THE REPUBLIC OF KENYA

NATIONAL IRRIGATION BOARD

BURA IRRIGATION SETTLEMENT PROJECT

BURA WEST PHASE I

AN ECONOMIC REVIEW - 1981

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September, 1981.

C O N T E N T S

The fall of the shilling from KSh.8.00 to KSh.10.40 to dollar means that the value of the cotton lint increases in Kenya shillings and, whilst the cost of inputs increases as a result of devaluation, the net benefit to the project increases. The average price of seed cotton should therefore rise from KSh.3.415 per kg to KSh.4.68 merely as a result of devaluation. Assuming that the land and water charges are doubled as a result of this increase in cotton price the tenants' net income would rise to KSh.8126 in year 10 and NIB's annual deficit would reduce to KSh.15 million from 1985 to 1989 and to KSh.7.5 million thereafter. These results are summarised in Table 1 Column 2.

However the present price fixed by the government for seed cotton is for BPA varieties. It is proposed to grow acala type varieties at Bura and these varieties sell for slightly lower prices on the world market but, the amount of lint per kg of seed cotton is about 19% more so that the value of the seed cotton is considerably more than the value of BPA varieties, (the lint out-turn of acala varieties is 38% compared with 32% for BPA varieties, therefore each kg of acala yields 18.75%, (0.38/0.32) more than BPA seed cotton). Because of this higher lint outturn the price of acala type seed cotton may be increased from KSh.4.68 to KSh.5.28, i.e. by 13% approximately. Increasing the price paid to the tenants enables the land and water charges to be increased even further, and if these charges are raised by a further KSh.3000/- per year at year 10 the tenants will still have a net income of about KSh.8000 per year and the Board will break even.

Table 1 - Effects of cotton prices and land and water charges on tenant incomes and NIB deficit

		Column 1	Column 2	Column 3
Rate of exchange used US $1.00	KSh	8.0	10.4	10.4
Average price for cotton seed/kg	KSh	3.415	4.68	5.28
Water charges per tenant per year (year 10)	KSh	3640	7280	10280
Tenant's net income (including market value of food) Year 10	KSh	7023	8126	8000
NIB annual deficit 1985-1989	KSh million	20	15	NIL
NIB annual deficit 1990	"	14	7.5	NIL

CONCLUSIONS

Since the last economic review in 1979, the overall economics of the Project (West, Phase I) have remained fairly constant, yielding a 7¾% internal rate of return for the most realistic set of assumptions. Higher capital costs and some slippage in first cotton planting are offset by higher lint prices.

Forecasts of average tenant net incomes suggest KSh 7000 per annum (at 1981 prices) if the water rate is held at the 1977 levels suggested by the World Bank. Inter-tenant variation could be very marked because of the sensitivity of incomes to cotton yields. But the average levels are well in excess of that realised in other NIB schemes.

The main problem area is the NIB financial position. 1981 projections suggest recurring deficits continuing after the investment period. These deficits are larger than computed in 1979 because operating costs have risen and the revenue from water charges and ginning returns have been held constant. Future movements in the seed cotton price payable to tenants, and the ginning margin and commission payable to NIB could materially affect the degree of subsidisation required for Bura.

The role of NIB in providing farmer credit and extension requires urgent decisions and planning.

A system of agricultural reporting and tenant income monitoring should be introduced to facilitate the management of the enlarging Scheme.

The interface of NIB with other Government Departments providing services at Bura (education, health, communications, police and local administration etc.) requires early clarification.

1. BACKGROUND

The Bura Irrigation Settlement Project (West Phase I) comprises the development of 6700 ha. of land for about 5000 tenant families, together with all the associated infrastructure needed in this isolated location. The Project is managed by the National Irrigation Board (NIB). Implementation of the construction work began in 1979 and, in August 1981, the first 50 tenant families arrived, in time for planting maize as the short season crop. By September 1981, about 250 ha. will be ready for cultivation and irrigation, and the development programme will accelerate thereafter. Full cropping is planned for the 1984/5 season. The main crop is cotton, followed by a 50% planting of maize, interplanted with cowpeas, in the off season.

This appraisal follows a series of Reports on the Project, the most recent being:

June 1975	"Bura Irrigation Scheme, Feasibility Study". ILACO.
May 1977	"Kenya: Bura Irrigation Settlement Project, Appraisal Report", The World Bank (Report No. 1446-KE).
August 1977	"Bura Irrigation Settlement Project, Project Planning Report", Sir M. MacDonald and Partners.
June 1979	"Bura Irrigation Settlement Project, Bura West Phase I - An Economic Review", Sir M. MacDonald and Partners.

This Report is essentially an update of the 1979 study. It was conducted in Kenya by Mr. M. E. Daw (of Huntings Technical Services Ltd.) between August 14 and September 1, 1981. The Study was initiated by the N.I.B., following suggestions made by the World Bank after their Supervision Mission in March, 1981.

2. OBJECTIVES

The terms of reference supplied by the NIB are included at Annex 1. Following a discussion between the General Manager and the Consultant Agricultural Economist on August 14, 1981, it was decided to follow the outline given and to complete a draft Report by September 10, 1981.

Essentially, the study examines the economics of the Project from the points of view of the tenant, NIB and the Government. The purpose is to assess the worthwhileness of the Project at these three levels, having regard to the changes in prices and costs since 1979. The relationship between NIB water charges and tenant incomes is of particular significance.

3. APPROACH AND METHOD

Three criteria for reviewing the Project are used:

- the economic rate of return
- expected level of tenant farm incomes, and their sensitivity
- the projected cash flow of the NIB with respect to Bura only.

The prices used all relate to early 1981. Data for the calculations were obtained from a number of sources, the most important being:

- NIB HQ
- NIB Hola
- NIB Bura
- Ministry of Agriculture (MOA)
- Sir M. MacDonald and Partners
- IBRD Commodity Price Forecasting Division
- Liverpool Cotton Services Ltd.
- Cotton Lint and Seed Marketing Board (CLSMB)
- National Cereal and Produce Board (NCPB)
- Central and International Banking staff
- Nairobi vehicle suppliers
- local transport companies
- Mombasa shipping agents
- Central Bureau of Statistics.

The technical content and assumptions of the Project were based on those used in 1979 which, in turn, used material from both the World Bank Appraisal (1977) and the Project Planning Report(1977). Some minor changes were incorporated into the present Report such as the revised phasing of land development, the number of families to be settled, and the cropping programme to be adopted by beginning tenants. Visits were made to Bura, Hola and to the various agencies in Nairobi to obtain relevant information.

The results of the economics study were discussed with the General Manager on August 31, 1981 and a draft report was prepared one week later.

