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A REPORT TO THE GOVERNMENT OF GRENADA
ON
OPPORTUNITIES FOR DEVELOPMENT IN
FORESTRY AND FOREST INDUSTRIES

by

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Forest Industries Consultant

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JOB DESCRIPTION • ASSOCIATE UN
FORESTRY EXPERT OR VOLUNTEER

1V

JOB DESCRIPTION - FORESTRY
CONSULTANT

V

SUMMARY AND RECOMMENDATIONS

1. Natural hardwood forests cover an estimated 10,000 acres in the mountainous areas of Grenada and Carriacou. Government forest reserves occupy approximately 4,000 acres, with the balance on private lands. Commercial timber resources in these forests, have been badly degraded by hurricane "Janet" in 1955 and the traditional practice of cutting only the best trees. Choice timber has been removed from accessible areas. Sawmills and furniture shops suffer from a severe and chronic shortage of suitable timber. The small quantity of timber now available is from private land clearing operations and the supplies are temporary. Good domestic and export markets exist for sawnwood and furniture. Timber supply is the limiting factor.

2. The small sawmill and furniture shops now in operation are adequate to process the small quantities of timber available. The best opportunities for development of the forest industries lie in improvement of the natural forests and establishment of commercial forest plantations to increase the timber supply.

3. There are no improvement opportunities at this time in (i) sawmills (ii) packaging or (iii) furniture for Grenada to present at the Meeting to Promote Investment and Industrial Co-operation to be sponsored by UNIDO 2 - 6 May 1977 in Montreal, Canada.

RECOMMENDATIONS:

1. Request an Associate UN Forestry Expert or Volunteer for two years to make an inventory of Government forestlands and prepare Working Plans to manage these natural forests. (See Appendix IV for job description).
2. Request a Forestry Consultant for three months from UNDP to make a study of the feasibility of a commercial forest plantation programme. (See Appendix V for job description).
3. Send an observer to the UNIDO sponsored Investment Promotion and Industrial Co-operation Meeting 2 - 6 May 1977 in Montreal, Canada, to become familiar with forestry and forest industries projects being promoted in other countries.

I N T R O D U C T I O N

1. The expert, Mr. Wendell P. Clark, served in Grenada 8 - 20 November 1976 in accordance with a request from the Government of Grenada to the Industrial Development Organisation of the United Nations (UNIDO) for assistance in promoting investment in forest industries. He worked in close co-operation with the Supervisor of Forests, Ministry of Agriculture, Forestry and Fisheries.

2. The assignment was to assist the Government in compiling data on projects in (1) sawmilling (2) packaging and (3) furniture for use by Grenada at a meeting to promote investment to be sponsored by UNIDO, 2 - 6 May 1977 in Montreal, Canada. (See Appendix 1 for Terms of Reference).

3. Subsequently, careful examination of these industries in Grenada disclosed no scope for external investment at this time. Opportunities for development lie, instead, in - (1) increasing the productivity of the natural forests, and (2) the establishment of commercial forest plantations to substitute domestically produced sawwood for the 3.2 million board feet of sawwood valued at EC\$1.4 million (US\$523,425) now imported annually (1973).

4. The author would like to acknowledge the friendly assistance and co-operation from all who helped make his stay in Grenada pleasant and productive. Special thanks to Miss Gloria Payne, P.S. - Planning, Development and Training; Mr. John D. Samuel, P.S. Ministry of Agriculture, Forestry and Fisheries; Mr. Vilhelm Lumholtz, Director, Agricultural Marketing Board; and to Mr. J.W.E. Lewis, Supervisor of Forestry, my genial host.

BACKGROUND

5. Grenada, the most southerly of the Windward Islands, is located 150 miles southwest of Barbados and 90 miles northwest of Trinidad (12°07'N by 61°42'W). The State includes the southernmost Grenadines, an arc of small islands extending to the north. The largest of these is the dependency of Carriacou (13 square miles). The area of the island of Grenada is 133 square miles. The island is of volcanic origin and the terrain is rugged and mountainous (Maximum Elevation 2,757'). Rainfall varies from 60 inches in coastal districts to 200 inches in the mountains.

6. The population is 105,000 (1973), of which 30,000 live in St. George's, the capital, 15,000 in Grenville, and the rest in smaller towns and rural areas. The annual population growth rate of 0.7% reflects a large emigration to Trinidad and elsewhere. The people are mainly of African-Negro descent and English is the language spoken.

