GOVERNMENT OF FIJI

MINISTRY OF OVERSEAS DEVELOPMENT, LONDON

NAVUA PRE-INVESTMENT STUDY

VOLUME 1
THE DEVELOPMENT PLAN

DECEMBER 1969

HUNTING TECHNICAL SERVICES LTD.
Land Use & Agricultural Consultants,

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VOLUMES COMPRISING THE REPORT

VOLUME 1	THE DEVELOPMENT PLAN
VOLUME 2	SUPPORTING REPORT
VOLUME 2A	APPENDICES
VOLUME 3	MAPS AND DRAWINGS
ANNEXURE	HYDRO-ELECTRIC DEVELOPMENT

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VOLUME I

Introduction

The Navua plains lie between 20 and 30 miles west of Suva (Fig. 1.1). They comprise some 20,000 acres, but this acreage includes isolated hills above the 100 foot contour, which were not within the area of study. The study area totals some 18,800 acres. The area is roughly bisected on a north-south axis by the Navua river and in an east-west direction by the Queens road, which is the southern section of the main road round the island.

Against a background of an existing deficiency of rice, (imports in 1967 cost $1,550,000*), a projected rapid population increase, and a critical balance of payments situation, this pre-investment study was commissioned to examine the feasibility of developing intensive rice production in the Navua plains, where it was thought that an area of at least 12,000 acres might be suitable for the purpose.

The report is presented in three volumes. Volume I summarises the results of the investigation, describes the recommended plan and discusses the economic implications of its implementation particularly in relation to the Government proposal for a similar rice development scheme in the Rewa delta and for smaller schemes elsewhere in the country.

Volume II presents the detailed supporting data and appendices. It contains a description of the physical environment and of the present economic and social conditions in the area, sets out the assumptions and criteria on which the development plan has been based, and finally gives a detailed, programmed plan, fully costed and with a complete economic and financial analysis.

Volume III contains maps and drawings.

* $ Signifies Fijian dollars throughout the report, unless otherwise stated.

The terms of reference for the study requested an examination of the feasibility of diverting irrigation supplies from the river by gravity as an alternative to pumping. It became clear during the field surveys that, because the irrigation requirement would be very small in relation to the river discharges, a diversionary structure across the Navua river would not be justified for irrigation purposes only, but might be if hydro-electric power could also be produced.

The Ministry of Works, Communications and Tourism then requested a broad examination of the potential for hydro-electric development down stream of the Navua gorge. The report is presented in a separate cover as an Annexure to the Main Report.

LOCATION MAP

FIJI

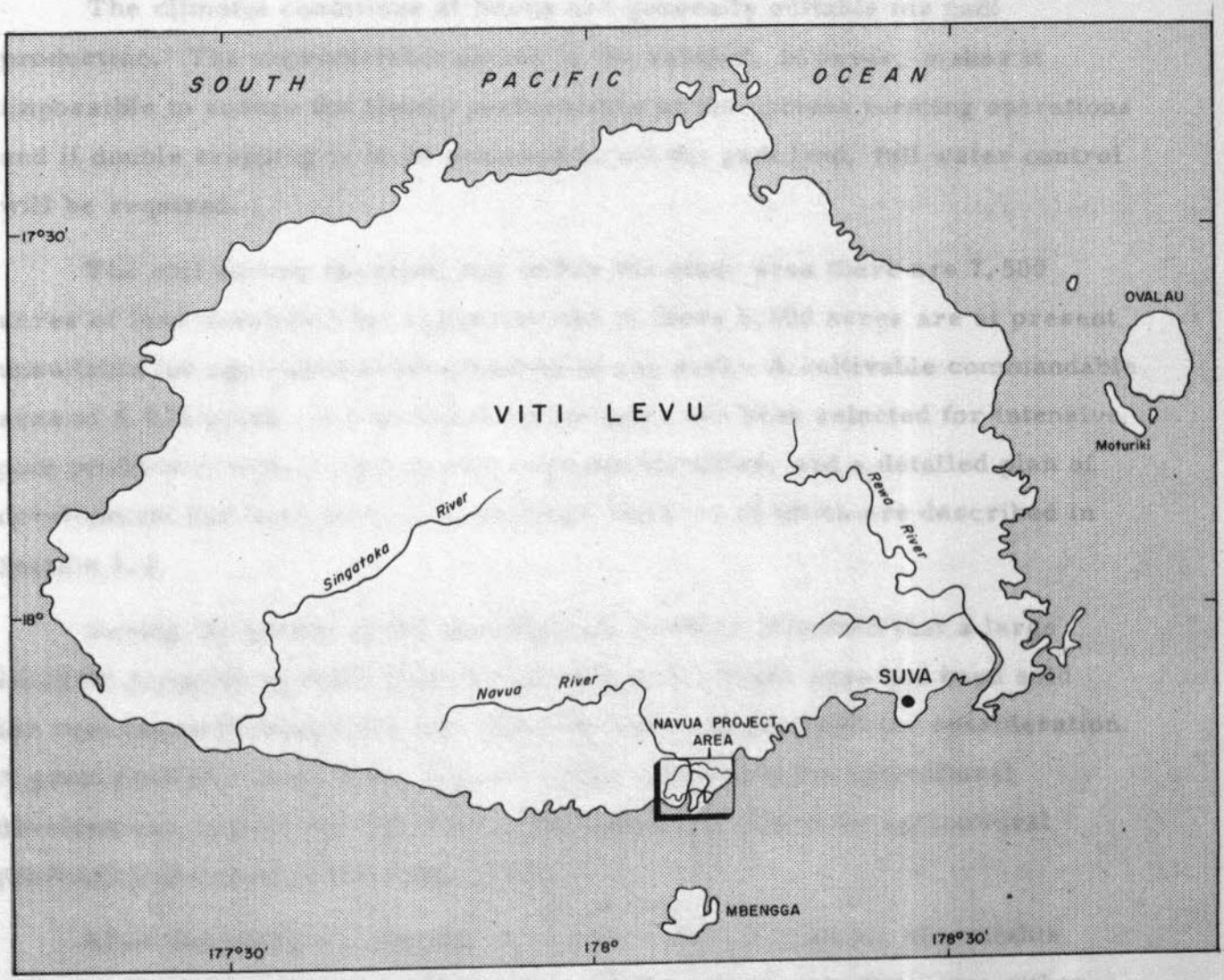


FIGURE 11

LOCATION MAP

FIJI

CHAPTER I

THE DEVELOPMENT PLAN

1.1. General

The climatic conditions at Navua are generally suitable for padi production. The unpredictable nature of the rainfall, however, makes it impossible to ensure the timely performance of the various farming operations and if double cropping is to be achieved on all the padi land, full water control will be required.

