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MWEA
An Irrigated Rice Settlement
in Kenya

Edited by
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WELTFORUM VERLAG · MÜNCHEN

M. The Perkerra Irrigation Scheme: A Contrasting Case

by ROBERT CHAMBERS

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It is difficult to appreciate adequately a single development project considered in isolation from its environment and from the record of similar projects elsewhere. To give a sharper focus to our review in this book of the achievements of the Mwea Irrigation Settlement, this chapter describes the very different history of effort and expenditure on a sister scheme which was started at the same time and for much the same reasons as Mwea. The Perkerra Irrigation Scheme is located in the Rift Valley north of Nakuru (see Chapter A, Fig. 1). Like Mwea it is operated by the National Irrigation Board, but it differs from Mwea in many respects. The most obvious contrast is its abysmal economic record. Among agricultural development projects which have survived their first decade of life it must rank as exceptionally uneconomic. By mid-1968, fifteen years after it was started, it had cost over

£500,000¹ for 1,226 acres irrigated by tenants² and required a protected market for its produce and an annual subsidy of the order of £24,000³. Unlike many projects which have run into difficulties, its problems in the latter 1960s cannot be attributed to deficiencies of management. Indeed, much managerial ability and effort had gone into achieving even this poor economic level. Rather the origins of the Scheme's problems can be found in its environment and history, an examination of which will reveal some of the types of difficulties into which a project can run, and from which a number of lessons can be drawn.

I. Historical Narrative

Like many government agricultural projects, the Perkerra Irrigation Scheme grew out of ecological change. The river which gives the Scheme its name has a steep and broken catchment area of about 600 square miles, ranging from over 8,000 feet where it rises on the western wall of the Rift Valley down to 3,200 feet where it enters Lake Baringo⁴. The mean annual rainfall varies from over 50 inches in the high forests to less than 30 inches at Mari-gat where the river leaves a gorge and enters alluvial plains near the lake⁵. In the latter nineteenth century these plains were the scene of irrigation from the Perkerra river carried out by the Njemps people, a Nilo-Hamitic group related to the Masai, who provided a staging post and source of food supplies to early European explorers. The Njemps raised the level of the water in the river by means of a brushwood barrier and spread it over the surrounding flat land. Although the barrier had to be replaced after

- 1 See Table 2 on page 350 for a breakdown and explanation. "Over £500,000" represents capital and recurrent expenditure less revenue, but does not include depreciation. No capital repayment or interest charges have ever been paid by the Scheme.
- 2 This total is derived from the Perkerra Irrigation Scheme Annual Report for 1967/68 which gives 343 tenants with 2-acre holdings and 135 tenants with 4-acre holdings.
- 3 In 1967/68 the grant from the Head Office of the National Irrigation Board was £25,401 (National Irrigation Board Accounts for the Year Ending 30/6/68 [mimeo], Nairobi, 28. 8. 68). The mean operating loss for the six financial years 1962/63 to 1967/68 was £23,580 (see Table 2).
- 4 For a map showing the catchment see J. C. DE WILDE et al., *Experiences with Agricultural Development in Tropical Africa, Volume II: The Case Studies*, The Johns Hopkins Press, Baltimore, 1967, p. 158. Chapter 5, "The Experience in the Districts of Baringo and Elgeyo-Marakwet", gives additional information about the area and its history.
- 5 More detailed physical and agricultural information can be found in "District Gazetteer, Baringo", (mimeo), by the District Agricultural Officer, Baringo District, Second Edition Revised, October 1961.

seasonal floods, the records of early explorers and the fact that the Njemps established two permanent villages suggest that the system was stable⁶.

This equilibrium was upset by the European presence in the early twentieth century and a sequence of events which destroyed the irrigation system. First, tribal raiding was reduced and human and stock populations increased. As a result the high grass which had dominated much of the Perkerra catchment was grazed down and replaced by bush so thick that it became impossible to ride a horse through it⁷. At the same time, the surface water runoff increased, and erosion became marked on the steep slopes of the catchment. As the river became flashier, so irrigation became more difficult. The climax came in 1918 when a flood changed the course of the river⁸. Attempts to rebuild the barrier failed, and from that time onwards the Njemps ceased to irrigate at Marigat and became pastoralists instead. But then severe overgrazing, the droughts of the latter 1920s, and the locust invasions which followed them, combined to produce a crisis in which the Government found it necessary to support the Njemps with famine relief.