7. The Gross Domestic Product (GDP) is US\$24 million (1974 estimate), with a per capita GDP of US\$228 (1974 estimate). Agriculture is the major sector of the economy, forty-four percent of the land is cultivated, 4 percent in pasture and 12 percent in forests. Nutmeg & Mace, Cacao and Bananas are the major crops. Tourism is another important economic sector. Exports in 1974 totalled US\$8.1 million (estimated) and consisted principally of Nutmegs & Mace, Cacao and Bananas. Imports totalled US\$16.3 million (1974 estimate) consisting of petroleum, consumer goods and food. Principal trading partners are the U.K., U.S.A., Canada, Trinidad & Tobago and other members of the Caribbean Common Market (CARICOM).

8. Grenada was discovered by Columbus in 1498. Initial settlement in 1650 by the French was continued later by the British. Sugar was the principal crop until the industry was weakened by the abolition of slavery and destroyed by the hurricane of 1780. Nutmeg was introduced in 1782, and together with Cacao and Bananas, has formed the principal economy since. The Country gained its independence from Great Britain in 1974.

9. It is now the desire of the Government to broaden and strengthen the economic base through diversification, modernisation and expansion of agriculture, promotion of tourism and encouraging the development of light agro-industries.

F O R E S T R E S O U R C E S

10. Government forest lands occupy 3,816 acres in rugged mountainous areas. Approximately 6,200 acres of forestland area are on private lands. The forest includes a wide variety of native tropical hardwood trees. Forests growing on steep terrain are reserved for watershed protection, and cutting is discouraged. These are "Protective Forest Areas". On less severe terrain cutting of specific trees is allowed in "Productive Forest Areas".

11. No information exists on the volume of usable timber available in the forests of Grenada. However, it is obvious from field visits that the tradition of allowing woodcutters to take only the choice portions of the most valuable trees has severely degraded the natural hardwood forests. In addition, hurricane "Janet" savagely damaged the Nation's forests in 1955. Sixty to seventy percent of the timber of commercial size at that time was destroyed by the storm. and plagues of insects and disease that followed.

12. The forests of Grenada have been studied briefly a few times over the years. In 1887 E.M.D. Hooper recommended forest reserves on ridges and watersheds to conserve water resources. The Grand Etang Reserve was established in 1906, the forest reserves on Carriacou a few years later. A Forestry Board was established in 1910.

13. In 1932, Capt. R.C. Marshall recommended establishment of a few more reserve areas, opening the Grand Etang Reserve to exploitation and a re-forestation. This was done in 1935, when the reserves were transferred to the Agricultural Department. Mr. A. Wimbush recommended an Assistant Conservator of Forests for the West Indies Islands, but the Leeward Islands opposed the idea and it was discarded.

14. Comprehensive studies were made of the forests of Grenada (including Carriacou), St. Vincent, St. Lucia and Dominica in 1944 by J.S. Beard, Assistant Conservator, Trinidad & Tobago. He identified the major forest species and called for an inventory of the forests "at once".

15. Limited sampling determined that Gommier (*Dacryodes excelsa*) comprised 75 percent of the trees of sawlog size in the Grand Etang Reserve - the major forest area. This timber is used for rough construction, but rough interlocking grain makes it unsuitable as a furniture wood. Its durability is not exceptional. Other species present in the natural forest of interest for sawnwood included Maruba (*Simarouba amra*), lauriers (*Lauraceae* spp), bois blanc (*Symplocos martinicensis*), tapuna (*Hieronyma caribaea*), mauricif (*Byrsonima spicata*) serrette (*B. coriacea*), mahoe cochon (*Gouania caribaea*) and balata (*Manilkara bidentata*). These latter species were present in very small quantities.

16. Selection fellings were recommended on protective forests and clearing 50 acres per year for commercial forest plantations on production forests. Mr. Beard estimated such fellings would yield 30,000 cubic feet of timber annually. Unfortunately, hurricane "Janet" followed Mr. Beard in 1955 and undoubtedly lowered his yield estimates considerably.

17. Experimental plantations of commercial forest species were established during the period 1957 - 1969, as recommended by Mr. Beard. These plantings include teak (*Tectona grandis*), blue mahoe (*Hybiscus elatus*), Red Cedar (*Cedrela mexicana*), White cedar (*Tabebuia pallida* Miers), mahogany (*swictenia mahogani*) and *Pinus caribaea* on Grenada, and teak, mahogany and white cedar on ten acres on Carriacou. These plantations now cover a total of 700 acres and growth has been excellent - especially for teak, blue mahoe and pine. Early difficulty with shoot borer damage in mahogany and red cedar was overcome with a small fly from India. White cedar seedlings seem delectable to goats, and virtually all white cedar trees planted on Carriacou have been deformed to bushes by the goats which relentlessly grace that island. The other plantation species show no grazing damage.

18. The present Supervisor of Forests, Mr. J.W.E. Lewis, proposed a comprehensive re-forestation and management plan in 1971. In addition to steps for applying scientific management to the natural forests, Mr. Lewis introduced the concept of joint agricultural use of forest plantations to increase the productivity of these lands.

