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Comoros Agricultural Sector Memorandum

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Northern Agriculture Division

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ABBREVIATIONS

ADB	African Development Bank
BDC	Banque de Développement des Comores
BDPA	Bureau pour le Développement de la Production Agricole
BEES	Bureau d'Etudes Economiques et Statistiques
CADER	Centre d'Appui au Développement Rural
CCCE	Caisse Centrale de Coopération Economique
CEFADER	Centre Federale d'Appui au Développement Rural
COMIMEX	Société Comorienne Pour L'Importation et L'Exportation
CREDICOM	Société de Crédit pour le Développement des Comores
EDF	European Development Fund
EEC	European Economic Community
ECU	European Currency Unit
FAC	Fonds d'Aide et de Coopération
ICRISAT	International Crop Research Institute for Semi-arid Tropics
IFAD	International Fund for Agricultural Development
IITA	International Institute for Tropical Agriculture
ILO	International Labor Organization
IRAT	Institut de Recherche d'Agronomie Tropicale
IRHO	Institut de Recherche pour les Huiles et les Oléagineux
MAI	Mean Annual Increment
MPIA	Ministère de la Production de l'Industrie et de L'Artisanat
PPF	Project Preparation Facility
SECMO	Société d'Etudes de Construction de Maisons et d'Ouvrages
SOCOVIA	Société Comorienne d'Importation des Viandes et des Produits Alimentaires
SODEPEC	Société de Développement des Pêches aux Comores
UNCDF	United Nations Capital Development Fund
UNDP	United National Development Program
WFP	World Food Program

Exchange Rate

325 Comorian Francs (CFAF) = US\$1 (1 US dollar)
50 Comorian Francs (CFAF) = FF1 (1 French Franc)
(The Comorian Franc is tied to the French Franc)

COMOROS

AGRICULTURE SECTOR MEMORANDUM

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Summary and Conclusions

i. Agriculture is the dominant sector of the Comorian economy. 80% of the population are directly dependent on it for their livelihood, it contributes 40% of GDP and virtually all export earnings. Despite its importance, the sector has been relatively neglected in the past. The three islands presently constituting the Federal Islamic Republic of the Comoros, Grande Comore, Anjouan and Moheli, gained independence only in 1975 and until then, while a limited range of high value export crops was encouraged, there were few sustained programs to develop food crop agriculture. With low yields, a limited land area of 1,660 km² only half of which is suitable for agriculture, and a rapidly growing population (347,000 in 1980), the country became rapidly dependent on food imports, especially on rice and meat. Imported food stuffs now account for approximately 40% of calorie intake, and constitute a heavy foreign exchange burden.

ii. The Government has adopted a strategy of food self-sufficiency, and the basic institutions for development of a rural extension network have been created. The strategy is being supported by a number of rural development projects, but is still in its initial stages. Programs are underway to improve productivity of bananas, maize, legumes, cassava and coconuts, and to encourage poultry production. Land terracing programs have begun. Projects to encourage production of fish and the cash crops of vanilla and cloves have met with mixed success, and not enough has been done so far to improve livestock, or to control deforestation and erosion.

iii. This document, the first agricultural sector memorandum on the Comoros, provides, after a general introduction in Chapter 1, a description of the food crop, export crop, livestock, fishing and forestry subsectors in Chapters 3 to 5. Chapter 6 describes agricultural marketing and agro-processing, while Chapter 7 describes the major agricultural institutions, training and manpower constraints. Chapter 8 describes investments underway and planned, while Chapter 9 summarizes the main constraints and recommendations for improvement by subsector.

Land Potential

iv. The scarcity of good agricultural land is probably the major constraint to increasing agricultural productivity. While about half the land area is cultivable, a maximum of only 51,000 ha is suitable for food crop cultivation. Furthermore, this area includes considerable land with very steep slopes and fragile soils vulnerable to erosion, which would more appropriately be cultivated with perennial crops. Slopes steeper than 60% cover nearly half of Anjouan and 40% of Moheli. As a result of the islands' fast growing population, reduction of fallow periods, and cultivation of increasingly steep slopes, soils over much of the islands' area are seriously degraded.

v. Partly because of the scarcity of good land, partly because of low yields, lack of alternative sources of livelihood and the poverty of most of the population, nutritional levels are currently very poor. Estimated daily food supplies per person are only 1943 calories and 47.1

gms of protein, compared with an average for low income countries of 2,120 calories. Furthermore the diet is very low quality, with the bulk of both calories and proteins being provided by starches. Consumption of imported rice is considerable even in the relatively fertile uplands, the main food crop producing areas, illustrating the extent of the food deficit in Comoros. Indeed, in order for Comoros to attain self-sufficiency, food production would have almost to quadruple over the next 25 years. The goal is thus unlikely to be attained. Furthermore, it should not be pursued at the expense of export crop promotion, Comoros' sole source of foreign exchange, and consisting mostly of perennial crops well suited to the country's steep slopes.

vi. The confused state of land tenure may be a further constraint to agricultural development. Before independence, much land was controlled by large land owners and colonial estates. In addition there are communal lands, lands owned by women, and lands owned by individual farm families. During the previous regime, cadastral records were burnt and some lands confiscated, and although they have now in principle been returned to their owners, increasing population pressure has encouraged the development of informal share cropping arrangements. These may make better use of land than the large land owners, but the lack of clarity may impede badly needed land improvement measures such as erosion control terracing; or maintenance of perennial crops.

Foodcrops

vii. A mixture of tree and arable crops is grown largely for subsistence. Along the drier coastal areas, coconuts are a basic staple, with bananas, cassava, breadfruit and some maize. Bananas, cassava and maize are also grown in the wetter, more fertile uplands, together with rice, pigeonpeas, cocoyams and vegetables.

viii. Foodcrops cover a total area of approximately 40,000 ha, and coconuts, grown both for subsistence and, though less and less, for export, a further 30,000 ha. Nearly one third of the foodcrop area (excluding coconuts) is devoted to upland rice, although this contributes only 8% of calories. Maize, legumes, bananas and the tubers are all more efficient in terms of production of food value per ha, and maize and legumes furthermore maintain soil nutrient balance better. It must be emphasized that all figures on production, and yields for all subsectors, are highly tentative, since there is no data collection service and no recent agricultural census. It is thus difficult at present to monitor the progress of ongoing projects, or to plan new projects. More detailed knowledge of farming systems, and establishment of a data collection, monitoring and planning unit are urgently needed.

ix. Agricultural techniques are simple. Use of hoes and rakes is uncommon, use of improved seed is very rare, and fertilizer and insecticides are unknown. Yields are low, averaging 300 kgs/ha for rice, 5,000 kg/ha for the roots and tubers and 7,000 kgs/ha for bananas. A project to increase food self-sufficiency by encouraging cultivation of improved maize in association with legumes is currently underway with EDF support. While technically the project is well conceived, consumers are likely to be reluctant to eat maize when they are accustomed to rice.

Yet measures to encourage adaptation, e.g. by taxing rice and subsidizing maize, would be administratively very costly and politically extremely unpopular.

x. The main constraint to the improvement of foodcrop productivity is the development and extension of technical packages appropriate to Comorian soils and farming systems. Progress is being made through the newly created rural extension network, the EDF supported project and an applied research project supported by FAC, but improvements, inevitably will take time.

Export crops

xi. The main export crops are ylang ylang (a tree whose flowers are distilled for a perfume base), cloves, vanilla and until recently, coconuts. The first three cover an area of approximately 9,000 ha. The value of export earnings fluctuate widely from year to year but in 1983 was an estimated CFAF 6.5 billion, mostly from vanilla and cloves. Exports of copra are now negligible, and are unlikely to recover much, given the poor price prospects and the increasing demands of the population for local consumption.

xii. While ylang ylang is grown both on smallholdings and on larger estates, both vanilla vines and clove trees are grown by small farmers, scattered among foodcrops. Yields particularly of vanilla are low. Improved crop husbandry and harveting is required, and the quality of processing needs to be improved, particularly for vanilla and ylang-ylang. Effective extension to improve cultivation and processing could increase productivity of the three main export crops very substantially.

Livestock

xiii. While animal husbandry is secondary to agriculture, it is nevertheless of considerable importance, and most farm families possess at least one head of cattle or a small ruminant. It is estimated that there are approximately 42,000 head of cattle, 22,000 goats, 3,000 sheep and 49,000 poultry or rabbits in the Comoros. Livestock productivity is reduced by poor nourishment of animals through deterioration of grazing area, by insufficient water particularly on Grande Comore, where there are very few natural springs, by high incidence of internal parasites, and, especially for cattle, by degradation of the genetic stock. Indeed, at present most meat consumed in Comoros is imported; local meat production is estimated at only 600 tons annually, compared with an average of 1,000 tons for imported meat, which represents a substantial foreign exchange cost. Productivity improvements could be brought about by simple health measures, provision of water catchment areas on the uplands, and improvement of grazing areas and forage crops in association with agriculture and land terracing. These measures would require the creation of a small livestock service within the rural extension network.

Fisheries

xiv. The present fish catch is estimated to be approximately 4,000 tons per year; thus fish make a significantly greater contribution to protein intake in the Comorian diet than meat. About 1,800 tons comprise species found on or near the continental shelf, which is narrow with rather poor production potential, estimated at 2,600 tons per year. A further 2,200 tons comprise deep sea pelagic species, especially tunny fish. The production potential of Comorian territorial waters is considerably greater, estimated at 12,000 tons per year, within a 50 km radius of the islands' shores. Production at present is limited by very simple fishing techniques (simple canoes powered by paddle or sail, lines with a single hook), by the lack of landing, preservation or marketing facilities. Most fish is eaten fresh in the coastal areas and does not reach the uplands. A project is underway with ADB support to improve the productivity of artisanal fisheries through improvements in fishing equipment, fish storage and marketing. Development of industrial scale fishing from Comoros' deep sea territorial waters cannot be envisaged while there are no adequate ports, boat maintenance or fish conservation facilities.

Forestry

xv. Indigenous forests probably cover about 17,600 ha at present, and wood production is one of the major activities of the island; wood is almost the sole source of fuel for cooking, but wood is used also in construction, ylang ylang distilling and lime kilns. Present wood consumption is estimated at 5,200 m³ for timber, 350,000 m³ for fuelwood and 10,000 m³ for poles.

xvi. Existing forests are being rapidly degraded as foodcrop cultivation spreads into forest areas, and forests which are exploited are not renewed; there are no forestry management and few reforestation or social forestry programs, even on the forest lands currently controlled by a large estate. Deforestation is contributing to soil erosion, while there is likely to be a substantial wood deficit by the year 2000. Importing wood and domestic fuel would constitute considerable foreign exchange costs. At present an integrated forestry management and land conservation service exists only in principle. Creation of such a service would permit management and maintenance of existing forests and of reforestation programs, and monitoring of land terracing and soil conservation programs in association with livestock and agriculture. Such a service should form part of the rural extension network.

Marketing

xvii. Foodcrops and livestock are produced largely for subsistence, with only an estimated 10% marketed. Government does not intervene and prices are determined by market forces. For imports the situation is less clear. Rice is imported by a newly created government body, the Office du Riz, and government allocates the right to distribute rice internally to a limited number of wholesalers. It is important that those who can offer the most competitive storage and distribution facilities are allocated these rights. The retail price of rice reflects import parity prices and is not subsidized. Meat is imported and sold internally through a parastatal, SOCOVIA, which has cold storage facilities in the main towns

and distribution points countrywide. SOCOVIA made a loss in 1982, due to reduced imports and revenues from meat sales. Meat prices in general, however, also reflect import parity prices. Government pricing policy is thus liberal, and pricing and marketing policies do not constitute an impediment to local production, whose main constraints, as described above, are caused rather by the difficulties in developing clear technical solutions for increasing productivity and by population pressure on the land.

xviii. Export crop marketing is mostly handled by a limited number of exporters, many of whom are also substantial producers. Producer prices are freely floating and fluctuate widely from year to year, resulting in over reaction by farmers; some ylang ylang plantations were uprooted when there was a price slump in 1979-80, while clove trees are probably being overplanted because of the present high prices. Revenues per hectare for vanilla and cloves are at present substantial compared with foodcrops. However, the markets for Comorian exports are fragile and unpredictable. Vanilla and ylang ylang are vulnerable to synthetic substitutes, while clove prices are likely to fall sharply when recent plantings in Brazil and Indonesia (the main consuming country) mature. In view of these uncertainties, efforts over the next few years should be concentrated on improving the productivity of existing plantings and the quality of processing, rather than on expansion in area of export crops.

xvix. The destination of over 50% of Comorian exports by value is France, and the concurrence of a limited number of exporters with a few traditional importers may result in a marketing policy which is less aggressive than it could be. Government has established a Stabilization Fund with IDA support, which would be responsible for setting minimum producer prices and exporters' margins, improving quality control and promoting new markets for Comorian exports.

xx. The climate on Comoros is favorable for the cultivation of a large variety of potential export crops, including coffee and tea, and luxury crops such as lychees, pineapples, guavas and macadamia nuts. The first two, however, could not be competitive with the major producers, given transport costs, while production of luxury perishables requires guaranteed supplies and rigorous quality control, which other islands in the Indian Ocean can probably better provide. Nevertheless, there may be scope for exports of some high quality fruits; this is best left to the private sector, with credit facilities made available through the banking system.

xxi. Agro-processing industries on Comoros, apart from distilling of ylang-ylang, drying of cloves and copra and curing of vanilla, are limited to the manufacture of soap from copra. Establishment of new processing industries is constrained by the limited market, high transport costs, difficulties in obtaining spare parts and imported inputs, and unreliable power supplies. Potential, at least in the short term, is limited.

Agricultural Institutions

xxii. The rural extension network was established only in 1980 with the creation of the CEFADER/CADER system. The aim is to establish rural extension centers (CADERS) throughout the country, each serving 20,000 to 30,000 rural population with an average of 10 extension workers and 2 home economists. Projects currently undertaken through them include rural water supplies, land terracing, vegetable cultivation, cultivation of improved maize with legumes to replace rice and poultry rearing. At present 9 CADERS exist, but there are plans to establish 2 more over the next 2 years, covering most of the country. They are controlled by a federal level body (the CEFADER) which provides technical supervision and support.

xxiii. The system has been established with UNDP/FAO support, and is at present heavily dependent on technical assistance. A major constraint to its effectiveness has been the uneven quality of extension staff, who have, furthermore, frequently been poorly supervised, without a clear work program or technical message. The problem is being addressed and clear work programs, with visit and training schedules, should be established for all extension staff by late 1984. The research/farming systems unit established with FAC support in 1983 should improve the development and dissemination of improved technical packages, while it is recommended that the government apply for assistance from the FAO fertilizer program, to test fertilizer response and develop a fertilizer package appropriate to the Comoros. The CEFADER/CADER system appears basically sound, and it is recommended that most assistance to rural development in the Comoros be directed towards the strengthening of this rural service network. Inevitably, much assistance in the initial years will comprise technical assistance and training.

xxiv. Indeed the most important constraint to development of Comorian rural services is lack of trained manpower at both senior and middle levels. While a substantial number of Comorians are undergoing degree-level training abroad, there is at present no systematic initial training of extension level staff; they are trained through in-service schemes and secondment to existing CADERS. The problem is being addressed through the construction of an agricultural training school on Moheli, a project supported by IDA. While it will be able to train general extension staff, the specialized knowledge needed for livestock and forestry work will require training abroad. It is essential that the school is adequately staffed, if necessary initially by technical assistance.

xxv. Agricultural credit systems have only recently been established. (Repayment rates for tools sold on credit through the EDF project were poor and the program has been discontinued). One system, established with a UNCDF grant, provides credit without interest or guarantee, the other, by the Development Bank of Comoros, requires 25% contribution from

borrowers and interest rates of 8% to 11%. The first is administered by CADER staff and there are administrative problems.

Investment Program

xxvi. Chapter 8 summarizes the rural development projects proposed and underway. Ongoing and planned foreign aid to the rural sector is substantial, US\$48 million in total and agricultural investment comprises 16% of the 1983-86 Interim Investment Program. Much of this aid is grant money, and the remainder is on highly concessionary terms and includes substantial training and technical assistance components. Where construction of infrastructure envisaged in new projects has proved inappropriate, in most cases the funds have not been spent, rather than the buildings constructed and then not maintained. Nevertheless it is important that investments of the level envisaged do effectively increase agricultural production and rural income, and that the institutions and services created can be effectively operated by government. It is essential too that the recurrent cost implications of ongoing projects are quantified: Government budgetary procedures are weak and need to be clarified.

xxvii. In 1982 only 1.6% of government's recurrent budget was allocated to agriculture. Successful operation of the agricultural, forestry, livestock, research and data collection services within the CEFADER/CADER system would cost approximately US\$1.1 million annually, 3.6% of the estimated current value of agricultural production and 8% of the government's recurrent budget for 1983, which is expected to increase substantially in 1984. The services should, therefore, be cost-effective in terms of increased agricultural output, and sustainable by government. Substantial foreign assistance will be required over the next 5 years, however, to assist them to establish and operate effectively.

Recommendations

xxviii. Chapter 9 summarizes the main problems and recommendations by subsector. The overriding constraint is the scarcity of fertile agricultural land combined with a rapidly growing population. In view of the nature of Comorian agricultural land, much of which is more suited to the cultivation of perennial rather than annual crops, and of the need to maintain export earnings, while the goal of government to increase foodcrop productivity is supported, it is unlikely that complete food self-sufficiency will be achieved. Moreover this goal should not be pursued at the expense of export crops.

xxix. The best strategy, therefore, is probably to maintain relative export and foodcrop areas approximately as they are at present, and to concentrate on improving the productivity of both. With this overall strategy as the goal, the major recommendations would be the following listed in order of priority: (i) development of suitable and acceptable technical packages for farmers; (ii) improvement of the level of skills of extension staff; (iii) clarification of the land tenure situation (without this rehabilitation of tree crops in particular would be very difficult); (iv) intensification of erosion control and social forestry program; (v) better quality control and cost-efficient processing of export crops;

(vi) development of an agricultural data collection, project monitoring and planning unit; (vii) establishment of a livestock service to increase meat production; and (viii) establishment of a forestry and land conservation service. Recommendations (i) and (ii) are already being addressed, although, even if the programs are successful, benefits will take time, (iv), (vi), (vii) and (viii) would be addressed through the Rural Services project currently under preparation with IDA and IFAD assistance and (v) would be handled through the Stabilization Fund with CEFADER/CADER extension staff. It is recommended that a land tenure study be carried out.

COMOROS

AGRICULTURAL SECTOR MEMO

SECTORAL BACKGROUND

Chapter 1 - General Background

1.01 The Comoros Archipelago, located between the northern end of Madagascar and the African mainland, consists of four islands, Grande Comore, Anjouan, Moheli and Mayotte, which is still under French administration. The population of the three islands under Comorian Government is approximately 365,000 and very largely rural. Twenty percent live in the eight towns of 5,000 people or more, while the principle town, Moroni, has a population of only 25,000.

1.02 Agriculture provides the livelihood of 80% of the people, while it contributes about 40% of GDP^{1/} and over 97% of export earnings. It is likely to continue to be the main source of growth through the 1980's. The industrial sector is very little developed, consisting mostly of simple agricultural processing. Comoros has no mineral resources, while the distance of the islands from major population centers, poor communications and the lack of a good natural harbor are drawbacks to the development of manufacturing. Transport links between the islands are very poor, though recent investments have substantially improved road infrastructure. Furthermore, the skill level of the population is low. Adult literacy rates are only about 20%. Health conditions are exceptionally poor. Life expectancy is only 46 years and child mortality rates are high. Malnutrition is wide spread and malaria hyperendemic.

1.03 Despite its importance to the economy, agricultural land is scarce on Comoros. The three islands have a total area of 1660 sq. kms; however, only about half of this is suitable for pasture or cultivation. Much of the land is steeply sloping, and is better suited to a mixture of tree crops and pasture than arable crop cultivation. With a population growth of 3.6% per year ^{2/} in the 1966-80 period, land pressure in many areas is intense.

1.04 The maps illustrate the broad pattern of rainfall on the islands, while Annex 5 provides some meteorological data. Temperatures vary little year round, and while the main rains fall between December and June, over much of the islands' area there is precipitation in every month. There are wide microclimatic variations, however. Annual daily maximum temperatures vary from 33°C on the coast, to 16°C at the highest elevations. While rainfall is 4,000 mms. or more in the highlands, with

^{1/} See Annex 2.6.

^{2/} This exceptionally high rate was caused partly by immigration following the expulsion of Comorians from Madagascar.

almost no dry season, it averages 2,500 mms on the west coast, with most precipitation occurring between December and May. The dry eastern coasts, however, are drought prone, with annual precipitation 1,000-1,200 mms, and a rainy season of only 3 to 4 months.

1.05 Because of the topography of the islands, difficult communications and transport and also for commercial reasons, under the colonial administration emphasis was placed on high value cash crops. They could tolerate steeply sloping, uneven soils and high transport costs were not a serious barrier to exports. The main tree crops developed were ylang-ylang (whose flowers are distilled for perfume base), coconuts and cloves. Production of vanilla, which grows well under a forest canopy, was also encouraged. Little was done to improve foodcrop agriculture, and a rural extension service was not created.

1.06 A mixture of tree and arable crops is grown largely for subsistence. Along the coast, coconuts are a basic staple, with bananas, breadfruit, cassava and some maize. Bananas, cassava and maize are also grown on the uplands in the interior, with rice, pigeonpeas, cocoyams and vegetables. Agricultural techniques are simple, a simple metal tipped stick being the main agricultural implement. Use of hoes and rakes is uncommon, use of improved seed is very rare, and fertilizer and insecticides are unknown. The bush fallow system is practised but fallow periods have had to be reduced or abandoned as population pressure has increased. Agricultural institutions are little developed and only since 1980 has an extension service been established, which does not yet cover all the islands' population.

1.07 Following rapid population growth and neglect of the traditional foodcrop sector, Comoros became increasingly dependent on imported foodstuffs. By 1965, rice imports were 13,000 tons for a population of 240,000, equivalent to over 500 calories per person per day or one quarter of calorie consumption. The pattern has continued since independence, and in 1982 rice imports were 25,000 tons (about 650 calories per person per day). Food accounted for over 30% of the value of imports in 1980. Recognising the increasing financial burden of imported food, the Government has recently adopted a strategy to increase food self-sufficiency through improved farming and land conservation techniques.

Chapter 2 - Land Use, Food Requirements and Land Tenure

(i) Land Use

2.01 The soils of the archipelago are of volcanic origin but their fertility varies widely. Except for recent volcanic formations which cover 8% of the area of Grande Comore (the only island with active volcanoes) and will remain sterile for some time, most soils are in a more or less advanced state of degradation. Relief, rainfall and the development of cultivation practices brought about by rapid population growth have all fostered harmful erosion effects on soils whose structure makes them erosion-prone. The relief of the islands is generally very steep:

gradients below 13% are found on less than 20% of the area of Anjouan and Moheli, while slopes steeper than 60% cover nearly half of Anjouan and nearly 40% of Moheli. On such steep slopes, rainfall of 2000 mm and even over 3000 mm a year in the areas exposed to the south-westerly trade winds, inevitably causes severe erosion when plant cover is not maintained at a suitable level. Yet protection from erosion is reduced as more steep land is brought under cultivation and fallow periods are eliminated as a consequence of rapid population growth and the reduction in land area per inhabitant. The soils of the archipelago receive practically no fertilizer either in the form of mineral fertilizers or of organic manure, they are very stony, and their fertility is well below what might be expected from their volcanic origin. In some places it has reached critical levels.

2.02 An inventory of cultivable land and an agroclimatic study was carried out by the Institute for Tropical Agronomic Research (Institut de Recherches d'Agronomie Tropicale -- IRAT) beginning in 1971. These studies provided the basis for the preparation of a series of maps and of proposals for rational agricultural use which have provided the Government with an excellent tool for land-use planning. The studies concluded that 96,535 ha, or 58% of the total land area of the Comoros, was suitable for agriculture. (61% of the area of Moheli, 62% of Grande Comore, but only 47% of Anjouan). On the basis of standard criteria of gradient, stoniness and soil depth, the studies in addition classified nearly 80% of this land as more suitable for perennial crops (including fruit trees, export crop trees and coconut palms), with only 17,085 ha more suitable for annual food crops. This area was clearly inadequate to support the food self-sufficiency strategy desired by the Government. At the Government's request, IRAT upgraded certain soil classifications, applying less severe selectivity criteria. The area suitable for annual food crops was thus increased to 51,215 ha. (See Table 1). The figures compare with present land-use in Comoros; about 40,000 ha are devoted to foodcrops, including bananas (see Table 4), and 39,000 ha to the major tree cash crops and coconuts (para 3.16).

Table 1 - Land-Use Potential On The Comoros Islands

	<u>Anjouan</u>	<u>Grande Comore</u>	<u>Moheli</u>	<u>Total</u>
Total Area (ha)	42,400	102,500	21,100	166,000
Population	137,600	192,200	17,200	347,000
Density hab/Km ²	325	188	82	209
<hr/>				
Land with Agricultural potential (ha)	19,930	63,675	12,930	96,535
Density hab/Km ²	690	302	133	359
<hr/>				
Mixed Foodcrops (ha)	13,435	27,685	10,095	51,215
Density hab/Km ²				
Foodcrop Land	1,024	694	170	678
Perennial Crops (ha)	6,495	35,990	2,835	45,320
Non-Cultivable (ha)	21,325	37,450	7,895	66,670
(of which allocated for reforestation [ha])	(16,015)	(2,685)	(4,320)	(23,020)

Source: IRAT 'Les Terres Cultivables des Comores' M. Brouwers, E. Latrille, G. Subreville, August 1977, and 1980 Population Census.

2.03 Table 1 illustrates two points. The first is that, with 6.78 inhabitants per hectare of land suitable for food crops (in 1980), and applying the principle that approximately one hectare could potentially provide the minimum needs of a family^{3/}, the total area that could potentially be allocated to food production is barely sufficient to supply the needs of the present population. Moreover, this self-sufficiency would only be achievable by considerably upgrading soil classifications. Without substantial improvement in soil fertilities, it would be impossible to obtain the same yields on the 34,000 ha. which have been reclassified as on the original 17,000 ha. Furthermore, part of the land which would have to be devoted to food crops is at present occupied by perennial crops, Comoros' sole source of export revenue. Secondly, while food self-sufficiency could just be achieved for the present population of the archipelago as a whole, there are substantial differences between the three islands: Grande Comore is at the limits of self-sufficiency, Moheli still possesses land amply exceeding the needs of its population, while on Anjouan there are at present more than 10 inhabitants for every hectare of land suitable for food crops -- about 50% higher than the number consistent with self-sufficiency. While food self-sufficiency could in theory be possible at present, it could only be maintained in the future, by very considerable productivity improvements to compensate for the population increase; Comoros' population is growing at a rate of 2.7% p.a. and is

3/ Estimate of G. Subreville, IRAT, assuming one family corresponds to five 'consumption units', i.e. two adults and five children.

expected to double over the next 25 years. Comoros at present produces under 60% of its calorie requirements, thus in order to attain food self-sufficiency production would have almost to quadruple in 25 years.

(ii) Nutrition

2.04 Nutrition data illustrate both the heavy dependence of Comorians on imported foods, and the poor level of nutrition in the Comoros. No food consumption survey has been carried out since 1966, but Table 2 provides an estimate of food supplies in 1980, based on production estimates and import data. Daily per capita supplies were 1943 calories, 85% of the recommended intake (FAO standards). The figures compare with average daily per capita supplies of 2,120 calories for low-income countries. Furthermore, about 80% of calories in the Comorian diet are provided by rice, roots and tubers, bananas and coconuts, all foods that are low in protein. Out of an estimated daily protein supply of 47 gms, nearly 75% are provided by cereals and starches, indicating, too, a low quality diet. The relatively low figure for fish reflects the lack of even simple drying and smoking methods to preserve fish for transport to the uplands. The low figure for meat illustrates the poor productivity levels of the present livestock population.

2.05 Imported rice and other imported foods account for nearly 40% of calories and 35% of proteins available. When compared with the 1966 consumption data, the table indicates a rise in the per capita quantity of rice consumed (by about 20%) and a fall in the quantity of coconuts; in 1966, coconuts were the largest single item in the diet. These changes reflect an increase in population, growing land pressure, stagnating coconut production and reduced per capita supplies.

2.06 There are wide varieties in diet between the islands, and between the uplands and lowlands. While the 1966 survey estimated total daily per capita calorie supplies at 2,000 for the Comoros, they were 3,200 for Moheli and only 1,600 for Anjouan. The relatively high figures for Moheli reflect the larger average landholdings, the abundance of coconuts and bananas, and the low population densities. The very low figures for Anjouan reflect the predominance of cash crops and dependence on wages, and the scarcity of land. Scarcities of locally grown basic staples on Anjouan are confirmed by a recent smallscale expenditure survey carried out in a number of upland villages. While food formed 30% of cash expenditure, 80% of this was for rice.

2.07 Consumption levels of tubers were higher in the uplands and of coconuts in the lowlands according to the 1966 survey, while consumption of bananas was more uniform. Bread was little eaten outside the towns. Although over twice as much rice was eaten in the towns as in the countryside, even in upland villages, the main food producing areas, rice provided 300 calories per person per day, indicating that here too the food deficit was substantial.

(iii) Inferences

2.08 A number of inferences may be made:

- (a) Food self-sufficiency could only be achieved through a substantial modification in the Comorian diet, at present heavily dependent on imported rice. The possibilities for substitution of rice by maize are discussed in Chapter 3, which also recommends increased emphasis of production on maize, legumes and tubers, especially sweet potatoes, all foods which are substantially more efficient than rice in terms of production of food value per hectare.
- (b) Food self-sufficiency at the level of the archipelago as a whole requires that either Moheli must produce food surpluses for Anjouan or that part of Anjouan's population must be moved to Moheli. Neither of these measures would be easy to put into effect. Farmers on Moheli are unlikely to produce quantities equivalent to three or four times their needs, given transport difficulties and limited improved technologies and the experience of other countries shows that the production of State farms is usually disappointing. Moreover, the movement of large food surpluses from Moheli to Anjouan would require a very substantial improvement in inter-island transportation. Population transfers, on the other hand, generally meet with a great deal of resistance in both the departing and the receiving areas, and would only be possible if accompanied by heavy investment in social infrastructure and very careful preparation.
- (c) The goal of food self-sufficiency must also be balanced against the need to maintain foreign exchange earnings through a limited range of export crops (virtually the government's sole source of foreign exchange), and to make efficient use of land which is marginal for foodcrop production. However, while agronomically there is some limited scope to increase export crops area, markets for Comorian exports are fragile, limited and vulnerable to substitutes (see Chapter 6 v and vi). Imputed gross cash earnings per hectare at present prices are very attractive for cloves and vanilla but much less so for ylang-ylang and copra, compared with foodcrops (see Annex 4). Tubers are in general more attractive than cereals. However, these comparisons are largely theoretical, since very little foodcrop production is marketed, and no quantitative work has been done of Comorian farming systems. Furthermore the production cycles of cloves and ylang ylang are long and land planted with these trees cannot easily be used for other purposes when demand for their products falls. (Vanilla is more flexible, vines coming into production after 3 years). Substantial expansion of area would therefore be very risky. The primary need is to increase productivity of export crops on their existing area through better husbandry, harvesting and processing (Chapter 3 ii). Once these increases are achieved, expansion of land area could perhaps be envisaged; world market prospects at present do not justify such an

TABLE 2 FOOD BALANCE ESTIMATES 1980

1980 Population 347,000

<u>Local Produce</u>	<u>Food Availability (tons)</u>	<u>Calories (per gm)</u>	<u>Protein (%)</u>	<u>Calories/day/ person</u>	<u>Protein gms/ day/person</u>
Rice	3,800	3.5	7.6	63	2.3
Maize	2,250	3.7	10.0	66	1.8
Cassava	25,500	1.3	1.2	242	2.4
Cocoyam	1,700	1.0	1.9	13	0.3
Yam	2,500	1.0	2.0	20	0.4
Sweet potato	4,500	1.0	2.3	36	0.8
Bananas	33,000	0.9	1.3	234	3.4
Coconut Flesh	9,230	4.3	4.0	313	2.9
Legumes	<u>3,450</u>	3.5	23	<u>95</u>	<u>6.3</u>
				<u>1,082</u>	<u>20.6</u>
Meat	600	1.8	22	8	1.1
Fish	<u>4,000</u>	2.0	22	<u>63</u>	<u>6.9</u>
				<u>71</u>	<u>8.0</u>
Breadfruit	N.A.	1.0	1.6	30	0.5
Fruits	N.A.	0.3	3.5	6	0.7
Vegetables	N.A.	0.5	0.8	12	0.2
Milk (fresh)	400	0.7	3.5	<u>2</u>	<u>0.1</u>
				50	1.5
<u>Imported Produce</u>					
Rice	22,000	3.5	7.6	608	13.2
Oil	181	9.0	-	13	-
Meat	1,314	1.8	22	19	2.3
Sugar	2,212	3.3	-	58	-
Flour	1,192	3.8	10.0	36	0.9
Milk (dried)	200	3.5	36	<u>6</u>	<u>0.6</u>
				<u>740</u>	<u>17.0</u>
				<u>1,943</u>	<u>47.1</u>

Sources: CEFADER for production data 1980, Service des Douanes for import data, which are 1979-81 average, and BEES 'Consommation des Ménages Comoriens et Production Vivrière de l'Archipel' 1966 for breadfruit, fruit and vegetables.

