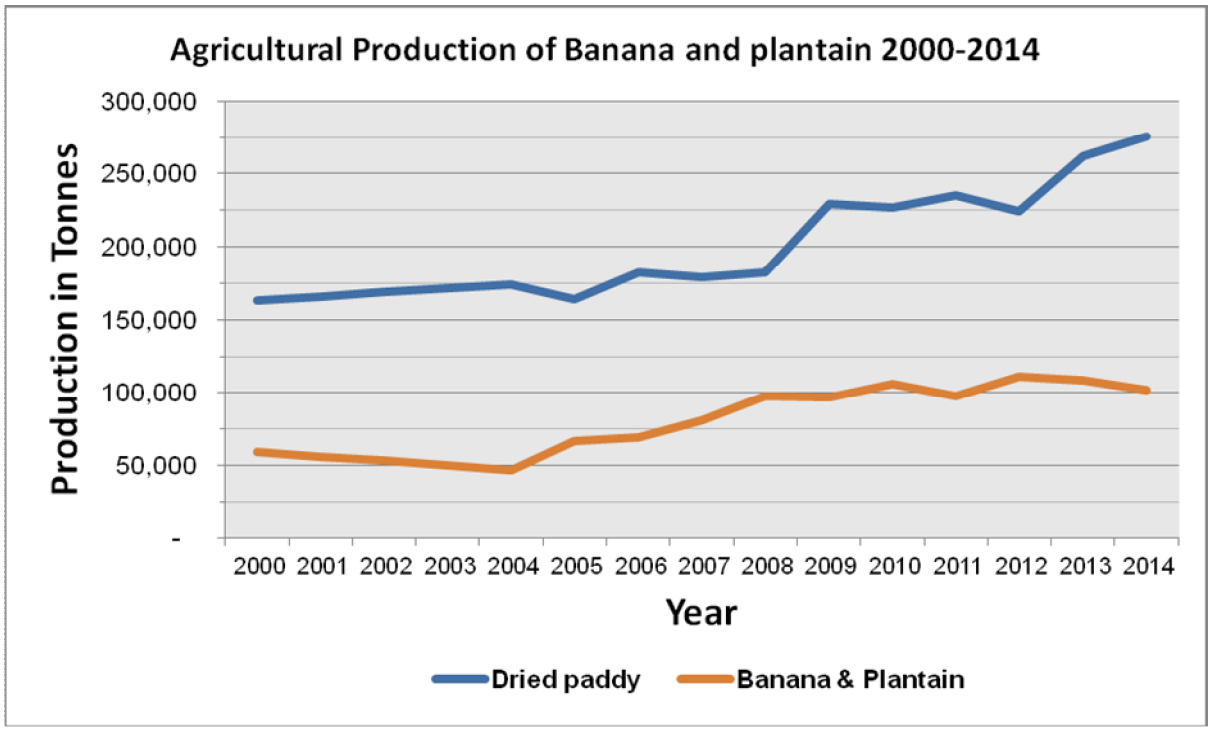
1. Substantial, gradual but stable increase of nearly 60% in rice production, from 174,500 tons in 2004 to 275,900 tons in 2014.
2. Gradual and consistent increase of 100% in banana and plantain production, from 47,000 tons in 2004 to 102,000 tons in 2014.
3. Less stable but nevertheless consistent increase of 33% in vegetable production, from 18,500 tons in 2004 to 24,600 tons in 2014.

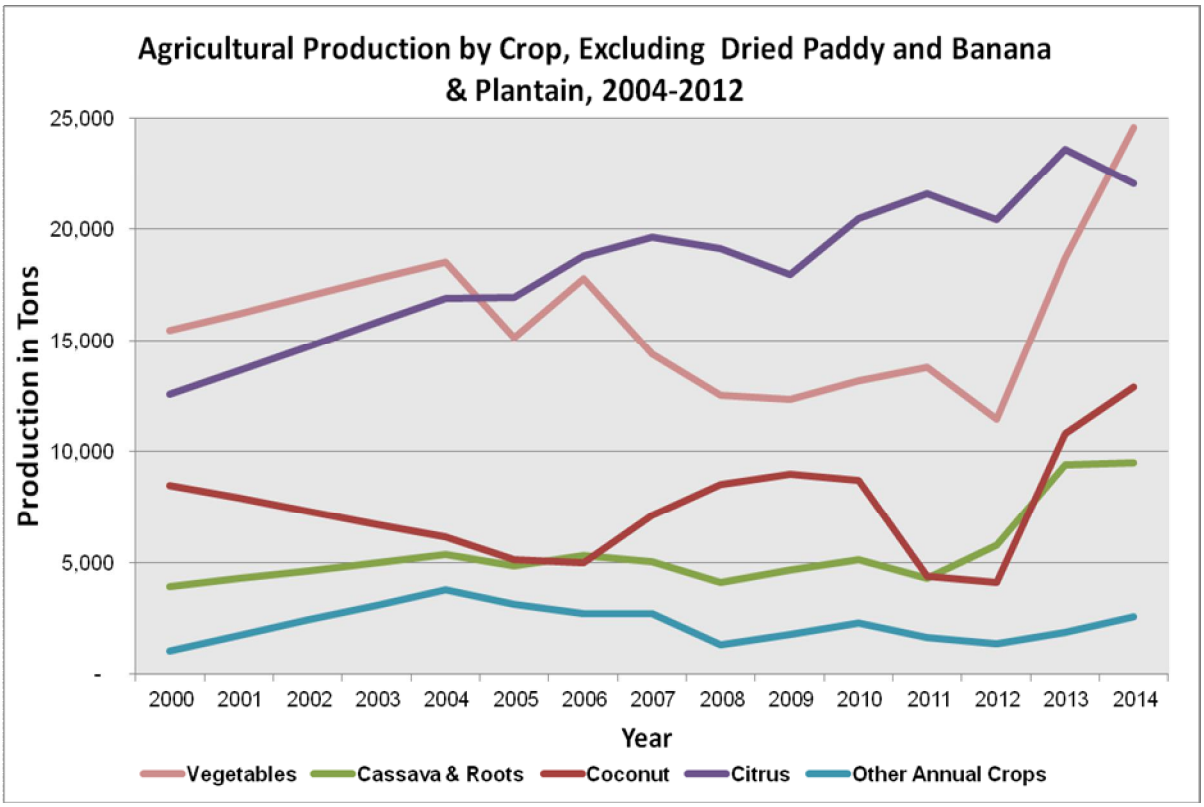
It should be noted that despite impressive increase in overall agricultural production through 2014, the gross agricultural production value has declined because of a significant decline in market prices, particularly for banana, plantain and oranges.

Decline

While certain branches have been gaining strength, there has been considerable decrease in others. Coffee and cacao almost entirely disappeared from Suriname's fields (there remains a single 30-hectare coffee orchard in Commewijne). The variety of vegetables cultivated has also declined.

Figures 2 and 3: Agricultural Production by Crop, 2004-2014 (Data from LVV Annual Report)





A more intensive study of these trends exposes fluctuation in agricultural production, including marked decline in some areas, until 2012, at which point a notable recovery of almost all crops began. This improvement constitutes an optimistic starting point for continuing processes of reinforcement and encouragement for the sector.

3.2 Distribution Across Districts

Most of the organized agricultural activity takes place in Nickerie, where the largest continuously cultivated lands are found, in private hands as well as in the possession of large cooperatives. Agriculture is mostly family-based, and with the exception of a large banana plantation in Saramacca, plots are small and scattered near villages and around cities and towns.

Table 3: Growing Area (Ha) and Quantity Harvested (Ton) by Type of Crop in 2014

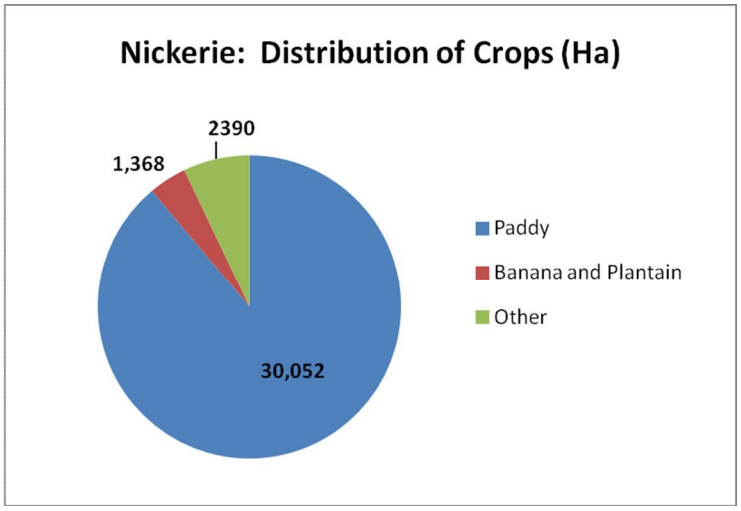
	Description	Nickerie		Coronie		Saramacca		Para	
		Area (ha)	Prod. (ton)	Area (ha)	Prod. (ton)	Area (ha)	Prod. (ton)	Area (ha)	Prod. (ton)
Annual Crops	Paddy	30,052	270,014	150	560	974	5,255		
	Vegetables	740	11,160	4	57	85	1,511	33	827
	Cassava & other Roots	107	2,176	0	12	76	2,237	18	520
	Other Field Crops (including watermelon, peanuts, other legumes)	193	1,097	2	40	70	907	0	1
	Total Annual Crops	31,092	284,447	157	669	1,206	9,909	51	1,347
Permanent Crops	Banana and Plantain	1,368	47,248	6	184	1,427	49,507	2	68
	Citrus	242	2,121	9	151	755	11,900	30	444
	Coconut	372	3,720	514	7,713	8	120	13	376
	Other Fruits	163	2,487	0	0	87	1,525	69	1,289
	Total Permanent Fruits	2,145	55,577	530	8,048	2,277	63,052	113	2,178
	General Total	**33,237**	**340,024**	**687**	**8,717**	**3,483**	**72,961**	**164**	**3,525**

	Description	Wanica		Commewijne		Marowijne		Total	
		Area (ha)	Prod. (ton)	Area (ha)	Prod. (ton)	Area (ha)	Prod. (ton)	Area (ha)	Prod. (ton)
Annual Crops	Paddy	10	22	0	0			**31,186**	**275,851**
	Vegetables	414	8,330	115	1,870	44	815	**1,435**	**23,743**
	Cassava & other Roots	52	1,001	7	104	203	3,448	**464**	**8,978**
	Other Field Crops (including watermelon, peanuts, other legumes)	18	107	62	366	7	58	**351**	**2,575**
	Total Annual Crops	494	9,460	184	2,339	253	4,321	**33,436**	**311,146**
Permanent Crops	Banana and Plantain	117	4,148	16	384	8	163	**2,944**	**101,634**
	Citrus	416	4,648	233	2,722	6	83	**1,691**	**21,626**
	Coconut	185	820	6	121	1	10	**1,098**	**12,503**
	Other Fruits	30	411	31	736	5	95	**384**	**5,254**
	Total Permanent Fruits	748	10,027	286	3,963	19	350	**6,118**	**141,017**
	General total	**1,242**	**19,487**	**470**	**6,303**	**272**	**4,671**	**39,555**	**452,163**

The following graphs present the distribution of the main crops in each district as follows:

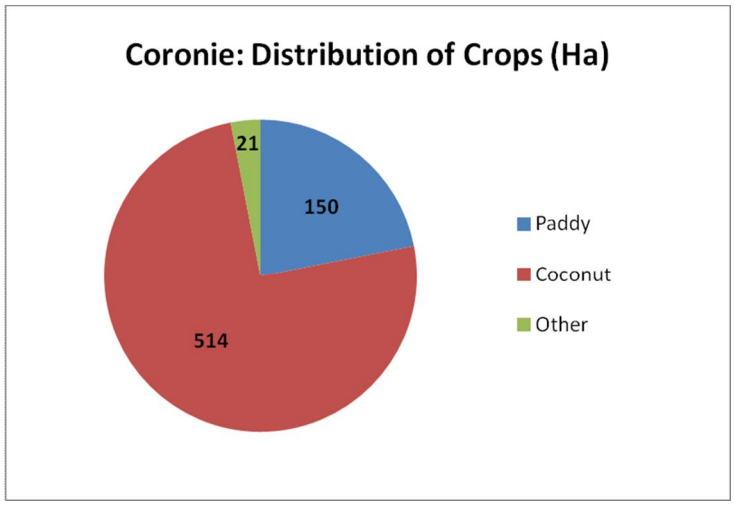
Nickerie

Cultivated land of 35,380 hectares, mostly rice paddies, as well as a single banana plantation of 1,370 hectares in size. In accordance, production is the highest of all districts, with 340,000 tons, accounting for 75% of all agricultural production.



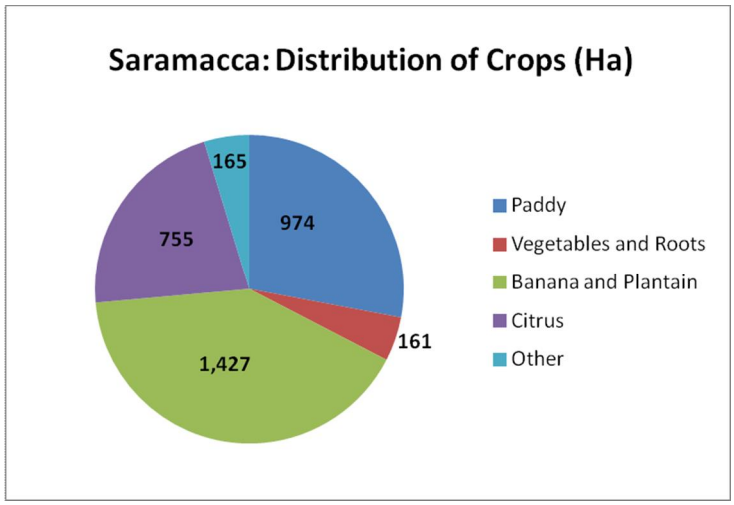
Coronie

Cultivated land of 1,066 hectares, the majority of which are coconut plantations, representing the majority of coconut cultivation in Suriname. In the south, a large rice plantation, only part of which is being cultivated.



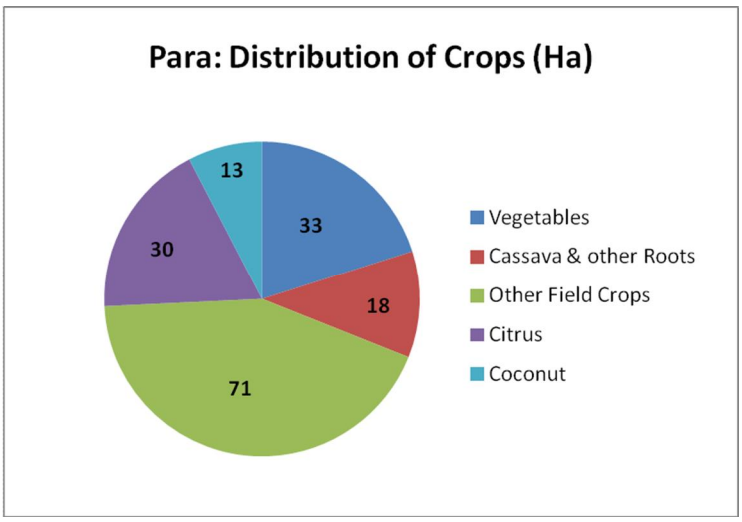
Saramacca

Cultivated land of 2,180 hectares, almost half of which are banana and plantain plantations concentrated in one area. Other prominent crops are citrus orchards of substantial size. The western part holds large paddy plantations.



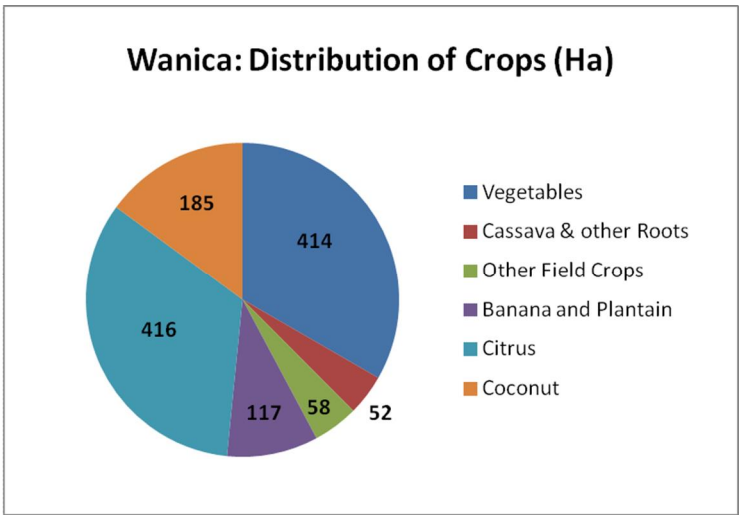
Para

Limited agriculture area of 165 hectares. These lands include a large variety of crops, as well as hundreds of hectares of shifting cultivation.



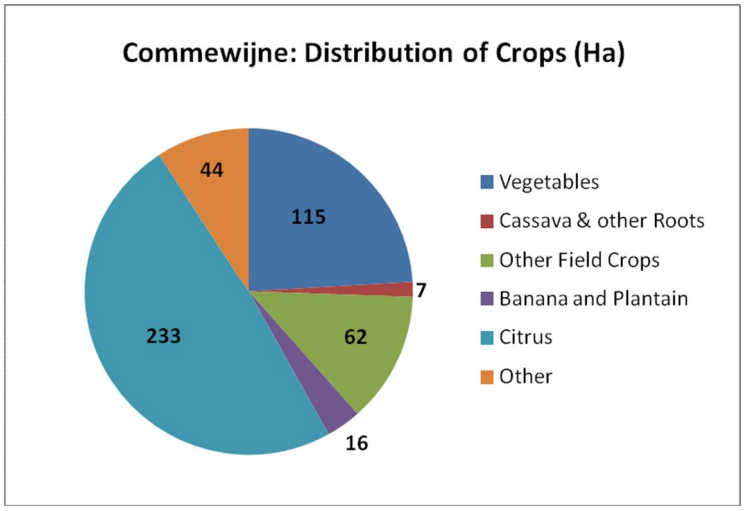
Wanica

1,250 hectares of cultivated land, mostly citrus orchards and vegetables. In Wanica milk production of significant extent takes place. Cultivation is intensive and the agriculture sector employs many workers.



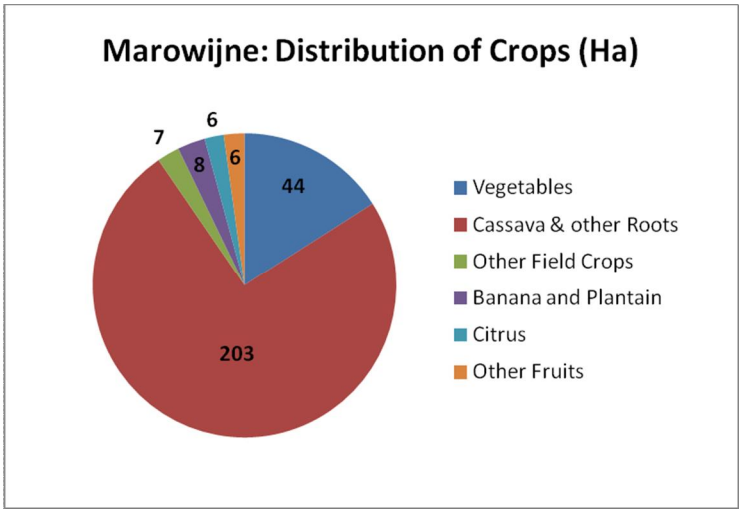
Commewijne

Despite the district's large size, the cultivated area is limited, around 470 hectares, in which the Alliance farm and its citrus production stands out, as well as an Indian cherry plantation, a coffee plantation (the last one in Suriname) and field crops.



Marowijne

Cultivated area amounts to 272 hectares, mostly in the form of shifting cultivation, growing vegetables and roots (mostly cassava) and fruit trees around settlements.



4. Looking Towards the Future

4.1 Forecast of Agricultural Consumption and Production

Suriname has about 570,000 residents (according to 2014 data). Natural population growth is about 1.12% per year. The Master Plan is oriented towards a 20-year projection, so it must prepare for the additional food that will be needed over this period. There are two factors to the growing demand:

1. Population growth – The Plan will aim for a target of population of about 720,000, which is the expected result of natural reproduction. Additional demand is expected from a projected growth in tourism and from returning residents.
2. Rise in living standards – the current annual consumption of a large category of products is relatively low in Suriname compared to the Western standard, in particular for dairy products, vegetables and fruits, and meat. The additional consumption that will accompany a rise in the quality of life is not uniform for all products; for example, there is no expected increase in the per capita consumption of items basic to the Surinamese diet such as rice, grains, banana and plantain. However, for all other agricultural products, it is reasonable to expect that per capita consumption will rise to match accepted standards in other developed countries.

Table 4 presents the expected local consumption for the year 2035, according to the premise explained above, compared to the current state:

Table 4: Recent and Future Consumption Estimates

Category	Item	Consumption - Tons / Year	
		2014	2035 Forecast
Annual Crops	Dried Paddy	172,100	216,800
	Vegetables	49,700	67,100
	Cassava & Other Roots		
	Other Field Crops (including watermelon, peanuts, other legumes)	2,600	3,200
Fruits	Banana and Plantain	26,400	33,300
	Other Fruits	45,700	61,700
Grain Products	Cereals	45,700	57,600
	Flour, Starch, Wheat	11,500	14,500
Meat	Beef	31,900	43,100
	Poultry		
	Pork		
	Sheep and Goats		
Animal Byproducts	Milk (in tons equivalent - including milk powder and cheese)	28,700	38,800
	Eggs (58.5 grams/egg)		
	Honey (in 1,000 liters/yr)		
Processed Foods	Coffee, Tea and Spices	890	1,200
	Cacao and Cacao Products	820	1,100
	Sugar and Sugar Products	25,400	32,000
	Products for Human Consumption: Extract, Essences, Concentrate, Sauce, Soup Ingredients, etc.	8,900	12,000
	Vegetable Fats and Oils and Preparations of Veg, Fruits and Plant	27,800	37,500
	Oleaginous Seeds and Fruits	1,400	1,900
	Preparation of Grains, Flour, Starch	7,100	9,600
	Drinks, Alcoholic Liquids and Vinegar	34,000	45,900

Assumptions

1. Current consumption was calculated according to current production amounts less exports plus imports.
2. For basic products, the only increase taken into account is for population growth, at 26%, since the improvement in quality of life should not affect consumption.
3. For products whose per capita consumption is expected to increase with quality of life, the Plan aims for a total increase of about 35%.

Analysis

In 2035, Suriname is expected to consume a significantly larger amount of food from what is produced locally and imported today. In a scenario of "business as usual", that is, if the country does not take steps to keep up with the pace of consumption, the national balance of payments is liable to deteriorate substantially. Suriname would have to import products on the scale of 1.1 billion SRD (330 M USD), as opposed to the 787.6 million SRD (245 M USD) spent on imports today − and that is without considering essentials such as rice and bananas which today are not imported at all. The national economy would be negatively impacted, and the cost of living would increase. Therefore there is an urgent need to address the social and economic consequences of the abovementioned forecast. The Master Plan focuses on the products in which demand is expected to rise the most: primarily meat, dairy and vegetables.

The Plan also points to products which are currently largely imported, the demand for which will continue to grow; Suriname can produce many of these items and supply the local market, and even export them (grains, cacao, avocado, poultry and dairy products). Similarly, the forecast implies an expected increase in consumption of processed goods, so in this context too there is an emphasis on the importance of establishing an industry for processing and preservation of agricultural produce, for the local market as well as for export.

Recommendations

The changes in the agriculture sector for local food supply, for import replacement, and for export should not be made according to current needs, but rather with a long-range view of about 20 years. The Plan suggests allocations and logistical preparations which should be fundamental to the national budget for at least the next decade, in order to reach the targets set for the year 2035. The advantage of a long-range plan is that it is not affected by short-term fluctuations, and it is set as a national mission with a broad consensus from across the public spectrum.

4.2 Additional Land for Cultivation

About 40,000 hectares of land is currently cultivated in Suriname, and an additional 20,000 hectares is used for pasture, but the total area defined as agricultural and suitable for planting is about 1.5 million hectares. A large portion of this land which is now abandoned was cultivated in the past. Table 5 presents the distribution of agricultural land by main crops according to two sources:

1. The Ministry of Agriculture
2. Up-to-date satellite photography which was taken in the context of the National Master Plan for Agricultural Development.

Table 5: Suriname's Agriculture in Hectares (2014)

	Item	Ha	Yield: Ton/Ha
Annual Crops	Dried Paddy	31,100	8.9
	Vegetables	1,450	17.0
	Cassava & other Roots	450	21.1
	Other Field Crops (including watermelon,	350	7.4
Annual Crops Subtotal		33,350	54.3
Permanent and Semi-Permanent Crops	Banana and Plantain	3,000	33.9
	Citrus	1,700	13.0
	Coconut	1,100	11.7
	Other Fruits	550	14.7
Perm & Semi-Perm Subtotal		6,350	73.4
CROPS SUBTOTAL		39,700	11.5
Pasture	Beef: Pasture	10,170	0.17
	Milk: Pasture (1,000 L/Ha)	6,000	0.68
PASTURE SUBTOTAL		16,170	
TOTAL		55,870	

Additional Land Required

This section will address the question of how much additional land is necessary to supply the future agricultural consumption needs of Suriname. This estimate references the consumption forecasts presented in Table 3 for the year 2035. The fundamental assumption, which is entirely reasonable but has far-reaching implications, is that Suriname is capable of providing its own food and even of producing surplus for export. In order to prepare for this goal, an estimate must be made of the necessary land that would need to be cultivated.

Table 6 presents the existing distribution of agricultural land, segmented by main crop, alongside the expected need for land by 2035, according to the assertions made

in the previous section of this chapter regarding the projected annual consumption by 2035.

Table 6: Additional Land Necessary to Supply Expected Consumption by 2035 (hectares)

Item	2014	Additional Needs	2035
	Land (Ha)	Land (Ha)	Land (Ha)
Dried Paddy	31,100	8,080	39,180
Vegetables	1,450	380	1,830
Cassava & other Roots	450	120	570
Other Field Crops (including watermelon, peanuts, other legumes)	350	90	440
Annual Crops Subtotal	33,350	8,670	42,020
Banana and Plantain	3,000	770	3,770
Citrus	1,700	450	2,150
Coconut	1,100	290	1,390
Other Fruits	550	150	700
Perm & Semi-Perm Subtotal	6,350	1,660	8,010
CROPS SUBTOTAL	39,700	10,300	50,000
Beef: Pasture	10,170	2,650	12,820
Milk: Pasture	6,000	1,550	7,550
PASTURE SUBTOTAL	16,170	4,200	20,370
TOTAL	55,870	14,500	70,370

Conclusions and Recommendations

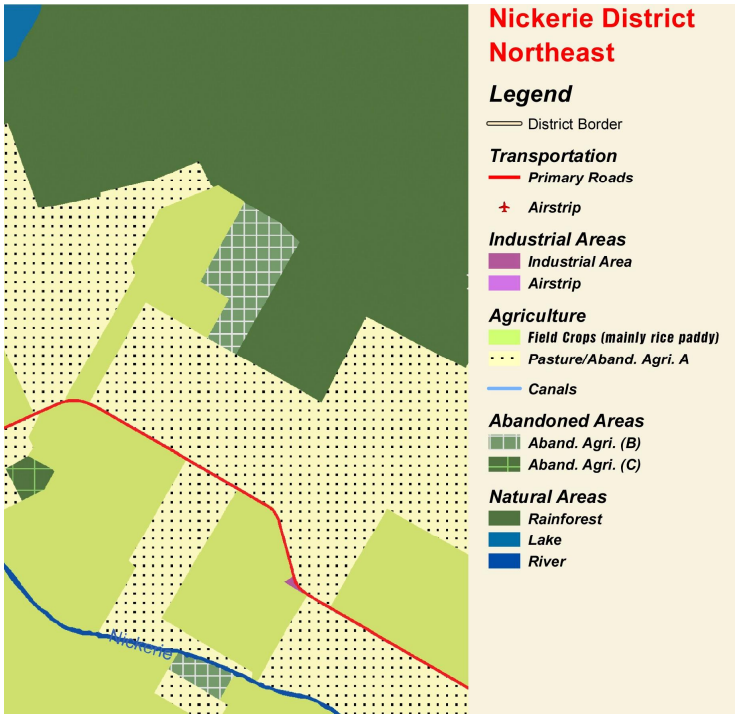
The additional land needed for production of local food supply, including partial replacement of imports, is approximately 14,500 hectares. Furthermore, land will be needed for cultivation of produce for export. According to Plan recommendations, the agricultural sector will increase production for export of mango, avocado, vegetables, etc. as well as adding additional crops such as cacao. The estimated land necessary for such expansion is about 5,000 hectares in the first five years, and another 5,000 in the five years after that.

Suriname has large reserves of agricultural land, far more than current consumption demands. Mostly, these are abandoned areas, which have been categorized by the `Master Plan as recently abandoned (Abandoned A), some of which currently serve as natural pasture grounds. Some use may also be made of lands on which the natural undergrowth has gradually returned (classified as Abandoned B or C). In addition, part of the future production will likely be performed using advanced technologies, intensive cultivation and greenhouses, methods which require less land area.

Therefore, it will be possible to supply the necessary additional farmland relatively easily, without the need for deforestation and other harm to natural resources, and with comparatively little investment and labor.

Above is an aerial photograph of abandoned area where natural vegetation has grown to a great extent. Below is an excerpt of the land use analysis atlas, where different kinds of abandoned plots have been outlined in Nickerie. This type of abandoned plot is quite common throughout Suriname's agricultural lands. Plots that are long abandoned may be an approachable target for agricultural rehabilitation: the plots are largely deforested, they are conveniently outlined for agriculture uses and are already in close proximity to settlements, and therefore accessible to farmers.

Figure 4: Examples of Different Categories of Abandoned Agricultural Land in Nickerie



5. Specific Agricultural Products

This section deals with a number of specific products which are central to the agricultural economy in Suriname. They are as follows:

1. Rice
2. Vegetables and Roots
3. Banana and Plantain
4. Citrus Fruit
5. Dairy
6. Fish
7. Poultry
8. Beef
9. Swine, Sheep and Goats
10. Animal Feed
11. Organic or "Natural" Produce

An analysis will be provided for each one, addressing the current state, the production level and its value, the production value chain, a forecast for the year 2035, and the development potential. This section addresses issues of the local market, import substitution, export, agricultural processing, job creation and profit potential.

5.1 Rice

Current State

Rice is the main product of Suriname's agriculture. From the 1970's onward the rice sector grew considerably, reaching its peak in 1987. After 1987, however, the sector presented a negative trend, in terms of acreage planted, production realized and exports generated.

Production in 2012 was 224,127 tons of dried paddy, of which 77,825 were used for domestic consumption, 56,317 for export, and 32,881 for cattle fodder and bran. The annual export value of rice was estimated at approximately 100 million SRD, but rose by 75% over the following two years.

Analysis and Evaluation

The rice sector is characterized by:

- ŏ Significant investment in water management infrastructure and roads
- ŏ Processing units, transportation and logistics
- ŏ A high degree of industrial mechanization

- ǒ A strong dependency on importation of machines, implements, fertilizers, chemicals, packing materials, and other requirements
- ǒ A large demand for irrigation water

Forecast and Recommendations

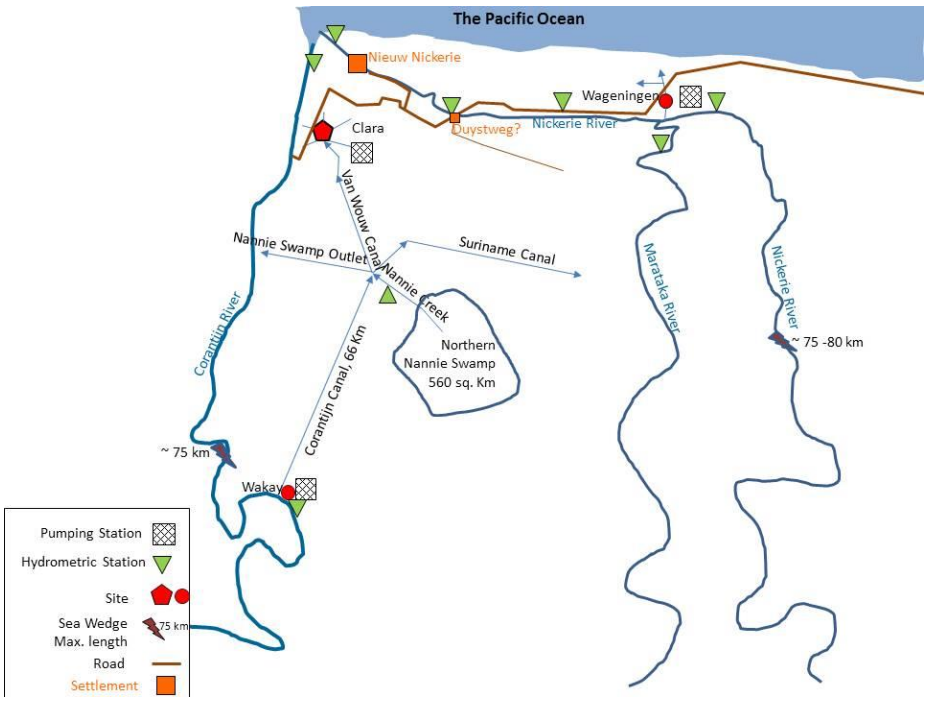
Estimates do not point to an increase in the per capita consumption of rice in Suriname; therefore the forecast for 2035 is an increase in consumption of local rice that matches the population increase. Nevertheless, there is potential for expansion of the sector, since the basic structural conditions and technical knowledge are already in place. The CARICOM market imports only 23% of its rice supply from CARICOM members, which means that this is a potential export market which should be better explored by Suriname.

However, looking at the long term, Suriname has no advantage in competing price. Therefore the government and private sector should invest in:

- ǒ Implemental R&D for new varieties
- ǒ Special add-value rice products
- ǒ Food processing industry for rice products

The potential for significant increase in rice production in Suriname lies in Nickerie, where there are about 20,000 hectares available in addition to the currently-cultivated 31,000. In order to make use of this land, however, the irrigation system must be rehabilitated, and the salinity problem in the Nickerie River and the plots on its northern banks must be solved.

Figure 5: Schematic illustration of the existing water flows and pumping and monitoring systems in Nickerie. For further detail, see the Business Plan for rice submitted with this report.



5.2 Vegetables and Roots

Current State

Production of vegetables and roots in Suriname came to 21,200 tons in 2012, at a value of 75.7 M SRD, in addition to which 16,800 tons were imported at a cost of 32.5 M SRD. Exports are about 3,400 tons per year, bringing in 5.2 M SRD.

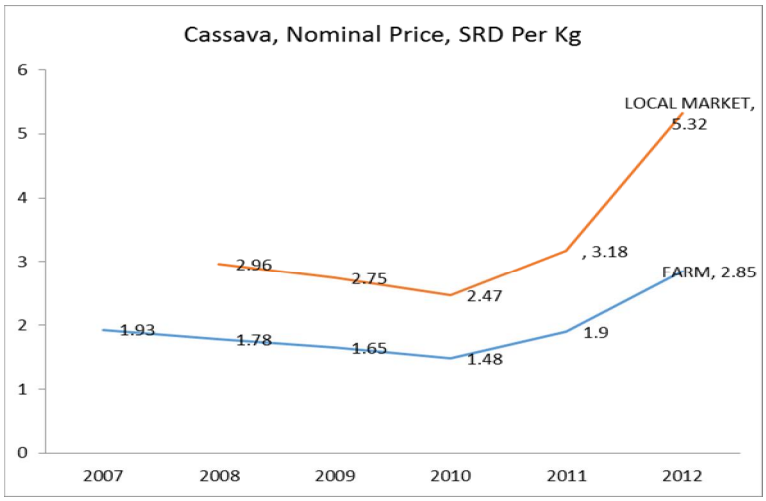
The following table presents the value chain per ton of production of a selection of vegetables on open farmland, according to the accepted cultivation methods in Suriname. It illustrates that the average cost of production is about 3,000 SRD/ton.

Table 7: Average Cost of Vegetable Production, SRD/Ton (2012, calculations from LVV data)

SRD/Ton	Kouseband	Paprika	Pepper	Sopropo	Tomato	Cauliflower	Cabbage	Average
Labour	1,172	734	1,680	3,544	3,672	650	615	1,724
Fertilizers and CP	162	219	164	1,433	368	147	172	381
Seeds and seedlings	42	608	98	199	708	71	71	257
Other	840	156	217	2,297	767	179	123	654
Total Direct Costs	**2,216**	**1,717**	**2,159**	**7,473**	**5,515**	**1,048**	**982**	**3,015**

The value chain of vegetables and roots teaches that by the time the product reaches the customer, its value doubles or nearly so. This is one of the weaknesses in the value chain of Suriname's agriculture, in which the consumer cost doubles but the agents (to whom a large portion of the increase goes) hardly provide any added value to the farmer or to the consumer. See for example the disparity between the market price and farm gate price of cassava (taken from LVV data).

Figure 4 : Prices of Cassava



One of the objectives of the SFP companies will be to improve the entire process of post-harvesting, marketing and distribution, increasing as well the added value to the farmer. An independent party will market the product locally and for export.

Growth Forecast

By 2035, the local consumption of vegetables and roots will grow to an estimated 46,500-55,000 tons. In order to supply this demand, it is necessary to intensify the activities in this field. In addition, it is possible to replace import of onions altogether, and possibly potatoes, by selecting varieties to plant which are suitable to Suriname's conditions.

Recommendations

Open-field and covered vegetables should be considered one of the priorities for Suriname's agricultural development, since it can address many goals simultaneously:

- **Import replacement** – almost 40% of current consumption is imported
- **Increased exports** – at the first stage to CARICOM members such as Trinidad, Tobago and Barbados, and later to other regional countries and to Europe
- **Affordable diet variety –** Local production answers the need for affordable means to increase the consumption of vegetables.
- **Processing potential** – Increased, continuous production of higher quality provides potential for development of agro-industry in the form of affordable and reliable raw materials.
- **Assured income** – There are many potential markets: export, local consumption and agro-industry.

Recommendations point to development of this branch of agriculture using intensive cultivation methods which do not require extensive land. A business plan for a vegetable farm, prepared in the context of this strategic Plan, is appended to this report. In parallel, we recommend the development of a processing industry for vegetable products, as well as cultivation of vegetables specifically for processing.

5.3 Banana and Plantain

Current State

The production of bananas and plantains in 2014 was nearly 102,000 tons, valued at 135.4 M SRD. From this, nearly 75% (all bananas) went to export, whose value was about 109.4 M SRD.

Analysis, Evaluation and Recommendations

Banana is the second main export product of Suriname, mainly produced in Nickerie and Saramacca. There are likely opportunities for the plantain export market to be

developed as well. In addition, processing can add value to fresh plantains and the potential market for these products should be explored.

There is a potential for wide-scale expansion of banana and plantain orchards over extensive lands in all of districts. The limitation is labor and salary to support it. However, improvements to the efficiency of farming methods and introduction of mechanization will reduce the labor needs and allow an increase in cultivation.