The soil survey revealed that within the study area there are 7,500 acres of land unsuitable for irrigation and of these 6,500 acres are at present unsuitable for agricultural development of any sort. A cultivable commandable area of 5,016 acres, in four separate parcels, has been selected for intensive padi production with irrigation and drainage facilities, and a detailed plan of development has been prepared, the main features of which are described in Section 1.2.

During the period of the investigation we were informed that a large freehold property (2,800 acres) in the west of the study area had been sold for real estate development, and this land has been excluded for consideration. A great part of it is in Class V and VI land, unsuitable for agricultural development, and its exclusion does not materially affect the agricultural production potential of the study area.

After deducting the proposed padi areas and excising the unavailable and unsuitable land, some 6,000 acres remain. At present these are either open grasslands of differing qualities or are tree and scrub of varying densities. Most of the grassland is now devoted to dairy farming, the main operator being the Fiji Pastoral Company, which accounts for three quarters of the milk and more than half the meat produced from the area. The environmental conditions at Navua are particularly congenial to growth of grassland and suggest an impressive potential for a greatly expanded dairy

CHAPTER 1

THE DEVELOPMENT PLAN

1.1. General

farming industry with opportunities for both smallholder and the Company to participate fruitfully in a co-operative development enterprise. Since the main object of the study was to assess the prospects for growing padi, the potential for dairying was not examined in depth. It is evident that two important prerequisites for success must be the rationalisation of milk processing and marketing and the training of future smallholder dairy farmers in the basic art of animal husbandry. It is recommended, that the prospects for establishing a dairy industry be examined in detail by two specialists, one in processing and marketing, the other in smallholder dairying. If the market outlook is good it is recommended that an experimental and training centre be established and that development proceed through a pilot project.

The saline, mangrove areas have high sulphate contents throughout their soil profiles, associated with low pH values. Their agricultural potential is problematic, even if reclamation from the sea and leaching of the salts is carried out. These swamps, however, are the natural habitat of tidal prawns; it is therefore recommended that the Fisheries Department should investigate the potential of these areas and, if the results are promising, develop the industry through a pilot project.

The coastal sands and the better drained soils of the Rewa and Tamanua series may be suitable for the production of vegetables and fruit respectively; these are crops that could well become of increasing importance if Navua develops as a tourist resort. Such development would also create a demand for fresh milk, meat and eggs, all of which could be satisfactorily produced in the prevailing environment.

Drawing 1 shows the locations of these general development proposals and of the padi project which is described below in general terms and in detail in Volume II, Chapters 6 - 11.

As explained in the introduction to this volume, the Ministry of Works, Communications and Tourism requested a broad examination of the potential for hydro-electric development downstream of the Navua gorge. This request was made in July 1969, and was not part of our original Terms of Reference. Our findings have been reported in an Annexure to the Main Report.

Two sites were examined, one just downstream of Waiyanitu, where a 70 foot high dam with a separate spillway could be constructed, and the other near the Vakabalea road where a barrage could be constructed. Table 1.1. gives the major features of the alternative schemes.

TABLE 1.1. Major Features of Alternative Hydro-electric Schemes

	Upper Site, no bedrock	Lower Site assuming bedrock	Lower Site assuming no bedrock
Installed capacity	13MW	6MW	6MW
Capital cost ($ million)	8.6	4.1	5.4;
Annual Output	60.1GWh	34.6GWh	34.6GWh
Cost per unit (cents):-			
first 20 years	1.46	1.27	1.69
year 21 - 35	0.12	0.16	0.16
year 36 - 70	0.10	0.12	0.12

The above costs for a unit generated are at the power station and they compare very favourably with the current and equivalent cost of diesel generation in Fiji of 2.14 cents. For the first 20 years amortisation of capital at 7 per cent has been assumed and a sinking fund for replacing machinery, over and above the normal operating and maintenance costs. In year 35 the machinery is replaced and year 70 is assumed to be the end of the scheme's life.

The low-head hydro-electric development could be a feasible proposition consistent with the Island's requirements. The hydrological data are adequate to predict the performance with confidence. The foundation conditions are not known; at the lower site it is considered that there is a better chance of finding bedrock whereas at the upper site bedrock could be at a great depth. Permeable foundations have therefore been assumed for the upper site.

If suitable bedrock is found at the lower site, this would probably offer the more viable alternative, but, if the foundation conditions are unsuitable, then the upper site would probably prove the more satisfactory. The upper site has the advantage of improving navigation through the gorge up to Namuamua. This would be of benefit to the hinterland and could facilitate the future investigation and construction of second stage hydro-electric development at the upper end of the gorge. Upstream development would probably result in regulated flow, thus increasing the output of any development below the gorge.

One of the main advantages of hydro-electric development downstream of the Navua gorge is that the sites are readily accessible and thus capable of early investigation and implementation. It is recommended, therefore, that a detailed appraisal, supported by geological surveys, be made at these sites. The detailed appraisal should also include a broad survey of the potential upstream.