This crisis, requiring Government intervention and expenditure, attracted official interest and provided an opportunity for ideas for an irrigation project. At first, in keeping with the style of the conservation era of colonial development, the aim was to restore what had been rather than to innovate: two attempts, both unsuccessful, were made to replace the Njemps' brushwood weir with a dam of sacks. These failures and the continuing plight of the Njemps encouraged bolder proposals. In 1933 the Senior Agricultural

6 For accounts of some visits by early explorers see J. THOMSON, *Through Masailand, A Journey of Exploration among the Snowclad Volcanic Mountains and Strange Tribes of Eastern Equatorial Africa*, London, Sampson Low, Marston, Searle and Rivington, 1885, pp. 400-402 and 526-529; E. C. DAWSON, ed., *The Last Journals of Bishop Hannington*, London, Seeley, 1888, pp. 195-196; Ludwig Ritter von HOHNEL, *The Discovery by Count Teleki of Lakes Rudolf and Stephanie*, London, Longman's Green and Company, 1894, Vol. I, pp. 433-34 and Vol. II, pp. 1-5; and C. PETERS, *New Light on Dark Africa: being the Narrative of the German Emin Pasha Expedition*, London, Ward, Lock and Company, 1891, pp. 268-277. On 8th January 1890 PETERS concluded a treaty with the Njemps under which Njemps and Baringo territory were ceded to him with a request that it receive German Protection. PETERS said that he found the Njemps people "intelligent and submissive" (p. 273). While there is no reason to think that he had an irrigation scheme in mind, it is interesting that he favoured the establishment of a station and believed that it "would very soon pay for itself as a commercial factory" (p. 273). Extracts from early explorers' accounts have been brought together in an unpublished monograph by Mrs. R. T. LAMBERT, "A Political History of Baringo and Eldama Ravine", c. 1951, which also contains much else of interest concerning the history of the area.

7 *Kenya Land Commission, Evidence and Memoranda*, Colonial No. 91, London, HMSO, 1934, Vol. II pp. 1805-08, evidence of Mr. M. BLUNDELL, and pp. 1820-22, evidence given by Mr. D. H. STANNING.

8 *Ibid.*, p. 1910, evidence given by Mr. E. B. HOSKING, O.B.E.

Chemist, after describing the desert conditions and the scores of freshly stripped skeletons of cattle he had seen around a manyatta at Marigat, considered the possibilities of piecemeal assistance to a number of small irrigation schemes on various rivers. But, he asked: "Is it really worth while considering such small practically individual projects?" And he backed his conclusion that "There is a very good prospect of a really big project being successfully run" with proposals for a barrage in the Perkerra gorge⁹. No immediate action was taken, but his report was followed up in 1936 by a more detailed survey by two engineers, CARRICK and TETLEY¹⁰. Although they found that the flows in the river varied dramatically between 3½ cusecs and 55,000 cusecs, they recommended construction of a weir and the settlement of Njempis and neighbouring Tugen on a scheme which would irrigate 3,000 acres. The capital cost they estimated at £16,000, with a recurrent cost of £1,600 a year. Since this recurrent cost would be less than the annual commitment for famine relief, they argued that the project would be justified.

From this time onwards, it is as though the idea of irrigation from the Perkerra river had a life of its own. At first it was championed by the Director of Public Works, who tried to seize two opportunities to implement a scheme. The first came in 1940, with the promise of abundant capital from Colonial Development and Welfare Funds. The second was in 1943, with the promise of abundant labour from Italian prisoners of war. But on both occasions the Administration vetoed the proposal, arguing that staff were short, that there were better alternative uses for the resources required, and that settlement of both Tugen and Njempis on the same scheme would be acceptable to neither. After the end of the war, however, the Administration began to show interest, if in a somewhat confused way. The Provincial Commissioner (PC) wrote in 1946: "It is simply appalling the way water goes to waste. I cannot comment on the various schemes which the experts have put up from time to time, as I cannot find much on the files in this office"¹¹. Although the 1936 CARRICK and TETLEY report had been lost, it was known about, and the idea of an irrigation project stayed alive. The Scheme's birth in 1953 was premature and unplanned, precipitated by crisis.