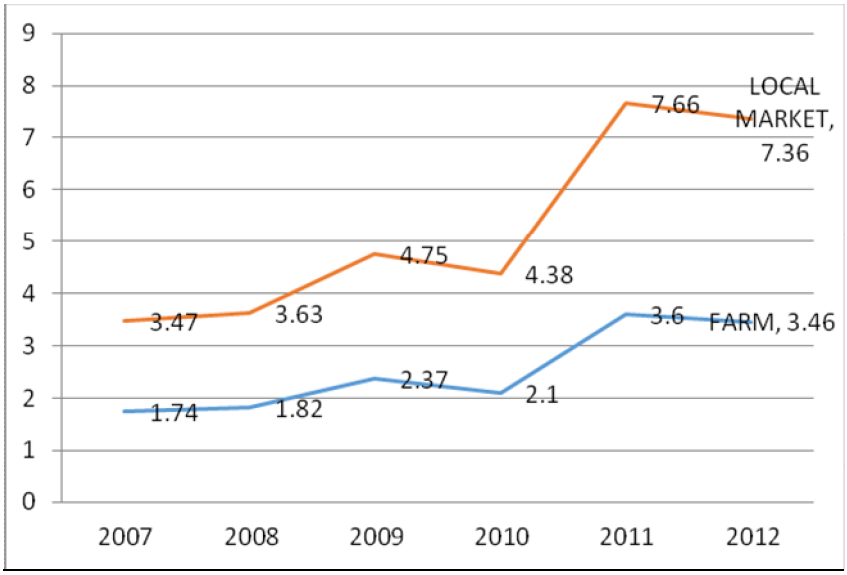
5.4 Citrus Fruit

Current State

Citrus production in Suriname came to 22,069 tons in 2014, at a value of 54.7 M SRD. Of this, only one-tenth of a percent went to export.

As in the case of cassava, the weakness of the marketing component in the citrus fruit value chain greatly reduces the benefit to both consumer and farmer. Figure __ illustrates the large disparity between the market price and the farm gate price for oranges.

Figure 5: Oranges, Nominal Price/Kg in SRD



This issue will be addressed by SFP companies' role in marketing and distribution.

Analysis, Evaluation and Recommendations

Citrus is an important sector that presents a potential export market as well as opportunities for development for the citrus processing industry, and addresses some of Suriname's internal issues such as development of the southern districts, creation of jobs and replacement of import. There is a need to upgrade quality, but the know-how and market partners are already available. Currently, pulps for processing travel

from Brazil through Europe to Suriname, but development of the local fresh citrus sector might considerably reduce costs of import.

A specific business plan for a citrus farm is presented, as an appendix to this Master Plan. It presents a strategic plan for the production of limes and oranges for the local market as well as for export, and in a later stage also for processing. It also lays a foundation to be used for other citrus fruits in the future. The business plan identifies extensive land of the necessary light soil type for citrus cultivation in Saramacca, Wanica, and Commewijne.

5.5 Dairy

Current State

The local annual milk production is 4.1 million liters, while total consumption is around 25 million liters per year. Meanwhile 20 million liter-equivalents of dairy products are imported.

Analysis, Evaluation and Recommendations

The excessive reliance on imported rather than locally-produced dairy indicates potential for success of a modern dairy farming enterprise, which would meet the needs of the local market and even produce for export. There is also potential for the development of an agro-industry in this field, after quality, continuity and unity of production are brought up to acceptable standards for industrial processing. Vertical integration of the dairy farm sector should be considered to improve efficiency by coordinating stages of production, post-harvest and food processing.

Table 8: Milk Value Chain

	SRD Per Liter	% of Revenue
Labor	0.3	8%
Fresh Grass	0.75	19%
Grains	0.8	20%
Other Costs	0.15	4%
Net Margin for the Farmer	0.5	13%
Revenue - Farm Gate	2.5	63%
Dairy Plant Cost of Raw Milk	0.17	4%
Dairy Plant Cost of Production	0.37	9%
Losses	0.03	1%
Packing	0.16	4%
Distribution	0.16	4%
Net Margin for the Dairy Plant	0.29	7%
Gross Margin Point of Sale	0.32	8%
Price for the End Consumer	4	100%

The development of the feed industry and of veterinary services is also expected to take place as a consequence of dairy sector expansion.

Local dairy consumption in 2035 is expected to be 33-43 million tons. Under current conditions, in order to produce even the quantity of milk consumed today and especially to keep pace with that increase, tens of thousands of hectares of pasture would be needed. However, if the sector moves to more intensive modern methods of dairy farming, it will be possible to substantially reduce the necessary land. A business plan for an industrialized dairy farm in Brokopondo is included as an appendix to this Master Plan.

5.6 Fish

Current Situation

According to data from the International Monetary Fund, local production is estimated at 595,000 tons per year. LVV data presents exports on the scale of 32,000 tons, generating revenue of around 120 million SRD. However, there are some important quality considerations, among which is the high mercury level in the fish.

Analysis, Evaluation and Recommendations

To achieve an increase in local production, a processing industry must be developed and quality must be more strictly monitored.

The aquaculture and fishery industries are underdeveloped in Suriname, considering its high potential of profitability. There is a potential export market that can be better explored. For successful export, however, it is essential to assure fish quality and to develop a processing industry. A bottleneck that should be taken into account is the need for locally-produced feed for the fish since feed is one of the main production costs in the fishery industry. Production of ornamental fish can be also a new and interesting market for Suriname, since the country has many comparative advantages such as relatively closeness to big markets, e.g. U.S.A and Canada, abundant warm water and indigenous tropical freshwater fishes.

A specific business plan for an aquaculture project is presented, as part of the Master Plan.

5.7 Poultry

Current Situation

Broilers are by far the main type of meat consumed by Suriname's population. The local production is 8,900 tons and imports account for nearly twice that amount. A consumption increase of 11,000 tons is expected by the year 2035.

Analysis, Evaluation and Recommendations

The relatively cheap import of poultry, mainly from Brazil, has a large effect on the market. Examination of the import process suggests that a large portion of the profit from imports is made at the point of sale at restaurants and hospitality services, where prices per kilogram are very high compared to prices in stores, and where generally the customer does not know the origin of the meat being served.

Replacement of import is the key factor for the development of local poultry production. There is a need to develop the value chain from local feed production through the farmer and to the point of sale at butcher shops. The possibility of integration with feed producers is an option to be analyzed and to be strongly considered.

A plan to develop a poultry farm in Brokopondo is proposed as part of the Master Plan.

5.8 Beef

Current Situation

The local production of beef is 1,700 tons. There are an additional 300 tons not reported and one ton imported. The annual consumption in 2012 was around 3,100 tons, 68% of which was produced locally, which translates to a per capita annual consumption of 5.9 kg per year.

Forecast

Annual consumption is expected to grow by about 1,000-2,500 tons by the year 2035. In order to replace all current and future imports according to the current system of beef production, an additional 11,000-19,000 Ha of pasture land would be needed. Part of this need can be filled by using currently uncultivated agricultural land which has not yet been heavily overgrown (referenced as "Abandoned A" in the attached Atlas).

Analysis, Evaluation and Recommendations

An analysis of the pastured beef industry in Suriname shows revenue of 21,000 SRD per ton of slaughtered meat, alongside a production cost of about 8,000 SRD. The remaining 13,000 SRD per ton serves as a return on the investments of land preparation and farm construction, estimated at 190,000 SRD. This would be a slow return on investment, except that in the process of establishing the farm a herd is also cultivated, which serves as an asset to its owners at a value of 83,000 SRD/ton. Including this asset, the rate of return is reasonable.

5.9 Swine, Sheep and Goats

1,900 tons of swine was produced in 2012 and 300 more tons were imported. The annual consumption of pork products is around 2,200 tons per year, or 4.1 kg per capita per year. An increase in consumption to at least 2,900 tons is expected by 2035.

There is marginal production of sheep and goats in Suriname. It is estimated that the local annual production is about 15 tons. Together with 5 imported tons, the consumption is around 20 tons per year. There are potential to expand and develop this sector in Suriname, also for export to nearby countries.

5.10 Animal Feed

The development of this sector is important in order to replace imports and essential to development of the beef, poultry and dairy farm sectors, to which it serves as an input. As discussed previously, cereals, mainly feed, is the product with the highest expected increase in local consumption over the next years, since it reflects the expected increase in the local consumption of milk and beef. The dairy and poultry projects planned for the southern farms also include a pilot of corn fields. This experiment should be handled carefully and if it shows success may be expanded. Similar vertical integration should be considered in future between livestock farmers and feed producers.

5.11 Organic or “Natural” Produce

Current Situation

The increase in living standards around the world has created a growing demand for organic produce, or cultivation using only natural pesticides and fertilizers, which are perceived to be healthier for consumers and environmentally friendly. The fact that almost no treatment is applied to fruits and few are applied to vegetables, and the

fact that Surinamese products are considered healthy, are a good basis on which to develop an organic brand.

Analysis, Evaluation and Recommendations

Suriname has several relative advantages in organic farming:

1. Organic farming requires large, remote areas, so that crops can grow without interferences caused by human activity. Suriname is relatively secluded, distant from industrial focal points, large roads, pollution and external influences.
2. It is possible to establish a wide buffer radius of dozens of kilometers around organic farms, a distinct demand of international standards. For example, the Alliance farm north of the Commewijne River is inaccessible by motorized vehicle. Such conditions may be used in branding efforts while developing organic farming.
3. Suriname has a small population, as well as low population density – less than 4 persons per sq. kilometer. There are relatively low levels of industrialization, meaning that pollution is also low and pressure on natural resources is not intense.
4. Exporting, in addition to accommodating tourists.

Developing organic agriculture or a “Natural” Suriname brand should involve joint efforts with local agents, who are familiar with Suriname's physical, economic, and social conditions. Ananta Agro NV is an organic farm founded by Maureen Silos, growing organic produce and offering growers interested in organic farming the opportunity to acquire land on her farm. A joint venture may be initiated in order to set up a commercial project or many small community projects.

This will require a very specific way of handing the crops both during growth and also during harvest and transport to arrive in Holland and Europe with produce that is considered fresh and healthy, taking into account that the quality of appearance will not be optimal but it will be marketable on the basis of its freshness and healthiness.

The recommendation is to start implementation with aubergines, okra, cabbage and bitter leaves, which are already exported today.

Part II
Challenges and Policies

6. Financial Challenges to Private Farmers

The biggest difficulty with agricultural investments relates to the long period of return. In addition to its length, this period is fraught with the uncertainty that accompanies the agricultural enterprise, leading to a strong sense of insecurity for farmers. Mechanisms that would alleviate these problems, such as credit and insurance for farmers, are lacking.

In Suriname the cost of credit is high, and conditions for long- and short-term loans are too rigorous in comparison with financing options for farmers internationally. In addition, there is no framework for farmers to insure themselves against catastrophic crops losses due to weather or infestations. These factors are the main reasons for the absence of investments in agriculture, a problem which exists in Suriname as well as in many other places in the world. In this situation, nearly the only body that can help open this bottleneck is a government entity – the government or institutions operating on its behalf.

The Master Plan proposes that the government assist in basic investments, and thereby lighten the necessary investments from the private sector for developing farms and market channels. In order to ensure that government funds are routed correctly, it is suggested that the government's help be provided through backing the companies of the SFP cooperative (to be described in detail in Section 10.2) which will have passed a government authorization process and which will be working to develop specific branches of agriculture in accordance with the principles of the strategic Plan. In addition, specific focus should be directed to the problems of credit and insurance:

6.1 Credit

Current Situation

As a majority of farmers' outlay happens more than half a year before the income arrives, there are cash flow problems for small farms as well as a significant barrier to investment in new crop varieties or technological tools. Financial authorities are not usually prepared to provide sufficient credit, because of low security and high risks. Upon a review of funding possibilities for farmers in Suriname it was found that conditions for long- and short-term loans are rigorous with relation to international funding possibilities, and are a significant bottleneck in agricultural development.

The result is that disadvantaged farmers do not have significant aid in obtaining credit for investments in agriculture. Those who can invest in agricultural development are

mainly persons with equity capital, who do not require loans, or bodies capable of recruiting capital abroad, where loans with better conditions may be obtained.

Many farmers have small obstacles in their paths, such as the need for a water pump to utilize a nearby water source on dry days, lack of fertilizers or agricultural tools, etc. The sums at issue are estimated to be between $1,000-$4,000 (4,000-16,000 SRD). The absence of such small sums is nevertheless an inhibiting factor for agricultural development and advancement across the country.

The Agriculture Bank is in an ongoing privatization process, with an emphasis on searching for a strategic investor with capabilities in international banking. The bank management in Suriname wishes to increase efficiency and ease the banking framework, and focus efforts on assistance to farmers in Suriname.

As such, there is a special offer currently being made to farmers in Suriname by the Agriculture Bank, which is considered to be good compared to regular loans. It carries the following terms:

Agrarich Kredit Fonds (AKF)

- A loan for the duration of 10 years, with a 6.75% interest rate, and the first half-year as a grace period.
- Maximum loan amount:
    - For most agricultural sectors, 200,000 SRD
    - An exception is made for the rice sector to 500,000 SRD

These are the best conditions offered for short-term as well as long-term loans. The proposed loans are expensive, and there are several consequences:

- 200,000 SRD is too small an amount to assist with establishing an agricultural business, for the long term.
- For a farmer interested in a short-term loan, intending to use it as working capital during the course of the year, this is an expensive loan which weighs down the business.

The credit shortage for Surinamese farmers affects nearly all layers of the agricultural sector. The Master Plan for Agricultural Development in Suriname wishes to focus here on a specific group, small-scale farmers in need of minimal aid in order to achieve significant professional advancement.

Recommendations

An official governmental institution, such as LVV or the Bank for Agricultural Development, shall provide a microcredit allocation to small farmers or to limited agricultural activities. Collateral will not be requested; however, to be approved for

the credit, the small farmer must assure by completion of a simple form that he/she meets the criteria, to be publically announced by the government in a clear and transparent manner.

Criteria for Loans

- Full-time occupation as a farmer, or at least confirmation of substantial part-time agricultural work.
- Convincing considerations regarding the barriers limiting development of the specific agricultural activity, and the possibilities of overcoming them with the assistance of credit.
- A partial work plan and business plan, including obligations to repay the entire grant within a defined period of time.

Budget

The providing institution will allocate a specific amount for loans every year. Nearly 450 loans per year at an average of USD 18,000 will require a budget of around 8 million USD per year for credit. This is a small amount in proportion to the national budget, but essential for these 600 small farmers.

6.2 Insurance

Current Situation

Agriculture is characterized by a high level of uncertainty in every channel of activity: markets, prices, competition, natural disasters and climate change. In particular, unpredictable risks result from climate change and extreme weather, as well as pests that infest a particular region and cannot be stopped in a reasonable manner. Such infestations occur randomly; many years might pass without the presence of any pests, followed by sequential years with pests, and they might overwhelm only a limited area while a neighboring farm may stay intact.

A necessary condition for promoting development is reducing uncertainty, and to this end insurance, even partial, is required as a safety net for farmers in all agricultural sectors of plants and livestock. In Suriname, however, insurance for farmers is non-existent. The Agriculture Bank has attempted to establish an insurance framework, but according to several interviews with the bank director, the initiative has been hampered and finally halted by a lack of ability to define or characterize probabilities for pests, soil salination and infrastructure damage.

Analysis and Recommendations

In the framework of the National Master Plan for Agricultural Development in Suriname, it is suggested that a governmental insurance company, with cooperation between the government and agricultural institutions, provide insurance for Suriname's farmers against unavoidable natural damages. It should be noted that there are many additional challenges to a farmer's ability to get a high yield which involve the farmer's professionalism and technological investment. These aspects would not be covered by the proposed insurance.

The government should also consider some revenue insurance but only to full-time modern farmers. This possibility should be examined very carefully and if established it might be the best support government can promise to farmers.

Principles of Insurance Program

- The company will allow to the farmer to choose between a basic or an extended insurance plan.
- The company will have external agents that will evaluate damage in the farmer's presence, immediately after the report of the damage, and in total transparency.
- Risk premium calculations will be done separately for each crop and each method of cultivation, relying on the historic results of each cultivar. Discounts will be calculated according to the absence of claims.
- Recompense for the farmers in case of damage will be at most the value of the production costs, with a deduction (policyholder's participation).
- The insurance company will be established in cooperation with the Ministry of Agriculture and with an arbitration commission that will offer farmers a fast, efficient and cheap inquiry, in case of difference of opinion regarding the compensation amount.

By participating in farmers' main risks in exchange for premiums, the government will avoid the direct involvement and financial burden of helping them in the wake of big natural disasters.

7. Challenges of the Local Market

7.1 Production

Price Fluctuation and Product Inconsistency

Local market prices for agricultural products have been rising in recent years but also fluctuating greatly, such that in the same year there are prices that vary by as much as 250%. This fluctuation stems from the disparity between the amounts produced during the rainy and the dry seasons, as well as from the lack of commitment to continuity in production on the part of local farmers.

Inconsistent, non-standardized production is part of a vicious cycle along the entire value chain, from farmer to end consumer and also for industrial purposes. It causes a preference for imports from among consumers and local industry, reducing demand for local produce. This further removes resources and motivation from local farmers, leaving them with too much uncertainty regarding their livelihoods.

The fact that there is no stable commerce creates fluctuation in prices as well as in supply. The lack of continuity of supply and consistent quality of local produce is the major reason why Suriname has very little agricultural industry, and what exists is based primarily on imported raw materials. An obvious example of the result is the import of juice concentrate from Brazil through Europe to Suriname, or the import of milk powder to local dairies to use in place of local milk.

Farmers who are confronted with partial, discontinuous or obstructed sales channels react opportunistically. Thus, for example, when the price of meat rises more dairy cows are slaughtered, and single-year crops are chosen according to the specific needs of small farmers.

The increased uncertainty that encompasses those who work in the sector also impacts other citizens who experience extreme fluctuations in availability and prices in the marketplace and who therefore cannot depend on local produce but are forced to import a large portion of their agricultural supply.

7.2 Post-Harvest and Point of Sale

Local open markets generally sell both fresh vegetables and fruits as well as poultry and flowers. Main problems with the fresh produce for sale are:

1. Symptoms of water loss in some products (leafy vegetables and peppers)
2. Different cultivars (different sizes, different stages of ripeness)

3. Low-quality cultivars (large cucumbers with prominent seeds, less flavorful mangos)
4. Fruit blemishes as a result of pre-harvest insect attacks (citrus fruits, mango)
5. Fruits showing symptoms of decay, probably overly ripe (mango, avocado)
6. "Food safety" of produce impossible to evaluate
7. Unit of sale of vegetables is by group or by unit, with no weight indication.
8. Most produce is transported to the market in plastic bags

In addition to the lack of standardization of quality and quantity, the present method of handling fruits and vegetables has significantly contributed to the lack of food security and safety.

There is a general lack of knowledge about post-harvest procedures, ranging from farmers who do not know any relevant principles to those who have been exporting for several years but have implemented only basic practices which can be further improved. Guidance for such improvements will require a significant development of extension service for post-harvest handling both for fruits and vegetables.

An example of the lack of post-harvest handling capabilities is a lack of packing facilities in orchards. After harvest the farmer places the fruits in wooden crates or plastic bags, without any type of post-harvest treatment, and the fruits are transferred to the market. Ethylene treatment for de-greening the fruit is not applied, nor is any insecticide sprayed on the fruit during its growth, resulting in spotting caused by different insects and fungi. For a specialized market of organic produce, such a condition may be acceptable, but in the wider general market this reduces the perceived quality.

Recommendations

There is an urgent need to impose uniformity on the unit of sale; produce should be sold by weight so that prices can be compared in order to create standards for consumers and especially for growers. There is an urgent need for post-harvest treatment of the fruits, for example by dipping the fruits in a solution of SOPP (sodium ortho phenyl phenate) at pH 11 followed by hot water brushing at 50° C.

The government should put special emphasis on pre-harvest and post-harvest extension services, given the current lack of knowledge at the growers' level. This must include institution of a system of post-harvest handling, with training for farmers on how to preserve product quality from the moment of harvest until delivery to the customer, through sorting, packaging, and chilled storage and transport. It should also establish, with government assistance, laboratories necessary to monitor product quality and thereby obtain permits for export to Europe, CARICOM and North America.

Improved extension services, the responsibility for which is presently governmental, will help farmers to source packing materials. For instance, leafy vegetables should be packaged in plastic bags, with small or intermediate holes to preserve humidity and prevent accumulation of CO2. Likewise, there is a need for guidance to farmers concerning varieties and harvest timing. For example: recommendation of a smaller type of cucumber with an attractive green color and more specific standards of harvesting. Similar recommendations may be made for tomatoes and mangos that have at least three or four different shapes and may be sold at various stages of ripening.

The government will also guide farmers concerning pre-harvest treatment with fungicides, and will determine clear standards for selling different crops. For instance, degree of ripeness, size range and color range should be standardized for each crop. Crops should be transported in corrugated cartons for protection during transport, maintaining their quality until the point of sale. Selling should be allowed only by weight.

7.3 Policy and Structural Obstacles

No Customs Protection

Unlike in some neighboring countries, Suriname's agriculture does not enjoy customs protections. Trade agreements signed by the government create potential markets for Surinamese exports, but while the branches of agriculture in Suriname are not geared towards production of items that are most in demand in foreign markets, these same agreements limit the possibility of customs protection for fresh agricultural produce. As a result, it is more financially worthwhile to import, which threatens local farmers.

The most obvious example of this is in the poultry sector. The country absorbs large amounts of imports from Brazil and from the US, of varying quality. The imported poultry is cheaper, and therefore it is not profitable for local farmers to grow their own. It might be expected that competition from import would reduce poultry prices for the population, but most of the imports reach only the institutional markets – hotels and restaurants – and these businesses keep the additional profit themselves rather than passing the savings on to their customers. In contrast, in the traditional marketplaces for the general public, mainly the local poultry is sold, which is preferred by the population because of habits of familiarity and taste.

For livestock in particular, the struggle to compete with imports is exacerbated by the difficulty of producing cereals for feed, which creates a double benefit from the importation of dairy products, meat, and poultry.

Unhelpful Middlemen

Some farmers sell their produce independently in small markets or individually near their homes. Those that seek the assistance of professional merchants often encounter unprofessional middlemen who do not provide added value to the farmers.

Additionally, farmers do not receive fair compensation for what they manage to produce for sale. There is an enormous discrepancy between the market price to the end consumer and the price received by the farmer at the farm gate, most of which remains as margin for merchants. The merchants are not sufficiently professional, however, and do not provide added value to the farmers they serve. They do not develop the local and export markets, nor supply the farmers with guidance on what to cultivate or with training or financial assistance during the crop season. A general lack of marketing knowledge on the part of farmers allows this situation to continue.

Recommendations

Duties and Protections

Suriname's government can examine creative methods for protecting local agriculture, particularly in strategic areas (such as cereals) in which it sees importance in strengthening local production for purposes of food security. Although the government is constrained by existing import agreements and duty protections, it is possible and acceptable to overcome these limitations in different ways. For example, imports of unprocessed whole poultry may be taxed but not those of processed or cut-up birds, etc.

It should be noted, though, that such protections also create a negative incentive to improve agricultural efficiency, and therefore the branches to be protected and the extent of the measures should be chosen carefully. For instance, local milk production can be protected, but it would be a mistake to protect the inefficient production that exists today, for which there is no realistic expectation of business success. The government must stipulate that protection of a sector be dependent on parallel fundamental changes in the production process. Such changes can often be made with relatively low investments.

Farming and Marketing

Another mechanism for the government to break the cycle of inadequate demand and inadequate production is the proposed cooperative of farmers and export companies described in detail in Section 10.2 below, to be known as Suriname Farmer's Products, or SFP. This structure will allow for large-scale, continuous, quality production, at a much higher level of efficiency using economies of scale.

The members of this cooperative will direct their production according to the crops for which Suriname has a relative advantage in the high-priced markets, such that Surinamese farmers will benefit from the trade agreements signed at the national level. The companies who participate in SFP will also, unlike independent agents, have a vested interest in assisting the individual farmers with whom they partner.

7.3 Limitations on Product Processing

Current Situation

The number of vegetable and fruit processors in Suriname is limited. In addition to the large processors, there are many small household fruit and vegetable processers. These processers produce from their home, use relatively simple facilities and often employ family members. They often supply nearby stores under their own brand name. Although the production volumes are relatively low, fruit and vegetable processing on the household level creates jobs mainly for women and contributes to the family income.

Analysis and Evaluation

The small size of the farms does not allow economies of scale. This results in high fluctuations in fresh fruit and vegetable prices, discontinuity in quality and insufficient supply. Food processors are therefore inclined to use imported raw materials, such as pulp, rather than local fresh fruits.

Suriname grows a variety of fresh fruit and vegetables, making it possible to produce a wide range of products ranging from fresh produce, juices, and crystallized fruit to wine and vinegar.

The capacity of vegetable and fruit processors in Suriname is limited. In addition to large processors, there are many small household fruit and vegetable processers who produce from their homes using relatively simple facilities and often employing family members. They often supply nearby stores under their own brand names. Although the production volumes are relatively low, fruit and vegetable processing on the household level creates jobs mainly for women and contributes to the family income. These products are sold to supermarkets in the local market or to the hospitality industry.

Household processors face the following obstacles:

- Often have little capital to invest in equipment
- They purchase small quantities of inputs: fresh vegetables and fruits, ingredients and packaging

- As a result of the small quantities purchased they face higher costs which makes it difficult for them to compete against products from the formal sector and imported products
- Have little access to credit facilities, lack collateral
- Little experience in quality control
- Product standardization is a big problem
- They often use market surpluses and seasonal availability of fruits and vegetables to process
- Appearance of the product is often not inviting enough
- Products have short shelf life due to insufficient know-how of conservation techniques

The small size of the farms does not allow economies of scale. This results in high fluctuations in fresh fruit and vegetable prices, discontinuity in quality and insufficient supply. Food processors are therefore inclined to use imported raw materials such as pulp rather than local fresh fruits.

Recommendations

The development of agricultural processing is dependent on the volume of production at the farm level. Therefore, it is essential to develop reliable export markets for the fresh produce, such that the raw material being used for local industry will be the leftovers. According to this logic, the recommendation at the present time is only to develop Suriname's agricultural processing industry to an intermediate degree, so that it will grow in a modular manner in parallel with the development of various agricultural sectors according to their respective export markets. When the agricultural industry is more firmly established, exports of processed products will also be possible.

8. Potential for Regional Exports

8.1 The CARICOM Market

Purpose

Suriname has the potential to become a central food supplier for CARICOM countries, specifically to the countries of the Lesser Antilles. This will increase Suriname's revenue from agricultural production, and provide its neighbors' needs in the form of relatively inexpensive, regional produce of high quality.

Background

Suriname lies on the coast of the Atlantic Ocean. Many of its neighboring countries are small island states, in which the potential area for agricultural development is limited. This is especially true with regards to the countries of the Lesser Antilles. In these countries production of food products is on a relatively small scale, and food imports are heavily relied upon, at great cost. As a result, food prices have gradually risen for the past 15 years, which in turn has had a negative influence on exchange rates, on social budgets and on infrastructure investments. Additionally, unemployment has grown, the rural standard of living has dropped, and urbanization trends are rising. The FAO estimates that there is a need for a comprehensive investment plan for the purpose of providing a constant supply of agricultural products to the Caribbean Islands. Suriname is located in proximity to the Caribbean countries, and is participating in CARICOM agreements, and may assist in providing solutions to these problems.

Suriname has vast agricultural lands and excellent conditions for agricultural development. Suriname can provide a substantial portion its neighbors' food supply, thus developing the local agricultural sector, which cannot otherwise grow due to the limited size of the market in Suriname. Export is essential for advanced agricultural development in Suriname, and export to CARICOM states – especially those in the Lesser Antilles, may motivate the agricultural sector in Suriname by creating economics of scale, while lightening the burden of more distant imports for its neighboring countries. A significant number of these countries are members of CARICOM, facilitating trade connections between them. With some initiative and this ready market, Suriname can fulfill the vision of becoming a regional food basket.

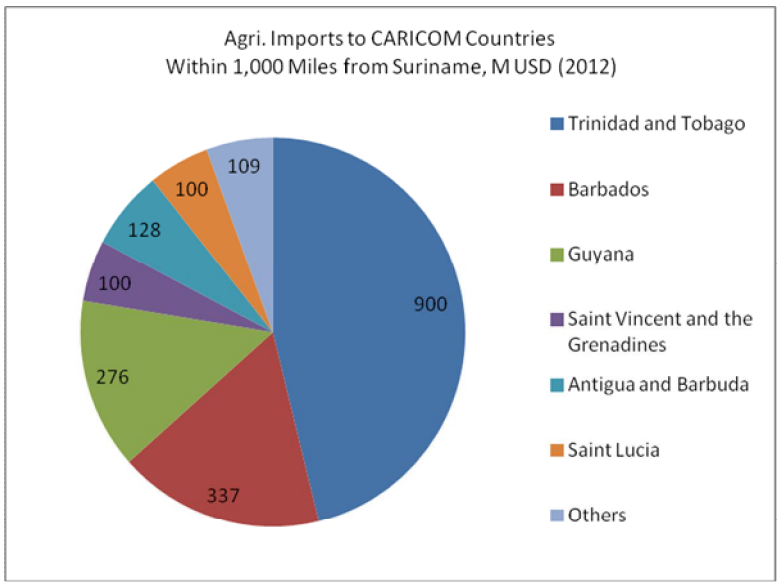
The Caribbean Islands are in high demand as a tourist destination. Many tourists arrive to the various countries each year, seeking out their famous beaches, warm weather, exotic forests and unique cuisine, and increase food demands. This means additional demands for agricultural products, particularly high quality foods –

different kinds of meat, fish and seafood, dairy, tropical exotic fruit, spices, juices and high-quality processed foods.

Data

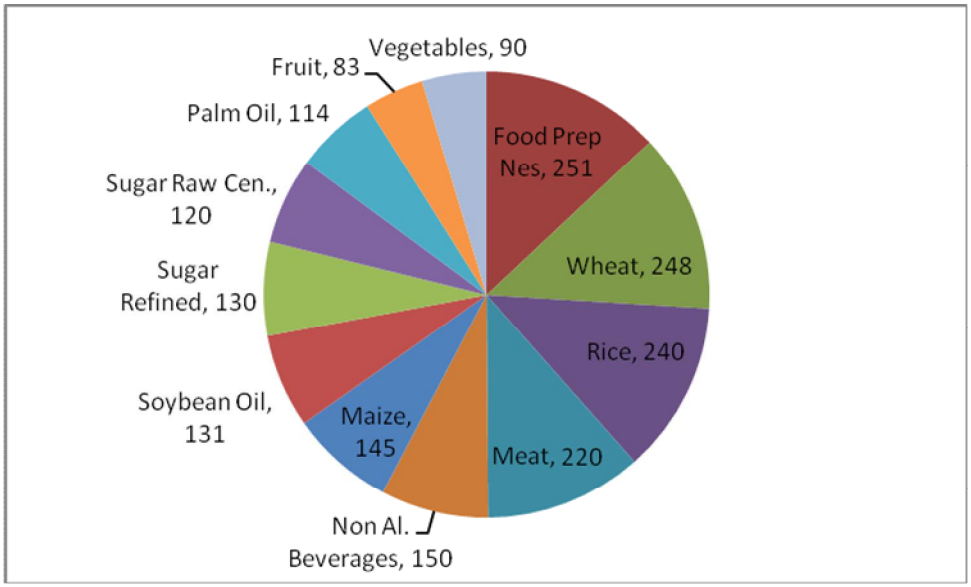
In the Lesser Antilles, most of which are located less than 2,000 kilometers from Suriname, live over 3.7 million people, on an area of 13,000 square kilometers, as dense as 287 people per square kilometer. These conditions mean high population density and a continuous shortage of land and water resources. The water issue has implications on the quality of life. Small island states, such as Barbados, lack available water sources, and are forced to seek out expensive solutions, e.g. sea water desalination. As a result, food imports in CARICOM states has risen from 2 billion USD in the year 2000 to 4.25 billion USD, with only 12.7% of them coming from within CARICOM countries. Barbados, for example, is an island of 430 square kilometers. About a third of it is cultivated land, but the needs are not answered by local production and much of the agricultural produce for consumption comes from imports. Similar conditions exist in Trinidad and Tobago.

Figure 6: Agricultural Imports to CARICOM Countries Within 1,000 miles from Suriname, M USD, 2012



Over the last decade basic food prices have gone up: wheat, rice, maize, and soy oil have risen by more than 100%. This has severe implications on the economy.

Figure 7: Agricultural Import Items to CARICOM



Beginning on a Small Scale

CARICOM members are located across a large range of distance from Suriname, between 1,000 and 3,000 kilometers. Of course, there is an advantage in exporting to closer countries, in the 1,000-1,500 kilometer range. These include small island countries of the Lesser Antilles, such as Trinidad and Tobago, Barbados, Grenada, Saint Vincent, Dominica and more. It is suggested that initially Suriname develop export networks to these countries, targeting specific crops and products most needed in the respective destinations. This way these crops and sub-sectors will also be prioritized in Suriname. In later stages, export will be expanded to include other countries, in CARICOM and beyond.

Figure 8: The map presents the Lesser Antilles countries close to Suriname, in radii of 1,000, 1,500 and 2,000 kilometers. Of these countries, CARICOM members are indicated in blue.

Summary and Recommendations

Suriname holds significant regional advantages in for the potential of functioning as a "food basket" for CARICOM states. There are vast agricultural lands in Suriname, as well as proximity to small island states, in which large populations live in limited areas, and where great proportions of the food products are imported.

As an initial stage, Suriname may become a key food provider for the Lesser Antilles. This should increase Suriname's agricultural production revenues, while answering neighboring countries' needs in the form of providing relatively cheap regional produce, of high quality.

The countries of the region have multiple and diverse needs in terms of food products, and Suriname is capable of providing for many of them, both by increasing production in existing branches, and by introducing new branches to the agriculture sector, specifically for export purposes: fruit, vegetables, meat, dairy product, cocoa. Currently, of the crops produced in Suriname the most relevant for the region are rice, bananas, citrus and meat. Increasing production of these items while establishing efficient marketing and export systems will provide for neighboring

countries' import needs while increasing Suriname's revenues from branches for which it already has infrastructure and experience. A prominent type of products in high demand is prepared foods. For production in this area, it is possible to establish processing plants, to provide finished products for export.

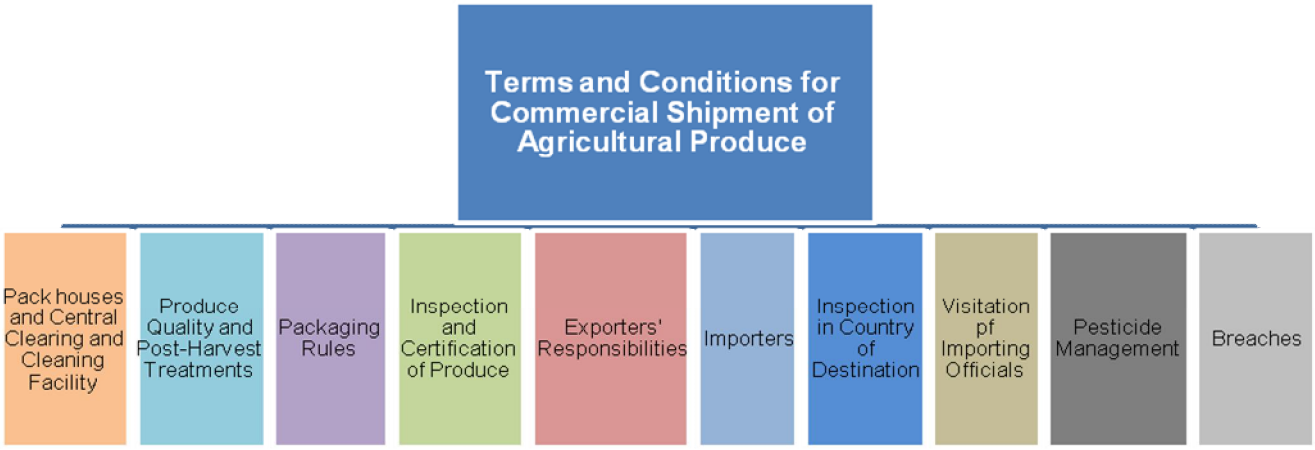
Utilizing its advantages, Suriname can assist neighbors having difficulty providing for their own populations, while enriching its own economy and strengthening its population.

8.2 A Successful Example of Regional Trade

The trade agreements between Guyana and Barbados\ Trinidad and Tobago\ St. Lucia are a good example that can serve as a basis for Suriname's governmental policy. The main terms and conditions of these agreements are expressed below and can be applied to Suriname in similar terms, with respect to the same countries and other potential neighbors in CARICOM.

Guyana and Barbados\Trinidad and Tobago\St. Lucia have a signed protocol of Terms and Conditions for Trade in Fresh Agricultural Produce from Guyana. Below is a diagram presenting the main topics that are addressed in the three protocols:

Figure 9: Main Topics that are addressed in the Terms and Conditions for Trade in Fresh Agricultural Produce from Guyana



Pack Houses and Central Clearing and Cleaning Facility

- Fresh agricultural produce shall be taken from farms within pest-free areas
- The produce will be prepared and packed at approved pack houses only
- Plant Protection Staff of the Ministry of Fisheries and Livestock in Guyana will certify all new pack houses
- Certified pack houses will be subject to visits at least once a month

Produce Quality and Post-Harvest Treatments

- The produce shall meet minimum quality standards:
  - Clean – free from soil, foreign material and odors
  - Free of injury – absence of harvest wounds, bruises or punctures
  - Firm – neither soft nor having spots
  - Free from disease – no sign of fungal/ bacteria growth or the development of dry or soft spots
  - Free of pests – no sign of dead or live insects or other arthropods at any stage of development in or on the produce or package
- Quality will be maintained through:
  - Field Officers will monitor on an ongoing basis the quality of the produce to ensure adherence to minimum quality standards
  - Produce quality in the designated market will be monitored by officials of the importing country
  - Shortcomings will be addressed to the Guyana authorities who shall address them in a timely and appropriate manner
  - The Guyana Marketing Corporation shall coordinate the training of farmers, exporters and pack house operators on Quality Assurance, Good Agricultural Practices and Export

Packaging

The packaging must comply with the agreed specification of:

- Maximum weight of the carton
- Employed bags or sacs
- Specific packing for certain produce
- No mixing of different produce within the package
- Labeling

Inspection and Certification of Produce

- The Plant Health Services of Guyana shall be responsible for the inspection of all the produce for export
- After the produce is inspected and approved for export, the Guyana Plant Health Services will issue the Phytosanitary Certificate

Exporters' Responsibilities

- Exporter and Pack house manager must keep written records of all produce taken into the pack house.

- These records must be accessible to the Plant Quarantine Services of both countries.

Importers

All importers of agricultural produce from Guyana must be registered with the Plant Quarantine Services of the importing country.

Inspection in Country of Destination

- All produce will be subject to a thorough inspection at the entry point of the country of destination.
- Any breaches of the Guidelines for trade in Agricultural Produce will result in either:
  - Confiscation and destruction of consignment or
  - Return of consignment to Guyana at the expense of the importer/exporter
- No liability shall be attached to any officer of the Ministry of Agricultural of the importing country.

Pesticide Management

- Farmers will be required to maintain records of all the pesticides applied on each crop.
- The records shall be made available to the Plant Health Officials of the importing country.

Visit by Officials of the Importing Country

- The importing country reserves the right to make scheduled visits to ensure the terms and conditions are maintained; Barbados reserves the right to make two with the option of additional visits should the need arise, Trinidad and Tobago and St. Lucia reserve the right to make one.
- The cost of the scheduled visits must be borne by the Government of Guyana.