1.2. The Padı Project

The location of the proposed padi project is shown on Drawing 1. It is composed of the following four separate and independent pumping schemes:-

Central	935 acres
Western	1566 acres
Eastern	2085 acres
Northern	430 acres
	5016

Out of this 5016 acres, 95 per cent (4765 acres) is available for settlement, the remainder being taken up with canals, drains and roads. Two-thirds of the acreage is composed of gley soils of the Navua, Tokotoko, Toguru and Naitonitoni series, which are considered to be pre-eminently suited to padi production, and which would be difficult and expensive to develop for other crops. Most of the remainder lies on the Tamanua series. If irrigation is provided it is considered that this series will produce padi yields as high as the gley soils.

It is recommended that the basic cropping pattern should be two crops of padi per year. Each farm should be provided with sufficient additional land to allow for a house, garden and small fodder plot, intensively managed, which with the addition of padi straw, should compensate for the loss of the fallow grazing obtained under the present extensive methods of land use.

The minimum size of holding required to provide the target family income ($800) is six acres, of which five would be used for padi. It is recommended that a six acre unit be established as the "basic" unit, and families farming six acres or less at present should be allocated one basic unit. However, the criterion has been adopted that all existing operators in the area should have an opportunity to benefit from the project, and should be given an irrigated holding capable of producing at least the income now being obtained. Thus the lay-out has been designed so that an irrigated unit may vary in size from 6 - 12 acres. Above 12 acres a new farm supply point is provided. This flexibility in farm size will also make it much easier to lay out the holdings with minimum waste of land.

1.2.1. Engineering works

The irrigation works are designed to distribute water supplies as and when required for both land preparation and crop growth. The system provides for the calculated peak requirements based on the 1 in 5 year low rainfall occurrence. The requirements of each scheme will be met by pumping from the Navua river into a system of major canals; these will convey and distribute water to the lateral canals from which farmers will abstract their requirements on a time basis, according to the size of their holdings.

Each scheme will have its own pump station, canal system and structures. It is recommended that Ornel-type floodlifter pumps be installed. These have already been used satisfactorily in Fiji. A total length of 11.6 miles of major canals and 45.9 miles of lateral canals will be required. The design duty at turn-out is

70 acres (CCA) per cusec, requiring a total discharge at pump stations of 88.6 cusecs, equivalent to 56.4 acres (CCA) per cusec.

During an average rainfall year it is estimated that the irrigation system will be in operation for 46 per cent of the time and that during this period it will work at an average of 50 per cent of the canal full supply capacity. This rate of utilisation, which appears high considering the rainfall, takes account of the fact that farmers will escape storm water readily to the drainage system if they know that they can replenish their fields with canal water.

The surface drainage system is designed to remove excess storm water and to maintain the padi fields in a dry condition prior to harvesting and in the period before land preparation. The capacity of the system is based on the 1 in 5 year high rainfall occurrence. The works comprise the drainage channels and their associated structures. Disposal is to the sea, the Navua river or to creeks and streams. The outfall structures for drains discharging into the sea or tidal reaches of the Navua are provided with flap gates. The mangrove swamps upstream will act as storage reservoirs when the downstream levels close the outfall gates. Although essentially concerned with the padi areas the drainage system is designed to cope with the disposal of run-off from adjoining hill, urban or pasture areas, which drain into the padi areas.

A total length of 26.2 miles of main drains and 19.4 miles of collector drains will be required. The design drainage duty for the padi areas is 13.2 acres (CCA) per cusec.

Few specific flood control measures can be recommended at this stage, because insufficient data are available on the behaviour of the Navua river (particularly under tidal influence) to predict the occurrence of floods with any confidence. However it is considered that the flood protection afforded by drainage

outfalls and by canal embankments, together with two minor works, one on the Wainikavika and the other at Naitata, should provide a large measure of protection against the 1 in 5 year flood. Provision is made in the maintenance costs for emergency measures should these prove necessary.

The existing 15 miles of roads in the project area will have to be extended to a total of 56 miles to provide access for every holding. The new roads will generally run alongside canals on the higher ground and will form part of the canal embankment. Where traffic density is expected to be low grassbound roads have been assumed, but elsewhere provision has been made for metalling.

The engineering works include initial scrub clearance and land levelling to within 3 inches above or below the final field level. Some 460 acres of land needs clearance and about 250,000 cu. yds. of earth must be moved to effect the levelling.

Buildings include a project office, stores, processing and milling installation and housing for some of the staff.

The main project engineering statistics are shown in Table 1.2.

1.2.2. Agriculture

The farming plan has been framed within a background of a rapidly rising population in a country where there is already pressure on available cultivable land and where supplies of readily available new land are limited. The aim of the study therefore, has been maximum production per acre and minimum holding size to enable as many families as possible to obtain holdings. The pattern of labour availability and requirements has been examined in detail, and it is concluded that an average family will be able to work the proposed basic unit without the

TABLE 1.2. Navua Rice Scheme - Project Statistics

AREAS					
Acres CCA	Eastern 2085	Central 935	Western 1566	Northern 430	Total 5016
IRRIGATION					
- Design duty at turn-out ..... 70 acres (CCA) per cusec					
	E	C	W	N	Total
Discharge at pump stations					
- cusecs	35.3	17.6	28.4	7.3	88.6
- acres/cusec	59.6	53.0	55.0	59.4	56.4
Length of canals (miles)					
- major	5.0	2.0	4.4	0.2	11.6
- laterals	19.6	7.3	13.5	5.5	45.9
- Total	24.6	9.3	17.9	5.7	57.5
DRAINAGE					
- Design duty for rice areas ... 13.2 acres (CCA) per cusec					
	E	C	W	N	Total
Length of drains (miles)					
- main	11.3	3.0	8.3	3.6	26.2
- collector	8.7	4.3	4.9	1.5	19.4
- Total	20.0	7.3	13.2	5.1	45.6
ROADS	E	C	W	N	Total
Length of roads (miles)					
- project	14.5	7.0	14.7	4.7	40.9
- existing	7.8	2.7	2.7	1.7	14.9
- Total	22.3	9.7	17.4	6.4	55.8
LAND CLEARANCE (acres)	101	234	119	12	466
LAND LEVELLING (cu. yds.)	93,700	41,130	76,410	39,570	250,810

use of expensive farm machinery. However, there are not enough oxen for timely cultivation of all the land. Provision therefore has been made for one-sixth of the cultivated land to be prepared by tractors, and for the import of improved animal drawn implements, which will increase the output of working oxen. Peak activity on the farms will be in the winter, when the main crop is being harvested and the off season crop land prepared. If a high off-season intensity is to be achieved it will be necessary either to speed up harvesting and threshing operations or land preparation. We recommend that a major effort be devoted to the former because:-

(a) First priority should be the safe securing of the standing crop.