19. Fifty acres of bananas would be planted annually in marginal or denuded forestlands, to be followed in two years by re-forestation. Income from the bananas would largely off-set planting costs. Additionally, he advocated the propagation of such horticultural crops as anthurium lilies

in conjunction with the timber species on these plantations. Unfortunately, funds for this project have not been forthcoming.

20. Mr. P.A.Durqnat, Assistant Conservator of Forests (Utilisation), Trinidad, visited Grenada for one day in 1974. He re-emphasised the need for forest plantations and provided helpful estimates of harvesting and re-forestation costs.

21. Dr. J. Menz, Manager of project CARDATS, a joint CARICOM/FAO project, made a reconnaissance level economic analysis of the work done by Messrs. Lewis and Durqnat. His analysis of the costs and benefits of the joint banana-forestry proposals indicated sufficient profitability to advise conducting an in-depth analysis as a possible investment opportunity for financing by an international financial institution.

22. Mr. G.S.Bell, Forestry Advisor to the British Development Division, visited Grenada for two days in 1975. He indicated that the BDD would consider assisting with a commercial re-forestation scheme - if presented, but saw no scope for investment in the sawmill industry at present.

FOREST INDUSTRIES

SAWNWOOD

23. The sawmill industry is suffering from a severe and chronic timber shortage that dates back at least to 1940. The domestic demand for sawnwood far exceeds the supply. The small amounts of timber available are coming almost entirely from clearing of former private estates, now being subdivided into half-acre plots. This source is temporary and will cease when the estate lands have been dispersed. Accessibility has long been a major problem with the government timberlands. There are very few forest access roads, and harvesting and transportation of timber is extremely laborious and expensive. These high costs discourage the use of any but the most valuable woods. Even so, domestically produced furniture woods are less expensive than the same woods imported.

24. Stumpage for fine furniture woods, such as teak and mahogany, sells for around EC\$4.50/cubic foot (US\$140/MBF). Gommier stumpage on government forestlands sells for EC\$35/MBF (US\$13/MBF).

Lumber prices for native species are EC\$500/MBF (US\$300-375/MBF).

25. The small sawmill owned and operated by the Duncan Brothers at Gonyave is the only one now operating in the country. It consists of a 40" Corley Circular Saw and Carriage. The non-edged boards are air-dried. The equipment is capable of cutting perhaps, 1-2 thousand board feet (MBF) per 8 hour day. However, due to the small and crooked logs and the large percent of limewood being cut for boat ribs, the normal daily output would be under 1 MBF.

There is a small furniture shop in conjunction with the sawmill. It contains some excellent new equipment, but the furniture work is mostly done by one of the Duncan Brothers who is very busy with other matters.

26. The Government sawbench at Queen's Park (St. George's) is not operating due to lack of logs. The operation consists of a 40" circular benchsaw, edger and elderly molder. It would be difficult to cut lumber accurately on this equipment and the yield must be low. The operation includes a damaged diptank for the hot-cold process of wood preservative treatment, and a machine for weaving wood-stake and wire-fencing. The diptank apparently exploded and is now occasionally used for cold soaking posts and fence stakes in creosote.

27. Some of the furniture shops visited were sawing small amounts of lumber from salvaged bits and pieces of logs on their shop bandsaws or two-man pitsaws.

28. The present small sawmill and furniture shop sawing operations are adequate for salvaging the available small volumes of low-grade timber. However, more efficient band sawmills with thinner, more accurate blades should be required for processing the larger volumes of better quality and more valuable woods that would become available from improvement cuttings on natural forests and later, high-grade material from plantations. Bandsaws are required in Trinidad to purchase and process plantation woods.

29. The 1973 imports of 3.2 million Bf of sawnwood indicates a market adequate to support one good efficient sawmill operation. Unfortunately, the island being essentially cone-shaped, it would be difficult to locate one central sawmill

operation to supply the whole island. The terrain and road networks almost require sawmills at St. George's, Gouyave and Grenville. It might be possible to locate at one port and barge, or boat lumber to the other locations, but the extra handling and shipping costs would nullify the economies of scale from the slightly larger operation.

30. The relatively small volumes of timber likely to be available, even from expanded improvement cuttings and later from the plantations (i.e. 3 million Bf), and the domestic nature of the market are unlikely to attract foreign investment in the sawmill industry. Private financing - with modest Government assistance and encouragement - should be adequate to provide for the foreseeable expansion of this industry. Free logs for a short initial period would help the small owner/operators convert from circular saws to bandsaws. Credit from the Grenada Agricultural Bank, through participation of small sawmill owners in the Agricultural Revolving Fund of the Caribbean Development Bank, would be another way to help.