The estimates of capital costs were taken from figures prepared for the Bank Supervision Mission in early 1981. Recurrent costs were developed using 1981 prices or by appropriate indexing from 1979, or a combination of both. The revenue from the Project was calculated from the expected buildup of crop production at current prices (early 1981). In the case of cotton, lint prices were derived from World Bank forecasts, adjusted for quality and priced in 1981 constant US dollars.

The economic rate of return was computed at two exchange rates - the official rate at February 1981 (taken as KSh 8 = 1 US S) and a shadow rate (KSh 11 = 1 US S) to reflect the real value of the shilling. The shadow rate was selected following discussions with

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professionals involved in banking and monetary policy - their estimates ranging from KSh 10.2 to 12 per 1 US $. The rate chosen also corresponded to that used in 1979, since when much of the foreign exchange investments have been made. The overall internal rate of return (IRR) was also computed for the remaining investment programme only i.e. assuming all costs to be "sunk" up to half way through 1981/82. In all IRR calculations, most of the infrastructure was charged to the Project at 50% of its actual cost. In addition, certain structures in the main and supply canals were charged at only 56% of cost, because they were designed for both Phases I and II (area of Phase II = 44% of total).

The calculation of tenant incomes was based on prices prevailing in 1981 (including current CLSMB prices) with NIB deductions for water charges set at the levels suggested by the World Bank in 1977. The aim was to examine whether such charges would still permit the average tenant to realise a net income of KSh 7000 (including home consumption but without charges for labour).

The NIB's cash budget (for Bura only) was built up from known and planned capital disbursements and expected recurrent costs and revenues from several sources, principally water charges to tenants (as used in farm budgets). The necessary Government funding was identified to enable NIB to achieve a zero net cash flow position by 1990.

4. PROJECT COSTS

Capital costs to 1983/84 are detailed at Annex 2. These correspond to February 1981 estimates at January 1981 prices. Price contingencies beyond January 1981 are therefore not included but physical contingencies are. The total figure (1977/78 to 1983/84) is KSh 1130 mn, of which there is a 51% foreign exchange component and a 13% tax and duty element. This gross sum is 26% greater than the 1979 estimate, at 1979 prices.

Recurrent costs (details at Annex 3) rise from KSh 4 mn in 1978/79 to KSh 79 mn in 1983/84 and KSh 86 mn in 1988/89. Of this latter figure, 34% is accounted for by projected NIB O + M costs, 27% by farm inputs (mainly fertiliser and crop protection), and 10% and 7% by the direct costs of ginning and pumping respectively (excluding replacement/depreciation).

The value of the Project output (in 1981 prices) is projected to exceed recurrent costs in 1983/84 and all costs (including capital replacements) from 1984/85 onwards (Annex 3).

5. PROJECT BENEFITS

Production. The build-up of crop production for the Project as a whole is shown at Annex 4. By 1990-91, seed cotton production should amount to 18,700 tonnes and the output of maize, cowpeas and shelled groundnuts should reach 7,700, 2,090 and 1,200 tonnes, respectively. A crude estimate of horticultural production is 1,700 tonnes of a mixture of vegetables.

The rising production levels result from the rapid development of cropland (scheduled to be complete by 1984/85) and a slow increase in yields. Groundnuts are scheduled for inclusion in the third cropping year, replacing some of the maize/ cowpeas crop. Yields are expected to increase over five years as follows, starting from the year of the virgin crop::

- seed cotton	2.5 to 3.0	tonnes per ha.
- maize	2.0 to 3.7	"
- cowpeas	0.5 to 1.0	"
- groundnuts	1.4 to 2.0	(unshelled).

The yields shown in Annex 4 are the mean levels for each year, having regard to the different succession of crops. Because of the later introduction of groundnuts, it is 1997/98 before all crop yields are expected to stabilise at the upper levels given above. On present plans, the crops areas will remain constant after 1992/93, at 6231 ha cotton, 2077 ha maize/cowpeas and 1039 ha groundnuts. The horticultural area (composed of 500 sq. m. of garden per tenant) will remain at 249 ha from 1984/85.

These areas and tonnages refer to a final estimate of the number of tenancies at 4985, covering 6480 ha.

In addition, there is an output from the 600 ha of irrigated forestry with felling commencing in 1987/88 and reaching a steady level by 1989/90.

<u>Prices</u>. In the case of <u>cotton</u>, two prices were used: the economic price for the Project as a whole and the price paid to tenants as administered by the CLSMB. All prices are set in 1981 constant KSh. The derivation of the economic price is detailed below on the assumption that Acala $1\frac{1}{8}$" lint is produced for export at a 37% out-turn figure using saw gins. Two exchange rates are used: the official rate (at early 1981) and a shadow rate of KSh 11 = 1 US $.

IBRD forecast for 1982 (in 1981 dollars) for Mexican SM $1\frac{1}{16}$" :	105 cents / lb.(1)
Adjustment of forecast downwards for over-estimation of 1981 prices by	5 cents/ lb.
Amended IBRD forecast	100 cents/ lb.
Add Acala $1\frac{1}{8}$" premium	6 cents/ lb.(2)
Amended forecast for Project lint	<u>106 cents/ lb.</u>
1982 lint price (in constant 1981 $) c.i.f. N. Eur.	<u>$2336/tonne</u>
<u>less</u> insce, freight & surcharges(3)	$180/tonne
<u>F.o.b. Mombasa</u>	<u>$2156/tonne</u>

	<u>@ KSh 8 = 1 US S</u>	<u>@ KSh 11 = 1 US S</u>
F.o.b. Mombasa	KSh 17,248 per tonne	23,716
<u>less</u> port charges, handling, documentation etc.	150	184(4)
transport Bura-Mombasa	300(5)	367(4)
Lint ex. ginnery	<u>KSh 16,798 per tonne</u>	<u>23,165</u>
Cotton Seed(6)	KSh 1,100 per tonne	1,100

(1) Commodity Forecasting Division Memorandum November 12, 1980. C.I.F. North Europe.

(2) derived from world price series from "Cotton Outlook" and from figures reproduced by CLSMB.

(3) Quotations obtained through E. African Shipping Conference.

(4) 60% F.E. content.

(5) recent quotation obtained.

(6) based on current value [illegible]

	@ KSh 8 = 1 US $	@ KSh 11 = 1 US $
Value of Seed Cotton Produced:		
370 kg lint	KSh 6215 per tonne seed cotton	8571
610 kg cottonseed	671	671
	6886	9242
Less ginning costs (2)	654	752
Less CLSMB marginal costs: (3)		
transport of seed (KSh 250/T.)	150	185 (1)
commission	200	200
admin, mkting, storage	250	250
Net Value of seed cotton	5632	7855

These economic prices were used in the economic analysis and for estimating the total value of the Project output (Annex 4).