(b) The unpredictable weather makes it imperative to take full advantage of any fine days.

(c) It is throught that there are a number of simple and relatively cheap pieces of equipment which can adequately meet the requirements.

At present there are insufficient performance data in Fiji to justify the importation of combine harvesters. It is not considered that the expenditure of foreign exchange on their import, or on the import of large numbers of agricultural tractors, is yet necessary.

If the reliance on working oxen as the continued principal source of farm power is to succeed, the animals must not only draw better implements, but also be properly fed. Further this must be done on the smallest possible acreage of land if padi production is not to be seriously reduced. Padi straw is an acceptable fodder for a large part of the rations of working oxen. Combined with some fresh para grass and, during periods of peak work, with rice bran, (which will be available from the mill), it can provide a complete balanced ration for the oxen.

This proposed method of feeding oxen is new to the farmers at Navua. Its adoption is an important concept and fundamental to the success of the project, and should be an important subject in the early advisory and extension programme.

The farming plan postulates full and efficient use of modern techniques and material inputs such as good quality, pure seed of approved varieties, fertilisers and insecticides. It assumes that research and experiment will continue and that improvements will evolve and be introduced regularly and rapidly. On these assumptions a rapid build-up of intensity and yield can be achieved. We have taken an average yield of just over 3 tons per acre per annum seven years after settlement as being realistic.

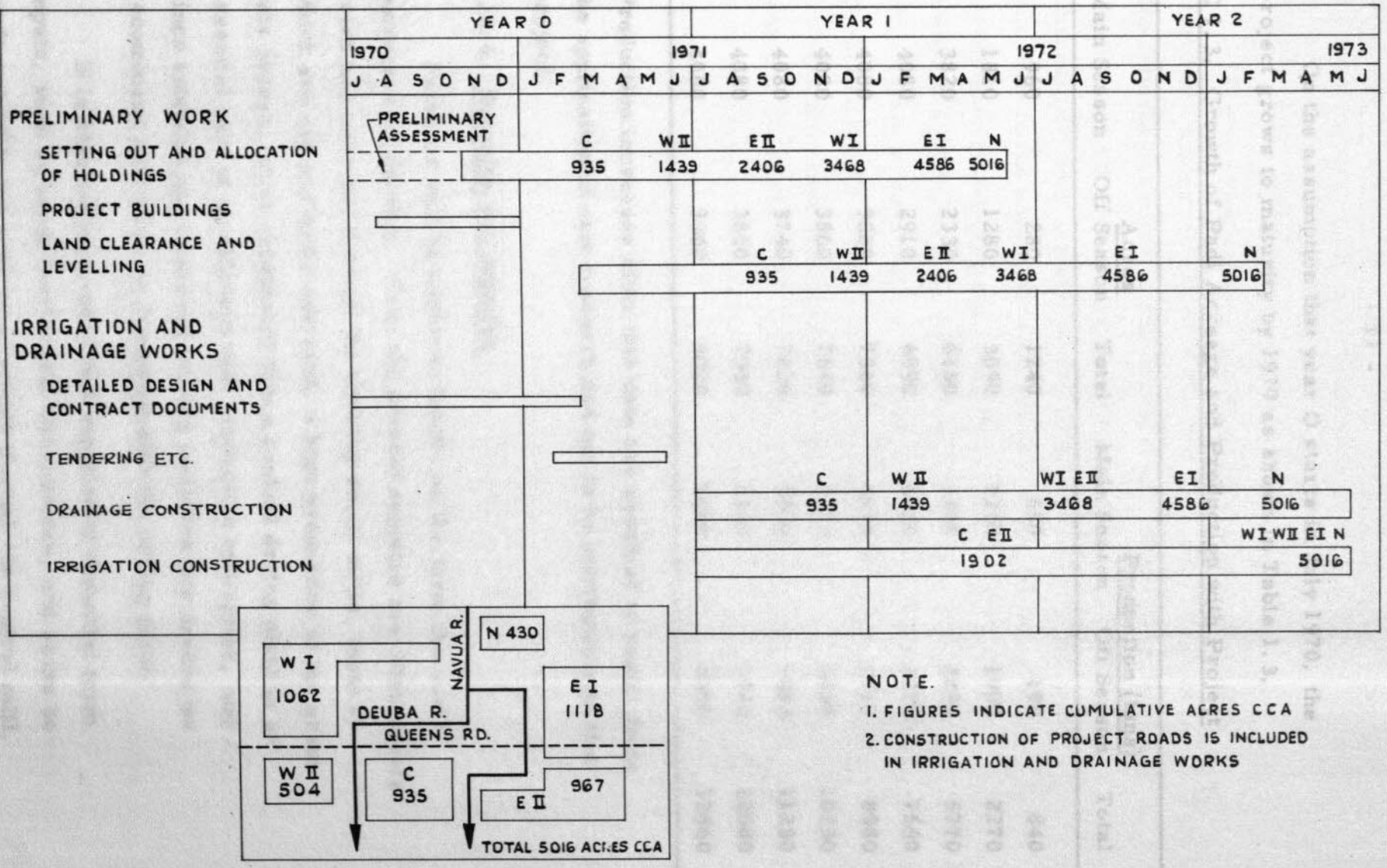
1.2.3. The programme of construction and development

The recommended construction programme is shown in Figure 1.2. Year O is assumed to start from the time of agreement to proceed, and from this date the programme will take three years to complete.