During the early stages of the Mau Mau Emergency, Kikuyu, Embu and Meru people were being "repatriated" from the Rift Valley Province to the Central Province from which they or their parents had originated; but when they arrived there many had no land or other means of subsistence.

⁹ Senior Agricultural Chemist, "Report on Portion of the Kamasia and Njempis Native Reserve with Special Reference to Irrigation Possibilities", 29. 4. 33.

¹⁰ H. E. CARRICK and A. E. TETLEY, "The Perkerra River Irrigation Project", 25. 6. 36.

¹¹ Letter, PC Rift Valley Province to R. P. Armitage, 13. 4. 46.

The PC, Rift Valley Province, pressed on both security and humanitarian grounds for camps for them to be set up within his province. Permission was given over the telephone, allowing the PC only 36 hours in which to decide where to site the first camp.

He called together departmental heads, administrative officers, and the Member of Legislative Council, and various proposals – quarrying, bush clearing, forest planting – were considered. None, however, was specific enough to indicate a definite site for a camp. But the District Commissioner (DC) Baringo favoured Marigat so that the labour could be used to improve the road to Nakuru and also perhaps for irrigation. Marigat was agreed, but the decision had been on where to site a camp rather than on implementing an irrigation scheme¹².

Commitment to the Scheme came about not so much through identifiable decisions as through a flow of events. After the detainees had been moved in and had begun working, road construction gave diminishing returns as labour had to work further and further from the camp. Then, when the 1936 report was eventually found, it emerged that the camp had been sited on the wrong side of the Perkerra river. The camp water supply which came from the neighbouring Molo river dried up, and both to obtain water and to concentrate work more economically on irrigation the camp was moved closer to the irrigation site. In the meantime the idea of irrigation fired the enthusiasm of officials who were soon talking of the Perkerra Irrigation Scheme in optimistic terms. In the words of the Annual Report of the Department of Agriculture for 1953:

“A Works Camp for displaced Kikuyu was established at Marigat to construct an irrigation canal from the Perkerra river onto the Njemps flats, where an initial irrigation scheme of 3,000 acres may later be extended to 6,000 acres.”¹³

Over the years of construction work on the Scheme achievements were disappointing. As Table 1 shows, acreages prepared for irrigation consistently fell below the targets set.

Nor, in the period up to 1959, was the settlement of tenants as effective as hoped. The first 47 Njemps and Tugen tenants came to the scheme in 1956, and their numbers swelled to 241 in 1958. But then many left or were dismissed, leaving only 114 at the end of 1959. Cultivation during this period was also beset with difficulties. Maize, groundnuts and tomatoes were tried but none of these gave any lasting hope of making the Scheme economically viable. Capital and recurrent costs were high and revenue negligible¹⁴. In these circumstances, the position was reviewed in 1959 and the Scheme

12 Interview with the PC, (1965).

13 *Department of Agriculture Annual Report for 1953*, Nairobi, Government Printer, p. 55.

14 See Table 2 on page 350.

Table 1. Development Targets and Achievements

Year target was set	Year set for target achievement	Target acreage to be prepared for irrigation	Acreage reported prepared at target date
1953	unstated	3,000, later perhaps 6,000	—
1955	1956	1,500	1,000
1956	1958	3,000	1,195
1958	1959	1,600	1,162

Sources: *Department of Agriculture Annual Reports* and *Perkerra Irrigation Scheme Annual Reports*.

Note: The acreages reported prepared in 1955 and 1956 were later recognised to be exaggerated because of surveying errors, inclusion of land in developed areas which could not be irrigated, and inclusion of land which was not fully prepared.

was placed on a care and maintenance basis for three years at the end of which time a decision was to be taken about its future.