Breaches

- Any importer who after being warned in writing of any breach of the protocol continues to breach shall be denied import permits.
- Import permits shall be issued only when importers indicate willingness, and demonstrate compliance with the terms and conditions of the protocol.
- Any farmer, exporter or packing house operator who after being warned in writing of any breach of the protocol continues the breach shall be decertified until the breach has been corrected.

Summary of the responsibilities of the Guyana Government according to the Terms and Conditions for Trade in Fresh Agricultural Produce from Guyana:

- Certification of all new pack houses
- At least monthly visitations to the pack houses
- Field Officers will monitor on an ongoing basis the quality of the produce to ensure adherence to minimum quality standards
- Shortcomings will be addressed to the Guyana authorities who shall address them in a timely and appropriate manner
- In charge of coordinating training for farmers, exporters and pack house operators on Quality Assurance, Good Agricultural Practices and Export
- Responsible for the inspection of all the produce for export
- Responsible for issuing the Phytosanitary Certificate
- The cost of the scheduled visits of Officials of the Importing Country must be borne by the Government of Guyana

9. Labor and Land Ownership

9.1 Current Situation

In total, the number of permanent, full-time direct agricultural jobs is estimated at 12,000, which primarily includes workers in various crop branches, as well as a few thousand jobs in the livestock and fishery sectors. There are several thousand more part-time and seasonal positions, and agricultural activity fuels additional employment in related fields such as product treatment and marketing.

In the table below, labor is shown according to its distribution by district. By far the highest full-time employment (FTE) in agriculture is found in Nickerie, mostly for its paddy crops, followed at a distance by Saramacca with a majority of permanent crops. Wanica's concentration of vegetable production employs the third largest group of agricultural laborers. As can be seen in the first column, vegetable production requires more workers per hectare, which might be a decisive factor in deciding where to produce.

Table 9: Total Direct Labor by District, FTEs (Full Time Employee)

FTE/Ha	Direct FTEs (Full Time Employee)	Mar.	Com.	Wan	Para	Sar'ca	Cor.	Nick.	Total
0.2	Dried Paddy	0	0	9	0	132	23	8,756	8,920
1.8	Vegetables	58	84	684	34	137	2	95	1,094
0.4	Roots	58	2	16	8	31	0	4	119
0.4	Permanent	5	110	247	31	865	127	435	1,820
0.4	Other	2	16	6	0	28	0	6	58
	Total	**121**	**196**	**956**	**73**	**1,165**	**152**	**9,290**	**12,011**

Most of the available labor force in Suriname has the option of making a livelihood by working for a governmental agency, in the service or commercial sector, or in the mining industry. Agricultural work is perceived as a last resort, and one that does not provide growth potential for its workers.

Thus, a significant majority of the farmers in Suriname, except for those employed in the banana and rice industries, work at agriculture part time. For them, agriculture is an additional activity to complement their income for financial security, and therefore they treat the occupation as a non-essential part of their employment.

Table 10: Number of Holdings by District and Owner Type (Suriname Census Data)

District	Total Holdings	Legal Status			
		Individual or Household	Corporation	Government	Institution / Other
Paramaribo	450	450			
Wanica	2,016	2,004	7	3	2
Nickerie	1,376	1,365	7	1	3
Coronie	149	149			
Saramacca	893	886	2	4	1
Commewijne	1,060	1,047	6	1	6
Marowijne	687	687			
Para	255	252	3		
Coastal TOTAL	**6,886**	**6,840**	**25**	**9**	**12**

This chart shows that the vast majority of landowners are private farmers. It can be assumed that their holdings are very small, on the order of 1-5 hectares, or in rare cases up to 20-30 hectares. In contrast, there are only 25 corporate and nine governmental farms, of land areas reaching several hundred to several thousand hectares.

Of the 6,840 private landowners, more than half of them are concentrated in three districts: Wanica, Nickerie and Commewijne. The following table provides further insight into the agricultural activity of private landowners.

Table 11: Private Holdings - Farming Purpose and Sex of Owner (Suriname Census Data)

DISTRICT	TOTAL HOLDINGS	Farming Purpose		
		Sale	Own Consumption	Unlisted
Paramaribo	450	300	150	0
Wanica	2,004	954	954	96
Nickerie	1,365	1007	252	106
Coronie	149	92	43	14
Saramacca	886	771	110	5
Commewijne	1,047	633	386	28
Marowijne	687	515	160	12
Para	252	115	126	11
Coastal TOTAL	**6,840**	**4387**	**2181**	**272**

It is apparent that between a third and half of private farmers cultivate their land only to produce food for their own consumption (the proportion varies according to district as well as according to age of the farmer).

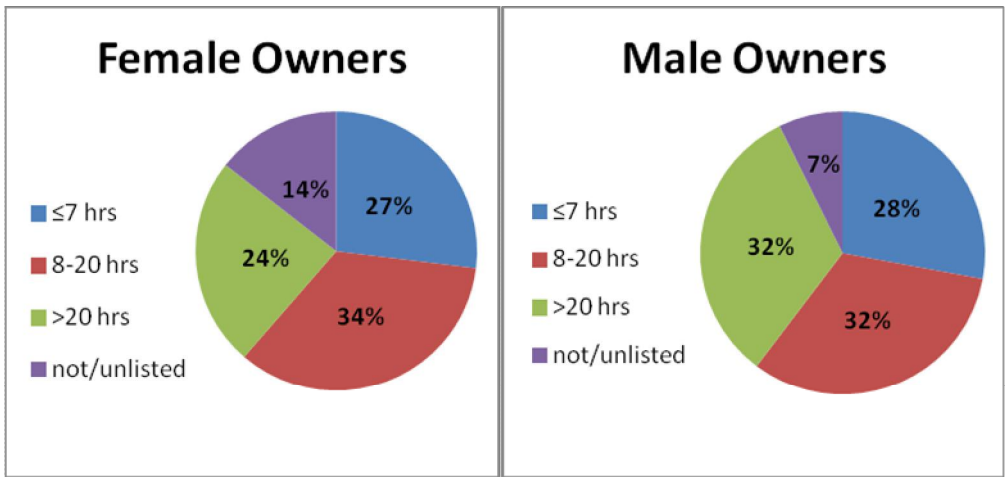
Table 12: Average Hours Worked Per Week and Sex of Farmer (Suriname Census Data)

District	Sex of Holder		≤7 Hours/Wk		8-20 Hours/Wk		>20 Hours/Wk		Not Working / Unlisted	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Paramaribo	380	70	110	20	160	30	90	10	20	10
Wanica	1,681	323	495	93	485	94	503	56	198	80
Nickerie	1,289	76	274	27	379	13	537	10	99	26
Coronie	120	29	35	16	30	5	38	1	17	7
Saramacca	801	85	197	22	296	27	287	24	21	12
Commewijne	917	130	365	61	329	37	179	14	44	18
Marowijne	289	398	79	70	110	180	96	140	4	8
Para	194	58	27	6	51	16	104	29	12	7
Coastal TOTALS	**5,671**	**1,169**	**1,582**	**315**	**1,840**	**402**	**1,834**	**284**	**376**	**161**
	6,840		**2,118**		**2,242**		**1,897**		**583**	

It can be seen that agricultural employment by private landowners is fairly evenly split between full-time (31%), part-time (33%) and negligible (28%) work rates. Although nearly everyone (at least 92%) cultivates some portion of their land to some extent, this data strengthens the assertion that a significant amount of farmland is abandoned or only partially utilized.

Meanwhile, there are about five times more men than women who practice agriculture, and only in Marowijne does the number of female farmers outweigh the males. This reflects the influence of the traditional agricultural structure. The percentage of women who do own holdings and engage in agriculture on a part-time or less than part-time basis matches the percentage of males who do so, but there are significantly more male owners who farm full-time and many more females who do not make agricultural use of their land at all.

Figures 10 and 11: Number of Hours Spent Farming per Week, by Sex (Suriname Census Data)



9.2 Analysis and Evaluation

Individual landowners, many of whom work at farming only part-time, do not have the time or resources necessary to develop their agricultural practices to a professional level, and therefore they also have difficulty finding financial support from banking institutions who want to insure the return of their loans.

With most of the farmland in the country split between many owners who each have their own goals, priorities and schedules, and no particular desire to unify their property, the large-scale production which is an integral part of modern agriculture is difficult to implement. The substantial proportion of farmers who produce crops solely for personal consumption contributes to overall agricultural inefficiency, as this function generally cannot supply the resources for advanced techniques and makes use of traditional farming methods. (On the other hand, there is of course value to the strengthening of the family unit and of the community, and to the food security ensured by household farming.)

Furthermore, because agriculture is a secondary pursuit for many small household farmers, even if they produce for sale they cannot guarantee continuity of supply and consistent quality of their product to customers. Consequently, the food industry cannot rely on these farmers, and therefore favors imports over local produce.

In the absence of demand from local industry, and with practically no options for export, the farmers sell their produce in the local market. Since this is the only sales channel, waves of surplus and shortage are created, which causes price fluctuation. The result is a cycle in which both the general populace and the farmers suffer, and there is no possibility of advancement. To continue the existing situation would mean a decline for the agriculture sector and an increasing reliance for the entire country on imported food items.

9.3 Recommendations

A condition for agricultural development as an export sector is availability of labor, and therefore the government must decide on a combination from among the following policy tools and operate accordingly:

- Financial incentives for Surinamese farm workers and for employers who employ Surinamese in the agricultural field.
- Recruitment of foreign workers in one of two tracks, to be decided upon by the government:
    - For absorption into the local population

- For a period of up to five years, after which they will return to their countries of origin.

In addition, the government of Suriname will work towards the establishment of large agricultural business units, which will view agriculture as their chief enterprise and will behave in an economically sustainable manner. These business entities will receive assistance from the government on condition that they integrate into their activities the small farmers who opt to practice commercial agriculture. Part-time farmers will be able to choose between absorption into a sophisticated industrial agriculture sector or continuation of agriculture as a partial source of income.

One mechanism proposed by this Plan is for multiple landowners to lease their land to an external entrepreneur, who pays them fairly and may also employ them to work on the farm. This exploits unused or underused plots, and unifies them to enable an economy of scale and the ability to implement advanced technological farming methods.

10. Mechanisms for Government Support

The aim of the Master Plan is to position the government as a facilitator for private sector growth in the agricultural industry. To that end, two programs have been designed to mutually assist small individual farmers and larger corporate entities. These two mechanisms are complementary to one another in their goals and activities:

10.1 Agricultural Service and Training Centers (ASTCs)

The Agricultural Service & Training Center (ASTC) concept is a Public-Private-Partnership model (cooperation between the government and private investors) as a regional one-stop shop providing solutions across the entire value chain for supporting farming communities around the world. It aims to provide farmers with modern farming technology and technical know-how, to exponentially improve crop and livestock production levels and overall quality.

The ASTC provides all of the necessary farming inputs such as seeds, chemicals, irrigation, fertilization as well as suitable technology, micro-finance and practical knowledge to local smallholder farmers, in order to support their activities and ensure that they will significantly improve their farming operation and crop yields.

The crops and livestock produced by the local farmers are then brought to the ASTC which also provides the post-harvest facilities, packaging, cold storage and marketing services of the fresh produce to local and regional markets. The ASTC will add value to some of the produce using processing plants and other agro-industries.

In order to ensure economies of scale and sustainability of the ASTC, it should also include a commercial farm of about 1000-2000 ha on governmental or private land that will produce crops and livestock to be processed, packaged, etc. alongside the goods produced by the smallholders. The commercial farm further contributes to the profitability of the project, ensuring return on investments made by the government and the private investor.

Each ASTC will be established on an area of 20 ha of land and will serve about 1,000 farmers on an area of 5,000 ha. The concept is to establish an ASTC in each district, designed in accordance with the region's specific conditions, agricultural crops, and population requirements. The development of the ASTC program will be gradual over a few years at an estimated cost to the government of 4 million USD for each ASTC, including its commercial farm. A similar investment is expected from the private sector.

10.2 Suriname Farmer's Products (SFP)

The Plan structures a cooperative relationship between farmers and mid-to-large entrepreneurs who wish to advance in produce processing and export, in cooperation with Suriname's government. By committing to a set of responsibilities to farmers and to national agricultural goals, companies will merit participation in the brand "Suriname Farmer’s Products" (SFP), which will include financial accommodations and incentives, resources, and logistical support from the government.

Current State Analysis

The vegetative branches of agriculture in Suriname are divided between corporate cultivation of rice, bananas and plantain in the West, which constitute the majority of the nation's fresh produce, and the remainder of the crops which are found mainly in the center of the country among family holdings. The livestock branches are characterized by small business units, in need of industrialization and modernization, and they are scattered across the country with a concentration in the center.

There are several factors which limit the development of agriculture in Suriname. An analysis of the strengths and weaknesses of the sector indicates one central bottleneck, for which focused solutions can be the key to elevating the level of the country's agriculture, and in the long term transforming Suriname into an advanced, industrialized agricultural nation.

The Challenge

This bottleneck is the handling of produce, which may include preservation, processing, and conditions of storage and transport, as well as its subsequent marketing. This entire field suffers from a lack of attention and expertise, as exemplified by several factors, discussed in more depth later in this chapter:

1. There is an absence of an organized, professional export channel.
2. Local trade in fresh agricultural products is rudimentary and lacking standardization, and both prices and supply are unstable.
3. There is a lack of agricultural industry, and what exists uses mainly imported raw materials.

Main Principles of the Plan

The strategic plan focuses on the topics of product handling and marketing as the central issue, which, if dealt with properly, will move the state of agriculture in Suriname to new realms. **The main component of the proposal is establishment of a platform by the government, on the basis of which product handling and marketing companies can advance the country's agriculture.**

The following are the main goals that the strategic plan erects for the coming years, in order to transform Suriname into an agricultural nation that excels in supplying produce to its local population and exporting to CARICOM:

- Initiating a flow of professional knowledge by creating centers for training and research, and channels for the transfer and implementation of farming knowledge at all levels.
- Transitioning agricultural activity to large business units, relatively large land areas, and increasing the use of greenhouses and advanced technology.
- Developing the export market and achieving significant replacement of imports, for select branches in which Suriname has a relative advantage.
- Developing an agricultural industry that is capable of processing produce and lengthening its shelf life in order to increase profits.

The Role of the Government

Today, the business environment is not attractive enough for the private sector to act. There is a need for the government to initiate a new platform upon which the private sector will participate in the agricultural endeavor.

In addition to the launching of the SFP platform, the government will aid with financial resources determined according to the value of the agricultural produce that the companies export. through entities it will authorize to advance agricultural

activity. The primary goals of government assistance will be removing obstacles to export, improving export-related logistics and advancing Suriname's brand.

The Role of SFP Companies

SFP companies will develop new farms, which will operate during the first years towards the goals of improving agro-technical aspects of cultivation and of establishing themselves in local CARICOM markets. In the second phase, after growth has stabilized, these companies will start emerging into other markets, and simultaneously the farms in Suriname will be expanded. Such expansion will be initially implemented slowly and carefully, and grow faster once market success is proven. Based on the success of these farms, the private sector will open additional farms, agricultural branches and service branches such as post-harvest, export and agricultural inputs. Thereby the effect of government investments will further increase.

The specific obligations of the SFP companies will be as follows:

1. The establishment (or expansion) of agricultural farms, including preparation of land, manpower, and suitable technology.
2. Union and organization of farmers who will operate in a business relationship with SFP companies, according to their professional guidance.
3. Creation of a business relationship with small farmers who wish to share their land in a cooperative fashion as part of a large farm, and to work in the sector on a part-time basis.
4. Provision of credit to farmers for use as working capital.
5. Provision of agricultural extension services by professional advisors and through the use of model farms under their management as demonstration centers. The essence of their mission will be to advance intensive agriculture in all of the spheres that they handle: covered crops, orchards, upgrading the cultivation of livestock with modern industrial processes, etc. The ultimate purpose is to yield the maximal output possible from the main resources of land and labor.

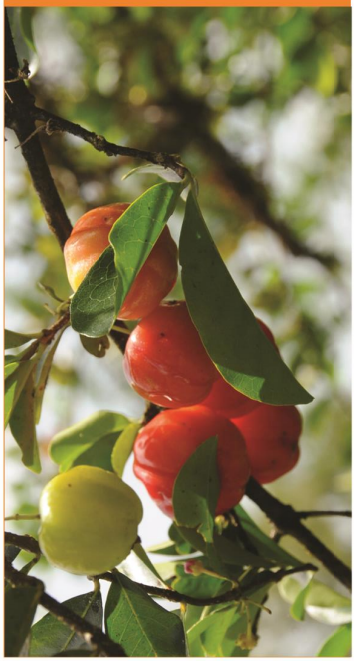
   Intensification of agriculture will permit the effective use of Suriname's significant relative advantage, which is **the ability to grow agricultural products continuously throughout the year**. By means of covering crops and industrializing product handling, it will be possible to regulate continuity of supply and consistency of production quality. Therefore, allowing Suriname to break into the export market and the agricultural industry, as well as to create stability in local markets so that residents can rely on a regular supply and predictable appropriate prices.

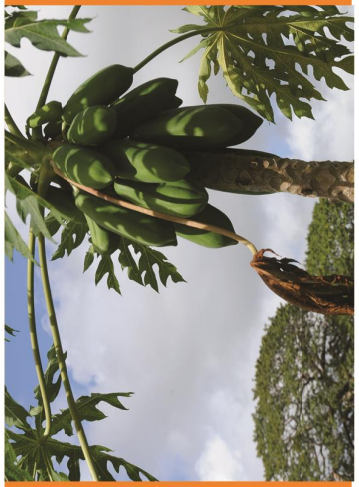
6. Provision of guidance to farmers on which crops to plant, in accordance with Suriname's relative advantages and with the demand in target markets: Europe, North America and CARICOM countries.
7. Establishment, with government assistance, of the laboratories necessary to monitor product quality and thereby obtain permits for export to Europe, CARICOM and North America.
8. Promotion of applied research and development departments, that will emphasize the introduction of foreign knowledge and experience from areas with similar climate to Suriname, and the application of that information to Suriname's particular conditions.
9. Institution of a system of post-harvest handling, including training for farmers on how to preserve product quality from the moment of harvest until delivery to the customer, through sorting, packaging, chilled storage and transport.
10. Investment in advertising the SFP brand in the export markets, and creation of connections between farmers and customers, so that there will be a vertical flow of knowledge from the market directly to the growers and a horizontal flow of knowledge between the farmers themselves.

Summary

The advantage of the proposed approach is the creation of incentives and tools on the part of the government, which will break down obstacles and unlock options for the continuation of the development process at the hands of private entrepreneurs and market forces.

Part III
District Survey





11. Physical Overview: The Distribution of Agriculture and Cultivation Methods

The Distribution of Agriculture in Suriname

This chapter presents the geographical distribution of the various kinds of agricultural lands cultivated at present in Suriname, as well as abandoned agricultural lands. At the same time, it describes the distribution of infrastructure, roads and settlements and maps the country's natural areas.

The National Master Plan for Suriname focuses mainly on the coastal plain, in which most of the population is concentrated, in addition to most of the country's agricultural and economic activity. Therefore, the mapping herein deals with the coastal plain alone, in addition to a few exceptions which reach inland in specific areas (for example the area of Brokopondo along the Suriname River).

General Spatial Divisions

Physical Division

The coastal region of Suriname can be divided into clear units on a east-west axis. The major rivers flowing from south to north form the borders for these units, separating between the large areas of land.

Administrative Division

Suriname is divided into ten administrative districts, of which seven lie on the coast. This division corresponds largely with the physical land units created by the routes of the major rivers flowing from south to north.

Figure 12: This map demonstrates how the boundaries of the administrative districts correspond.

Figure 13: Land-Use Map of Coastal Suriname (Produced by Kaplan Planners, Ltd.)

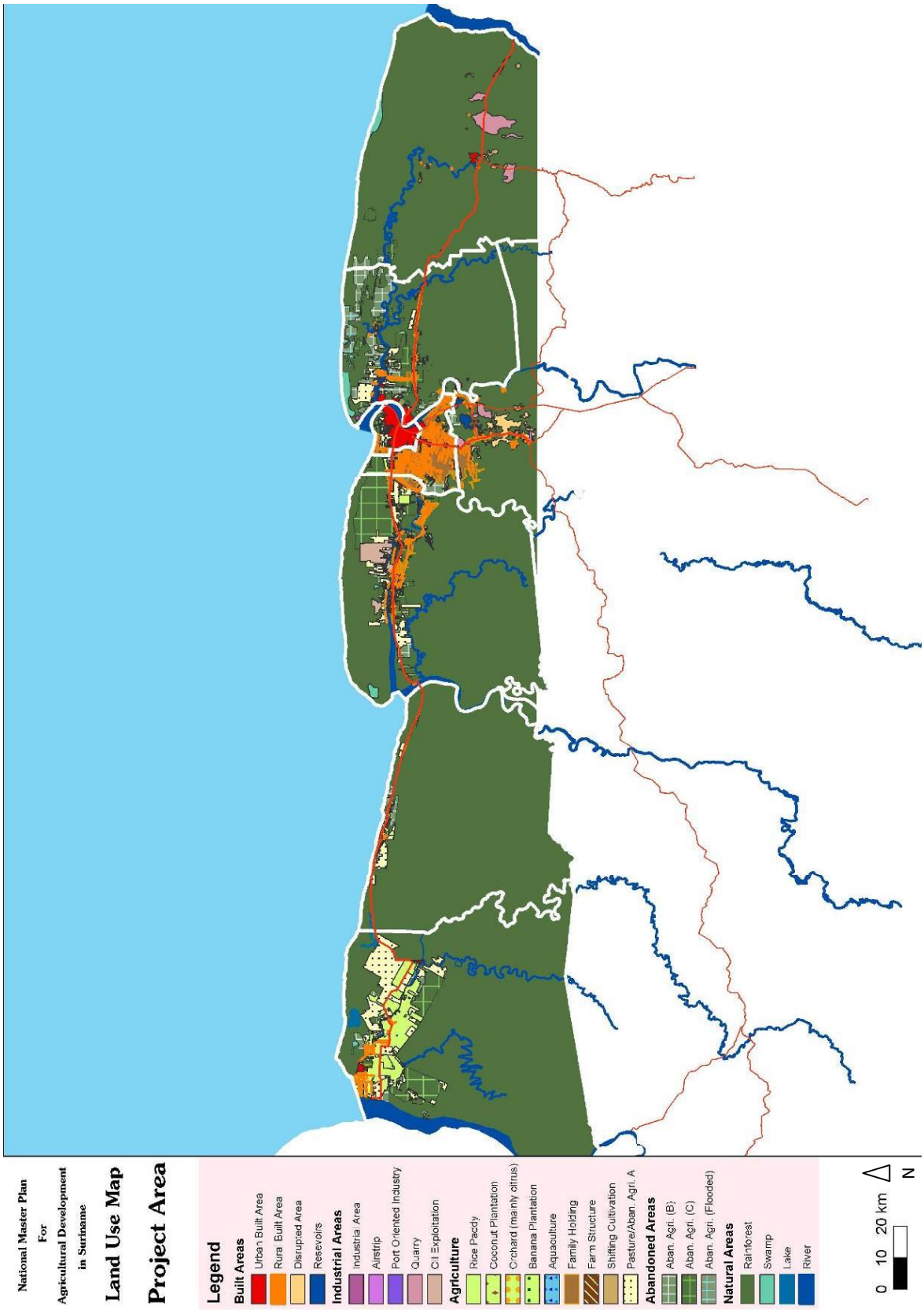


Table 13: Total Areas of Coastal Suriname by Land Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Suriname Coastline (Summary of Project Area)	
Agriculture	Area in ha
Field Crops (mainly rice paddy)	35,005
Banana & Plantain	2,405
Coconut Plantation	1,175
Family Holdings - Standing Cultivation*	8,750
Shifting Cultivation	3,655
Pasture/Abandoned Agri. A**	91,575
Total Agriculture	142,566
Abandoned Areas	Area in ha
Abandoned Agriculture - B	44,255
Abandoned Agriculture - C	83,120
Abandoned Agriculture - Flooded	7,245
Total Aban. Areas	134,620
Built Areas	Area in ha
Rural Built Area	9,415
Urban Built Area	15,125
Industrial Area	685
Port Oriented Industry	75
Oil Exploitation	6,960
Airstrip	350
Farm Structure	120
Disrupted Area	6,640
Resevoirs	2,340
Quarry	11,450
Total Built Areas	53,160
Natural Areas	Area in ha
Rainforest	1,717,555
Swamp	8,605
River	51,680
Lake	3,470
Total Natural Areas	1,781,310
District Total	2,111,656

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are calculated as a part of the Pasture/Abandoned Agriculture - A category, as they are used for the family livestock

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated areas in family holdings. See note above.

12. Description of the Large Land Units

12.1 Nickerie

General Description

The Nickerie District is the westernmost district in the country. The Corantijn River forms its border in the west (this is Suriname's border with Guyana). The eastern border, adjacent to Coronie, passes through swamp lands and does not follow any natural features. The eastern part of the province is completely unpopulated. In the western edge, on the banks of the Nickerie River, close to the main road, lies the city of Nickerie, the capital of the district. Another city is Wageningen, south-east of Nickerie, with a population of 1,937. The remainder of the district's population totals 32,296, living along the internal interconnecting roads in villages such as Waterloo, Paradise, Utrecht and Kupido. Most of the population is employed in agriculture, in the rice paddies and banana plantations. Nickerie is the only district in Suriname in which agriculture constitutes the main source of employment for most of the population.

Agricultural Lands in the Nickerie District

Most of the large farming lands and corporate agriculture are centralized in Nickerie. The main crop is rice, alongside 1,200 hectares of banana farms as well as sheep and goat farms and open pasture for cattle. A substantial part of the rice fields are abandoned for various reasons, both physical and financial, although most of that land is north of the Nickerie River and has been abandoned because of soil salinity problems.

The agricultural lands are concentrated for the most part in a strip close to the southern bank of the Nickerie River, which flows south-east to north-west. The average width of this strip is 7 km, and it is 45 km in length. Most of the area to the south of the Nickerie River is intensively cultivated. To the north of the river are mostly abandoned plots. It is reasonable to suppose that this is a result of their proximity to the sea and the ensuing problem of salinity.

Rice

Rice cultivation in Suriname is privatized. Most of the rice cultivation in the country is in Nickerie, while some is in Coronie and Saramacca. A small amount of upland rice is cultivated in the interior of the country. This is the most important crop for local farmers but the total volume of rice produced is small.

In Nickerie approximately 1,500 small- and medium- and around 50 large-scale farmers cultivate hundreds to thousands of hectares each. The types of farmers in

this sector and the size of the plots are both undergoing a process of change: small-scale farmers are leaving the sector, leading to a decline in the number of farmers cultivating rice and a rise in the average size of the plots used for rice cultivation. Many of these farmers are only engaged in part-time cultivation.

All the rice cultivated on the coastal plain is of the lowland rice variety, irrigated by flooding. The land is flat and the soil heavy clay. The Nickerie River serves as a water source, as does the national water supply system that draws on the swamps and Corantijn River.

At present, 42,000 hectares have been prepared for rice cultivation, all on heavy, flat lands. The area actually planted totals 29,000 hectares in the first cycle and 23,000 in the second cycle. Thus the total annual area devoted to rice cultivation is 50-55,000 hectares.

In Nickerie rice is cultivated mechanically: seeds are sown from the air or by hand. Pesticides are sprayed from the air. The remainder of the cultivation is mechanical and combine harvesters are used. Farmers without such tools rent these services. Despite this, some farmers possess more tools required. Three companies provide pesticide and planting services, with a fourth in the early stages of establishment.

The process of cultivation and preparing the land following the harvest involves burning the stubble, plowing the land with a disc-plough, dry-disc plowing twice, flooding, wet-disc plowing, and smoothing out the surface. The maximum depth of the plowing is not greater than 15ï 20 cm.

The harvest is usually performed wet, which causes significant compression of the soil in addition to creating deep tracks, damaging the leveled ground. The rice crop is 4ï 5 tonnes per hectare per cycle. It is possible to grow two annual cycles, when the rice is harvested during the dry seasons. The rice is harvested at approximately 20% humidity and dried to 14% humidity before processing.

There are 17 factories processing rice in the country and four exporters. The factories and exporters coordinate prices, resulting in a lower price for the farmer and making the cultivation of raw rice not lucrative. Small-scale farmers are therefore gradually abandoning the sector, meaning that rice cultivation is shifting to larger plots. It is estimated that a farmer can profit from a rice paddy of approximately 50 hectares in area.

Banana Plantations

Around five kilometers south of the city of Nickerie, in a flat area, is a large banana plantation of 1,275 hectares in area.

The soil is clay, heavy and has high water retention. The water penetrates slowly and the movement of the water in the soil is also slow, making natural drainage problematic. Planting is done in high beds, two rows to each bed, with a tertiary drainage channel separating between every two beds. The drained water flows through a system of primary and secondary channels to the river.

Irrigation is used only in the dry seasons. The source of the water is the main irrigation channel from which the water is pumped to the system. Water is provided by the government at no cost. The only expenses are those of pumping and the upkeep of the pumping and irrigation systems.

Fertilizers are spread by hand around the trunks of the plants.

All the agricultural labor is performed by hand: day to day work, pruning, care of the banana bunches, marking the bunches, protecting the plants, weeding, irrigation, fertilization and harvest. The bunches picked from the trees by hand are taken to a cable car located between each two plots and from the cable car to the packing plant. Treatments to protect the trees are performed by plane.

The banana yield is 50 tonnes per hectare per year, of which 90% is exported and the rest is for the local market.

Sorting and packing take place in five packing plants within the area of the plantation. The bananas are picked before they are ripe and begin the process while still green. They are then immediately placed into cooling at the end of the packing process.

The number of workers on the plantation reaches 1,300, of which 800 are permanent. The harvest takes place all year round and in accordance there is a cyclical pattern for all the other related work. During the rice harvest there is sometimes a lack of manpower on the plantation since workers temporarily go to work in the rice paddies.

Agricultural Potential in the Nickerie District

As was noted, Nickerie is almost the only area in Suriname in which bananas are cultivated on a large scale, and in which there is agriculture in the framework of collective farms, rather than only family holdings.

This situation clearly affects the local agricultural potential, since it is possible to expand and increase the agricultural activity on the basis of existing resources.

Policy Formulation

Rehabilitation of abandoned rice fields: There are now approximately 30,000 hectares of abandoned rice fields. These lands are deforested from natural woods, have existing infrastructure in the form of leveled ground, incorporated irrigation and

drainage, and also have trained manpower nearby. The problems which caused these farms to be abandoned can be divided into several types:

A. **Financial and credit problems** – farmers' losses over the years that have reached substantial debts, subjugation of the land and eventually its abandonment.
B. **Salification problems** – mainly in the lots along the north Nickerie river bank. As a result of sea-water infiltrating upstream, water irrigation sources suffer from salification, mainly in the dry seasons, causing the lots to be abandoned.
C. **Agro-technical problems** – defective irrigation and drainage canals, defective pumps, defective leveling and lack of roads.

Recommendations

A. Establishing a platform for negotiation with the banks in order to sort out problems of debt and credit. Identification of systems and methods to overcome the ongoing crises in a way that enables the farmers to return to cultivation, and, at least, partial protection of bank finances.
B. A national project for treatment of the sea-water infiltration into the Nickerie river by washing it back to sea. Solving this problem will immediately release about 1,500 abandoned hectares in the northern river shore.

Offering specific and localized solutions for improving the existing systems, including road networks, irrigation, drainage canals, pumps, etc. The solution offered will address specific territories, define the local problems and offer solutions. For example, in the context of this Master Plan there is a specific proposal for a project in the "autonomous" region south of Wageningen.

Figure 14: Land-Use Map of Nickerie (Produced by Kaplan Planners, Ltd.)

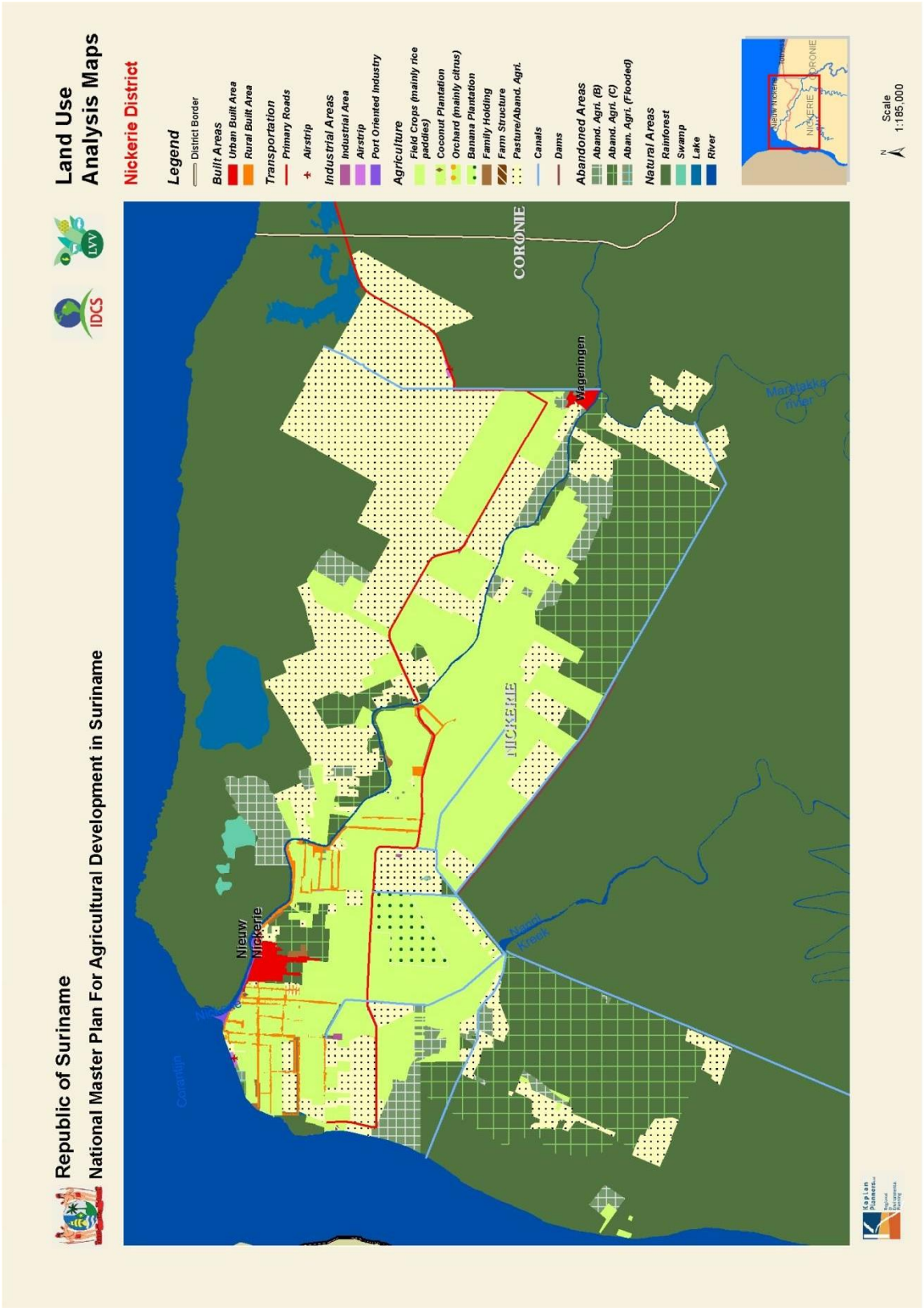


Table 14: Areas of Nickerie by Land Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Nickerie	
Agriculture	Area in ha
Field Crops (mainly rice paddy)	31,310
Banana & Plantain	1,290
Coconut Plantation	60
Family Holdings - Standing Cultivation*	390
Pasture/Abandoned Agri. A**	29,200
Total Agriculture	62,250
Abandoned Areas	Area in ha
Abandoned Agriculture - B	5,280
Abandoned Agriculture - C	21,295
Abandoned Agriculture - Flooded	45
Total Aban. Areas	26,620
Built Areas	Area in ha
Rural Built Area	1,075
Urban Built Area	660
Industrial Area	30
Port Oriented Industry	70
Airstrip	35
Farm Structure	10
Total Built Areas	1,880
Natural Areas	Area in ha
Rainforest	397,840
Swamp	405
River	29,730
Lake	2,955
Total Natural Areas	430,930
District Total	521,680

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are calculated as a part of the Pasture/Abandoned Agriculture - A category, as they are used for the family livestock

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated areas in family holdings. See note above.

12.2 Coronie

General Description

The Coronie District has a clear eastern border ï the Coppename River, 103 kilometers in length up to the border with the Nickerie District. The main road in Coronie is close to the coast, 0.5-2.5 km away from the water, and is the only one passing through the district. Coronie is largely unpopulated, and the one relatively large concentration of residents is in the area around the district capital, Totness. This is almost the only population center in the entire district.

Close to the border with Saramacca is an additional, small population center. The proximity of the main road and the village to the coast necessitated the construction of a dam as a defense against flooding. In addition, the swamps to the south constitute a threat to agricultural lands and therefore to the north of them a dam has been constructed to protect the agricultural plots.

Agricultural lands in the Coronie District

In Coronie there used to be two main crops – coconut plantations on the sand strips, close to the Totness, and rice fields in the south, in addition to wide-scale rice fields north of the swamp territories. To date, the coconut plantations and rice fields are abandoned, with the exclusion of a few lots. The reasons for abandonment are mostly financial.

The agricultural lands are concentrated around the Totness, in one large bloc, totaling 1,540 hectares and including a variety of plots. This concentration is bordered on the south by a dam to prevent flooding from the swamps.

Group A

This group of paddies is distinguishable by its secondary division into horizontal units East-West, as follows:

1. West of Totness: An elongated unit north of the main road including a range of agricultural uses: family holdings, abandoned and flooded plots, in addition to plantations of coconut trees scattered among natural vegetation that is currently in a process of renewal.
2. East of Totness: The series of homes becomes sparser and north of the road are abandoned and flooded agricultural lands.
3. A series of coconut plantations, south of the main road, on both sides of Totness on a south-east axis: the area totals approximately 1,115 hectares. The coconut plantations are interspersed with natural forests and other fruit trees.

4. To the south of this series are two large concentrations of rice paddies. Most of them are abandoned. To the south is a long dam protecting them from the flooding that originates in the swamps to the south. To the north-east of the series of coconut plantations is another concentration of abandoned rice paddies, also protected in the south by a dam.

Group B

In the east of the Coronie District, along the main road, is a series of isolated houses. Next to these are scattered agricultural lands, all of which are abandoned. In the eastern part a large prominent water reservoir is located in the former shell quarries.

Agricultural Potential in the Coronie District

The agricultural potential of Coronie relies on the large abandoned rice paddies and the coconut trees. The restoration of the dam, organization of an irrigation system and construction of sea defenses are the basic actions required for rehabilitation.

Proximity to the extensive rice paddies in Nickerie, in addition to the mechanical tools found in that district for harvesting purposes, will no doubt aid efforts at rehabilitation, since it will be possible to rely on the logistic network of Nickerie.

Policy Formulation

1. Establishing a platform for negotiation with the banks in order to sort out problems of debt and credit. Identification of systems and ways to overcome the ongoing crises in a way that enables the farmers to return to cultivation, and, at least, partial protection of bank finances.
2. Examining coconut plantation rehabilitation options and building a factory for processing coconut products.
3. Agro-tourism integration – in Coronie initiatives for the development of agricultural tourism have begun. There exist good conditions in the district for combining agriculture with nature values.
4. There is a flooding problem that originates in the southern swamp, therefore strengthening the bridge is necessary in order to protect against floods.