We have assumed that year O starts on 1st July 1970, and the preliminary work and construction schedules are phased so that schemes are progressively provided with the necessary facilities for padi cultivation.

Settlement in each scheme has been planned to follow closely on land clearance, in order to prevent regeneration of undesirable vegetation. This early settlement may result in adverse effects and a lower production from the first crop, and this has been allowed for in the build up of yields and intensities.

CONSTRUCTION PROGRAMME

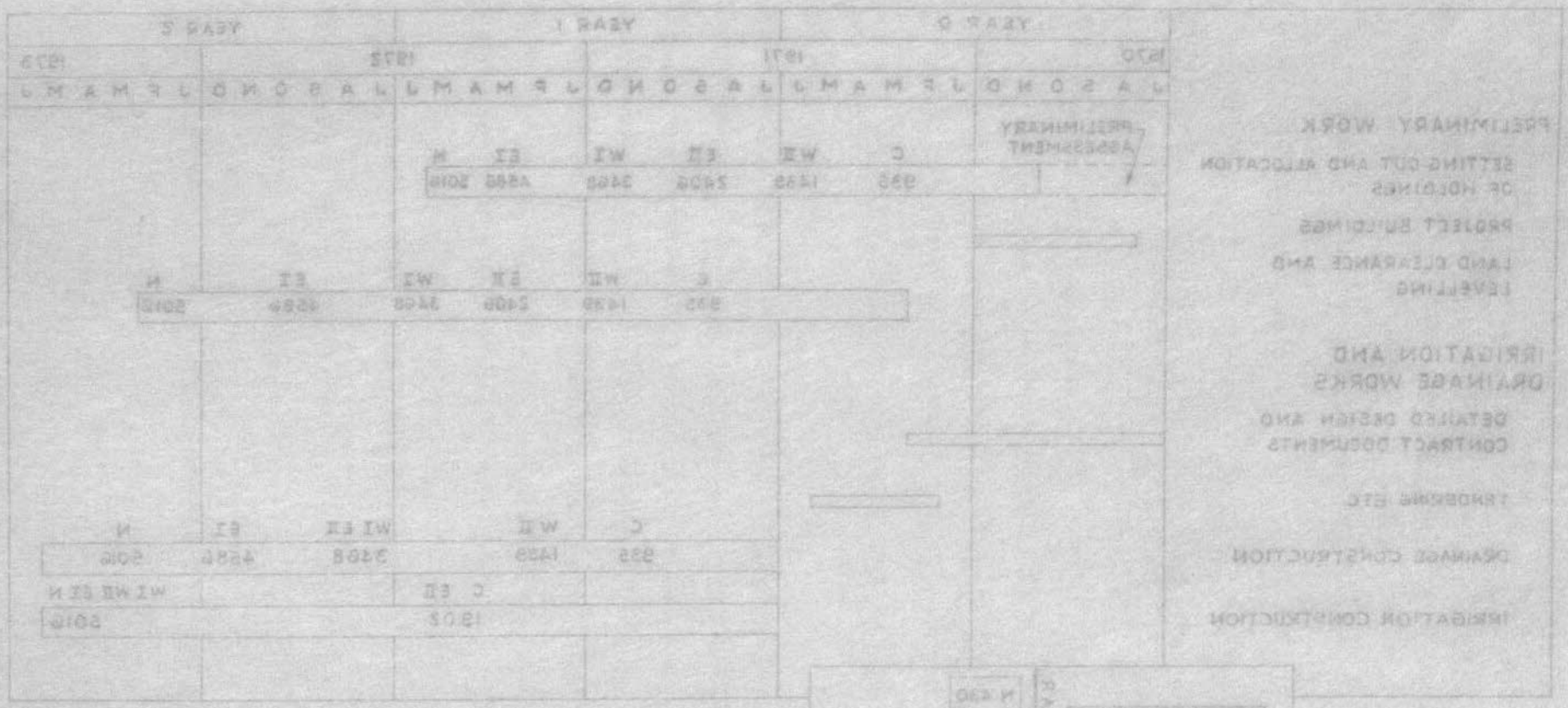


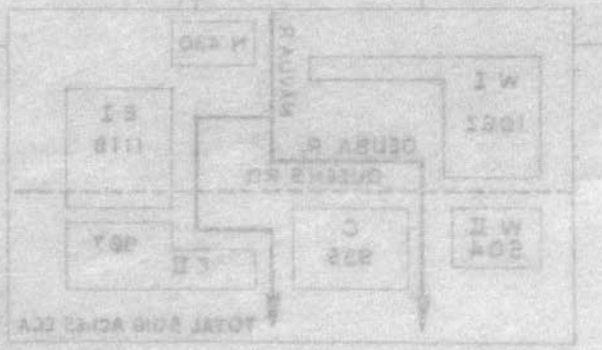
NOTE.

1. FIGURES INDICATE CUMULATIVE ACRES CCA
2. CONSTRUCTION OF PROJECT ROADS IS INCLUDED IN IRRIGATION AND DRAINAGE WORKS

Figure 1·2

CONSTRUCTION PROGRAMME





NOTE

1. FIGURES INDICATE CUMULATIVE AREAS CCA
2. CONSTRUCTION OF PROJECT ROADS IS INCLUDED IN IRRIGATION AND DRAINAGE WORKS

On the assumption that year O starts in July 1970, the project grows to maturity by 1979 as shown in Table 1.3.

TABLE 1.3. Growth of Padi Acreage and Production with Project

	Acres			Production (tons)		
	Main Season	Off Season	Total	Main Season	Off Season	Total
1971	960	280	1240	650	190	840
1972	1810	1280	3090	1270	1000	2270
1973	3820	2330	6150	3480	2290	5770
1974	4080	2910	6990	4320	3270	7590
1975	4080	3280	7360	4870	4110	8980
1976	4080	3560	7640	5370	4860	10230
1977	4080	3740	7820	5800	5480	11280
1978	4080	3860	7940	6140	5940	12080
1979	4080	3940	8020	6480	6380	12860

Production increases after this date are assumed to result from the application of new research and not to be attributable to the project.