ROUNDWOOD

31. Many minor species of timber are not naturally durable and are susceptible to attack by insects and fungus. Such woods must be given preservative treatments to ensure satisfactory service. The improvement cuttings proposed for the natural forest and future plantation thinnings, would create large volumes of such minor species and small-size material suitable for posts, poles and fencing.

32. The Government's plans to diversify agriculture through encouraging the production of fruit, vegetables and livestock will require large amounts of fencing, and light agricultural construction (i.e. sheds, pens, feeders, etc.). These

These activities will create a good market for the increased supplies of preservative treated posts, poles, and fencing.

33. Even these favourable factors, however, will probably not justify a pressure impregnation preservative treatment plant. Fortunately, diptanks utilising the "hot-cold" or "double diffusion" processes are effective and can be locally built for around EC\$10,000 to EC\$25,000. The Government's diptank at Queen's Park should be renovated and utilised as soon as wood becomes available from improvement cuttings. Other diptank installations should be encouraged at Gouyave, Grenville and Hillsborough (Carriacou). Private investment could be stimulated through a small agricultural loan, or the operation could be part of an agricultural programme, such as livestock development.

34. Fence machines should also be encouraged in conjunction with the diptanks at the locations suggested above. They should be available for a modest sum of - say - EC\$2,000.

FURNITURE

35. There are numerous small furniture shops scattered around the country. The demand for their products far outstrips the wood available to them. The shops are reasonably well equipped with modern woodworking machinery. Unfortunately skilled craftsmen are in seriously short supply, and the quality of furniture produced by the different shops ranges from excellent to rustic.

36. Basic woodworking skills (use of hammer, saw, hand-plane) are taught on a part-time (1/2 day per week) basis, as part of the vocational education programme, in 19 primary

and secondary schools. There also is a vocational institute offering further training in Woodworking and Carpentry. Unfortunately, very few students are interested in woodworking. Carpentry is somewhat more popular, but the biggest interest is in electrical, refrigeration, and auto mechanics. These vocations are the best paid and have a more modern image, than woodworking and carpentry.

37. Most furniture shop owners queried on the matter, indicated interest in training apprentices. The youngster would go to school full-time and work in the furniture shop part-time for pay. This would be a way to give advanced woodworking training with a production emphasis, and produce a saleable product in the process. Vocational education supervisors in the schools could co-ordinate the programme, and it would require no investment by the Government.

38. Experienced woodworkers now employed in the shops also showed keen interest in more advanced training. Arrangements could be made for an expert to come to Grenada for three months and conduct such advanced training. Another approach might be a carefully arranged seminar, based on a selective tour of the furniture industry of Trinidad, demonstrations of new equipment by tool manufacturers, and lectures on material flow, shop efficiency, and advanced woodworking. Such a seminar could be for one week in Trinidad. It could be conducted by a UNIDO expert, or through arrangements with the Caribbean Industrial Research Institute, (CARIRI) at St. Augustine, Trinidad, W.I.

39. Exports of Chairs & seats (site 821-01) and furniture ((821-09) totalled EC\$1,466 (US\$550) in 1973. Imports were Chairs and Seats EC\$123,633 (US\$46,395) and furniture EC\$232,557 (US\$87,270). Most of the best furniture being

produced during shop visits was for export to Trinidad. Top quality furniture from Grenada will find ready markets in Trinidad and elsewhere. Wood supply is the limiting factor. The market is there.

40. Local schools are now importing considerable quantities of furniture and lumber to make furniture. These imports will rise rapidly as more children enter school and remain longer for increased education. Government programmes to improve living standards in rural areas and attract young people back to the countryside will require more and better furniture. A young population will need greatly increased housing. There will be even more serious shortages of all kinds of building materials, unless action is taken now. Wood is a material that lends itself well to highly efficient production of pre-fabricated housing and furniture. Steps must be taken now to ensure future supplies of wood in Grenada.

CONTAINERS

41. In addition to the three main agricultural crops - Nutmegs & Mace, Bananas and Cacao - 4,898,502 lbs of fruits, vegetables and root crops were produced in Grenada in 1975. These perishable foods were shipped in any available containers, many unsuitable. Handling, shipping, storing and sales losses are estimated to be as high as 50 percent for some of these agricultural products.

42. Assuming 20 lbs of produce per box, a life of 50 trips per year, 20 percent loss of boxes, it would require 5,880 boxes annually to package the annual production. At an average of 3.85 Bf per box and a yield factor of 50 percent in cutting of lumber for the boxes,

approximately 45 MBF of lumber would be required to package Grenada's current production of fruits, vegetables and root crops.