To calculate the net returns to farmers, the current CLSMB price was used, being somewhat below the above figure because of CLSMB deductions and because of the lower value of seed cotton from UKA and BPA varieties. (4) For budgeting tenant incomes, however, the current price for non-Acala varieties was used: KSh 3.60 per kg for AR and KSh 1.75 for BR, in a 90:10 ratio. This gives an average produce price of KSh 3415 per tonne.

(1) 60% F.E. Content

(2) Based on recent capital estimates and running costs itemised in PPR. 40% F.E. content.

(3) Based on 1980 estimates of CLSMB expenses which totalled KSh 1221/ tonne seed cotton.

(4) It has been calculated that Acala seed cotton is worth around 14% more than current Kenyan varieties because of its high lint out-turn.

Prices for maize have been based on the assumption that all production from the Project will be locally consumed.[1] The effect of the Project will undoubtedly be to increase the levels of consumption of the incoming population, with negligible effect on Kenya's import-export position. No adjustments have therefore been made for transport costs. Since the farmers' selling prices at Hola have approximated to the NCPB's official buying-in price (KSh 95 per kg bag), this has been used to estimate the value of Project output and tenant incomes. This corresponds to a price (1981 levels) of KSh 1056 per tonne.

The same reasoning and procedure has been used to price cowpeas and groundnuts, despite the unusually high prices prevailing for groundnuts in 1981. Using official NCPB prices, cowpeas are valued at KSh 1333 and groundnuts at KSh 6250.

Horticultural produce is priced at KSh 2 per kg on average. There is no monetary increase since 1979 because it may well be that some tenants will prefer to plant maize in their garden areas rather than the higher-valued vegetable crops.

In the case of timber for fuelwood, 1985 prices (in 1981 shillings) have been set at KSh 650 per cu. m. This is based on the locally prevailing price of KSh 280 per cu. m. in 1977, with upward adjustments for inflation and scarcity factors.

(1) At full development, 7700 tonnes will be produced - sufficient for 120 kg per head for the 65,000 projected Bura population. This per capita consumption is very close to the national average for maize.

Value of Production. The financial outputs given in Annex 4, which combine the above production and price figures, indicate a build-up to KSh 127 mn in 1989/90 (at 1981 prices) from agriculture.(1) This is twice the gross value of produce from all NIB Schemes in 1979/80 - or an increase of 80% after allowing for price inflation between 1979 and 1981. In that year, Hola's output was KSh 4.4 mn.

With the shilling shadow priced, the output value rises to KSh 169 mn annually.

Cotton accounts for more than 80% of the source of project value produced, at full development.

Annual output exceeds annual costs from 1984/85 and, in the 1990's, the surplus should be running at KSh 50 mn per annum at 1981 prices and after allowing for capital replacement.

6. ECONOMIC ANALYSIS

Annexes 5 and 6 set out the 50 year analysis of cost and benefit streams (1977/8 to 2027/28) for the Project at the official rate of exchange and at the shadow rate, respectively. All taxes and duties have been removed so as to indicate the real effect on the Kenyan economy.

(1) In addition, there would be KSh 5 mn from timber by that year.

50 per cent of the non-agricultural infrastructure has been charged to the Project and 56% of the supply and main canal structures (see footnotes to Annex 5 and 6 tables). 25% of the O + M costs, other than NIB, are charged, although this is a minor cost item. The NYS input is excluded on the grounds of the training function provided by the work on the Project.

All these adjustments to both capital and recurrent costs are the same as made during the 1979 Economic Review so direct comparisons can be made between the 1979 position and that obtaining in early 1981.

With the shilling valued at par (Annex 5), 1983/84 should produce a net benefit of zero, following which the net figure rises quickly to KSh 70 mn per annum by 1988/89 and beyond. By 1994/95, cumulative deficits should be written off excluding interest. Over 50 years, the internal rate of return is <u>6¾%</u> - almost identical to that computed in 1979. Increased project benefits appear to have kept pace with rising capital costs and the one year slippage in planting the first cotton area.

By shadow pricing the shilling at KSh 11 = 1 US $ (i.e. effectively devaluing by 38%), Annex 6 indicates the higher real capital costs but with annual net benefits becoming positive in 1983/84. Thereafter, annual net benefits rise to KSh 95 mn in 1988/89. The cumulative position becomes positive in 1993/94 - one year earlier than with the shilling at par.

The effect of valuing the shilling at its real market value is to slightly improve the economics of the Project so that it yields an IRR of 7¾%. This compares with 8.4% obtained in the 1979 analysis - the fall being due to the higher capital costs and the delayed start to the foreign exchange earnings of the Project from cotton sales.

A further exercise was carried out to assess the IRR on the remaining investments and cash flows from mid-way through 1981/82. This treats all costs to date as "sunk investments" and would be relevant to any decision on whether or not to complete the Project. The IRR is 17% (KSh 8 = 1 US $) and 19% (KSh 11 = 1 US $) so obviously the Project must now be carried through to completion.

On balance, the most relevant measure of the overall economics of the Bura Project is the 7¾% IRR obtained when the shilling is shadow priced at its true value. This is a moderate rate of return but acceptable in view of the conditions of the loans, the infrastructure carried and the non-quantifiable benefits which should accrue from the Project. These may be listed as:

- relief of landless poverty with some saving in social costs
- multiplier effect on employment and incomes created by the activity around Bura
- provision of experience in planning and executing a sizeable irrigation project - which will be relevant to further Tana River developments
- strategic presence of an enlarged population in Eastern Kenya
- possibility of other revenue - earning activities at Bura, e.g. fisheries, livestock.

7. TENANT INCOMES

The planned cropping pattern, yields and expected revenue for incoming tenants are all shown in detail at Annex 7, for the first nine years of farming the 1.3 ha unit. Cropping intensity is 150% with the short season crop of maize/cowpeas gradually moving to the inclusion of 0.2 ha of groundnuts. Surplus maize and cow-peas are available for sale from the second season, as yield is expected to increase from 2.0 to 2.5 tonnes per ha for maize and 0.5 to 0.6 tonnes for cowpeas. Groundnuts (when grown) are partly consumed by the family and half the horticultural output is expected to be for domestic use. Home consumption levels are based on the expected average family size and mean rural per capita levels of consumption.

Ex-farm prices for this 1981 analysis are:

Seed cotton (mean of AR and BR)	KSh 3.415 per kg
Maize	KSh 95 per 90 kg bag
Cowpeas	KSh 120 per 90 kg bag
Groundnuts (shelled)	KSh 500 per 80 kg bag
Garden produce	KSh 2 per kg

Cash revenues rises to KSh 14,400 by Year 8 with cotton sales providing 89% of the income. If home-consumed produce is valued at the same prices as above, this adds a further KSh 2800 of imputed revenue.