1.2.4. Services and supplies

Farmers will be unable to handle on the farm the vastly increased production. Even the present supplies are often poorly dried and when put through the existing small mills, most of which are old and badly operated, a high proportion of the grain gets broken. It is considered that a central drying plant is an essential part of an efficient padi production enterprise, and since extended and improved milling facilities are needed we recommend that these be combined with the drying plant.

It is also recommended that supplies of essential farm inputs, such as seed, fertilisers, insecticides, and sacks be made available for cash or on credit through the central mill.

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	Acreage			Production (tons)		
	Main Season	Off Season	Total	Main Season	Off Season	Total
1971	960	280	1240	650	190	840
1972	1810	1280	3090	1270	1000	2270
1973	1850	2330	4180	3450	2290	5740
1974	4080	2910	6990	4320	3270	7590
1975	4080	3280	7360	4970	4110	8980
1976	4080	3560	7640	5320	4680	10236
1977	4080	3740	7820	5800	5340	11240
1978	4080	3860	7940	6140	5940	12080
1979	4080	3940	8020	6480	6380	12860

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It is also recommended that supplies of essential farm inputs, such as seed, fertilizers, insecticides, and sacks be made available for cash or on credit through the central mill.

1.2.5. Land tenure

The complex existing land tenure position is discussed in detail in Chapter 10. Most of the land is freehold, except in the Central Area where it is Native Land. There is little Crown Land. It is considered that the project can be operated successfully only if a Management Authority is created which would be in the equivalent of a landlord-tenant relationship with participating farmers irrespective of the de facto land ownership position. The simple way is for the management to acquire actual ownership of the land, but this may not always be possible, and an alternative proposal has been made, aimed at safeguarding existing ownership rights, guaranteeing owners a share in the fruits of development and at the same time ensuring that the project management does in fact control the project operation.

1.2.6. Project management

The recommended project management organisation is shown in Figure 1.3. The functions of the various sections are discussed in detail in Chapter 11. The organisation should be established as early as possible. After the project has reached maturity and is seen to be operating successfully, many of the functions might well revert to the appropriate Government Departments.

1.3. The Development Authority for Navua

To ensure that the development suggested in Section 1.1. and the project outlined in Section 1.2. are carried out successfully and in a balanced manner it is recommended that the whole of the study area be proclaimed a "Development Area" under the Land Development Ordinance, and that an Authority be established with full responsibility for carrying out overall development. It is suggested that the Chairman of the Authority be a Representative of the Ministry of

Natural Resources and that the following interested organisations or groups provide members.

Representatives of:

The Treasury
Department of Agriculture
Public Works Department
Survey Department
Department of Commerce & Industry
Co-operatives Department
Fiji Development Bank
Fiji Pastoral Company
The Navua Farming Community (1 or 2)

The first task of the Authority would be to establish the Project Management Organisation for the Padi Project, which would be responsible to the Authority for the implementation of that Project. The Authority would be responsible for decisions regarding the planning of enterprises in the remainder of the area and for phasing further investigations and development projects.

CHAPTER 2

ECONOMIC AND FINANCIAL ANALYSIS

2.1. Project Returns

One of the primary objectives of this study is to substitute locally grown rice for the imported article. Prospective producer prices for padi in Fiji have therefore been related to prices for imported rice from elsewhere in the region. Although conditions of uncertainty must prevail in regard to future rice production and prices outside Fiji, the available evidence suggests that producer prices for padi in Fiji are likely to follow the indicated falling trend for the last two years. The levels to which producer prices may fall must be a matter for conjecture.

In order to establish the range of prices for local grown padi four assumptions have been made in relation to future production conditions in Fiji and to external rice prices. These are first that Fiji will not produce an exportable surplus and that the c. i. f. price for rice will remain at about $160 per ton. Secondly that in the same production situation the c. i. f. price will fall to about $120 per ton. Third, that an exportable surplus will be produced and command an f. o. b. price of $130 per ton by 1980. Fourth, that such an exportable surplus would command an f. o. b. price of $100 per ton.

Necessary allowances have been made for outturn (56 per cent), processing costs ($12 per ton of padi), transport and handling charges ($2 per ton) and a margin between the mill and wholesale warehouse ($10 per ton). As a consequence the following farm gate prices for padi will prevail. In the first situation the price between 1970 and 1980 will remain at $80 per ton; in the second, the price will fall from $80 per ton to $56 per ton in the same period; in the third situation the price will fall from $80 per ton to $68; and in the fourth the fall will be from $80 per ton to $44.

On the above basis the gross value of padi production from Navua is as shown in Table 2.1 (and allowing for variable crop production costs):

TABLE 2.1. Gross value of Navua padi production triennially ($)

Year	With Project tons/padi	Without Project tons/padi	Increment from Project tons/padi	Assumed Price Levels per ton $80	$80-$56	$80-$68	$80-$44
1971	836	836	-	-	-	-	-
1974	7,589	836	6,755	503,099	435,569	476,087	408,556
1977	11,274	836	10,438	777,631	589,747	694,127	516,681
1980	12,866	836	12,030	896,235	607,515	751,875	463,155

An additional value has been placed upon the produce resulting from the cultivation of the homestead garden as a result of development. This value rises from $65,000 in 1971 to $87,000 in 1980, an increment of $22,000 to the project following its implementation. This increment is directly and progressively reflected in the values set out in Table 2.1.

On Farm costs have been calculated in order to determine the nett value of production from the project (Table 2.2).