Notes: assumptions: all coconut is consumed fresh; all imported milk is dried skimmed milk; fish is fresh not smoked; preparation and plate losses not accounted for; 1 kg of paddy yields 0.6 kg of rice; all maize is eaten green.

expansion. Under these circumstances, the best short to medium term strategy is to retain land-use approximately as at present, and to concentrate on increasing productivity of both food and export crops. Some land at present planted to export crops is better suited to food crops, hence replanting programs and any changes of use should be monitored by the CEFADER (Rural Services network - Centre Federal d'Appui au Developpement rural). Modest expansion of export crop area could be envisaged in the late 1980's, once productivity increases are attained and if market prospects appear reasonable. Some forest land recently planted to food crops should be reafforested to prevent further soil erosion and fertility losses.

(iv) Land Tenure

2.09 A further constraint to increasing land productivity may be the pattern of land ownership, which is at present confused. Four types of landholdings exist in the Comoros: state lands, which are mainly forest lands on Grande Comore; company estate lands, which occupied nearly 20% of the arable land during the colonial period,^{4/} and were used mostly for the cultivation of export crops; individual landholdings, which vary from well under 1 ha. to over 500 ha and on which a combination of family labor, hired labor and sharecropping arrangements exist; and 'maghahoude' lands, mainly on Grande Comore and controlled by women in the family.

2.10 A cadastral survey existed, but it was burned during the events following independence. Large private landholdings were confiscated during the Soilih regime, and have since been restored to their owners. However, much land has been occupied by 'squatters' through the 1970's, especially on Anjouan as a result of increasing land pressure. Landowners may now have informal sharecropping arrangements with these squatters. A common arrangement is for squatters to contribute about one-third of their crop to the landowners. The largest company estate on Anjouan, Societe Bambao, has adopted this arrangement on some of its land to avoid problems of hired labor.

2.11 Land cultivated with cash crops tends still to belong to companies or relatively large landowners. On Moheli the Societe Bambao owns large coconut plantations, while on Anjouan they own about 3,000 ha, mostly of ylang. There are at least four other large landowners on Anjouan with holdings of 500 ha or more. Wage labor is still common for cash crops, and agricultural wages are low, averaging CFAF 150 to CFAF 300 (US\$0.45 to US\$0.90) per day. At independence, it was estimated that two-thirds of Anjouan's farming population were landless.

2.12 Landsales have been inhibited by Government fixed prices for agricultural land. The official price is CFAF15,000 to CFAF20,000 (US\$46 to US\$61) per ha of land, with prices ranging from CFAF500-1000 per coconut

^{4/} In 1964, approximately 33% of lands were classified as state lands, 17% as colonial company estate lands, and 50% as village and Comorian owned land. As little as 6.1% of land on Moheli was owned by private Comorians.

tree and CFAF2,500 per clove or ylang tree on that land, and it has remained unchanged since 1970. Some unofficial sales have taken place at higher prices, estimated in Anjouan at CFAF50-100,000 per ha, with clove trees CFAF7,500 to CFAF 10,000 each.

2.13 According to a survey carried out by SECMO (Societe d'Etudes de Construction de Maisons et d'Ouvrages) in 1976, landholdings (including sharecropped land) averaged 0.84 ha in Grande Comore, 0.33 ha in Anjouan and 3.23 ha in Moheli. The abundance of land on Moheli explains the relatively large holdings. Small family farms are most common on Grande Comore, especially on the uplands. However, on Grande Comore, substantial holdings of forest land are owned by the Societe Bambao, and according to present legislation, Government has no means of controlling the exploitation of these.

2.14 A land tax exists of CFAF 1000 per ha per year for unexploited, and CFAF 500 per ha per year for exploited agricultural land, but it is rarely collected. There is a need for Government to review land tenure systems and the legislation regarding the exploitation and sale of agricultural and forest land. The present lack of clarity may be impeding both owners and sharecroppers from improving land (through replanting or soil conservation), while forest reserves are being depleted without being renewed (see also Chapter 5). It is recommended that a land tenure/land use survey be carried out, possibly by selecting a number of areas for detailed study. This would assist the government in determining whether the present arrangements are a constraint to land improvement.

Chapter 3 - Agriculture

(i) Food Crops

3.01 A wide range of food crops is cultivated. The main tubers are cassava, followed by sweet potato, yam and cocoyam. Upland rice is the main grain crop, followed by maize, whose cultivation is increasing but which is still much less important. Pigeon pea^{5/} is the most widespread legume, followed by cow pea^{6/} and Jerusalem pea^{7/}. Groundnuts, grown solely for consumption as whole nuts, and soybeans for which there is little demand and do not form part of the traditional diet, are minor crops. Cassava grows mainly in the coastal regions and rice on the upland plateau, while cultivation of legumes is widespread. Bananas, both plantains and the sweet variety, are the major fruit, while breadfruit^{8/} is also a starch of some importance. Other fruit trees, either cultivated or growing wild, include mango, lychee, jackfruit,^{9/} sago plant or false

5/ Cajanus cajan or cajan pea.

6/ Vigna Unguiculata.

7/ Phaseolus aureus, or mung bean.

8/ Artocarpus incisa.

9/ Artocarpus intergrifolia.

sago (cycas species), common and Chinese guava and false raspberry.^{10/} These fruits are popular and consumption levels are high. Finally, with about 1,660,000 trees over some 30,000 ha, coconut is a major crop, comprising a substantial part of the diet particularly in coastal areas, supplying a series of byproducts for domestic use, and producing copra for export and local processing (para 3.29).

3.02 Apart from hill rice, usually cultivated as a pure crop, food crops are usually grown in association, sometimes under coconut groves in the coastal regions, when soil conditions are suitable, and more rarely under ylang-ylang trees. Mixed cropping not only provides the small farmers with some protection against climatic hazards, and in many cases makes profitable use of the land; it also provides better soil cover than single cropping and provides sloping land with better erosion protection. Terraces and anti-erosion hedges are quite commonly used on Grande Comore, where they have existed for several centuries;^{11/} however, they are still rare on the other islands, particularly Anjouan, where the sharply broken relief makes them particularly necessary. Some small farmers practise double cropping in the regions exposed to the South-west winds where rainfall exceeds 100 mm per month over a period of at least 6-8 months; elsewhere a single crop cycle is the rule. Irrigated farming is not practised and there are very few possibilities for its development.

3.03 Production estimates are very unreliable; cultivation methods are complex and there is no agricultural data collection service (it is recommended that a unit be established). However, comparison of food balance sheets and imports with production figures indicate that the figures in Table 3 are reasonable:

^{10/} *Rubus rosaefolius*.

^{11/} IRAT estimates that there are 12,500 ha. of food crops on terraces there.

Table 3 - Foodcrop Production (tons) 1966-81

	<u>1966</u>	<u>1976</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1983</u> <u>2/</u>
<u>Cereals</u>						
Rice (paddy)	3,350	3,375	3,661	3,700	3,800	4,030
Maize (grain)	1,155	1,383	1,545	1,800	2,250	3,100
<u>Roots and Tubers</u>						
Cassava	23,000	21,455	24,466	25,000	25,500	27,050
Cocoyam	1,020	1,207	1,368	1,500	1,700	1,800
Yam	1,226	1,459	1,662	2,000	2,500	2,660
Sweet Potato	2,612	3,090	3,523	4,200	4,500	4,770
<u>Legumes</u>						
Pigeon pea and others	2,122	2,697	n.a.	3,000	3,450	3,660
<u>Fruits</u>						
Bananas	23,000	27,548	31,415	32,000	33,000	35,000
Coconuts (000 nuts)	29,100 ^{1/}	48,700	48,700	48,740	46,150	46,000
Other	n.a.	1,974	2,251	2,300	2,400	n/a

1/ Probable underestimate.

2/ Estimate.

Source: CEFADER (Centre Fédérale d'Appui au Développement Rural), IRAT, Mission Estimates M = Millions

3.04 Average yields are low (Table 4), reflecting simple cultivation techniques, primitive tools (nevertheless well adapted to the often stony soils), elimination of fallowing, and the almost total lack of fertilizer, improved seed or pest control. Systematic trials to test fertilizer response have never been carried out in Comoros, so it is not possible at present to make recommendations about appropriate fertilizer type or application levels. While crops are likely to be responsive on the fertile uplands, crops on the light and stony soils of the coastal areas are unlikely to respond well. Pesticides have not been used either. Improvements in productivity over the next few years can best be attained through introduction of simple improved techniques including row planting, stone removal, simple terracing and use of improved hand tools and improved seed. In the longer run, introduction of fertilizer may be envisaged (see Chapter 7 (iii)).

Table 4 - Estimated Production, Yield, Area and Food Value Per Hectare of the Main Food Crops, 1980

	<u>Production</u> (tons)	<u>Yield</u> (Kgs-ha)	<u>Area</u> (ha)	<u>% of Land</u> <u>Area</u>	<u>Food Value per ha</u>	
					<u>Calories</u> <u>/ha</u>	<u>Prot./</u> <u>ha(Kg)</u>
Upland rice (paddy)	3,800	200- 400	12,500	31.6	630,000	14
Maize	2,250	400- 500	5,000	12.6	1,665,000	45
Cassava	25,500	4,000-6,000	5,000	12.6	6,500,000	60
Cocoyam	1,700	4,000-6,000	350	0.9	5,000,000	95
Yam	2,500	4,000-6,000	500	1.3	5,000,000	100
Sweet potato	4,500	2,500-3,000	1,500	3.8	2,750,000	63
Pigeon pea & legumes	3,450	300- 400	10,000	25.3	1,225,000	81
Banana	33,000	6,000-8,000	4,700	11.9	6,300,000	63
			39,550	100.0		
Coconut	46,150,000*	30 nuts/tree	(30,000)+		(1,333,000)	(12)

* Number of nuts, assuming 1 nut yields 200 gms coconut flesh, total copra production is 9,230 tons or 310 kgs/ha of copra.

+ Planting densities are usually well below normal technical standards averaging (only 50 trees/ha) and intercropping is common. At densities of 100 palms/ha, food values would be doubled.

Source: CEFADER, mission estimates.

Prot. = Proteins

3.05 According to the estimates presented in Table 4, food crops other than coconut occupy about 40,000 ha in terms of single-cultivation equivalent. This figure appears to be plausible, considering that (i) on Grande Comore, and more particularly on Anjouan, all the available land is cultivated; (ii) food crops are being grown on lands better suited to tree crops and are encroaching on the forest lands; (iii) double-cropping, although practised in certain places, is not very common. Table 4 also compares the area devoted to the different foodcrops with their food value per hectare. It illustrates both the dominance of rice and the inefficient use it makes of land, comprising 32% of the cultivated area devoted to foodcrops while providing only 8% of calories (excluding coconuts; see also Table 2). By contrast, legumes, which are the second crop by area, covering 25% of foodcrop area, produce over 12% of foodcrop calories and 35% of proteins.

3.06 While production of food crops has increased over the course of the years it has not kept pace with population growth for the grain and tuber staples (see below):

Per Capita Production (kg)

	<u>1966</u>	<u>1980</u>
Grains	18.9	17.4
Tubers	117.1	98.6
Legumes	8.9	9.9
Bananas	96.6	95.1

The decline in per capita food production has been offset by growing imports of rice, which have risen from some 5,900 tons in 1961 to 12,900 tons in 1965 and about 25,000 tons at the present time, accounting in value terms for about 30% of total imports and 75% of food imports.

Development of Alternatives to Rice

3.07 Operation Maize, financed by EDF (European Development Fund), has the dual objective of producing maize domestically both for human consumption and for the manufacture of poultry feed and gradually replacing rice in the local diet. Given present knowledge, the prospects for developing rice production are mediocre. Current yields are low and can be expected to fall steadily if the practice of continuous rice-growing on impoverished soils is not changed. Striga asiatica, a parasitic plant that is very difficult to control and makes the soil unsuitable for rice-growing, is spreading. Research findings carried out several years ago on rainfed rice are disappointing. None of the plateau rice varieties tested is suited for the uplands of the archipelago. The best varieties tested, whose production potential is elsewhere greater than 5 t/ha, did not exceed 2 t/ha in any of the experimental trials, and though these were carried out under various conditions it was not possible to determine the reasons for this disappointing performance (G. Subreville, IRAT 1981). The possibilities of developing irrigated rice are extremely limited; probably no more than 100 to 150 ha on Moheli ^{12/} and virtually nothing on the other islands could be irrigated. Consequently, if rice remains the basic food, imports, which are already a very heavy burden, will soon cause unacceptably heavy outflows of foreign exchange. Fully justified economically, the replacement of rice by maize is also warranted agronomically. While the continuous growing of rice as now practised is detrimental to soil fertility, maize can be grown in association with legumes, resulting in both a much lower risk of erosion and in soil improvement through improvement in nitrogen content.

3.08 The potential yield of maize is markedly higher than that of rice particularly in the Comoros. However, even when intercropped with legumes, this potential can be reached only with the use of mineral and organic

^{12/} The possibilities for increasing rice production are nonetheless more promising on Moheli than the other islands, and both the Caisse Centrale and Chinese bilateral aid are planning assistance in this area for Moheli: A pilot project for irrigated rice, supported by FAO, had shown some success on the few hectares developed by the end of 1982. Even with considerably expanded rice production on Moheli, however, substantial rice imports would still be necessary.

fertilizers, to which maize responds particularly well, but which are still virtually unused in Comoros.^{13/} Lastly, in terms of nutrition, maize is also preferable to rice owing to its greater content of amino acids. Millet and sorghum have the same advantages as maize and could also be tested, especially in the dryer coastal areas less suitable for maize.

3.09 Operation Maize, which has thus far been limited to Grande Comore, but which is expected to be extended to the other islands, has had some success. The number of farmers receiving assistance under the project is in accordance with objectives.^{14/} However, one of the objectives, purchases of grain maize for milling into maize meal to replace rice, has not been met. Maize purchases by the Operation, at a fixed price at the beginning of the crop year, are negligible. Farmers are selling most of their production themselves, mostly as green maize at very lucrative prices. Green maize does not really replace rice for human consumption. The farmers also sell some grain maize direct, but local human consumption is extremely low. This maize generally has a limited market, which is controlled by a few large poultry breeders who are willing to pay at least 50% more than the fixed price, while the EDF financed processing plant has insufficient maize and small poultry breeders cannot obtain feed. The marketing component of the project will not be continued in the second phase.

3.10 It is difficult to estimate the extent to which maize can effectively replace rice in the future for the local diet. Small-scale tests made under the Operation seem to indicate some interest on the part of consumers, especially for cracked maize or semolina. However,

^{13/} Assuming a field cost of fertilizer of US\$300/ton (CFAF 97,500/ton), and an application rate of 200 kg/ha, fertilizer costs per ha, excluding labor, would be roughly CFAF 20,000 ha. Considering that farmers usually become interested when the ratio between incremental revenues and costs is 3 to 1, the value of incremental production per ha would have to be around CFAF 60,000, equivalent to about 600 kg if the maize is sold on the parallel market. Such expectations do not seem unreasonable but the assumptions, including the cost of fertilizer, have to be carefully verified and tested and the great diversity of soils must be considered (200 kg/ha may be adequate on good soils but too low elsewhere, while the cost of fertilizer in Comoros, at present imported in very small quantities, is at present CFAF260/kg for NPK and CFAF300/kg for ammonium nitrate, more than twice the price estimated above). It should also be noted that Operation Maize expected yields to reach 1,500 kg/ha through better husbandry and improved seed, but without fertilizer, while average yields of assisted farmers are at present estimated at some 800 kg/ha. Until more progress has been made with cultivation methods, there would not be much point in recommending fertilizer, which would be largely wasted. Maize is also particularly vulnerable to mealmoth damage, which could be treated by pesticides, also untested in the Comoros.

^{14/} 3,800 farmers assisted in 1982 and 1,000 ha of improved maize was planted.

experience in most countries shows that, although consumers readily adopt rice instead of tubers or other grains, the opposite is extremely rare. In all likelihood, progress will be very slow without any significant change in the current ratio between the prices for maize and rice. For the former, the official price of CFAF 65/kg (US\$0.20/kg) for grain maize in 1983 would not be a sufficient incentive to switch from the traditional practice of rice growing to maize.^{15/} Farmers are continuing to sell their maize on the free market, at CFAF 100/kg or more.

3.11 Producers have not yet faced difficulty in marketing maize. If however, as production expands, the free market price falls sharply and maize ceases to be lucrative for producers, thought might be given to adopting a system to subsidize maize over rice, in order to encourage maize production and consumption. It could consist of the following:

- (i) establishment of an official floor price for grain maize, perhaps at CFAF 100/kg;
- (ii) establishment of a maximum retail price for maize, markedly below that for rice; and
- (iii) establishment of a tax on imported rice, the amount of which would vary each year the proceeds being used to subsidize maize.

3.12 The establishment of such a system and its management would certainly not be easy. In particular:

- (i) the tax on rice, fairly low at the outset because the quantities of maize to be subsidized will be low, would rise quickly if the operation succeeds; however, when maize became accepted as part of the daily diet, it should be possible to raise its price, diminishing the subsidy per kg proportionally;
- (ii) enough maize would have to be available at all times to satisfy consumer demand, perhaps requiring some maize imports until local production covers needs; and
- (iii) to the extent that the retail price for imported rice rose, farmers could also realise a higher price for locally produced rice. It would be necessary to analyze in depth on an annual basis the price relationships between rice and maize and the tax on imported rice, from the standpoint of both the consumer and the farmer.

^{15/} With an average yield of about 800 kg/ha (as against 400 to 500 kg/ha for traditional crops), maize would bring in gross receipts of CFAF 52,000/ha whereas gross receipts from rice are about CFAF 27,000/ha on the basis of 300 kg/ha with an average paddy price of CFAF 90/kg. However, as Annex 4 indicates, farmers' crop choice in Comoros is not clearly determined by price signals or comparative advantages.

An increase in the price of a food staple such as rice, which is already taxed, would certainly be an unpopular measure and a difficult political decision. It would also entail substantial administrative costs, which Government can ill afford. The argument illustrates, however, the difficulties involved in substituting maize for rice, if consumers do not adapt readily to it.

3.13 Legumes, whose area has varied little in recent years, provide essential plant proteins for a diet highly deficient in animal protein. As they also improve the soil and their leaves provide good-quality forage for animals, their cultivation should be encouraged. Existing varieties are well liked and well-adapted, especially pigeon peas, which provide good ground cover and grow well even under difficult conditions. Current yields, which are low, could undoubtedly be raised through improved varieties and farming methods. In areas where double cropping is possible, a short-cycle legume could also be substituted for pigeon peas. Although traditional species -- pigeon peas, cow peas and mung beans -- should not be replaced by other legumes at present, trials to introduce varieties with a higher production potential, such as Phaseolus beans (dwarf and climbing), should be undertaken and rural home economists should pursue efforts to promote preparation and consumption of these foods.

3.14 The area under bananas is increasing, thanks mostly to an operation undertaken with WFP (World Food Program) assistance that consists of repurchasing surplus young shoots from growers for distribution free of charge in other areas. Not surprisingly, this project is highly successful. However, bananas are sometimes planted in regions with insufficient rainfall, and frequently they are established under forests, encroaching on reserves and degrading soils.

3.15 Cassava, primarily the "sweet" variety, is liked because it can remain in the ground and be harvested as needed. However, the plant exhausts the soil, and since soil is already rather depleted, it might be agronomically preferable to develop sweet potatoes. More attention should be given to improving cultivation methods for tubers in general, whose energy value is considerable.

(ii) Cash and Export Crops

3.16 Four products -- ylang-ylang,^{16/} vanilla, cloves and copra -- represent virtually all export receipts and constitute the chief source of foreign exchange. Since 1979 copra exports have fallen considerably. Exports of other products (coffee, cocoa, cinammon, essences other than ylang-ylang, pepper, vegetables and fruits) are negligible in comparison to the four major commodities, and now comprise under 1% of the total. Sisal, which had been grown in the past, has totally disappeared. A profile of exports over the last ten years is given in Annex 2.1.

3.17 In the absence of reliable agricultural data (para 3.01) and because of the practice of growing crops in association (para 3.02), estimates on the area covered by export crops are tentative. In 1980 there

16/ Cananga odorata, F geunina.

were some 1,160,000 ylang-ylang trees and 4,980,000 vanilla vines, representing 2,900 ha and 2,490 ha, respectively. Clove trees are scattered among other crops, usually without any maintenance. They cover 3,300 ha, of which three quarters are reportedly in production ^{17/}. Thus vanilla, cloves and ylang ylang cover about 9,000 ha. Coconuts, both an export and a subsistence crop, cover an additional 30,000 ha but are mostly interplanted with foodcrops.

3.18 Export crops are unevenly distributed among the three islands. Grande Comore is the major producer of vanilla, ylang-ylang is cultivated primarily on Grande Comore and Anjouan, and Moheli is the chief producer of copra for export. Cloves, which were first introduced on Anjouan and Moheli, are now grown on all three islands.

Table 5 - Cash Crop Cultivation by Island 1980

	<u>Grande Comore</u>		<u>Anjouan</u>		<u>Moheli</u>		<u>Total</u>	
	<u>No. of Trees</u>	<u>%</u>	<u>No. of Trees</u>	<u>%</u>	<u>No. of Trees</u>	<u>%</u>	<u>No. of Trees</u>	<u>%</u>
Ylang-ylang tree	600,000	51.7	500,000	43.1	60,000	5.1	1,160,000	100
Vanilla vines	3,790,000	76.1	1,025,000	20.6	164,000	3.3	4,979,000	100
Coconut trees	787,000	47.4	460,000	27.7	415,000	24.9	1,662,000	100
Cloves	NA		NA		NA		NA	

3.19 Ylang-Ylang The Comores are the world's primary producer of ylang-ylang essences, used mainly in the manufacture of high-quality perfumes, and cosmetics and soap. Comorian production accounts for about 80% of world consumption.^{18/} In the past, ylang-ylang trees were grown mostly on large colonial estates. However, individual farms, of varying size, now supply some 60% of the flowers. Regardless of the size of the holding, the flowers are generally harvested by women, who are paid by the basket.^{19/} Distillation was handled by a large number of distilleries, more than 370 in total,^{20/} but except for some large facilities, many have closed down because they are no longer profitable.

3.20 Introduced at the turn of the century, the ylang-ylang tree found favorable conditions in the Comoros, particularly on Anjouan. It is hardy and well-adapted to the country; it does well in poor soil unsuited for most other crops and can be planted on steep slopes. Ylang ylang starts producing five to six years after planting. Productivity begins to decline after 20 years. Some trees were planted on large estates on good-quality

^{17/} Source: General Directorate of Planning.

^{18/} Madagascar is the second producer.

^{19/} Estimates on payment vary from CFAF20 to CFAF75 per kg. of flowers.

^{20/} Only 28 according to an ILO (International Labour Organization) survey.

soil, which would have been better used for food crops. The tree has no known diseases or predators. Yields vary widely, but over the 1971-81 period averaged about 1.1 to 1.4 tons of flowers per hectare.

3.21 The major problems facing ylang-ylang growing in the Comoros are:

- (i) the aging of the plantations, which are often more than 30 to 40 years old;
- (ii) as regards quality, the lack of care during distillation (flowers picked green, excessive delay between harvest and distillation, unclean equipment, less than rigorous supervision of operations) and use of cottage distilleries; as a result, the essences marketed are of variable quality;
- (iii) the rising cost of fuel oil for distilleries and the rapid disappearance of fuelwood which has substantially increased processing costs; and
- (iv) the threat of competition from cananga and synthetic products (see also Chapter 6 (v)) on marketing).

3.22 The solution to these problems requires:

- (i) gradual rehabilitation of the ylang-ylang plantations^{21/} through improved maintenance and replanting of aging trees; replanting programs should be monitored by the CEFADER to ensure that no replanting takes place on land more appropriate for foodcrops.
- (ii) the application of strict quality standards for distillation, official accreditation of distillers and quality control of exported essences;
- (iii) use of more economical distillation methods and energy sources; (Solar energy methods are being tested by the Societe Bambao); and
- (iv) a well-designed campaign to promote ylang-ylang among users. After rehabilitation of existing plantations and low cost fuel supplies for distilling are assured, some expansion into other poor soil areas could be envisaged in the medium term if market prospects stabilise.

3.23 Vanilla The Comores rank second among vanilla producers behind Madagascar, with 15-20% and 78% of world production respectively. Vanilla is grown by a large number of small farmers, over 9,000 in total. Sharecropping is common and the sharecroppers return a third of the harvest in return for using the land to the landowners, who frequently live in the towns. The vines are often planted between rows of food crops. With nearly 5 million vines, annual production potential under full development

^{21/} No development project is now involved with ylang-ylang improvement.

should be at least 500 tons of prepared vanilla, as compared to current production of 150 to 200 tons. Vanilla vines have a production period of about six years. Pods should not be picked until the third year if maximum yields are to be attained, and regular weeding and artificial pollination are necessary. However, these principles are frequently not observed.

3.24 The interest that the farmer shows in his vines depends on the price for green vanilla. If prices are right, they are given reasonable attention, but, when prices are low, the vines tend to be neglected. This lack of consistency in maintenance, which is probably aggravated by sharecropping, has an unfavorable impact on the annual harvest, early bearing, overall yield and the longevity of the vine.

3.25 The green vanilla is cured either on the premises of the exporters -- of whom there are four -- or else by a large number of small-scale preparers, (estimated at about 200) who then sell the cured product to the exporters. Some of these small operators do not have the necessary equipment and produce a mediocre vanilla. Another major cause of quality deterioration is the frequency of theft in the fields. In order to avoid losing a part of their crop, growers pick the pods before they are ripe, which results in weight loss, a lower green vanilla/cured vanilla yield, a tendency toward mouldiness and a substantial drop in vanillin content. Sometimes growers cure the vanilla artificially, although this practice is prohibited. As a result, Comorian vanilla frequently fetches rather less than that produced in Madagascar, which the importers say has a higher vanillin content and is of better quality.

3.26 There are substantial possibilities for vanilla development in the Comores ^{22/} (See also Chapter 6 v) on marketing). Once productivity on the existing vanilla area has been increased, there may be some scope for expanding planted area. One of the objectives of a vanilla/clove project financed by ADB (African Development Bank)^{23/} is the multiplication and distribution of vines to increase production. However, the project has achieved little in recent years and is currently being reoriented; most renewal of vines is carried out spontaneously by growers. A certain number of steps should be taken to improve the yields and quality of Comorian vanilla (preferably within the context of the ADB project):

^{22/} The expansion of fusarium disease which is present on Moheli calls for close surveillance, however.

^{23/} The African Development Bank financed a project in 1978 for the promotion of vanilla and clove cultivation. The objective was to increase the area planted to vanilla, cloves, banana and legumes by 4,800 ha. The project included construction of 32 farm buildings and pilot farms for demonstration purposes, training of 30 extension workers, 16 lorries and 16 warehouses each of 500 m² and two technical assistants. The project was scaled down in 1979. Furthermore, there were difficulties in obtaining the technical assistance. Four-fifths of the loan remained undisbursed as of late 1982. The project was financed under the previous regime and included social objectives which are no longer appropriate. The project is expected to be reappraised in late 1984.

- (i) improvement in vine maintenance is necessary. Appropriate stakes should be used and regular pruning carried out. Pollination should be carried out at the correct time and premature harvesting discouraged;
- (ii) for security, measures should be taken to prevent pod thefts, though admittedly this will not be easy;^{24/}
- (iii) forceful action should be taken to stamp out artificial maturing; curers should be required to register, to meet clearly specified standards and to be accredited; credit could be made available to help them improve their equipment;^{25/}
- (iv) a highly skilled specialist in Comoros' main export crops (particularly vanilla and cloves) should be recruited at CEFADER level to train extension staff in improved cashcrop husbandry techniques (again preferably within the reoriented ADB project)

Cloves

3.27 Although introduced much more recently than ylang-ylang and vanilla, cloves have expanded rapidly as a result of the high world prices for cloves, the easy establishment and maintenance of plantations and the simplicity of processing the harvest. The clove tree has found favorable conditions in the Comoros, especially on Anjouan, which accounts for about 70% of present production. The stands appear healthy and the average production per tree seems good, although there is at present no reliable estimate of yields. Nursery multiplication and distribution of clove seedlings are the responsibility of the vanilla/cloves project but recently most trees have been planted by farmers themselves without any involvement on the part of the project. These trees, whose numbers are most uncertain, have usually been planted without planning and control, sometimes occupying land more appropriate for food crops; density^{26/} has generally been too high and the minimal weeding that is essential when a plantation is started has not been carried out. The trees have often been brought into production too early and branches have been broken during picking as soon as the trees have reached a certain height, reducing subsequent yields; ladders are not used at harvest and fatal accidents occur every year when the cloves are picked. The trees should not be harvested regularly until they are eight to 10 years old and the tree does not attain full productivity levels until 20 years. Good yields can be maintained until 75 years.

^{24/} The Study on Promotion of Comorian Exports (Bureau Pandata, January 1982) recommends that the pods be marked, not presently done in the Comoros but a regular practice in Madagascar.

^{25/} Industrial ovens could be envisaged for the large-scale curers.

^{26/} Normal density is 100 trees/ha.

3.28 At present prices,^{27/} and with an average yield of 300 kg dry cloves per hectare clove cultivation represents a high cash income and an excellent return on the labor involved. The productivity cycle is such, however, that a very good crop is obtained only once every three to five years; furthermore, these very high prices are likely to be temporary (see Chapter 6 v). In view of the lack of data on the expansion rate and age of the clove plantations, it is not possible to make a precise estimate of production potential,^{28/} although production is increasing rapidly.

3.29 The measures to be taken to improve clove cultivation include:

- (i) better supervision of present plantings and better cultivation methods (site selection, observance of planting densities, tending of young trees);
- (ii) improved picking and drying methods, with use of simple equipment to prevent harvesting accidents (e.g. ladders); and
- (iii) in conjunction with the other producers, establishment of trials aimed at lessening the fluctuations of the production cycle, so as to ensure more regular exports.

Copra

3.30 The coconut palm is planted along the entire coastal belt of each of the three islands. Conditions are favorable up to altitudes of 400 m, but coconuts are also found at higher altitudes, and in regions with marginal rainfall, where productivity is low. The plantations on the Comoros are old; more than half the trees were planted shortly after the great cyclone of 1950 and the rest are even older. There are virtually no recent plantations. The stand consists essentially of rather heterogeneous "Grands des Comores" (Comorian tall), with some dwarfs providing essentially fresh nuts because they are reportedly sweeter. The trees are not tended in any way or given fertilizer. On the contrary, the holds cut in their trunks to facilitate harvesting are potential sources of infection and should be prohibited. While the trees are free of any serious diseases,^{29/} various parasites are present. Surveys made around 1970 by IRHO (Institut de Recherche pour les Huiles et les Oleagineux) estimated annual production at some 75 million nuts. With no new plantations, that is the maximum present production. However, more than a third of the production is lost each year to rodents, which brings the number available down to some 46 million or less.

3.31 About ten years ago, nearly a third of the nuts were processed into copra for export. Recently, however, copra exports have declined

^{27/} See para. 6.25.

^{28/} Assuming that the actual plantation area is 3,300 ha., and that the average yield per cycle is 300 kg/ha, the existing plantations' potential would be 1,000 tons per year.

^{29/} Of the 'Kaincope' or 'Yellow Lethal Disease' type.

considerably^{30/} partly because of depressed demand for copra (see chapter 6 v), partly because of increased domestic demand for coconuts, an essential food item for the rapidly growing population.

3.32 With an annual per capita consumption of 111 nuts for food^{31/} the number available for processing into copra is at most 7 million, representing 1,500 tons of copra. Moreover, some 300 to 400 tons of copra are used by the local soapmaking industry (Chapter 6 (vii), further reducing the potential for export, and the tonnage used locally can be expected to increase. The situation varies considerably from island to island: Anjouan currently consumes more nuts for food than it produces, production and consumption are more or less in equilibrium on Grand Comore, while Moheli has a surplus notwithstanding a distinctly higher per capita fresh nut consumption than the other islands.