Recommended Project

Rehabilitation and Expansion of Coconut Orchards

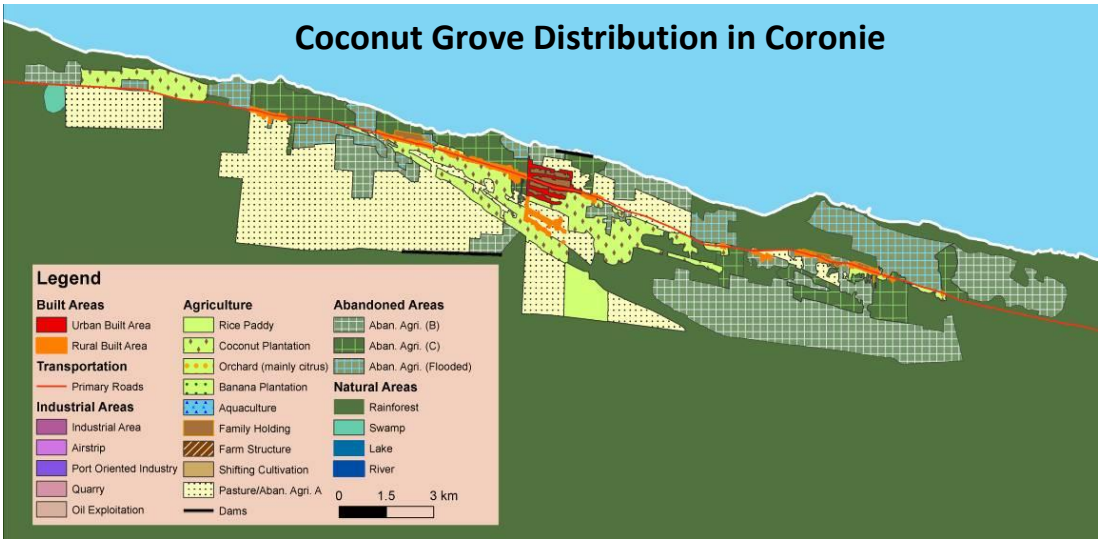
There are approximately 1,115 hectares of coconut plantation in Suriname, much of which has been abandoned. Among the challenges to continuing cultivation are the extreme height of older trees which makes harvesting difficult, a lack of labor, and a lack of processing facilities. Large investments would be required to bring production to a profitable level. There are also family farmers who grow coconuts on small plots, but any processing performed on this fruit is done in small local factories, with rudimentary equipment.

Coconut is one of many crops which have recently attracted greater consumer attention in the United States, Canada, Western Europe, China and Australia, as having many health benefits when used for food and for cosmetics. In addition to coconut milk, cream, and coconut meat which are better known in food preparation, many additional products processed from coconut have become fashionable. Coconut water in particular is marketed widely worldwide as a

healthy alternative to sports drinks, while coconut flour (made from the dried meat of the fruit) is used as a gluten-free flour substitute and coconut oil is increasingly popular for skin and hair care. In areas local to coconut cultivation, there has also been an increase over the past couple of decades in use of coconut oil for vehicle fuel in combination with or instead of diesel, as well as for electricity production.

The logical beginning for rehabilitation and expansion of coconut cultivation would be in Coronie, where existing orchards may be improved and abandoned ones replanted. In this context, attention must be given to the problem of the ocean's advance and penetration along Coronie's coast and its expected impact on the coconut plantations.

Figure 15: The map below illustrates the distribution of coconut groves across Coronie, marked in yellow-green with brown dots.



Furthermore, there are plans and initiatives in Coronie to develop eco-tourism projects, taking advantage of the district's varied natural environment, which includes swamps, beaches, nature reserves, birdwatching spots, and historical sites. Such ventures may be successfully integrated with the renewal of the coconut orchards, which are attractive and impressive, providing a special

atmosphere and landscape. Coconut can thus also contribute to making agricultural tourism an important layer in the local tourism network.

The benefits of cultivating coconut are clear, as it is a product with large demand and Suriname is among the limited locations appropriate for its growth. As such it has the potential to provide significant employment, as well as an opportunity to enhance the local industry's equipment, perhaps through collaboration with a cosmetics company that has a place in the world market. A note of caution, however: Seen as especially desirable, many items derived from coconut sell for very large profit margins, and it is important for farmers and others involved in early-stage processing to be aware of the market prices so as to receive fair compensation for production and export.

Figure 16: Land-Use Map of Coronie (Produced by Kaplan Planners, Ltd.)

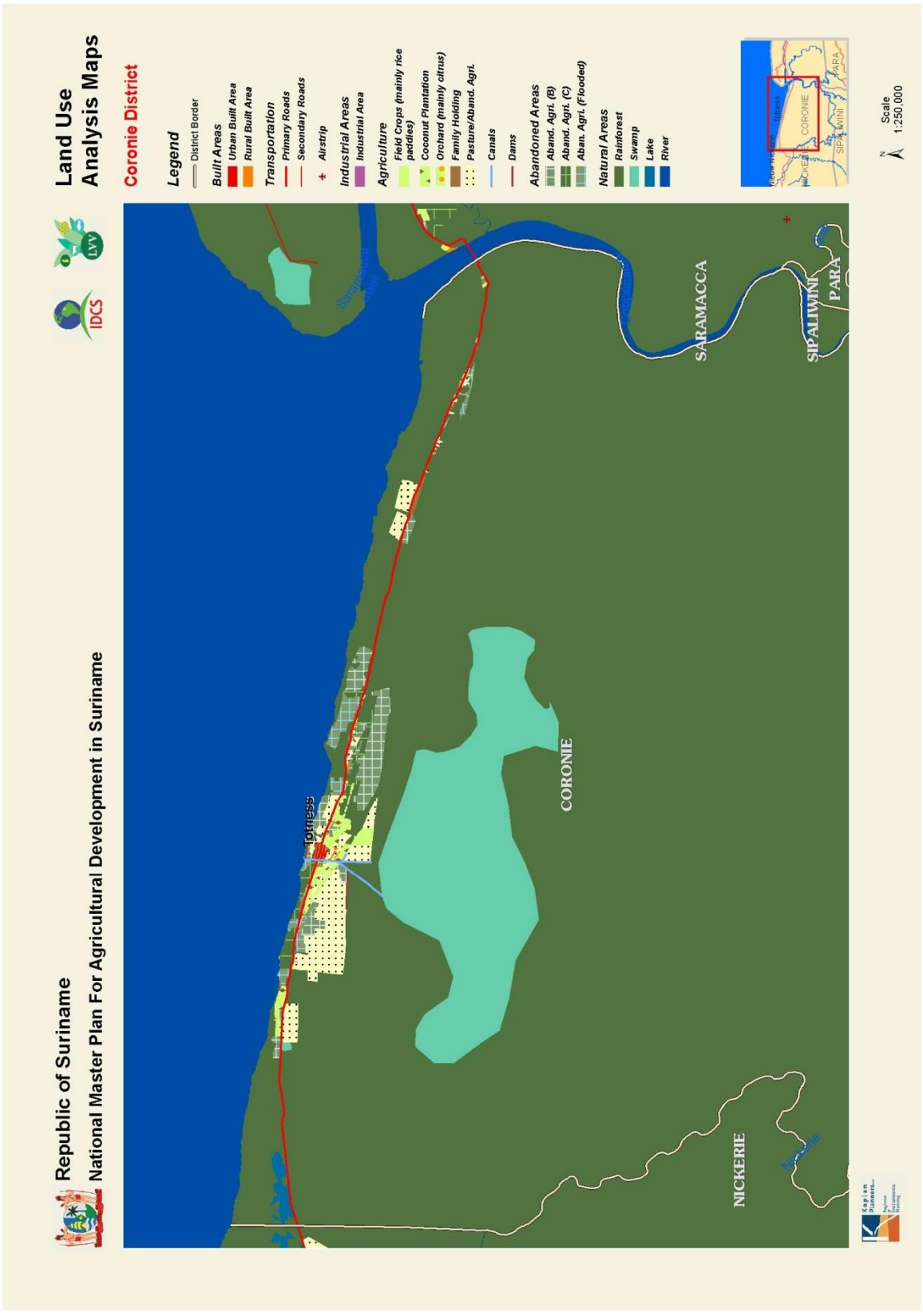


Table 15: Areas of Coronie by Land Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Coronie	
Agriculture	Area in ha
Field Crops (mainly rice paddy)	220
Coconut Plantation	1,115
Family Holdings - Standing Cultivation*	40
Pasture/Abandoned Agri. A**	4,315
Total Agriculture	5,690
Abandoned Areas	Area in ha
Abandoned Agriculture - B	2,880
Abandoned Agriculture - C	1,130
Abandoned Agriculture - Flooded	1,150
Total Aban. Areas	5,160
Built Areas	Area in ha
Rural Built Area	195
Urban Built Area	90
Industrial Area	10
Total Built Areas	295
Natural Areas	Area in ha
Rainforest	362,140
Swamp	55
Lake	515
Total Natural Areas	362,710
District Total	373,855

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are calculated as a part of the Pasture/Abandoned Agriculture - A category, as they are used for the family livestock

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated areas in family holdings. See note above.

The view along a lake adjacent to the coconut plantation in Coronie.

12.3 Saramacca

General Description

The Saramacca District is bordered by the Wanica district in the east (an imaginary line continues the route of the Saramacca River after it bends to the west), the sea from the north and the Coppename River on the west.

Agriculture in Saramacca is varied in character and includes different types of farms: small family holdings, collective farms, pasture and large family holdings, depending on road and housing distribution.

The Road Network in Saramacca

The Saramacca District contains a number of East-West and North-South roads. The East-West Roads are:

1. The Northern road, which branches off from the main highway before it crosses of the Saramacca River. It continues adjacent to the northern bank of the river for about 20 km until it reaches a dead end.
2. The main highway from Wanica, crossing the Saramacca River and continuing south of it, which later also crosses over the Coppename River.
3. The road south of the main highway from the city of Groningen, the district's capital, 15 km in length.

In addition to these are two prominent North-South roads:

4. A road that branches off from the main North-South Highway, close to the border with the Wanica District.
5. The continuation of this road, close to the Saramacca River at its bend to the north.

Agricultural Lands in the Saramacca District

As was noted, almost all of the agriculture in the district is to be found along the roads and is described here accordingly:

1. The Northern road, parallel and adjacent to the Saramacca River, ending in a dead end. Along its entire length are to be found a few, isolated houses, but most of the road is not populated.
2. A strip of approximately 100ï 300m separates the road from the river and most of it is abandoned agricultural land. The main concentration of agricultural plots is to be found north of the road, in the form of long lengthwise plots, stretching over a distance of 4ï 6 km northwards. These plots take up a total area of thousands of hectares and even reach into the oil concessions north of the road. The area north of the road offers significant agricultural potential, despite

its small population. The abandoned plots are very large, clear of natural forest and close to existing infrastructure.

3. Along the eastern section of the main highway, up to its meeting pointing with the Saramacca River, mainly on the southern side of the road, lies a series of long plots, 1.5 km in length and a few hundred meters in width. Their area is 10ï 30 hectares.
4. The continuation of the main highway, between the Saramacca and Coppename Rivers, is characterized by family holdings along various sections of the road. South of the river, along a stretch of around 7 km, are located large water pools. The western part of the road is not populated and along it are to be found large plots, mostly abandoned. There are a number of roads south of river, running parallel to it, along which are family holdings.
5. The southern road is of great agricultural importance. On both sides of it are extensive agricultural lands, some of them actively cultivated today.
6. A number of secondary roads run parallel to the southern road, part of a larger, interconnected road network. Extensive expanses of lands are "trapped" within this network, and these are in the form of family holdings.

This pattern is to a certain extent similar to that of the family holdings in the Wanica District. Indeed, most of Suriname's family holdings are concentrated in these parts of Saramacca and Wanica.

The western part of Saramacca, close to the Coppename River, is almost completely unpopulated. The agricultural pattern varies ï from family holdings to large plots, mostly alongside the main road, but there is no cultivation at present.

Prominent Agricultural Areas

In Saramacca there exists great agricultural variety: family-run agriculture, banana plantations and wide-scale privately owned territories.

A large part of the agricultural lands in Saramacca are abandoned. By our estimation there are approximately 70,000 hectares of "Abandoned A" (deforested) lands. The assumption is that at least a part of this area is used for pasture.

The most prominent large agricultural areas are to be found along the eastern border of Saramacca, adjacent to Wanica:

1. Banana plantations. One of 939 hectares in area, the other 170 hectares.
2. Uitkijk. A large agricultural area, 1,473 hectares in size, east of the main North-South Highway. This area contains a mosaic of dozens of agricultural plots, mostly uniform in size: 6.7 hectares. Around 20% are cultivated. These cannot

be described as family holdings since they are not owned by the nearby residents.

Similarly, there is a large plot of 2,685 hectares in area between the banana plantations and the main road. Part of it is abandoned, but has not been covered by forest.

Pasture Lands in Saramacca

The largest area of pasture in Saramacca is located 10km south of Groningen.

Within this area are a number of natural pasture farms with delineated and well cared for lands, feeding cattle of the Zebu variety. One of the farms (Vamam) raises water buffalo, in a clearly swampy area. Adjacent to the farm are scattered cultivated lands which grow various crops, including cassava, watermelon and vegetables.

The lands of the farm are characterized by sandy ridges and between these ridges are areas of clay soils. South of the farm are extensive swamps. The farm is prone to seasonal flooding during the rainy season from nearby swamps.

The Vanam farm includes a cowshed with 60 dairy cows. Milk production is approximately 10 liters per cow each day. The milk is transported daily to a central dairy farm in Wanica. According to the farmers' reports, the cows graze in natural pasture with no food supplements. There are no veterinary services.

Agricultural Potential in the Saramacca District

The Saramacca District offers potential for agricultural development on a number of plains:

3. Extensive abandoned lands, without forest cover, and thus not requiring financial investment to prepare the land for cultivation. These lands amount to a total area of 11,738 hectares, divided into 198 units throughout Saramacca.

   The ready availability of these plots presents potential for agricultural development on a large scale, using modern technology, with wide ranging distribution and close to both existing infrastructure and water sources.

4. Family holdings. A significant percentage of the lands in the Saramacca District are in the form of family holdings which are cultivated on a part-time basis. The establishment of guidance and aid centers for farmers will increase the efficiency of these holdings and their outputs.

Moreover, adjacent to the family holdings are extensive abandoned plots, most of which have been cleared. This presents us with the following situation: Active farmers, who cultivate large areas intensively, continuously and professionally (at times areas of dozens of hectares), could increase the size of their cultivated lands if suitable plots

can be found. It is necessary to determine ways to allow the most exceptional local farmers to access these large areas of land, and to direct them to expand towards increasing agricultural potential. This will enable the establishment of large farms using modern technology and drawing manpower from among the local agricultural population.

Policy Formulation

1. In Saramacca there are many farmers with high professional abilities who are cultivating large areas. These farmers have limited access to credit, and cannot develop and broaden their activities. Just as in Nickerie, a platform must be established for negotiation with the banks, as well as Identification of systems and methods to overcome ongoing crises. The proposal to establish guidance and logistical centers is also appropriate to conditions in Saramacca, to provide further resources to promising farmers with limited means.
2. In Saramacca extensive sandy territories were located during the mapping process. In these territories lies great potential for building new plantations that require proper irrigation, such as citrus. Additionally, vegetable crops that require proper drainage may be directed to these areas.
3. In the past, rice was a main agricultural product of Saramacca. Today these territories are abandoned, but great potential lies in the rehabilitation and reestablishment of rice cultivation.

Figure 17: Land-Use Map of Saramacca (Produced by Kaplan Planners, Ltd.)

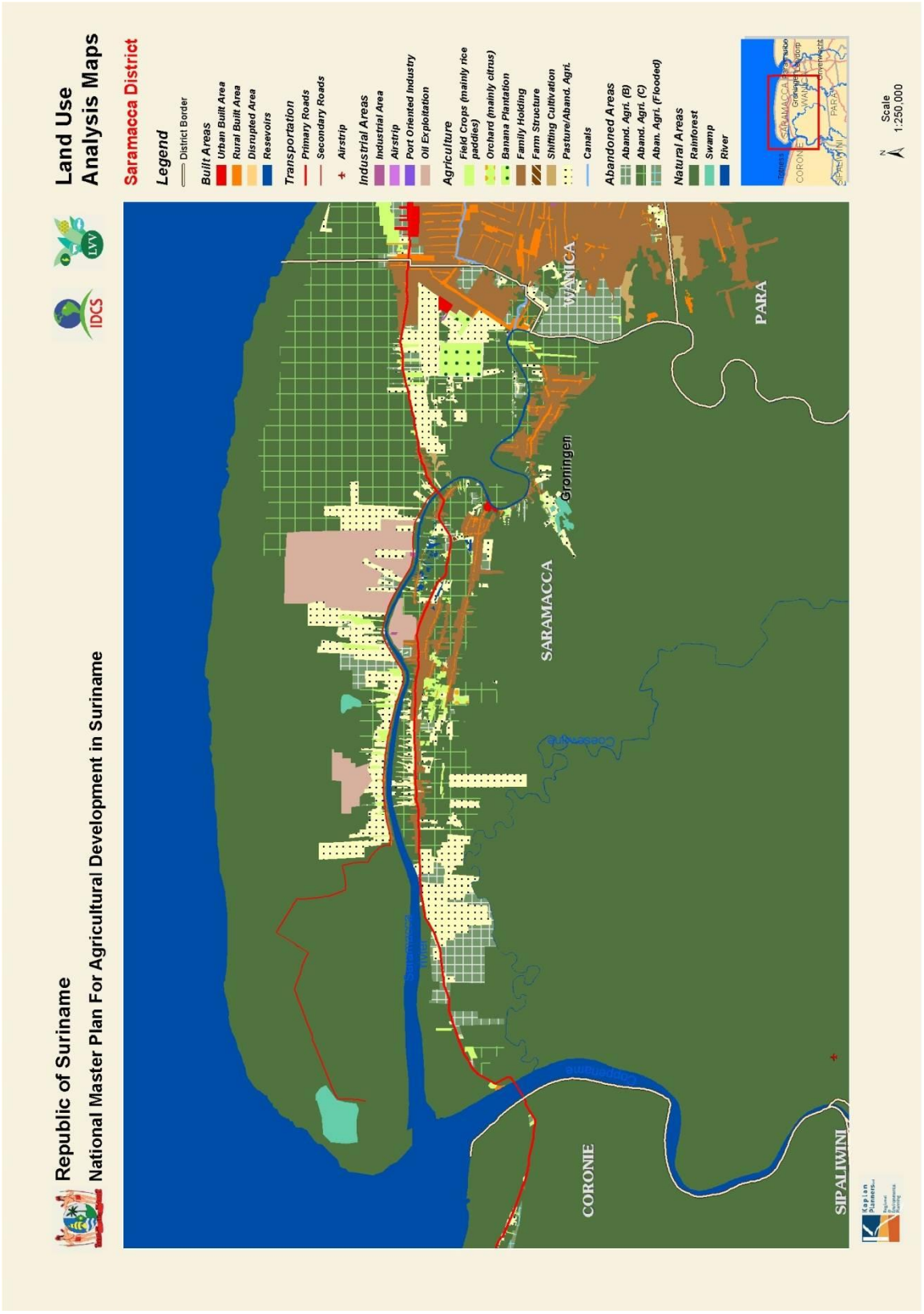


Table 16: Areas of Saramacca by Land Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Saramaaca	
Agriculture	Area in ha
Field Crops (mainly rice paddy)	1,680
Banana & Plantain	1,115
Family Holdings - Standing Cultivation*	2,320
Shifting Cultivation	75
Pasture/Abandoned Agri. A**	20,125
Total Agriculture	25,315
Abandoned Areas	Area in ha
Abandoned Agriculture - B	4,740
Abandoned Agriculture - C	38,155
Abandoned Agriculture - Flooded	10
Total Aban. Areas	42,905
Built Areas	Area in ha
Rural Built Area	1,380
Urban Built Area	145
Industrial Area	65
Oil Exploitation	6,960
Farm Structure	50
Resevoirs	175
Total Built Areas	8,775
Natural Areas	Area in ha
Rainforest	296,790
Swamp	1,450
River	9,675
Total Natural Areas	307,915
District Total	384,910

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are calculated as a part of the Pasture/Abandoned Agriculture - A category, as they are used for the family livestock

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated areas in family holdings. See note above.

12.4 Wanica

General Description

The Wanica District surrounds the Paramaribo District on the west and south. This district has a clearly suburban-agricultural character (apart from the urban nature of the main highway running south from Paramaribo, on which lies Wanica's capital city, Lelydorp). Almost the entire district is crossed by a network of roads running east-west and north-south, with rural homes on both sides. Adjacent to most of these houses are agricultural plots.

Agricultural Lands in the Wanica District

The district's web-like network of roads encloses plots owned by the residents living along the edges of these roads. This pattern acts as a basis for the existence of family holdings, which account for most of the district's area.

The extent of the agricultural land within this pattern of family holdings is not consistent, but ranges from 10% to 40%. Apart from this, additional significant areas of the district are not developed:

1. In the north, abandoned agricultural plots are to be found alongside natural areas. Likewise the lands here exhibit signs of development and urban expansion encroaching northwards.

2. In the east, between the developed area and the Suriname River. Homes with adjacent family holdings have developed next to the river, in addition to natural and abandoned areas.

3. To the west and south, on the border with the Saramacca District are large areas of abandoned lands, reaching the distrct border ï the Saramacca River ï in addition to the natural areas that border the district on the south.

As was noted, most of the agricultural lands in Wanica are in the form of family holdings. At the same time, there are a number of natural pasture farms around dairies. These dairies are of significant agricultural-economic value to the country.

Agricultural Potential in the Wanica District

Wanica contains the main potential lands for the expansion of Paramaribo. This expansion is already noticeable along the two main highways: the main road westwards towards Saramacca and the road running south to Lelydorp. Along these roads fast urban development has begun, and it is to be presumed that these lands and those bordering them offer relatively little potential for agriculture, since it will be impossible to compete with their high real estate value.

Those lands with agricultural potential in the Wanica District are to be found between the local roads, in the form of the family holdings located along them.

In fact, this constitutes the main agricultural potential of the district, since the Wanica District does not offer plots suitable for other types of agriculture.

Therefore, to develop agriculture in this district, efforts must focus on the streamlining and specialization of family holdings. This line of development is dependent on policy formation to create programs for family holdings.

An additional line of development may be dairy farms. Modernization of existing dairy farms, through mechanization and improved efficiency, may provide for a significant proportion of the milk consumption in Suriname, and it may even be possible to develop an industry of dairy products.

It should be noted that most of the lands in Wanica are sandy in texture and thus advantageous for specific crops, in contrast to the clay soils dominant along most of the coastal plain.

Today, Wanica constitutes a Paramaribo suburb. There is great demand for residential space in the district and there is recognizable unsupervised expansion of construction towards the natural and agricultural area.

In Wanica there is also a long-standing farming tradition, however, and almost every territory in the district was cultivated. Land is commonly divided into small farming plots, in the possession of families who partially cultivate them. Family-run agriculture is very common in Wanica and large farms are scarcely found.

Policy Formulation

The proximity and good accessibility to Paramaribo provides Wanica with the opportunity of supplying fresh produce to the city, as well as to the docks at the entrance of the Suriname River and to the nearby airport that is within short driving distance, for export.

In Wanica, like in Saramacca, trained and professional farmers can be found, the main problem is lack of updated knowledge, marketing and appropriate modern technologies. The main recommendation will be similar to the one in Saramacca.

Additionally, attention must be given to the small dairy farms in Wanica that are working in a scattered and inefficient manner. The establishment of a central dairy farm and a central milk production plant, using advanced technology, will make a

substantial change in the field. The use of sophisticated methods will bring a reduction in the required area and large plots could thus be redirected to building family vegetable farms, in open fields and greenhouses.

It should be noted that like in Saramacca, Wanica also has sandy soil with good drainage. This fact is significant to the ability to incorporate new crops that require superior drainage and cultivation conditions which are not limited by heavy soil.

Recommended Projects

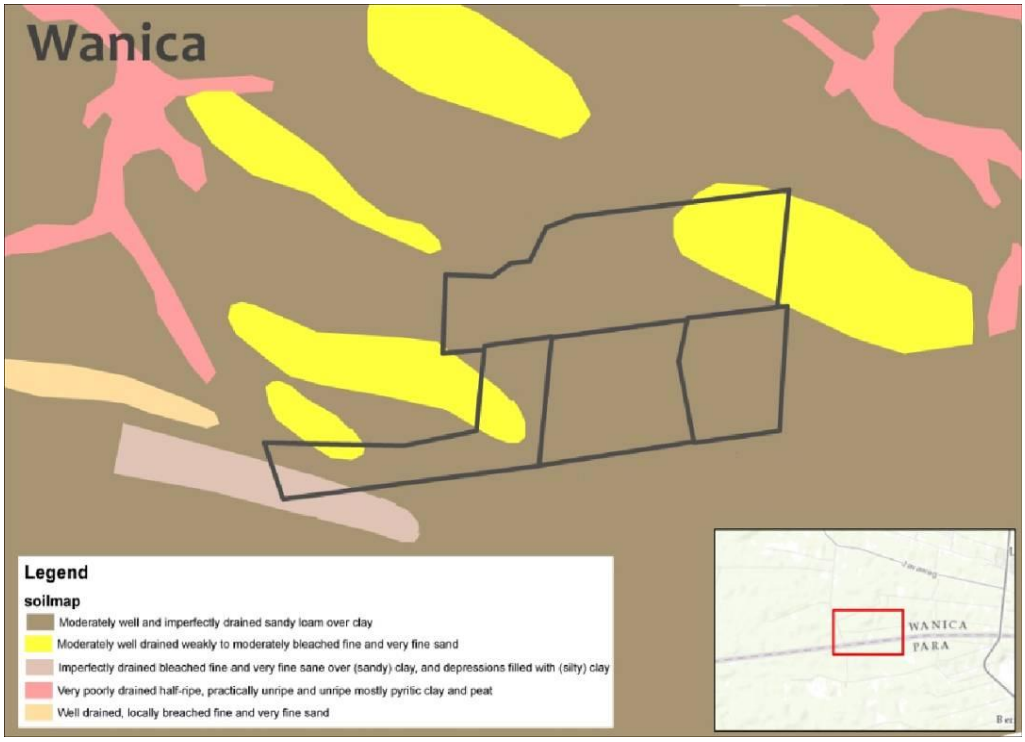
Model Vegetable Farm

The proposal of a Suriname Farmers' Fresh cooperative proposed in Chapter 6.4 provides a prototype for open-field and covered-crop vegetables. The proposal includes, among the services SFF will provide for its member farmer, a small model farm in Wanica.

The model farm will be composed of eight hectares and include an open field and a covered-crop area that simultaneously produce six different crops. The model's construction is such that it will be able to deliver several tons of vegetables every week to the local market and to export. Its modular nature will allow it to be reproduced and adapted to other areas as appropriate, accommodating different crop types by changing its operational assumptions. The plan is to create other farms based on this model according to the accomplishment of the cooperative's objectives.

The land examined for the project is appropriate for the cultivation of most types of vegetables in demand in CARICOM countries, to substitute for imports from the United States or other sources. Even so, specific soil tests must be performed. In clay soil it is possible to grow most vegetables but the more sensitive ones – tomato, pepper, melon – must be covered or grown only in the dry season, and then there is a concern about continuity of the product required in the market. As part of preparing the farm, it is necessary to set up a drainage system before planting any crops.

Figure 18: Model Farm Suggested Location



Open-Field Vegetables:

- This model is planned to accommodate three different open-field crops: Gallia Melon, Seedless Watermelon and Butternut Squash.
- The crops are divided by blocks and they sum a total of 6.1 Ha. The blocks are used to produce one of the three crops during a cycle.
- There is a rotation between the blocks after the harvest period, to provide continuity.
- The eight-hectare farm is larger than the planted area at any given time, since the cycles do not have the same duration and the land should rest after a sequence of cycles.

Covered-Crop Vegetables:

- The covered crops are planned to accommodate three different vegetables: Cherry Tomatoes, Capsicum and Zucchini.
- The crops are divided by blocks and they sum a total of 0.6 Ha. The blocks are used to produce one of the three crops during a cycle.
- There are 0.2 Ha extra for the sake of land rest.
- Covered crops are considerably more intensive than open-field crops.

Figure 19: Land-Use Map of Wanica (Produced by Kaplan Planners, Ltd.)

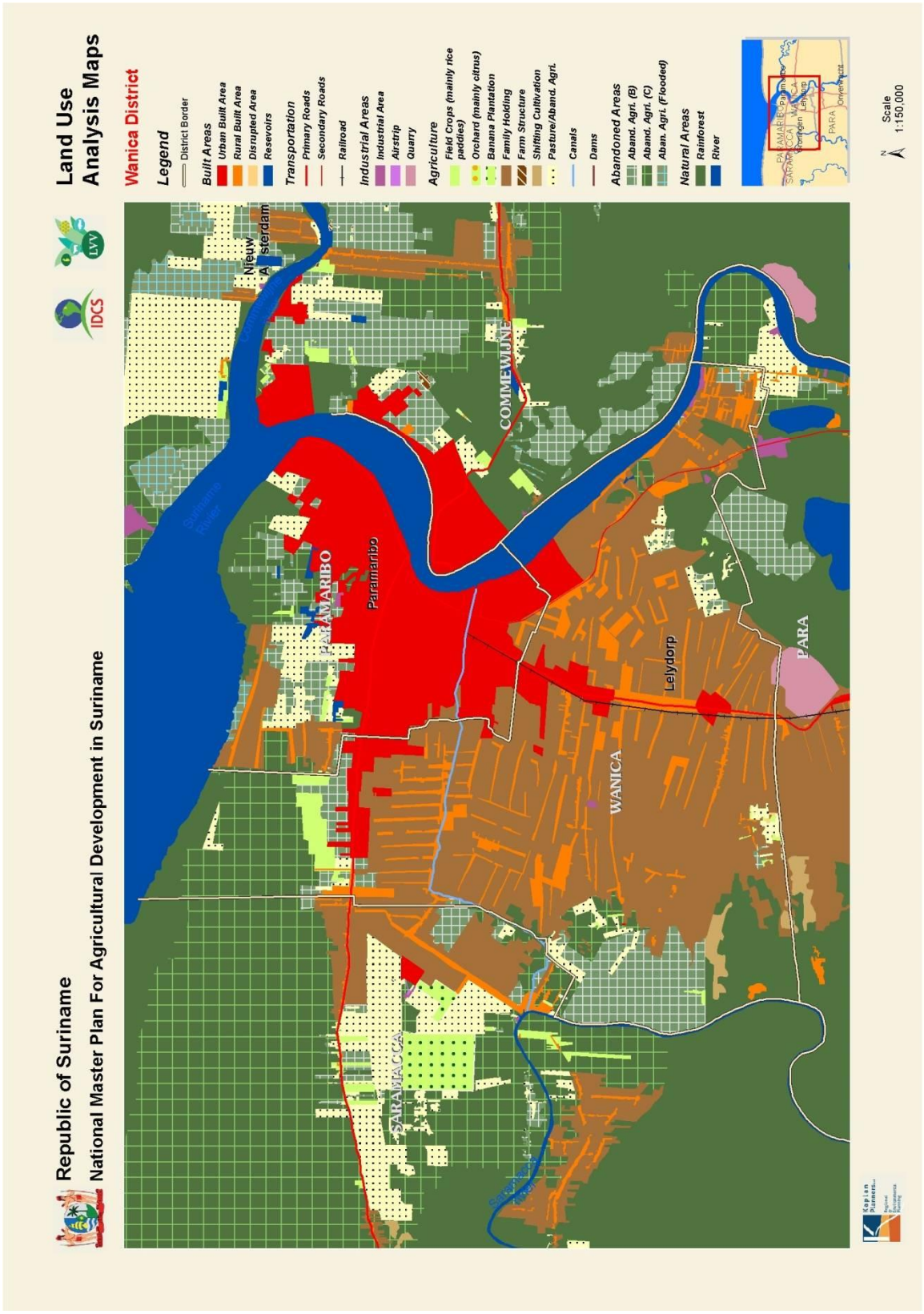


Table 17: Areas of Wanica by Land Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Wanica	
Agriculture	Area in ha
Field Crops (mainly rice paddy)	590
Family Holdings - Standing Cultivation*	4,140
Shifting Cultivation	300
Pasture/Abandoned Agri. A**	20,180
Total Agriculture	25,210
Abandoned Areas	Area in ha
Abandoned Agriculture - B	3,625
Abandoned Agriculture - C	3,660
Total Aban. Areas	7,285
Built Areas	Area in ha
Rural Built Area	4,310
Urban Built Area	2,185
Industrial Area	85
Quarry	40
Total Built Areas	6,620
Natural Areas	Area in ha
Rainforest	4,250
River	1,425
Total Natural Areas	5,675
District Total	44,790

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated

12.5 Paramaribo

General Description

The Paramaribo District is for the most part urban. The developed neighborhoods of the capital city Paramaribo account for most of the district's area. The developed lands of urban fabric even stretch outside the borders of the district, into the Wanica District and across the Suriname River into the Commewijne District. Other parts are suburban or rural, with plots of family holding. The area of the Paramaribo District is 17,686 hectares and its population numbers 240,924.

Agricultural Lands in the Paramaribo District

A strip of four-five kilometers in width separates the coast and the northern neighborhoods of urban Paramaribo. Building and infrastructural work in preparation for the city's expansion northwards are evident here. In the eastern part of the district cultivated and abandoned agricultural lands are still to be found, in the form of family holdings and a few continuous strips of cultivated plots.

The rise of the sea level is evident in the district, and cultivated plots are flooded. It is presumed that those cultivated plots close to the coast are in the process of becoming flooded and the resulting rise in the soil's salinity makes their agricultural value relatively low.

Agricultural Potential in the Paramaribo District

The Paramaribo District is mostly urban. Despite the fact that there are still open lands in the district, some agriculturally active, cultivation here is relatively negligible. The reasons for this are:

1. The expansion of the city at the expense of agricultural lands.
2. Proximity to the sea, the danger of flooding and the salinity of the soils in the northern part of the district.

In Paramaribo, agriculture-related efforts need to be focused on creating logistical bases, central markets, and export points at the city's major port as well as businesses selling agricultural equipment, materials and technology. In addition guidance and aid services for farmers throughout the national level should be based in the capital.

Figure 20: Land-Use Map of Paramaribo (Produced by Kaplan Planners, Ltd.)

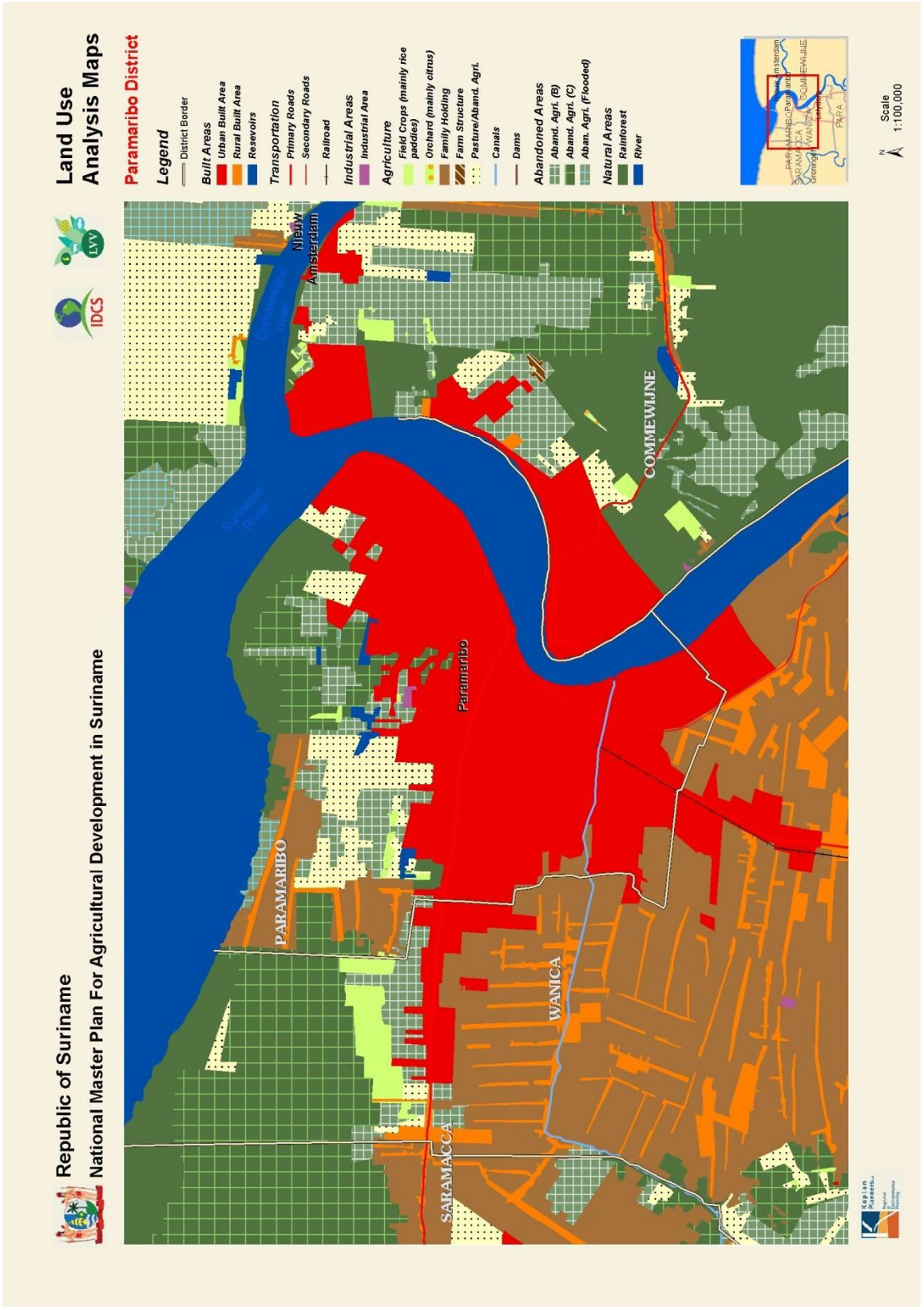


Table 18: Areas of Paramaribo by Land Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Paramaribo	
Agriculture	Area in ha
Field Crops (mainly rice paddy)	95
Family Holdings - Standing Cultivation*	250
Pasture/Abandoned Agri. A**	2,580
Total Agriculture	2,925
Abandoned Areas	Area in ha
Abandoned Agriculture - B	1,180
Abandoned Agriculture - C	1,370
Abandoned Agriculture - Flooded	130
Total Aban. Areas	2,680
Built Areas	Area in ha
Rural Built Area	290
Urban Built Area	8,540
Industrial Area	20
Resevoirs	135
Total Built Areas	8,985
Natural Areas	Area in ha
Rainforest	995
River	2,225
Total Natural Areas	3,220
District Total	17,810

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are calculated as a part of the Pasture/Abandoned Agriculture - A category, as they are used for the family livestock

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated areas in family holdings. See note above.

12.6 Brokopondo

General Description

The Brokopondo district is, in fact, a part of the Interior, and is located south of the coastal plain. However, it can be viewed as a link between the Interior and the outer plains. Brokopondo's location holds advantages: close accessibility to Paramaribo and the airport via two national roads that go south of Paramaribo into the district; good natural conditions for developing varied agriculture branches; and climate advantages.