TABLE 2.2. On Farm Costs triennially ($)

Year	With Project (acres)	Without Project (acres)	Increase in Project (acres)	Non-variable and fixed farm costs @ $28.10 per acre
1971	1,246	1,246	-	-
1974	6,995	1,246	5,749	161,547
1977	7,830	1,246	6,584	185,010
1980	8,019	1,246	6,773	190,321

2.2. Project Costs

The programme of development which has been subjected to analysis assumes a phased capital implementation period of four years from 1970 to 1973. These costs from $60,230 in 1970 to $201,880 in 1971. They rise again in 1972 to $951,500 falling to $347,370 in 1973.

Of the total capital cost of the scheme of $1, 560, 980 the foreign exchange component is $881, 970.

Subsequently capital replacement costs are incurred amounting to $114, 590 in the year 1980 and again in 1988; $186, 820 in 1992 falling to $114, 590 in 1996 and the year 2000.

Recurrent capital costs have been calculated to rise from $8, 910 in the year 1970 to a maximum of $124, 190 in 1974, falling thereafter to a constant figure of $79, 475 by 1981.

Table 2. 3. indicates the important years in which the capital and recurrent costs are incurred:

TABLE 2. 3. Navua Capital Recurrent and Replacement Costs ($)

	Initial & Replacement	Recurrent	Total
1970	60, 230	8, 910	69, 140
1971	201, 880	24, 400	226, 280
1972	951, 500	86, 090	1, 037, 590
1973	347, 370	124, 190	471, 560
1980	114, 590	89, 430	240, 020
1988	114, 590	79, 475	194, 070
1992	186, 820	79, 475	266, 295
1996	114, 590	79, 475	194, 070

Working capital requirements for the scheme comprise consumption credit and inputs. Although these rise to a total of $ 347, 300 in the year 1973 provision has been made for the repayment of all working capital within the analysis period of the year 2009.

2. 3. Internal Rate of Return

By computing the present value of projected future production over the project life and the present value of costs during the same period the Internal Rate of Return has been calculated (Figure 2. 1).

NAVUA INTERNAL RATES OF RETURN UNDER DIFFERENT PRICE ASSUMPTIONS

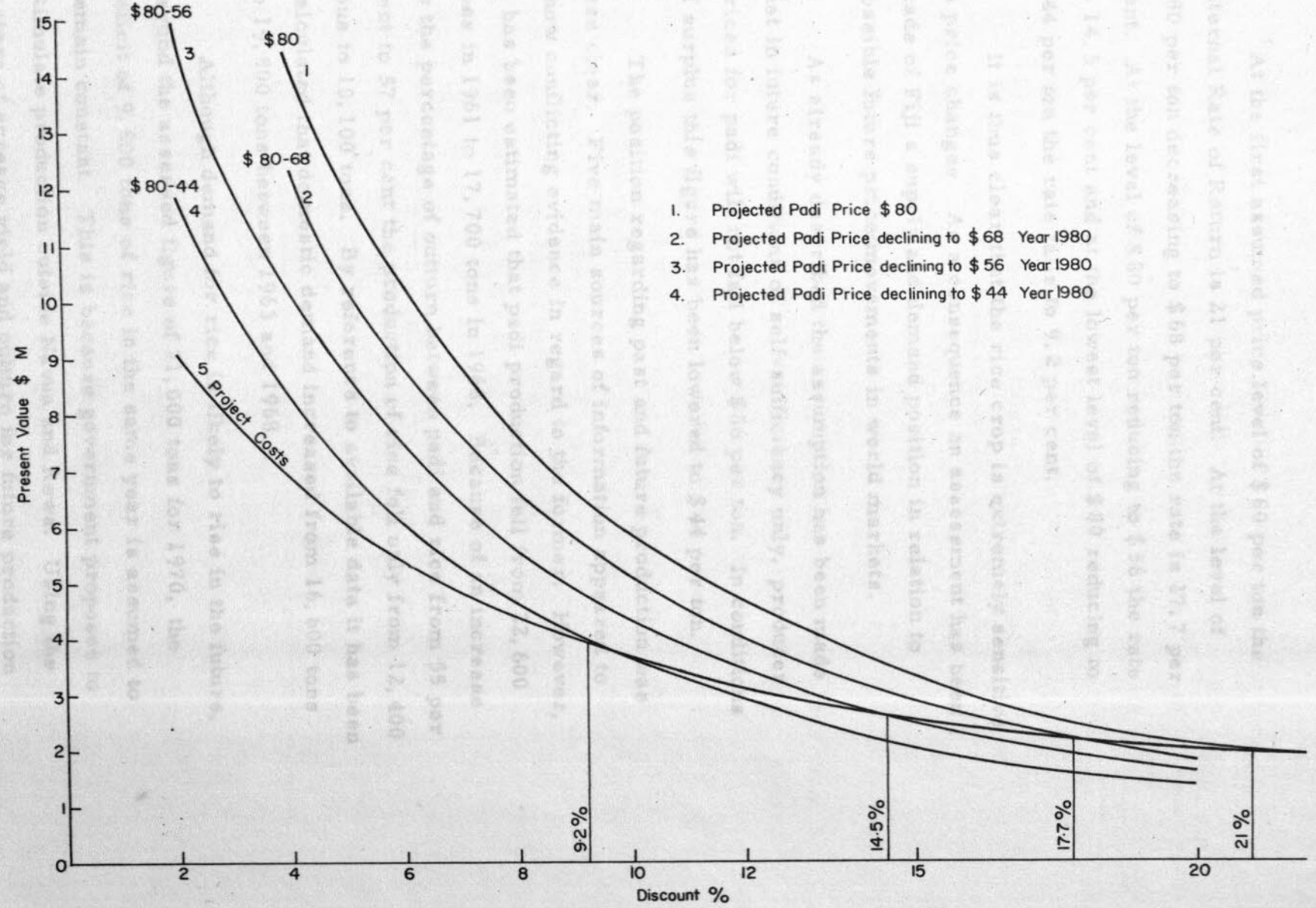
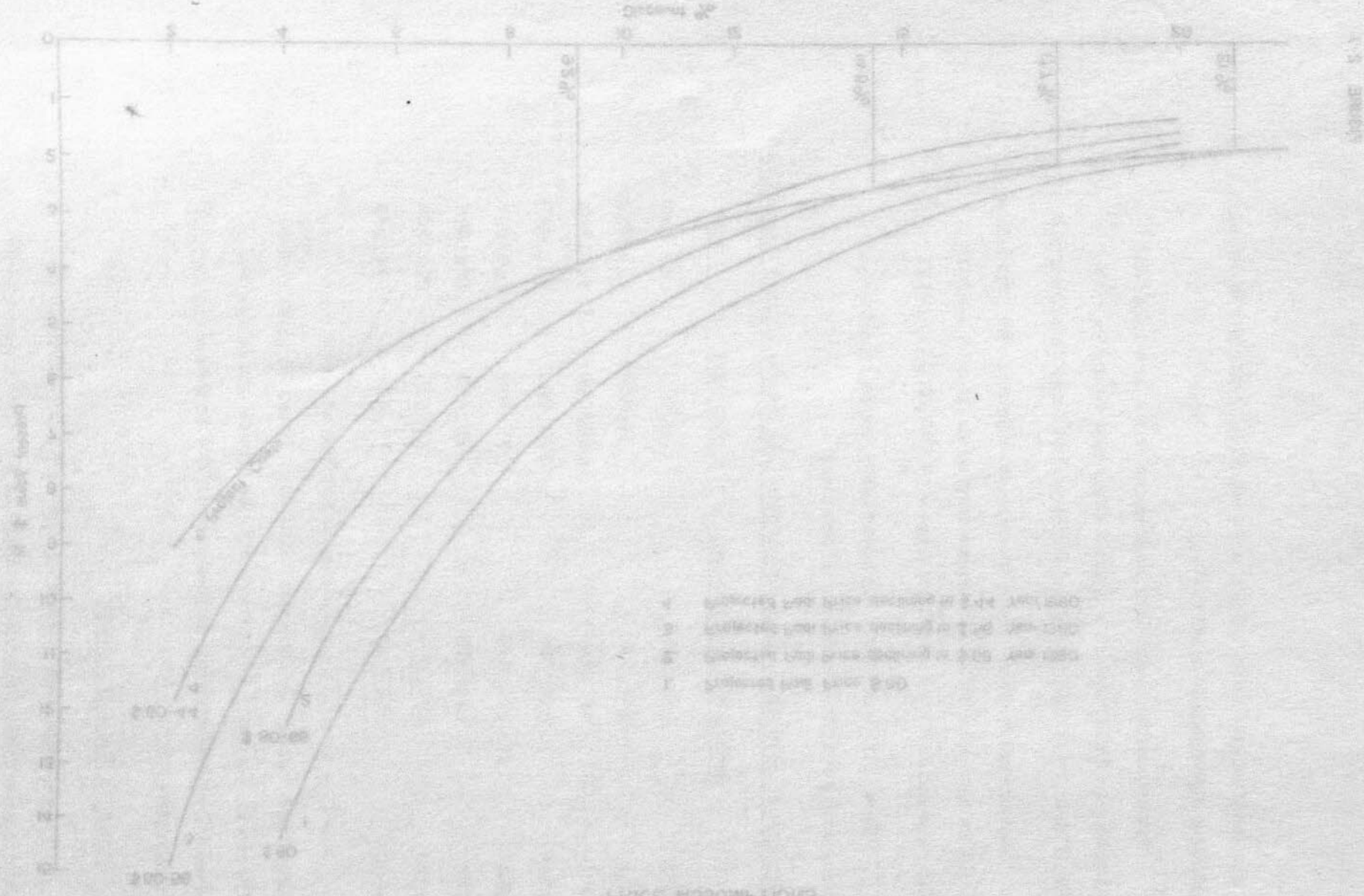