3.33 Increasing production, both to meet the growing demand for local consumption and to increase exports, is a priority goal. The Coconut Palm Rehabilitation and Rodent Control Project, financed by the IDA (credit 1035 Com) is endeavoring to bring this about by: (i) helping planters to control rodents to reduce losses; (ii) increasing productivity of existing plantations, and (iii) gradually replacing the present trees by hybrids with a better production potential. It is still too early to assess the impact of the project, which has to overcome a certain number of constraints, including technical problems, and reluctance on the part of producers to cut down existing trees for replanting. However, a revival of copra production and effort on the part of the planters is unlikely without a substantial improvement in producer and world prices and an improvement in Madagascar's position. Recommendations are discussed in para. 6.25.

3.34. Possibilities for the diversification of export crops are discussed in Chapter 6 (vi).

Chapter 4 - Livestock and Fishing

(i) Livestock

4.01 Animal husbandry is of some importance in Comoros, though it is secondary to agriculture. Most farms possess at least one head of cattle or a small ruminant. Poultry-raising, particularly of layer hens, is growing rapidly and some farms keep ducks, geese, pigeons and even turkeys. Rabbit-raising is fairly widespread. Also found in the Comoros, particularly on Moheli, are donkeys, used for transport and a few dozen pigs, raised for consumption by Europeans.

^{30/} To 1,000 tons in 1981 and perhaps less than 200 tons in 1982.

^{31/} The average for the three islands (from Appraisal Report on Coconut Palm Plantation Rehabilitation and Rodent Control Project; World Bank, May 1980).

4.02 The animal population is difficult to estimate. The last livestock census - which was not very precise - was carried out in 1973 by the Bureau d'Etudes Economiques et Statistiques (BEES). The census reports the following figures for the three islands: 40,250 cattle; 5,700 sheep; 42,500 goats; and 480 donkeys, i.e. about 0.5 cattle and 0.6 small ruminants per hectare of cultivable land. Since then the development of livestock herds has been affected by drought, as in northern Grande Comore in 1981, the introduction of symptomatic anthrax in the early '70's and (with more marked effect) the political events of the previous regime. These resulted in the slaughter of many cattle and small ruminants to prevent possible nationalization of livestock.

4.03 An attempt to update animal numbers in 1978 indicated stabilization of the cattle herd but a substantial decline in the numbers of small ruminants between 1973 and 1978, a conclusion supported by a limited survey carried out in 1980 in the Nioumakele peninsula on Anjouan. However, a survey of some areas at the end of 1982 found more cattle than anticipated, indicating that the animal population in these surveys may have been underestimated.

Forage and Water Resources

4.04 There is very little natural grazing in the Comoros. Apart from a few thousand hectares of primary meadow on Grande Comore located on the Sangani plateau and the ridge between the Grille and Kartala massifs, and a few hundred hectares in the Mda M'Voule circle on Moheli, the grazing areas are limited to fallow land and vegetation beneath tree crops. Bush-covered land on steep slopes unsuitable for cultivation, and a sparse bush-type vegetation on recent lava flows, covering a considerable area, are also fairly well suited to goat-raising.

4.05 It is clear, however, that the uncontrolled use of natural grazing lands has led to the development of species that are either unattractive, such as Imperata cylindrica, or not very palatable, such as Panicum maximum; the potential carrying capacity is low and tending to decline. Moreover, population pressure in the Comoros is leading to a progressive reduction in fallow land and to increased mixed cropping under tree plantations, reducing traditional forage availability. There are no longer areas available for expanding livestock numbers, and the development of animal production will have to come largely from increased productivity through closer integration of farming and stockraising, the planting of forage trees on uncultivated areas, and the development of anti-erosive hedges and leguminous crops.

4.06 Water resources in the Comoros vary widely. There is abundant rainfall, but relief and the position of the various regions in relation to the monsoon winds have given rise to great diversity in climate. Moreover, the volcanic structure of the islands results in significant variations in surface water or groundwater reserves. Three types of water resources are used at present:

- (i) rain water, which is collected in tanks and constitutes the sole water resource of the uplands and East Coast of Grande Comore, where there is practically no natural runoff;

- (ii) fresh underground water, which is limited on Grande Comore to six springs in the uplands and to a few watertables in one or two plains of the coastal strip;
- (iii) the surface water of some perennial streams on the islands of Anjouan and Moheli.

4.07 Provision of adequate water to stock, while it presents few problems near the perennial streams of Anjouan and Moheli, represents a serious constraint everywhere else, particularly on Grande Comore, where most of the animals suffer chronically from a lack of water; the high water content of feed in the form of banana-tree stems and other water-rich vegetable pulps does not compensate enough for this deficiency.

Livestock Characteristics

4.08 Cattle in the Comoros are usually small in size and of the zebu type. Most are red or mahogany in color, very similar to the "Red Sindh" breed, and reach an average live weight of 200-250 kg in the adult stage. They were probably imported from India from the 8th century onward and appear to be well adapted to conditions in the Comoros. Other imports, notably from Madagascar, have led to the creation of a cattle population, less numerous but also of the zebu type, of larger size and black or black-and-white in color. This group varies fairly widely in conformation. Since 1950 attempts have been undertaken to improve the local cattle by crossing with imported foreign breeds. Small numbers of bulls have been imported from France (Normand), South Africa (Friesland) and Madagascar (Renitelo^{32/}), but their crossing with the local cattle has left little trace on Comorian stock.

4.09 There are two main types of cattle-raising in the Comoros. In the farming areas, the animals are generally tethered, and moved from one area to another. They receive a feed supplement, more or less regularly, usually cassava or bananas peelings, pigeon-pea leaves, kitchen waste, and banana stems which in many cases are regarded as also satisfying their water needs. This diet is barely sufficient to ensure the survival of the animals, and their yields are considerably affected. On the uplands of Grande Comore and Moheli, the cattle are sometimes grouped into small community herds placed under the care of a herdsman. These animals graze on the natural meadows on Grande Comore and Moheli or in the forests. No valid data are available concerning the yields of these cattle. Given local conditions and the average quality of the livestock, the various productivity parameters are probably very low. The fertility rate is estimated at 50% at most, and the low percentage of calves counted in the herds during the BEES census shows that the calf mortality rate is high, no doubt as a result of high parasite infestation associated with chronic malnutrition. A number of reports estimate herd offtake at around 11%, which seems to be rather optimistic. The cows are sometimes milked, once a

^{32/} "Triple breed" cattle: Madagascar zebu, Limoges (Limousin), Afrikander.

day at most, but it seems likely that this milk is obtained by depriving the calf. The yield does not exceed one or two liters of milk a day for a maximum of 4-5 months.

4.10 Sheep vary even more widely in conformation than cattle. They are generally small, of coarse-hair or wool type, black, light or dark brown or pied in color, with a moderately fat tail. Average live weight rarely exceeds 20 kg for females and 30 kg for males. They are very sensitive to internal parasite infestation and to ticks, and often exhibit signs of foot-rot due to the humidity and the rocky nature of the soil; they are therefore raised mainly in the drier parts of the islands, particularly the low areas near the coast. They form small herds and find their nourishment on sparse pastures and garbage heaps near villages. No data are available on sheep yields in the Comoros. Their numbers appear to have declined considerably during the last 15 years, from an estimated 10,000 head in 1966 to 6,000 in 1973 and only 3,000 in 1978, but again this is subject to confirmation by a more detailed survey.

4.11 Goat-raising appears to be much more successful than sheep-raising, although the number of goats is said to have declined appreciably during the previous regime. Goats, too, vary widely in conformation. They are generally small, with a live weight of 15-25 kg and vary in color from white to red or black, some being pied or even tricolored. Some castrated males can apparently reach 40 kg live weight. Unlike sheep, goats are raised everywhere, usually in small herds which graze more or less freely on the sparse vegetation around the villages or the bushes in the arid areas or, in the dense farming areas, tethered in the same way as cattle. Although goat-raising is often condemned, it has its place in the Comoros, where it is the only form of stockraising to take advantage of the bush-type vegetation on the recent volcanic terrain and the very steep terrain inaccessible to other species. Goat yields appear to be fairly good and twin pregnancies are not uncommon. Goat milk is not consumed at present.

4.12 The other domestic animal species vary in economic importance. Donkeys and pigs are negligible in number, as are turkeys, pigeons, ducks and geese. Rabbit-raising was introduced in the 1950s, but, in spite of an encouraging initial development, has subsequently declined. The CEFADER recently initiated programs with the assistance of UNDP (United Nations Development Program) and the EDF, to develop raising of broiler and layer chickens through replacement of small, low yielding local breeds by imported improved strains. Initial results are encouraging, though there have been shortages of both imported feed concentrate and maize due to the difficulty of supplying the existing food processing unit with maize.

Livestock Pathology

4.13 Very little information exists about livestock disease in Comoros. The only documents available on the subject date from the 1960s. These data are probably still valid although at the time there was no laboratory to confirm the veterinarians' diagnoses.

4.14 Cattle pathology seems to be fairly simple. None of the major infectious diseases such as rinderpest, CBPP, anthrax and foot-and-mouth disease are found in the Comoros. However, blackleg, introduced in the early 1970's on Grande Comore, has not yet been eradicated, and Pasturellosis has been suspected in the past among calves. The common diseases of reproduction, such as brucellosis, vibriosis and trichomonosis, do not appear to have been diagnosed up to now. Tuberculosis is rare. On the other hand, streptothricosis is frequently cited and apparently causes deaths, particularly among the crossbred offspring of imported breeds. Lumpy skin disease of cattle has also been identified in the past. The parasitic diseases appear to have a particularly severe impact on cattle yields. Ticks (particularly Amblyoma and Urubooophilus) are widespread. Apart from their direct action as predators and the sores they cause, which are difficult to treat, they are also vectors of dangerous blood parasites which were detected about 20 years ago on samples sent for analysis in a veterinary laboratory of Madagascar. A number of types of pyroplasm and anaplasms thus clearly exist in the Comoros which are undoubtedly the cause, if not of deaths, at least of a substantial morbidity. Among intestinal parasites, calf maw-worm (ascaris) is said to cause many deaths among young cattle. The other intestinal parasites detected include the genus Haemonchus, trychostrongiloides, Bunostomum and Trichuris, whose economic importance is associated with growth retardation and lower yields of the animals that carry them. Pulmonary strongylosis and coccidiosis appear to be of minor importance.

4.15 Sheep and goats appear to be particularly subject to intestinal parasites, especially the strongylosis. These parasites, which differ little from those found on cattle, are more important among the small ruminants, among which they cause loss of weight, diarrhea and, in some cases, severe oedemas in the throat area. Foot-rot is common among sheep, and scab among goats.

4.16 Poultry pathology in the Comoros is fairly simple. However, a few serious infectious diseases are present, such as Newcastle disease, fowl smallpox and cholera, against which it is essential that imported strains be vaccinated. The parasitic diseases, fowl ascaridiosis and coccidiosis, can cause heavy mortality. Rabbits appear to be affected seriously only by pasteurellosis, syphilis and coccidiosis.

Livestock production resources and uses

4.17 The inadequacy of the available information on livestock production parameters and the importance of subsistence production make any attempt to estimate livestock production in the Comoros subject to error. However, estimates have been made on the basis of the BEES consumption study carried out in 1965-66. The distribution by species is as follows:

Table 6 A - Production and Consumption of Livestock Products
(tons per year)

<u>Product</u>	<u>Quantities Marketed</u>	<u>Quantities Consumed</u>	<u>Total</u>
Beef	268	685	953
Other meat	87	230	317
Milk	520	1,330	1,850
Eggs (thousands)	120	315	435

Source: BEES Consumption Survey 1966.

4.18 Compared with estimated livestock numbers for each species at the time, these production estimates appear to be very optimistic, since they indicate livestock yield rates double those observed in other countries with identical stock. Based on the only livestock population figures available (1978 estimates) and assuming they have remained the same, the following parameters could be used.

Table 6 B - Production and Consumption of Livestock Products

<u>Product</u>	<u>Herd Size</u>	<u>Yield (%)</u>	<u>Average Carcass Weight (kgs)</u>	<u>Offals % of carcass weight</u>	<u>Est. Prod. (tons)</u>
Beef	41,730	11	90	20%	428 (with 7% offal)
Mutton	2,950	15	12.5	20%	10
Goat Meat	22,000	25	10.0	20%	50
Poultry rabbit	49,000	50	0.9		22
					<u>600</u>

4.19 Usable milk production can be estimated at about 400,000 liters (assuming lactating cows represent 20% of the herd and production left over after calving is 50 liters/year), and egg production about 500,000 units (25% of laying hens giving 50 kgs per year).

4.20 Annual local livestock production thus appears to be of the order of 600 tons of meat and offal, 400,000 liters of milk and 540,000 eggs. This production represents a possible average annual consumption per head of population of 1.8 kg of meat, 1 liter of milk and less than 2 eggs - a production sufficient to cover barely 7% of the minimum animal protein needs of the population.

4.21 Meat imports into the Comoros have developed mainly since 1945, when the improvement of transportation facilities made it possible to supply the Comoros with meat from Madagascar at prices competitive with locally produced meat. These imports rose steadily up to independence, in 1975. Meat is no longer imported from Madagascar, but since then the quantities imported have risen fivefold, reaching 1,410 tons of meat and

about 119 tons of powdered milk concentrate in 1980. Meat imports fell to 580 tons in 1983, but milk imports rose to 295 tons. (These fluctuations are caused partly by the timing of cargo arrivals).

4.22 Thus, in 1980 the total availability of livestock products amounted to less than 2,000 tons of meat, 2.1 million liters of milk and 540,000 eggs, representing an average annual consumption per head of population of about 5.8 kg of meat, 6 liters of milk and less than 2 eggs. These quantities are equivalent to 1.2 kg of animal protein a year per head of population, or 3.5 g a day, i.e. barely 20% of the animal protein needs of the population. Apart from small-scale poultry production, Government at present provides no supporting services for livestock, and a livestock service exists only on paper in the CEFADER. There are no trained veterinarians or livestock specialists, and very few livestock or animal health assistants.

Recommendations

4.23 A number of actions could substantially improve the condition of livestock and its productivity on Comoros. They would be preceded by studies to determine more precisely the livestock population, its pathology and common animal husbandry techniques on Comoros. Activities would include:

- (i) establishment of a simple animal health service within the existing rural extension system;
- (ii) implementation of simple measures to improve productivity through integration of agriculture, forestry and livestock, including introduction of forage legumes including trees, anti-erosive grasses suitable for animal consumption, improvement of pastures, construction of rainwater catchment areas on the uplands, and, eventually, genetic improvement;
- (iii) elaboration of sanitary regulations for imports of meat and live animals, particularly day-old chicks, and for inter-island transport; and
- (iv) continuation of the poultry projects with greater emphasis on reliance on indigenous feed.

4.24 These measures would entail establishment of a simple animal health/production division, forming part of the CEFADER system but with its own trained personnel. A livestock survey, equipment of a small laboratory and initiation of simple animal health measures are currently being undertaken under a Technical Assistance Grant financed by IFAD (International Fund for Agricultural Development). A recently approved Rural Services project cofinanced by IDA and IFAD, will provide further support for the division.

(ii) Fishing

4.25 The territorial fishing waters of Grande Comore, Anjouan and Moheli comprise a total area of 55-60,000 km² within a 50 km. radius of their coasts. The continental shelf of the islands is very narrow, sharply indented and covers an area of only about 900 km². The surface water temperature, influenced by southern equatorial currents, is consistently warm (24° - 27°C). These waters have the reputation of being rather low yielding in continental shelf and pelagic coastal fish species, except for the small islands of Nioumachoua to the south of Moheli. The southern equatorial current is, however, favourable for tunny fish, which are found in relatively large numbers. At present, industrial fishing is not carried out within Comorian territorial waters. However, about 6000-7000 fishermen practice artisanal-scale fishing on a full-time or part-time basis, from 104 coastal villages.

4.26 Given the narrowness of the continental shelf, and unfavourable hydrological conditions, which limit the number of fishing days of the traditional boats (gallawas) the fish catch is rather low. There are approximately 2,800 boats operating from the three islands. They are simple canoes with one or two cross balances of 4 to 9 meters in length, mostly either dependent for movement on paddles or sail. Fewer than 3% are equipped with motors. Average daily catch per canoe varies from 7 to 15-20 kg, between the islands, with an average of 15 kg. With fewer than 100 fishing days^{33/} per year on average annual production per canoe is about 1.4 tons. The catch of motor-powered canoes is more than twice that of paddle-canoes. Thus, total catch can be estimated at approximately 4000 tons per year, consisting of 1,800 tons of species found on the continental shelf or coastal pelagic species, mostly tunny. The value of production at local market prices of CFAF 300/kg would thus be about CFAF 1.2 billion.

4.27 Fish plays an important part in the Comorian diet. Present production is equivalent to an annual consumption of approximately 11 kg per head per year, equal to about 6.9 gms of animal protein per day, or 40% of the minimum animal protein needs of the population.^{34/} However, availability of fish is very unevenly distributed through the islands, because of the almost total lack of storage, marketing or processing facilities. Most fish is directly consumed by fishermen and their families, or sold on the beaches. The majority of production is thus consumed in the coastal areas, while the people living on the uplands have little chance to obtain fish. Although fishery productivity is very low, it seems clear that the fishermen themselves limit their catches in order to keep supply in line with market demand and thereby avoid losing unsold quantities of a product which, in the absence of preservation facilities, cannot be kept fresh for more than a few hours.

^{33/} One hundred and twenty days per year on Grande Comore and Anjouan, 36 days on Moheli.

^{34/} Fish and meat (local and imported) available provide about 60% of minimum animal protein needs.

4.28 Without detailed scientific studies, it is not possible to provide precise figures on the potential equilibrium yield of coastal fish. Most experts, basing their judgement on other archipelagoes with similar hydrological conditions, estimate the theoretical fish yield from the continental plateau at 2,600 to 3,000 tons annually. The offshore waters are potentially richer in fish, especially in the large tunny varieties (yellowfin, albacore, and red tunny) but also the smaller tunnies (skipjack). On the basis of figures obtained from fleets operating mostly out of Madagascar, it is estimated that annual production from deep water fishing is about 2 kgs/ha.; production potential within the 50 km radius of the three islands is about 12,000 tons.

4.29 There are many constraints to the development of fishing in the Comoros. As discussed above, the continental shelf is narrow and the coastal waters are not very productive; furthermore, most fishing vessels are old, and renewal is difficult because of increasing deforestation. Fishing equipment is rudimentary (mostly one line cast by hand with a single hook) and inappropriate for more intensive fishing. Fishermen are not able to go far from the coast, and cannot alter their fishing grounds following changes in the wind. Fishing is also handicapped by the inadequate number of landing facilities (only at Moroni and Mutsamudu ports) and by the difficulty of landing on the coastline, which is often rocky. There are no facilities for fish sorting or marketing; this is often carried out when the fish is landed, on the sands or rocks. Fish conservation also poses problems; the traditional methods of cooking and drying are rarely used and in any case inadequate, since they do not allow for fish conservation in any quantity.

4.30 The main institution responsible for fisheries is the Service for Maritime Fishing in the MPIA. It has almost no manpower or material resources to carry out programs. Government is aware of value to the country of developing fisheries, both in order to improve the Comorian diet by increased consumption of animal protein, to increase fishermen's revenues and to substitute for meat imports. In order to achieve these objectives, Government intends:

- (i) to develop artisanal fishing by improving boats in order that they may reach more distant fishing grounds;
- (ii) to install improved means of fish conservation in the major consuming centers;
- (iii) to develop marketing channels within the country; and
- (iv) to limit both foreign and domestic industrial fishing to areas over 12 nautical miles from the coast.

4.31 There have been several projects to aid fishermen in the past, either through credit for purchase of equipment and motors through CREDICOM (Societe de Credit pour le Developpement des Comores), or through provision of motor-powered vessels in order to facilitate access to more distant

fishing grounds.^{35/} These limited programs have failed through lack of funds or technical assistance. In 1981, ADB approved a credit to Comoros of ECU 4.2 m, in order to help Government develop the sector. The project, which would be implemented by a parastatal created for the purpose in 1981, SODEPEC (Societe pour le Developpement de la Peche aux Comores) would remove the main constraints to development of artisanal fishing in Comoros and permit a significant increase in production and improved conservation of fish for local consumption. The project would create fleets of small motorized fishing boats, it would provide the necessary funding for purchase and distribution of improved fishing equipment, purchase of vehicles and training of middle-level Comorians.

4.32 This project has experienced substantial delays, partly because of problems in recruiting technical assistance, and partly because of lack of experienced Comorian staff to implement the project, whose design is quite complex. However, it could permit a significant increase in the catch of the continental shelf species within the 12 mile limit reserved to artisanal fisheries, with no risk, at present, of over-fishing. Development of industrial fishing, on the other hand, cannot be envisaged in the short term because of the lack of bait,^{36/} the inadequacy of port infrastructure, the lack of trained fishermen, and the substantial initial investment that would be necessary.

Chapter 5 - Forestry

Forest Area

5.01 In view of the destruction of archives and the absence of inventories in recent years, data on the extent and composition of Comorian forest lands are to be regarded with caution. As of 1980, indigenous forests probably covered about 17,600 ha.

Table 7 - Forest Area on Comoros (ha)

	<u>Grande Comore</u>	<u>Anjouan</u>	<u>Moheli</u>	<u>Total</u>
Primary/Closed Forest	5,200	400	3,900	9,500
Secondary forest	<u>6,800</u>	<u>1,300</u>	<u>-</u>	<u>8,100</u>
TOTAL	<u>12,000</u>	<u>1,700</u>	<u>3,900</u>	<u>17,600</u>

Source: 'Activites forestieres dans le developpement rural' by G. Fay and M. Morel, FAO, 1982, figures adjusted in accordance with the Derille report (FAO/UNDP, 1974) and official statistics.

35/ UNDP/FAO project Developpement de la Peche Artisanale aux Comores.

36/ Only in Mayotte lagoon is production of bait sufficient.

With an additional 4,000 ha of seriously degraded forest inter-planted with banana trees, forest land covers about 16% of the archipelago. On both Grande Comore and Moheli there is also scrubland, which contains variable amounts of woody material and often has a potential for forest development, but the area is uncertain.

5.02 The best remaining natural forests are on Grande Comore. A closed humid forest covers 5,000 ha, between 600 m and 1,500 m above sea level, on the well watered western and southern slopes of the Kartala. The canopy is 20 to 30 m high and valuable species used for timber are still present.^{37/} The usable volume is about 30 to 40 m³/ha which is satisfactory for natural tropical forests. Another humid forest covers part of the 'Grille' plateau, at an altitude of 800 to 900 m. Its composition is similar to that of the Kartala forest^{38/}. However, the height of the stand varies from 10 to 20 m. On Anjouan, only patches of degraded forest still remain except on the slopes of Mount N'Tingui. On Moheli the forest although dense, is degraded, and trees are rather small, often twisted, with a large base.

5.03 Most forests, which in the past were part of the large colonial estates, have since reverted to public ownership. However, the 5,000 ha of forest on the western slopes of the Kartala are still exploited by a corporation (in which Government holds part of the stock), which claims to own the land in full property, although title deeds are not available, due to the destruction of most cadastral records.

5.04 A number of exotic plantations have been established over the last thirty years. Total area is in the order of a few hundred hectares, but estimates vary considerably, not only because archives have been destroyed, but probably also because some plantings have been abandoned^{39/}. Some plantings were made to protect springs. The plantation with the greatest production potential is the Maoueni eucalyptus forest, on Grande Comore, with an area of approximately 500 ha. None of the exotic stands has been managed or maintained, and thinnings have been carried out only by the local population, without any control, haphazardly and unsystematically. Nevertheless, despite substantial differences from stand to stand, after the natural elimination of a number of unsuitable species the surviving trees have developed well, with good MAI's (mean annual increments)^{40/}. Apart from afforestation of the conventional type,

^{37/} Such as *Khaya comorensis* (Comorian Mahogany), *Ocotea comorensis* (the false camphor tree) *Weinmania* sp., *Chrysophyllum* sp. etc.

^{38/} Except that the most valuable tree, *Khaya comorensis*, is not present.

^{39/} According to official figures, there were 1,000 ha of exotic plantings, in 1980, while a 1979 FAO report mentions 400 ha (Rapport de Mission de Programmation, identification et formulation) and the 1982 Fay Morel report indicates 1,279 ha.

^{40/} In particular, among species grown only for the production of wood products, *Eucalyptus robusta*, *Tectona grandis*, *Pithecellobium saman*, *Grevillea robusta*, *Casuarina equisetifolia*.

plantings along the roads are quite frequent. They consist mainly of Sandragon^{41/}, a leguminous tree whose leaves are often used as fodder.

5.05 The Kartala forest is the only one which has been consistently exploited. The company which owns the forest employs some 200 workers to extract about 10 m³ of timber a day^{42/}, using manual labor and primitive methods. There is no Government control over the company's activities. The same corporation also operates the only mechanized sawmill of the archipelago, processing 10 m³ per day and producing 4.4 m³ of sawn timber. The equipment is obsolete but still in reasonably good condition and there is a labor force of 45. The mill handles about 2,600 m² per year, which is believed to be equivalent to half of the total volume of wood being processed. The other half is processed by a large number of pit sawyers, who achieve at best yields of 30%.

Demand for Forest Products

5.06 Forests play a vital role in the Comoros, both for ensuring ecological balance and for meeting the demand for wood products. It has been proved that deforestation usually (i) causes higher temperatures and lowers precipitation; (ii) accelerates erosion and reduces soil fertility, because of loss of humus; and (iii) seriously affects the yield of springs. These unfavorable effects are exacerbated in the Comoros by the monsoon type climate, steeply sloping terrain, fragile soils and inadequate farming methods. Forest products are being used in the Comoros for a large variety of purposes. If they were no longer available, the country would have to import substitutes, using scarce foreign exchange. They are virtually the only source of domestic energy^{43/}, providing not only firewood for cooking but also fuel for ylang ylang distilleries, lime kilns and bakeries; they provide all the timber used for construction, carpentry, cabinet-making, fishing boats and craft activities; they provide poles and round wood of all sizes needed for traditional houses. With a workforce of over 1000, wood processing is one of the major activities of the islands.

5.07 The latest study on the forestry sector estimates consumption and future demand of wood products, as indicated in Table 8: the study emphasizes, nevertheless, that these figures have no statistical base and provide only an indication of the major parameters.

^{41/} Pterocarpus indicus.

^{42/} The quantity of rough timber processed has reportedly recently fallen to 4.5 m³/day, and the workforce to 120.

^{43/} Except for a small hydropower plant on Anjouan.

Table 8 - Demand for Forest Products, 1980-2000

	1980		2000	
	m ³	%	m ³	%
Timber	5,200	1.3	10,400	1.7
Firewood & charcoal(domestic)*	350,800	86.0	526,600	86.8
Industrial Uses	42,000	10.3	50,000	8.2
Poles	10,000	2.4	20,000	3.3
Total	408,000	100.0	607,000	100.0

Source: Activites forestieres dans le developpement Rural by G. Fay and M. Morel, FAO, 1982.

* Assuming 1 m³/year/capita in 1980, which seems reasonable, and 0.75 m³/year/capita in year 2000, higher fuel costs and improved stoves resulting in a 25% saving.

Despite the unreliability of the figures, it is clear that firewood accounts for the major part of consumption. In spite of a possible reduction in per capita consumption, the share of firewood in total wood consumption is likely to increase slightly until the end of the century. It is clear that the existing forests, which probably yield at best 2 to 3 m³/ha/annually, fall far short of meeting the demand for wood fuel. There does not seem to be a shortage of firewood for the moment. In fact, a very substantial proportion of firewood is not collected in forests. This is because plantations of coconut palm, ylang-ylang and clove trees in particular, largely contribute to the supply. However, sources of non-forest woodfuel will at best remain at their present level in the future, implying that an annual deficit of at least 200,000 m³ can be expected by the end of the century if measures are not taken to improve the situation.

5.08 In all probability, the deficit will be larger, because the natural forest is shrinking and agriculture is expanding. Due to population pressure, there is a growing shortage of cultivable land, aggravated by the extensive nature of traditional farming. The method known as 'la gratte', which consists of 2 to 3 years of associated crops, followed by a fallow period and burning of regrowth, is gradually spreading to the highlands and reducing the remaining forest area. In addition, forests located close to villages are being increasingly interplanted with bananas, usually in association with cocoyams. In order to ensure that the bananas receive more light and develop better, clearings are gradually increased in size, until only a few isolated forest trees are left, which have very little chance of survival. Established on fertile soils, with a good humus content, these banana stands provide substantial revenues over the short term. However, besides contributing largely to the degradation of the forest, they accelerate the erosion process when they are established on steep slopes, which is often the case. Estimates vary as to the rate of forest destruction. Authorities consider that some 200 ha of

primary forest and 100 ha of secondary forest are lost to agriculture every year. These are unverified assumptions however, and other estimates put the figures higher. Even if the authorities are right, the situation will very soon become serious, because deterioration will inevitably accelerate, with the growing population pressing for more land and more wood fuel. The situation is already critical on Anjouan.

Actions Underway

5.09 The World Food Program rural development project is supporting soil conservation activities through terracing and planting of anti-erosive (using vetivers and forage grasses) on steeply sloping land, with food for work. These activities are organized by CADER extension workers, who also distribute the food rations. In 1981 750 ha were affected by reterracing. The total area on which soil protection measures are needed is not known. The terracing methods are appropriate: however, the work is not monitored and it is not clear how well the terraces are maintained. Some testing of alternative grasses would also be beneficial. The program has also supported reforestation; 58 village nurseries had been established by the end of 1981, and 200 ha of uplands had been reforested. However, there is little control or maintenance of the young trees, and their survival rate is not likely to be high. The ADB supported project on the Nioumakele peninsula in Anjouan envisages protection of the degraded Moya forest through planting a forest strip 50 meters wide around the forest (350 ha replanting in all).^{44/} This activity has not yet started; it is controversial, given the very dense population on the peninsula.

5.10 Forestry activities are controlled by the Forestry Department at the CEFADER. However, it does not have the technical staff, the financial resources and the legal weapons to formulate a forestry policy, let alone to implement such a policy, to monitor and control soil conservation and reforestation efforts, and take the urgent measures which would be necessary to save the remaining forests and to meet the country's future needs.

Indeed:

- (i) apart from the chief of the Forestry Department, there are only two other university trained foresters and both of them hold senior positions in agriculture at the CEFADER; intermediate

^{44/} The Moya forest covers 7,000 ha; the main trees to be planted would be eucalyptus and Casuarina equisetifolia. Though eucalyptus has a rapid growth rate, it is unlikely to provide the erosion protection needed for the steeply sloping, fragile soils of the peninsula. Other trees could be tested including tropical Acacia auriculiformis, which provides good fuel wood, and Acacia mangium. Both of these protect the soil and provide it with nitrogen.

level staff supervisors and foremen are few and poorly trained^{45/}.

- (ii) although forest production represents 11% of the primary sector and 4.6% of GDP, a negligible proportion of the investment or operating budget is allocated to the forestry sector^{46/}; and
- (iii) even though the existing legislation is pertinent in many aspects, it dates from 50 years back. Except for minor amendments, it has never been updated to take into account, for example, the changes brought about by the country's access to independence; in particular, the legislation is not enforceable for privately owned forests. Owners of these forests are not subject to any Government control; they cannot be forced to follow adequate husbandry methods which would safeguard the future of the forests^{47/}, and the Forestry Department cannot enforce the law, which would be applicable elsewhere, in particular, with respect to traditional rights.

Recommendations

5.11 Measures that should be taken without delay have been described in various reports on the forestry sector. They imply that the Forestry Department, to be renamed the Land Conservation and Forestry Department, be strengthened and provided with adequate operating funds, recognizing the limited resources of the country. They would in particular consist of:

- (i) formulating a forestry policy which ensures conservation of forest and soil resources while recognizing the need to promote agricultural production, within the Government's economic development strategy;
- (ii) reviewing and amending as appropriate existing legislation;
- (iii) preparing management plans and protection programs where appropriate for existing forests;
- (iv) controlling all forms of tree extraction, including the traditional right of use and felling on privately owned land;

^{45/} As a consequence, control over forestry operators is virtually impossible and loggers, who are aware that the risk of being prosecuted is negligible, usually do not apply for felling permits: during the first half of 1981, there were only 30 applications for felling 32 trees.

^{46/} Source: Directorate General of Planning.

^{47/} As a consequence, the Kartala forest, which is the only forest really being exploited, is totally out of Government control; this is an abnormal and unsatisfactory situation, even if the operation does not necessarily commit violations. The legal position of the company exploiting the forest is not clear at present.

- (v) making better use of the remaining wood resources;
- (vi) protecting catchment areas and springs;
- (vii) restoring eroded land, protecting land vulnerable to erosions and encouraging social forestry programs; and
- (viii) developing additional forms of wood produce to meet future demand.