43. Minimum capacity mechanised packaging equipment would be as follows:

	<u>Minimum</u> <u>daily output</u>	<u>Estimated</u> <u>Investment</u>
Wire-bound Cases	5,000	EC\$319,775 (US\$120,000)
Light packing cases	2,000	98,600 (US\$ 37,000)
Pallets	50	53,300 (US\$ 20,000)

44. Grenada's box and crate requirements, unfortunately, would be far below the minimum volumes required for mechanised equipment. Boxes and crates can be easily made by hand in furniture shops and their production should be encouraged to save food losses. Again, the availability of lumber is the limiting factor in the expansion of wood container production. There seems to be little scope for foreign investment in container production at present.

BOAT BUILDING

45. Small wooden boats and inter-island schooners are built in the country by traditional means. This construction goes on at a rate determined by need and the wood supply. Bent limbs and trunks of trees are cut into pre-bent ribs for the boats and hand-fitted to the curvature of the hull.

46. Modern fishing boats and schooners are increasing, made of steel or fibreglass and imported from abroad. Anything to obtain more wood and increase the output of sawnwood will help this traditional construction of boats. No opportunity for foreign investment in this small

industry is readily apparent.

OPPORTUNITIES FOR DEVELOPMENT

IMPROVING NATURAL FORESTS

47. The forest inventory urgently recommended in 1944 and 1973 is even more urgently needed today. Forest management plans cannot be made, feeder roads built, industries developed or markets and investment promoted without some idea of what volume and type of timber is in the forest. The lack of this information has prevented the most productive use of the forests of Grenada, at least since the beginning of this century.

48. The productivity of the natural forests can be increased without interfering with protection of the watersheds. These forests contain many defective trees and trees of species of little value for construction or furniture. Other trees have become so crowded together that further growth is impossible. These trees together with mature individuals of the more valuable species should be selected for cutting by a forest officer, and removed to make room for younger and more vigorous trees of preferred species. Such thinning and timberstand improvement will improve the forest by increasing growth rates and value of the residual growing stock.

49. An increased flow of timber from such improvement cutting, together with clearing for commercial forest plantations, will provide an immediate increase in timber supplies for construction, furniture, containers and preservative-treated roundwood. An increase in the demand

for roundwood and containers will provide markets for species not suited to sawnwood and furniture.

50. The traditional Government timber sales policies will have to be changed to facilitate the marketing of non-traditional furniture and construction woods. At present, woodcutters are sold only the choice portions of the best species. Everything else is left to occupy space in the forest. The practice followed in North America, Europe, Japan and elsewhere, is to select, measure and mark all trees to be cut in a given area. The buyer then submits his bid on the basis of the total volume to be sold in that area, not just the cream. If local woodcutters hesitate to buy competitively by this method, invite foreign buyers.

51. The proposed increase in utilisation of the natural forests would provide an immediate increase in government revenues from stumpage sales, increased industrial production and employment, and a reduction in sawnwood imports. Forestry and forest products industries are very labour intensive, and employment would be increased in both rural and urban areas. More sawnwood, posts, poles, fencing and containers would be available to support Government plans for modernizing, diversifying and expanding the agricultural sector.

COMMERCIAL AND FOREST PLANTATIONS

52. Plantations of rapid-growing trees of valuable species are replacing less productive natural forests throughout the world. Superior seed from carefully selected stock, intended for specific products, grown under scientific management, produce the desired goods in minimum time. Plantation crops normally mature in 25 - 35 years in the tropics vs 80 - 100

years required by many of the commercially important species grown in natural forests.

53. Species trials already established in Grenada indicate that three valuable and useful plantation species do very well here. Teak (*Tectona grandis*) is a beautiful and durable wood highly prized throughout the world for furniture, veneer and plywood. Thinnings from Teak plantations make very good posts, poles and fencing. Trinidad has been planting Teak since 1928, and now has over 19,000 acres in plantations of this excellent wood.

54. Caribbean Pine (*P. Caribaea*) is a fast growing conifer planted widely in the tropics. It provides excellent construction timber for a wide variety of uses: houses, plywood, containers, etc. It grows quite well in Grenada. Trinidad has been planting 1,000 acres of Pine annually since 1956 and now has over 8,500 acres in Pine.

55. The third species - Blue Mahoe (*Hybiscus elata*), is native to Jamaica. It is a hard-wood with medium density, durable wood. It can be used for a wide range of products including construction, containers and furniture.

56. These three species - and perhaps Mahogany, Red and White Cedar - are growing very well in Grenada. Trees are straight and growing rapidly. They should provide thinnings for posts and small poles in 12 years, large poles and small sawlogs in 20 years, and mature sawlogs and veneer logs in 35 years (The 1957 plantations will be mature just 16 years from now).