The "Operating Cash Income" (cash revenue minus direct costs other than Scheme charges) is budgeted at KSh 6000 in Year 1 and KSh 9000 in Year 10. From this figure must be deducted Scheme charges for water, house repayments and an element of interest on seasonal credit. The latter is nominal, but the water rate is set at KSh 1600 per ha for Years 1 to 3, KSh2000 in Years 4 to 5, and KSh 2800 per ha for Year 9 onwards. These are the IBRD recommendations from 1977 but have been retained to ensure a forecast tenant net income of KSh 7000 at full production. The tenant is expected to repay the house costs of KSh 20,000 equally over 20 years, with no interest.

The following is a summary of the farm budget (at 1981 prices), using figures from Annex 8.

	Year					(KSh)
	1	2	3	4	5	10
Operating Cash Income	6027	6811	7390	7739	8253	8975
Land & water charges	2080	2080	2080	2600	2600	3640
Other Scheme charges	90	1100	1100	1100	1100	1100
Net Cash Income	3857	3631	4210	4039	4553	4235
Value of Private Consumption	2017	2038	2038	2476	2538	2788
Net Income	5874	5669	6248	6515	7091	7023

Clearly, the water rate cannot be increased without causing the average tenant net income to fall below KSh 7000 per annum. Although these charges are much higher than any other Kenyan irrigation scheme, so also is the budgeted net income. At Hola, comparable mean net incomes from cotton (accounts for 80% of total net income) were:

	1975	KSh 3846
	1976	5140
	1977	2004
	1978	2534
provisional	1979	2480.

With the high cost - high output system at Bura, the susceptibility of tenant incomes to falls in production or prices is of serious concern. This is particularly marked for cotton. The sensitivity analysis at Annex 9 indicates that net incomes would fall by 36% to KSh 4462 from a 20% drop in seed cotton yield. By contrast, if short season crop yields fell by 20%, the effect on net income is only 10%.

The price received by tenants for seed cotton is also a significant factor in their net incomes. If Acala is recognised as worth more than current varieties, the CLSMB should be in a position to pay KSh 4.10 per kg for AR grade. This would result in a 25% increase in net incomes compared with the current prices used in the analysis. Such a pricing structure could allow the NIB to increase its water rate by up to 50% whilst still leaving tenant net incomes at KSh 7000 per annum. The effect on NIB finances would be marked.

8. NIB CASH FLOW (BURA)

The forecast cash flow is detailed at Annex 10 from 1977/78 through to the 1990's. Government funds are assumed to cover all capital commitments up to 1983/84, in line with 1981 project estimates. This would, however, still leave a deficit from the current year onwards because NIB revenue from tenants and from the CLSMB fails to match the recurrent costs expected (O + M, ginning, pumping). Since the 1979 study, all NIB costs have inflated but the water rate and CLSMB ginning margin have been held constant. Consequently, the deficits, and therefore the level of Government Support, are larger now. In order to move to a cumulative break-even situation by 1990, KSh 30 mn per annum are needed from Government for 1981/82 to 1983/4, KSh 20 mn annually for the next six years and KSh 14 mn each year from 1990 (all at 1981 prices).

The recurring deficit once the Scheme is complete, budgeted at KSh 14 mn annually, highlights the need to look for economies in terms of regular operating expenses and returns from tenants and from the Cotton Board. The O and M charge for Bura (by NIB) has been budgeted at KSh 30 mn p.a. and this should now be reviewed, especially in terms of staffing and vehicles, to see if economies are possible. Other costs are relatively fixed, except that pumping costs (KSh 6.4 mn) would be saved if a barrage were built to serve Phase II and Bura East. The share of barrage maintenance costs attributable to Phase I would be unlikely to exceed the budgeted pumping costs. On the revenue side, the scope for improvement lies with the cotton crop and the returns obtained through the CLSMB. Higher producer prices might enable higher water rates to be charged. The ginning fee could well be increased (currently does not cover the expected total costs of ginning at Bura, including depreciation) since it has remained constant for the last three years. Also in view of the fact that Bura will increase the cotton handled by CLSMB by around 50%, some scale economies should result, and a larger share of the Board's commission might be passed on to NIB.

In summary, the Scheme should generate acceptable tenant incomes, its return on capital is reasonable considering the non-quantifiable benefits, but the budgeted financial position of the NIB is serious.

Plans should now be formulated to provide Government support beyond the period of investment, and negotiations are required with the Cotton Board to clarify the financial arrangements between tenants, NIB and the CLSMB.

ANNEX 1 - TERMS OF REFERENCE SET BY NIB

Background

In 1979 the Project Consultant (Sir M. MacDonald & Partners Ltd) carried out an Economic Review of the Bura Irrigation Settlement Project. With two years having passed and with the Project about to commence operation it is considered that an update of the financial and economic aspects of the Project is required.

Objectives

The object of the 1981 Economic Review is to update the analyses presented in the 1979 Economic Review to take account of recent changes in costs and prices. The Review will provide an up-to-date basis for decisions to be taken on charges to be made to farmers for land and water services and house repayments. It will also enable up-dates of estimates of NIB's cash flow for operating the Project to be made for forward budgeting purposes.

Scope of Work

1. In order to carry out the review the basic assumptions used in the World Bank Appraisal Report and the 1979 Economic Review will be taken into consideration. The Review will not examine possible changes to the overall project design or major changes to project phasing.

2. The Economic Review will present an updated estimate of total project costs, expenditure already made, expenditure committed and expenditure required to complete the project. The amounts of such costs financed by lending Agencies and the Government of Kenya will be identified.

3. Output prices and production costs will be reviewed and updated revised Crop budgets will be prepared.

4. As in 1979 the following shall be done:

(a) The Project internal rate of return will be computed. Costs and benefit streams will be calculated.

(b) Update Farm Budgets will be prepared. Proposals for the level of charges to be levied by NIB on the tenant will be made and tenant incomes estimated.

(c) A cash flow forecast for NIB will be computed with particular attention being given to any operating deficits that may occur.

(d) Sensitivity tests will be carried out to show the effect of uncertain assumptions particularly yield and output price assumptions.