5.12 In order to achieve the above objectives, the following actions would be necessary:

- (i) training, in order to increase the number of staff and improve their qualifications, particularly at intermediate level to implement land conservation and forestry programs;
- (ii) legislation to adapt forestry laws and regulations to the present needs of the country, and its enforcement;
- (iii) silviculture, to protect and to improve management of the remaining natural forests and the exotic plantations, and to develop additional wood resources; this will involve inventories, policing and delimitation of forest estates, preparation and implementation of management plans, development of effective controls to halt degradation and illegal exploitation, establishment of new plantings, etc;
- (iv) conservation of wood resources, which could consist, for example, in encouraging local industries to substitute other sources of energy for wood, or to develop their own wood fuel through tax incentives, in developing and distributing more efficient stoves for domestic cooking, in developing the use of charcoal^{48/}, in training and providing credit to pit sawers to acquire better equipment and improve their productivity; etc; and
- (v) supervision and monitoring of soil and land conservation and social forestry programs, and testing and development of improved methods.

5.13 Any forestry strategy will have to take into account the implications of the growing pressure on the land:

- (i) it will not be possible to meet future demand by conventional afforestation of land suited to other crops, in particular food crops;

^{48/} Since processing firewood into charcoal results in a substantial loss of calories, promoting of charcoal is only justified if that loss is compensated by savings of calories when the charcoal is being utilized.

- (iii) alternative methods will therefore be needed, such as increasing production of existing forests; farm (social) forestry (planting of trees around houses, around cultivated land, and on terraces for erosion control); associating forestry with livestock (in particular on the plateau of Grande Comore) or with agriculture (eg with the banana plantations); planting on land not suited to farming (recent lava, volcanic exhaust cones, slopes in excess of 50%, exhausted soils, roadsides), even if yields will often be low; and
- (iv) a major task of the forestry department should be to persuade the rural population through information campaigns, based on the media, posters, leaflets, slide presentations, that forests play a crucial role, and that deforestation and waste of wood have severe adverse consequences. Indeed, even if control measures can be strengthened to prevent violations, no program of forest conservation and/or afforestation will have a reasonable chance of succeeding without the consent and active support of the population. To gain such support, plantings should whenever technically feasible and economically justified, be based on trees which are popular, because they can often be used for multiple purposes^{49/}. Another motivation which could prove attractive would consist of directly involving villages in management and revenue sharing schemes of forests located in their area.

Chapter 6 - Marketing and Pricing

(i) Foodcrops

6.01 Foodcrops are produced very largely for subsistence. It is estimated that under 10% is marketed, mostly tubers and fresh vegetables. There is an overall food deficit, and even in the fertile uplands rice forms over 15% of calorie intake. Foods are generally sold in very small quantities. Most marketing is carried out by women and takes three alternative forms. Women may carry down foods (bananas, cocoyam, sweet potatoes etc.) to the coast and exchange them by barter for coconuts or fish. They may take food themselves to market, usually by bush taxi. Taxi prices are fixed and the price generally respected; from M'Beni, a major east coast center, to Moroni, they were CFAF 850 per person in late 1982 and CFAF 100 for a sack of produce (a distance of 40 kilometers). Women may also sell their produce to saleswomen, who then transport it themselves, to major markets. Their margins are estimated to be 12-14%.

6.02 Food prices are said to be much lower in rural than in urban markets, but there are no consistent data to support this. A survey of urban markets and coastal and upland village markets carried out in late 1981^{50/} did not present a clear picture of price differentials, and,

^{49/} Such as *Grevillea robusta* (silky or Silver Oak) *Casuarina equisetifolia* (filas), clove and mango trees, forage trees.

^{50/} 'Assistance en Politique Commerciale et des Prix' Willhelm Guardia, May 1982, UNDP.

except in Moroni, market price data are not collected systematically (See Annex 2.5).

6.03 Floor prices have been fixed for maize sold to the EDF maize project (CFAF 65/kg in late 1982) but the great majority of maize is sold green for double the floor price or more, and there have been difficulties in obtaining maize for poultry feed. Although in principle, fixed prices are announced for some agricultural products at major markets, in practice these are not observed and prices reflect market forces, with considerable seasonal fluctuations. There are no procurement mechanisms for any agricultural products.

6.04 The only food products for which there have been marketing problems to date are for some vegetables, a wide variety of which have been introduced and encouraged by the CEFADER/CADER extension program. Demand for some, including potatoes, onions, tomatoes and chilies, is sustained, but for others (green beans, carrots, cabbage, cucumbers, etc.) producers are dependent on the small expatriate community and there are seasonal surpluses. The solution would appear to be for the CADERS, except in the Moroni area, to limit distribution of vegetable seeds to those vegetables which are adapted to Comorian tastes.

6.05 The lack of feeder roads from the fertile uplands to all-weather roads is perceived by the Comorian authorities as a constraint to foodcrop marketing, supposing there were a marketable surplus. Though distances are short, rarely more than 10 kilometers, gradients are extremely steep and on Grande Comore the terrain is unsuitable for donkeys. The second Highway (maintenance) Project financed by IDA (Cr. 3450-Com) includes improvement of 186 kms of earth roads; this should improve the situation substantially.

(ii) Imported Food

6.06 The marketing of imported products, and of rice in particular, is relatively efficient. The three major importers have sufficient storage capacity, and fleets of lorries and vans which deliver rice regularly from the port to storehouses and larger villages. These lorries usually return empty to the capital. The reason given for their not carrying food produce is that they are forbidden to carry people, and that women generally prefer to carry produce to market themselves. Quantities of marketable surplus, too, are too small and supplies too irregular at present to sustain medium-scale organized foodcrop marketing. Nonetheless, the lorries constitute a transport capacity which is at present underutilized, and which could transport produce at considerably lower cost than the present "bush-taxi" system.

6.07 Total grain storage capacity of the port, including 2,000 tons constructed under the WFP project and 1,000 tons under the EDF maize project, is 10,000 tons^{51/}. The other 7,000 tons capacity is owned by the private wholesalers. Rice imports at present average 25,000 tons per year

^{51/} 'Assistance en Politique Commerciale et des Prix', Willhelm Guardia, May 1982, UNDP.

and are generally imported in two shipments. Imports have grown somewhat faster than the rate of population growth (see Annex 2.4), reflecting population growth and the decline in the man/land ratio.

6.08 Until early 1982, the import and distribution of rice was controlled by five major importers, who grouped together to purchase rice in bulk cargoes. On the basis of the recommendations of a UNDP report, this system was replaced in early 1982 through the establishment of a Government body, the Office du Riz, within the Ministry of Commerce and External Relations. Government through the Office has assumed responsibility for rice imports, through direct negotiations with exporting Governments. The Office also grants to various wholesalers the right to distribute rice. The aim of the Office is to buy imported rice at the most competitive price possible, and thus maintain low, though not subsidized prices for the consumer. It is important that inter-government negotiations do obtain a favourable price; and that distribution costs are kept low by awarding contracts to wholesalers with the most competitive credit terms and the best storage and transport facilities (competition may have been reduced by the new system).

6.09 The retail rice price is fixed at each shipment; in December 1982 it was CFAF 140/kg in Moroni and CFAF 145/kg (US\$0.45/kg) in the major rural centres, reflecting a C&F price of US\$290/ton (approximately CFAF 100/kg, see Annex 2.3). It is not subsidized, reflecting distribution costs and including import taxes of approximately 9%; sales taxes of 6% are not collected.

6.10 In terms of price per unit of nutritional value, the rice price is roughly equivalent to that of locally produced roots, tubers and bananas, suggesting considerable substitutability between the main staples (coconuts, the other main staple, are rarely sold in urban markets).^{52/} For the urban consumer there appears to be little advantage at present in purchasing local food rather than imported rice. For the rural population, however, where the bulk of food demand, both local and imported, is concentrated, increased production would reduce cash expenditures on rice, a significant benefit. Overcoming the technological barriers to increased productivity could also reduce the unit costs of local food production, insofar as these are measurable, and reduce its price relative to rice.

6.11 Flour imports have fluctuated in both the 1976-81 and the 1971-75 period they averaged 1,600 tons annually. In 1982 the retail price of CFAF 200/kg (US\$0.62/kg) for bread was about double the C&F price of FF 1,950/ton (CFAF 97.5/kg). An official price structure was not available, but the retail price does not appear to be subsidized, and may include an import and consumption tax (these officially total 37% but there is no record of whether they are collected). The third major food import by value, (apart from meat, see para 6.13) is sugar. Imports have fluctuated depending on the level of concessional grants, but in 1981 they were 920 tons. The C&F price was CFAF 145/kg and the retail price CFAF 275/kg,

^{52/} CFAF 145/kg. for rice is equivalent to approximately CFAF 40 per 1,000 calories, while the price of bananas, sweet potatoes and manioc average CFAF 35 to 50 per 1,000 calories.

again indicating the absence of a subsidy and the collection of some taxes (these officially total 21% plus CFAF 10/kg of the C&F price).

6.12 In summary, although lack of reliable data preclude a thorough analysis of foodcrop marketing problems in Comoros, it appears that the prices of the major local and imported foodstuffs reflect market forces, and that sugar and wheatflour, which cannot easily be produced in Comoros, are quite heavily taxed though these taxes are not recorded. The main constraints to increased foodcrop production, as described in Chapter 3, are caused by the difficulties in developing clear technical solutions for increasing productivity, and by population pressure on the land, rather than by price or marketing constraints.

(iii) Livestock Products

6.13 Cattle and small ruminants are slaughtered commercially only on a very small scale in Comoros. Anjouan has 6 butchers,^{53/} mostly in the urban centers, of whom 2 work part-time, and Moheli has 1 butcher at Fomboni. On Grande Comore, commercial slaughtering is even rarer, and there are no animal slaughtering facilities in most towns. Some slaughtering areas were established in the past near water points (particularly on Anjouan) but they are no longer used and are falling into disrepair. The bulk of production is consumed by the livestock owners themselves, mostly at traditional or religious feasts. Neither family nor commercial scale slaughtering is subject to health or administrative control. Milk is consumed only by the family, while eggs are sometimes sent to town, to be sold with grains or vegetables. Frozen imported meat and powdered milk account for the bulk of marketing of meat and dairy products.

6.14 There are no animal product marketing centers in the Comoros. Apart from a few stalls in the grocery shops in Moroni and Mutsamudu, the only points of sale reserved for animal products are those managed by the company SOCOVIA (Societe Comorienne d' Importation des Viandes et des Produits Alimentaires), which has a de facto monopoly of meat imports and possesses cold-storage facilities for conservation. SOCOVIA is a mixed-capital company with a capital of CFAF 70 million, of which 60% is held by the State and 40% by private investors. It was established in 1979 to resolve the problems encountered by State companies such as COMIMEX (Societe Comorienne pour L'Importation et L'Exportation) -- while benefiting from their experience in commerce and management of warehouses and refrigerated vehicles -- and is responsible for the supply of meat to the domestic market. Like the other parastatal companies, SOCOVIA has been placed under the jurisdiction of the Ministry of Finance and Planning. It has a de facto monopoly on all meat imports and is responsible for their distribution throughout the archipelago. SOCOVIA possesses 46 points of sale on Grande Comore and manages all of the country's cold stores. In principle, frozen meat is delivered to the sales every day by a refrigerated van, which also supply the grocery stores in the towns.

^{53/} Annual slaughtering at Mutsamudu apparently amounts to some 350-400 cattle and 500-600 sheep and goats, coming mostly from the Djililime peninsula.

However, at the beginning of 1982 only nine of these points of sale, all located near Moroni, were in operation and these fell far short of meeting the elementary standards of hygiene required for products of this kind (by the end of 1982, 33 were operating).

6.15 Cold-storage capacities have been considerably improved during the last two years through a loan of CFAF 265 million obtained by SOCOVIA from private banks.^{54/} In addition to the existing facilities,^{55/} a new warehouse with a capacity of 200-250 tons has been built on Moroni and another, of 150 tons, is under construction at Mutsamudu. SOCOVIA, which had begun to import meat from African countries (Botswana, Zimbabwe, South Africa and Kenya) now imports it almost exclusively from Europe (France and Germany). Following good operating results in 1981, during which the company marketed as much as five tons of meat a day, SOCOVIA ran into some problems early in 1982 as a result of a sharp fall in sales (less than 30 tons a month), due no doubt to the country's general economic situation. The level of sales has improved by the end of the year, without, however, allowing SOCOVIA to balance its accounts for 1982 (see Annex 2.4).

6.16 Meat imports are second in value only to rice, and totalled CFAF 658 million in 1982, for 1,500 tons of meat (local meat production was an estimated 600 tons in 1980), imported at an average CIF price of CFAF 550 (US\$1.7) per kilo. Meat imports represented 17% of the value of food imports in 1982 and as much as 25% in 1980; thus SOCOVIA's turnover is substantial.

6.17 No reliable data are available on the prices of locally produced livestock products. However, the few surveys carried out show substantial variations from one island to another and within each island. For example, local meat prices vary from CFAF 600-800/kg for beef on Moheli to over CFAF 1,000 on Anjouan. The prices of mutton and goat meat are similar to beef prices on Anjouan and Moheli but higher on Grande Comore. Chicken sells for CFAF 650-900/kg and rabbit for as much as CFAF 1,000/kg, while turkeys and geese fetch even higher prices. Frozen imported beef is marketed at CFAF 735/kg for the cheaper cuts while the price of filet runs as high as CFAF 3,000/kg. Frozen imported chicken fetches CFAF 1,300/kg. These high prices, due probably to the relative scarcity of these products, compare with production costs which in the case of chicken do not exceed CFAF 450/kg. As with agricultural products, imported meat is not subsidized and does not impede local production, whose constraints are described in Chapter 4 i.

(iv) Fishery Products

6.18 At present, fish is sold at unloading points by the fishermen themselves. Annual per capita consumption of fish is estimated at 11kg, but this figure conceals sharp regional disparities. The fishermen keep about 20% of their catch for family consumption. The quantities marketed

^{54/} Banque Worms, Paris.

^{55/} Refrigerated containers with an aggregate capacity of 80-100 tons on Grande Comore, 12-15 tons on Anjouan and 8 tons on Moheli.

are consumed only in the fishing villages and the immediate vicinity, and many villages in the interior never, or only very rarely, have any fish. Imported fish, mostly smoked fish from Madagascar, averaged 250 tons annually between 1975 and 1980 (compared with local production of fresh fish of 4,000 tons), but imports fluctuate sharply from year to year and fewer than 100 tons annually have been imported since 1980.

6.19 The selling price of fish, like that of meat, varies widely. Fish is sold at CFAF 150-250/kg on Moheli, CFAF 250-300/kg on Anjouan (CFAF 400/kg at Mutsamudu), and CFAF 350-400/kg on Grande Comore (CFAF 500-600/kg at Moroni). Fish prices have risen sharply in recent years; a recent decree by the Governor of Grande Comore set the maximum price of fish at CFAF 500/kg (US\$1.5/kg) in the island. This price however, is not observed. Fish remains nonetheless substantially cheaper than meat, and the potential for increased production is considerable.

6.20 The ADB financed artisanal fishery development project aims to improve fish marketing through the contribution of cold stores and the purchase of refrigerated vehicles. One of the aims of the Societe de Developpement des Peches aux Comores (SODEPEC), established by legislative decree on September 18, 1981, is to finance marketing of fishery products. It is a mixed-capital of CFAF 24 million of which two-thirds is held by the State and one-third by fishermen's associations. These are to be established through the project, provided with technical support and help to obtain loans and sell their products (see also para 4.31). At the end of 1982, SODEPEC had not yet begun its activities because of delay in recruiting technical assistance under the project.

(v) Export Crop Marketing

6.21 Export crop marketing in the Comoros has the following characteristics: (i) a large number of small producers, especially for vanilla and cloves (see Chapter 3); (ii) the absence of organized collection points; (iii) freely floating producer prices; and (iv) a small number of exporters, many of whom are also substantial producers.

6.22 The export markets for ylang essence, vanilla and cloves are controlled by a total of 15 merchants; only two or three now market copra, whose production has fallen sharply in recent years. Among the 15 exporters of the three main products, however, four are of minor importance, while 80% of the market is concentrated in the hands of five major exporters, each exporting at least 10%, and the largest 23% of total production. In 1980, nearly 99% of the ylang and vanilla markets were controlled by five and four exporters, respectively. There is a larger number of clove exporters; nonetheless, of the 13 merchants, five handle 80% of production.

6.23 Vanilla is the only export product for which the Government fixes an official floor price before the purchasing season begins, and also different opening dates for purchase depending on the region. There are no organized markets for buying green vanilla and the purchasing is done mainly by representatives of the curers/exporters, who give the producers advances in cash or in kind, especially in rice. In boom times competition between buyers is fierce and the official floor price is generally

exceeded, with the producers using the advances received as a means for pushing up the bidding. In 1981, the floor price was CFAF 1,050/kg (US\$3.2) for green vanilla, but buyers paid upto CFAF 1,500/kg.^{56/} At present prices, and even with the relatively low yields obtained, vanilla is a very attractive crop for small planters. Assuming 100 kg/ha and CFAF 1,050/kg for green vanilla, which are minimum assumptions, the revenue would be CFAF 105,000/ha, one-third of which would go to the owner in the case of sharecropping. Actual producer prices were CFAF 2,000/kg at the end of 1982, and gross revenues approximately CFAF 200,000/ha (US\$615).^{57/} Despite competition from synthetic vanillin, market prospects at present appear reasonable, and Table 9 illustrates that since 1974, the world market and producer price has risen fairly consistently (see also Annex 2.1).^{58/}

6.24 Real prices have not been maintained over the 1974-81 period for ylang ylang, however (see Table 9), and from 1979 to 1981 in particular the ylang-ylang market went through a crisis. Sales slumped, particularly for third-grade essence, owing to competition from Indonesian and Malaysian cananga, price stagnation and increased production costs. Exports, which averaged 60 tons per year in the 1975-79 period, fell to 30 tons in 1980. Some small farmers abandoned harvesting, pruning and maintenance. Ylang-ylang stumps were cleared to make room for food crops, but the extent of destruction is uncertain. Ylang-ylang trees were also destroyed in other producing countries. There was a recovery in the last quarter of 1981 and prices should remain fairly high over the short run, primarily owing to a shortage of third-grade essence,^{59/} which has once again become competitive compared with cananga because of the renewed strength of the US dollar. It is important, however, that the quality of distilling, which has declined since 1975, is improved (see also para 3.18). Producer revenues per hectare average CFAF 70,000 gross (US\$215), and compare unfavorably with cloves and vanilla, assuming a producer price of CFAF 50/kg of flowers, and 1.4 tons of flowers/ha.

6.25 There are no controls over clove purchasing. Competition between the relatively large number of exporters benefits the producers. Table 9 indicates the very rapid world price increase for cloves since 1980. At present producer prices of CFAF 2,000/kg or more and yields of 300kgs/ha, gross revenues are CFAF 600,000/ha (US\$1,845). (The clove stems, comprising 5% to 10% of production, sell for CFAF 100 to 150/kg). As a

^{56/} See Annex 4.

^{57/} See Annex 2.2 b.

^{58/} Annex 2 illustrates in more detail the evolution of prices and exports, 1971 to 1981, and describes the present price structure for the main export crops.

^{59/} Depending on the length of distillation, 'superior', 'first', 'second' and 'third' grade essences are produced, each characterised by its density and ester index.

Table. 9 - PRODUCER AND FOB PRICES FOR MAJOR AGRICULTURAL EXPORTS IN COMOROS AND MADAGASCAR (FCFA/KG.)

Product	Price	1974	1975	1976	1977	1978	1979	1980	1981
Vanilla	<u>Comoros</u>								
	Official Floor price (green vanilla)	360	360	450	500	600	900	1,150	1,050
	Actual producer price	na	na	na	na	600	1,500-2,000	1,000-1,500	1,200-1,500
	FOB price (dried vanilla) (1)	2,946	3,267	3,746	4,707	6,299	13,562	14,969	13,537
	Producer price/FOB price (2)	61%	55%	60%	53%	48%	65%	42%	50%
	<u>Madagascar</u>								
	Producer price/FOB price (3)	na	55%	52%	54%	55%	60%	60%	58%
Cloves	<u>Comoros</u>								
	Producer price (dry cloves)	800	500	600	800	600	750	1,250	1,500-1,750
	FOB price (1)	975	1,043	923	1,337	1,164	1,277	2,386	2,450
	Producer price/FOB price	82%	48%	65%	60%	52%	59%	52%	66%
	<u>Madagascar</u>								
	Producer price/FOB price (3)	na	60%	62%	61%	59%	74%	59%	60%
	<u>Comoros</u>								
Ylang-	Producer price (flowers)	40	40	45	46	40	40	50	50
Ylang	FOB Price Extra (1)	13,248	14,361	15,249	16,988	18,307	18,165	18,100	17,500
	3rd Quality (1)	5,118	5,425	5,417	6,715	6,842	7,230	7,168	7,500
	Producer price/FOB price	25%	23%	27%	24%	19%	19%	19%	22%
	<u>Comoros</u>								
Coprah	Producer Price	na	45	35	60	40	60	40	40
	FOB Price (1)	110	74	49	101	100	113	109	77
	Producer Price/FOB Price	na	61%	71%	59%	40%	53%	37%	52%

(1) See Annex 2.1

(2) 5 kg green vanilla = 1 kg dried vanilla.

(3) Source World Bank (4,6 kg green vanilla = 1 kg dried vanilla, from Madagascar Agricultural Sector Memorandum October 1982
Agricultural Sector Memorandum October 1982.

(4) Producer/FOB price ratios for ylang-ylang and coprah are not available for Madagascar.

result, plantings have expanded very rapidly. However, Comoros' position on the world market is marginal. Moreover, Brazil, and the main consumer, Indonesia, are developing their own plantations vigorously. Under these conditions, the medium-term prospects for cloves look uncertain and prices may not remain at their present level in real terms for long. However, if the clove market collapses, the trees could still be used for firewood, a significant benefit in Comoros, where deforestation is proceeding at a disturbing rate.

6.26 The world market price for copra fell sharply from 1981 and 1982, and exports slumped, because of the abundant availability on the market of fats in general and of copra in particular. Prices on the main copra producing island, Moheli, fell to only CFAF 7.25 per nut for fresh nuts and CFAF 40/kg for smoked copra, representing a gross cash income of only CFAF 20,000/ha (US\$62). By the end of 1983, producer prices for copra had increased to CFAF 60/kg and exports had increased (see Annex 2.1) somewhat. Nevertheless, the short-term prospects for a rapid expansion in copra exports are not promising for three reasons. Firstly, Madagascar, the Comoros' traditional customer, needs copra for its processing industries and would probably be prepared to pay more than the going world price, but is experiencing a severe economic crisis and lacks foreign exchange. This crisis is likely to last for some time. The short-term prospects for recovery even if world prices increase do not appear good partly because of expanded local demand for coconuts (see paras 1.33 to 1.35). Secondly, over the past years, there has been very little replanting of aging plantations and coconut yields may be falling. Thirdly, demand for fresh nuts on Anjouan and Grande Comore is growing, owing to the increased population. Fresh nuts are sold for CFAF 25 to CFAF 50 each on Anjouan and Grande Comore. A certain number of Moheli nuts are sold on the other islands for eating, but sales are limited by transportation difficulties. Under these circumstances, the following is recommended: (i) improvement in the return for copra. Production of white instead of smoked copra would bring higher prices. There is some demand for the product, especially from Pakistan. This would entail modification of traditional preparation methods, since quality standards for white copra are very strict, improved methods of copra processing, including sun-drying on black tarpaulin sheets, and drying in hot air ovens, are envisaged under the Coconut project; (ii) removal of the presentlevy of CFAF 6/kg, which penalises exports further; and (iii) encouragement of replanting programs on all three islands, as envisaged under the Coconut project.

6.27 The oligopolistic position of the major exporters, combined with an uncontrolled marketing system, could operate to the detriment of the small producers. Table 9 summarizes the relationship between producer and FOB prices over the last decade but does not provide a clear indication of the extent to which cartels may have been formed by the exporters. It appears, however, that (i) for vanilla, the only product for which an official floor price is announced every year, the actual producer price is normally higher than the floor price, and that (ii) for vanilla and cloves, the FOB producer price relationships are similar to those in Madagascar,

where prices are controlled.^{60/} These conclusions must be treated with caution, however, since both the FOB and the producer price figures are unreliable.

6.28 It is likely that when world prices are high, competition between exporters works to the benefit of producers, who use crop advances as a means of increasing prices further. When the world market is depressed, as for copra at present and ylang ylang 1979-81, the producers are in a more vulnerable position with regard to exporters. Harvesting may be abandoned and in some cases trees uprooted. The absence of an effective price regulating mechanism and the complete absence of control over merchants accentuates world price fluctuations for products whose prices are in any case highly volatile.

6.29 In principle, market concentration in the hands of a few merchants should assist maintenance of product standards, and processors should be able more easily to make the investments needed to improve processing quality. The exporters ought in theory also be in a position to group together in the search for new markets. Table 10 indicates that in fact, except for cloves, (with the greatest number of exporters), exports are limited to a few countries, mostly with a long tradition of importing Comorian products. Exports are limited to one single country for ylang, five for vanilla, three for copra, but 15 for cloves.

Table 10 - Principal Exports by Country of Destination, 1981

Country	Ylang		Vanilla		Cloves		Copra		Total	
	W	V	W	V	W	V	W	V	W	V
France	100%	100%	52%	57%	42%	43%	9%	7%	28%	55%
W.Germany	-	-	13%	14%	37%	35%	-	-	17%	21%
U.S.A.	-	-	33%	28%	-	3%	-	-	3%	15%
Belgium	-	-	-	-	5%	4%	-	-	2%	2%
Netherlands	-	-	-	-	8%	7%	-	-	3%	3%
Britain	-	-	-	-	4%	4%	-	-	2%	2%
Japan	-	-	-	-	1%	1%	-	-	-	-
Morocco	-	-	-	-	1%	1%	-	-	-	-
Pakistan	-	-	-	-	-	-	62%	59%	29%	1%
Madagascar	-	-	-	-	-	-	29%	34%	14%	1%
Others	-	-	2%	1%	2%	2%	-	-	2%	-
Total	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>	<u>100%</u>

W = Weight
V = Value

Source: Direction des Douanes

^{60/} Annex 2.2 gives the price structure of the major export crops, and does not indicate an 'excessive' margin for the exporters.

6.30 France is the primary importer of Comorian products, with more than 50% of the market. This is explained by her long relationship with the Comoros and, for ylang, by her dominant position until recently in the perfume and cosmetic industry. A proportion of purchases by France are re-exported, especially ylang; a number of importers prefer buying through French importers rather than directly from Comorian exporters since they consider this provides them with a better assurance of quality. French companies are also largely responsible for the promotion of Comorian products. Direct responsibility by Comorians for product marketing could lead to more dynamic promotion campaigns. The present marketing system is not aggressive in seeking new outlets, and this may be the result of the long association between traditional Comorian exporters and French importers. Effective product marketing will be critical to export success in the future; the copra market is depressed and likely to remain so for some time, the medium term prospects for cloves are not good, and while the future of ylang and vanilla is better, these products will remain increasingly vulnerable to synthetic substitutes and other products such as cananga. An intensive campaign would be necessary to gain a solid position in the American and Japanese markets. Manufacturers of synthetic substitutes^{61/} are firmly established,^{62/} Comorian products are little known or sold, and natural products have on occasions been subjected to attack.^{63/}

6.31 It would not be desirable to develop Comorian exports through the establishment of a parastatal; this has been tried and has usually failed in other countries. Marketing is best left to the private sector. Establishment of promotion bureaux in importing countries would not be financially justifiable. Measures to promote crops could include:

- (i) Reorganization of the crop purchasing system, through establishment of organized markets where producers are able, but not obliged to sell their produce, and are well informed about producer prices;
- (ii) An information campaign for producers on world market prospects;
- (iii) cooperation with other producing countries in order to have more weight over world markets;^{64/}

^{61/} The production capacity worldwide of synthetic vanilla is over 10,000 tons p.a., while the world market is 8,000 tons p.a. The annual production potential worldwide of natural vanilla is estimated at some 1,600 tons.

^{62/} Production capacity of synthetic vanilla is 6,000 tons in U.S.A. and Canada and 750 tons in Japan, while natural vanilla purchases are 1,000 tons for U.S.A. (mostly from the Comores), 65 tons for Canada and 30 tons for Japan.

^{63/} In Japan, especially for ylang.

^{64/} With Madagascar for ylang and vanilla, with Madagascar and Tanzania for cloves, with Seychelles for copra etc.

- (iv) making better use of existing organizations;^{65/}
 - (v) improving market promotion with international aid;^{66/}
 - (vi) providing exporters with financial incentives to search for new markets. Nevertheless, quality improvement, efficient quality control and reliable quality levels are essential pre-requisites to promotion activities (See Chapter 3 (ii)). Establishment and monitoring of quality norms is in principle the responsibility of the Stabilization Fund, established in late 1982.
- (vi) Diversification of Export Crops

6.32 Any attempt at diversification, whether development of crops already grown on a small scale or introduction of new ones, must take account of the following constraints:

- (i) the relative isolation of the archipelago from potential importers and its limited number of international air and sea links;
- (ii) the inadequacy and unreliability of transport between the islands;
- (iii) the small size of the domestic market, further characterized by the low purchasing power of the population; which severely limits the capacity for absorption of surpluses;
- (iv) the limited amount of land available and possible competition with food crops;
- (v) the complexity of the landholding system; and
- (vi) the great variety of agro-climatic conditions which, while allowing for considerable diversification, at the same time prevents large scale cultivation of a single crop.

Some of these constraints may gradually be removed -- especially those relating to transportation facilities -- but they must be recognized, and it is particularly important that farmers should not be encouraged to cultivate new crops for which there would be no outlet.

^{65/} Such as 'Univanille'.

^{66/} The EEC in particular. Much could also be learnt from other countries which have successfully established agencies responsible for promotion of local products e.g. the Office de Commercialisation et d'Exportation in Morocco, and the Ivoirian Coffee exporting agency. Such organizations have effectively identified counterparts in importing countries, and established quality control measures. It is recommended that the Stabilization Fund seek technical assistance in this field.

6.33 It would be desirable to concentrate on crops: (i) with a high value per unit weight, and a limited incidence of transportation costs (ii) which are not affected by unreliable transport (this would eliminate highly perishable foodstuffs) and (iii) for which the Comoros have a comparative advantage. With the exception of copra, the present main export crops meet all these criteria. Other products and crops for which conditions in the Comoros are favorable and which fit into this category are peppers (of all types, including green pepper processed for preservation) and spices in general, essential oils other than ylang-ylang, and medicinal plants. Essential oils identified as having particular promise are basilic, neroli, patchonli and petitgrain. Aside from medicinal plants, all of these are already grown on a small scale.

6.34 Markets are mostly small and highly specialized for these products, with in general a limited number of buyers. Prices often vary greatly from year to year, but price movements vary for each crop; this lessens revenue fluctuations overall if a grower's range of crops is diversified. There is a dynamic private sector on the Comoros. It is best placed to adapt quickly to market changes and risk taking. The Government's role should be confined to protection of the interests of small planters by: (i) ensuring that the arrangements with exporters are fair,^{67/} and (ii) establishing mechanisms that will prevent major fluctuations in world prices from having repercussions for small planters.

6.35 There is probably little point in developing commodities with a large international market such as coffee and cocoa, which are already grown on a small scale, or oilpalm. The quantities that the Comoros would be able to market would be too small to attract importers. Moreover, conditions are not favorable for cocoa. Palm oil, which would be directed at the same market as copra, would face problems of collection and processing.

6.36 Finally, exports of fresh products, such as vegetables, cut flowers, or tropical fruits, would entail major gathering, packaging and transportation problems even if production problems could be resolved.^{68/} It would be unrealistic to assume Comoros could compete successfully in the European market, a particularly demanding one as to product quality and regularity of supply, with other suppliers offering the same products and who are well organized. In addition, tropical products such as pineapples and bananas are already encountering overproduction and marketing problems. Nevertheless, certain openings could be explored:

- (i) If Africa does not offer outlets (countries may produce similar items or are short of foreign exchange), the Gulf region could offer some attractive prospects, although the quality requirements in most of the countries are similar to those of the

^{67/} By way of example, the contracts concluded by a processor/exporter with small planters for raising basil can be mentioned.

^{68/} Appropriate techniques would have to be developed to extend the production period for pineapples, which is currently only a few weeks.

European market, and transportation could still be a serious constraint;

- (ii) It would be worth trying to introduce in Europe products for which the Comoros would have virtually no competitors, especially the "Chinese guava" which presently grows spontaneously and is gathered in the wild; this fruit, whose pleasant taste is very different from that of other fruits already on the market and is moreover easy to eat, would be well received. As the quantities exported would be small to begin with and the product would not be known, it would be preferable initially to make arrangements with firms specializing in luxury products; great care would have to be taken with packaging and shipment, as the fruit is highly perishable;^{69/}
- (iii) the supply of fresh food to ships passing off the Comoros, begun not long ago by a private company, is an interesting experiment and could offer quite significant possibilities for development. Demand is so far limited mainly to tomatoes, lettuce and tropical fruits.