In 1962, after the three years, there was considerable discussion¹⁵ about whether to close down, maintain or expand the Scheme. In favour of closure it was argued that the Scheme was technically unjustifiable because of the small and unreliable river flow; that there was still no crop on which its economy could securely be based; that an annual loss of between £15,000 and £19,000 would be saved; and that if the Scheme was to be wound up it should be done without delay before it became part of the established life of the district. Against closure it was argued that there was a moral obligation to the tenants; that the tenants would have to be resettled elsewhere if the Scheme were abandoned; that the £365,000 already spent would have to be written off; and that the Scheme's maize production would cease and it might be necessary to resume famine relief in the area. Moreover, the Scheme was proving popular and there was a waiting list of 150 potential tenants. The Chief Agriculturalist pointed out that although only 430 acres were being cultivated, a total of 1,750 acres had to varying degrees been developed and the balance of 1,320 acres could be brought into production for a relatively small additional cost. He further argued that expansion would reduce the annual loss to Government. The decision hung in the balance: in April 1962 a meeting of senior officials advised that the Scheme should be closed down; in May they supported a decision that it should expand.

From 1955 onwards another more ambitious idea was occasionally considered. A water storage dam might provide a more reliable water supply and

¹⁵ This paragraph and subsequent historical paragraphs are based upon *Department of Agriculture Annual Reports*, *Perkerra Irrigation Scheme Annual Reports*, *Minutes of the Perkerra Irrigation Scheme Committee*, and various memoranda, letters, and personal interviews.

allow a much larger acreage to be irrigated. A site was identified and in 1960 the Chief Hydraulic Engineer estimated the ultimate irrigation potential of the catchment at 16,000 acres and the cost of developing this potential by means of a storage dam at between £3 million and £5 million. Silting would be acute and the life of the reservoir would only be about thirty years. After the 1962 decision to expand the Scheme, however, further exploration revealed another site higher up the catchment where the silt load was much less. A dam built there to store enough water to irrigate 6,400 acres was estimated at about £1 million, and for a time there seemed a possibility of surveys for a very much larger project. The planners and agriculturalists had higher priorities, however, and the proposal was shelved.

Table 2. Finance and Settlement

	(1) Capital £	(2) Recurrent £	(3) Depreciation ^a £	(4) Revenue £	(5) Operating Losses in £ (2)+(3)-(4)	(6) Total Tenants
1954	86,336	21,588	1,727	Nil	23,315	-
1955						-
1956	33,546	16,490	2,398	Nil	18,888	47
1957	55,016	22,213	3,498	500	25,211	72
1958	32,777	16,145	4,153	800	19,498	241
1959	9,675	31,060	4,347	2,100	33,307	114
1960	2,771	16,313	4,402	2,640	18,075	99
1961	3,045	14,460	4,463	2,405	16,518	128
1962	7,221	20,218	4,608	2,021	22,805	326
1963	14,241	31,906	4,892	13,232	23,566	334
1964	6,198	35,580	5,017	7,114	33,483	362
1965	10,940	44,790	5,236	33,197	16,829	402
1966	8,447	27,156 ^b	7,788	15,545 ^b	19,399	503
1967	3,202	34,464 ^b	6,357	15,420 ^b	25,401	481
Totals	273,415	332,383	58,886	94,974	296,295	-

^a Depreciation does not include the irrigation works. Were they included, depreciation and operating losses would be substantially higher.

^b Recurrent expenditure and revenue figures for 1966/67 and 1967/68 are lower because of the exclusion of items such as fertilisers and insecticides which were in and out items and which previously appeared in both columns.

Sources: Columns (1) to (5), letter from General Manager, National Irrigation Board, 24. 10. 68; column (6), annual reports of the Perkerra Irrigation Scheme and also *Department of Agriculture Annual Reports*.

Notes: The financial year ran from 1st July to 30th June. Financial figures refer to the financial years ending on 30th June of the next year to come. Thus, capital expenditure for the year 1956/57 was £33,546. Tenant figures are for 31st December of the year against which they appear, except for the 1967 and 1968 figures which are for 30th June.