ANNEX 2 CAPITAL COSTS TO 1983 - 84 [1/]

(KSh mn, (Jan 1981) Prices)

	77/78	78/79	79/80	80/81	81/82	82/83	83/84	Total to full implem	% Taxes	%FE
IRRIGATION WORKS River Works										
Contract 19 Site Investigation			1.11					1.11	—	
Irrigation & Drainage Works Contract 3 Supply Canal			41.02	4.89				45.91		
Contract 4 Main Canal, Bush clearing & Land Levelling			1.15	23.03	23.22	8.53		55.93		
Contract 5 Hydraulic Structures Pump Station, Irrigation and Drainage System			6.81	76.55	81.11	31.72		196.19		
NIB Advisors		2.17	9.00	9.17				20.34		
		2.17	59.09	113.64	104.33	40.25		319.48	15	.55
WILDLIFE - Included in Contract 5										
ROADS AND AIRFIELD Contract 13 Scheme Roads, and Airstrip			3.59	7.73	13.56	6.45		31.33	15	50
BUILDINGS AND INFRASTRUCTURE a) RC & Village Roads Cont.13			2.02	4.35	7.63	3.63		17.63		
b) Settlers houses etc BBF				15.41	30.82	30.82	15.41	92.46		
c) Water Supply & Sewerage Contracts 8A, 8B & 6				20.11	76.61	41.80		138.52		
d) Electricity Supply Contracts 2 & 12				5.00		25.89		30.89		
e) NIB Buildings Contract 2, 6 & 20			17.31	40.56	77.53			135.40		
f) Gov. Buildings Contracts 6 & 7					24.08	24.17	24.15	72.40		
			19.33	85.43	216.67	126.31	39.56	487.3	13	33
PUBLIC HEALTH Vehicles, Equipment etc		0.31	0.83	0.67	2.13	1.35		5.29	13	82
AFFORESTATION				0.65	4.14	4.13	3.49	12.41	5	20
VEHICLES & EQUIPMENT		5.95	5.95	22.77	13.30	6.30		54.27	12	82
GINNERY					43.02	41.44		84.46	16	82
CONSULTANCY Bura West	3.75	30.47	20.51	16.04	15.29	10.41	4.00	100.47	5	82
MANAGEMENT					8.97	8.97	8.97	26.91	5	60
TRAINING				1.35	1.66	4.70		7.71	0	100
TOTAL	3.75	38.90	109.30	248.28	423.07	250.31	56.02	1129.63	12.7	51.3

1/ Based on the format used in Table 1, Annex 13, IBRD Appraisal 1977.

ANNEX 3 **CAPITAL AND RECURRENT COSTS (INCLUDING TAX) AND TOTAL REVENUE 1977/8 - 1989/90**

KSh mn 1981 Prices

CAPITAL	77/8	78/9	79/80	80/1	81/2	82/3	83/4	84/5	85/6	86/7	87/8	88/9	89/90
Irrigation Works		2.2	59.1	113.3	104.3	40.3							5.2
Roads & Airfields			3.6	7.7	13.6	6.5							
Bldgs & Infrasts			19.3	85.4	216.7	126.3	39.6						
Public Health		0.3	0.8	0.7	2.1	1.4			0.8				
Afforestation				0.7	4.1	4.1	3.5						
Vehicles & Equip		6.0	6.0	22.8	13.3	6.3		6.0	6.0	22.8	13.3	6.3	
Ginnery					43.0	41.4							
Consultancy	3.8	30.5	20.5	16.0	15.3	10.4	4.0						
Agric. Mgt.					9.0	9.0	9.0						
Training				1.4	1.7	4.7							
Total Capital	3.8	38.9	109.3	248.3	423.1	250.3	56.0	6.0	6.8	22.8	13.3	6.3	5.2
RECURRENT:													
Pump Station													
Fuel & Lub					1.5	4.9	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Spares					0.2	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Total Pump Station					1.7	5.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Public Health													
Salaries		0.3	0.3	0.3	0.5	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
O & M		0.3	0.3	0.3	1.0	1.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Total Pub. Health		0.6	0.6	0.6	1.5	2.2	2.9	2.9	2.9	2.9	2.9	2.9	2.9
Afforestation Mgt.				0.5	1.4	1.8	1.8	1.8	1.4	1.4	1.4	1.4	1.4
NIB O & M		2.5	2.5	5.9	17.0	26.6	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Other O & M			0.5	1.7	2.9	4.1	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Farm inputs 3/					0.1	7.1	14.5	18.7	18.9	19.2	19.4	19.6	20.0
Ginnery O & M 4/						2.9	5.9	7.8	8.1	8.4	8.7	8.8	8.9
Total Recurrent		3.1	3.6	8.7	24.6	50.0	66.3	72.5	72.5	73.1	73.6	73.9	74.4
TOTAL COSTS	3.8	42.0	112.9	257.0	447.7	300.3	122.3	78.5	79.3	95.9	86.9	80.2	79.6
TOTAL VALUE PRODUCED 5/					0.5	39.9	82.7	106.9	112.3	117.5	122.7	125.8	127.0

1. Engines replaced every 7 yrs ('89/90 & '96/97), pump every 12 yrs ('94/5 etc).
2. Replacement every 5 years (85/6, 90/1 etc),
3. Excluding mechanisation costs (included in NIB O and M) but including seed fertiliser and crop protection.
4. All costs excluding depreciation/replacement.
5. From Table 4 with KSh at par (February 1981).

NNEX 4 TEN YEAR BUILD-UP OF SCHEME CROP PRODUCTION AND ECONOMIC VALUE [1/]

KSh mn (1981 Prices)

	81/2	82/3	83/4	84/5	85/6	86/7	87/8	88/9	89/90	90/1
TTON										
ea (ha)		2395	4883	6231	6231	6231	6231	6231	6231	6231
eld (T/ha)		2.50	2.55	2.62	2.72	2.82	2.92	2.98	3.00	3.00
oduction (tonnes)		5988	12447	16305	16928	17552	18175	18558	18693	18693
lue @ KSh5632 (KSh mn) 2/		33.72	70.10	91.83	95.34	98.85	102.36	104.52	105.28	105.28
lue @ KSh7855 (KSh mn) 3/		47.03	97.77	128.08	132.97	137.87	142.76	145.77	146.83	146.83
IZE										
ea (ha)	129	1725	3116	3094	2828	2586	2453	2327	2199	2088
eld (T/ha)	2.0	2.04	2.29	2.68	2.98	3.28	3.57	3.70	3.70	3.70
duction (tonnes)	258	3515	7133	8292	8427	8482	8757	8610	8136	7726
lue @ KSh1056 (KSh mn)	0.27	3.71	7.53	8.76	8.90	8.96	9.25	9.09	8.59	8.18
PEAS										
ea (ha)	129	1725	3116	3094	2828	2586	2453	2327	2199	2088
eld (T/ha)	0.5	0.51	0.56	0.66	0.76	0.86	0.96	1.00	1.00	1.00
duction (tonnes)	65	875	1743	2042	2149	2224	2355	2327	2199	2088
lue @ KSh1333 (KSh mn)	0.09	1.17	2.32	2.72	2.86	2.96	3.14	3.10	2.93	2.78
UNDNUTS										
ea (ha)	-	-	-	22	288	530	663	789	917	1028
eld (T/ha) 4/				1.40	1.42	1.52	1.65	1.74	1.81	1.85
duction (tonnes) 5/				20	265	523	711	893	1076	1235
lue @ KSh6250 (KSh mn)				0.13	1.66	3.27	4.44	5.58	6.73	7.72
RDEN										
ea (ha)	10	96	195	249	249	249	249	249	249	249
duction (tonnes)	70	672	1365	1743	1743	1743	1743	1743	1743	1743
lue @ KSh 2 (KSh mn)	0.14	1.34	2.73	3.49	3.49	3.49	3.49	3.49	3.49	3.49
al Value (KSh mn) 2/	0.50	39.94	82.68	106.93	112.25	117.53	122.68	125.78	127.02	127.45
al Value (KSh mn) 3/	0.50	59.25	110.35	143.18	149.88	156.55	163.08	167.03	168.57	169.00

Corresponds to Table 2, Annex 24, IBRD Appraisal 1977

At early 1981 exchange rate of KSh 8 = US$ 1.