6.37 As regards fresh products, too, the initiative ought to come primarily from the private sector, which should establish contacts with markets and assume the risks. Credit could be sought from the newly established Development Bank (para 7.33). Government should protect the growers and provide technical and management assistance, improve infrastructure if necessary (e.g. rural roads to assist marketing), facilitate export procedures and exercise quality control.

(vii) Agro-Processing Industries

6.38 There are approximately 370 distilleries of essential oils (largely ylang ylang), most of which use obsolete equipment of poor quality and vanilla preparation is carried out by about 200 mostly very small-scale processors. Apart from these, however, the manufacture of soap is at present the only agro-industry in Comoros.

6.39 The Fidaly soap factory at Moroni presses 300 to 400 tons of copra per year, using a small, very old press with an hourly capacity of 250 kgs of copra. The copra is brought from Moheli through collecting agents^{70/} and it produces a 'household' soap which serves only the domestic market. Recently, the factory has also begun to mould and sell a better quality toilet soap from imported basic ingredients. There are

^{69/} It should be noted, however, that guava also grows in other countries of the region. Mauritius, in particular, could become a serious competitor if the ventures were to succeed. Madagascar already exports lychees, another Comorian luxury fruit, to European markets, on a small scale.

^{70/} According to Fidaly, the cost of copra is CFAF 70/Kg FOB Moheli; and CFAF 82/kg delivered to the factory.

plans to establish a second soap factory at Anjouan.^{71/} It will use an even smaller press, with a processing capacity of 1 ton per day. No market studies have been undertaken to establish the justification of the proposed Anjouan plant.

6.40 Apart from Anjouan soap factory, the only other agro-processing project in the planning stage, also to be owned by Fidaly, is for the manufacture of coconut oil for local consumption and cosmetic products for export. A new press, with a processing capacity of 700 kgs copra/hour, has been imported. It is intended that the industrially manufactured coconut oil will partially replace oil produced by artisanal methods.^{72/} However, apart from the possibility that the industrially produced oil may not correspond to Comorian tastes, the project is likely to face a number of problems including:

- (i) the need to obtain white copra; oil produced from smoke-dried coprah would have to be further refined, and this would not be feasible, since machinery for refining the small quantities involved does not exist;
- (ii) the low efficiency of the press, which would yield 50% oil from copra, leaving 15-20% of oil in the copra cake, compared with norms of only 7%;
- (iii) the high cost of electricity, together with frequent power cuts, which would substantially increase production costs;
- (iv) the problem of supply and high cost of packaging; and
- (v) the disposal of the copra cake - at present this potentially useful by-product is wasted.

6.41 The problems of the Moroni oil manufacturing plant are typical of those that any potential entrepreneur would face in the Comorian environment. The very limited domestic market, transport problems^{73/} and recruitment and training of manpower at all levels are also problems general to the development of Comorian industries. Even supposing these latter can be overcome, any industry would have to face the following handicaps:

- (i) supply difficulties, for inputs, spare parts, fuel, packaging etc.,
- (ii) high cost, unreliable energy supplies;
- (iii) the small scale of production, resulting in high unit costs; and
- (iv) the negligible value, if any, of by-products.

^{71/} Mamadaly in partnership with Hatim Adamjee.

^{72/} Whose market price is CFAF 400-500/Litre.

^{73/} These are also constraints to diversifying agricultural production.

In general, the development potential of processing industries is limited and necessarily small-scale.

6.42 Government should encourage the establishment of industries by the private sector which feasibility studies clearly indicate to be of interest to the Comoros. Measures could include bank loans,^{74/} possible tax advantages, measures to facilitate supply of imported materials and exports, etc., all within the framework of an investment code.

Chapter 7 - Institutions

(1) The CEFADER System

7.01 The Ministry of Production (Ministere de la Production Agricole, de l'Industrie et de l'Artisanat: (MPTIA)) is responsible for overall agricultural policy, and for communications with other government departments. It has five main sections, that of fishing, industry and artisanal industry, administration, legal and external affairs, and the General Inspectorate of Rural Development (see Annex 1.1). By far its largest department, however, is the CEFADER (Centre Federal d' Appui au Developpement Rural). The CEFADER, with its regional CADERS (Centres d' Appui au Developpement Rural) is in effect the technical arm of the Ministry of Production, with a high degree of operational autonomy. Relationships between the CEFADER, the Ministry of Production and the Ministry of Finance are good. There has been close coordination in development of the Agricultural Plan now under preparation.

7.02 The CEFADER/CADER system (see Annex 1.2) was established in 1980 when the Government, aware of the almost total lack of rural services, created, with FAO and UNDP assistance, the framework of a system of rural services. The CEFADER with its CADERS provides the structure through which rural development activities can be directed. Agriculture, forestry, livestock, research, training and extension, home economics and rural data collection, monitoring and planning divisions exist in theory, though as yet only the agriculture, training and home economics divisions are operational.

7.03 To date five CADERS are fully operational (see map). Mibimi on Moheli covers 15 of the 20 villages on the island. Tsembehou and Mremani on Anjouan currently cover about 40% of the island's population, and there is also a 'Precader' at Poumouni, a smaller center which is a satellite of Mremani in western Anjouan. Grande Comore, with 55% of the total population is less well covered. There are two CADERS, one in the northwest at Maoueni, and one in the southwest, at Simboussa covering between them about one-quarter of the island's population. The aim of the government is eventually to serve the entire rural population through CADERS. Each CADER has a director, an assistant director and an accountant. Each has an average of 10 extension agents, whose salaries are paid either by the government or through different externally funded

^{74/} A project to provide assistance to the Development Bank of Comoros for such loans, is currently being considered for IDA financing.

projects (EDF maize project, ADB vanilla project), and two home economists. Most CADERs also have technical assistance through a UN volunteer. Each has a few hectares of land on which crop trials and demonstrations are carried out, a poultry farm, and Mibimi on Moheli has a small cattle farm.

7.04 The projects carried out through the CEFADER/CADER system at present include: a poultry rearing project (FAO/EDF); a project to encourage cultivation of improved maize varieties in rotation with pigeon peas and other food crops, using improved hand tools (EDF); a project to promote production of vanilla, cloves and bananas (ADB); a project for rat control and rehabilitation of coconut groves (IDA); a farm systems research/development project (FAC); a project with food for work involving land terracing and soil restoration, for work encouragement of extension, and rural works including construction of water cisterns and road maintenance (FAO with WFP)^{75/}; and a banana replanting project (Government with WFP). A rural development project on the peninsula of Nioumakele in Anjouan is in its start-up phase (ADB). Finally, preparatory activities are underway for a Rural Services project whose objective is to strengthen financial management, monitoring and data collection, extension, livestock, forestry and land conservation activities (IDA/IFAD). These projects are all co-ordinated and supervised by the CEFADER, and implemented through all the CADERs (except where agronomically inappropriate, eg. the coconut project only affects coastal areas).^{76/}

7.05 The CADERs vary in effectiveness, depending on the quality of staff, as do the projects funded through them. The most effectively managed is the maize project which has clearly defined work programs and strong technical assistance at CADER level. Four thousand (4,000) farmers are involved so far, each growing on average, 0.25 ha of maize. Extension workers are responsible for distribution of improved seed and hand tools for cash (sales were on credit, but the repayment rate was poor (Chapter 7 (iv)), and delivery of technical messages. These include simple terracing and destoning of fields, row-planting, improved crop association and instructions on how to use the hand-tools (hoes, forks, rakes) and improved seed. Comorian agriculture has not yet reached the stage when more sophisticated inputs, fertilizer or pesticides can be applied on a large scale. The 33 extension workers each have between 90 and 200 contact farmers whom they visit once a month, and they receive regular supervision and on-the-job training from project management at CEFADER headquarters. The system appears adequate.

7.06 The WFP/FAO program has been the second major extension-related activity of the CADERs. Much of its work involves rural works and land conservation, but achievements in 1981 also included seed multiplication of maize, pigeonpea, groundnut and potatoes. Field trials and extension of

^{75/} These are described in Annex 3.

^{76/} Some externally funded activities are envisaged only on a regional level, eg. the recently funded ADB rural development project only affects the two CADERs on Anjouan. Overall control, however, will remain with the CEFADER.

improved farming techniques are carried out by the CEFADER agronomy division. Particularly successful have been the programs to introduce diversified vegetable growing, though there has sometimes been a marketing problem for produce. The programs of the home economists are also quite well defined and supervised. They include nutrition, hygiene, poultry rearing, vegetable growing and agriculture. The area in which the CEFADER/CADER system has been weakest until recently has been in training and extension (see also Chapter 7 (ii)).

7.07 Supervision in the past has not always received clear orientation. Part of the problem has been that different staff, funded under the various projects, have tended to work exclusively on these activities; there has not always been coordination or control by the CADER director. Thus, the CEFADER/CADER government-funded staff (typically two per CADER) have worked on vegetable and to some extent, chicken production; the WFP funded staff (two per CADER) have organized and distributed food-for-work for land terracing, banana replanting and road maintenance; the staff funded by the ADB vanilla/clove project (two per CADER but a total of 30 in the country) have not had a clear program since disbursements were suspended; and those funded by the EDF maize project (all working on Grande Comore) have worked on extension of improved maize cultivation in association with legumes, roots and tubers. Coconut project staff have worked mainly in coastal areas, where until recently CADERS were not established. Furthermore, some key areas in the farming system, including animal production and social forestry, have received very little attention. Another problem has been that there is no clearly defined salary structure for CEFADER staff. Staff financed through projects earn substantially more than non-project staff.

7.08 The problem is being addressed by the CEFADER and a new arrangement is being put into effect, which should substantially improve the situation. As an interim measure, bi-annual in-service training programs for all CEFADER staff are being organized with the assistance of the EDF Maize project management. Through the IDA/IFAD Rural Services project, organized work programs for all extension staff, who would gradually be trained to be multidisciplinary, will be put into effect. These would include field visits and fortnightly training sessions at CEFADER headquarters from technical specialists. Close links between extension and the research project (Chapter 7 (iii)), being initiated should also improve the quality of technical messages. Thus, though the problem of the variable quality of agricultural extension personnel remains, considerable efforts are being made to upgrade staff.

7.09 Over the next few years, extension staff will receive technical advice from supervisors (the CADER senior staff) and CEFADER staff. The country is too small, the number of extension workers too limited,^{77/} and the technical messages too simple to justify a comprehensive network of subject matter specialists for each crop or activity. As recommended in Chapter 3 ii), recruitment of an agronomist specialising in Comorian export crops is recommended to develop improved extension methods particularly for

^{77/} When the CADER system is complete there will be approximately 110 extension workers.

vanilla and clove cultivation. The animal health and production activities would also require specialist staff. They would work closely with agricultural extension staff, for example on encouragement of fodder trees and improved grasses (Chapter 5). The land conservation and forestry service staff would coordinate and supervise CADER soil protection and reforestation programs. Given that expensive inputs are unlikely to be used for some time, establishment of a comprehensive credit system is not a priority.

Plans for Expansion

7.10 The CADER system is being extended to cover most of the country. UNCDF (United Nations Capital Development Fund) is financing the construction of 4 new CADERs, 2 on Anjouan, and 2 on the northern coast and southwest of Grande Comore respectively. These were constructed in 1983. IDA is expected to finance the construction of 2 CADERs on eastern Grande Comore through the Rural Services project. About half the staff for these new CADERs have already been assigned (see Table 11). Government plans for the total number of CADERs needed has varied between 11 and 16, since the network began to be established in 1980. According to UNCDF estimates, a new CADER on a green-field site costs about CFAF 97 million^{78/}. It is recommended that government extend the geographical coverage of the 11 CADERs existing or planned, rather than construct new ones, in order to economize on infrastructure costs.

7.11 The difficulties of staffing the CADERs must also be recognized. A total of 65 agricultural staff have not yet been incorporated into the CEFADER/CADER system. Apart from those working on the EDF maize project most have had very little supervision for the last 10 years, many have had little or no initial training, and some are nearing retirement. There are at least 15 Comorians with university-level training in the CEFADER system. Though over 30 Comorians are undergoing university-level training abroad, initial training of middle and lower staff is at present less systematic (see Section 7 (ii) Training).

^{78/} US\$ 300,000; this includes generous staff quarters, office and vehicle repair space and there is scope for economy.

Table 11 - Existing CADERS and Plans for Expansion

<u>Name</u>	<u>Location</u>	<u>Population</u>
<u>Existing</u>		
Simboussa	S.Grde Comore	20,000*
Maoueni	N.Grde Comore	23,000
Mibini	Moheli	14,000
Tsembehou	C. Anjouan	25,000
Mremani	S. Anjouan	35,000
		<u>117,000</u>
<u>Under Construction</u>		
St. Benoit	N.Grde Comore	22,500
Mvouni	S.W.Grde Comore	30,000
Patsi	N. Anjouan	25,000
Bongueni	W. Anjouan	30,000
<u>Planned</u>		
Moheli		-
Mbeni	N.E. Grde Comore	24,000
Sidjou	S.E. Grde Comore	<u>18,000</u>
Population to be covered by CADERS		<u>266,000</u>
Population per CADER		24,000

Source: CEFADER and mission estimates.

See Section 7 (ii) on Training, and see Maps.

* Estimate: CADER established before Population census.

7.12 The Rural Services project recently approved by IDA and IFAD, aims in coordination with the projects financed by the donors, to build up the strength of the CEFADER/CADER system in a number of ways:

- (i) By creation of an agricultural data collection, planning and project monitoring unit with IDA assistance. This would provide the data needed for monitoring and planning project progress. It would also provide basic information about cropping patterns, farm systems and yields in the Comoros (this is a serious lack, as the previous sections have indicated). Close collaboration with the FAC research program should be established in this field;
- (ii) By strengthening the financial management, previously very erratic, of the CEFADER and CADERS. This was initially provided for under the Coconut project;

- (iii) By instigating organized work programs with regular training, supervision, and contacts with farmers for all staff;
- (v) By creation of a small livestock production and animal health service, which would be responsible for establishing measures to enforce standards of hygiene for imported meat and animals, establishing simple animal health and vaccination programs, and improving livestock productivity by increasing production of forage crops and improving drinking water supplies (see Chapter 4).

7.13 In addition, a FAC-financed research and development project is conducting adaptive research on farming systems and improved varieties. These services should help to build up the strength of the CEFADER/CADER system. Inevitably in the early years a large proportion of assistance would be for technical assistance and training. CEFADER headquarters, previously short of office space, are being expanded through the construction of new office space by a UNCDF grant.

7.14 The CEFADER/CADER system was established only in 1980, and it is too early yet to assess its impact on agricultural production. It is heavily dependent on technical assistance and must remain so for some time. One of the aims of the CEFADER/CADER structure is that there should be maximum decentralization for the CADERS. While there are wide agro-climatic differences in Comoros, the size of the country and the scarcity of skilled manpower make strong central coordination imperative. Not all CADERS are fully staffed, and, as mentioned above, extension workers have not always received systematic training or supervision.

7.15 Another aim has been that, given the financial constraints of the government, the CADERS should be as financially autonomous as possible, for example, poultry and vegetables produced by the CADER should be sold at a profit. Agricultural credit is also to be channelled through the CADERS (see Chapter 7 (iv)). While it is recognized that government funds are scarce, the diversification of CADER activities into commerce and credit is likely to be administratively very costly, and to take much time from their main activity, which must be extension. It is important, however, that inputs sold through the CADERS, such as tools and plant material, be sold on a full cost basis, in order to avoid the financial burden of subsidies; Government recognizes this principle.

7.16 Inevitably the CEFADER/CADERS have faced problems. Nevertheless, the beginnings of a rural extension service have been created, and given the limitations of staff and the inevitable growing pains of a new structure, the achievements especially of the EDF and FAO/WPF projects are considerable. Senior CEFADER and Ministry of Production officials are well aware, furthermore, of the difficulties involved in strengthening Comorian institutions.

Recommendations

7.17 The following recommendations are made:

- (i) The number of CADERs should be limited to 11 and their geographical coverage extended to cover the whole country, rather than increased to 16.^{79/}
 - (ii) As services are built up and the range of services is extended, investment should be in training, extension and production oriented activities (with initially technical assistance). New physical infrastructure is not needed beyond the 11 proposed, and CADER staff should not engage substantially in marketing or credit activities.
 - (iii) Extension needs to be more clearly focused and controlled. Technical packages should be tested and extended as they are developed, through cooperation between the extension and research program.
 - (iv) As the range of services provided is extended, the role of the CEFADER/CADERs, and the other ministries, must be clearly defined; the data collection activities of the CEFADER must not overlap with those of the Direction du Plan. Coordination will be achieved by maintaining close relationships between the two Ministries.
- (ii) Training

7.18 Until independence most preliminary training for skilled Comorian agricultural staff, at all levels, was carried out abroad. Upper level staff were typically trained in France, and lower level staff in Madagascar or other neighbouring countries. A farmers' training school also existed near Moroni. Since independence, while the pattern of university training in France has continued, there has been very little formal initial training of extension level staff, in any of the main rural development fields.

7.19 Table 12 indicates the total number of agricultural staff in the Comoros (excluding administrative and accounts staff and unskilled workers), who are currently on the payroll. Their quality varies widely, particularly at the extension level; while some have received formal training outside Comoros, and some though with little initial training have long experience, others have not had a clear work program for many years, and would need substantial retraining to become effective.

7.20 At the higher levels too, there is a severe shortage of trained staff; there are no degree level livestock specialists, and two of the three foresters work as agriculturalists. The few existing upper level staff are obliged to spend much time on administrative, rather than technical work. There are more expatriates than Comorians at the CEFADER, while each CADER also has a UN volunteer.

^{79/} Table 11 illustrates that the 10 for which population figures are given should cover a population of over 245,000, or nearly 85% of the rural population.

7.21 Government is well aware of the constraints the shortage of skilled manpower places on building up rural development institutions in the Comoros. Thirty Seven Comorians are currently undergoing higher-level training in rural development abroad, including nine in agriculture, six in livestock and five in forestry specialities. Some are trained through bilateral assistance agreements, others through Government grants. The problem in the past has been that many of those who have undergone training have remained abroad, since Comorian salaries, (CFAF 90,000 to a maximum of CFAF 180,000 per month or US\$300 to US\$600 per month for degree level staff), are not competitive with those in France or some other francophone countries. Nevertheless, a reasonable proportion of those undergoing training may be expected to take up service over the next five years.

7.22 Government has addressed the problem of training junior-level manpower through an education project financed with IDA assistance (3493-Com, total costs US\$6.5 million). An agricultural school is to be constructed on Moheli with facilities for 40 students. The school will also provide inservice training to CADER staff. Teaching is to be provided partly by a director and full time agricultural extension training specialist, and partly by senior CEFADER staff on a part-time basis. No additional technical assistance is foreseen under the project, which will not finance the operating costs of the school.

7.23 Construction is intended to be completed by mid-1984, in time for the academic year of 1984-85. The school is to be located four kilometers from the Mibini CADER, and would use its land for practical agricultural work (buses are to be provided).

7.24 While the school will be well-placed to train general agricultural extension workers, it may be more difficult to train more specialized staff; qualified manpower to carry out this specialised training is not available in Comoros. The use of CEFADER staff for training may be hampered too, by the unreliability of transport between Moheli and Grande Comore, fuel shortages on Moheli, and the already overcharged work program of CEFADER staff. For shorter in-service sessions, it may prove logistically simpler for Grande Comore staff to come to CEFADER headquarters, and for CEFADER staff to go to Anjouan, than for all course participants to go to Moheli.

7.25 The following recommendations may help to make best use of the school when it is constructed.

- (a) A Comorian director should be identified and trained without delay; if no Comorians are available an expatriate director should be recruited and funding identified.

Table 12 - Additional Staff Requirements

	<u>Existing Staff Assigned to CEFADER/CADER</u>	<u>Summary of Require- ments</u>	<u>Existing Staff Not Assigned to CADERS</u>	<u>'Net' Incremental Requirements</u>
Graduate/diploma level	21	8	2	9
Technical level	8	23	11	14
Certificate/ prac. training	95	72	39	43
Prac. training	<u>-</u>	<u>-</u>	<u>15</u>	<u>-</u>
	<u>124</u>	<u>103</u>	<u>67</u>	<u>66</u>

- (b) An agronomist with experience in training and extension should be recruited, most likely for at least three years, who would handle the bulk of the teaching. (Specialist staff would have to be trained abroad).
- (c) Given the already heavy commitments of CEFADER staff, their contribution to teaching should be limited and tightly defined.
- (d) Every effort should be made to overcome the logistical problems of operating a school on Moheli, with special attention to sufficient supply of vehicles, fuel and food.

7.26 Training of home economists was carried out at the CEFADER over a three-month period in early 1982, and was well-organized. Each home economist works with five villagers, recruiting one 'animator' per village (paid by WFP rations). It is likely that training of new home economists will be at CEFADER headquarters, rather than at Moheli, so that the young women are able to stay with relatives in Moroni, rather than in an institution.

(iii) Research

7.27 IRAT and IRHO both participate in research programs, in the context of the EDF maize project and the IDA Coconut Rehabilitation Project respectively. There are, however, no independent ongoing research programs

in Comoros, for agriculture or livestock.^{80/} Adaptive research is essential to overcome the constraints to increasing productivity on Comoros, brought about by soil exhaustion and the scarcity of cultivable land. However, creation of an autonomous research institute would not be financially feasible, given the size of the country and its wide agroclimatic variations.

7.29 Government has created a research and development unit within the CEFADER whose aim is to meet research needs within the constraints of the country. The unit is being financed by the FAC under bilateral aid for an initial period of two years and comprises four technical assistants, based on Grande Comore and Anjouan. Its most important task is the study of Comorian farming systems and the means to increase substantially production and yields. Its role will be: (i) to define Comorian farming systems and identify the main constraints to improving peasant agriculture; (ii) to develop and test improved farming systems with emphasis on soil fertility improvements and improved varieties; (iii) to create an information center identifying international research experience in countries with similar agroclimatic conditions, particularly in the same region, such as Madagascar, Mauritius, Reunion and Seychelles; and (iv) to support training and extension, both through small farmer programs and development of technical packages.

7.30 The approach adopted seems appropriate. It should continue to be supported by technical assistance agreements with specialized institutions similar to those ongoing; these agreements would be coordinated and approved by the new research and development unit. Contacts should also be developed with relevant international research bodies in francophone and non-francophone countries, such as IITA for roots and tubers and ICRISAT for legumes.

7.31 Given the almost total lack of experience in Comoros with testing response to more sophisticated inputs, a useful complement to the farming systems research approach adopted by the FAC financed project could be the FAO fertilizer program. This program, financed by the fertilizer industry and thus free to Governments, runs extensive trials to test response to fertilizer. Working in parallel with the CEFADER/CADER research and development unit, it should be possible to develop appropriate fertilizer packages within five years.

(iv) Agricultural Credit

7.32 Two institutions are responsible for rural credit, the CEFADER and the Development Bank (Banque de Developpement des Comores: (BDC)). The loan and repayment conditions, the source of funds, the borrowers and the size of the credit, are different for the two institutions.

7.33 Until recently the CEFADER granted credit in kind, under the EDF maize project, in the form of small agricultural implements. The credit, whose estimated value was CFAF10,000 was repayable over 4 years without interest through sales of maize. The repayment rate was generally poor,

^{80/} BDPA (Bureau pour le Developpement de la Production Agricole) undertook applied research and field trials in the 1960's, but did little under farmer conditions.

with defaults averaging 40%. This credit program has been discontinued and agricultural implements financed by the maize project are now sold for cash.

7.34 In 1982 the CEFADER received a grant of US\$500,000 from UNCDF to be disbursed over the 1983 to 1985 period in 3 tranches of US\$160,000 each, the balance to be used to cover the expenses of the UNCDF. According to this agreement, credits granted by the CEFADER are allocated exclusively to farmers who participate in the CADER program, for the development of food crops and market gardening, poultry, and the purchase of agricultural implements and construction materials. The maximum credit is limited to CFAF 300,000. Repayment in kind in the form of farm products is envisaged, but is proving very difficult to implement. The repayment period is limited to one year for food crops and vegetables, and three years for the other operations, with repayment in three equal tranches. No interest is charged, but loans for poultry rearing are subject to a commission of 5% when they are granted, to cover administrative expenses. No guarantee is required from borrowers. The program is currently running into a number of administrative problems.

7.35 According to its regulations, the Development Bank can grant agricultural loans for purchase of inputs, material and equipment, for the construction and repair of agricultural buildings, the purchase of livestock and animal fodder, etc. The lower limit for a Development Bank credit is CFAF 300,000 and the maximum loan period is 5 years. For a BDC loan a contribution of at least 25% is required from the borrowers, and the interest rates, to be determined on a case by case basis, are between 8% and 11% per year. Agriculture comprises only one of the lending activities of the Development Bank, which has lines of credit for various purposes. As of December 1982, 8 loans totalling CFAF 7.3 million had been granted for agriculture, mostly for poultry food or cash crop development. A formal request had also been made for the establishment of a 37 ha farm.

7.36 Links between the two institutions are rather informal. Funds allocated by the UNCDF to the CEFADER are placed in the Development Bank, but simply as a deposit account. The CEFADER will have complete responsibility for the loans it makes, though at its request the Development Bank may provide assistance in the establishment of loan administration procedures. The Development Bank for its part submits routinely all its loan requests to the CEFADER for confirmation that they are consistent with national development policies, and for a technical evaluation. Furthermore, the CEFADER controls the use of funds for loans granted by the Development Bank and provides assistance to the borrower if he is within the CADER system. Although the UNCDF and BDC credit programs will serve on principle different borrowers, there is a risk that the very different repayment conditions may lead to abuse.

7.37 It is likely that the real cost of CEFADER credits will be very high, taking into account the very low ceiling for individual loans, the absence of interest on loans and probable repayment rate, which may well be no higher than those loans financed by the maize project. It is unlikely that it will be possible to continue with the loan program once the UNCDF funds have been exhausted. Furthermore, administration of a large number of small loans will absorb a considerable proportion of the time of CEFADER

staff, reducing time available for extension activities and technical assistance. It may be preferable to allocate responsibility for all agricultural loans to the Development Bank, the CEFADER providing assistance simply on a technical level, and to reduce the number of loans by selling inputs and simple agricultural materials distributed by CADER staff only on a cash basis.

(v) Stabilization Fund

7.38 Stabilization funds for export crops have existed in Comoros for some years: for vanilla since 1969, for copra since 1973 and for ylang-ylang essence since 1975. A clove stabilization fund was created in 1982.^{81/} Except for the vanilla fund during the colonial period, none of the funds has contributed effectively to price stabilization. Their main function has been, rather, to impose an export levy; this has had a negative impact particularly on copra, for which there has been a severe slump in sales. The Fund was directed by an officer of the Ministry of Finance. He played no role in the establishment of prices, price structures, appropriate levies or in the discussion of marketing policy. He did not produce an annual report, statement of expenditures, or a plan of campaign, and his influence over the exporters was minimal.^{82/}

7.39 Funds were deposited with the Treasury, but at the end of 1978 all funds had been used for the repayment of the accumulated debts of the previous regime. Since then, the Treasury has registered operations by products, but funds are not available for price stabilization in practice, since they have been diverted to support other Government and parastatal activities ^{83/}

7.40 The Government, aware that the situation was unsatisfactory, and committed to creating an operational stabilization fund for copra under the Coconut Rehabilitation project requested the World Bank to study the possibility of reorganizing the existing system. The conclusions of a mission in early 1982 received Government support,^{84/} and were as follows:

^{81/} Another stabilization fund also exists in theory for imported rice.

^{82/} Despite the fact that the ylang-ylang fund financed the destruction of some flowers in 1979, in order to reduce exports and maintain prices.

^{83/} As of December 1981, funds available on paper were CFAF 180.1 million (US\$0.6 million) for all export products, including CFAF 18.2 million for copra, CFAF 116.5 million for vanilla, and CFAF 45.4 million for ylang; in addition, there were CFAF 26.7 million for imported rice (Source: Treasury). CFAF 100 million were removed from the vanilla account and placed in a fixed term account; CFAF 40 million were lent to Comoros Airways, which has considerable liabilities.

^{84/} Caisse de Stabilisation; Rapport de Mission Paul Jouve, February 1982.

- (i) the climate for the successful operation of a stabilization fund was not very favourable, given the financial problems of the country, the difficulties of maintaining reserves, and the important role of the exporters, some of whom preferred freely floating prices, despite the additional risks involved ^{85/};
- (ii) nevertheless a stabilization fund could reduce the price fluctuations of these commodities, which face particularly volatile markets;
- (iii) a common fund for all four major commodities was recommended because this would best provide for temporary subsidization of products facing depressed markets.

7.41 The report attached crucial importance to choice of a well qualified director with a strong personality and independent of external influence. It recommended strongly that the Stabex^{86/} funds be placed in the new Stabilization Fund. It recommended that the fund's responsibilities be limited to three essential functions:

- (i) guarantee of stable, remunerative prices to producers;
- (ii) identification and repatriation of profits; and
- (iii) improvement of quality control and marketing conditions.

7.42 Government acted rapidly and in November 1982, the federal assembly approved the law creating the new stabilization fund. IDA will provide assistance as requested in quality control and marketing. The Stabilization Fund levy on copra has been removed to encourage production. However, there is no means for distribution of fund revenues to producers to mitigate price fluctuations, and stabilization funds continue to be used for general revenue purposes. It is still not clear that the Fund will be able to stabilize producer prices.

Chapter 8 - Government Policies and Actions Underway

(i) Development Policy

8.01 Food self-sufficiency is the highest development priority of the Government. The other objectives are: (i) infrastructure development, both within and between the islands and with the rest of the world; (ii) exploration and development of new energy resources, particularly renewable energy; (iii) improvement in water supply, for agriculture and human consumption; (iv) improvement in sanitation; (v) strengthening of

^{85/} An argument justifying paying the producers less, since the exporters must protect themselves against possible price slump.

^{86/} Stabex is a stabilization fund created by the EEC (European Economic Community) in order to compensate member states for reduced revenues following temporary price declines for major exports.

education, especially technical education, adapted to the needs of the country; (vi) improvement of housing conditions of the poor.

8.02 Government is aware that its aim of self-sufficiency in food production by 1990, with an adequate, varied diet for the population, is unlikely to be achieved. Among common food items in the diet, wheat cannot be grown in the Comoros, while there are severe technical constraints to a rapid increase in production of rice or meat. Furthermore, pursuit of this objective must not be at the cost of efficient land use. Government's aim is therefore to increase production of cash crops concurrently with foodcrops, in order to earn the foreign exchange necessary for food imports (see also Annex 4, Land Use Strategy and paras 2.02 to 2.08). The two aims are compatible except in those areas where food and cash crops are competing for the same land; the extent of these areas is not known but is rather limited. Government's aim is also to encourage small-scale producers rather than large landowners or private companies.^{88/}

(ii) Investments Planned and Underway

8.03 Development projects in progress and under preparation, are consistent with these aims. They are all aimed at the small-scale producer, while creation of collectives or state farms is not envisaged (earlier attempts to establish these failed). The projects also avoid excessive intervention in marketing, which could discourage production. Projects underway, or planned for the immediate future, are summarised in Chart 1.

8.04 Government has recently prepared an investment plan for the 1983-90 period. External financing is being sought for almost all new investments. Total investments for the 1983-86 interim plan for agriculture (CFAF 15.7 billion, US\$48 million) compare with CFAF 12

^{88/} In recent years, the latter have not used their holdings well. With appropriate land legislation, however, the situation could improve.