The Brokopondo District is outside the borders of the coastal plain in the direction of the strip of Savanna. Limited parts of the district, for the most part along the route of the Suriname River, are included in the national master plan for agricultural development in Suriname.

The district is distinguished from the coastal plain by several factors:

1. The character of the land: In opposition to the flat land and clay soil of the coastal plain, it is characterized by sandy, gently undulating lands: savanna.
2. Population patterns: The villages in the district are similar to those of the interior rather than the coastal plain ï small isolated villages along the banks of the river and not major roads.
3. Most of the agriculture is shifting cultivation, whilst in the coastal plain agriculture is principally of a permanent nature.

Agricultural Lands in the Brokopondo District

As was noted, the agricultural lands in the district are worked according to shifting cultivation. The main concentrations of lands are to be found around small villages on the banks of the Suriname River: Victoria, Berg en Dal, Klaaskreek, Phedra, Babunhol, Afobaka and others. Each village numbers 30ï 100 homes and around these are small delineated plots.

Likewise, concentrations of rural homes are to be found on the sides of the major roads, together with limited cultivated plots.

The soil is sandy, with some bleached sand and low natural fertility. A short time after deforestation and agricultural cultivation these lands are completely bleached and lose their fertility and agricultural value. They are then abandoned and the farmer moves on to prepare new agricultural land.

Agricultural Potential in the Brokopondo District

Despite the fact that the district has relatively little agricultural land and activity it does possess significant potential for agricultural development.

The main focus of potential lies in the abandoned farms along the Suriname River: Victoria, Phedra, Babunhol. The advantages for agricultural renewal of these farms are:

1. Existing infrastructure for agriculture including nearby water sources, lands cleared of natural forest, delineation of plots, initial preparation of the land and more.
2. The plots are owned by the government and thus efforts can be concentrated and focused on a particular area without any limitations, issues of ownership or problems of lease agreements.
3. The farms are located in populated and accessible areas, with good roads leading to them and small villages nearby or adjacent that can provide potential sources of labor.

Policy Formulation

Brokopondo district has a substantial concentration of government farms. These farms have an advantage with regards to development of agricultural projects, since they are more readily available, without complications from problems of ownership and rights to land. Development of these farms could also supply a solution for the employment problems in the area, and help involve the local population in agricultural projects, while introducing advanced methods and technologies.

This Plan points to four government farms in Brokopondo, for which development plans are proposed:

- Phedra
- Victoria
- Babunhol
- Marshall Creek

These farms will become developmental centers which will supply varied agricultural products on the national level, as well as centers for demonstration and guidance of advanced agricultural techniques. A focus on employment solutions and economic improvements for local residents of Brokopondo, who are in effect residents of the Interior despite the area's intermediate geographic position, has great implications for the future of the Interior overall. Success in development of these government farms can lead the way towards employment solutions for many other Interior residents.

12.7 Commewijne

General Description

The Commewijne District lies between Penica Creek and the Suriname River, bordered on the south by a line running parallel to the coast, from the Commewijne River eastwards to the Suriname River.

The agricultural lands within the district in effect reach the East-West highway, which in fact forms the border of the populated area located north of the highway. The total area of the Commewijne District is 231,462 hectares and its population numbers 34,233.

The capital of the district, Nieuw Amsterdam, lies at the meeting point of the Commewijne and Suriname Rivers and is in fact a suburb of Paramaribo. This is the only urban settlement in the district, with the remainder of the population living in rural areas, mostly along the major roads.

Geographically, the Commewijne district can be divided into three lengthwise strips:

1. The northern unit: from the coastal plain to the Commewijne River. This unit is actually isolated from the rest of the country in terms of land travel. It can only be reached by crossing the Commewijne River by boat. It has almost only dirt tracks. A few small villages are to be found in the unit, along the route of the river.
2. The central unit: between the Commewijne River and the main East-West highway. This unit is accessible and has a larger number of populated areas than its northern neighbor. The road system includes the main East-West highway, through which Commewijne and Paramaribo Districts are accessible.
3. The southern unit: the area surrounding the East-West highway until the first swamps. This unit is almost completely unpopulated, apart from a line of houses south of the highway. Most of the land in the unit is covered with natural forest and swamps.

Agricultural Lands in the Commewijne District

Commewijne includes vast and extremely diverse territories. Most of the district's land (on the coastal plains) is natural or abandoned territories of B or C status, that is to say, covered almost completely in natural forestry.

In practice, Commewijne district contains several "islands" of agriculture settlements – in the Elk Maar region, near the east-west main road, at the West Indian cherry orchards, at the Katwijk coffee plantation in the north, at the Alliance farm, etc. Therefore, recommendation of the necessary development will focus on the settled farming territories instead of spreading over the entire district.

The Commewijne District includes large expanses of agricultural lands, most abandoned, and some in varying states of cultivation. Follows is a description of the agricultural lands according to the division above.

1. Northern Unit

The entire northern part of the Commewijne District was cultivated in the distant past. Currently, active agricultural cultivation is concentrated in three main sites: the Van Alen and Alliance Farms and around small villages such as Margrita.

- The Van Alen Farm includes 5000 hectares of tended natural pasture, in addition to fish farms and a small number of field crops.
- The Alliance Farm is a government farm incorporating 100 hectares of various citrus fruit orchards including grapefruits, oranges and tangerines. It is one of the largest citrus farms in Suriname. Boats transport its produce across the Suriname River to Paramaribo. Adjacent to the farm is a small village numbering around 60 families, most of which are employed in the citrus orchards.
- Small villages such as Margrita. The homes in these villages are close to roads and the Commewijne River. These villages include family holdings totaling 445 hectares.

Abandoned Agricultural Lands

Substantial abandoned agricultural lands are to be found within this unit, accounting for most of its area. Especially prominent are abandoned lands that are now flooded (level D). It is reasonable to assume that at least some of these abandoned lands are used for pasture.

2. Central Unit

The active agricultural cultivation in this unit is concentrated in family holdings on two major axes:

1. North-south, through the village of Alk-Maar
2. East-west, along the main East-West road, through the villages of Voorburg, Mariënburg, Stolkertsjiver and others.

Many of the family holdings that constitute most of the agricultural activity in this unit are irrigated. Their main crops are vegetables, which are transported to the markets in Paramaribo. In addition, family holdings are to be found next to the concentrations of small villages along the Suriname River.

The total area of agricultural land in the form of family holdings in this unit amounts to 2,302 hectares. Of these, it is estimated that around 10% is currently cultivated: around 230 hectares.

Cherry Orchard

A farm with a large Indian cherry orchard is located in the eastern part of the unit.

The farm's total area is 40 hectares: it measures 4km in length and 100m in width. Twenty four rain water reservoirs, scattered throughout the orchard, provide water. The orchard is irrigated by pumping water from these reservoirs into channels. When excess water accumulates, it is drawn from the channels back into the reservoirs. Parallel to the orchard runs a creek with brackish water. The orchard yields 10-15 tonnes per hectare (depending upon the type of cherry). Part of the produce is sold to a Surinamese company which produces juice and part is exported to Western Europe. The fruit and its juice are marketed as organic products under the brand Bio Acerola. The farm includes a processing plant.

KW Coffee Plantation and Citrus Orchard

South of the Commewijne River lies the KW Farm, which includes a coffee plantation and a citrus orchard.

This is the last extant coffee plantation in Suriname. It is 30 hectares in area, and includes the Robusta and Arabica (mocha) varieties. At the center of the plantation is a grinding and packaging plant, active once a sufficient yield has accumulated. The product of the plantation is Suriname's only brand of coffee and is marketed within the country and exported to Western Europe. The annual yield is around 6 tonnes (24,000 packages of 250g each).

Close to the coffee plantation is a partly abandoned, poorly kept citrus orchard of 135 hectares in area. The annual yield is around 2,500 tonnes.

The farm includes a guest house, surrounded by an impressive, well-tended garden. A local team provides agriculturally-oriented guided tours. This tourist activity accounts for part of the farm's income. There are plans to develop further the touristic aspects of the farm.

The farm employs around ten permanent workers on the coffee plantation and for the upkeep of the processing plant, in addition to a manager and tour guide.

Pasture

South of the Commewijne River are two large pasture farms:

1. Panama UC, on clay lands.

2. Soucil Jahamia, on alternating clay and sandy lands.

These two farms share similar characteristics. Each one is around 400 hectares in size. Each has a herd numbering approximately 350 animals of the Zebu variety. Natural pasture is used for meat herds and local vegetation is to be found interspersed throughout the area.

The Soucil Jahamia Farm also has a citrus orchard of 6 hectares, the remnant of a once much larger orchard of 26 hectares. Most of the orchard has been abandoned.

Each farm is run by a manager and two-three workers (family members or paid employees). Food supplements and silage are not used. There are no veterinary services and in the case of illness the animals are placed in isolation and receive a course of antibiotics.

The reconstruction and restoration of a large, industrial building, which served in the past as a coffee processing plant, is currently underway on the Panama farm. According to the plans, this will be used for touristic purposes.

Abandoned Agricultural Lands

Long ago the entire northwestern section of the Commewijne District was cultivated. Today, natural forest has returned to most of the area. The map identifies those sections that remain cleared of most natural vegetation ï possibly used as pasture areas. A mostly abandoned plot of 2000 hectares, about two kilometers north of the East-West highway, is especially prominent. At its edges there are plots of vegetables, mainly peppers, some of which are irrigated. Adjacent to these are plots covered with forest of a medium-high density. The abandoned lands extend to the meeting of the road with the Commewijne River.

3. Southern Unit, around the East-West Highway

The East-West Highway is the main road connecting Paramaribo to the eastern districts of Commewijne and Marowijne. The western part of the Commewijne District, until the highway meets the Commewijne River, is populated, with homes on both sides of the road. Nearby are to be found family holdings that include field crops and some orchards, accounting for around 10% of the area.

The highway and its margins lie on a wide sandy mountain range, in contrast to the continuous clay of the coastal strips. Close to the highway, a number of abandoned plots are evident. It should also be noted that a tissue culture factory exists, south of the East-West road close to Tamanredjo.

Extended areas in this southern unit were cultivated in the past, along the major rivers: the western bank of the Suriname River and around the banks of the Commewijne and Perica Rivers. Today, few remnants of this agriculture remain.

Agricultural Potential in the Commewijne District

1. The northern unit. The area north of the Commewijne River between the river and the sea is isolated from the rest of the country and accessible only by boat. This constitutes a certain disadvantage, but it can also be advantageous in marketing the area as isolated from pollution and industry. This could certainly be valuable for organic agriculture and tourism. The central potential in this area lies in the development and advancement of the Van Alen farm, which encompasses more than 5000 hectares.

2. The central unit. Most of the agricultural lands in this unit are family holdings. Cultivated agricultural lands are to be found throughout ribbon villages such as Alk-Maar. The establishment of a center in the area to provide aid, guidance and technological advice, and to refer successful farmers to cultivate additional available plots, is likely to advance agricultural production in the area. These recommendations also apply to the population along the northern edge of the East-West highway.

It is possible to improve and enlarge pasture areas and add to the herds that feed there. Food supplements and silage, insemination and readily available veterinary services, in addition to efficient management of the area, will lead to a significant improvement in the pasture conditions and its profitability.

3. The southern unit. It is important to emphasize the special conditions of the land on which the East-West highway was paved. The soil is sandy, and the area includes wide open expanses, among the largest on the coastal plain. There are thousands of hectares of fine sand, silty sand and other similar soils with good drainage. The optimal usage in this unit is orchards and field crops that require good drainage. It should be noted that this area is highly accessible via the East-West Highway, providing a direct connection to Paramaribo and the ports.

Policy Formulation

Because of the diversity of the district and the wide expanse of farming lands in different and distant locations, specific areas must be focused upon, and each assigned its own developmental policy.

In the Commewijne district two family-run agricultural concentrations can be found:

a. The east-west main road, the main road that connects the Commewijne district with the Marowijne district, is paved on a wide sandy ridge. This provides many advantages for crop supply and management. Many farms are

scattered along both sides of the road, each having a different activity level and specialization.

b. Agricultural farm units are concentrated in the Elk Maar region, along the north-south road that connects the east-west road with Marinberg, and in practicality, along two parallel axes. It is notable that in this area the rate of cultivation is relatively high.

In both these regions of high concentration of family-run agriculture, guidance and logistical centers should be established.

In addition to Commewijne's family holdings there is a large governmental farm, the Alliance farm. In fact, it is the only government farm that is currently working, producing and marketing agricultural produce (citrus). In Alliance there is also a small village, most of whose workers are employed on the farm. The farm's cultivated lands now measure about 100 hectares, and there are plans for great expansion, potentially of about 2,000 hectares.

The Alliance farm has many advantages, mainly its high level of activity and continuous production. It is therefore possible to continue development upon the existing foundation, and significantly improve the situation. However, the location has heavy clay soils and no relative advantage for citrus cultivation. For that reason we propose that while fields already planted with citrus continue to grow it for the time being, aided by improvement to irrigation, drainage and management, crops that are better adapted to heavy soil should be considered for new plots.

The Alliance farm may have a benefit in being completely isolated, located beyond the north bank of the Suriname River without any paved roads. This situation grants an organic product image advantage (if organic agriculture management should be adopted), as an area isolated and distant from pollution sources. See a further description in Chapter 11.1.3 of a complete improvement project at Alliance.

In other territories beyond the two banks of the Commewijne River there are vast pastures. Prominent is the Van Allen farm that is approximately 5,000 hectares in size. Here also exists a small village where the residents are employed in the farm. South of the river there are two natural cattle farms that are about 400 hectares each. A central project is proposed for improving that natural pasture, to include improvement of the soil and the existing pasture vegetation, increase of available veterinarian services, improvement in the types of cattle in the field, guidance on a regular basis, solving the drainage problems and compressing the soil.

Recommended Projects

1. Expansion of West Indian Cherry Orchards

In Commewijne there is a relatively large orchard of West Indian cherries, or Acerola; its approximately 40 hectares yields 10-15 tonnes of fruit each. The bushes are irrigated and drained by a channel system running to individual rainwater reservoirs scattered throughout the orchard, and there is an adjacent facility to process the fruit. The farm employs approximately 20 workers, only five of which are permanent.

The Acerola orchard is organic. Pest control is accomplished through alternative methods, among them the planting of certain other trees nearby which have a pest-repellent effect. The farm thus has organic certification (ISO SR-BIO-609), and demand for its product is high locally and in European markets.

The little-known West Indian cherry, also known as Acerola, is a sweet-sour tropical fruit originating in Yucatan. It grows in Central America, the Caribbean and South America, as well as in the far south of the United States and in tropical and subtropical areas of Africa, Asia and Australia. It grows on shrubs in dry, sandy soil in full sunlight, in temperatures above 0˚C. The plants are intolerant to winds because of their shallow roots, but can survive on little water.

The trees alongside the road repel insects which would otherwise prey on the orchard's fruit.

The Acerola has been recognized by the European Food Safety Authority (EFSA) as an important source for vitamin C and phenolic antioxidants; it has extremely high quantities of both, as well as other important vitamins and minerals. As such, it is processed into concentrate and powder for use as additives to other juices and for nutritional supplements. Sweetened, Acerola juice can also be drunk fresh.

The large demand for West Indian cherry products and the profitability of the existing orchards indicate a likelihood of success if cultivation and production capacity at either or both of these sites were to be increased. A further possible addition of a tourism component to the orchard's activities, including seasonal fruit-picking, could further contribute to revenue. It would be worthwhile to examine building a local guesthouse alongside the orchard.

A machine used to process the fruit into juice, which is bottled for local sale.

The expansion of the West Indian cherry cultivation is based on the existing orchard and the adjacent factory. There is a projection of success for this project at any scale, as there is much demand for the product as well as willingness on the part of the owners to broaden their operations.

2. Expansion of Katwijk Coffee Plantation

In the past there were thousands of hectares of coffee fields in Suriname, particularly along the coastal plain. Today, only one plantation remains, Katwijk, located at the edge of the Commewijne River, approximately 11 km east of Paramaribo. The plantation is about 30 hectares in size and grows the Robusta and Arabica varieties of coffee. At the center of the plantation is a grinding and packaging plant, active two or three times each year, once a sufficient yield has accumulated in order to begin processing. The product of the plantation is Suriname's only brand of coffee, with a unique aroma, and it is in high demand. The annual yield, around 6 tonnes (24,000 packages of 250g each), is marketed within the country and exported in small quantities to Western Europe.

Coffee is a popular beverage as well as a significant commodity in the international economy. Most coffee is grown in Latin America, sub-Saharan Africa and south-east Asia. The leading countries in coffee consumption, on the other hand, are located in western and northern Europe. Global coffee consumption has been constantly rising in recent decades, as its popularity grows and new markets are adopting and growing accustomed to it.

The coffee plants grow in the shade of natural rainforest. To the right are fruits of the coffee plant.

There is potential for expansion of the Katwijk coffee fields, and conversations have been had to that effect with the factory owner, Joseph N. Nouk Chaia, who expressed willingness to expand in light of the existing demand and profitability. Furthermore, expansion of the fields themselves can be integrated with the tourism aspect of the location, which currently takes the form of an active guesthouse and tours of the plantation which contribute to its income.

The coffee plantation in Commewijne is isolated and far from residential areas as well as sources of pollution. It may thus be possible to create a local brand of organic coffee. In this context, the options should be examined for replacing conventional pesticides with organic methods. Branding of this coffee as organic creates the potential to cater to a unique niche, especially in the European market.

Figure 21: Land-Use Map of Commewijne (Produced by Kaplan Planners, Ltd.)

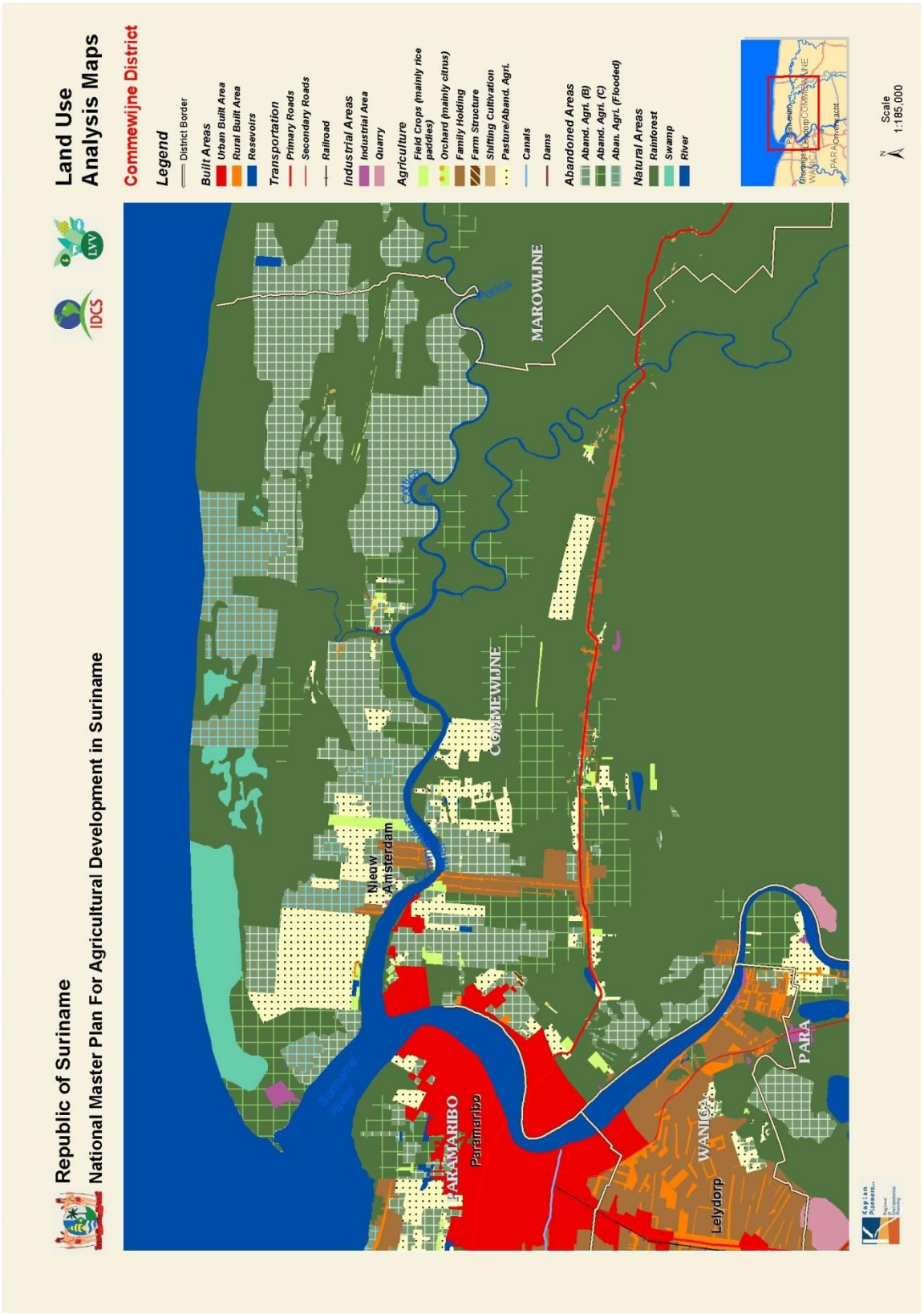


Table 19: Areas of Commewijne by Land-Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Commewijne	
Agriculture	**Area in ha**
Field Crops (mainly rice paddy)	920
Cultivation*	760
Shifting Cultivation	90
Pasture/Abandoned Agri. A**	10,110
Total Agriculture	11,880
Abandoned Areas	**Area in ha**
Abandoned Agriculture - B	22,745
Abandoned Agriculture - C	13,930
Abandoned Agriculture - Flooded	5,910
Total Aban. Areas	42,585
Built Areas	**Area in ha**
Rural Built Area	760
Urban Built Area	2,670
Industrial Area	240
Farm Structure	60
Resevoirs	270
Quarry	360
Total Built Areas	4,360
Natural Areas	**Area in ha**
Rainforest	167,750
Swamp	4,260
River	3,050
Total Natural Areas	175,060
District Total	233,885

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are calculated as a part of the Pasture/Abandoned Agriculture - A category, as they are used for the family livestock

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated areas in family holdings. See note above.

12.8 Marowijne

General Description

This district lies between the Marowijne River in the east and the estuary of the Cottica River in the west. It is sparsely populated. It includes three cities ï Apatu, Mungo and Albina ï and a few dozen villages. Most of the area is covered with natural forests and swamps. It is bordered on the south by a line running parallel to the Commewijne River. The Marowijne District is 382,133 hectares in area and it has a total population of 18,300.

Agricultural Description in the Marowijne District

The Marowijne district, in spite of being located on the outer plain, is, for practical purposes, a part of the Interior. The entire district is covered by natural terrain – rainforests and swamps. The only existing agricultural lands are used for shifting cultivation, and are concentrated mostly around the main road that leads to the district's capital, Albina. Additionally, there are a few more plots along the Cotica and Marowijne rivers that flow to the north. The district used to have a large farm for oil palm and patamac close to Moengo, but today this farm is abandoned.

Agriculture is the most limited of all the districts on the coastal plain. No modern methods are currently used in Marowijne, not even family holdings. The existing plots are shifting cultivation plots scattered around the villages and roads. There is extensive fishing activity along the major rivers. Most of the district's agricultural products, from field crops to fish, appear to serve the local population alone.

Agricultural Potential in the Marowijne District

Agricultural development in Marowijne is connected to questions concerning the interior: How do we relate to traditional agriculture using shifting cultivation? Should we develop agricultural focus points in these areas and, if so, how should they be designed, taking into account the way of life and local traditions?

For the following reasons, the Marowijne District would not seem to be first on the agenda for agricultural development:

1. The lands are located at a significant distance from the population centers, markets and export points around Paramaribo.
2. Most of the lands are covered with natural forest and therefore the economic feasibility of developing these lands is doubtful.
3. Today no serious agricultural infrastructure exists in the district. Most of the agricultural plots are worked using shifting cultivation.

The main potential to be considered here concerns aiding and advancing local agriculture to meet the needs of the local population.

Policy Formulation

The Marowijne district has different characteristics than the other coastal districts, in terms of agricultural lands and population distribution. The development policy in Marowijne should be more moderate and adapted to its unique conditions. The main subject to be addressed is a conflict between honoring the traditional practices of shifting cultivation and stimulating gradual change for long-term benefit. Shifting cultivation methods are not congruent with sustainable development terms, because of the continuous damage to the forest that will increase with population growth. Therefore, these methods must be converted into permanent agriculture, in small lots using environmental friendly methods, but the change must be made gradually in consideration of the effects on the human fabric of the small local communities.

In the Patamaca farm partial rehabilitation can be considered, while integrating and supplying occupational solutions for the local population.

Figure 22: Land-Use Map of Marowijne (Produced by Kaplan Planners, Ltd.)

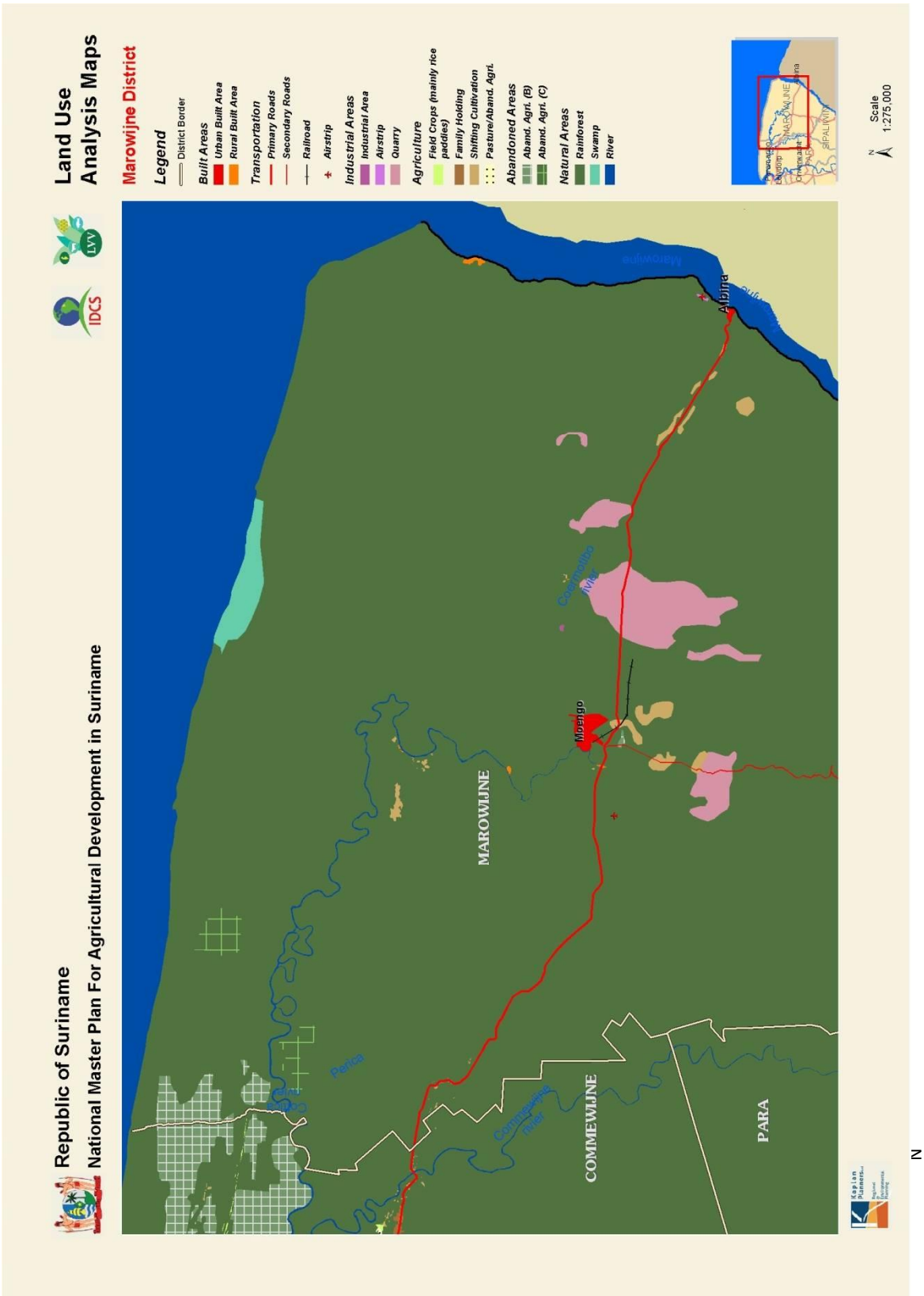


Table 20: Areas of Marowijne by Land Use, Ha (Produced by Kaplan Planners, Ltd.)

Area Calculation: Marowijne	
Agriculture	Area in ha
Family Holdings - Standing Cultivation*	10
Shifting Cultivation	1,900
Total Agriculture	1,910
Abandoned Areas	Area in ha
Abandoned Agriculture - B	2,495
Abandoned Agriculture - C	2,270
Abandoned Agriculture - Flooded	0
Total Aban. Areas	4,765
Built Areas	Area in ha
Rural Built Area	135
Urban Built Area	700
Industrial Area	20
Airstrip	25
Quarry	8,920
Total Built Areas	9,800
Natural Areas	Area in ha
Rainforest	364,710
Swamp	2,435
River	1,285
Total Natural Areas	368,430
District Total	384,905

* Family Holdings are agricultural areas sorrounding the rural settelments, containing small family plots, 1-5 hectaers in size. We asses that only about 15% of these plots are actively cultivated. Accordingly, out of 41,000 hectaers of family holdings areas, 15% are counted as active agriculture, mainly field crops and orchards. 85% are calculated as a part of the Pasture/Abandoned Agriculture - A

** Area recognized as Abandoned A is completely deforested, so it is assumed to be even partially used for pasture. Satellite image interpretation showed it is difficult to differentiate Abandoned A areas from active pasture areas. This category includes also the uncultivated areas in family holdings. See note above.

12.9 Summary

General Characteristics of Agriculture in Suriname

In the past, wide expanses of cultivated agricultural lands were to be found in Suriname – crops included coffee, cocoa, coconut, citrus fruits, vegetables and livestock. Today, most of these lands have been abandoned.

At present, the most common crops are citrus fruits, vegetables, plantains, bananas, beans and chili peppers. The agro-technological level needs improvement. Today, most of the labor involved in cultivating is performed by hand and there is little use of mechanical tools. There is almost no irrigation. In many cases farmers use saved seeds. Backpack sprayers are used for chemicals and pesticides, fertilizer is spread by hand and likewise threshing is performed manually (or alternatively using tractors to trample the land).

Agricultural lands require better care: at present plantations are not pruned and nurtured appropriately, weeds abound and the fields suffer from an obvious lack of uniformity. As a result yields are low and the quality of products is not optimal. Many farmers are public sector workers and thus only work part-time on their farms, using their government salaries to provide for their families. The fact that these farmers have additional employment in public service makes it difficult for them to focus energy and professionalism on agriculture.

The fresh produce, fruit and vegetables, is mainly intended for local markets or sale in Paramaribo. In most cases farmers sell their produce to intermediaries, who transport it to the markets and sell it there, but in some cases the farmers bring the produce to the markets themselves. A tiny percentage of the produce is exported – to neighboring countries and Holland.

Most of the country's agricultural lands are today located on the young coastal plain. The heavy clay soil there has high levels of water retention. The altitude rises only a few meters above sea level and the topography is flat.

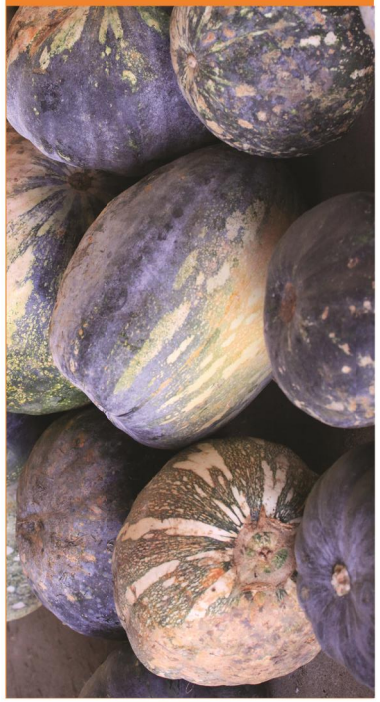
The river waters are salty due to the penetration of sea water at high tide. This enables the growth of mangroves along the banks of the rivers. The salt water from the rivers penetrates into the drainage channels, causing salinity of soils that are not well drained.

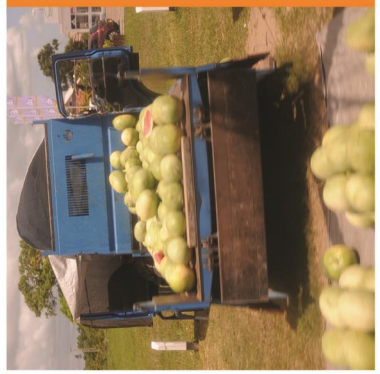
Drainage systems exist in the agricultural lands and are intended to drain the excess water from the agricultural plots into the river. The government is responsible for the upkeep of these systems. However, because these drainage channels are not maintained properly, as is also true of the dams between the river and the channels, many lands are not suitably drained. This constitutes a major problem for agriculture.

In cases of heavy soils an efficient drainage system is a prerequisite for the existence of modern, productive agriculture.

The agricultural plots are for the most part elevated and separated by drainage channels. The depth of the roots from which the water is drained is between a few centimeters and less than one millimeter. During the rainy season many of the lands are flooded or saturated and the earth becomes muddy and sticky.

Part IV
Physical Conditions





13. Climate

General

Suriname is situated on the northern coast of South America and lies just north of the equator. Its climate is largely controlled by the passage of the Inter Tropical Convergence Zone (ITCZ) above the region. The ITCZ is the area where the NE and SE trade winds meet and this area follows the sun in its movement north to about 15^0 latitude or south to about 10^0 latitude over the equator. The ITCZ thus passes twice every year over Suriname, once travelling southwards and once travelling northwards, bringing heavy rainfall when it is overhead.

Rainfall

The northern part of Suriname has an Af - type of Köppen classification. This means that the mean monthly rainfall in the coastal area is always higher than 60mm. However, a small strip along the northwestern portion of the coastal area, including Coronie and Nickerie, might have lower than 60mm rainfall in the driest months. The greater portion of Suriname has an Am - type climate whilst in the southwest the Aw - type climate prevails.

Temperature

Temperatures are high during all seasons and the mean annual air temperature varies only 2^0-3^0C. However, along the coast the daily fluctuations of temperature are about 5^0C whilst in the interior daily fluctuations of 10^0 - 12^0C occur. At Paramaribo the mean air temperature is 27.3 ^{0}C with the lowest occurring in January with a mean of 26.2 ^{0}C and the highest in September and October with a mean of 28.2 ^{0}C. Maximum daily temperatures (average 31 ^{0}C) occur at 1500hrs whilst minimums (average 23 ^{0}C) occur at 0600hrs. The main factors determining temperatures are cloud cover and evaporation. Mean annual soil temperature in the forest at a depth of 2.5m is about 24 ^{0} - 26 ^{0}C.

Humidity

Humidity averages about 80 - 90% annually in the coastal regions whilst in the central and southern regions daily air humidity is lower and averages about 75%. These values increase during the wet seasons.

In the forest tracts the air humidity largely depends on the entrance of the sun's radiation and at a height of 1.5m. relative air humidity lies between 70 - 100%. In open areas the fluctuation is even greater lying between 50 - 100%. Sharp decreases and increases are observed in the relative air humidity about 10hrs and 17hrs respectively.

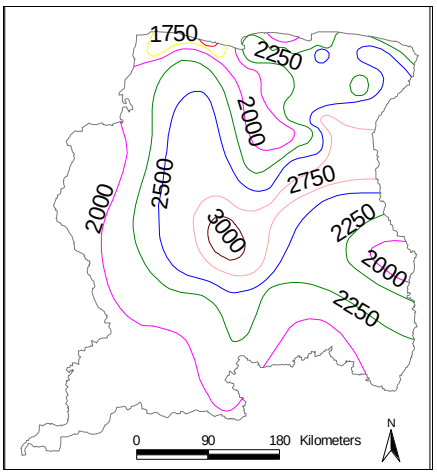
Wind speed and direction

The mean wind speed is 1.3 on the Beaufort scale. Maximum mean windspeeds occur during the dry seasons attaining 1.6 Beaufort in February with a second peak in September and October. Minimum mean windspeeds of 1.0 Beaufort occur in January. Windspeeds of 3 - 4 Beaufort generally occur during the day but during the evening and night, especially in the interior, the windspeeds drop.

Average Annual Rainfall

The average annual rainfall in Suriname varies between 1,500 to 3,000 mm (Figure 5).

Figure 23: Average Annual Rainfall (mm)
(Source: NARENA - Country Study Climate Suriname- Water Resources, 1999)



Dry and Rainy Seasons

The climate in Suriname is divided into 4 seasons:

Long dry season: From mid-August to early December

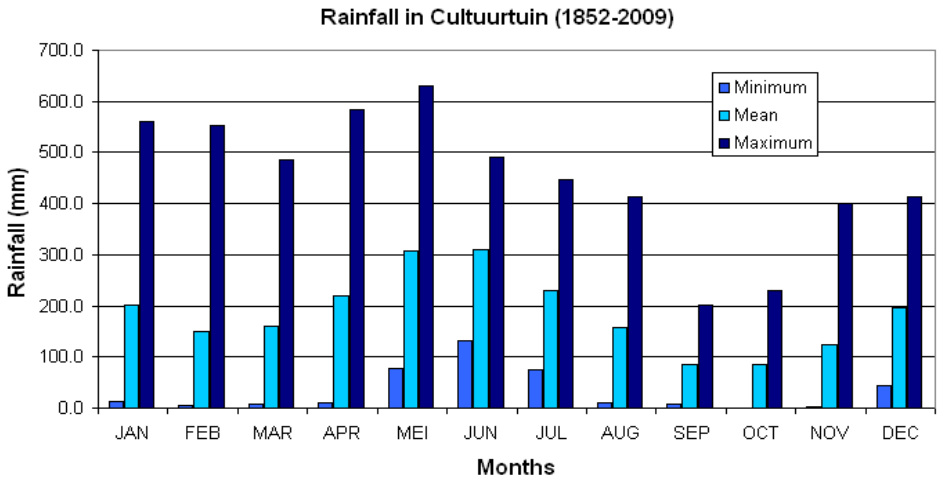
Short rainy season: From early December to early February

Short dry season: From Early February to late April

Long rainy season: From late April to mid-August

The rainy seasons first begin in the east and later in the west. The rainfall distribution during the year in the Paramaribo area is presented in Figure 2. Note the wide amplitude between the minimum and maximum.

Figure 24: Annual Rainfall Distribution
(Source: NARENA - Country Study Climate Suriname- Water Resources, 1999



14. Soil

This chapter includes a proposal for re-classification of soil types, based on their physical qualities, and the creation of a generalized yet comprehensive soil map.