At shadow exchange rate of KSh 11 = US$ 1.

Unshelled yield

Shelled, at 65% extraction.

ANNEX 5 - ECONOMIC COST AND BENEFIT STREAMS (NO SHADOWED FE) [1/]

KSh mn (KSh 8 = 1US $)

	77/8	78/9	79/80	80/1	81/2	82/3	83/4	84/5	85/6	86/7	87/8	88/9	89/90	Annual mean 90/1to 27/28
CAPITAL ITEMS														
Irrign.Works [2/]			40.7	79.1	79.1	34.3							5.0	1.3
Roads, Airfields			3.1	6.6	11.5	5.5								
Blgs, infrasts [3/]			15.9	54.8	128.0	54.9	17.2							0.1
Pub. Health [4/]		0.1	0.4	0.3	0.9	0.6			0.7					
Afforestation				0.6	3.9	3.9	3.3							
Vehicles & Equ		5.2	5.2	20.0	11.7	5.5		5.2	5.2	20.0	11.7	5.5		6.9
Consultancy	3.6	28.9	19.5	15.2	14.5	9.9	3.8							
Agr. Mgt					8.5	8.5	8.5							
Training				1.4	1.7	4.7								
Tot.Capital	3.6	34.2	84.8	178.0	259.8	127.8	32.8	5.2	5.9	20.0	11.7	5.5	5.0	8.3
RECURRENT:														
Pumping					1.4	4.2	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Pub. Health [4/]		0.3	0.3	0.3	0.7	1.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Forestry Maint				0.5	1.3	1.6	1.6	1.6	1.3	1.3	1.3	1.3	1.3	1.3
NIB O + M		2.1	2.1	4.9	14.1	22.1	24.5	24.5	24.5	24.5	24.5	24.5	24.5	24.5
Other O + M [5/]			0.1	0.4	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Farm Inputs					0.1	7.1	14.5	18.7	18.9	19.2	19.4	19.6	20.0	21.0
Family Labour [7/]					0.1	1.0	2.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5
TOT.RECURRENT	-	2.4	2.5	6.1	14.5	37.9	49.9	54.6	54.5	54.8	55.0	55.2	55.6	56.6
TOTAL COSTS	3.6	36.6	87.3	184.1	278.2	165.7	82.7	59.8	60.4	74.8	66.7	60.7	60.6	64.9
BENEFITS:														
Crops [8/]					0.5	39.9	82.7	106.9	112.3	117.5	122.7	125.8	127.0	127.5
Forestry											3.6	3.7	4.7	4.7
Tot.Benefits					0.5	39.9	82.7	106.9	112.3	117.5	126.3	129.5	131.7	132.2
NET BENEFITS [9/]	-3.6	-36.6	-87.3	$\overline{184.1}$	$\overline{277.7}$	$\overline{125.8}$	0	47.1	60.9	42.7	59.6	68.8	71.1	67.3
Cum. Net Benefits(negative)	3.6	40.2	127.5	311.6	589.3	715.1	715.1	668.0	607.1	564.4	504.8	436.0	364.9	297.6

1. Taxes excluded.
2. NYS Advisers excluded. Main and Supply Canal Structures charged at 56% because of benefit to stage II.
3. 50% total cost charged except NIB buildings @ 100% chargeable.
4. 50% total cost charged.
5. Ginnery and ginning costs excluded - computed in derived cotton price.
6. 25% of total costs charged.
7. Valued at KSh 500 per family
8. From Annex 4.
9. IRR = $6^{3}/_{4}$%

ANNEX 6 • ECONOMIC COST AND BENEFIT STREAMS (Shadow FE) 1/

KSh mn (KSh 11 = 1 US $

	77/8	78/9	79/80	80/1	81/2	82/3	83/4	84/5	85/6	86/7	87/8	88/9	89/90	Annual Mean 90/1-27/8
CAPITAL ITEMS:														
Irrign.Works 2/			49.1	95.4	109.4	41.4							6.7	1.8
Roads,Airfields			3.7	7.8	13.7	6.5								
Blgs,infrast 3/			17.9	61.6	143.8	61.7	19.3							
Public Health 4/		0.1	0.5	0.4	1.2	0.8			0.9					0.1
Afforestation				0.6	4.2	4.2	3.6							
Vehicles & Equipt 5/		6.8	6.8	26.2	15.3	7.2		6.8	6.8	26.2	15.3	7.2		9.0
Consultancy	4.7	37.8	25.5	19.9	19.0	12.9	5.0							
Agric. Mgt.					10.4	10.4	10.4							
Training				1.9	2.3	6.5								
TOT.CAPITAL	4.7	44.7	103.5	213.8	319.3	151.6	38.3	6.8	7.7	26.2	15.3	7.2	6.7	10.9
RECURRENT :														
Pumping					1.9	5.6	6.8	6.8	6.8	6.8	6.8	6.8	6.8	6.8
Public Health 4/		0.4	0.4	0.4	0.8	1.3	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Forestry Maint				0.5	1.3	1.7	1.7	1.7	1.3	1.3	1.3	1.3	1.3	1.3
NIB O + M		2.5	2.5	5.8	16.8	26.3	29.1	29.1	29.1	29.1	29.1	29.1	29.1	29.1
Other O + M 6/			0.1	0.4	0.7	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Farm Inputs					0.1	9.5	19.4	25.0	25.3	25.7	25.9	26.2	26.8	28.1
Family Labour 7/					0.1	1.0	2.0	2.5	2.5	2.5	2.5	2.5	2.5	2.5
TOT.RECURRENT		2.9	3.0	7.1	21.7	46.3	61.7	67.8	67.7	68.1	68.3	68.6	69.2	70.5
TOT. COSTS	4.7	47.6	106.5	220.9	341.0	197.9	100.0	74.6	75.4	94.3	83.6	75.8	75.9	82.4
BENEFITS :														
Crops 8/					0.5	59.3	110.4	143.2	149.9	156.6	163.1	167.0	168.6	169.0
Forestry											3.6	3.7	4.7	4.7
TOT. BENEFITS					0.5	59.3	110.4	143.2	149.9	156.6	166.7	170.7	173.3	173.7
NET BENEFITS 9/	-4.7	-47.6	106.5	220.9	340.7	138.6	10.4	68.6	74.5	62.3	83.1	94.9	97.4	91.3
CUM.NET BENEFITS (negative)	4.7	52.3	158.8	379.7	738.4	877.0	866.6	798.0	723.5	661.2	578.1	483.2	385.8	294.5