Chart 1 - Summary of Principal Projects in the Rural Sector (ongoing and under preparation)

Project Name	Executing Agency	Implementation Period	Location	Financing		Project Objectives	Comments
				Organization	Amount		
1. Maize project (Phase I)	CEFADER	1978-82	Grande Comore	EDF	CFA 532 m (US\$1.6m)	Development of maize for animal and human consumption (substitution of maize for rice) extension program for 4,000 farmers cultivating 0.25 ha. maize each.	4,148 farmers in program. Most maize eaten green; some sold to poultry farmers.
2. Maize project (Phase II)	CEFADER	1983-86	Grande Comore & the other islands.	EDF	ECU 1.5m (US\$1.6m)	Development activities for other food crops; extension, training, seed multiplication; line of credit for small operators.	Starting June 1984.
3. Vanilla/Clove project	CEFADER	1978-82	All islands	ADB	\$7.6 m	Establishment of farms for production of vanilla vines and clove seedlings; increase in banana production through replanting of shoots; construction of hangars for vanilla processing.	Inactive; reappraisal planned for December 1984 with redefinition of objectives.
4. Rural Development Project (Phase I)	CEFADER	1979-82	All islands.	UNDP	\$2.5 m	Development of rural extension network in Comoros through initial establishment of five CADERS and the CEFADER	Started well.
5. Rural Development Project (Phase II)	CEFADER	1983-86	All islands	UNDP	\$2 m	Continued support to CADER/CEFADER rural extension network.	Assistance mostly confined to technical assistance because of budgetary constraints.
6. Coconut rehabilitation and Rodent control.	CEFADER	1980-85	All islands.	IDA	\$5.7 m	Replanting of existing trees by improved varieties, elimination of rodents responsible for losses of 30% of production; improvement in copra processing.	Progressing well. incentives
7. Soil protection and Erosion control (Phase I).	CEFADER	1980-83	Anjouan	EDF	ECU 0.65 m (US\$0.9 m)	Pilot project on 200 ha. at Nioumakele.	Being completed.
8. Soil protection & erosion control (Phase II).	CEFADER	NA	Anjouan	EDF	NA	Probably in Sima area.	To be negotiated.
9. Poultry project.	CEFADER	1979-85	All islands.	UNICEF, EDF, UNDP	\$ 0.2 m \$ 0.4 m \$ 1.7 m	Annual production of 300 tons of poultry meat and 4 million eggs.	Difficulties in securing poultry feed, management and financial problems.
10. Integrated rural development.	CEFADER	1981-84	All islands	WFP	\$ 7 m	Food for work for soil protection, erosion control, seed production, tree replanting, rural road improvement & maintenance, water cisterns, banana replanting, assistance to extension and training.	Progressing well. WFP rations have become principal stimulus to rural activities in some areas.
11. Artisanal Fisheries	SODEPEC	1982-84	All islands.	ADB	ECU 4.2 m (US\$4.4 m)	Improvement of artisanal fishing and fish marketing; training of personnel; 40% increase in fish production.	Implementation delays.
12. Research & Development	CEFADER	1983-85	All islands.	FAC	FF 2.8 m (US\$ 0.5 m)	Study of farming systems and development of technical packages. Establishment of a documentation center.	Technical assistance arrived January 1983.

Chart 1 - Summary of Principal Projects in the Rural Sector (ongoing and under preparation)

<u>Project Name</u>	<u>Executing Agency</u>	<u>Implementation Period</u>	<u>Location</u>	<u>Financing</u>		<u>Project Objectives</u>	<u>Comments</u>
				<u>Organization</u>	<u>Amount</u>		
13. Rice production & integrated development	CEFADER	1983-84	Moheli	Caisse Centrale	FF 5 m (US\$0.8 m)	100 ha. of irrigated rice; improvement of upland rice cultivation; development of the islands.	Follow-up to FAO pilot project.
14. Integrated rural development Nioumakele - Tsambehou	CEFADER	1983-87	Anjouan	ADB	US\$ 10 m	Extension and increased crop production for 5,000 farm families in 2 CADERS, reforestation, infrastructure improvement.	Technical assistance arrived March 1984.
15. Assistance to rural development	CEFADER	1983-86	Grande Comore & Anjouan	UNCDF	\$ 1.2 m	Financing of capital construction costs only of 4 CADERS provision of office space for CEFADER.	CADERS complete, CEFADER buildings not yet started.
16. Agricultural Credit.	CEFADER	1982-85	All islands.	UNCDF	\$ 0.5 m	Credit up to CFAF 300,000 per beneficiary for foodcrops, market gardening, poultry, farm equipment and construction materials to farmers participating in extension. No interest, no security required.	Loans being disbursed but administrative problems are considerable.
17. Strengthening of rural services	CEFADER	1984-88	All islands	IDA IFAD	\$ 9 m	Strengthening of Rural Services Network through reinforcement of planning, data collection and project monitoring; financial management; extension and organization work programs; live-stock and forestry activities.	Approved in May 1984; preparatory activities underway.

Sources: CEFADER, ADB, EDF, UNDCF, FAC, Caisse Centrale, IFAD, IDA.

Table 13 - Agricultural Investment Plan
(CFAF millions)

	<u>1978-82</u>	<u>1983-86</u>	<u>1987-90</u>	<u>1983-90</u>
Projects underway or with financing secured	2,862	9,486	640	10,374
Projects seeking financing	-	6,214	5,739	11,953
Sub-total, Agriculture	<u>2,862</u>	<u>15,700</u>	<u>6,379</u>	<u>22,327</u>
Total Plan (all sectors)	<u>34,499</u>	<u>96,803</u>	<u>43,172</u>	<u>139,974</u>
Agriculture as % of Plan	8	16	15	16

Source: Direction du Plan, Bank Estimates.

billion for roads and CFAF 14.7 billion for ports. According to the Plan, financing is already secured for two-thirds of the Interim Agricultural Investment Plan) for the 1983-86 period, and 46% for the 1983-90 period.

8.05 Annex 6 summarizes the Agricultural Investment Program by sub-sector, for the 1983-90 period, as of December 1983. A total of 43 projects are listed, varying in size from CFAF 7 million to CFAF 3.3 billion. It should be noted that not all the projects under preparation are included in the Plan (e.g. the support to the CEFADER garage and rural works program recently approved by CARE). Financing is sought for 26 projects totalling CFAF 12 billion (US\$37 million). However, of these, 6 projects totalling CFAF 3.1 billion are already covered by the IDA/IFAD Rural Services project, the WFP has renewed its food for work project (CFAF 2.9 billion), while development of Moheli (CFAF 216 million) and development of PreCADERS (CFAF 215 million) are being covered by Caisse Centrale and FAC respectively. Thus in effect 17 projects totalling only CFAF 5.5 billion (US\$17 million) remain to be financed for the 1983-90 period. Not all are clearly defined (e.g. Center of Agriculture CFAF 57 million), some are premature (development of semi-artisanal fishing, CFAF 1,340 million, a maritime center CFAF 343 million, should not be financed until the ADB artisanal fisheries project is further developed and reoriented if necessary), while some are over-ambitious (rehabilitation of two farms CFAF 329 million).

8.06 Priority projects include the proposed agricultural census with a study of land tenure, projects to encourage export crops and, when appropriate seed varieties are developed, seed multiplication (estimated total value CFAF 522 million, US\$1.6 million).

8.07 In summary, therefore, at least over the next three years, investments in agricultural development have been largely covered through projects already financed. Existing activities should be consolidated and

coordinated, and Comorian staff trained to manage them, before substantial new programs are embarked upon.

8.08 It is important, too, that in the search for as much donor financing as possible, the implications for debt repayment, recurrent costs and management are clearly appreciated. Chart 1 lists projects worth over US\$55 million. Of these, over US\$20 million are grant money (EDF, UN institutions, WFP, FAC and the remainder are 'soft' loans on terms similar to those of IDA (ADB, Caisse Centrale, IDA). Nevertheless, debt repayment must begin by the early 1990's. Government revenues are limited but substantial efforts are being made to improve revenue collection (see para 9.1).^{89/} Given Comoros' poverty and short history of independence, most aid through the 1980's will continue to be on soft terms.

8.09 More serious may be maintaining the projects once the donor financing has terminated. However, technical assistance and initial training account for a substantial proportion of project costs in all cases, and these investments do not incur 'maintenance' costs. ADB financed projects account for US\$22 million of the projects in Chart 1. The village and fish marketing centers to be financed under the Nioumakele and fishing projects should in principle be 'self-financing', while it is intended that the rural population will maintain the rural roads to be financed.

8.10 The main maintenance costs which Government must incur are salaries and maintenance and replacement of vehicles and buildings. Experience with Comorian agricultural projects to date has indicated that where the level of investment planned was inappropriate, Government will not incur the investment and disbursements will slow down, rather than spend the money on redundant infrastructure. Only US\$2 million of the US\$7 million ADB vanilla/clove project was disbursed, in part because the project foresaw construction of 30 village centres and hangars, which were not required, and provision of more lorries than were needed to transport produce.^{90/} Similarly, the fish marketing and cold storage centres for the fishing project are not being built at present. It is important, nevertheless, that infrastructure is not 'over-planned' in the projects under preparation or under way.

8.11 The approximate cost of maintaining the CEFADER/CADER extension network, with its agricultural extension and applied research, livestock, forestry and data collection units recommended in the previous chapters is

^{89/} Government revenues are discussed in a recent Country Economic Memorandum, 'The Comoros-Current Economic Situation and Prospects' World Bank May 1982. The problem of debt repayment is also being addressed by the Planning Directorate in a planning document under preparation. The transport and infrastructure sector is likely to pose the most serious problems of debt repayment, since it is here that investments have been heaviest, and there has been little grant money.

^{90/} This project was one of the first to be financed after independence, when political conditions were still unstable.

indicated below. The costs include in-service but not initial training, and exclude all technical assistance. A substantial 'contingency' factor is added, since the CEFADER/CADER accounts are not yet complete, and certain expenditures, at present covered through international grants or loans, may not be accounted for. Nevertheless, the figures give an indication of the eventual cost to Government of running a reasonable, though simple, rural service system. Costs would be CFAF 380 m (US\$1.2 m) per year. This represents approximately 3% of the value of production in the agricultural sector in 1981, expressed in 1983 prices (CFAF 12.7 billion, US\$39 million).

Estimated Annual Maintenance Costs of CEFADER/CADER System

<u>Service</u>	<u>CFAF m</u>
CEFADER	55
11 CADERS (20 m each)	99
Forestry	14
Livestock	22
Data Collection	8
Coconut Activities	15
Research/Development Activities	11
Ministry	55
Vehicle Replacement	45
In-service Training/Supervision	18
	<u>342</u>
Miscellaneous & Physical Contingencies	<u>38</u>
	<u>380</u>

Source: CEFADER and mission estimates: Operating costs for livestock, forestry/soil conservation, training and supervision, and monitoring and planning, calculated by staff appraisal mission. Costs of CEFADER, CADERS and Ministry provided by Government. Costs of vehicle replacement based on replacing 37 cars every four years, 44 motorbikes every two years, and one lorry per year. Coconut activities and research and development costs are based on the mission's estimates, and must be treated as very rough estimates. Miscellaneous would include overseas fellowships, expanded extension in vanilla and cloves, etc., it is a generous estimate.

8.12 The CEFADER/CADER system was established only in 1980, there is as yet no means of monitoring its effectiveness (the data collection/monitoring unit would do this), and it is too early to assess its longterm impact on production. ^{91/} It is likely, however, that the value of

^{91/} Recommendations for improving the effectiveness of the system are discussed in Chapters 3 to 7 and summarised in Chapter 9.

production would increase by substantially more than 3% as a result of its activities, and thus that the rural extension network would be 'cost-effective'.

8.13 At present, most of the CEFADER/CADER running costs are met by external aid. Only CFAF 55 million, or 1% of budgeted Federal Government expenditures of CFAF 4,700 million in 1983, were allocated to the MPIA. CFAF 380 million represents 8% of 1983 Government revenues, which are to be increased substantially, from CFAF 4.7 to CFAF 5.4 billion in 1984. Thus financing the level of expenditure foreseen for the rural services network out of the Government budget seems feasible, in the long run, if Government accords a higher priority expenditure to the Agricultural Sector.

8.14 The manpower constraint, both at senior management and at middle level, is the most serious that these projects will face. (See Chapter 7 i), ii). It is important that all projects include substantial training components, realistic implementation schedules, and realistic assumptions about the results that can be achieved in the short run. It is important to assess the longer-run implications of these projects for strengthening capacity for executing successful rural development programs.

Aid Coordination

8.15 It is important, too, that duplication between projects is avoided. Duplication has already occurred to some extent in the poultry projects, currently financed jointly by UNICEF, UNDP and EDF. Financing is being sought for an agricultural laboratory, while a laboratory is also foreseen under the livestock project currently under preparation. Problems in the field are to some extent mitigated by the very small size of the country, and the ease and frequency of personal contacts. A second area where there have been some problems over coordination of aid have been in the financing of technical assistance. In some instances, bilateral agreements have been entered into without a clearly defined program of activity or supporting services for the technical assistance.

8.16 Government is aware of these problems of duplication and coordination, which can be avoided by tighter definition by government of projects for which financing is sought, and closer control over these projects once implementation starts. A data collection, project monitoring and planning unit has recently been established in the CEFADER, which should fulfil this role. It would co-ordinate projects being considered by the donor agencies, and would liaise closely with the Directorate of Planning in the Finance Ministry. An informal meeting among agricultural donors was held in Paris in May 1984, while a donors' conference, planned to take place in the Comoros in July 1984, should also help to establish formal contacts between donors.

Chapter 9 - Summary of Problems and Recommendations

(i) Country Problems

9.01 Development problems in agriculture are closely linked to those of the economy. Government resources are too limited to provide

comprehensive services in agriculture (including livestock and forestry), health and education. Much current public expenditure, including the salaries of project staff, is financed by external aid; 40% of the current and almost all capital expenditure in 1980 was met through foreign subventions. Government expenditure levels are already low and cannot be cut significantly further. Scope for passing on charges to farmers is limited by the subsistence nature of foodcrop agriculture, with only very limited quantities marketed, and by the poverty of most of the rural population. (The very high revenues per hectare for vanilla and cloves are misleading; most farmers grow only a few vanilla vines or clove trees, often through share cropping arrangements). Government has accorded high priority to food self-sufficiency and rural development (Chapter 8). Nevertheless, budgeted federal government current expenditure by the Ministry of Production and Industry in 1981 was lower than almost any other ministry. There may be scope for re-ordering budgetary priorities to accord a greater priority to rural development.

9.02 Revenue sources are limited and until recently collection has been inefficient. 80% of locally collected federal revenues are from indirect taxes, and of these 80% from import or export taxes which have frequently not been levied, or under-levied. Furthermore, as of 1981-82, 60% of enterprises, including most parastatals, did not report to the tax authorities or appear on the tax assessment lists. There is also scope for better collection of other taxes and charges, including the land tax, taxes on motor vehicles, and utilities charges. Government is aware of the problem and both the IMF and French bilateral aid are assisting the authorities with ways to improve tax collection. Mostly through better collection of import and export duties, Government revenues increased from CFAF 3 billion in 1982 to CFAF 4.7 billion in 1983 and are expected to be CFAF 5.4 billion in 1984. Thereafter, scope for further increase will be limited. Agricultural strategies must be devised within the constraints of severely limited domestic resources.

9.03 Budgetary procedures are also very poor, with frequent recurrent expenditures being classified as investment expenditures, and, for projects, no breakdown of annual costs. The recurrent costs of ongoing activities are not adequately quantified, while the recurrent cost implications of the 1983-86 Interim Investment Program have not been calculated. Government is increasingly aware of the problem and has requested assistance with improved budgetary management.

9.04 Comoros' topography, its remote location and lack of a natural harbor are also constraints to development. High transport costs limit export crops to high value products, most of which have limited world markets or can be produced more efficiently elsewhere (see 6 (vi)). Most skill levels of the population are low. On the one hand, this limits the choices for development (projects requiring a skilled labor force, or high levels of organization are excluded) and on the other hand it limits the services Government can provide.

Rural Development Problems

9.05 The major problems of the different subsectors are described in detail in Chapter 1 to 7 and summarised below. Many are related to the

most serious overall constraints, shortage of good agricultural land combined with increasing population pressure. While the Governments' overall strategy of aiming for increased food self-sufficiency by increasing foodcrop productivity is supported, the level of exports must also be increased (see Annex 4); the present ratios planted to food and export crops should not be significantly modified at present. Recommendations are listed after the problems, together with the suggested institutional mechanism for implementation. It should be emphasized that the great majority of the recommendations can be implemented within the framework of the CEFADER/CADER system with its attached services; thus extra costs above those summarised in para 8.10 would not be entailed. The main focus of Government and international donor activity should therefore be on the continued strengthening of the CEFADER/CADER network.

(ii) Institutions and Manpower Development

Problems

- 9.06 (i) Design of appropriate agricultural development programs is limited by the almost complete lack of reliable data. CEFADER staff are not trained in data collection or project monitoring. It is thus difficult both to plan new projects and to assess the progress of those ongoing and in some cases, there has been duplication between projects.
- (ii) There is a serious shortage of trained technical manpower, at higher and lower levels. Although higher level staff are being trained abroad, many may not return. No systematic initial training programs exist for lower level staff at present, and very few are being trained abroad. While the new agricultural school to be opened on Moheli in early 1984 will provide training for general extension workers, it is likely to have staffing problems and logistical problems in operating efficiently.
- (iii) Work programs of CADER extension staff are not always clearly defined or supervised.
- (iv) There is a danger that the CADER/CEFADER system may be expected to assume responsibility for an increasing number of activities, at the expense of its major function, extension. In particular, administration of credit schemes and commercial production and marketing by CADER staff are likely to reduce substantially the time available for extension.
- (v) Some recently created agriculture-related institutions may not be well adapted to country constraints eg. SODEPEC as originally conceived requires a large accounting staff to administer its fish marketing program, which is not available in the Comoros.

Recommendations

9.07 The CEFADER/CADER system should be supported and strengthened in the following ways: some of these recommendations are already being implemented.

- (i) the total number of CADERS should be kept to a maximum of eleven, in order to keep operating costs to a minimum;
- (ii) CADER staff should concentrate on extension, they should not administer credit or attempt financial self-sufficiency through commercial scale production;
- (iii) the extension activities should be strengthened by better supervision, establishment of clear work programs and visit schedules, and regular in-service training. A farming system research unit is being established within the CEFADER, while improved in-service training of all CADER staff is envisaged under the Rural Services project. These two measures should strengthen the quality of extension considerably.
- (iv) the CEFADER should be strengthened by establishment of a small agricultural data collection/project monitoring unit, which would also assist project planning. This unit is being established under the Rural Services project.
- (v) initial training of CADER extension staff should be carried out through field placements and in-service training schemes until the establishment of the training school at Moheli. Specialised forestry and livestock extension staff, and staff at technician level and above, should be trained abroad;
- (vi) training abroad of higher level staff should be carefully monitored to ensure that the type of training offered is appropriate to Comorian agriculture;
- (vii) construction of the planned new CADERS should not be undertaken without timely identification and training of the staff to operate them;
- (viii) the recurrent cost implications of the extension of services and the ability of Government to finance these should be clearly established before new investments are embarked upon. Inputs should be sold at full cost price in order to avoid the burden of subsidies;
- (ix) the costs of the parastatals SOCOVIA and SODEPEC (once it becomes operational) should be carefully monitored to ensure that they operate as effective commercial enterprises (parastatals in other sectors, particularly in utilities and air transport, have proved a drain on the Government budget).

(iii) Foodcrops

Problems

- 9.08 (i) There is progressive soil deterioration, caused by food cropping on steeply sloping land, insufficient land terracing and erosion control measures, reduced fallow periods and the lack of

fertilizers. The confused land tenure pattern may also impede improvements to land including land conservation measures;

- (ii) Cultivation techniques are simple; use of even simple handtools such as hoes is limited. Yields are low. Except for upland maize, few improved varieties for foodcrops have been tested and are available for multiplication. While yields could be improved by some improvement in crop husbandry, no work has been done on fertilizer response;
- (iii) Rice is the main item in the diet (mostly imported) and the most important crop by landarea, though it makes poor use of soil especially on Anjouan and Grande Comore and potential for improvement is limited. However, there are difficulties in changing food habits to replace consumption of rice and bread by cereals that can productively be produced locally.

Recommendations

9.09 Efforts to increase production and productivity should be continued through:

- (i) applied research and field trials for improved technical packages and farming systems, with particular emphasis on improved varieties for upland rice, lowland maize, legumes and tubers, especially sweet potatoes; these are all foods which are more efficient than rice in terms of production of food value per hectare; this is ongoing under the FAC-financed research project;
- (ii) improved mixed cropping patterns and crop husbandry;
- (iii) introduction of simple hand-tools and rowcropping;
- (iv) contour terracing and soil protection;
- (v) integration of livestock and forestry with agriculture;
- (vi) improved extension methods;
- (vii) exploration of means to encourage maize production and consumption to replace rice;
- (viii) use of the FAO fertilizer program.

These measures should be implemented through the CEFADER/CADER extension system, through more effective extension and applied research. Government should also give consideration to commissioning a study on land tenure, to determine what constraints, if any, it imposes on land improvement.

(iv) Cashcrops

Problems

- 9.10 (i) Some cash crops are planted on soils better suited to foodcrops, especially clove trees in recent years.
- (ii) Husbandry techniques need improvement; vanilla vines are poorly maintained and exploited for production too early, pods are picked before maturity; cloves plantations densities are too high; the trees are damaged at harvest, etc.
- (iii) A substantial proportion of coconut and ylang ylang trees are aging.
- (iv) The quality of preparation and processing is poor; vanilla is artificially matured lowering vanillin content, cloves are dried without care, the quality of copra and ylang essence needs to be improved.

Recommendations

9.11 Though the present ratios of land planted to food and export crops should not be significantly changed, efforts should be made a) gradually to shift export crops to soils which are less well suited for foodcrops through appropriate incentives; b) to improve both crop productivity and product quality. Recommendations are as follows:

- (i) for ylang-ylang, rehabilitation of plantations through improved maintenance and replanting of ylang-ylang after verification with the CEFADER that there is no competing use from foodcrops; supervision of distilleries and establishment of distilling quality norms to improve the quality of processing; quality control of exported essences; development of alternative energy sources for distilling to diesel or fuelwood;
- (ii) for vanilla; improved husbandry, use of appropriate stakes and proper pruning; improved maintenance, delay of exploitation until the vines are three to four years old; elimination of premature harvesting and artificial curing; registration of curers and export quality control;
- (iii) for cloves; reduced planting densities, improved picking and drying methods; improved organization and information systems for marketing;
- (iv) for coconut; replanting of aging trees, intensified efforts to control rodents, improved copra processing, including introduction of white copra production;
- (v) an agronomist with expertise in Comorian export crops, particularly in vanilla and cloves, should be recruited at CEFADER level to train extension workers in knowledge and

extension of improved export crop husbandry techniques to farmers.

9.12 Improved cultivation methods should be handled through the CEFADER/CADER network, where extension officers should be adequately trained and monitored. In particular, better guidance to the vanilla and clove farmers should be provided through the ADB project, which should be urgently reoriented to that effect. Quality control, an essential prerequisite for sustained export growth, should be handled partly by the extension network and partly through the Stabilization Fund.

(v) Livestock

Problems

- 9.13 (i) The animal population is not known.
- (ii) Productivity levels are low.
- (iii) There is no recent information on disease patterns (though parasite infestation is considerable), and no animal health service.
- (iv) As a result of uncontrolled breeding the genetic stock of cattle has deteriorated.
- (v) In Grande Comore, where there are almost no natural rivers or springs, animals do not receive sufficient water.
- (vi) Natural pastures are few and some have been degraded through uncontrolled use.
- (vii) There is no sanitary control over livestock slaughtering or marketing.

Recommendations

- 9.14 Livestock productivity could be improved substantially by:
- (i) collection of information on the characteristics and pathology of the animal population, and definition of the measures necessary to improve animal health and productivity;
- (ii) provision of simple health and production services on a cash basis (distribution of drugs, use of improved breeding stock etc.);
- (iii) improvement of pastures through improved grasses and pasture management, and better exploitation of brushland with feed potential;
- (iv) construction of simple rainwater catchments in upland pastures;

- (v) cultivation of nutritious grasses on anti-erosive contour strips;
- (vi) continued promotion of poultry rearing with greater reliance on locally produced feed; and
- (vii) establishment of sanitary control measures: a) over livestock products imported and distributed by SOCOVIA and particularly of imported live animals and day-old chicks; b) over local slaughtering.

9.15 These improvements would require creation of a small health/livestock service, within the CEFADER/CADER system, but with its own, separately trained staff (numbering in total perhaps 25). Establishment of the service should help to reduce meat imports and increase consumption of animal products. Preparatory activities for establishment of the service under the Rural Services project are underway through an IFAD financed technical assistance grant.

(vi) Fisheries

9.16 (i) Artisanal fishing methods limit the catch to well below potential levels, while the narrow continental platform limits the coastal fish population.

(ii) Lack of simple conservation techniques, processing or marketing facilities limit consumption to the coastal areas.

9.17 Recommendations are as follows:

(i) improvement of fishing equipment and techniques;

(ii) improved landing, processing and marketing methods, with initial emphasis on smoking and drying rather than cold storage. It may be necessary to scale down the marketing objectives and the planned scale of SODEPEC, given the scarcity of accounting and other skilled staff in Comoros; and

(iii) over the longer run, deepwater fishing could be developed, but only when Comoros has adequate port and boat maintenance facilities.

(vii) Forestry and Land Conservation

Problems

9.18 (i) There is no definition of the forest area, no forest inventory, and no forest management.

(ii) Forestry legislation is not adapted to the present day, in particular, privately controlled forest areas are not subject to Comorian legislation.

(iii) There is little protection of forest lands against destruction and use for foodcrops.

- (iv) There is no forestry policy, to protect and develop forest resources.
- (v) Cultivation methods on steeply sloping foodcrop lands encourage erosion, and while anti-erosion programs are underway, they are not closely monitored for quality.

Recommendations

9.19 Protection of existing forests and formulation of a forestry policy are urgently needed. The following actions are recommended:

- (i) amendment of existing legislation;
- (ii) demarcation of forestry boundaries, carrying out of a forestry inventory;
- (iii) preparation of management plans for existing forests;
- (iv) protection of catchment areas and springs;
- (v) monitoring, control and maintenance of anti-erosion programs.
- (vi) fuelwood plantations and development of alternative energy sources;
- (vii) integration of social forestry programs with those for livestock, food and cash crops.
- (viii) trials and studies for development of appropriate tree varieties.

9.20 In order to achieve these aims, a small forestry and land conservation service would have to be established, within the CEFADER with perhaps 10 to 12 skilled personnel. It would work closely with CADER staff, and would also monitor proposals for changes in landuse. Establishment of this service is being supported under the Rural Services project.

- (viii) Marketing

Problems

- 9.21 (i) Development of efficient marketing arrangements for foodcrops are constrained by the very small scale of production and the small quantities and irregular supplies of marketable surplus.
- (ii) While the internal distribution and marketing of rice has been relatively efficient, the operating procedures of the newly created Office du Riz are not clear, and competition among distributors may have been reduced.
 - (iii) Producers are unprotected against world price fluctuations for export crops, and not always informed about current world or producer prices.

- (iv) Control of marketing in the hands of a few exporters may impede dynamism in the search for new export markets.
- (v) World markets for traditional Comorian exports are limited and fragile.

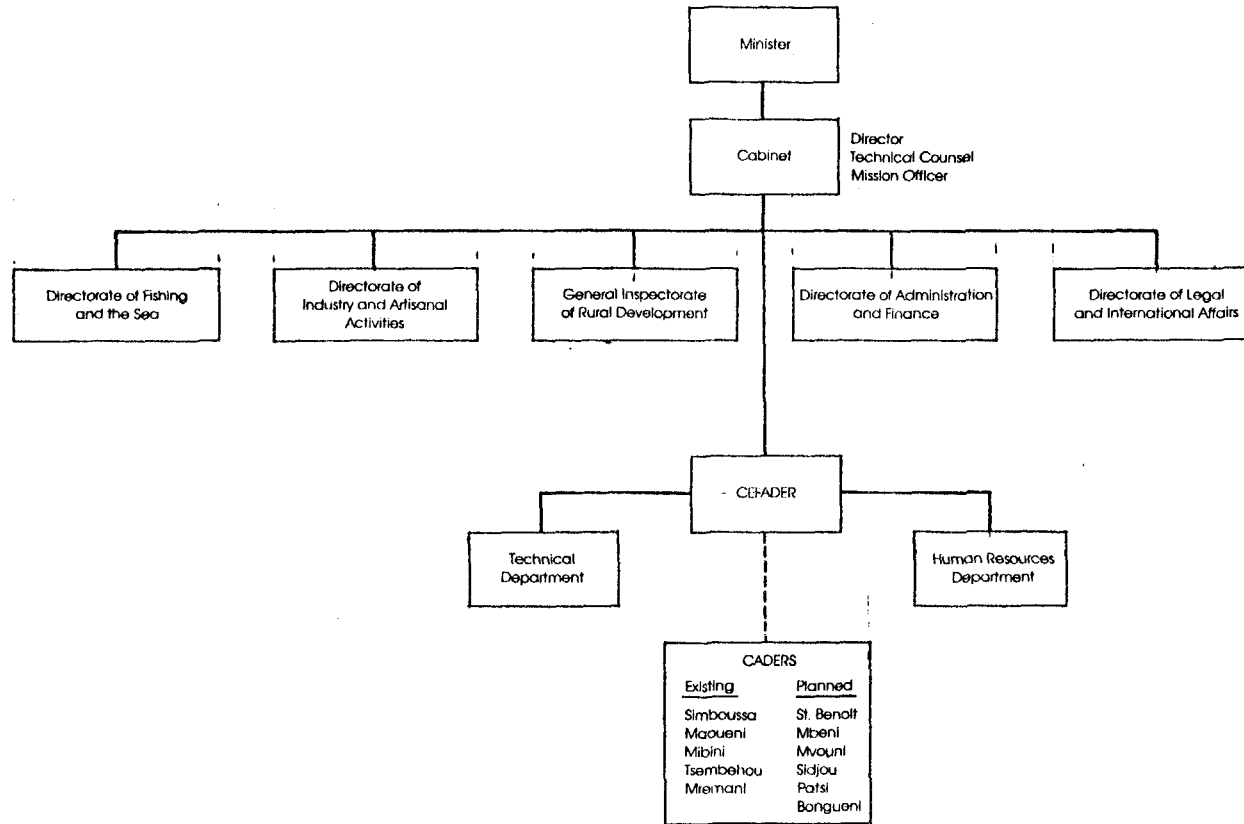
Recommendations

9.22 The following measures are recommended:

- (i) when marketable surpluses of foodcrops become significant, encouragement of private marketing through such measures as credit for purchase of vehicles;
- (ii) avoidance of seasonal surpluses of exotic vegetables by encouragement by the CEFADER of vegetable production adapted to Comorian, rather than European tastes in the CADERS far from Moroni, when marketing is unreliable;
- (iii) granting of distribution rights for rice on competitive principles clearly established by the 'Office du Riz', to ensure efficiency;
- (iv) improved organization and information systems for export crop marketing;
- (v) strengthening of cash crop marketing through the stabilization fund to be responsible for price stabilization, quality control and the search for new products and markets, and promotion of Comorian products;
- (vi) further exploration of possible diversification into: export produce with a high value per unit weight, such as essential oils other than ylang-ylang, alkaloids, spices and pepper; specialised fruits for which there is little competition from other producers; expansion of exports of fresh produce to the Gulf.

Government intervention in foodcrop marketing should be kept to a minimum, with the possible exception of maize if circumstances change. The Stabilization Fund should be instrumental in developing and promoting better processing, quality control (whose importance cannot be overemphasized) and the search for new market outlets for the main export products. The newly established Development Bank should accelerate its financial assistance to modernize outdated and fuel inefficient processing equipment. The direct role of Government should be restricted to protecting the interests of small farmers.