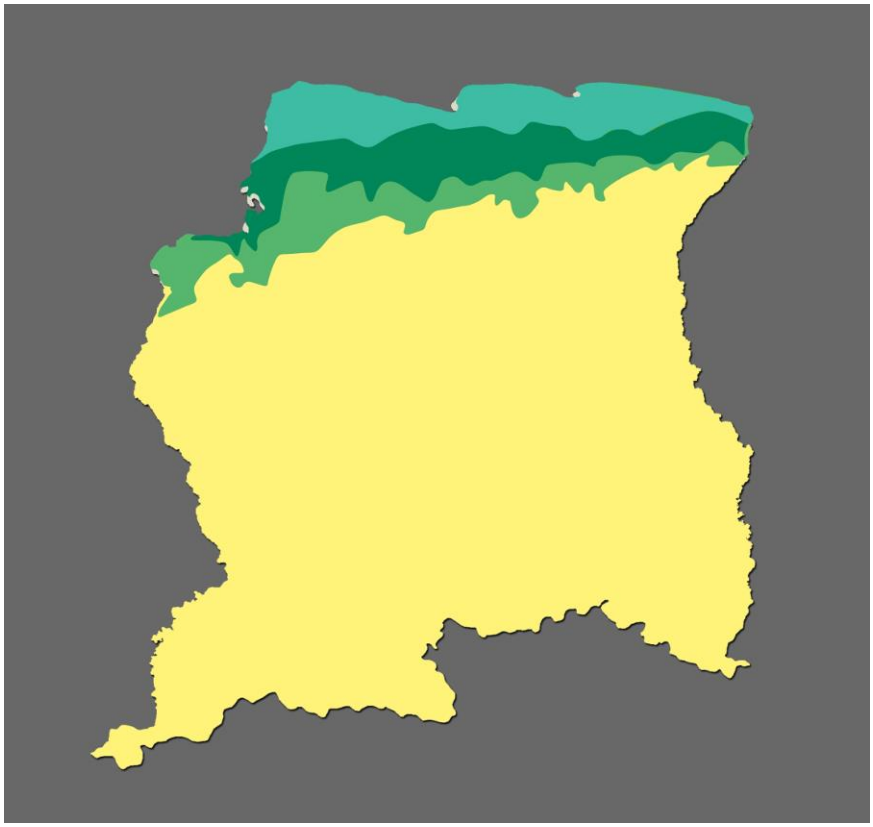
The re-classification and categorization were conducted in order to understand and interpret the soil qualities in an agricultural context. The proposal herein groups together soil types with similar characteristics for agriculture purposes. The main quality taken into consideration was the soil texture, since this influences a series of further aspects of the soil including drainage, water retention, fertility and more.

The merging of the groups will be carried out, at this stage, for each of the morphological groups in northern Suriname:

- **Young Coastal Plain**
- **Old Coastal Plain**
- **Terraces**
- **Dek / Zanderij**

On the basis of the generalization and re-categorization of land units we will go on to produce a series of land-suitability maps for various crops, based on the comprehensive map.

Figure 25: Schematic illustration of different soil types along Suriname's coast



Proposal for Generalization and Justifications

The basis for producing the map is the general soil survey, which constitutes the most comprehensive soil map of the country, including 75 soil types.

This survey—The Reconnaissance Soil Map of Northern Suriname—was prepared by the soil survey department of the Ministry of Development between the years 1970 and 1974. It encompasses the entire country and appears on maps on the scales of 1:50,000, 1:100,000 and 1:200,000, in addition to a more general map on the scale of 1:500,000. The survey is very detailed, relative to the large area that it covers, mapping units to a resolution of single hectares and achieving a high level of accuracy. This survey will serve in the present project as the general foundation for analysis of the soil types.

The 75 land units are grouped according to their geographical/morphological location, as depicted in the following diagrams. At this stage the agricultural qualities of the soils have been surveyed meticulously and they have been re-grouped according to these qualities and agricultural considerations, and not in relation to their morphology.

Figure 26: Example of Reconnaissance Soil Map of Northern Suriname

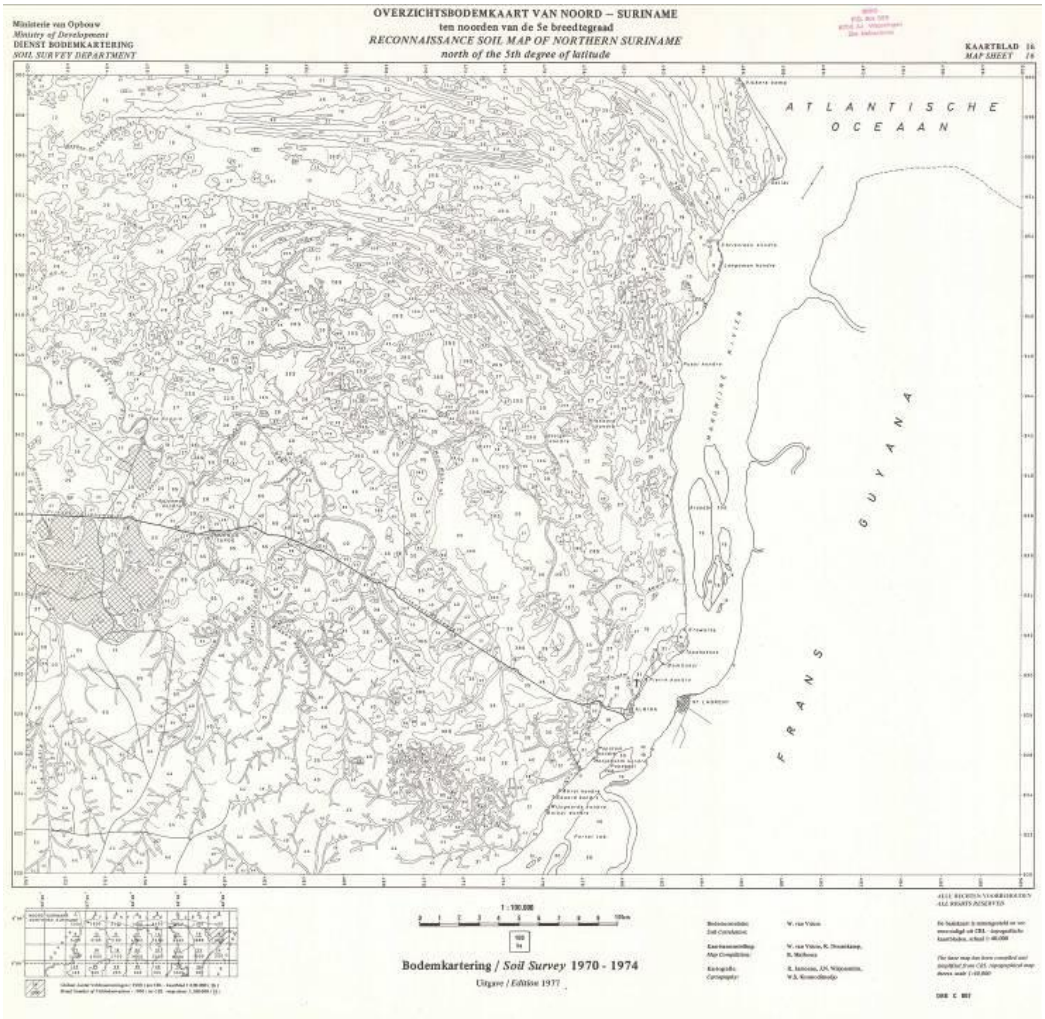


Table 21: The categorization and explanations of the re-classified soil types

Soil Types by Attributes	Soil Type from the Suriname Soil Map	Morphology	Soil Attributes				
		Young Coastal Plain	Fertility	Water Capacity	Drainage	Comments	Workability
I Sandy Ridges	1	Well (to poorly) drained shells, shell-grit, shell sand, medium and fine sand	Ranges from Medium for shell ridges (high OM) and loamy sands, to Low for medium and fine sands, to Very Low for coarse sands	Low; Medium in Footslope Depending upon grain size: Very Low in coarse sand to High in sandy loam	Moderately High - High; Medium to Low in Footslope Permeability: depending upon texture: Rapid to (Moderately) Slow	Distinction should be made between: 1. Texture 2. Physiography (narrow ridges and wide plateaus). Ridges within units 6 and 7 have saline to brackish groundwater	High
	2	Well drained medium and fine sand to sandy loam					
	8	(Moderately) well drained medium and fine sand					
	9	Imperfectly drained sandy loam to medium and fine sand to sandy loam, locally sandy clay on medium and fine sand					
II Ripe Clay	3	Poorly and imperfectly drained ripe clay with yellow and red mottles	High (units 10 and 11) to Very High (units 3 and 4)	High	Moderately Low - Low Permeability: Slow to Moderate; Very Slow in compacted soils	Soil structure is solid and stable. Upper part may or may not to some degree be compacted due to natural processes Variable	Low
	4	Poorly drained half-ripe and ripe clay with brown and yellow mottles, locally over peat					

	10	Imperfectly and poorly drained ripe clay with yellow and red mottles, locally over sand				thickness of peat (local name 'pegasse') layer in swamp areas	
	11	Poorly and very poorly drained nearly ripe clay with yellow and/or red mottles, locally over sand or sandy loam					
III Incompletely ripened Brackish and Saline Clay	6	Very poorly drained practically unripe and half-ripe brackish clay	Very High	High	Low Permeability generally (Moderately) Slow.	Saline or brackish soil, near the sea	Low
	7	Very poorly drained unripe and practically unripe clay					
IV Incompletely ripened Clay	5	Very poorly drained half-ripe clay with olive mottles, locally silty clay	Very High	High	Very poorly drained. Permeability: Slow	Soils requires increase of ripening prior to use in order to improve bearing capacity and structure; variable peat thickness	Extremely Low
	12	Very poorly drained ombrogenous peat	Very High	High	Low Permeability generally (Moderately) Slow	Soils requires increase of ripening prior to use in order to improve bearing capacity and structure; may contain thick (>40 cm) peat layers; may contain	
	16	Very poorly drained half-ripe (peaty) clay with brown and yellow mottles					

						potential Acid Sulphate Soils; very low elevation (mean sealevel)	
	19	Very poorly drained half-ripe, practically unripe and unripe mostly pyritic clay and peat					
V Fluvio-marine Soils (marine sediments, deposited in a river environment)	13	Imperfectly drained silt and silt loam	Medium (Silts and loams) - Very High	High	Imperfectly drained; Permeability: Moderate to Slow	Highly variable conditions (according to irrigation?). Susceptible to erosion (13, 14) and often compacted subsoil (13, 14, 15)	Low
	14	Imperfectly drained loam and clay over sand					
	15	Imperfectly and poorly drained ripe clay with brown, yellow and/or red mottles, locally silty clay and silt loam					
VI Polder	17	(Formerly) artificially drained ripe clay with yellow, brown and/or red mottles, locally clay over loamy sand, and/or sandy clay loam in the subsoil (plantations)	High - Very High	High	Imperfectly to Poorly drained. Permeability: Moderate to Slow (in particular 18)	Unit 17 contains cambered beds, farm ditches, canals and dams; sluices may or may not be present; in abandoned plantation these structures may be in a variable degree of decay. Unit 18 comprises abandoned small sawahs with only low	Low
	18	Very poorly drained half-ripe clay (rice-fields)					

						dams; the soil may have been compacted due to puddling	
Old Coastal Plain			**Fertility**	**Water Capacity**	**Drainage**	**Comments**	**Workability**
VII Sandy Ridges	20	Well drained, locally bleached fine and very fine sand	Low (Very Low for bleached soils)	Low to Medium due to (very) fine grain size	Moderately Well drained. Permeability: Moderate (very fine grain size)		High
	21	Moderately well drained weakly to moderately bleached fine and very fine sand over loam					
VIII Hard Pan Podzol/ Bleached Sand	22	Imperfectly and poorly drained bleached fine and very fine sand	Very Low	Low	Problematic because of Hard-Pan Soil Imperfectly drained. Permeability Moderate. Deep flow blocked by hardpan		High
	25	Imperfectly drained bleached fine and very fine sand over (sandy) clay, and depressions filled with (silty) clay					
IX Medium-Heavy textured Plateau (or Flats) Soil	23	Moderately well and imperfectly drained sandy loam over clay	Low-Medium	High	Moderately Well drained (rel. elevated locations and plateau edges), Imperfectly drained (central plateaus and footslopes)		High
	24	Moderately well and imperfectly drained fine and very fine sand over sandy clay loam or (sandy) clay					
	26	Imperfectly and poorly drained					

		(sandy or silt) loam and (sandy or silty) clay over clay			and poorly drained (depressions). Permeability: Moderate to Slow; deep flow often blocked by slowly permeable subsoil (clay)		
X Silty Clays on Plateaus (or Flats)	27	Moderately well and imperfectly drained silt and silt loam over stiff (silty) clay	Medium	High	As IX, but see comments; Permeability of subsoil Very Slow	Usually with compact to very compact subsoil, in unit 29 starting close to the surface	Low
	28	Imperfectly and poorly drained silt loam over stiff silty clay loam and (silty) clay					
	29	Poorly and very poorly drained stiff silty clay loam and clay over stiff (silty) clay					
XI Alluvial Soils Alongside Rivers	30	(Moderately) well drained sand, loam and clay and poorly and imperfectly drained clay	Medium-Low	Medium in Sands (levees) and High in Clays (backswamps)	Poorly and Imperfectly drained backswamps and Well drained in levees	Levees clay may be to some degrees compacted	Low
Terraces			**Fertility**	**Water Capacity**	**Drainage**	**Comments**	**Workability**
XII Light-	31	Well and moderately well	Medium-Low	High to Medium	(Moderately) Well		High

Medium textured Slope and Plateau Soils		drained medium and coarse sand and (sandy) loam to sandy clay loam and (sandy) clay		(loams)-Low (Sands)	drained. Permeability usually Rapid		
XIII Footslope and Depression Soils	32	Imperfectly drained silty clay, often silt loam over silty clay	Medium to Low	High	Imperfectly drained. Permeability: Moderate to rapid		Low
Dek (Cover) / Zanderij			**Fertility**	**Water Capacity**	**Drainage**	**Comments**	**Workability**
XIV Light-Medium-textured Slope and Plateau Soils	36	Well drained medium and coarse sand to sandy clay loam	Medium (Loams) to Low (Sands)	Low (Sands) to Medium or High (Loams)	(Moderately) Well drained (Plateau and upper and middle slopes). Imperfectly drained on lower slopes	Typically soil conditions vary on relatively short distances	High
	37	(Moderately) well drained sandy loam over sandy clay loam, or sandy clay loam					
	39	Moderately well and imperfectly drained sandy (clay) loam					
	40	Moderately well and imperfectly drained loamy sand to sandy clay; locally somewhat excessively drained (bleached) medium and coarse sand					
XV Light-	33	Imperfectly and poorly drained bleached	Very Low	Very Low	Excessively (no hardpan -		High

textured Bleached Soil		medium and coarse sand			35) to Imperfectly (hardpan 38 or low terrain position - 33). Permeability Very Rapid		
	35	Excessively drained bleached medium and coarse sand					
	38	Imperfectly drained bleached medium and coarse sand					
Creek Valleys of Terrace and Dek Landscape			**Fertility**	**Water Capacity**	**Drainage**	**Comments**	**Workability**
XVI Creek Valleys	34	Poorly drained medium or coarse sand, loam or clay	Not assessed. The Forestry Act indicates that Protection forest should be maintained along lakes, rivers and creeks. Informally (not defined by law) a distance of 500 meter is sometimes mentioned for large water bodies (lakes and rivers) and 200 meters for both sides of creeks. However, it is realized that the distance should be depending upon the slope. A proper distance can be set for concessions.			Creek valleys have a complex soil pattern, with considerable variations on short distance	High
	41	Poorly drained medium and coarse sand, sandy loam, often over clay, locally peaty sand					

15. Water Resources

Suriname has 4 main types of water resources: Rivers, swamps, lake, and groundwater.

15.1 Rivers

Seven main rivers flow in a general South-North direction to the Atlantic Ocean. The following table presents the rivers and their discharges. The difference between the Extreme High and the Extreme Low discharges is a consequence of the climate regime fluctuations.

Table 22: Characteristics of the Main Rivers in Suriname

River	Basin Area (km^2)	Discharge (m^3/s)		
		Annual Average	Extreme Low	Extreme High
Corantijn	67,600	1,597	100	15,000
Nickerie	10,100	174	10	1,800
Coppename	21,700	565	25	4,200
Saramacca	9,400	257	10	2,000
Suriname	16,500	442	20	4,000
Commewijne	6,600	169	5	1,200
Marowijne	68,700	1,791	100	15,000

The following information about rivers in Suriname in this chapter is based on the 1999 report "Country Study Climate Change Suriname, Water Resources Profile Technical report No. 4", by Amatali and Sanipal.

Corantijn River

The Corantijn River forms Suriname's border with Guyana. As of 1999, there were 8 hydrometric stations along the river, measuring mainly water level.

Discharge: Estimations of the discharge of the river yielded an average discharge of 1,580 m3/s, between the years 1967-1983 at Mataway hydrometric station (km 243).

Water level: On average the range between the annual highest high water (HHW) and the annual lowest low water (LLW) at Clara sluice is about 350 cm.

Salinity: During the dry seasons, salty water from the ocean intrudes into the river about 210 km upstream. The salt wedge of 200 mg Cl/l, however, remains about 75km upstream from the mouth. The chlorinity changes abruptly during periods of peak water flow, whilst at low flow the increase of chlorinity is gradual and extends much further upstream.

Nickerie River

The Nickerie River source is at the Bakhuis Mountains, the catchment area is around 10,100 square km, and can be divided into 3 parts:

- The Lower Part, up to Wageningen at km 73, where there are rice polders and human settlements. Water supply for irrigation and domestic use depends mainly on the river.
- The Middle Part, between Wageningen and Stondansie Falls, where the river flows through Coronie Swamp, Marataka and Nanni Swamps.
- The Upper Part is the area of the Stondansie catchment.

There were 22 hydrometric stations along the river as of 1999, measuring water level, chlorinity and discharge. Stondansie catchment area is about 5160 km^2, comprising around 51% of the total catchment of the Nickerie River.

Water Levels: The observed fluctuation of sea level at the Nickerie Monding station has reached 421 cm.

Salinity: The intrusion of salt into the Nickerie River is one of the challenges of the water management program. Much of the potential of developing the Nickerie right bank depends on the engineering solution to this issue.

Coppename River

The Coppename river source is at the Wilhelmina Mountains. The catchment area is around 21,700 square km, divided into 2 parts:

- The lower part, affected by tide, is the swamp area - Coronie swamp on one side and Coesewijne swam on the other. This area is basically undeveloped.

- The upper part, including the area of the Maksita catchment, is a non-tidal area. The first hydrometric station was located here.

10 hydrometric stations were put up along the river, measuring mainly water level.

Discharges: The Maksita catchment area is about 12,300 square km, comprising around 57% of the total catchment of the Coppename River.

Water Levels: Water level is basically affected by the Atlantic Ocean semi diurnal tide. The water level fluctuations at Boskamp station reach 424 cm.

Salinity: The salt wedge in this river depends on the tidal effect of the Atlantic Ocean in the estuary and on the freshwater discharge from upstream. During the dry seasons, seawater penetrates as far as 172 km upstream.

Saramacca River

The source of the Saramacca River is in the central highlands of Suriname. The catchment area of the river is about 9,000 square km. This area can be divided into 3 parts:

- The lower part, affected by the Atlantic Ocean tide. In this area there are rice polders and various settlements. Both drain mainly into the river. The rice crops use river water for irrigation (as well as local swamp water). Water is also used for Banana plantation irrigation.
- The Middle Part, which is located between Santifron and Deamhosso, passes through the Savana Belt and the Old Coastal Plain.
- The Upper Part includes the area of the Dramhosso catchment in the Grote Saramacca River and the Anoemafoetoe catchment in the Kleine Saramacca. This part has the first upstream discharge station.

Discharge: The catchment area of the Dramhosso basin is about 3,520 square km, comprising around 39% of the total catchment of the Saramacca River.

Water Level: Water level is affected mainly by the Atlantic Ocean semi diurnal tide. The fluctuations of water level at Carl Francois station (km 43) reach 312 cm.

Salinity: During the dry seasons seawater penetrates during periods of tide as far as 240km upstream. Chlorinity changes gradually along the way. During the wet seasons, chlorinity changes abruptly, but extends less far upstream.
During the dry seasons the salt wedge of 300mg/l chlorinity is located just downstream from Groningen at Km 85, affecting the rice polders between km 43 and km 75. It is assumed that during this time swamps become the sole water source.

Suriname River

The main source of Suriname River is the Eilerts de Haan mountain range. The area of catchment is approximately 16,500 square km. This area can be divided into 3 parts:

- The lower part, located from the river mouth to the Brokopondo Lake, is the urban and industrial part, containing Paramaribo and other cities. A dam and a hydroelectric plant are located at km 194, regulating the river.
- The middle part contains the Brokopondo Lake, by the size of 1,600 square m.
- The upper part includes the catchment area of Pokigron, at km 173.

16 hydrometric stations were erected along the river, some of which are still active. All the stations measured water level, and some of them also measured chlorinity.

Discharge: The catchment area of the Poigron station is about 5,160 square km- around 51% of the total catchment of the Saramacca River. The catchment area of Afobaka is about 12,550 km^2, comprising 76% of the total catchment.

Water Level: Water level is affected mainly by the Atlantic Ocean semi diurnal tide. The fluctuations of water level at Geleidelicht station (km 25) reach 404 cm.

Salinity: During the dry seasons, seawater penetrates as far as Berg en Dal, 164 km upstream. The salt wedge of 300mg/l then lies much further than at Paramaribo (52km) and almost reaches to Paranam at km 88. In general, during the dry seasons chlorinity changes gradually and extends much further upstream, while during the wet seasons it changes abruptly and does not extend as far.

Commewijne River

The source of the Commewijne River is in the Hok-A-Hing mountain range near the Brokopondo Lake. The outfall of the river is in the estuary of Suriname River. It is the only main river flowing, in large part, through the Old and Young Coastal Plain.

The area of catchment is about 6,600 square km. This area can be divided into 2 parts:

- The Lower Part, which is affected by the ocean tidal regime, includes settlements at the estuarine lower part. The settlements and polders' drainage systems are based on the river tides.
- The upper part is not affected by the ocean tide.

Not many studies have taken place in the Commewijne River. 14 hydrometric stations were constructed along the river; few of them are operating today.

Discharge: There are no stations measuring discharge along the river. In a preliminary study discharges were measured during 2 weeks at the Destombesburg station (km 115). The catchment area of this station is about 2,990 km^2, which is 45% of the total catchment.

Water Level: The semi-diurnal movement of the Atlantic seawater mainly determines the water level in the estuary of the river. The range of the water level at station Alliance lies mostly between +191 to -118 cm NSP.
Salinity: During the dry seasons seawater penetrates very deep up the river. Chlorinity changes abruptly during rainy seasons whilst at low flow (dry seasons) the increase of chlorinity is gradual and extends much further upstream.

Marowijne River

Marowijne River originates at the Tumuk Humak Mountains. The catchment area is around 68,700 square meters.

5 hydrometric stations were constructed along the river. One of them is still operating today - Albina station.

Discharge: The catchment area of the Lange Tabbetje station is about 63,500 square km, comprising around 92% of the total catchment of the Marowijne River.

Water Level: The semi-diurnal movement of the Atlantic seawater mainly determines the water level in the estuary of the river. The range of the water level at station Galibi (km 30) lies mostly within +212 and –98 cm NSP.

Salinity: During the dry seasons seawater penetrates very deep up the river. Chlorinity changes abruptly during periods of peak water flow (rainy seasons) whilst at low flow (dry seasons) the increase of chlorinity is gradual and extends much further upstream. The salt wedge of 300 mg/l chlorinity during the dry seasons can be found upstream of Albina at km 58.6.

15.2 Swamps

Freshwater from swamps is used for irrigation. The discharge of the 4 large swamps in Surinam is shown in the next table:

Table 23: Discharge of the Large Swamps

District	Swamp	Discharge (m^3/s)		
		Min.	Max.	
Nickerie	Nanni	9.5	16.8	
Coronie	Coronie			
Coesewijne	Coesewijne	8.0	22.1	
Commewijne	Surnau			

15.3 Bronkopondo Lake

Bronkopondo Lake spreads over approximately 1,600 square km in the Bronkopondo district, south of Paramaribo. The lake has a dam and hydroelectric plant at its northern section, regulating the flow into the Suriname River. The water capacity that flows from the lake into the Surinam River is controlled by the electrical company according to electricity demand. The main gold deposits and mines are located in the catchment area of the lake. The use of mercury in the process of gold

exploitation pollutes the lake's water. The lake does not serve as a direct water resource for agriculture.

15.4 Groundwater

The aquifers of Suriname are in the coastal area, which is built up of unconsolidated sediments consisting of a sequence of kaolinite clay, sand, and gravel, interbedded with thin beds of organic compound. Groundwater resources in Suriname are scarce and are used only for domestic needs.

The Coastal Basin is divided into two parts based on groundwater age and flow:

- **Savannah and Old Coastal Plain**

  The regional underground water flow is slow, at rates of up to about 6 m/day. The groundwater age is up to 2,000 years. The annual recharge is estimated at 480 mm in the savanna area west of Zanderij and 200 mm in the Old Coastal plain at Rijsdijk.

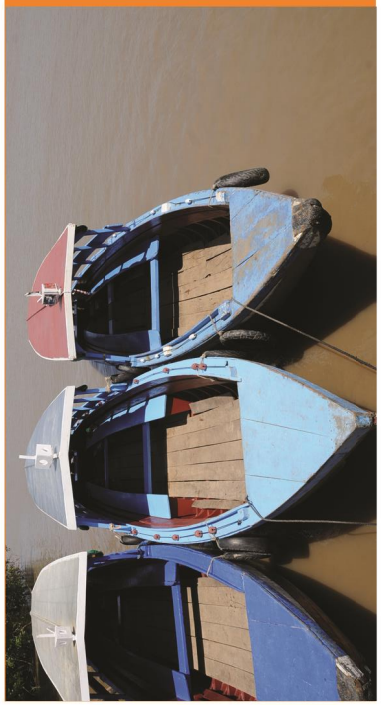
- **Young Coastal Pain**

  The main aquifers are the A-Sand and Coesewijne aquifers. There is virtually no hydraulic gradient, and groundwater ages vary from about 10,000 to 20,000 years. It is assumed that these two aquifers are not recharged at present.

Ground Water Resources

In general groundwater is available from the Coesewijne and A-Sand aquifers, and various amounts of fresh water are generally available from the Zanderij aquifer to the south of the coastal areas. In the eastern areas various amounts of water are available from local aquifers. The area of south Suriname has scarce to moderate brackish to saline groundwater.

Part V
Special Topics



16. Agricultural Extension Services

A Proposal for Revitalizing the Agricultural Training Framework

16.1 Introduction

The government of Suriname is currently investing considerable efforts and resources to improve the performance of the agricultural sector, including providing technical assistance to different levels of farmers.

Suriname's poor agricultural performance is due in part to the fact that extension services are inefficient. Practitioners and professionals in the field of extension work are aware of the situation, but although recommendations have been made to improve the current system, very little is actually been done.

In Israel, one of the most important factors in the success of agriculture is the rapid invention, development and adaptation of new technologies, which are immediately transferred to the farming community. This is a participatory process that involves researchers, extension agents and farmers in the development of innovations that are quickly adopted on the farms.

Improvements to extension services will not increase farmers' income unless other changes are also introduced. These include: generation and adaptation of new technologies by an effective research organization, rapid technology transfer to farmers through an effective education system, and provision of essential incentives and conditions which will motivate farmers to successfully improve their methods of production.

The future agricultural extension service should be part of a comprehensive human resource development effort that includes:

1. Agricultural research oriented towards the solution of problems in the agricultural sector and strongly linked to extension services
2. Agricultural extension aimed mainly at improving the productivity of agricultural activities, i.e. technologies, varieties, crop management, etc.
3. Development of skills and knowledge for farmers to be able to deal with farm management and the marketing of agriculture as well as with crop production technologies
4. Socially-oriented activities to establish a more cooperative plan of action; this would produce benefits such as economies of scale, empowerment of

small-scale rural agro-businesses and more long-term sustainability of such initiatives

5. Measures and support actions which aim to help farmers obtain the means to execute their plans

The aim of this chapter is to review the present situation, to analyse the strengths and weaknesses of the existing extension services and to propose recommendations for improvement.

More specifically, the following components were studied:

- Organization of the extension services
- Objectives of extension
- Extension activities for different clients
- Extension methods
- Farmers' participation in extension
- Training of farmers and extension agents
- Monitoring and evaluation
- Links between research, extension and farmers.

16.2 Methodology

The findings and recommendations presented in this chapter have been assessed using the following methodologies:

a) Review of documents, reports and studies in the field of extension and training

b) Critical analysis of the existing information, identifying strengths and weaknesses

c) Interviews with officials at the Ministry of Agriculture, Animal Husbandry and Fisheries Headquarters, Regions and Resorts

d) Field visits with small, medium and large-scale farmers

16.3 Assessment of the Existing Situation and Recommendations by Topic

Generally, the major constraints facing extension services are: physical (availability of markets and crop production inputs), administrative (transport and accommodation for extension workers), developmental (training of farmers and staff, linkages between extension and research), and finally farmers' limitations (farm labour, draft power).

The present government is committed to developing agriculture, including by providing advisory and technology transfer services to the farmers. Major efforts are being invested to improve extension activities and to upgrade extension staff. The major production areas are covered with extension staff in most of the regions and resorts.

Extension Organization

a. Assessment

In the Ministry of Agriculture, Animal Husbandry and Fisheries (LVV), there are five Departments: Agriculture, Animal Husbandry and Fisheries, Agricultural Research, Marketing & Processing and Administrative Services.

The Department of Agriculture is responsible for the provision of extension services at the National, Regional, Resort and Rayon levels. Some extension activities are also performed by the Department of Animal Husbandry, by ADRON and by NGO's.

The Agricultural Department of LVV is also in charge of extension regarding crop production. It employs a cadre of 132 extension officers, having a status of Aspirant, Junior and Senior. The majority of the extension officers are Aspirants (the lower level). Most of the extension officers are based in the different Regions and Resorts, except for a small team at headquarters.

Geographically, LVV has three regional offices (east, middle, and west) in the coastal zone. Each of the Regions contains several Resorts, also with their own offices. In total there are 13 resorts in the coastal zone – two in the eastern region, six in the middle region, and five in the western region. The regional offices are led by a regional Coordinator, which oversees all activities of LVV in that region, including extension. The regional Coordinators report directly to the Director of the Agricultural Department.

An efficient extension service must have several functions and units including administration, planning, supervision, training, information and communication, monitoring and evaluation.

One of the major problems hampering the delivery of professional assistance to farmers is the small amount of time extension agents are expected to devote to administering advisory programs. Extension officers are also used for other tasks such as data collection, supervising infrastructure maintenance, licenses, etc.

The Regional Coordinator is in practical terms the implementing arm of the Ministry. Although the Ministry has decentralised its activities, most of the responsibilities and means are still concentrated at the national level. The links between national and regional levels is not strong enough.

Similarly the Regional Coordinators are busy with many administrative functions and do not dedicate enough time to planning, supervision, monitoring and evaluation of extension programs. They also do not produce sufficient written materials and visual aids for extension agents and farmers. The result is weak feedback and therefore no information to understand why farmers are not adopting recommended innovations.

Additional issues related to job descriptions, working conditions, quality of work and motivation of extension personnel are not given the appropriate attention.

Another inconvenience is the missing link between extension for crops and extension for animal production. This unification is important because farmers deal with crops and animals as a complementary combination of activities.

b. Recommendations

It is necessary to support the Regional Coordinator by appointing an additional Extension Officer in order to strengthen the functions of planning, training, supervision, monitoring and evaluation.

Extension work in crops and animal production must be coordinated and improved.

As recommended at the national level, the functions of administration and service to the farmers should be separated from those of extension. This separation has to be done for all extension personnel in order to leave enough time for farm visits and to re-establish confidence between the farmers and the extension service providers.

Once administrative functions are separated from extension activities, the tasks and roles of extension officers have to be reviewed and oriented mainly to visiting farmers' fields. A clear program of work has to be established, complemented by a program of supervision. It is recommended that administrative functions be handled by a separate unit or by separate extension officers, unrelated to advisory services.

In the long run, there is a need for a strategy aiming at less public sector involvement in extension. Responsibilities for extension should gradually be handed over to other advisory service suppliers and to the private sector. There is a need for flexibility and adoption of multiple approaches to extension.

The role of the public sector should decrease, but not disappear. The government should continue programs of human resource development and training, information about markets and weather, environmental protection, and the like.

The planning team recommends the further decentralisation of extension activities by devolving responsibilities and means. The Resort Leader must have the freedom to plan, implement, finance, supervise and evaluate his programs according to the specific needs of his clients in the specific Resort.

Each Regional office must be equipped with a small unit assigned to prepare extension publications, (including pamphlets and leaflets for farmers and extension personnel), and to prepare and broadcast radio programs for farmers and other interested parties.

Objectives of Extension

a. Assessment

In order to be efficient, credible and sustainable, an extension service must have a clear definition of its objectives. The agricultural policy of the government influences the objectives of the extension services and the strategies and activities which will be implemented as a result.

If the objective is to reduce poverty, the target population, content, methods and means will be adapted. If the objective is to promote commercialisation and advanced technologies, the extension clients should be commercial farmers and the content of the messages, methods and organization must be adapted accordingly.

At present, there is no clear strategy of extension, no concrete objectives, and no performance indicators.

In order to implement extension activities efficiently there must be a clear definition of the extension services' mission and the criteria to be used for assessing impacts. Such a definition of extension objectives will enable staff to identify different target populations and their needs. It will then be easier to clearly define and focus extension activities to ensure appropriate messages and methods are passed on to each category of farmer. It will also mean that services and resources are used more efficiently.

b. Recommendations

According to this Master Plan, a multi-disciplinary approach to extension should be pursued, targeting different levels of farmers according to their farm types. Traditional small and part-time farmers require a socially-oriented extension approach. An economically-oriented one will be needed for advanced, medium and large farmers.

It is recommended to clearly define objectives specific to each target population. Objectives will be reached through planning activities and clearly measurable expected outputs.

Target Populations

a. Assessment

Understanding the social situation of the farmers, who are the target population, is a necessary condition for the planning of extension activities and the content of technological messages and for the selection of extension methods.

Most agricultural activity in Suriname (outside Nickerie District) is focused in small family-run agricultural farms, ranging from an area of a few hundred square meters to 2-3 hectares. This type of agriculture is characterized as a secondary occupation. The cultivated areas are diverse and include field crops, vegetables, various types of orchards, and pasture land. It should be noted that most of the land that falls into the category of family holdings is not actually cultivated.

Agricultural production is also done by some private farmers and in state farms that need to be rehabilitated.

The agricultural extension services in Suriname are geared to all farmers who have a widely differing range of educational and technical knowledge. The clients to be served by the extension services are traditional, commercial, women and youth. The different target populations need different extension messages and methods.

While farmers do express their desire to be given technical advice and guidance, they do not have much confidence in the extension service and its ability to deliver effective technical advice. This situation could be explained by the apparently inadequate professional abilities of the extension officers to serve different levels of farmers and could also be due to logistical and motivational problems in the extension services. In addition, often there are too many farmers under the responsibility of one extension officer. At the same time much of the extension officer's time and effort is involved in the implementation of administrative functions.

Farmers' participation in extension is very limited and this reduces their motivation and capacity to improve production.

These findings may explain one of the major reasons for the poor performance of the whole agricultural sector. The farmers' negative attitude and low levels of confidence towards the extension service is due to the minimal contact between extension officers and farmers and the weak participation by farmers in the extension process.

Women are a very important target population for extension purposes. Gender equity and access to economic opportunities in agriculture are not given the necessary attention and women are the objects of discrimination in this area. Extension messages are generally disseminated to males.

b. Recommendations

As discussed above, different target groups need different extension methods, content and organization. Again, the different target groups will depend on the national agricultural policy orientation. The target groups for extension will be private advanced farmers or organised groups of advanced farmers cultivating substantial areas using large-scale mechanisation and advanced technologies as well as the small and part-time farmers, including traditional ones, women and youth.

It is recommended that the farmers be classified according to the different farm types for extension purposes. A clear division of farmers into categories will enable the adaptation of extension messages and content to the different types of farmer.

Israeli experience shows that the existence of commercial and less advanced farmers in the same area enhances the adoption of new technologies. Traditional and progressive farmers can learn from the advanced ones, if extension messages are adapted to their specific conditions.

Specific efforts have to be made in order to increase female participation in extension and to develop gender awareness among male extension agents.

Content of Extension Work

a. Assessment

Organizational, professional and motivational aspects influence the content of extension messages and activities.

As already mentioned, most of the extension workers' time and effort goes into the supply of aid program packages and services. This means the extension agents are not being used to their full professional potential.

The technical extension messages, if they are transmitted at all, are too general and unfocused. There is no clear guidance on what to recommend to a traditional farmer and what to suggest to a commercial one. The extension messages are not always adapted to female farmers' needs.

The technical level of the agents is often not high enough to enable them to give good professional advice to the advanced farmers. Messages for advanced farmers are not market-oriented; they focus mainly on the agronomic side of agriculture, but not the economic one.

Extension officers have limited knowledge about the economics of farming (some extension officers have followed the agri-business course, but there is no dedicated specialist in this subject matter in the system). Therefore extension service suffers from very limited or no economic guidance.

b. Recommendations

In the different professional chapters of this Master Plan, improved agricultural technologies are recommended. In order to implement these recommendations, most of the extension agent's time must be devoted to visiting the farmers' fields. There are different ways of making this happen. In the Israeli extension service, one day per week is devoted to administrative duties and during the rest of the week the agents visit farmers. Alternatively it may be advisable to assign some of the regional staff currently involved in both extension and administrative tasks, to be responsible only for the implementation of the "non-extension" programs.

The contents of the different messages have to be adapted to the different levels of farmer. For traditional farmers specific "impact points" in the different crops must be identified. Instead of giving general recommendations, the agents should identify the weaknesses in the techniques being used and focus their recommendations on specific improvements to influence agricultural yields (such as plant protection, timing of irrigation, etc.). Specific practical training will be needed to help extension workers identify "impact points" for their extension activities.

Specific appropriate extension messages on topics such as labour-saving technologies should be adapted for female farmers.

The advanced farmers will need more specific and market-oriented technologies. In the different professional chapters of this Master Plan, specific technical recommendations are made for each one of the proposed improved and new technologies. The content of extension for this level must be more comprehensive and oriented for decision-making.

Besides up-to-date technical information, commercial farmers will need more information about prices and markets, farm management, new irrigation methods, integrated pest management and the like.

The extension agent must be an "advisor" and not only an extension "officer". There is a need to redefine the role of the Aspirant, Junior and Senior extension officers.

The role of the SMS (Subject Matter Specialist) is crucial in this issue, especially for advanced farmers and collaboration with research is required. It is recommended to train senior officers in specific topics in order to serve as Specialists.

Extension Methods

a. Assessment

The methods of extension depend on the farmers' needs, the personnel available, the extension officer's skill level, the total number of farmers to be served by each officer, the types of crops to be grown, and the intensity of technical assistance needed. The methods chosen will influence the cost of extension.

Most of the extension officers' work is done at present in the office. The principal method used is the farm visit but most of the officers visited during this mission claim that they do not visit enough farmers, due to lack of transport facilities.

Extension officers acquired some experience with alternative extension approaches such as Farmers' Field Schools, Good Agricultural Practices and Integrated Pest Management. There are also some demonstrations of technologies in the demonstration plots of the Resort offices, but not enough.

Some trials were also done with the Farmers' Field School, a participatory approach used for conducting focus group discussions with the farmers. This was very much appreciated by the farmers.

The quantity of farm visits implemented by extension officers is insufficient and the quality is doubtful: the rate at which new technologies are being adopted is very low - even very well-proved and efficient technologies are minimally adopted. Consequently, no impact is felt on the yields.