FIGURE 2·1



At the first assumed price level of $80 per ton the Internal Rate of Return is 21 per cent. At the level of $80 per ton decreasing to $68 per ton the rate is 17.7 per cent. At the level of $80 per ton reducing to $56 the rate is 14.5 per cent and at the lowest level of $80 reducing to $44 per ton the rate falls to 9.2 per cent.

It is thus clear that the rice crop is extremely sensitive to price changes. As a consequence an assessment has been made of Fiji's supply and demand position in relation to possible future price movements in world markets.

As already described the assumption has been made that in future conditions of self-sufficiency only, producer prices for padi will not fall below $56 per ton. In conditions of surplus this figure has been lowered to $44 per ton.

The position regarding past and future production was less clear. Five main sources of information appeared to show conflicting evidence in regard to the former. However, it has been estimated that padi production fell from 22,600 tons in 1961 to 17,700 tons in 1968. Because of an increase in the percentage of outturn between padi and rice from 55 per cent to 57 per cent the production of rice fell only from 12,400 tons to 10,100 tons. By reference to available data it has been calculated that domestic demand increased from 16,600 tons to 19,500 tons between 1963 and 1968.

Although demand for rice is likely to rise in the future, beyond the assessed figure of 21,000 tons for 1970, the deficit of 9,600 tons of rice in the same year is assumed to remain constant. This is because government proposes to stimulate production outside Navua and Rewa. Using the factors of acreage yield and outturn for future production

at Navua it is considered that the scheme can supply 7710 tons of this deficit by 1979. The part to be played by both Navua and Rewa therefore becomes very significant in the field of government decision, if rice production from either or both schemes is to remain viable. In the light of known objectives, of which early substitution of the imported rice element by local production is important, it is recommended that development should commence at least in the Central Area of Navua without delay.

2.4. Financial Analysis

An objective for development of Navua has been the provision of a net farm income of $800 per year. Calculation of costs, yields and prices have shown that in the most favourable conditions of future price, this can be achieved from a holding of six acres. If, in conditions of national surplus the producer price fell to $56 per ton for padi this target would not be achieved. By increasing the holding size to 7 acres a net farm income of $725 could be achieved but decision would be required on the desirability of levying full loan repayment charges.