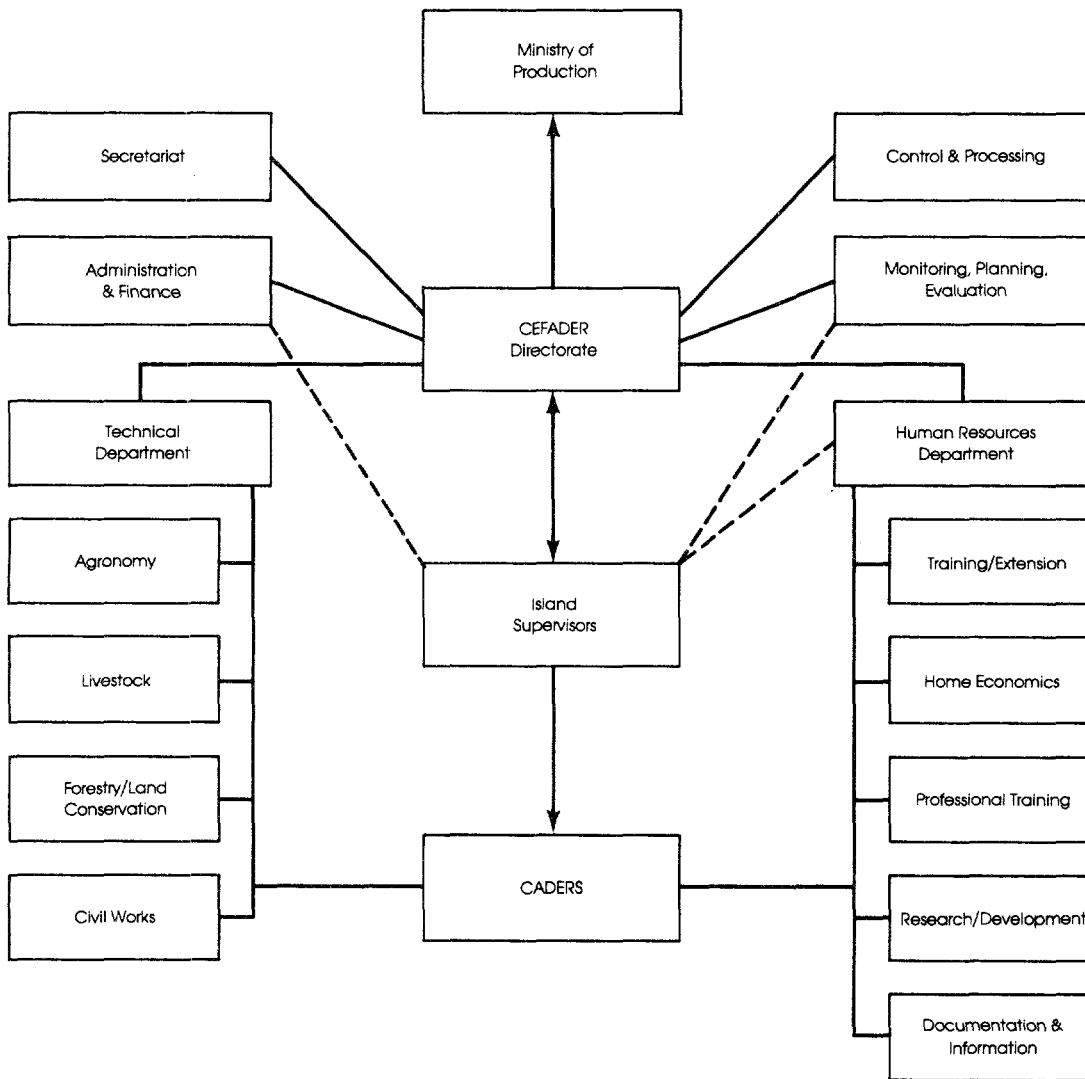
COMOROS
MINISTRY OF PRODUCTION, INDUSTRY AND ARTISANAL ACTIVITIES
Organization Chart



Source: Ministry of Production Industry and Artisanal Activities

World Bank—24688

COMOROS
AGRICULTURAL SECTOR MEMORANDUM
Federal Organization for Support to Rural Development (CEFADER)
Revised Organization Chart



AGRICULTURAL EXPORTS 1972 - 1977
(Quantities in tonnes; Values in millions CFAF; Values/kg in CFAF)

	1972			1973			1974			1975			1976			1977		
	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)
<u>Ylang</u>																		
Extra	28.1	261.3	9,291	31.9	316.3	9,905	27.1	359.5	13,248	16.5	236.7	14,361	19.6	299.0	15,249	15.6	265.0	16,988
1st Quality	6.9	41.3	5,971	7.2	51.8	7,151	7.5	71.1	9,466	5.2	57.0	10,915	4.1	40.4	9,762	2.5	29.0	11,679
2nd Quality	8.6	33.2	3,879	10.2	42.8	4,194	9.4	64.2	6,808	2.8	20.2	7,196	3.7	28.2	7,630	2.2	18.7	8,318
3rd Quality	55.1	159.3	2,893	49.6	149.0	3,003	54.4	278.6	5,118	34.9	189.2	5,425	45.5	246.4	5,417	39.1	262.4	6,715
Concrete	0.5	5.9	10,989	0.9	9.5	11,013	0.8	12.2	15,920	0.7	11.2	17,266	0.2	4.0	23,994	0.6	12.0	19,301
<u>Total</u>	<u>99.2</u>	<u>501.0</u>	<u>5,050</u>	<u>99.8</u>	<u>569.4</u>	<u>5,700</u>	<u>99.2</u>	<u>785.6</u>	<u>7,912</u>	<u>60.1</u>	<u>514.3</u>	<u>8,568</u>	<u>73.1</u>	<u>618.0</u>	<u>8,453</u>	<u>60.0</u>	<u>587.1</u>	<u>9,779</u>
<u>Vanilla</u>	207.0	613.8	2,965	34.3	100.1	2,918	160.5	472.9	2,946	210.9	689.0	3,267	124.1	464.9	3,746	230.4	1,084.6	4,707
<u>Cloves</u>	202.6	165.1	815	120.6	87.7	727	248.5	242.3	975	561.9	585.8	1,043	880.2	812.0	923	219.9	294.1	1,337
<u>Coprah</u>	2,423.5	90.4	37	4,891.0	229.6	47	4,178.1	459.9	110	1,259.6	92.6	74	2,516.5	122.5	49	1,317.2	133.4	101
<u>Other</u>		140.7			119.2			141.7			155.3			205.6			102.7	
<u>Total</u>	<u>1,511.0</u>			<u>1,106.0</u>			<u>2,102.4</u>			<u>2,037.0</u>			<u>2,223.0</u>			<u>2,201.9</u>		

AGRICULTURAL EXPORTS 1978-1983
(Quantities in tonnes; Values in millions CFAF; Values/kg in CFAF)

	1978			1979			1980			1981			1982			1983		
	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)	Quantity (tonnes)	Value (CFAF M)	V/kg (CFAF/kg)
<u>Ylang</u>																		
Extra	18.5	338.0	18,307	16.9	307.7	18,165	13.6	246.6	18,100	nc	nc	17,500	17.0	317	18,647	14.1	262	18,582
1st Quality	3.8	45.5	11,833	4.0	49.9	12,377	3.8	47.1	12,489	nc	nc	nc	6.0	85	18,167	2.7	38	14,074
2nd Quality	2.2	19.0	8,821	1.2	10.7	8,876	1.6	13.7	8,390	nc	nc	nc	4.0	37	9,250	1.6	14	8,750
3rd Quality	36.2	247.6	6,842	38.1	275.3	7,230	11.6	83.0	7,168	nc	nc	7,500	36.0	264	7,330	30.5	237	7,770
Concrete	0.4	7.8	19,378	0.3	6.6	19,298	0.2	5.3	23,551	nc	nc	nc	1.0	12	12,000	0.4	7	17,500
<u>Total</u>	61.0	657.9	10,776	60.5	650.2	10,730	30.8	395.7	12,827	40.2	453.8	11,297	639.0	702	10,986	49.3	558	11,318
<u>Vanilla</u>	116.9	736.3	6,299	167.5	2,271.7	13,562	12.9	193.1	14,969	160.2	2,169.3	13,537	207.0	3,252	15,710	132.0	2,618	19,833
<u>Cloves</u>	396.6	461.8	1,164	333.7	426.0	1,277	816.3	1,947.3	2,386	871.0	2,149.0	2,450	135.0	323	2,393	1,133.0	3,182	2,808
<u>Coprah</u>	2,060.5	205.1	100	2,291.7	259.2	113	774.7	84.7	109	1,020.7	78.4	77	195.0	19	97	688.0	64	93
<u>Other</u>		65.6			128.5			83.8			31.8			34			70	
<u>Total</u>		2,126.7			3,735.6			2,704.6			4,882.3			4,330			6,492	

Sources: Direction des Douanes, Direction du Plan, Banque Centrale, EEC Pandata Report
Quantities (Q) in tonnes.
Values (V) in millions of CFAF.
Unit value (V/kg) in CFAF/kg.

(1) Figures are provisional estimates.

Price Structure for Copra 1982

<u>Copra Cost Breakdown</u>	<u>Prices CFAF/Kg</u>
Producer Price	40
Collectors Commission	5
Transport Costs	5
Losses (10%)	7
Storage	1
<u>Price: delivery to port</u>	<u>58</u>
Storage	1
Handling	6
Transport	0.5
Loading	2.8
Financial Charges	1
Negotiation of Documents	0.5
Stabilization Fund	6
FOB Cost price exporter	<u>75.8</u>
CIF Price Madagascar	US\$ 285/ton
	i.e.CFAF 92.6
Transport Costs	CFAF 10.8
FOB price	<u>82/kg</u>
Export Tax: 6% of FOB price	5
Exporter Receives	<u>77/kg</u>

Source: Exporters

(Transport cost Comores - Madagascar from one shipload: CFAF 1.05 million for 97.5 tons)

Price Structure for Vanilla 1982

<u>Vanilla Cost Breakdown</u>	<u>Cost in CFAF/Kg Cost</u>	<u>Accumulated Cost CFAF</u>
<u>Producers Price</u>	2,000	
- Collectors Margin	200	
- Yield 5/1		11,000
- Preparation Costs	300	
- Preparer's Fee	500	
- Waste	100	
- Transportation & Packing	<u>100</u>	
	<u>1,000</u>	12,000
<u>Value Ex-Factory</u>		
- Financial Costs	1,400	
- Transit Costs	50	
- Dock Fees	10	
- Documentation	170	
- Broker's Fee	96	
- Stabilization Fund Tax	<u>500</u>	
	<u>2,226</u>	
<u>F.O.B. Cost Price</u>		14,226
- Exporters Commission 12% FOB		<u>2,100</u>
		<u>16,326</u>
<u>F.O.B. Price - FF350/Kg. = CFAF17,500/Kg.</u>		
- Subtract 20% Customs tax		CFAF 3,500/Kg.
- Exporter Receives		CFAF14,000/Kg.

1/ Official Floor price: CFAF 1,205/Kg. in 1982

Source: 'Etude sur la promotion des exportations aux Comoros', PANDATA/EEC 1982; exporters' estimates.

Price Structure for Cloves 1982

<u>Cloves Cost Breakdown</u>	<u>Prices CFAF/Kg</u>
Producer Price <u>1/</u>	2,000
Collector's Commission	200
Losses (10%)	220
Transport	10
Packing	10
Embarkation	32
Negotiations	100
Financial Charges 7.5%	165
Export Cost Price	2,737
F.O.B. Selling Price	FF 58-60/Kg.(CFAF 2,900-3,000/Kg)
Customs Duties 15.5%	457
Exporter receives	2,493 (Average)

1/ Drying is carried out by individual producers. Producer price fluctuates widely and may be over-estimated.

Source: Exporters estimates; 'Assistance en politique Commerciale et des Prix' Alexis Guardia CNUCED 1981; EEC/Pandata report.

Estimated Price Structure for Ylang Ylang 1982

<u>Ylang-Ylang Cost Breakdown</u>	<u>Price CFAF/Kg</u>	<u>Accumulated Price CFAF/Kg</u>
Producer purchase price fresh flowers	50	
Collectors' commission	5	
Price to distiller	<u>55</u>	<u>55</u>
Fuel diesel oil/Kg	155	
Electricity	6	
Labor	13	
Depreciation	10	
Financial charges (18% p.a. 5 months)	18	
Cost price per kg of flowers distilled	257	<u>257</u>
Conversion for $\frac{1 \text{ kg of essence } 2.2}{1 \text{ kg flowers } 100}$		
Cost price for 1kg of essence	11,680	11,680
Distillers' margin	350	
Distillers' price	12,030	12,030
Evaporation & transport losses	240	
Packaging	120	
Transport	70	
Storage (5 months)	140	
Analysis & testing	40	
Financial charges (18% p.a. 5 months)	948	
FOB cost price	13,588	<u>13,588</u>
On average distilled ylang ylang yields:		
Extra 20%	1st.quality 10%	2nd Quality 10%
3rd Quality 60%		
FOB price/kg 17,500	13,200	10,000
		7,500
		Av. 10,320
Theoretical loss per kg of ylang exported		CFAF 3,268

Note: The largest cost item in ylang processing is diesel oil for distilling (CFAF 7,045/kg of essence). Much ylang is in fact distilled using fuel-wood not diesel oil, thus actual production costs are lower than indicated above. Fuelwood is not a long term solution, given wood scarcity, the largest processor is experimenting with alternative energy sources.

Source: 'Etude sur la Promotion des Exportations de Comores' Pandata EEC 1982.

Price Structure of Imported Rice (November 1982)

<u>RICE</u>	<u>CFAF TON</u>
Price (C&F US\$290/tons)	94,250
Insurance 3%	3,000
Losses 1%	<u>1,000</u>
CIF PRICE MORONI	98,250
Banking Costs (3% of CIF)	3,000
Transit Costs (1% of CIF Price)	1,000
Unloading Costs	3,250
Transportation	2,000
Stocking Costs	600
Import Taxes	<u>10,800</u>
of which:	
Custom Clearing Taxes 3%	20,650
Commercialization Taxes 5.5% + 1CFAF/Kg	
Chamber of Commerce 0.5%	
PRICE/DELIVERED TO IMPORTER/WHOLESALE WAREHOUSE	<u>118,900</u>
Banking Costs 2.5%	3,000
Distribution Costs (5CFAF per Kilo)	5,000
Stocking Losses (1.5%)	1,780
Net Margin (3.5%)	4,100
Sales Tax (3%) - Not Collected	<u>-</u>
PRICE/DELIVERED TO WHOLESALE	132,780
Wholesalers Margin	3,300
Net Margin (Retailers' Margin)	5,000
Sales tax (3%) - Not Collected	<u>-</u>
	<u>141,080</u>
Consumer Price	140/Kg Moroni 145/Kg Rural areas

Note: Table assumes exchange rate of CFAF 325/US\$. Actual exchange rate for negotiated shipload is not known.

Source: Importers

Food Imports Volume and Value 1976-83
(Volume Tons, Value CFAF Million)

		<u>1971-75</u> (Average)	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
<u>Rice</u>	Volume	14,625	12,450	9,615	13,955	23,245	12,815	30,448	24,853	13,308
	Value	n/a	600	565	1,049	1,092	1,096	2,703	2,401	1,052
<u>Flour</u>	Volume	1,621	975	575	2,890	1,370	1,255	950	1,979	905
	Value	n/a	73	40	131	125	111	90	190	99
<u>Meat</u>	Volume	383	650	250	840	1,325	1,411	1,205	1,501	579
	Value	n/a	147	144	343	547	654	660	658	371
<u>Sugar</u>	Volume	1,700	1,490	960	2,950	2,780	2,935	920	2,078	2,865
	Value	n/a	126	75	161	265	290	134	303	361
<u>Milk</u>	Volume	n/a	n/a	n/a	n/a	283	119	194	374	295
	Value	n/a	n/a	n/a	n/a	129	316	65	162	136
<u>Oil</u>	Volume	108	35	140	40	145	n/a	217	161	66
	Value	n/a	n/a	n/a	n/a	57	51	66	58	24

Source: Service des Douanes; Bank Centrale; Comoros 'Current Economic Situation and Prospects' World Bank, May 1982.

Note: Not all data are consistent because: (i) volume and value data are sometimes registered at different points in the calendar year; (ii) food provided as gifts is not always distinguished from food bought commercially; (iii) nomenclature of items has changed without this being explicitly stated.

Food Crop Prices 1979-81
(Market Prices Moroni)
 (CFAF/kg)

	<u>1979</u>	<u>1980</u>	<u>1981</u>
<u>Imported Products</u>			
Rice	100	105	130
Sugar	170	170	275
Bread	150	150	170
Maize	50	50	100
Onion	500	600	600
Meat	830	1,210	1,500
Sardines	170	200	200
Milk	200	200	275
Chicken	850	850	950
<u>Local Products</u>			
Fish	500	500	750
Chicken (live)	2,000	2,000	2,500
Banana/Kame	30	30	35
Paka	10	10	15
Manioc	35	35	40
Taro (3 pieces)	50	50	50-100
Sweet Potato	30	30	40
Breadfruit	50-100	n/a	45-125
Dried Coconut	35	35	35
Fresh Coconut	n/a	n/a	25
Charcoal	75	75	100

Source: Comorian Authorities.

Gross Domestic Product by Industrial Origin at Current Prices, 1977-81
(CF million)

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>
Farming, livestock, fishing and forestry	6,734	7,195	8,991	10,593	12,416
Manufacturing	766	885	1,033	1,214	1,448
Electricity, gas and water	80	88	90	110	136
Construction and public works	1,123	1,379	1,738	2,354	2,801
Trade ^{1/} , hotels, bars and restaurants	3,682	4,211	5,368	6,214	7,399
Transport and communications	236	281	333	385	458
Banks, insurance, real estate	405	496	597	687	809
Public administration	1,099	2,291	3,069	3,675	4,353
Other services	124	146	167	194	228
GDP at market prices	14,249	16,972	21,386	25,426	30,048
Net indirect taxes	1,532	1,904	2,312	2,297	2,933
GDP at factor cost	12,717	15,068	19,074	23,129	27,115

^{1/} Including import duties and taxes

Sources: UNECA and staff estimates.

Value of Agricultural Production
(CFAF millions - 1979 Prices)

	<u>Unit Price</u> <u>CFAF/Kg</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1983</u>
<u>Cereals</u>							
Rice	60	203	209	220	222	228	241
Maize	30	41	44	46	54	68	93
<u>Vegetables</u>							
Cassava	40	858	930	979	1,000	1,020	1,082
Cocoyam	50	60	65	68	75	85	90
Yams	25	36	40	42	50	63	67
Sweet Potatoes	50	155	168	176	210	225	238
<u>Fruits</u>							
Bananas	50	1,377	1,483	1,571	1,600	1,650	1,750
Coconuts	15	243	243	243	243	n/a	n/a
Other Fruits	70	138	150	158	161	n/a	n/a
<u>Export Products</u>							
Vanilla	1,500 (Green)	930	1,725	878	1,350	193	198
Ylang-Ylang Essence	6,350	464	381	388	462	196	311
Other Vegetable Essence	10,220	22	21	22	25	n/a	82
Copra	60	139	79	124	165	464	41
Cloves	1,130	994	249	374	386	922	1,145
Cocoa	300	3	4	2	5	-	-
Coffee	400	13	7	9	6	-	2
<u>Meat And Fish</u>							
Beef	470	362	517	376	376	200	212
Other Meats	600	162	243	175	174	56	52
Fish	250	888	1,400	1,400	1,250	1,000	n/a
<u>Miscellaneous</u>							
Milk	70	17	19	20	21	16	28
Eggs	40	24	24	24	28	8	20
Wood	n/a	1,130	1,198	1,286	1,370	n/a	n/a
TOTAL	-	<u>8,259</u>	<u>9,199</u>	<u>8,581</u>	<u>9,233</u>		
Volume Index (1979 = 100)	-	89.5	99.6	92.3	100.0		

Source: Updated from: 'Comoros Current Economic Situation and Prospects, May 1982'.
Provisional Estimates: Figures for wood and fish are not consistent.

COMOROS - ECONOMIC INDICATORS

Population: .417 million ^{d/} (mid-1981)
 GNP per capita: US\$310 (1981)

Indicator	Amount (US\$ Million at) (current prices) 1980	Annual Growth Rates (%) (at constant 1980 prices)									
		Actual					Projected				
		1978	1979	1980	1981 ^{c/}	1982 ^{c/}	1983	1984	1985	1986	1987
NATIONAL ACCOUNTS											
Gross domestic product ^{a/}	120.3	3.0	9.6	7.3	5.5	3.4	8.0	3.1	3.1	3.0	2.8
Agriculture	50.1	-7.3	8.3	7.7	4.6	3.0	3.0	3.0	3.0	3.0	3.0
Industry	17.4	-1.1	7.0	13.4	6.2	2.7	34.8	1.2	1.0	0.4	-0.7
Services	52.8	16.3	11.6	5.1	6.1	6.1	4.0	4.0	4.0	4.0	4.0
Consumption	107.6	4.5	6.0	7.5	14.1	2.9	6.1	3.2	2.2	2.4	2.6
Gross investment	41.4	20.3	27.1	46.1	-6.6	-10.6	56.8	-12.9	-2.1	-2.0	-4.3
Exports of GNS	13.4	-40.0	36.2	-37.6	68.5	6.3	2.7	4.1	4.9	4.1	4.3
Imports of GNS	33.2	-7.6	25.1	10.2	35.8	-6.0	32.6	-8.6	-2.0	-1.4	-2.2
Gross national savings	25.0	n.a.	36.2	43.2	16.9	-27.2	12.3	2.4	0.8	1.3	3.0
Gross domestic savings	23.8	-15.9	-10.4	+133.3	-71.4	31.9	8.0	3.1	3.1	3.0	2.8
PRICES											
GNP deflator		78.4	90.3	100.0	112.0	125.3	137.8	151.6	166.8	183.5	
Exchange rate		225.64	212.73	211.30	271.73	326.0	326.0	326.0	326.0	326.0	
Share of GDP at Market Prices (%)											
(at current prices)^{b/}											
		1976	1980	1985	1990						
Gross domestic product							6.0	4.2	2.8		
Agriculture		44.3	47.2	39.2	39.4		3.8	3.0	3.0		
Industry		13.2	13.7	17.4	16.7		7.1	8.1	-0.9		
Services		42.5	44.1	43.4	45.9		8.0	4.0	4.0		
Consumption		91.8	90.1	93.7	92.3		5.0	3.4	2.6		
Gross investment		18.3	25.2	30.7	21.7		-9.6	4.4	-2.3		
Exports GNS		23.3	10.8	17.7	19.3		-8.4	4.3	4.7		
Imports GNS		33.4	26.1	42.1	33.3		6.2	2.6	-2.0		
Gross national savings		n.a.	20.8	16.4	15.0		..	-0.2	1.1		
Gross domestic savings		9.7	5.0	3.6	3.6		-18.4	9.8	2.0		
Average Annual Increase (%)											
(at constant 1980 prices)											
							1976-80	1981-86	1985-90		
As % of GNP											
			1979	1980	1981	1982					
PUBLIC FINANCE											
Current revenues				10.6	10.5	13.2	11.0				
Grants				18.9	23.5	24.9	19.3				
Current expenditures				26.7	33.9	35.1	30.5				
Current deficit				-2	-1	3.0	-2				
Capital expenditures				14.5	17.1	12.8	11.1				
Foreign financing				14.7	17.0	9.8	11.3				
OTHER INDICATORS											
GNP growth rate (%)				4.4	4.2	2.8					
GNP per capita growth rate (%)				n.a.	1.3	0.0					
Energy consumption growth rate (%)				n.a.	n.a.	n.a.					
IDEA				5.07	7.2	9.5					
Marginal Savings rate				n.a.	0.05	-0.01					
Import elasticity				1.03	0.6	-0.7					

^{/a} At market prices; components are expressed at factor cost and will not add due to exclusion of net indirect taxes and subsidies.

^{/b} Projected years at constant prices.

^{/c} Population for the whole archipelago - Data presented in the attachment concern only the three islands, Grande Comore, Anjouan and Moheli for which estimated population in 1981 is .384 million.

CEFADER/CADER World Food Program Activities

3.01 The value of the CEFADER/CADER program financed directly by UNDP amounted to US\$3.6 million during the 1979-81 period. It comprised mostly technical assistance, payment of local salaries, and rehabilitating and equipping the new CADERS. Staff supervised both WFP activities (see below) and those funded by other agencies. They also carried out a total of 19 training courses for extension workers, and conducted field trials for improved varieties of foodcrops, and different intercropping methods.

Home Economists

3.02 During 1981, 10 home economists were trained and placed at CADER headquarters, under the supervision of the CADER director and the overall supervision of a technical assistant of CEFADER level. They are responsible for extension mainly with women, and their responsibilities include conducting training programs in nutrition, cooking, home hygiene, poultry rearing, vegetable growing and agriculture. It is too early to assess the effectiveness of their work.

Market Gardening and Fruit Trees

3.03 A total of 2,400 producers bought 7,350 kgs of vegetable seed (including 4,500 kgs of seed potato) and planted vegetables over 90 ha, in Anjouan and Grande Comore and mostly near the capital cities. However, there have been problems in marketing production. Approximately 40,000 fruit tree seedlings were also sold at cost price through the CADERS. No details have been collected on their survival rates.

3.04 WFP are currently assisting the CEFADER/CADER rural development program by providing food for work for activities including land terracing, seed multiplication, reforestation, rural road maintenance, village extension and banana replanting. These programs are supervised by CADER extension agents. The total value of the project, over the 1981-85 period, is estimated at US\$7.2 million. It is thus the largest project by value, fully operational, in the Comoros. Rations were also used for the experimental rice project on Moheli.

3.05 Through 1981, a total of 1,579,000 rations were distributed as follows:

<u>Food Type</u>	<u>Daily Ration (gms)</u>	<u>Total (tons)</u>
Rice	300	624
Maize	100	208
Fish	40	63
Oil	20	32
Sugar	10	16

3.06 "Work norms" were established to determine appropriate rations for work carried out. Achievements recorded during 1981, were as follows:

Soil conservation and terracing	:	750 ha.
Seed multiplication	:	30,000 kgs maize, 2,500 kgs pigeonpea, 850 kgs groundnut, 1,200 kgs potatoes, 420 kgs beans.
Reforestation	:	58 village nurseries, 200 ha of upland reforesting
Rural road maintenance	:	120 kms
Rural extension	:	85 village leaders
Banana replanting	:	125,000 banana trees

In addition, 12,500 rations were distributed for works involving improvement to village water supplies, and 15,000 rations were also distributed for the FAO funded rice project.

3.07 Results are not available on the success of the replanting programs, and not all the land conservation efforts were well co-ordinated. There was some confusion, too, over the reorientation of the program away from paying food as wages, and towards supplementing directly farmers' own efforts. The number of kilometers of rural roads maintained is surprisingly high. Nevertheless, the program has started well; the quality of the replanting and land terracing programs needs to be evaluated through the project period.

3.08 UNDP financing of CEFADER/CADER activities is to be reduced because of budgeting constraints from US\$1 million in 1982 to US\$0.55 million in 1983, and US\$0.5 million in 1984. The main cuts will be in the financing of operating costs other than technical assistance.

Land Use Strategy

4.01 Government strategy which consists of aiming at food self-sufficiency while at the same time increasing revenues from export crops may prima facie look ambiguous. In fact, it reflects a number of concerns and uncertainties: (i) it would be unrealistic to assume that food self-sufficiency has any chance of being successfully achieved in the 1990's; (ii) even in the long term, food self-sufficiency appears highly doubtful for several reasons (in the absence of research, the potential for increasing productivity of foodcrops is not known, land which is suitable for food crops is limited, consumers' taste would have to change, the population is growing rapidly etc.); (iii) food and particularly rice imports are nevertheless increasingly draining scarce foreign exchange resources; (iv) some land would most efficiently be used by cultivating export crops and importing food with the export revenues; furthermore in order to meet the cost of food imports, the level of foreign exchange resources, which are mainly provided by export crops, will have to be maintained and even increased in the future; and (v) for reasons developed in Chapter 6, world market prices for major Comorian export commodities are hard to predict in the long run.

4.02 If in view of the circumstances, Government's dual approach to agricultural development appears reasonable, the question arises as to whether it is applicable and to what extent food crops and the three major export crops are really in competition.^{1/} If one looks at the issue in terms of land occupancy, the estimated five million vanilla vines would, if grown in pure stands, cover between 2,500 and 3,000 ha, some 5% of the 'upgraded' suitable area for mixed foodcrops, but some 16% of the area prior to 'upgrading.' Because vines are often planted on better soils, the latter figure is more likely. But, as long as vanilla is interplanted with foodcrops, competition with food crops for land will remain minimal, and foreign exchange receipts from vanilla are substantial. Ylang trees should not compete at all with food crops if they were established only on poor soils, where they grow well, but this has not always been the case in the past. What proportion of the estimated 2,900 ha of ylang trees could have been allocated to food crops is not known, but that area is no doubt diminishing, given that due to depressed ylang flower prices, an unknown number of trees are being uprooted to be replaced by food crops. Clove trees are probably the major crop in contention at present. Their population is most uncertain but rising rapidly and most trees are interspersed among food crops, even though they could grow on less favorable soils. Not much can grow under the canopy of the clove trees, usually too densely planted, and there is some competition for land with food crops.

^{1/} Coconut palms are more a source of food than cash produce and copra exports have decreased considerably.

^{1/} See Annex 2.6.

4.03 Apart from land, there is also competition for labor between food crops on one hand, and vanilla and ylang on the other hand. (Much less labor is involved in clove cultivation). Although little is known about what labor is really required for the various crops in the Comoros, it is likely that manual pollination of vanilla and picking of ylang flowers alone require some 200 and 130 man days/ha respectively. These operations are usually carried out by women, who also provide the major labor force on food crops. Curing of vanilla is of course also labor intensive.

4.04 It is fairly easy to estimate what export crops earn at present in terms of foreign exchange. Based on price structure in Annex 2.2, foreign exchange revenues per hectare would be roughly US\$980 for ylang-ylang, US\$2,150 for vanilla and US\$2,700 for cloves, based on average yields of 1,400 kg of flowers, 200 kg of green vanilla (well below what could be achieved with better maintenance), and 300 kg of dry cloves. At present, yields for the main food crops it would be cheaper to import rice and pay for it by increased exports, if these exports could be produced (see below), and if export crop prices, which are highly volatile, are maintained.

Cost of Importing Rice to Replace Food Crops

	Yield 1982 (kgs/ha)	Price 1982		Yield 1990 (kgs/ha)	Import Substitution Price 1990	
		US\$/ton	US\$/ha		(US\$/ton)	US\$/ha
Rice	300	412	74	1,000	462	277
Maize	500	437	218	1,500	488	732
Cassava	5,000	154	770	8,000	172	1,372
Bananas	7,000	108	756	10,000	119	1,190
Sweet Potatoes	2,750	117	322	5,000	132	660
Coconuts	620	506	157	900	552	497

Assumptions: (i) Import substitution price calculated in terms of energy equivalent for rice, since increased domestic food production substitutes for rice imports. Import parity price of rice: CFAF 145/kg - CFAF 10.8/kg taxes i.e. CFAF 134/kg (US\$412/ton). Energy values of the other crops: cassava, 1.3 cal/gm, bananas 0.9 cal/gm; sweet potatoes 1 cal/gm. Import parity price of rice in 1990, assumed to be US\$462 in 1990. (ii) Maize figures are for traditional maize. A more precise estimate is difficult, because yields under the maize project are not well known and most maize is sold on the free market, largely as green maize. (iii) Conversion of paddy to rice: 1:06. (iv) No processing losses assumed on the other crops. (v) Coconut calculations are based on 100 trees/ha and 44 nuts per tree in 1990. The improved variety currently being developed can be planted at a density of 150 trees/ha with 75 nuts/tree. Thus the import substitution price of the improved variety would be US\$1,590/ha.

4.05 Because future prices of Comorian export commodities are so uncertain, no similar analysis can be made for, say, 1990. However, based on price projections for rice, and assuming that yields of export crops would remain stagnant while average foodcrop yields of foodcrops would increase as indicated, foodcrops become reasonably competitive with ylang-ylang, except for rice (cassava and bananas appear more advantageous than cereals). However, even with no yield increase, FOB prices for vanilla and clove would have to drop by nearly 50%, before it would become more profitable to grow food rather than export crops. At present, production levels, such a dramatic price drop is possible for cloves but most unlikely for vanilla; ylang-ylang prices too are likely to remain about constant.

4.06 How a strategy to promote either export or food crops can be implemented at farmers' level is another matter. The reaction of farmers to market prices has been somewhat mixed and unclear. The average revenue per hectare is about CFAF 70,000 for ylang plantations, (based on sales of fresh flowers), CFAF 400,000 for vanilla (for green vanilla) and CFAF 600,000 for cloves (for dry cloves). Revenues from rice are in the order of CFAF 30,000/ha, probably CFAF 50,000/ha and up for maize. Of course, these are all gross figures which do not take into account gestation periods of export crops, particularly cloves, and labor involved. Based on labor assumptions which are somewhat vague, net revenues per man day would probably be at least CFAF 700 and about CFAF 425 for maize and rice respectively, CFAF 2,000 for cassava and CFAF 2,200 for bananas, CFAF 530, CFAF 2,000 and CFAF 4,800 for ylang, vanilla and cloves, when these crops are in full production. (These figures have little meaning, given the pattern of small plots with crops grown in association in Comoros. Little is known about the value attached to family labor. Furthermore, foodcrops are grown very largely for subsistence). Yet, while there is understandably much enthusiasm for cloves, and relatively little for ylang-ylang, rice continues to be the major crop by area, with no evidence of area reduction. Bananas are popular, but there is little evidence of expansion in vanilla or cassava area and husbandry is neglected despite the high revenue figures.

4.07 The figures indicated that a strategy to promote foodcrops at the expense of export crops would not be advisable. However: (i) agronomically, though there is some scope for expansion of export crop area, it is limited. On the higher altitudes, where the bulk of annual foodcrops are cultivated, the export crops do not grow well; (ii) markets for ylang-ylang and vanilla are reasonably stable; however, the price for ylang could collapse if production increases rapidly without considerable product promotion campaigns (Comoros is almost the monopoly producer and marketing is controlled by French importers); the market for vanilla is vulnerable to synthetic substitutes and Comorian prices may fall if production from Madagascar, the major producer, recovers; medium term market prospects for cloves are poor; (iii) the effects on soil fertility of the different foodcrops must be considered; legumes, maize, sweet potatoes and bananas do not exhaust the soil as do rice and manioc; (iv) there is much scope for increasing both export crop and foodcrop productivity without changing radically the area devoted to either and this should be the first priority; (v) control of planting of most crops except ylang-ylang (grown mostly in plantations) would not be easy, while; (v) response to price incentives is not clear.