The use of written, technical materials (leaflets, pamphlets and the like), and of radio or TV programs is also very limited.

b. Recommendations

The planning team recommends that extension methods be adapted to the different levels of farmers. Commercial farmers will need more individual farm visits by subject matter specialists (SMS) rather than extension officers. These visits have to be regular, carefully planned, and based on the changing needs of the agricultural calendar. For low-level farmers, more group methods and increased use of the media is advised.

An extension approach that is better tailored to the specific needs of individual farmers is needed, particularly with regard to commercial farmers who require experienced, professional agents**.**

A clear program for farm visits has to be prepared by each extension agent, based on the yearly agricultural calendar. The SMSs have to visit more commercial farmers and become real "advisors". The officers should concentrate their efforts on the medium and low-level farmers, carrying out more farm visits and additional small demonstrations in the farmers' fields**.**

The role of the extension agent has to change from "officer" to "advisor". The scope of the extension messages has to be broadened to become more professional and market oriented.

It is necessary to improve the quality of written documents for extension agents and for different levels of farmers, through a Division of Public Relations and Communications. This division must increase the quantity and quality of radio and TV programs for farmers. It is recommended that the division be decentralised and that a small communications unit be installed in each Region to prepare specific extension aids.

It is recommended that inter-farmer visits become a regular feature. This method is not expensive and, as proven by the Israeli experience, it is very positive. Such visits have been so beneficial to farmers in Israel that growers are paying to participate in these exchanges of information.

One of the most important groups of extension methods to be developed is the participatory one. Involving farmers in participatory planning and evaluation of the extension activities will reinforce the efficiency, credibility, accountability and sustainability of the extension services.

In the future, farmers' involvement and participation in the extension process will also serve to gradually transfer responsibility for extension from the government to farmers' organizations.

The existing LVV infrastructure can be transformed and adjusted to serve as training/demonstration/ information centers.

It is also recommended that new computer-based and other electronic extension methods be developed.

Transportation for Field Workers

a. Assessment

A lack of transport for the extension officers is one of the major handicaps facing the service. Extension work takes place in the farmers' fields and not in the office. Availability of transport influences staff ability to visit farmers, the ratio of extension officers to farmers and the coverage of the service (efficiency and sustainability). It also affects the confidence with which the farmers view the service (credibility and accountability).

b. Recommendations

It is necessary and urgent to solve the transport problem. Without transport and visits to farmers' fields, none of the technologies recommended can be implemented.

It is recommended to check the possibility of a car purchase scheme for field extension personnel. The car will serve for private and work purposes, with field allowances per Km.

Training

a. Assessment

Extension and training are key factors for the modernization of agriculture and the transfer of improved technologies to the farmers.

Training is the acquisition of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies. Training has specific goals of improving one's capability, capacity, productivity and performance.

Although substantial efforts are made to train farmers and extension agents, the theoretical and practical skill level of the field workers remains deficient, particularly in the areas of advanced techniques and technologies. Most of the training sessions are not oriented enough to practical solutions for the farmers. Issues dealing with farm management and marketing have not been developed sufficiently.

Actually, most of the personnel of the LVV suffer from deficiencies in knowledge, skills and competencies and the performance as professionals is inadequate. The educational profile of a large part of the extension staff is too low. The knowledge in extension planning and methods is deficient.

One of the most important activities in extension is planning of advisory services according to the problems of the farmers. The extension officers are not trained in extension planning and methods. Likewise, there is not an extension program of visits to farmers.

The professional knowledge level in agronomy is also deficient and most of the farmers are asking for advice from other farmers and not from extension agents.

In some issues like plant protection problems, extension agents do not have the appropriate knowledge to solve farmers' problems and advice is given by inputs' dealers.

Another training problem is the inexistence of subject matter specialists at the National and Regional level. All the extension officers are generalists.

Training in farm management, commercial issues, post- harvest and marketing is also needed.

It is worthwhile to mention that although there is a need for practical agricultural training in Suriname, there are not enough technical agricultural secondary schools and only a few theoretical agricultural classes. Only few students are choosing agronomic studies at the University level.

b. Recommendations

In order to prepare an adequate training program, training needs assessment must be done by interviews and questionnaires for officials in LVV, field extension officers and farmers. The training needs assessment will orient the different training programs.

Specific training has to be imparted to the local staff, Regional specialists, and selected advanced farmers. The trainees will be selected according to clearly defined criteria.

The proposed approach for training is: In service training. Training will be imparted in selected days, while the extension activities with the farmers will not be interrupted.

Training for extension officers must be continuous and regular, not just once a year. The appropriate periods, content, duration and methods of training will be defined with the LVV, according to the needs of the staff.

According to the recommendations made in the different chapters of this Master Plan, specific training will be needed in seed bed and seedling preparation, irrigation, mechanisation, crop protection, field services, marketing, and new crops.

Specific practical training will be needed to help extension workers identify “impact points” for their extension activities.

The adoption of a market-oriented, client-driven approach to extension means all personnel, particularly marketing officers, will need extra training.

All extension personnel need immediate training in participatory approaches to help them identify the farmers’ real extension needs, to assist in the planning of the extension officer's work, and to improve the evaluation of the impact of extension work.

It is also recommended to establish a monitoring and evaluation system for the different courses and training sessions.

Links Between Extension and Research

a. Assessment

The task of the Department of Agricultural Research is to develop appropriate production technologies aimed at diversifying the agricultural production base and increasing productivity while also conserving the natural resource base.

The general impression among extension professionals and practitioners is that the links between extension and research are very weak at the national, regional and resort levels. The feedback from extension to research and vice versa is inadequate.

There is no clear plan for improving the development, transfer and utilisation of new and improved technologies.

Suriname has a small population and one College of Agriculture. All the personnel in the agricultural sector were trained in the same institution. Similar factors are cited when explaining the good links between extension and research in Israel and Holland - both countries have a small population and a single agricultural training institution. For this reason the Consultants believe that if the professional links between extension and research are improved in Suriname, agricultural success will be a consequence.

b. Recommendations

In order to strengthen links between research and extension, the DAR must promote joint research and extension activities at field level. This includes demonstrations of new varieties in farmers' fields, field days, program committees and Regional Co-ordinating Committees.

The Consultants believe that serious collaboration between extension and research can only be developed at the field level. It is recommended that extension and research personnel from the existing experimental stations are involved in improving practical mechanisms at the Resort and Regional level. This collaboration must be institutionalised and not voluntary.

For instance, researchers could participate in periodical trainings of extension officers and future Specialists (SMSs) in different disciplines. Such training would benefit the extension personnel by improving their knowledge and practical skills. Researchers would also benefit from the continuous feedback they could get on farmers' problems and the rate at which new technologies are being adopted. They could also benefit from the possibility of using extension SMSs as partners in field trials which would be planned together with the farmers.

The Consultants wish to emphasise previous recommendations, which stress the need to concentrate on a participatory approach. Research should be planned in collaboration with farmers and extension agents.

Extension evaluation sessions of the last agricultural season and planning for the next one should be participatory, involving extension agents, researchers and farmers.

National and Regional Committees will be useful only if they plan joint activities at the level of farmers' fields.

Program Planning

a. Assessment

Program planning is not properly done at the National level. There are no clear objectives, extension activities, expected outputs and measurable criteria for monitoring and evaluation.

Some program planning is carried out at a Regional level but farmers are not involved. Therefore at the District level and in the Agricultural Extension Areas, extension objectives do not reflect the plans carried out by the regional staff.

b. Recommendations

The Consultants recommend the application of an appropriate extension planning by defining objectives, targets, activities and expected outputs.

Extension activities should concentrate more on the messages given to farmers, and less on the administrative information and programs. Outputs have to be carefully planned and evaluated in qualitative and quantitative terms.

Extension activities should be planned with the participation of the beneficiaries. This should be done before the main agricultural season and at the end of the production period. This process will improve the efficiency of the program and the involvement of the farmers.

For each activity, operational extension objectives must be defined (what to do, with how many farmers, when, etc.). It will be easier to plan a clear programme of farm visits with this information.

The programme planning process has to consider the different levels of farmers and to plan according to the specific needs of each category of farmers.

Monitoring and Evaluation

a. Assessment

External and internal monitoring and evaluation of extension activities are important tools for improving extension performance. A good evaluation unit could have followed up the widespread criticisms about the gap between research results and the poor performance of farmers. The evaluation and interviews of the farmers have to concentrate on the rate of adoption of new technologies and the reasons for not adopting.

The answers would help the extension services in their search for a solution to the problem.

Actually, most of the reports deal with data and information about farmers and farming activities but not about results of extension activities such as adoption of new technologies and yields and income improvement.

b. Recommendations

Monitoring and evaluation units must be established at the national and regional level. There must be an assessment of evaluation criteria, interviews, questionnaires and studies.

Client impact assessment studies must be conducted in order to evaluate the impact of extension on farmers' yields and income and to improve the services given to farmers.

In order to improve the rate at which innovations are adopted, it is recommended that a survey be conducted among the farmers. The aim of this study would be to find out why farmers are not adopting new technologies: Is it because of a negative attitude towards the technologies? Are farmers missing practical knowledge or do they lack the means to implement the recommended technologies? Answers to these questions would help to bridge the current gap between research recommendations and their implementation in the farmers' fields.

16.4 Final Recommendations

Although it is clear WHAT has to be done to improve extension services to the farmers, it is not always clear HOW it should be done. The planning team recommends that a pilot agricultural extension project be introduced as an appropriate means of testing how to implement improvements in the present extension services.

In the course of the recent study of the extension services' strengths and weaknesses, a proposal for immediate action has been formulated. This proposal contains the rationale and the implementation plan for a pilot project.

The aim of this pilot project is to improve the efficiency and quality of extension activities in order to give a better service to the farmers. This objective will be achieved by adapting the modus operandi of the extension services in a selected area to improve the participation of farmers, the professional abilities of the staff, the quality of recommendations made to farmers (i.e. the extension messages), and extension methods generally.

More specifically, the following extension activities will be improved:

- Appropriate program planning and implementation
- Redefinition of extension areas and farmer categories
- Assessment of appropriate recommendations and extension methods
- Continuous and practical training for extension agents

- Participation of research staff in training
- Efficient supervision, monitoring and evaluation

The major activities planned for this pilot project are:

(i) participative diagnosis of farmers' extension needs with farmers' committees

(ii) redefinition of an extension agent's area, including the number of farmers allocated to each agent

(iii) categorisation of farmers according to the level and type of farm

(iv) role definition and mode of action of the extension agents

(v) organization of continual training for the agents depending on the technologies being transferred to the farmers

(vi) elaboration of work programs for the agents

(vii) planning programs for appropriate supervision

(viii) participation of research resource persons in periodical training of SMSs

It is proposed to organise a workshop to discuss the different implementation problems of such a pilot. During this meeting most of the activities proposed for improving the extension services will be discussed.

17. Agro-Technical Recommendations

17.1 Vegetables and Covered Crops

Agricultural projects have been tested in other CARICOM countries, and many have come to the conclusion that in order to produce vegetables year-round to supply the local market as well as for export, it is necessary to cover the crops in some sort of greenhouse or with plastic mulch. The necessary investment caused hesitation on the part of farmers, and they have only recently begun to establish small farms with relatively small investments and with the assistance of European agencies and the governments of their own countries. This is how projects have begun in Dominica, Jamaica, Antigua, and other large Caribbean islands, as well as in Guyana.

Cultivation for export in the CARICOM area necessitates covering certain crops from rain, such as tomatoes and peppers. Ignoring this need causes the farmer to lose the crop and consequently the export contract, upon not being able to provide the expected quality and quantity.

In southern CARICOM countries such as Suriname, Guyana, Trinidad, etc. covering crops is even more necessary because the amount of precipitation and the length of the rainy season is greater than on the northern islands.

The optimal covering is a simple structure, or a high passable tunnel, preferably with roof ventilation. The center of the structure should be at least 4.5-5 meters in height. The walls may be made out of light insect screening. Within the structure, elevated plots should be erected and covered with plastic mulch above the level of the irrigation hoses, in order to preserve the uniformity of the crop and avoid the use of pesticides as much as possible, and in order to keep the soil moist. The result is clean vegetables with a much lower occurrence of rotting, thereby allowing a smaller cultivation area and a larger harvest output per unit of area, sometimes as much as triple or more.

There is a rationale behind the choice of drip irrigation and the use of plastic mulch for covering the land. The first helps to control the amount of water for each crop. Furthermore, it increases the fertilization efficiency by the application of fertilizers through the irrigation system ("fertigation"). The second reduces weed growth, mitigates soil erosion and improves soil conditions. Mulching can also help to improve crop yields and optimize water use.

The adoption of both techniques instead of the traditional ones represents a conceptual change in Suriname's agriculture that aims to reduce risks, increase yields and optimize the use of raw materials.

For any land and every project, specific soil tests must be performed. In clay soil it is possible to grow most vegetables but the more sensitive ones – tomato, pepper, melon – must be covered or grown only in the dry season, and then there is a concern about continuity of the product required in the market. As part of preparing a farm, there will always be a need to set up a drainage system before planting any crops.

The introduction of new technological components like a greenhouse, drip irrigation, crop beds, plastic mulch, and different methods of fertilization will be closely accompanied by training, including on-site seminars and written material, so that the growers will understand the potential contained in each innovation; otherwise the innovation will not support itself.

17.2 Citrus Orchards

The main recommendation for citrus orchards is to create large plots which are uniformly planted. The trees should be more densely laid out than they are currently, and raised above the drainage channels, so that the tree roots will be above the level of the groundwater and can breathe. As a result, irrigation must be performed by spreading a drip system across the beds. This creates the additional advantage of controlling fertilization through the irrigation system. In combination, these techniques will increase yield.

An additional topic that should be emphasized is the adjustment of planting preparations to the climate conditions in Suriname, in order to ensure optimal output. It is necessary to gather expertise from elsewhere in the world and adapt it for implementation in Suriname. The central recommendations for citrus are as follows:

Lime is to be planted with spacing of 5 x 2.0 meters, which is 1,000 trees per hectare, in plots five meters wide, with one row in the center of each plot on a raised bed. That is, it will be necessary to prepare the land with channels at a distance of five meters apart.

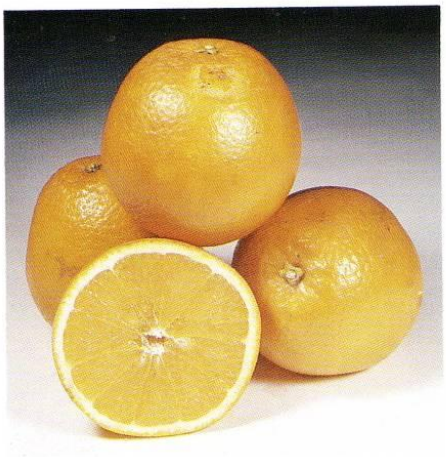
Oranges are to be planted with spacing of 5 x 2.5 meters, which is 800 trees per hectare, on plots arranged similarly to those of the limes.

The recommended species of limes for Suriname are Tahiti and Mexican, half of which will be grafted to Macrophylla and the other half to Rangpur (Cravo) lime. For oranges, Valencia, Pera, Hamlin and Pineapple oranges are to be grafted on Rangpur (Cravo) rootstock.

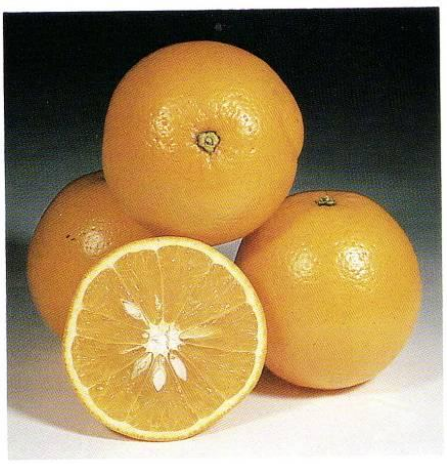
Fertilizers and growth products to be used include NPK (Nitrogen, Phosphorus and Potassium). Limestone is used to raise the pH level of the soil. Most crops and plants grow best in soil that has a pH between 6 and 7, which is slightly acidic or neutral. According to the soil analysis in Alliance, the addition of limestone is recommended for equilibrating the pH.

PERSIAN LIME (LEFT) WEST INDIAN LIME (RIGHT)
The Persian lime is seedless and larger than the West Indian variety

Plastic mulch will be used only during the planting period, in order to prevent the growth of weeds that compete with the trees. This will improve the harvest and reduce the need for pesticides.



PERA
Brazil's most important orange variety



PINEAPPLE
Florida's leading midseason orange

17.3 Aquaculture

As part of a desire to achieve maximal production while preserving the natural resources of Suriname, intensive aquaculture systems are proposed. These systems will allow continuity and consistency of production, so that the export market may be developed. Such technological frameworks are characterized by a number of common parameters as follows:

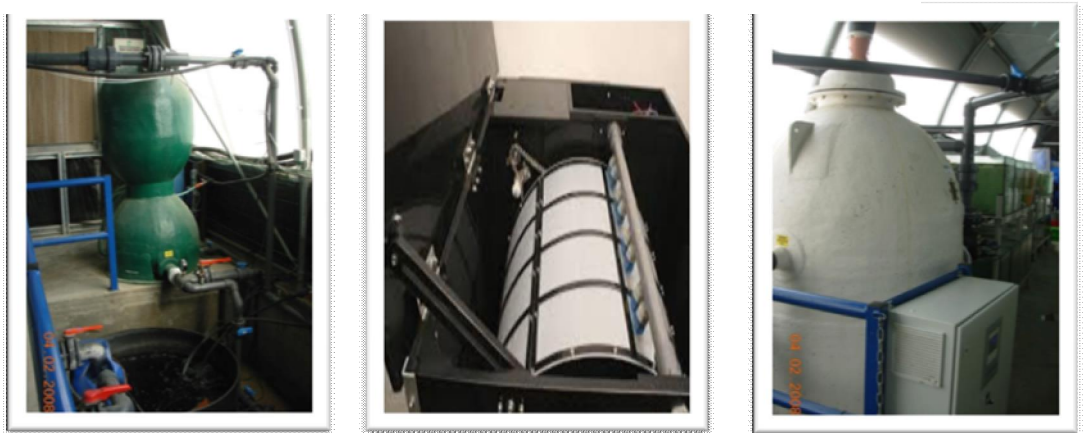
- The systems are built in closed structures, isolated against disease-carrying vectors (birds and other predators). This also protects them against climate and temperature changes.
- The water is treated to make it suitable to the fishes' needs (according to their habitat and growth potential).

A charcoal filter to neutralize chlorine and other chemicals.

Storage tanks which hold water adapted to the needs and parameters of the fish, including pH, temperature, and water hardness. Approximately 5-25% of this water is circulated daily into the tanks in the production facility.

A centrifuge which spins the water from the filters to the cultivation tanks and back to the filters.

A mechanical filter to remove solids and a biological filter to neutralize the poisonous nitrates emitted from the fish. There are also combined filters. The entire filtering system is automatically controlled and washed.



A system which monitors and alerts for important parameters in the water, as well as backup systems for electricity, ventilation, and heating.

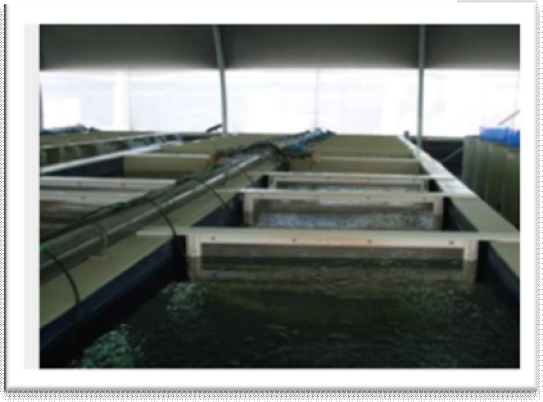
The facilities are adapted to the various stages of cultivation.

Equipment for the production of live young fish to use for feed.

An automated feeding system, controlled by computer.

Unique equipment for sorting, catching, storage before transport, packing and shipping of the fish.

The packing array accomodates pre-transport storage, where a quality control inspection is performed before rapid professional packaging and shipping. (The product's shelf-life is only 24-48 hours.)



A data collection system which allows for a regular work routine protected by strict biological security.

The production plan is established according to the marketing plan. Programs for the genetic programming and care of the fish are established according to the production plan.

17.4 Livestock and Dairy

Should there be a decision to advance in the dairy sector, it would still not be able to compete economically with the imported milk powder from Europe – and thus be an attractive project to local dairies – unless there is a significant change in the production process. The continuation of business as usual will mean a gradual end to the dairy farm sector in Suriname. In order to create a change it will be necessary to build new industrial facilities for cattle, and to further improve the existing homogenization machinery. It is worth considering vertical integration, from the production of feed to the production of raw milk and possibly even through the dairy processing stage. Industrialized production would include the construction of shelters for the cattle, modern milking machines, feed being brought to the cows, improvement of the herd and increased care for its health, and reassessment of the entire production process.

Regarding the beef cattle sector, it is recommended to continue production on the basis of Suriname's relative advantage of expansive potential pasture area.

17.5 Organic Agriculture

The increase in living standards around the world has created a growing demand for organic produce, or cultivation using only natural pesticides and fertilizers, which are perceived to be healthier for consumers and environmentally friendly. In the past decade, the world market for organic produce has grown 8.9% annually, and in 2012, it had a volume of 63 billion USD. Currently, organic agriculture takes around 1% of total farmland around the world.

Suriname has several relative advantages in organic farming:

1. Organic farming requires large, remote areas, so that crops can grow without interferences caused by human activity. Suriname is relatively secluded, distant from industrial focal points, large roads, pollution and external influences.
2. It is possible to establish a wide buffer radius of dozens of kilometers around organic farms, a distinct demand of international standards. For example, the Alliance farm north of the Commewijne River is inaccessible by motorized vehicle. Such conditions may be used in branding efforts while developing organic farming.
3. Suriname has a small population, as well as low population density – less than 4 persons per sq. kilometer. There are relatively low levels of industrialization, meaning that pollution is also low and pressure on natural resources is not intense.
4. The European and North American demand for organic produce is high, and on the rise. Exporting, in addition to accommodating tourists, may prove beneficial for Suriname's economy.

Developing organic agriculture in Suriname should involve joint efforts with local agents, who are familiar with Suriname's physical, economical, social conditions. Ananta Agro NV is an organic farm founded by Maureen Silos, growing organic produce and offering growers interested in organic farming the opportunity to acquire land on her farm. A joint venture may be initiated in order to set up a commercial project or many small community projects.

18. Environmental Concerns

The need to balance between development and the environment has been well known for a few decades. During the past decade, extensive efforts have been made to balance environmental preservation with development trends in Suriname. This is a particularly important issue in Suriname given the country's wealth of natural resources, both in quantity and quality. A particular emphasis is placed on the preservation of the country's virgin rain forests. While it is inevitable that the promotion of agricultural development in Suriname will incur some environmental costs, the Master Plan explicitly aims at evaluating and minimizing these costs and thus creating the optimal balance between the values of agricultural development and environmental conservation.

18.1 Specific Environmental Threats

Most of Suriname's population and most of its economic activity are concentrated on the coastal plain – the Old Coastal Plain and the Young Coastal Plain. This plain's average height is a few meters above sea level. The major city Paramaribo is located at an altitude of 3 meters above sea level, and Totness and Nickerie are at 0-1 meters above sea level. Suriname is located along the Atlantic Ocean, and has a flat topography. It is therefore under a continuous threat from the rising sea level. Many studies have been carried out on the subject, and they point to the expected increase of the sea level by between 20-51 cm by the year 2100. More extreme scenarios talk about increasing heights of 80-180 cm.

Significant increase in the height of the sea level could lead to flooding of low-lying areas on the coastal plain and substantial damage to infrastructure, including in agriculture. In fact, there is already considerable infiltration of seawater and significant erosion on land (In Coronie, and in north Totness, where a dam was recently built along 1.2 km in an attempt to protect the city. Finally, in North Paramaribo, there is clear evidence of infiltration and erosion of the coast to a distance of a few hundred meters, causing flooding and disappearance of farmland below sea level.

18.2 Suggested Course of Action

It can be assumed that the most significant penetration of coastal areas by the ocean were a result of human activities, such as deforestation of mangroves, infrastructure development and agricultural activity close to the beach (as detected in Totness and Northeast Paramaribo). The role of The National Master Plan for the Development of Agriculture in Suriname is to suggest ways of dealing with this phenomenon, the

threat of which is far greater than to agriculture alone. The proposal before us deals with a holistic solution that copes with the problem which affects construction infrastructure and agriculture alike.

The essence of the proposal is to define and establish the role of the coastal strip as a shield for the entire coastal plain of Suriname.

This wide strip that ranges in width from 5-10 km in Nickerie, Commewijne and Saramacca, up to a few meters in Totness and Paramaribo, has a critical importance in protecting the coastal plain. The strip is covered with mangroves in the north, and forest habitats in the center. The mangroves are located among three ecosystems:

- Brackish water – mangroves and salty brackish lagoons, and brackish herbaceous swamps.
- Low swamp forest –swamp wood, including palm swamp forest.
- High swamp forest – shallow freshwater swamp of the coastal plan.

This strip will be declared a nature reserve, which requires limitation on development, infrastructure construction and agriculture. The mangroves will be a natural buffer zone that will prevent the penetration of the sea to the mainland. An additional benefit of the limitation on development in that area is the protection of the spawning areas of sea turtles, allowing for an increase in the population of this rare species.

Figure 27: A schematic illustration of the proposed division between development and coastal protection

The role of the coastal strip will be to protect the development strip directly south of it, as well as the remainder of the mainland. This approach, which also will assist in rehabilitation of the damaged mangrove areas, presents an outline for comprehensive planning for Suriname. Although this element of coastal protection is

beyond the framework of a development plan for agriculture specifically, it is important to the agricultural development policy as well. Agricultural development should be supportive of and integrated into the national development policy in Suriname.

Part VI: Summary and Conclusion

The Master Plan for the Development of Agriculture in Suriname sees agriculture not only as an economic tool in itself, but also as a social and cultural theme, a part of the heritage and tradition of Suriname. As in many countries, agriculture represents values and function beyond food production.

These values include maintaining lands and traditional landscapes, and preserving culture, heritage, ecological and environmental assets. Agriculture provides employment and maintenance as well as nutritional security for the population. The state supports, participates and assists in the agricultural enterprise for the sake of all of these benefits, both direct and indirect.

This plan seeks to modernize, industrialize and specialize the agriculture in Suriname, while also maintaining traditional and communal agricultural structures. The modern and the traditional together will help obtain all the external benefits that agriculture provides.

The combination of these two aspects will make significant strides towards reducing imports, increasing exports, strengthening the national budget, providing diverse employment within agriculture and its related industries, and maintaining the natural settings, traditions and social fabric of Suriname.

Appendix
LVV Annual Report Data

CONTENTS

TABLES

MINISTRY OF AGRICULTURE, ANIMAL HUSBANDRY AND FISHERIES
DIVISION OF AGRICULTURAL STATISTICS

A-1 : AREA GROWING OF CROPS IN HECTARES BY TYPE OF CROP

DESCRIPTION	2009	2010	2011	2012	2013	2014
ANNUAL CROPS:						
Paddy	54.492	53.555	56.930	51.379	58.274	62.211
Maize	10	15	14	11	19	36
Cassava	142	168	146	173	237	255
Other tubers *	60	59	69	125	167	209
Peanuts	23	21	18	26	30	21
Urdi	100	85	80	37	93	139
Other pulses **	22	24	18	20	22	25
Vegetables ***	736	746	718	608	1.021	1.436
Watermelon	80	90	77	63	84	129
TOTAL ANNUAL CROPS	**55.665**	**54.763**	**58.070**	**52.442**	**59.947**	**64.461**
SEMI - PERMANENT CROPS:						
Bananas	1.963	2.081	2.044	2.051	2.173	2.164
Plantains	424	440	417	602	762	781
Pine-Apple	20	20	20	19	20	62
Passion fruit	15	14	15	89	76	67
Pawpaw (papaya)	18	17	13	13	32	41
TOTAL SEMI - PERMANENT CROPS	**2.440**	**2.572**	**2.509**	**2.774**	**3.063**	**3.115**
PERMANENT CROPS:						
Coconut	813	822	570	467	953	1.099
Oranges	1.420	1.414	1.169	1.138	1.235	1.108
Grapefruits	105	113	110	83	84	83
Pummelo	123	120	126	127	127	128
Other citrus ****	254	239	175	141	161	371
Avocado	8	8	5	5	5	11
Mango	91	90	61	54	170	179
Cherry	12	12	20	23	24	24
Other permanent crops *****	175	164	101	117	141	149
TOTAL PERMANENT CROPS	**3.001**	**2.982**	**2.337**	**2.155**	**2.900**	**3.152**
TOTAL AREA GROWING	**61.106**	**60.317**	**62.916**	**57.371**	**65.910**	**70.728**
Total Small+Large scale Farming	**61.106**	**60.317**	**62.916**	**57.371**	**65.910**	**70.728**
Small scale Farming	28.881	30.267	29.614	29.206	31.994	33.022
Large scale Farming	32.225	30.050	33.302	28.165	33.916	37.706

Note:
* Other tubers: Sweet potato, Yautia, Taro and Yam.
** Other pulses: Soybean, Cowpeas and Sieva bean.
*** Vegetables - see Table B-4.
**** Other citrus: Tangerine, Lime, Tangelo, Lemon, Orange Curacao, Yellow- and Red King. From 2012 Qumquat is also included in other citrus.
***** Other permanent crops: Cocoa, Coffee, Soursop, Guava, Sapodilla, Genip, Ambarella, Java apple, Olive, Bread-fruit, Cashew, Duran / Manges, Tamarind, Yellow mombin, Noni, Bilimbi, Rambutan, Malay apple and Star-apple.

Small scale farming: Farms with an area of 0,1 - 12 hectares
Large scale farming: Farms with an area of > 12 hectares

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A-2 : QUANTITY HARVESTED OF CROPS IN TONS BY TYPE OF CROP

DESCRIPTION	2009	2010	2011	2012	2013	2014
ANNUAL CROPS :						
Dried paddy	229.370	226.686	235.298	224.127	262.029	275.851
Maize	24	35	32	29	47	87
Cassava	3.931	4.243	3.334	4.186	7.077	7.129
Other tubers *	719	878	945	1.597	2.324	2.369
Peanut	27	32	26	38	33	31
Urdi	104	92	66	39	98	119
Other pulses **	36	37	24	25	68	136
Vegetables ***	12.344	13.717	13.791	11.435	18.695	24.569
Watermelon	1.582	2.103	1.514	1.219	1.615	2.202
TOTAL ANNUAL CROPS	**248.137**	**247.823**	**255.030**	**242.695**	**291.986**	**312.493**
SEMI - PERMANENT CROPS :						
Bananas	82.267	94.272	85.017	92.391	85.584	77.014
Plantain	14.493	12.330	13.025	18.622	23.426	24.688
Pine-Apple	300	425	350	336	432	1.109
Passion fruit	220	190	208	1.288	1.146	1.035
Pawpaw (papaya)	393	346	262	264	660	811
TOTAL SEMI - PERMANENT CROPS	**97.673**	**107.563**	**98.862**	**112.901**	**111.248**	**104.657**
PERMANENT CROPS :						
Coconut	9.014	8.709	4.389	4.090	10.786	12.880
Oranges	12.709	15.138	16.118	15.566	17.502	14.599
Grapefruit	1.252	1.314	1.544	1.040	1.171	1.053
Pummelo	1.253	1.216	1.386	1.877	2.496	2.484
Other citrus ****	2.755	2.809	2.524	1.964	2.431	3.933
Avocado	153	140	103	102	102	220
Mango	1.639	1.149	767	649	2.567	2.676
Cherry	306	260	601	572	693	692
Other permanent crops *****	2.392	2.167	1.372	1.332	1.650	1.604
TOTAL PERMANENT CROPS	**31.473**	**32.902**	**28.804**	**27.192**	**39.398**	**40.141**
TOTAL QUANTITY HARVESTED	**377.283**	**388.288**	**382.696**	**382.788**	**442.632**	**457.291**
Total Small+Large scale Farming	**377.283**	**388.288**	**382.696**	**382.788**	**442.632**	**457.291**
Small scale Farming	168.739	181.652	175.818	181.415	225.185	234.241
Large scale Farming	208.544	206.636	206.878	201.373	217.447	223.050

Note:
* Other tubers: Sweet potato, Yautia, Taro and Yam.
** Other pulses: Soybean, Cowpeas and Sieva bean.
*** Vegetables - see Table B-4.
**** Other citrus: Tangerine, Lime, Tangelo, Lemon, Orange Curacao, Yellow- and Red King. From 2012 Qumquat is also included in other citrus.
***** Other permanent crops: Cocoa, Coffee, Soursop, Guava, Sapodilla, Genip, Ambarella, Java apple, Olive, Bread-fruit, Cashew, Duran / Manges, Tamarind, Yellow mombin, Noni, Bilimbi, Rambutan, Malay apple and Star-apple.

Small scale farming: Farms with an area of 0,1 - 12 hectares
Large scale farming: Farms with an area of > 12 hectares

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A-3 : FARMGATE PRICES OF AGRICULTURAL AND LIVESTOCK/POULTRY PRODUCTS

DESCRIPTION	AVERAGE YEAR (SRD/KG)					
	2009	2010	2011	2012	2013	2014
ANNUAL CROPS						
Wet paddy	0,56	0,64	0,95	0,86	0,81	0,71
Maize	4,75	4,85	6,00	5,91	6,00	5,93
Cassava	1,65	1,48	1,90	2,85	1,75	1,22
Peanut	6,26	6,00	7,20	7,67	8,63	12,50
Urdi	9,68	9,15	9,50	10,96	10,91	11,18
Watermelon	1,72	1,55	3,40	3,32	3,41	5,30
SEMI - PERMANENT CROPS						
Bananas	1,27	0,97	1,18	1,25	1,20	1,11
Plantains	2,03	1,46	2,61	3,03	3,57	2,02
Pine-Apple	3,96	4,76	5,50	5,24	5,75	5,77
Passion fruit	3,36	4,22	6,24	6,93	6,45	8,71
Pawpaw (papaya)	2,89	3,57	4,90	5,08	6,06	3,94
PERMANENT CROPS						
Coconuts	1,31	1,33	1,50	1,57	1,97	2,81
Oranges	2,37	2,10	3,60	3,46	4,93	3,09
Grapefruit	1,13	1,23	2,90	1,99	2,84	3,53
Pummelo	2,71	2,31	2,12	1,95	2,56	2,38
Avocado	4,54	4,20	4,50	5,54	7,48	6,35
Mango	2,74	2,68	2,70	2,92	2,66	2,06
LIVESTOCK/POULTRY PRODUCTS						
Beef	10,50	12,25	17,50	20,25	20,50	21,00
Pork	8,90	8,88	9,10	10,54	10,25	10,20
Mutton and Goats meat	24,70	27,63	29,25	37,38	29,75	26,35
Chicken	9,50	9,80	10,77	9,85	11,45	11,16
Eggs (per piece)	0,45	0,51	0,69	0,81	0,69	0,80
Milk (per liter)	1,90	1,90	2,50	2,50	2,50	2,50

Note:

a. 1 kg oranges = about 4 pieces (of an average size)
b. 1 kg grapefruit = about 2 pieces (of an average size)
c. 1 kg pummelo = about 1 piece (of an average size)
d. Other citrus: 1 kg tangerine = about 5 pieces (of an average size)
   1 kg lime = about 16 pieces (Surinamese lime)
   1 kg tangelo = 3 - 4 pieces (average size)
e. 1 kg coconuts = 1 piece (average size)

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A-4 : GROSS PRODUCTION VALUE OF AGRICULTURAL AND LIVESTOCK/POULTRY PRODUCTS

DESCRIPTION	IN SRD1000					
	2009	2010	2011	2012	2013	2014
ANNUAL CROPS:						
Dried paddy	128.447	145.079	223.533	192.749	212.244	195.854
Maize	114	170	192	171	282	516
Cassava	6.486	6.280	6.335	11.930	12.385	8.697
Peanut	169	192	187	291	285	388
Urdi	1.007	842	627	427	1.069	1.330
Watermelon	2.721	3.260	5.148	4.047	5.507	11.671
TOTAL ANNUAL CROPS	**183.367**	**219.248**	**298.468**	**271.328**	**325.954**	**337.094**
SEMI - PERMANENT CROPS:						
Bananas	104.479	91.444	100.320	115.489	102.701	85.486
Plantain	29.421	18.002	33.995	56.425	83.631	49.870
Pine-Apple	1.188	2.023	1.925	1.761	2.484	6.399
Passion fruit	739	802	1.298	8.926	7.392	9.015
Pawpaw (papaya)	1.136	1.235	1.284	1.341	4.000	3.195
TOTAL SEMI - PERMANENT CROPS	**136.963**	**113.506**	**138.822**	**183.942**	**200.208**	**153.965**
PERMANENT CROPS:						
Coconuts	11.808	11.583	6.584	6.421	21.248	36.193
Oranges	30.120	31.790	58.025	53.858	86.285	45.111
Grapefruit	1.415	1.616	4.478	2.070	3.326	3.717
Pummelo	3.396	2.809	2.938	3.660	6.390	5.912
Avocado	695	588	464	565	763	1.397
Mango	4.491	3.079	2.071	1.895	6.828	5.513
TOTAL PERMANENT CROPS	**65.755**	**64.723**	**90.209**	**82.099**	**146.184**	**141.617**
LIVESTOCK/POULTRY PRODUCTS:						
Beef	19.856	23.055	33.950	37.463	34.317	34.860
Pork	15.655	16.970	19.629	19.510	19.680	22.899
Mutton and goats meat	405	425	430	568	494	482
Chicken	108.224	117.443	113.494	112.162	96.558	99.335
Eggs	21.046	23.438	22.303	44.079	38.914	42.350
Milk (in liters)	9.377	9.948	13.010	11.995	10.653	10.188
TOTAL LIVESTOCK/POULTRY PRODUCTS	**174.563**	**191.279**	**202.816**	**225.777**	**200.616**	**210.114**
TOTAL AGRICULTURAL &						
LIVESTOCK/POULTRY PRODUCTS	**560.648**	**588.756**	**730.315**	**763.146**	**872.962**	**842.790**

Note:
* Other tubers: Sweet potato, Yautia, Taro and Yam.
** Other pulses: Soybean, Cowpeas and Sieva bean.
*** Vegetables - see Table B-4.
**** Other citrus: Tangerine, Lime, Tangelo, Lemon, Orange Curacao, Yellow- and Red King.
From 2012 Qumquat is also included in other citrus.