1. Taxes excluded
2. NYS Advisers excluded. Main and Supply Canal Structures charges at 56% because of benefit to stage II.
3. 50% total cost charged except NIB buildings @ 100% chargeable .
4. 50% total cost charged
5. Ginnery and ginning costs excluded - computed in derived cotton price
6. 25% of total costs charged
7. Valued at KSh 500 per family
8. From Annex 4.
9. IRR = 7 3/4%

ANNEX 7

CROPPING PATTERN PRODUCTION AND REVENUE AT TENANT LEVEL[1]

Years 2	1	2	3	4	5	6	7	8	9
COTTON									
Area Planted (ha)	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Yield (ton/ha)	2.5	2.6	2.7	2.8	2.9	3.0	3.0	3.0	3.0
Production (ton)	3.13	3.25	3.38	3.5	3.62	3.75	3.75	3.75	3.75
Selling Price (KSh/ton) 3/	3.415								
Revenue (KSh)	10 689	11 099	11 543	11 953	12 362	12 805			
MAIZE									
Area Planted (ha) 4/	0.60	0.60	0.60	0.50	0.50	0.45	0.45	0.40	0.40
Yield (ton/ha)	2.0	2.5	2.8	3.1	3.4	3.7	3.7	3.7	3.7
Production (ton)	1.20	1.50	1.68	1.55	1.70	1.67	1.67	1.48	1.48
Production Consumed (ton)	1.20	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Production sold (ton)	-	0.28	0.46	0.33	0.48	0.45	0.45	0.26	0.26
Selling Price (KSh/ton) 5/	1 056								
Revenue (KSh)	-	296	486	348	507	475	475	275	275
COWPEAS									
Area Planted (ha) 4/	0.60	0.60	0.60	0.50	0.50	0.45	0.45	0.40	0.40
Yield (ton/ha)	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.0	1.0
Production (ton)	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Production Consumed (ton)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Production Sold (ton)	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Selling Price (KSh/ton) 5/	1 333								
Revenue (KSh)	-	133							
GROUNDNUTS									
Area Planted (ha)		-	-	0.10	0.10	0.15	0.15	0.20	0.20
Yield (ton/ha, unshelled)	-	-	-	1.4	1.6	1.8	1.9	2.0	2.0
Production (ton, shelled) 6/		-	-	0.09	0.10	0.18	0.19	0.26	0.26
Production Consumed (ton)		-	-	0.07	0.08	0.12	0.12	0.12	0.12
Production sold (ton)		-	-	0.02	0.02	0.06	0.07	0.14	0.14
Selling Price (KSh/ton) 5/	-	-	-	6 250					
Revenue (KSh)	-	-	-	125	125	375	438	875	875
GARDEN CROPS									
Production (kg)	350	350	350	350	350	350	350	350	350
Production Consumed (kg)	175	175	175	175	175	175	175	175	175
Revenue (KSh) 7/	350	350	350	350	350	350	350	350	350
TOTAL CASH REVENUE FROM CROPS (KSh)	11 039	11 879	12 512	12 910	13 477	14 138	14 201	14 438	14 438
Market Value of Production Consumed 8/	2 017	2 038	2 038	2 476	2538	2 788	2 788	2 788	2 788

1. The Table layout is identical to Annex 8 of the IBRD Appraisal, 1977
2. Tenant is assumed to plant a maize/cowpeas crop immediately after he is established on his holding, and a first cotton crop in February. Full production is reached in year 9.
3. Seed cotton at 1981 CLSMB prices; KSh 3.60/kg AR, 1.75 BR
4. Maize and cowpeas are planted in association.
5. Prices used are National Cereal and Produce Board prices July 1981
6. Shelling percentage 65%
7. 175 kg at KSh 2 kg
8. Maize, cowpeas, groundnuts and hoticultural produce valued at prices used above.

ANNEX 8.

REVISED FARM BUDGET AT 1981 PRICES [1]

KSh [2]

Years	1	2	3	4	5	10
A. COTTON						
Gross Revenue	10 689	11 099	11 543	11 953	12 362	12 806
Production Costs:						
Mechanical Cultivation 3/	696	696	696	696	696	696
Fertilizer 4/	720	738	762	787	811	951
Aerial and hand spraying of Insecticides	2 250	2 250	2 250	2 250	2 250	2 250
Transport 5/	176	183	190	198	204	211
Herbicide	125	125	125	125	125	125
Total Production Cost	3 967	3 992	4 023	4 056	4 086	4 233
Net Revenue from Cotton	6 722	7 107	7 520	7 897	8 276	8 573
B. GROUNDNUTS						
Gross Revenue after Private Consumption	–	–	–	125	125	875
Production Costs:						
Fertilizer 6/	–	–	–	10	10	20
Seed 16/	–	–	–	72	72	144
Harvesting 7/	–	–	–	18	18	36
Total Production Cost				100	100	200
Net Revenue without value of private Consumption	–	–	–	25	25	675
C. MAIZE/COWPEAS (in Association)						
Gross Revenue after Private Consumption	–	429	619	481	640	408
Production Costs:						
Fertilizer 8/	287	317	341	311	335	384
Insecticides 9/	23	23	23	19	19	15
Seed 10/	84	84	84	70	70	56
Mechanical Cultivation 11/	226	226	226	189	189	151
Total Production Cost	620	650	674	589	613	606
Net Revenue without value of private Consumption 12/	(620)	(221)	(55)	(108)		(198)
D. GARDEN AREA 13/						
Net Revenue of Sales	350	350	350	350	350	350
E. MISCELLANEOUS COSTS (tools, bags, repairs) 17/	425	425	425	425	425	425
F. OPERATING CASH INCOME	6 027	6 811	7 390	7 739	8 253	8 975
G. MISCELLANEOUS CHARGES						
Land and Water Charges	2 080	2 080	2 080	2 600	2 600	3 640
House Repayments 14/	–	1 000	1 000	1 000	1 000	1 000
Interest on seasonal advance 15/	90	100	100	100	100	100
Sub-Total	2 170	3 180	3 180	3 700	3 700	4 740
H. NET CASH INCOME (excl.Private Consumption)	3 857	3 631	4 210	4 039	4 553	4 235
I. MARKET VALUE OF PRODUCE CONSUMED	2 017	2 038	2 038	2 476	2 538	2 788
J. NET INCOME, (including value of private Consumption)	5 874	5 669	6 248	6 515	7 091	7 023

ANNEX 8 FOOTNOTES :

1/ The table layout is identical to Table 1 of Annex 19 of the IBRD Appraisal, 1977.