4.08 In summary, it is recommended that Government adopt a careful approach in its strategy of establishing priorities between export and foodcrops, in view of the uncertain market prospects of export commodities on the one hand, and of the increasing burden of food and mainly rice imports on the other hand. This means that: (i) on suitable soils cultivation of foodcrops should be encouraged, and every effort should be made to improve present yields by means which can be economically justified; (ii) adequate measures should be devised to discourage the present excessive expansion of clove trees, or at least to plant trees under an appropriate agro-forestry system where they would not compete with foodcrops; (iii) ylang trees should be rehabilitated, replanted and even expanded on poor stony soils where foodcrops would hardly grow, but the interest in ylang will only be reactivated if processing equipment is improved and processing costs are reduced, so that the producer price of fresh flowers can be substantially increased; (iv) expansion in vanilla area could be considered once yields on the present area have increased substantially, and if the market remains favorable; and (v) in any case, market conditions and trends of export crops should be closely monitored, in order to react quickly and to reorient priorities, if needed; this would be one of the prerogatives of the Stabilization Fund. However, although Government can influence choices through adequate motivations, the final decision on what is being grown will inevitably, and as it ought to be, remain with the farmer; the above figures indicate that price may not be the only determining factor.

Données climatiques typiques (moyenne 1970-1974)

<u>MORONI (Grande Comore)</u>	<u>Jan.</u>	<u>Fév.</u>	<u>Mars</u>	<u>Avril</u>	<u>Mai</u>	<u>Juin</u>	<u>Juillet</u>	<u>Août</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Déc.</u>
Température												
Maximum (°c)	32,6	32,8	32,8	32,3	31,9	30,8	30,4	29,9	30,1	31,6	32,8	32,3
Minimum (°c)	21,4	22,7	21,4	20,7	19,2	17,1	16,1	15,5	16,9	18,5	19,7	21,1
Précipitations												
mm	399	321	227	260	287	238	134	83	67	145	58	199
Nombre de jours	16	14	16	16	9	9	8	9	7	10	7	14
Humidité moyenne (%)	82	83	83	87	88	76	77	79	79	82	79	77
Insolation (heures)	165	162	215	192	246	228	236	218	205	200	243	227
<u>CUANI (Anjouan)</u>												
Température												
Maximum (°c)	32,1	32,0	32,1	32,2	32,0	31,0	30,7	29,7	29,5	30,1	31,6	32,1
Minimum (°c)	21,3	22,1	21,9	20,9	19,3	16,7	17,0	16,8	16,7	19,2	20,1	20,6
Précipitations												
mm	405	255	399	184	33	66	13	26	50	40	84	207
Nombre de jours	17	13	20	13	6	4	2	5	7	13	10	12
Humidité moyenne (%)	84	84	83	65	78	74	74	76	77	84	79	80
Insolation (heures)	154	156	210	219	205	234	254	238	220	201	230	209

Source: Service de la Météorologie, Direction de l'Aviation civile

Investment Projects

(1983-90)

ENREG	ACTIVITE	No	NOM DU PROJET	DATE	COUT	FINANCEMENT	No PNUD
* SECTEUR: 10000							
1	AO	0 1	APPUI PAM.	1981-1985	2107	PAM	
2	AO	0 2	APPUI PAM (II PHASE).	1985-1989	2900 SGP	Recherche	
* SECTEUR: 11101							
27	00	025	FEDEXAG: DIVERSIFICATION DES CULTURES D'EXPORT.	1984	2	Recherche	
9	AO	0 7	DEVELOPPEMENT DE LA PRODUCTION DU MAIS.	1978-1987	1583	FED(IV & V) FAO-TCF	
14	AO	012	REHABILITATION COCOTIERS, LUTTE CONTRE LES RONGEURS	1980-1985	1307		
19	AO	017	ETUDE DE STRATEGIE ALIMENTAIRE.	1983	29	FAO	
34	AO	032	PRODUCTION SCHEMCIERE.	1984-1988	272	Recherche	
37	AO	035	EXTENSION LUTTE CONTRE LES RONGEURS (COCOTERAIE).	1985-1990	248	Recherche	
38	AO	034	SCHEMA DIRECTEUR DE LA FILIERE COCOTIER.	1985	24	Recherche	
32	AI	130	FILIERE SUCRE.	1985-1989	874	Recherche	
20	CO	018	FONDS DE ROULEMENT POUR LE CREDIT AGRICOLE.	1983-1985	192	FENU	
13	DO	011	PROJET PILOTE DRS NIOUMAKELE (Anjouan).	1980-1983	273	FED	
22	DO	020	DEVELOPPEMENT REGIONAL DE L'ILE DE MOHELI.	1983-1985	214	Recherche	
25	DO	023	DEVELOPPEMENT REGIONAL INTEGRE NIOUMAKELE/TSEMBEHU	1983-1987	2887	BAD FAD PAM	
33	DO	031	DEVELOPPEMENT REGIONAL (COTE EST GRANDE COMORE).	1984-1989	1183	Recherche	
21	IO	019	DIVERSIFICATION DES STRUCTURES D'EXPORTATION	1984	20	Recherche	
24	IO	024	AMENAGEMENT DE STRUCTURES AGRAIRES.	1984	57	Recherche	
28	IO	026	CREATION D'UNE CELLULE D'INFORMATION STATISTIQUE	1984-1985	145	Recherche	
29	IO	027	RECENSEMENT DU SECTEUR AGRICOLE.	1984-1984	204	Recherche	
30	IO	028	DISPOSITIF DE PROMOTION DES PRODUITS A L'EXPORT	1984-1988	237	Recherche	
31	IO	029	LABORATOIRE AGRONOMIQUE ET VETERINAIRE	1984-1987	192	Recherche	
35	IO	033	CREATION DE STRUCTURES LEGERES PRE CADER	1985-1990	215	Recherche	
36	IO	034	APPUI A LA COMMERCIALIZATION DES PRODUITS AGR	1984-1990	878	Recherche	
11	TA	A 9	DEVELOPPEMENT REGIONAL INTEGRE NIOUMAKELE/TSEMBEHU	1979-1981	204800	PNUD	COI/78/002

Investment Projects

(1983-88)

ENREG	ACTIVITE	No	NOM DU PROJET	DATE	COUT	FINANCEMENT	No PNUD
* SECTEUR: 11101							
13	TA	A13	DEVELOPPEMENT DES CULTURES MARAICHERES.	1981-1982	430000	FAO	TCP/CO1/001
14	TA	A16	CREATION PERIMETRE RIZICOLE PILOTE A MOHELI.	1982	300000	FAO	TCP/CO1/002
17	TA	A15	VOLONTAIRES DU PROGRES.	1981-1983	1587300	FRANCE	
18	TA	A14	RENFORCEMENT DU DISPOSITIF D'APPUI AU DEV. RURAL.	1981-1984	2121	PNUD FENU FAO FAC UN	
19	BO	0 6	DEVELOPPEMENT DE LA VANILLE ET DU GIROFLE.	1976-1987	1070	BAD FAD	
* SECTEUR: 11102							
39	AO	0 1	FEDERAG: PROGRAMME AVICOLE MOHELI.	1984-1986	400	Recherche	
41	AO	0 3	DEVELOPPEMENT DU PETIT ELEVAGE (AVICOLE)	1979-1985	310	PNUD FED UNICEF	
43	AO	0 7	ELEVAGE FAMILIAL.	1984-1984	400	Recherche	
44	AO	0 8	REHABILITATION FERMES ELEVAGE MANGANI & MOVOULE.	1984-1989	329	Recherche	
47	AO	0 9	FEDERAG: ETUDE BOVINE. (Ateliers d'embranchement)	1984	7	Recherche	
43	AI	1 5	CENTRE NATIONAL D'APICULTURE.	1983-1987	54	Recherche	
44	AI	1 4	PROGRAMME AVICOLE (RENFORCEMENT ET EXTENSION).	1984-1985	130	Recherche	
42	TA	A 4	PRODUCTION FOURMINS ET ALIMENTS POUR VOLAILLES	1980-1982	5324320	PNUD	CO1/79/027
* SECTEUR: 12100							
48	BO	0 1	FORET.	1982-1983	31	FAO TCP	
49	BO	0 2	DEVELOPPEMENT DU SECTEUR FORESTIER.	1984-1990	1045	Recherche	
* SECTEUR: 13000							
51	BO	0 2	PROJET PILOTE DE PECHE SEMI-ARTISANALE.	1982-1985	1240	Recherche	
52	AO	0 3	DEVELOPPEMENT DE LA PECHE ARTISANALE.	1982-1985	1025	BAD FAD FAO JAPON	TCP/CO1/0103
53	AO	0 4	DISPOSITIF DE CONTROLE DE LA ZONE MARITIME	1984-1988	343	Recherche	
54	AO	0 5	PECHE HAUTE MER	1984-1984	450	Recherche	

Bibliography

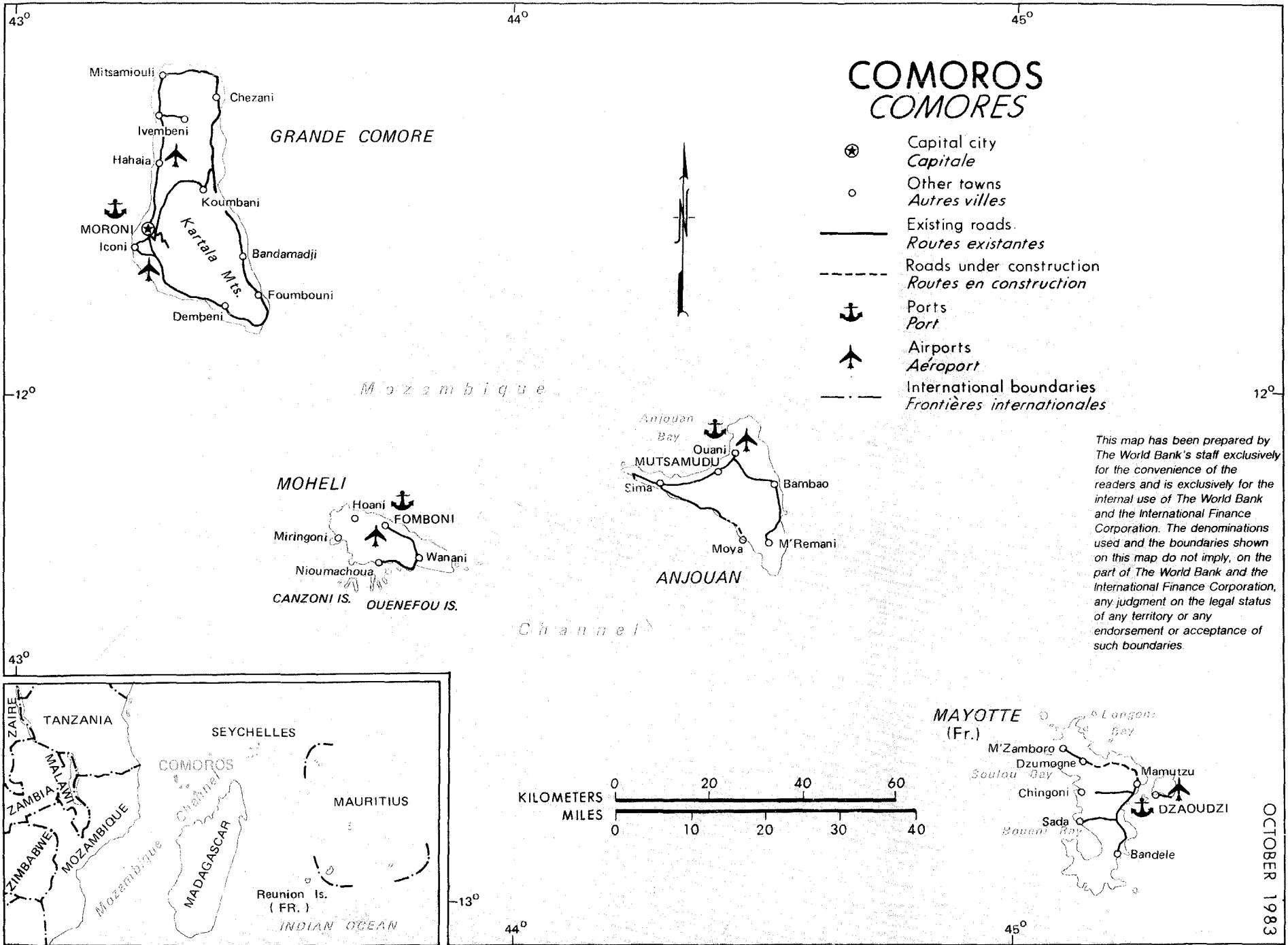
1. AUBRAY (R) La Pêche Maritime aux Comores: étude techno-économique de pré-investissement - Novembre 1976
2. AUDROING (M) Project d'aménagement sylvo-pastoral IRAM Mai 1981
3. BAUL (M) Rapport de Mission aux Comores: Considérations sur l'Elevage BDPA 1961
4. BEES Consommation des ménages Comoriennes et production vivrière de l'archipel 1966
5. BESNAULT Notes Sur l'Elevage aux Comores 1966
6. BERREUR (L), Bligné (A), Gouin (C), Schweb (R), Etude sur la promotion des exportations des Comores (ylang-ylang, vanille et girofle) Rapport de synthèse provisoire EEC/PANDATA Janvier 1982
7. BROUWERS (M), Latrille (Ed.), Subreville (G.), Les terres cultivables des Comores IRAT/RFIC* Août 1977.
8. CEFADER - Projet d'Appui au développement rural Rapport intérimaire Phase 1 (13.10.79 au 30.11.81).
9. COUDERT (J.) Commercialisation des produits agricoles en RFIC FAO Décembre 1980.
10. DEVILLE (A.) Projet de Programme pour le futur développement forestier dans l'archipel des Comores PNUD/FAO 1974.
11. DESMANGLES (F.) Développement de la Statistique Agricole - Recensement Général de l'Agriculture et mise en place d'un système permanent de collecte de données agricoles courantes FAO Août 1981.
12. FAD Rapport d'Evaluation: Projet de Développement de la Pêche Artisanale RFIC Octobre 1979.
13. FAO Les infrastructures au milieu rural, les aménagements hydro-agricoles, la petite hydrolique rurale 1973.
14. FAY(G.), et Morel (M.), Développement forestier aux Comores FAO Juillet 1981.

* RFIC: République Fédérale Islamique des Comores.

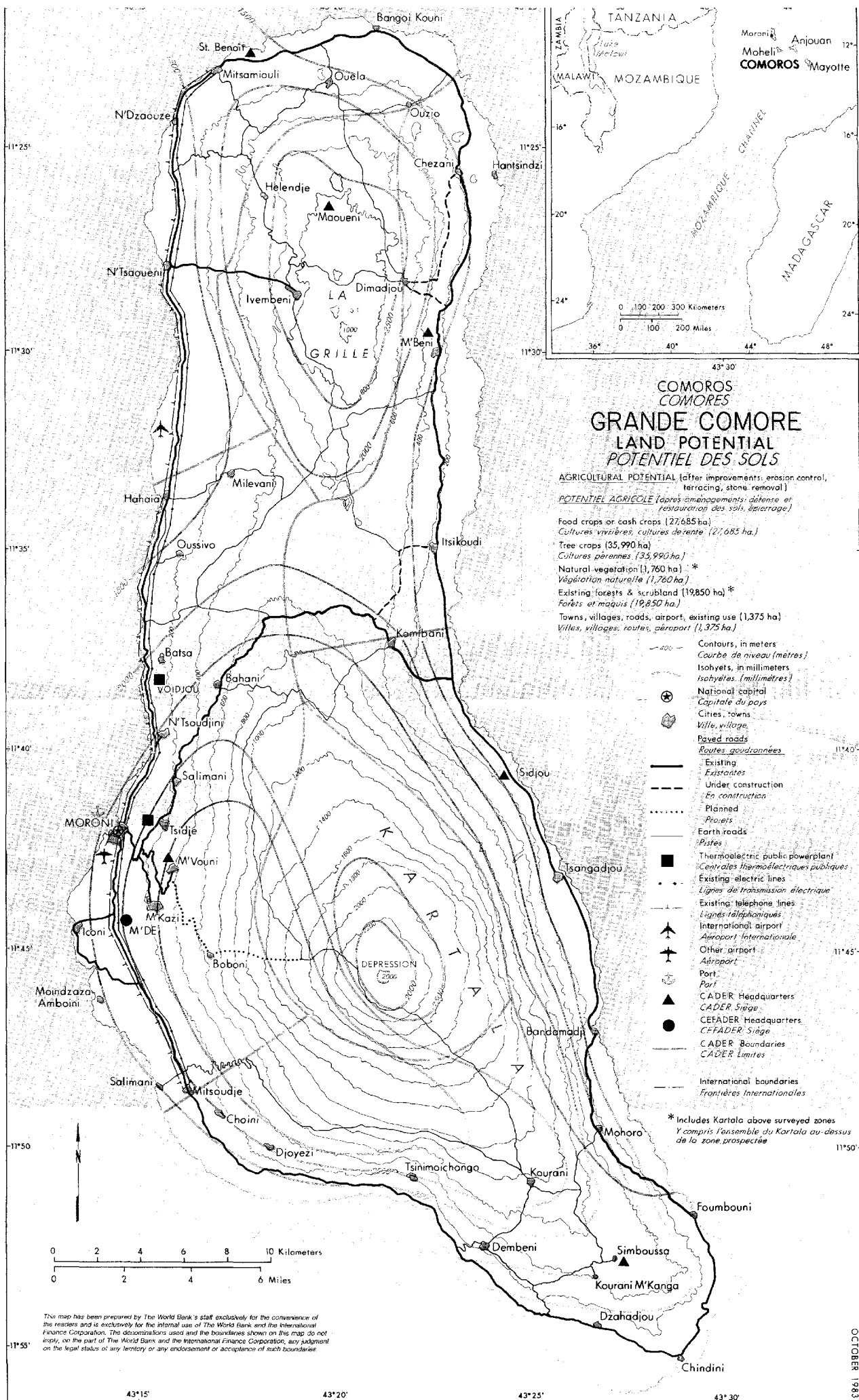
15. GAILLARD (J.) - Proposition d'un Plan de Développement Rural Intégré - Région Nioumakele Novembre 1980.
16. GRISON RFIC - Mission de Recommandation FIDA Novembre 1981.
17. GUARDIA (A.) Assistance en Politique Commerciale et des Prix CNUCED Novembre 1981.
18. HOAL (R.) La Pêche aux Comores Septembre 1962.
19. JOUVE (P.) Comores - Caisse de Stabilisation - Rapport de Mission Banque Mondiale Janvier 1982.
20. KAREGE (C.) Situation de l'Elevage en RFIC et Perspectives de Développement Juillet 1981.
21. KAREGE (C.) Rapport sur la vaccination contre le Charbon Symptomatique, Campagne 1980-81, Juillet 1981.
22. LEVREY (Y.), Moyon (F.) L'Elevage aux Comores - Propositions pour le Développement des Ruminants Rapport Ministère Coopération Octobre 1980.
23. PAM Projet Iles Comores 2545 - Développement rural à fins multiples Octobre 1980.
24. PAM Projet Polyvalent d'Appui au Développement Rural - projet PAM 2545 Rapport annuel 1981.
25. PALLAS Ph. Rapport de Mission en RFIC Mars 1980.
26. PNUD/FAO Mission de Programmation, identification et formulation 1979.
27. RFIC Recensement général de la Population et de l'habitat: resultats provisoires Direction Générale du Plan Bureau Central de Recensement Juin 1981.
28. RFIC Programme d'Action pour la décennie 1980-90 de la RFIC Septembre 1981.
29. RFIC Requête de la RFIC au Gouvernement de La République Française pour une assistance financière et technique à l'agriculture Mars 1981.
30. RFIC Programme indicative de la coopération financière dans le cadre de la Convention de Lomé II entre la RFIC et la CEE.
31. RFIC loi no. 81-24 portant statuts de la Société de Développement de la pêche aux Comores Septembre 1981.
32. SOCOVIA Importation des viandes et produits alimentaires 1979-81.
33. SUTTIE (J.) Projet de Rapport de Mission sur les pâturages et fourrages aux Comores Novembre 1973.

34. WORLD BANK - The Economy of the Comoros July 1977.
35. WORLD BANK - The Comoros - Current Situation and Prospects May 1982.
36. WORLD BANK - Comoros - Agriculture and Rural Development - Sector Memorandum - January 1981 (Draft).
37. WORLD BANK/UNIDO CP FIRC - Survey of Selected Economic Sectors - May 1982.

Note: Substantial documentation produced before independence exists in the library of BDPA (Bureau pour le Développement de la Production Agricole) in Paris.



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COMOROS
COMORES
GRANDE COMORE
LAND POTENTIAL
POTENTIEL DES SOLS

AGRICULTURAL POTENTIAL (after improvements: erosion control, terracing, stone removal)

POTENTIEL AGRICOLE (après aménagements: défense et restauration des sols, épierrage)

Food crops or cash crops (27,685 ha)

Cultures vivrières, cultures de rente (27,685 ha.)

Tree crops (35,990 ha)

Cultures pérennes (35,990 ha.)

Natural vegetation (1,760 ha) *

Végétation naturelle (1,760 ha.)

Existing forests & scrubland (19,850 ha) *

Forêts et maquis (19,850 ha.)

Towns, villages, roads, airport, existing use (1,375 ha)

Villes, villages, routes, aéroport (1,375 ha.)

- 400 — Contours, in meters
Courbe de niveau (mètres)
- Isohyets, in millimeters
Isohyètes (millimètres)
- ★ National capital
Capitale du pays
- Cities, towns
Villes, villages
- Paved roads
Routes goudronnées
- Existing
Existantes
- - - Under construction
En construction
- Planned
Projets
- Earth roads
Pistes
- Thermoelectric public powerplant
Centrales thermoélectriques publiques
- Existing electric lines
Lignes de transmission électrique
- Existing telephone lines
Lignes téléphoniques
- ✈ International airport
Aéroport internationale
- ✈ Other airport
Aéroport
- ⚓ Port
- ▲ CADER Headquarters
CADER Siège
- CEFADER Headquarters
CEFADER Siège
- CADER Boundaries
CADER Limites
- International boundaries
Frontières Internationales

* Includes Kartala above surveyed zones
Y compris l'ensemble du Kartala au-dessus de la zone prospectée

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COMOROS COMORES ANJOUAN LAND POTENTIAL POTENTIEL DES SOLS

AGRICULTURAL POTENTIAL (after improvements:
erosion control, terracing, stone removal)
POTENTIEL AGRICOLE (après aménagements:
défense et restauration des sols, épierrage)

Food crops or cash crops (13,435 ha.)
Cultures vivrières, cultures de rente (13,435 ha.)

Tree crops (6,495 ha.)
Cultures pérennes (6,495 ha.)

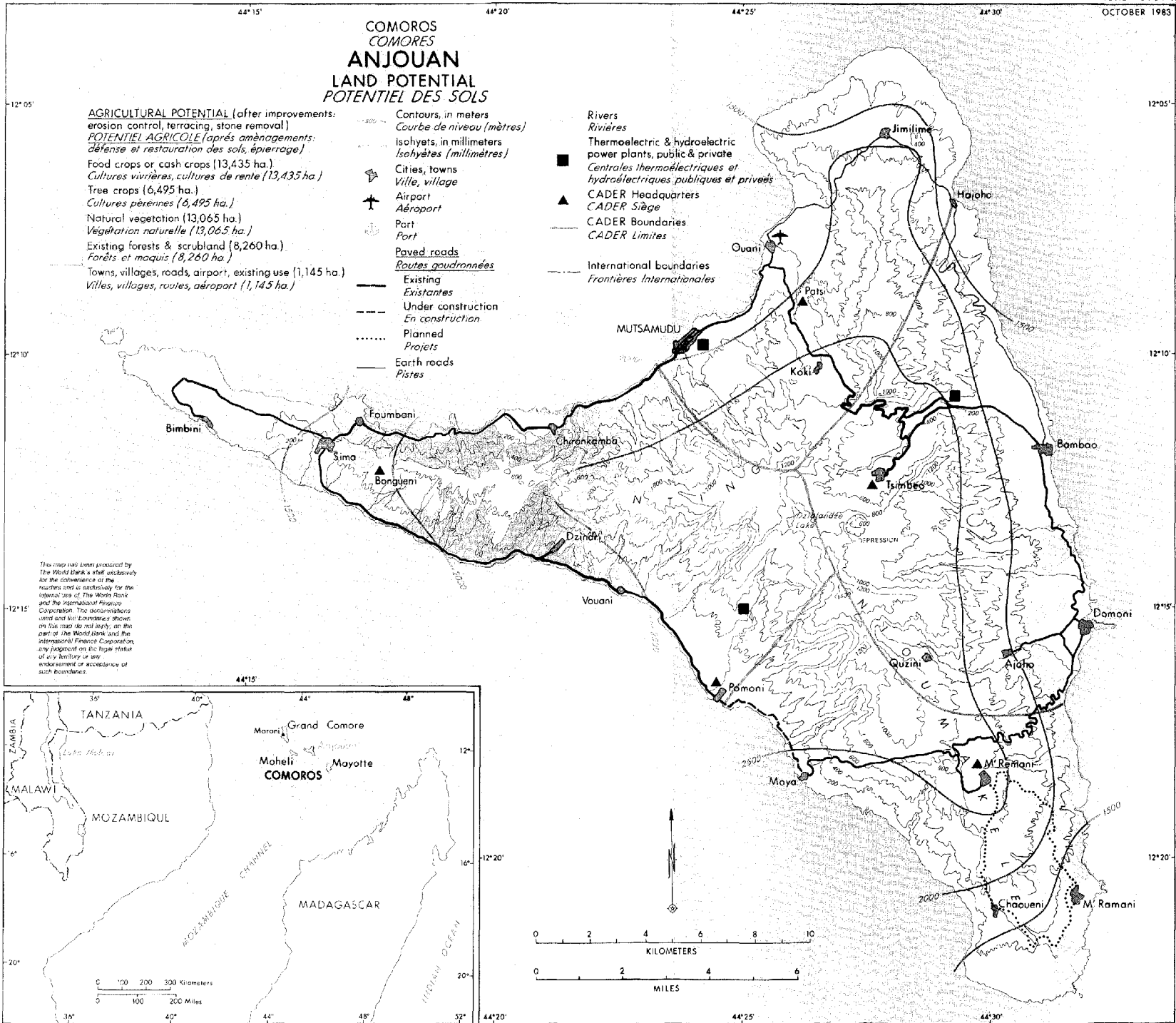
Natural vegetation (13,065 ha.)
Végétation naturelle (13,065 ha.)

Existing forests & scrubland (8,260 ha.)
Forêts et maquis (8,260 ha.)

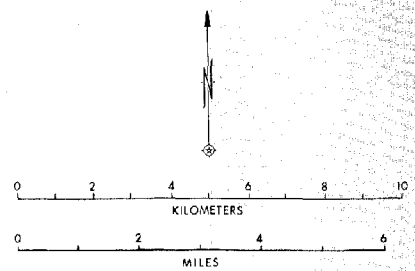
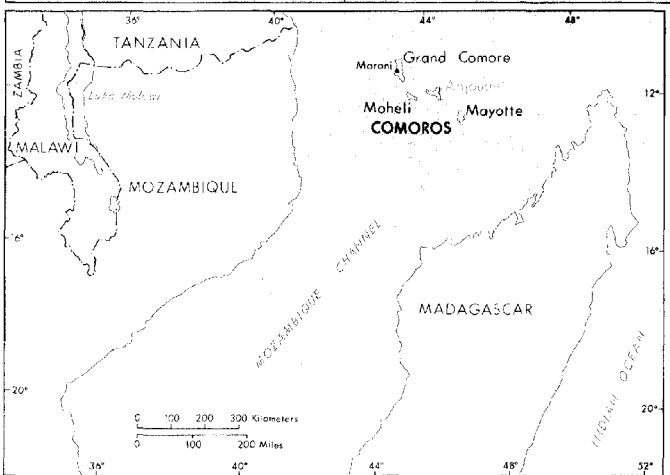
Towns, villages, roads, airport, existing use (1,145 ha.)
Villes, villages, routes, aéroport (1,145 ha.)

- Contours, in meters
Courbe de niveau (mètres)
- Isohyets, in millimeters
Isohyètes (millimètres)
- Cities, towns
Ville, village
- Airport
Aéroport
- Port
Port
- Paved roads
Routes goudronnées
- Existing
Existantes
- Under construction
En construction
- Planned
Projets
- Earth roads
Pistes

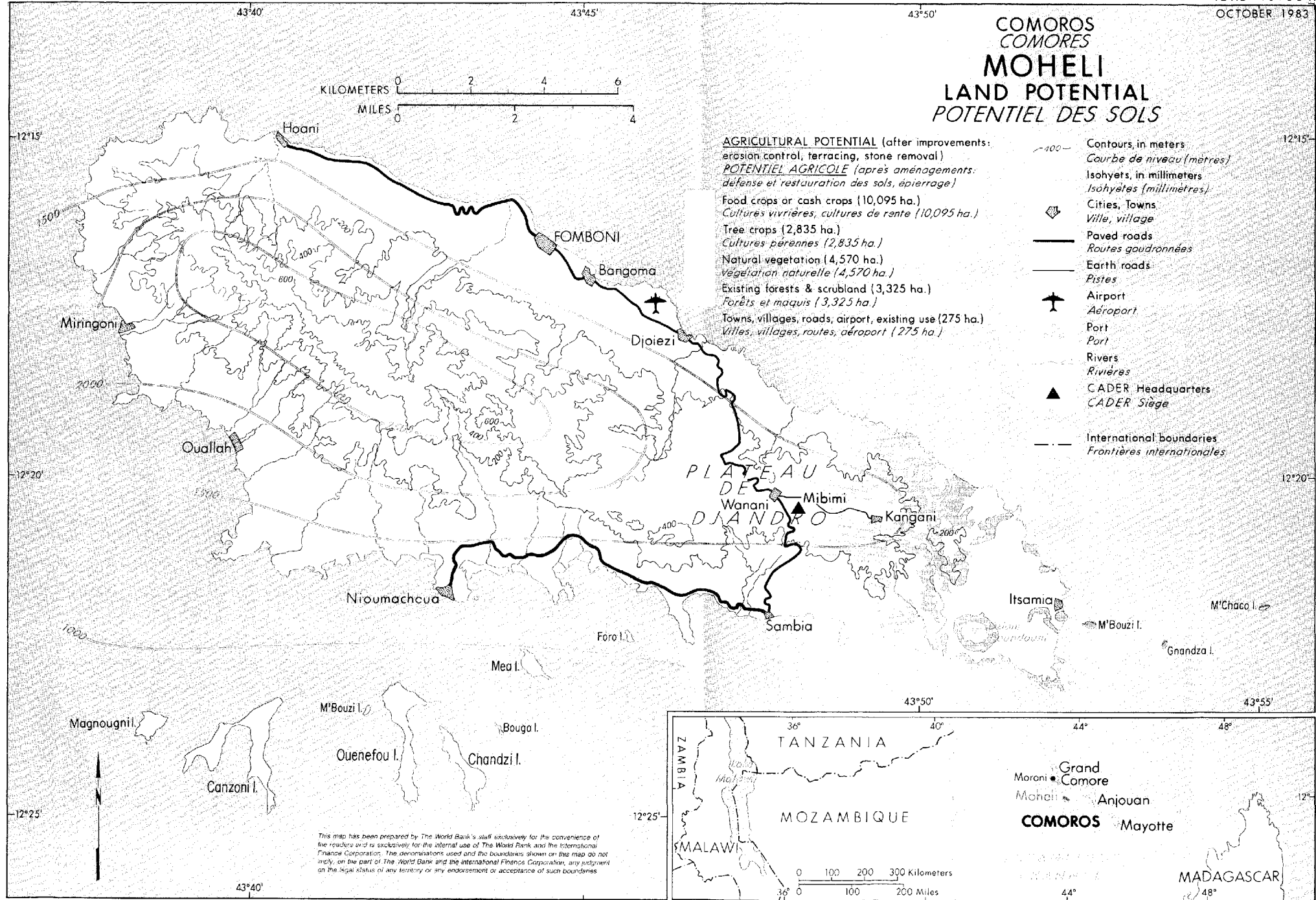
- Rivers
Rivières
- Thermoelectric & hydroelectric power plants, public & private
Centrales thermoélectriques et hydroélectriques publiques et privées
- CADER Headquarters
CADER Siège
- CADER Boundaries
CADER Limites
- International boundaries
Frontières Internationales



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COMOROS COMORES MOHELI LAND POTENTIAL POTENTIEL DES SOLS



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