57. With good management, these species should produce a final crop of 7,800 Bf per acre. An annual planting of

410 acres could eventually (after 35 years) replace the current (1973) annual import of 3.196 million Bf of sawwood. A total plantation area of 14,350 acres would be needed on Grenada and Carriacou. This plantation area could be reduced by the volume of sawwood produced from increased utilization of the natural forests.

58. The sawmill and furniture shops in the country are now operating primarily on timber from private lands. Successful afforestation of private lands would further reduce the area of Government land needed for commercial forest plantations. Two large Carriacou landowners expressed an interest in such plantations.

59. There are approximately 2,000 acres of productive forests on Government forestlands. In addition, there are an estimated 10,000 acres of marginal agricultural land on Grenada and 4,000 acres on Carriacou. These 14,000 acres of marginal lands are usually too steep, rocky or uneven, for agriculture, but could be used for grazing and forest plantations. Steep watersheds and inaccessible areas should be kept in natural protection forests. But plantations would be suitable where soil erosion and runoff do not pose severe problems, such as - abandoned fields and scrub areas, seasonal pasturals, non-productive natural forests, and other idle land on Grenada and Carriacou.

60. Returns from commercial forest plantations can be increased through controlled grazing or from fodder production. Sheep and cattle do not harm the plantation species considered here, if introduced a few years after planting, when the trees are 8 feet or more in height. The animals reduce plantation maintenance costs by cleaning out weeds and brush that compete with the trees and produce an annual

income between thinning and timber harvests. Goats are extremely efficient at grazing on forestlands and can (and do) remove all vegetables from hillsides, if not carefully controlled. For this reason, it is advisable to keep goats out of plantations in hilly areas.

61. Plantation sites would normally be adjacent to agricultural areas and accessible to transportation. Selection should be based on the most recent soil capability maps, present and planned feeder roads and in close co-ordination with agricultural land use plans. Forest access should utilise agricultural feeder roads to the maximum extent. Roads built primarily for forest access should emphasise plantation access over harvesting of natural protection forests. Underground water surveys planned for Carriacou would be useful for locating areas where deep rooted trees, such as Lobolly Pine (*P. pallustris*), might reach water in otherwise arid regions.

62. Blue Mahoe seedlings are easy to grow in simple forest beds on plantation sites. Toak and Pine require more care and must be tended in nurseries. It should be possible to minimise nursery costs by arranging for them to be grown in agricultural nurseries, such as lime and nutmeg, under the supervision of a forest officer.

63. There are numerous fertile opportunities to enhance the natural symbiosis between agriculture and forestry through close co-operation. Obvious examples in Grenada include joint planning, construction and maintenance of feeder roads to share investment and operating costs; sharing equipment repair and maintenance facilities; encouraging forest and watershed conservation and efficient wood use along with agricultural extension and education

efforts; extend agricultural credit facilities to small forest industries; utilise agricultural transportation and distribution systems to collect, process and distribute forest products (including treated posts and poles, furniture, crates, etc.); and providing treated roundwood and forage for livestock expansion schemes. A closer look would uncover more areas of co-operation.

64. Financing for an economically viable commercial forest plantation scheme should be available from the Caribbean Development Bank, InterAmerican Development Bank, or IBRD. With a per capita GDP of US\$228, Grenada would qualify for concessionary low rates of interest on long term loans.

65. In implementing these two recommendations, it is well to keep in mind that the forest areas and potential benefits, while important to the economy of Grenada, are still quite small relative to the forest areas and forest industries of many timbered countries. It would be easy to undertake a forestry and plantation scheme too large and expensive to be supported by the potential benefits.

66. With these considerations firmly in mind, I believe that the improvement of natural forests can be implemented by the Forestry Department with the assistance of an Associate UN Forestry Expert or a Forestry Volunteer assisted by a Ranger, a labourer and a driver. A simple ground survey covering approximately 4,000 acres would determine volume by species, size classes and stocking for each forest reserve. The inventory field work and data compilation should take 6 - 12 months. Working plans can be developed from the survey results and improvement cuttings started within a total period of two years. Subsequent management of the natural forests, according to the Working Plan, can be done by the Forestry Department. See Appendix IV for a job description for the Associate UN Forestry Expert

or Forestry Volunteer.

67. A comprehensive feasibility study must precede the Commercial Forest Plantation Project. Although an annual planting of up to 410 acres is a relatively modest undertaking, the total programme will require up to 14,350 acres when fully operational in 35 years, and it will have to be externally financed. The total project will have to be planned in detail, including cost-benefit and cash flow analyses to determine the economic feasibility, the land must be selected, acquired or reserved, an operating budget prepared and financing obtained prior to starting operations. This feasibility study and project planning will require an expert for 3 months. Assistance in securing external financing will require the expert for an additional month. See Appendix V for the job description of the Forestry Consultant.