2/ All revenues are derived from the Production Schedule shown in Annex 7.

3/ KSh 557 per ha

4/ Ammonium Sulf. (21%) requirements increase from 286 kg/ha in year 1 to 380 kg/ha in year 10 and thereafter. Cost of Ammonium sulf. KSh 2 400 ton including handling and transportation

5/ KSh 40 per ton seed cotton plus 50 cents per 30 kg bag ie KSh 56 per ton

6/ 48 kg/ha of ammonium sulf.

7/ Digger shaker @ KSh 182 per ha

8/ Ammonium Sulf. (21%) requirements increase from 240 kg/ha in year 1 to 480 kg/ha in year 10 and thereafter.

9/ 15 kg DDT 5% @ KSh 2.5/kg.

10/ KSh 140/ha for maize and cowpeas seed.

11/ Land preparation at KSh 377 per ha.

12/ Food requirements during the first year are met by the World Food Programme.

13/ Garden production 350 kg per year valued at KSh 2/kg, half of which is sold.

14/ Repayment of KSh 20 000 over 20 years

15/ Interest on Farm costs

16/ 90 kg/ha @ KSh 8/kg

17/ Increase of 25% 1979 - 81

ANNEX 9 SENSITIVITY OF TENANT INCOMES TO PRICES AND YIELDS 1/

Assumptions	Income Measure Yr.	1	2	3	4	5	10
Basic Assumptions (A)	Net cash Income Net Income	3 857 5 874	3 631 5 669	4 210 6 248	4 039 6 515	4 553 7 091	4 235 7 023
Seed cotton at 3.90 and 1.90 (B)	Net cash Income Net Income	4 749 6 766	4 557 6 595	5 173 7 211	5 037 7 513	5 585 8 123	5 304 8 092
Seed cotton at 4.10 and 2.00 (C)	Net cash Income Net Income	5 344 7 361	5 175 7 213	5 816 8 817	5 702 8 178	6 272 8 810	6 016 8 804
Short season crop Yield 2/down 20% from (A)	Net cash Income Net Income	3 857 5 541	3 202 5 240	3 722 5 760	3 433 5 909	3 936 6 474	3 502 6 290
Short season crop Yield down 20% from (B)	Net cash Income Net Income	4 749 6 433	4 128 6 166	4 685 6 723	4 431 6 907	4 968 7 506	4 571 7 359
Short season crop Yield down 20% from (C)	Net cash Income Net Income	5 344 7 028	4 746 6 784	5 328 8 329	5 096 7 572	5 655 8 193	5 283 8 071
Cotton yield down 20% from (A)	Net cash Income Net Income	1 719 3 736	1 411 3 449	1 901 3 939	1 648 4 124	2 081 4 619	1 674 4 462
Cotton yield down 20% from (B)	Net cash Income Net Income	2 433 4 450	2 152 4 190	2 672 4 710	2 447 4 923	2 906 5 444	2 529 5 317
Cotton yield down 20% from (C)	Net cash Income Net Income	2 909 4 926	2 646 4 684	3 186 6 187	2 979 5 455	3 456 5 994	3 099 5 887

1/ Figures correspond to items H and J in Table 2

2/ ie Maize, cowpeas and groundnuts.

ANNEX 10 - FORECAST OF NIB CASH FLOW 1

KSh mn (1981 Prices)

	77/8	78/9	79/80	80/1	81/2	82/3	83/4	84/5	85/6	86/7	87/8	88/9	89/90	Mean 1990s
DISPOSAL OF FUNDS:														
Capital item 2	3.8	38.9	109.3	248.3	423.3	250.3	56.0	6.0	6.8	22.8	13.3	6.3	5.2	9.5
NIB O + M		2.5	2.5	5.9	17.0	26.6	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Forestry mgt.				0.5	1.4	1.8	1.8	1.8	1.4	1.4	1.4	1.4	1.4	1.4
Farm Inputs					0.1	7.1	14.5	18.7	18.9	19.2	19.4	19.6	20.0	21.0
Ginnery Operation						2.9	5.9	7.8	8.1	8.4	8.7	8.8	8.9	8.9
Pumping Costs					1.7	5.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Total 3	3.8	41.4	111.8	254.7	443.3	294.0	114.1	70.2	71.1	87.7	78.7	72.0	71.4	76.7
NIB SOURCES OF FUNDS														
Land & water charges 4					0.1	4.0	8.1	10.5	11.4	12.6	15.0	17.0	18.1	18.1
House repayment					0.2	1.9	3.9	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Charges for inputs & mech. 5						0.2	8.8	18.0	23.2	23.5	23.7	24.0	24.2	25.1
CLSMB ginning fee 6						3.3	6.9	9.1	9.4	9.7	10.1	10.3	10.4	10.4
CLSMB Commission 7						1.1	2.2	3.0	3.0	3.1	3.3	3.3	3.4	3.4
Sundry revenue 8						0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Total NIB Sources					0.3	10.9	30.6	46.3	52.7	54.6	57.8	60.3	61.8	62.7
NIB Deficit	3.8	41.4	111.8	254.7	443.0	283.1	83.5	23.9	18.4	33.1	20.9	11.7	9.6	14.0
GOVT. FUNDS:														
Capital Allocations 9	5.0	39.0	109.0	248.0	423.0	250.0	56.0							
Required recurrent allocation					30.0	30.0	30.0	20.0	20.0	20.0	20.0	20.0	20.0	14.0
Tot. Govt. injection	5.0	39.0	109.0	248.0	453.0	280.0	86.0	20.0	20.0	20.0	20.0	20.0	20.0	14.0
NET SURPLUS	1.2	(2.4)	(2.8)	(6.7)	10.0	(3.1)	2.5	(3.9)	1.6	(13.1)	(0.9)	8.3	10.4	0
ACCUM. SURPLUS	1.2	(1.2)	(4.0)	(10.7)	(0.7)	(3.8)	(1.3)	(5.2)	(3.6)	(16.7)	(17.6)	(9.3)	1.1	1.1

1/ The table corresponds to Annex 9 of the 1979 Economic Review (MMP)
2/ All capital expenditure incurred by NIB - no allocation out of the project (as in the economic analysis)
3/ Excludes any interest charges
4/ At IBRD recommended rates (1977) - correspond with tenant incomes of KSh 7000 Annex 8.
5/ At rates detailed in Annex 8.
6/ KSh 1.50/kg lint (1981 level paid to private ginners)
7/ KSh 0.18/kg seed cotton (1980-1 estimate of commission receivable by CLSMB which could be passed on)
8/ Water and electricity charges for non farmers (1979 figu res +40%)
9/ Through Ministry of Agriculture
10/ Suggested levels on Government cash injection to ensure movement to debt elimination in 1990.