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A-5 : NUMBER AND PRODUCTION OF LIVESTOCK/POULTRY BY TYPE

DESCRIPTION	UNIT	2009	2010	2011	2012	2013	2014
LIVESTOCK:							
Total cattle	pcs (head)	53.610	58.150	55.245	57.136	46.060	36.138
Total pigs	,,	28.838	32.125	34.327	32.155	32.524	36.422
Total other livestock *	,,	1.024	888	895	864	908	981
Total sheeps and goats	,,	13.000	12.548	12.392	10.593	10.001	9.831
Total chicken and other poultry **	1000 pcs (head)	5.910	6.150	5.694	6.333	4.955	5.098
PRODUCTION:							
Milk to the Milk Company	1000 ltr	4.935	5.236	5.204	4.798	4.261	4.075
Eggs	1000 pcs	46.769	45.956	32.323	54.418	56.397	52.937
SLAUGHTERED ANIMALS:							
Cattle	pcs (head)	10.722	11.630	11.049	10.407	9.278	8.472
Pigs	,,	24.853	27.627	29.521	27.653	27.176	31.398
Sheeps and goats	,,	1.595	1.487	1.428	1.467	1.327	1.596
Chicken and other poultry	1000 pcs (head)	5.696	6.863	5.854	7.004	4.958	5.251
SLAUGHTERED WEIGHT:							
Cattle	ton	1.891	1.882	1.940	1.850	1.674	1.660
Pigs	,,	1.759	1.911	2.157	1.851	1.920	2.245
Sheeps and goats	,,	16,4	15,4	14,7	15,2	16,6	18,3
Chicken and other poultry	ton	11.392	11.984	10.538	11.387	8.433	8.901
AVG. SLAUGHTERED ANIMALS:							
Cattle	kg	176,4	161,8	175,6	177,8	180,4	195,9
Pigs	,,	70,8	69,2	73,1	66,9	70,7	71,5
Sheeps and goats	,,	10,3	10,4	10,3	10,4	12,5	11,5
IMPORTED MEAT:							
Salted meat - quantity	ton	1.049	1.092	1.052	982	925	888
- value	SRD1000	9.693	9.753	12.702	10.581	13.063	15.089
Chicken and other poultry - quantity	ton	15.516	16.848	14.869	12.408	19.558	17.960
- value	SRD1000	52.250	48.237	59.560	50.898	74.260	79.629
APICULTURE:							
Beekeepers	pcs	23	23	23	40	30	25
Hives	pcs	2.450	2.250	2.250	2.500	2.422	2.400
Honey production	ltr	27.250	27.000	27.250	31.250	23.720	22.650

Note:
* Other livestock = Buffalo's, Horses, Donkeys and Mules.
** Other poultry = Ducks, Geese and Ostriches.

Source: Ministry of Agriculture - Department of Animal Husbandry
Ministry of Agriculture - Department of Agriculture (Apiculture).
Melk Centrale N.V. (Milk Company).
Customs (ASYCUDA)

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A-6: EXPORT QUANTITY AND VALUE OF MARINE FISHERY AND PRODUCTS

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
FISH EXPORTS :							
QUANTITY:							
Fresh fish and fish parts	ton	4.459	4.657	7.633	6.685	8.460	13.680
Frozen fish and fish parts	,,	12.830	13.524	11.028	8.367	12.869	10.310
Fish filets (fresh, frozen, dried etc.)	,,	2.929	2.894	3.294	3.469	4.175	4.851
Smoked, dried and salted fish	,,	138	160	128	62	64	150
TOTAL	**ton**	**20.356**	**21.235**	**22.083**	**18.583**	**25.568**	**28.991**
Value:							
Fresh fish and fish parts	SRD1000	6.226	6.073	12.064	10.712	13.284	23.513
Frozen fish and fish parts	,,	22.158	20.552	21.338	16.929	25.892	20.369
Fish filets (fresh, frozen, dried etc.)	,,	17.460	16.887	23.591	24.046	30.166	35.414
Smoked, dried and salted fish	,,	807	902	886	395	438	861
TOTAL	**SRD1000**	**46.651**	**44.414**	**57.879**	**52.082**	**69.780**	**80.157**
Value/ton	**SRD/ton**	**2.292**	**2.092**	**2.621**	**2.803**	**2.729**	**2.765**
SHRIMP AND MOLLUSCS EXPORTS : **Quantity:**							
Frozen shrimps and prawns**	ton	3.306	6.674	3.605	3.146	4.016	2.691
Other crustaceans	,,	26	18	33	33	37	87
TOTAL	**ton**	**3.332**	**6.692**	**3.638**	**3.179**	**4.053**	**2.778**
Value:							
Frozen shrimps and prawns**	SRD1000	34.920	41.676	52.749	44.901	53.586	38.197
Other crustaceans	,,	363	281	570	247	619	657
TOTAL	**SRD1000**	**35.283**	**41.957**	**53.319**	**45.148**	**54.205**	**38.854**
Value per kg	**SRD**	**10,59**	**6,27**	**14,66**	**14,20**	**13,37**	**13,99**

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

** From 2010 the figures are only for shrimps.
Source: Customs (ASYCUDA)

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A-7 : EXPORT QUANTITY AND VALUE OF AGRICULTURAL PRODUCTS

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
QUANTITY:							
Rice products	ton	51.941	89.412	46.109	56.317	77.161	103.755
Bananas **	,,	58.132	70.239	68.138	62.213	76.585	75.261
Vegetables	,,	2.757	3.239	2.723	2.476	2.806	2.717
Fruit (excl. Bananas)	,,	160	1.122	1.006	611	579	431
Processed vegetables, fruits and plant parts	,,	339	401	792	1.409	648	409
Flowers/Ornamentals	,,	145	102	139	92	54	49
Fish products	,,	20.356	21.235	22.083	18.583	25.568	28.991
Crustaceans	,,	3.332	6.692	3.638	3.179	4.053	2.778
TOTAL EXPORT QUANTITY	**ton**	**137.162**	**192.442**	**144.628**	**144.880**	**187.454**	**214.391**
VALUE:							
Rice products	SRD1000	58.950	105.213	99.664	103.155	132.114	179.814
Bananas **	,,	73.608	67.987	110.986	89.110	110.740	109.446
Vegetables	,,	4.193	5.289	5.179	3.661	4.123	4.746
Fruit (excl. Bananas)	,,	217	1.238	1.517	768	649	505
Processed vegetables, fruits and plant parts	,,	586	711	1.689	2.717	1.681	702
Flowers/Ornamentals	,,	372	404	778	451	675	401
Fish products	,,	46.651	44.414	57.879	52.082	69.780	80.157
Crustaceans	,,	35.283	41.957	53.319	45.148	54.205	38.854
TOTAL EXPORT VALUE	**SRD1000**	**219.860**	**267.213**	**331.011**	**297.092**	**373.967**	**414.625**
TOTAL EXPORT VALUE	**USD1000**	**79.086**	**96.120**	**101.850**	**91.413**	**115.067**	**127.577**

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

** Total export ----> S.B.B.S.(2009-2013), Food and Agriculture Industries N.V. (FAI) (2014) + Small scale farming.

Source: Customs (ASYCUDA)

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A-8 : IMPORT QUANTITY AND VALUE OF AGRICULTURAL PRODUCTS

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
QUANTITY :							
Vegetables and tubers	ton	15.294	15.647	16.332	12.513	17.389	18.318
Vegetable fats and oils	,,	10.805	12.322	12.702	8.510	19.139	13.464
Preparation of vegetables, fruits, and other plant parts	,,	23.210	10.056	11.037	8.734	16.352	14.288
Coffee, tea, maté and spices	,,	391	364	546	348	915	888
Cacao and cacao products	,,	1.022	929	906	709	1.407	820
Sugar and sugar products	,,	19.282	22.626	23.250	16.749	23.513	25.410
Products for human consumption **	,,	7.486	3.868	8.555	7.262	9.904	8.865
Cereals	,,	14.759	38.527	100.715	98.012	28.255	45.697
Flour, starch, wheat	,,	22.041	17.221	12.866	9.883	14.606	11.548
Oleaginous seeds and fruits	,,	675	612	648	564	2.024	1.374
Preparation of grains, flour, starch	,,	3.937	2.246	5.356	4.452	7.011	7.130
Drinks, alcoholic liquids and vinegar***	,,	18.196	17.608	**n.a.**	14.062	35.266	34.034
Floriculture	,,	42	35	87	63	68	137
Dairy products, eggs, honey	,,	3.560	3.621	4.032	3.068	12.546	4.324
Preparation of meat, fish,crustaceans and molluscs	,,	3.635	3.843	2.927	2.408	5.433	4.102
Fruits	,,	2.114	2.000	1.978	1.819	2.740	3.035
Meat and edible offals	,,	16.768	18.285	19.388	13.493	23.011	19.101
TOTAL IMPORT QUANTITY	**ton**	**163.217**	**169.810**	**221.325**	**202.649**	**219.579**	**212.535**
VALUE:							
Vegetables and tubers	SRD1000	18.445	27.690	32.452	18.187	36.278	34.298
Vegetable fats and oils	,,	38.122	43.815	65.936	44.766	96.420	59.611
Preparation of vegetables, fruits, and other plant parts	,,	27.565	31.641	43.298	35.420	66.643	55.111
Coffee, tea, maté and spices	,,	3.172	3.792	6.917	4.483	8.656	8.467
Cacao and cacao products	,,	6.696	5.071	7.194	5.546	13.469	7.373
Sugar and sugar products	,,	35.457	48.560	71.962	48.101	63.778	61.667
Products for human consumption **	,,	66.935	25.396	92.930	78.638	107.739	96.410
Cereals	,,	15.243	27.515	47.779	35.032	40.285	45.996
Flour, starch, wheat	,,	34.569	25.292	23.601	16.963	28.204	21.341
Oleaginous seeds and fruits	,,	2.504	2.416	3.160	2.859	7.561	5.345
Preparation of grains, flour, starch	,,	23.581	13.615	37.836	33.189	68.374	57.103
Drinks, alcoholic liquids and vinegar ***	,,	52.136	50.971	**n.a.**	54.140	286.532	126.010
Floriculture	,,	1.868	662	1.306	1.129	1.395	2.495
Dairy products, eggs, honey	,,	33.750	35.618	51.732	38.441	66.075	62.870
Preparation of meat, fish,crustaceans and molluscs	,,	23.758	24.312	23.742	19.565	39.699	30.440
Fruits	,,	6.905	6.462	8.468	8.205	11.086	16.923
Meat and edible offals	,,	56.245	60.997	87.405	63.918	97.010	97.785
TOTAL IMPORT VALUE	**SRD1000**	**446.951**	**433.825**	**605.718**	**508.582**	**1.039.204**	**789.245**
TOTAL IMPORT VALUE	**USD1000**	**160.774**	**156.052**	**186.375**	**156.487**	**319.755**	**242.845**

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

** Extract, essences, concentrate, yeast, sauce, preparations, soup ingedrients, ice and other products for human consumption.
*** for 2011 n.a. = not available

Source: Customs (ASYCUDA)

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B-1 : AREAS AND QUANTITY HARVESTED OF PADDY

DESCRIPTION	UNIT	2009	2010	2011	2012	2013	2014
PADDY AREAS:							
Standing area	ha	50.790	50.790	50.790	50.790	50.790	50.790
Planted area: Second crop *	,,	26.255	26.840	29.346	24.594	27.840	30.733
Main crop **	,,	28.237	26.715	27.584	26.785	30.434	31.478
TOTAL AREA	**ha**	**54.492**	**53.555**	**56.930**	**51.379**	58.274	62.211
Total area:	**ha**	**54.492**	**53.555**	**56.930**	**51.379**	**58.274**	**62.211**
- Small scale farming	,,	24.193	25.542	25.590	25.189	26.336	26.483
- Large scale farming	,,	30.299	28.013	31.340	26.190	31.938	35.728
Total area by Region:							
- District Nickerie	,,	52.371	51.660	55.856	50.435	56.974	60.103
- Other districts	,,	2.121	1.895	1.074	944	1.300	2.108
PADDY PRODUCTION:							
Second crop	ton	110.560	118.624	120.053	103.633	125.506	136.203
Main crop	,,	118.810	108.062	115.245	120.494	136.523	139.648
TOTAL PRODUCTION	**ton**	**229.370**	**226.686**	**235.298**	**224.127**	**262.029**	**275.851**
Total quantity harvested:	**ton**	**229.370**	**226.686**	**235.298**	**224.127**	**262.029**	**275.851**
- Small scale farming	,,	102.272	114.322	111.697	113.894	125.721	126.266
- Large scale farming	,,	127.098	112.364	123.601	110.233	136.308	149.585
Total quantity by Region:							
- District Nickerie	,,	221.751	219.551	231.772	220.070	256.241	270.014
- Other districts	,,	7.619	7.135	3.526	4.057	5.788	5.837
AVERAGE PRODUCTION/HA:							
Second crop	kg	4,211	4,420	4,091	4,214	4,508	4,432
Main crop	,,	4,208	4,045	4,178	4,499	4,486	4,436
National	,,	4,209	4,233	4,133	4,362	4,496	4,434
Small scale farming	,,	4,227	4,476	4,365	4,522	4,774	4,768
Large scale farming	,,	4,195	4,011	3,944	4,209	4,268	4,187
District Nickerie	,,	4,234	4,250	4,149	4,363	4,498	4,493
Other districts	,,	3,592	3,765	3,283	4,298	4,453	2,769

Note:
Small scale farming: Farms with an area of 0,1-12 hectares
Large scale farming: Farms with an area of > 12 hectares
* Second crop: growing from the second week of November till the end of December.
** Main crop: growing from the second week of May till the end of June.

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B-2 : PADDY PRODUCTION, PROCESSING AND DESTINATION

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
1. Standing area	ha	50.790	50.790	50.790	50.790	50.790	50.790
2. Planted area	,,	54.492	53.555	56.930	51.379	58.274	62.211
3. Cropping intensity	,,	1,07	1,05	1,12	1,01	1,15	1,22
4. Wet paddy (21% moisture)	ton	249.858	246.935	256.316	244.147	285.435	300.491
5. Dry paddy (91,8% from wet paddy)	,,	229.370	226.686	235.298	224.127	262.029	275.851
6. Sowing seed(140 kg./ha)	,,	7.629	7.498	7.970	7.193	8.158	8.710
7. Cattle fodder and transport losses (4% from 5)	,,	9.175	9.067	9.412	8.965	10.481	11.034
8. Dried paddy for processing (5-(6+7))	,,	212.566	210.121	217.916	207.969	243.390	256.107
9. Husk and losses field (24% from 8)	,,	51.016	50.429	52.300	49.913	58.414	61.466
10.Cargo extradition (8-9)	,,	161.550	159.692	165.616	158.056	184.976	194.641
11.Export Cargo **	,,	28.849	36.409	21.887	25.192	42.096	56.022
12.Rest Cargo for domestic processing (10-11)	,,	132.701	123.283	143.729	132.864	142.880	138.619
13.White rice (82% from 12)	,,	108.815	101.092	117.858	108.949	117.162	113.668
14.Export white rice (different broken)	,,	23.092	53.003	24.222	31.125	35.065	47.733
15.Total domestic consumption and in stock (13-14)	,,	85.723	48.089	93.636	77.824	82.097	65.935
16.Bran (18% from 12)	,,	23.886	22.191	25.871	23.916	25.718	24.952
17.Export value of rice production	SRD1000	58.950	105.213	99.664	103.155	132.114	179.814
18. Total Export (11+14)	ton	51.941	89.412	46.109	56.317	77.161	103.755
19. % Export Cargo	%	55,5	40,7	47,5	44,7	54,6	54,0
20. % Export White Rice	%	44,5	59,3	52,5	55,3	45,4	46,0

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

** From 2008 parboiled rice is included (see table B-3).

Source: Export figures - Customs (ASYCUDA)

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B-3 : EXPORT QUANTITY AND VALUE OF RICE BY TYPE AND DESTINATION

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
QUANTITY							
White rice	ton	22.597	52.443	24.183	31.090	34.765	46.508
Broken rice	,,	495	560	39	35	300	1.225
Cargo rice	,,	28.758	36.332	21.789	25.016	42.047	52.312
Parboiled rice	,,	91	77	98	176	49	3.710
TOTAL QUANTITY	**ton**	**51.941**	**89.412**	**46.109**	**56.317**	**77.161**	**103.755**
VALUE							
White rice	SRD1000	27.009	61.685	58.451	53.306	49.599	70.981
Broken rice	,,	1.162	652	82	45	251	1.259
Cargo rice	,,	30.606	42.739	40.906	49.419	82.086	99.882
Parboiled rice	,,	173	137	225	385	178	7.692
TOTAL EXPORT VALUE	**SRD1000**	**58.950**	**105.213**	**99.664**	**103.155**	**132.114**	**179.814**
AVERAGE EXPORT VALUE /TON							
White rice	SRD	1.195	1.176	2.417	1.715	1.427	1.526
Broken rice	,,	2.347	1.164	2.103	1.286	837	1.028
Cargo rice	,,	1.064	1.176	1.877	1.975	1.952	1.909
Parboiled rice	,,	1.901	1.779	2.296	2.188	3.633	2.073
EXPORT DESTINATION Region and Country:							
Caribbean area							
Aruba	ton	141	279	117	2.899	6.939	422
Dominican Republic	,,	-	-	-	-	-	12
Gaudeloupe	,,	542	182	251	165	468	299
Haiti	,,	2.218	14.594	1	-	2.050	6.475
Jamaica	,,	11.046	22.460	36.177	42.077	59.415	65.767
Martinique	,,	313	454	489	460	762	505
Netherlands Antilles	,,	50	-	70	-	-	100
Trinidad	,,	719	698	591	463	675	648
Other	,,	24	-	8	28	-	37
TOTAL	**ton**	**15.053**	**38.667**	**37.704**	**46.092**	**70.309**	**74.265**
South America	,,						
Brazil	,,	-	-	-	500	-	-
French Guyana	,,	889	2.074	2.652	1.437	2.034	1.905
Guyana	,,	11.910	2.892	-	-	-	50
Other	,,	-	-	45	-	-	-
TOTAL	**ton**	**12.799**	**4.966**	**2.697**	**1.937**	**2.034**	**1.955**
North and Central America	,,						
Belize	,,	-	-	-	-	-	-
VS	,,	-	150	-	0	2.000	-
Other	,,	-	3.201	-	750	749	14.700
TOTAL	**ton**	**0**	**3.351**	**0**	**750**	**2.749**	**14.700**
Europe	,,						
Belgium	,,	175	879	25	125	125	-
Germany	,,	-	23	-	-	-	-
France	,,	1.696	1.805	1.500	2.420	1.415	2.100
Netherlands	,,	21.174	27.844	4.036	1.229	405	1.000
Portugal	,,	46	6.169	23	3.523	-	9.215
Switzerland	,,	-	-	-	-	-	-
Other	,,	998	4.998	124	241	124	520
TOTAL	**ton**	**24.089**	**41.718**	**5.708**	**7.538**	**2.069**	**12.835**
Other countries	**ton**	**0**	**710**	**0**	**0**	0	0
GENERAL TOTAL	**ton**	**51.941**	**89.412**	**46.109**	**56.317**	**77.161**	**103.755**

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

Source: Customs (ASYCUDA)

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B-4 : AREA GROWING AND QUANTITY HARVESTED BY TYPE OF VEGETABLES AND EXPORT OF VEGETABLES

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
Tomatoes	ha	65	70	59	55	102	126
	ton	1.065	1.048	741	654	1.284	1.475
Cabbage	ha	46	43	33	22	39	57
	ton	798	1.015	851	595	1.021	1.306
French beans	ha	14	19	19	18	25	29
	ton	178	286	317	300	417	399
String beans	ha	83	89	78	79	130	176
	ton	1.196	1.611	1.228	1.386	1.814	2.464
Tanja leaves	ha	29	35	65	23	45	70
	ton	670	851	1.548	533	933	1.765
Chinese cabbage	ha	26	17	18	19	40	73
	ton	247	207	217	232	442	647
Egg-plant	ha	25	36	35	37	71	96
	ton	630	1.072	1.163	1.087	2.242	2.732
Cucumber	ha	28	26	26	21	46	70
	ton	578	582	602	494	1.131	1.583
Hot pepper	ha	80	68	62	44	98	127
	ton	1.582	1.352	1.462	1.107	2.308	2.821
Pumpkin	ha	33	39	36	35	72	116
	ton	554	673	568	543	1.083	1.533
Carilla (Bitter gourd)	ha	61	63	64	57	73	93
	ton	1.040	1.005	1.242	978	1.259	1.515
Okra	ha	117	104	96	92	121	137
	ton	1.713	1.511	1.468	1.356	1.654	1.928
Egg-plant (bitter)	ha	46	42	35	26	40	62
	ton	940	880	741	580	877	1.248
Other vegetables **	ha	83	95	92	80	119	204
	ton	1.153	1.624	1.643	1.590	2.230	3.153
TOTAL AREA GROWING	**ha**	**736**	**746**	**718**	**608**	**1.021**	**1.436**
TOTAL QUANTITY HARVESTED	**ton**	**12.344**	**13.717**	**13.791**	**11.435**	**18.695**	**24.569**
TOTAL EXPORT OF VEGETABLES:							
- Quantity	ton	2.757	3.239	2.723	2.476	2.806	2.717
- Value	SRD1000	4.193	5.289	5.179	3.661	4.123	4.746
Value per ton	**SRD**	**1.521**	**1.633**	**1.902**	**1.479**	**1.469**	**1.747**

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

** Other annual crops: cauliflower, sweet pepper, bitter green, black nightshade, swamp cabbage, calaloo, leek, shallot, lettuce, vine spinach, sim, bottle gourd calebash, towel gourd, cuanteloupe, chinese radish, pickled gherkin, koendroe, celery, ginger and from 2013 including cantaloupe.

Source: Export figures - Customs (ASYCUDA)

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B-5 : AVERAGE CONSUMER PRICE OF AGRICULTURAL PRODUCTS

DESCRIPTION	(SRD/KG)					
	2009	2010	2011	2012	2013	2014
VEGETABLES *						
Cabbage	5,93	7,13	6,51	7,41	7,11	5,91
French beans	8,99	10,51	9,90	10,93	9,69	10,16
Tomatoes	9,44	10,27	10,93	9,80	12,92	12,45
Egg-plant (bitter)	4,41	6,68	5,53	7,46	7,11	6,30
Cucumber	2,48	2,66	2,61	3,22	3,52	3,26
Egg-plant	4,33	5,55	5,39	7,18	5,99	6,78
Hot pepper	9,17	18,20	8,01	17,05	6,47	11,26
Pumpkin	2,44	3,28	2,93	3,88	2,97	3,13
Carilla (Bitter gourd)	3,53	4,34	4,52	4,67	5,07	4,78
Okra	7,26	9,93	9,53	10,8	8,13	8,24
String beans	7,83	10,47	9,61	11,12	9,73	9,26
Chinese cabbage	7,33	7,44	6,89	6,66	7,34	6,15
Tanja leaves	9,83	9,23	7,26	7,84	6,60	5,74
FRUITS*						
Bananas	1,13	1,13	1,97	2,28	2,18	2,02
Plantains	3,39	2,33	4,36	5,05	5,95	3,36
Pine-Apple	6,60	8,55	9,58	8,74	9,59	9,61
Passionfruit	6,72	6,58	8,33	9,24	8,60	11,61
Coconuts	2,63	2,69	3,03	3,13	3,94	5,61
Oranges	4,75	4,38	7,66	7,36	10,48	6,58
Tangerine	6,55	6,61	7,86	9,96	12,55	13,08
Grapefruit	2,26	2,46	3,39	2,33	3,32	4,13
Lime	12,35	11,51	18,14	24,09	26,25	40,65
Pummelo	4,92	4,20	3,85	3,55	4,65	4,33
Lemon	8,48	7,60	9,71	9,70	12,27	14,75
Tangelo			9,37	6,70	12,81	12,45
Papaya	5,78	4,29	5,99	6,35	7,58	4,92
Avocado	9,07	9,03	9,62	11,79	15,92	13,50
Mango	4,56	4,98	5,00	5,84	5,32	4,11
Watermelon	2,86	2,58	5,71	5,54	5,69	8,83
RICE *						
White rice	2,59	2,27	3,08	3,13	3,00	3,00
MEAT **						
Beaf	20,31	22,42	29,10	32,99	32,84	32,96
Pork	19,61	22,68	21,61	26,35	26,31	26,10
Mutton	38,00	42,50	45,00	57,50	62,50	62,50
Goat	38,00	42,50	45,00	57,50	62,50	62,50
Chicken	12,76	13,77	14,85	15,80	14,63	14,46
Eggs (per piece)	0,72	0,75	0,80	0,94	0,80	0,90
Milk (per liter)	2,75	2,75	3,75	3,75	4,00	4,00

Note:
* Average consumer price from the Central Market in Paramaribo.
** Average consumer price from several butcheries.

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B-6 (1): AREA GROWING AND QUANTITY HARVESTED OF BANANAS

DESCRIPTION	UNIT	2009	2010	2011	2012	2013	2014
AREA GROWING:							
Small scale farming	ha	35	43	82	76	195	186
Large scale farming	,,	1.928	2.038	1.962	1.975	1.978	1.978
- Jarikaba	,,	957	1059	985	977	1001	1001
- Nickerie	,,	971	979	977	998	977	977
TOTAL AREA GROWING	**ha**	**1.963**	**2.081**	**2.044**	**2.051**	**2.173**	**2.164**
QUANTITY HARVESTED:	,,						
Small scale farming	ton	821	872	1.740	1.251	4.445	3.548
Large scale farming	,,	81.446	93.400	83.277	91.140	81.139	73.466
- Jarikaba	,,	41.186	44.300	39.472	45.514	38.442	37.179
- Nickerie	,,	40.260	49.100	43.805	45.626	42.697	36.287
TOTAL QUANTITY HARVESTED	**ton**	**82.267**	**94.272**	**85.017**	**92.391**	**85.584**	**77.014**
Harvested area	ha	1.717	2.061	2.042	2.037	2.165	2.156
Production per ha harvested area	ton	47,9	45,7	41,6	45,4	39,5	35,7

Source: Large scale farming - S.B.B.S.(2009-2013), Food and Agriculture Industries N.V. (FAI) (2014).
Small scale farming - Ministry of Agriculture, Animal Husbandry and Fisheries (Resort offices).

B-6 (2): EXPORT OF BANANAS

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
Quantity	ton	58.132	70.239	68.138	62.213	76.585	75.261
Value	SRD1000	73.608	67.987	110.986	89.110	110.740	109.446
Value per ton	**SRD**	**1.266**	**968**	**1.629**	**1.432**	**1.446**	**1.454**

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

Total export ----> S.B.B.S.(2009-2013), Food and Agriculture Industries N.V. (FAI) (2014) + Small scale farming.

Source: Export figures - Customs (ASYCUDA)

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B-7 : AREA GROWING, QUANTITY HARVESTED AND IMPORT OF PEANUTS

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
Total area growing and production:							
Planted area	ha	23	21	18	26	30	21
Quantity harvested (shelled)	ton	27	32	26	38	33	31
Production value	SRD1000	169	192	187	291	285	388
Value per ton	SRD	6.259	6.000	7.192	7.658	8.636	12.516
Production per ha	kg	1.174	1.524	1.444	1.462	1.100	1.476
District Saramacca:							
Planted area	ha	17	15	13	22	22	13
Quantity harvested (shelled)	ton	20	22	20	33	23	20
Production per ha	kg	1.176	1.467	1.538	1.500	1.045	1.538
Farm price (shelled)	SRD/kg	6,26	6,00	7,20	7,67	8,63	12,50
Consumer price (Central Market)	,,	10,44	10,10	14,54	15,34	17,26	25,00
IMPORT:							
Peanut - Quantity	ton	345	378	387	333	857	186
- value	SRD1000	1.035	1.201	1.582	1.527	3.360	912
Import value per ton	**SRD**	**3.000**	**3.177**	**4.088**	**4.586**	**3.921**	**4.903**
Peanut butter - Quantity	ton	203	380	432	304	883	469
- value	SRD1000	1.464	2.502	3.364	2.809	7.953	4.102

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

Source: Import figures - Customs (ASYCUDA)

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B-8 : AREA GROWING AND QUANTITY HARVESTED BY TYPE OF CITRUS AND EXPORT OF CITRUS

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
AREA GROWING :							
Oranges	ha	1.420	1.414	1.169	1.138	1.235	1.108
Grapefruit	,,	105	113	110	83	84	83
Pummelo	,,	123	120	126	127	127	128
Tangerine	,,	40	37	37	20	20	18
Lime	,,	23	22	21	15	16	18
Tangelo	,,	38	39	40	31	25	25
Other citrus**	,,	153	141	77	75	100	310
TOTAL AREA GROWING	**ha**	**1.902**	**1.886**	**1.580**	**1.489**	**1.607**	**1.690**
TOTAL AREA HARVESTED	**ha**	**1.435**	**1.415**	**1.264**	**1.191**	**1.286**	**1.352**
QUANTITY HARVESTED :							
Oranges	ton	12.709	15.138	16.118	15.566	17.502	14.599
Grapefruit	,,	1.252	1.314	1.544	1.040	1.171	1.053
Pummelo	,,	1.253	1.216	1.386	1.877	2.496	2.484
Tangerine	,,	400	411	419	258	282	231
Lime	,,	368	316	316	219	265	324
Tangelo	,,	380	566	780	550	460	459
Other citrus**	,,	1.607	1.516	1.009	937	1.424	2.919
TOTAL QUANTITY HARVESTED	**ton**	**17.969**	**20.477**	**21.572**	**20.447**	**23.600**	**22.069**
EXPORT CITRUS:							
Quantity	ton	11	159	151	88	68	28
Value	SRD1000	15	195	237	120	78	33
Value per ton	**SRD**	**1.364**	**1.226**	**1.570**	**1.364**	**1.147**	**1.179**

* Remark:
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
2006-2010 -----> USD1 = SRD 2,78 (Average Customs exchange rate).
2011-2014 -----> USD1 = SRD 3,25 (,, ,,).

** Other citrus: Lemon, Orange Curacao, Yellow- and Red King.
From 2012 Qumquat is also included in other citrus.

Source: Export figures - Customs (ASYCUDA)

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B-9 : AREA GROWING, QUANTITY HARVESTED AND CONSUMER PRICE BY TYPE OF TUBER

DESCRIPTION	2009	2010	2011	2012	2013	2014
AREA GROWING IN HA :						
Sweet potato	7	24	27	27	39	51
Cassava	142	168	146	173	237	255
Yautia	25	17	19	36	48	74
Taro	20	14	17	53	68	67
Other tubers	8	4	6	9	12	17
TOTAL AREA GROWING	**202**	**227**	**215**	**298**	**404**	**464**
QUANTITY HARVESTED (TON) :						
Sweet potato	98	457	485	502	661	499
Cassava	3.931	4.243	3.334	4.186	7.077	7.129
Yautia	252	172	191	361	559	735
Taro	248	208	222	664	1016	1006
Other tubers	121	41	47	70	88	129
TOTAL QUANTITY HARVESTED	**4.650**	**5.121**	**4.279**	**5.783**	**9.401**	**9.498**
PRICES (CENTRAL MARKET) IN SRD/KG:						
Sweet potato	5,27	5,17	5,90	5,14	5,92	5,05
Cassava	2,75	2,47	2,86	5,18	3,44	2,39
Yautia	4,19	9,42	6,95	9,49	11,87	15,91
Taro	9,60	4,08	3,89	5,39	6,64	4,85
Other tubers	8,87	8,87	10,36	11,56	15,43	12,49

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B-10 : NUMBER OF LIVESTOCK/POULTRY BY TYPE

DESCRIPTION	UNIT	2009	2010	2011	2012	2013	2014
CATTLE :							
- Beef cattle	pcs (head)	32.166	34.890	33.147	31.221	27.636	25.416
- Dairy cattle	,,	21.444	23.260	22.098	25.915	18.424	10.722
TOTAL CATTLE	**pcs (head)**	**53.610**	**58.150**	**55.245**	**57.136**	**46.060**	**36.138**
PIGS :							
Sows	pcs (head)	2.884	3.213	3.433	3.216	3.252	3.642
Bears	,,	288	321	343	322	325	364
Farrows	,,	25.666	28.591	30.551	28.618	28.946	32.416
TOTAL NUMBER OF PIGS	**pcs (head)**	**28.838**	**32.125**	**34.327**	**32.155**	**32.524**	**36.422**
POULTRY:							
Chicken and other poultry	**1000 pcs**	**5.910**	**6.150**	**5.694**	**6.333**	**4.955**	**5.098**
OTHER LIVESTOCK :							
Buffalo's	pcs (head)	837	721	760	719	743	817
Horses	,,	187	162	134	142	159	156
Donkeys and mules	,,	-	5	1	3	6	8
Total other livestock	**pcs (head)**	**1.024**	**888**	**895**	**864**	**908**	**981**
Goats	,,	5.850	5.648	5.576	4.483	4.024	4.058
Sheeps	,,	7.150	6.900	6.816	6.110	5.977	5.773
Total goats and sheeps	**pcs (head)**	**13.000**	**12.548**	**12.392**	**10.593**	**10.001**	**9.831**

Source: Ministry of Agriculture - Animal Husbandry Department

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B-11 : NUMBER, PRICES AND IMPORT OF POULTRY/PRODUCTS

DESCRIPTION	UNIT	2009	2010	2011	2012	2013	2014
1. Inputs breeding eggs:							
- Import	1000 pcs	2.772	2.734	2.229	2.707	308	161
- Local	,,	5.771	6.148	6.133	6.366	6.611	7.001
2. TOTAL NUMBER OF EGGS	**1000 pcs**	**8.543**	**8.882**	**8.362**	**9.073**	**6.919**	**7.162**
3. Number of chicks	,,	6.407	6.662	6.272	6.805	5.189	5.372
4. Number of broilers	,,	5.446	5.662	5.331	5.784	4.411	4.566
5. Number of other poultry	,,	250	330	252	300	350	350
6. Number of layers	,,	214	158	111	249	194	182
7. TOTAL NUMBER OF POULTRY	**1000 pcs**	**5.910**	**6.150**	**5.694**	**6.333**	**4.955**	**5.098**
8. Meat production	1000 kg	10.892	11.324	10.034	10.887	7.933	8.401
- Average slaughtered weight	kg	1,70	1,70	1,60	1,60	1,60	1,60
9. Meat production of other poultry	1000 kg	500	660	504	500	500	500
Total meat production (8+9)	**1000 kg**	**11.392**	**11.984**	**10.538**	**11.387**	**8.433**	**8.901**
10. Farm price of chicken per kg	SRD	9,50	9,80	10,77	9,85	11,45	11,16
- Chicken meat (Central Market) per kg.	,,	12,76	13,77	14,85	15,80	14,63	14,46
- Other poultry meat (Central Market) per kg.	,,	25,50	33,84	34,92	42,73	39,97	29,50
11. Selling price chicks (Import Breeding Eggs)	,,	2,50	2,70	2,90	3,50	3,80	4,25
Selling price chicks (Local Breeding Eggs)	,,	2,40	2,60	2,80	3,00	3,00	3,25
12. Production and consumption of eggs	1000 pcs	46.769	45.956	32.323	54.418	56.397	52.937
- Value per piece (farm price)	SRD	0,45	0,51	0,69	0,81	0,69	0,80
- Value per piece (consumer price)	SRD	0,72	0,75	0,80	0,94	0,80	0,90
13. Import value breeding eggs	SRD 1000	2.606	2.679	2.786	3.384	706	328
Import value per piece	SRD	0,94	0,98	1,25	1,25	2,29	2,04

Source: Ministry of Agriculture - Animal Husbandry Department
Customs (ASYCUDA)

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B-12 : REGIONAL DECENTRALIZATION OF PASTURE AND PRODUCTION OF ANIMAL FEED

DESCRIPTION	UNIT	2009	2010	2011	2012 *	2013	2014
PASTURE :							
Commewijne	ha	3.450	3.450	3.625	3.625	3.625	3.625
Wanica A	,,	2.185	2.185	2.197	1.631	1.810	1.810
Wanica B	,,	1.590	1.590	1.590	1.590	1.590	1.590
Wanica C	,,	1.500	1.410	1.410	1.410	1.410	1.410
Saramacca	,,	2.645	2.645	2.645	2.645	3.517	3.517
Para	,,	2.000	2.000	2.000	1.695	1.695	1.695
Nickerie	,,	3.000	3.015	2.557	2.557	2.557	2.557
Other districts **	,,	1.000	1.000	1.000	1.000	1.000	1.000
TOTAL OF PASTURE	**ha**	**17.370**	**17.295**	**17.024**	**16.153**	**17.204**	**17.204**
PRODUCTION OF ANIMAL FEED:							
Broiler chicken feed	ton	27.230	33.305	24.773	22.978	29.543	24.529
Layer chicken feed	,,	9.630	7.110	9.428	8.765	11.270	10.781
Hog feed	,,	202	270	345	451	580	455
Cattle feed	,,	325	350	327	313	402	396
Others	,,	1.404	1.585	1.259	1.761	1.213	1.718
TOTAL ANIMAL FEED	**ton**	**38.791**	**42.620**	**36.132**	**34.268**	**43.008**	**37.879**
SUPPLY OF RAW MATERIALS:							
Corn***	ton	14.328	17.143	15.714	10.241	12.183	25.286
Rice/grinding mill	,,	4.294	6.122	4.469	7.162	7.164	7.637
Soybean	,,	4.694	5.485	5.748	8.066	7.180	5.359
Concentrate	,,	8.971	10.199	9.895	9.987	8.691	8.213
Others	,,	1.412	1.718	3.039	4.125	3.931	3.642
TOTAL	**ton**	**33.699**	**40.667**	**38.865**	**39.581**	**39.149**	**50.137**

* Remark
The import and export figures for the year 2012 include the following months:
January till July, November and December.
Due to a technical problem at the Customs, the figures for the other months (August, September and October) are not available.

Note:
** Other districts: Brokopondo, Marowijne, Coronie, Paramaribo and surroundings
*** Corn - Import figures Customs (ASYCUDA)

Source: Ministry of Agriculture - Animal Husbandry Department
Customs (ASYCUDA)

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B-13 : SUPPLY OF MILK AND PROCESSING BY MELKCENTRALE N.V.

DESCRIPTION	UNIT	2009	2010	2011	2012	2013	2014
MELK CENTRALE N.V							
PRODUCTION:							
Purchase of farm milk	1000 ltr	4.935	5.236	5.204	4.798	4.261	4.075
Processed milk powder	,,	2.403	2.328	2.588	2.148	2.882	2.663
TOTAL PROCESSED	**1000 ltr**	**7.338**	**7.564**	**7.792**	**6.946**	**7.143**	**6.738**
Pasteurized milk	,,	5.794	5.665	5.964	5.106	4.348	3.869
Milk products	,,	1.529	1.831	1.810	1.736	2.932	3.012
% milk powder	%	33	31	33	31	40	40
VALUE:							
Purchase of farm milk	SRD1000	9.377	9.948	13.895	12.811	11.377	10.880
Milk powder	,,	3.379	3.375	5.131	3.738	6.421	6.421
Milk powder per liter	SRD1	1,41	1,45	1,98	1,74	2,23	2,41
Farm milk per liter	,,	1,90	1,90	2,50	2,50	2,50	2,50
IMPORT MILK POWDER							
- Quantity	ton	1.391	1.433	1.459	1.663	1.156	2.537
- Value	SRD1000	12.508	14.403	12.683	16.147	15.302	33.732
- Value per ton	SRD	8.992	10.051	8.693	9.710	13.237	13.296
MELKCENTRALE N.V:							
Processed milk powder	ton	355	295	365	303	414	337
SUPPLY FARM MILK MELK CENTRALE							
Indira Gandhiweg	1000 ltr	2.958	3.307	3.322	3.163	2.883	2.874
Uitkijk	,,	610	585	530	483	386	276
Kwatta	,,	302	261	212	178	189	174
Domburg / Houttuin / Livorno	,,	876	934	972	862	719	711
Meerzorg	,,	189	149	168	112	84	40
TOTAL SUPPLY FARM MILK	**1000 ltr**	**4.935**	**5.236**	**5.204**	**4.798**	**4.261**	**4.075**

Source: Melk Centrale N.V. (Milk Company).
Ministry of Agriculture - Animal Husbandry Department
Customs (ASYCUDA)