A P P E N D I X 1

T E R M S . O F R E F E R E N C E

The consultant, Mr. Wendell P. Clark, was recruited by the United Nations Industrial Development Organisation (UNIDO) to assist the Government of Grenada as follows:

His terms of reference were:

- (a) "He shall travel to Grenada for 15 days to assist the local authorities compile the necessary data for the Industrial Project Information Form for the following three projects which will be submitted by Grenada at the Meeting to Promote Investment and Industrial Co-operation in selected wood-processing industries (i) sawmill (ii) packaging (iii) furniture.
- (b) These sheets, duly filled in, are to be submitted to UNIDO by air mail.
- (c) Write a short report (about 10 pages) on the potential for the development of the wood-processing industries in Grenada, identifying problems to be solved and suggesting possible assistance by UNIDO.

A P P E N D I X 11

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A P P E N D I X 111

PERSONS CONTACTED

- Mr. Antoine - Antoine Furniture Shop - St. George's.
- Mr. Arthur Branch - Deputy Technical Manager, Ministry of
Agriculture, Forestry & Fisheries (MOAFF)
- Mr. Charles Cayenne - Landowner - Carriacou.
- Mr. C. Charles - C. Charles Furniture Shop - Gouyave.
- Mr. Compton - Headmaster, Carriacou Schools.
- Mr. Nelson Cox - Admin. Officer, Carriacou.
- The Duncan Bros. (3) - Duncan Sawmill - Gouyave.
- Mr. Forsythe - Handicraft Education Supervisor, Grenada Schools
- Mr. Charles Francis - Land Use Officer, MOAFF
- Harrah's Furniture Shop - Grand Anse, St. George's.
- Mr. George Henry - Director, Vocational Institute, St. George's
- Mr. Carlyle Hope - Asst. Agric. Officer, MOAFF, Carriacou.
- Mr. J.W.E. Lewis - Supervisor of Forests, MOAFF.
- Mr. Vilhelm Lumholtz - Director, Agric. Marketing Bd., MOAFF

Miss Gloria Payne - Perm. Sec. Planning, Development & Education

Rev. Peters - Handicraft Development Centre, St. George's.

Mr. Redhead - Chief Protocol, MOAFF.

Mr. John D. Samuel - Permanent Secretary, MOAFF.

M. Jacques Sirvain - Physical Planning, MOAFF.

A P P E N D I X IV

JOB DESCRIPTION

POST TITLE: Associate Forestry Expert or Volunteer

DURATION: Two years

DATE REQUIRED: Assoon as possible

DUTY STATION: St. George's, Grenada, with travel
throughout the country.

DUTIES: The Expert will make an inventory of the
Government Forestlands and prepare Working
Plans for managing these timberlands.
He (or she) will report to the Supervisor of
Forests, and will be assisted by a Counter-
part Ranger, a driver and labourers as required.

QUALIFICATIONS: University degree in Forestry. Experience
in tropical forestry of the southern pine region
of the USA would be an asset, but is not essential.
The Expert must be in good health and willing to
work in dense, humid jungles, on rough terrain.

LANGUAGE: English

BACKGROUND: Natural hardwood forests cover an estimated
10,000 acres in the mountainous areas of Grenada
and Carriacou. Government Forest Reserves
occupy approximately 4,000 acres, with the balance

APPENDIX IV (Cont'd)

on private lands. Commercial timber resources in these forests have been badly degraded by hurricane "Janet" in 1955 and the traditional practice of cutting only the best trees. Choice timber has been removed from accessible areas. Sawmills and furniture shops suffer from a severe and chronic shortage of suitable timber.

No inventory has ever been made of the natural forests of Grenada. Such data is necessary to prepare Working Plans and put the forests under proper silvicultural and utilisation management. Such a survey will present volume by species, size classes and stocking.

A P P E N D I X V

JOB DESCRIPTION

POST TITLE: Forestry Consultant

DURATION: Three months, with a possible additional month at a later date.

DATE REQUIRED: As soon as possible.

DUTY STATION: St. George's, Grenada, with travel throughout the country.

DUTIES: The Consultant will work closely with the Supervisor of Forests and other key officials of the Government to study the feasibility of a commercial forest plantation programme for Grenada. The programme would involve close co-ordination and co-operation between forestry and agricultural activities at every level.

Specifically the Consultant will:

1. Determine the economic feasibility of the project utilising cost-benefit and cash flow analyses.
2. Determine land to be selected, acquired or reserved for the programme.

A P P E N D I X V (Continued)

3. Upon finding the project to be feasible:
Prepare a detailed operating plan and budget for implementing the project.

The expert should be available for one month at a later date, to assist in obtaining financing if required.

QUALIFICATIONS: University degree in Forestry. Experience with forest economics and tropical forestry is highly desirable. A broad knowledge of tropical agriculture would also be useful.

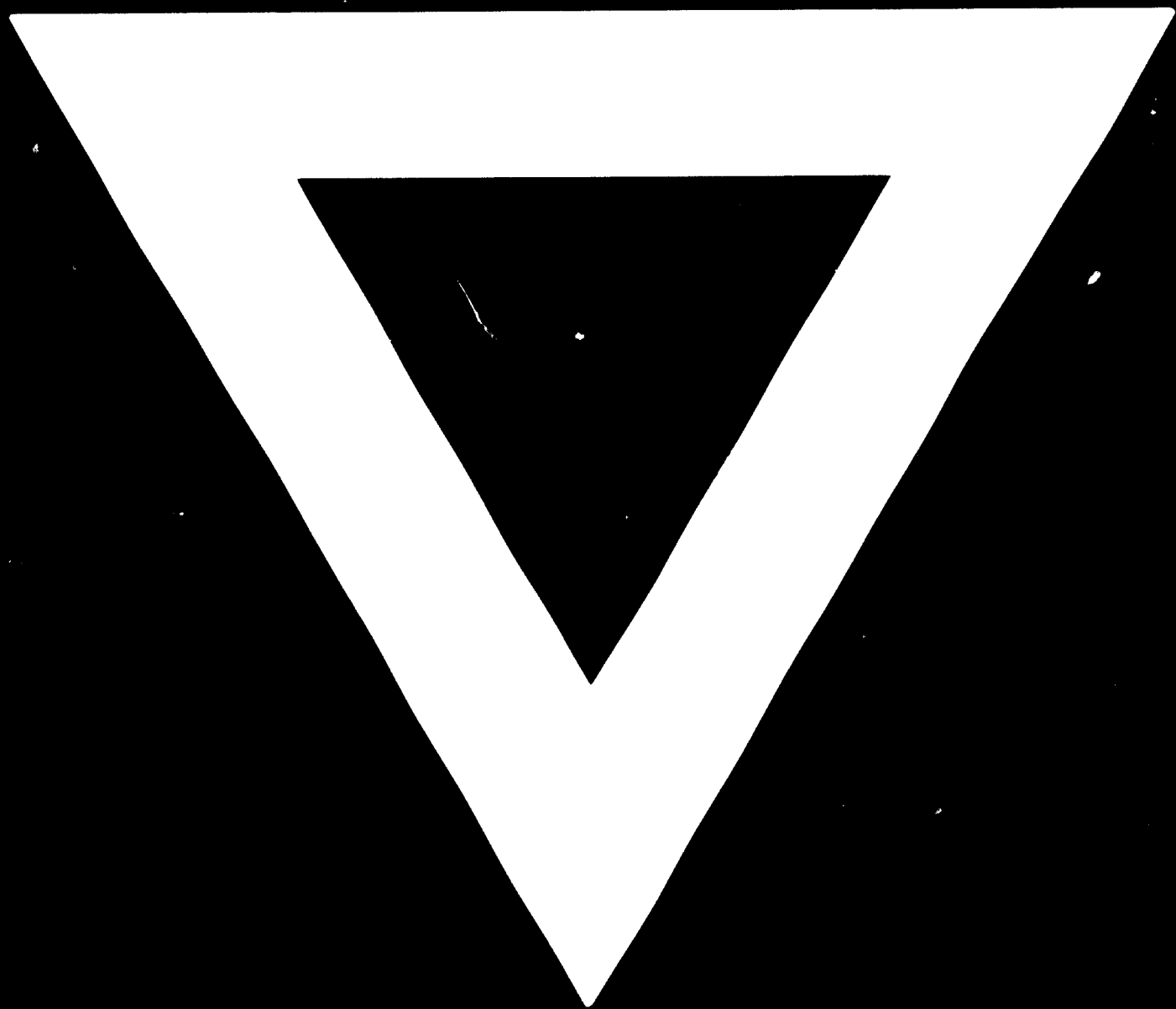
LANGUAGE: English

BACKGROUND: Natural hardwood forests cover an estimated 10,000 acres in the mountainous areas of Grenada and Carriacou. Government Forest Reserves occupy approximately 4,000 acres, with the balance on private lands. Commercial timber resources in these forests have been badly degraded by hurricane "Janet" and the traditional practice of cutting only the best trees. Choice timber has been removed from accessible areas. Sawmills and furniture shops suffer from a severe and chronic shortage of suitable timber.

Limited plantings since 1957 indicate Teak, Caribbean Pine and Blue Mahoe grow very well on Grenada. Commercial forest plantations have been recommended to increase the timber and substitute for the 3.2 million BF of sawnwood now imported.



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