In the meantime the Scheme was being expanded. At the end of 1962 840 acres were reported to be "developed", and by the end of 1963 the figure had risen to 1,381 acres. More tenants were settled and by mid-1967 there were over 500. After early disease control problems had been largely overcome through spraying, onion production became the main cash crop, with maize still grown for tenants' subsistence. Mechanical cultivation, centrally controlled by the scheme management, was coordinated with activities carried out by tenants¹⁶. The acreage of onions cropped was increased from 62 in the 1961/62 season to 673 in 1967/68 and yields rose in the same period from 0.58 to 3.52 tons per acre. But the very success of onion production under the high cost conditions of Perkerra created severe problems of marketing. The economy of the Scheme had been staked on one crop, but competition from cheaper growers depressed the onion market and by mid-1968 the gamble on onions appeared to have failed and the search for new crops was intensified.

By mid-1968 the capital cost of Perkerra had been £273,000, the recurrent cost not including depreciation £332,000, and the revenue only £95,000. The Scheme was kept alive by the National Irrigation Board with a direct grant running at about £24,000 per annum. Since much of the revenue of the Board was derived from Mwea, this can be seen as a transfer equivalent in round figures to £13 from each Mwea tenant each year to provide some £50 subsidy each year to each Perkerra tenant. Nor did it seem likely that the fact that Perkerra was in the constituency of a distinguished political leader would diminish its chances of survival. It had become a mature dwarf, confirmed in its dependence, kept alive by its richer sister, and sustained in its search for economic viability by the hope that a near-miracle would overcome its structural impediments.

This brief historical summary has been designed to explain why and how the Scheme came into being, and to describe the bare outlines of its progress and of the major decisions which have affected it. Every development scheme is, of course, unique, and some of the features of Perkerra are exceptional. Nevertheless, with this account as a necessary background, an examination of the problems encountered over the first fifteen years of the life of this scheme will reveal some of the difficulties which can be anticipated and hopefully avoided in other agricultural development projects.

¹⁶ See DE WILDE et. al., op. cit., pp. 221-241 for observations on the Perkerra and Mwea systems of management, especially pp. 228-231 for Perkerra.

II. The Problems Experienced

The problems experienced can be separated into those concerned with construction and irrigation; production and marketing; tenant management; and government organisation.

1. Construction and Irrigation Problems

The first major construction problem concerned the diversion weir in the Perkerra river. Because of the urgency of early implementation a temporary cement weir was quickly and cheaply constructed. The speed and cheapness proved, in the long run, to be expensive. Between 1954 and 1962 almost continual repairs were necessary. Flood damage in 1954 was estimated to require £6,000 to £12,000, and again in 1961 £5,000. In other years there were reports of cracking in the weir, and scouring on the lower side undermining the whole structure, all of which added to the costs of the project.

The distribution of water and layout of the irrigation system also proved difficult and expensive. The ground was more irregular than expected, which increased the amount of earth-moving necessary and required the construction of culverts to carry water over gullies. For four years there was a departmental difference of opinion about the form of layout to be adopted, and over 400 acres levelled into basins had later to be virtually abandoned for some years to the nutgrass which flourished in the swamp conditions they provided.

Labour and machinery were difficult to control. The physical work of development was at first carried out mainly by detainees. The Prisons Department, which supervised them, was interested in work performance as a means to rehabilitation rather than as an end in itself, and tended to measure its success in terms of the numbers of detainees who could be released rather than the numbers who could be kept at work. Development was slowed by a sharp rundown in numbers, from about 1,000 in 1955 to only 200 in 1957, aggravated by delays in the supply of machinery to substitute for hand labour. Then, when earth-moving machinery did eventually arrive, there were problems of finding staff able to maintain it, of breakdowns, and of recurrent hold-ups waiting for spare parts.

The most serious irrigation problem, if anything more acute in 1968 than in 1954, was the erratic flow of the Perkerra river. The rapid runoff in the eroded catchment continued to send sudden floods down the river. These damaged the headworks and left heavy silt deposits in the canals and feeders. More critical, however, were the periods of water shortage. In the

drought of 1961, the flow was down to 3 cusecs. For the first five months of that year the entire river flow was extracted and for most of that time proved inadequate. The vegetation cover of the catchment area has probably deteriorated since the Scheme was started, as the high forest is gradually cut down and cultivated and as much of the lower catchment is overgrazed. In his Annual Report for 1965, the Manager stated that:

"Reports from the District Range Management Officer, Baringo District, are particularly disturbing. (He) reports that, as a result of the recent drought, the increase in Tugen stock which has encroached progressively higher into the hills has laid waste the entire catchment area. The situation is now as bad, if not worse, than in 1954. This state of affairs, if left unchecked, threatens the very existence of the Perkerra Irrigation Scheme."¹⁷

A year later he wrote: "Whether the Perkerra river will still exist at Marigat in another ten years is a matter for conjecture."¹⁸

2. Production and Marketing Problems

Although no crop trials had been carried out when development began, they were quickly instituted and several crops grew very well. Unfortunately, they invariably grew less well when cultivated on a wider scale. The first crop grown was maize. Initial high yields of 20 bags an acre soon dropped to 10 bags and less. The decline was attributed partly to loss of fertility in the soil, but contributory factors were the ravages of bush pig, Grant's Gazelle, Kavirondo crane and thieves, all converging upon the Scheme as the only abundant food source in what was otherwise virtual desert.

Since maize was food for tenants and its official market value was too low to make it a possible cash crop, there was during the latter 1950s a search for a second more profitable crop which could alternate with maize and enable tenants to pay a water rate. Groundnuts were tried, but the seed had poor viability and the tenants were uncooperative. A determined attempt was made to grow tomatoes which were to be supplied to a canning factory. There can be few horticultural hazards to which the tomatoes grown in 1956, 1957 and 1958 were not subject. The crop was planted late. Seedlings were destroyed by heavy rain. Labour demands were high, but labour was scarce. It was not known whether to stake the plants or not to stake them. When the sun shone they suffered from sunscorch and when it rained they were victims of mildew. They were variously attacked by wilt, blight and eelworm. They were damaged in picking and packing. Finally, after the jolting of a long lorry journey over bad roads they arrived at the canning factory having undergone a thorough, but unplanned, form of processing. Tomatoes failed.

¹⁷ Perkerra Irrigation Scheme Annual Report for 1965.

¹⁸ Perkerra Irrigation Scheme Annual Report for 1966.

During the first six years of the Scheme, attention was so fixed on physical development, water management and settling tenants that agricultural research played little part in deciding cropping policies. In 1960, the Chief Research Officer of the Ministry of Agriculture wrote that:

"... no lasting progress can be expected on this scheme unless adequate provision is made for research. Scheme history to date indicates that the provision of facilities for research came about more as an afterthought than as a recognised and planned precursor for sound development."¹⁹

In the early 1960s more effort went into research. Beef and bananas did well, but onions which had already shown promise were so successful that they were rapidly adopted as the main cash crop for the Scheme.

At first there were serious problems in onion production. Most of the 1961 crop was wiped out by an unknown disease. Later, however, this was diagnosed as blast and a control was found for it. A Texan onion expert provided by USAID gave valuable advice and various other difficulties were overcome. Much managerial effort and ingenuity went into organising and operating systems of onion cultivation, spraying and harvesting to achieve high yields, high quality, and almost continuous production. Compared with crops tried earlier tenant co-operation was good as long as prices were acceptable.

Table 3. Onion Acreages and Yields

Season	Acres of Transplants	Total Yield (Tons)	Mean Yield (Tons per Acre)
Before 1960/61	Not known	Not known	Not known
1960/61	Not known	174 ^a	Not known
1961/62	62	36	0.58
1962/63	253	760	3.00
1963/64	416	1,130	2.72
1964/65	390	776	1.98
1965/66	570	2,442	4.28
1966/67	443	1,894	4.27
1967/68	673	2,372	3.52

^a Tons of tenant-grown onions sold by the Scheme during 1960. An unknown additional quantity remained unsold at the end of 1960.

Sources: Personal Communication, 29. 11. 68, from the Manager, Perkerra Irrigation Scheme, for the 1960/61 yield; National Irrigation Board, General Manager's Annual Report 1966-1967, (mimeo), p. 12 for 1961/62 and 1962/63; and Perkerra Irrigation Scheme Annual Report 1967-1968, p. 5 for subsequent seasons.

19 Chief Research Officer, "An Outline of Research Objectives against the Background of a Suggested Policy for the Perkerra Irrigation Scheme", (mimeo), 22. 1. 60.

Unfortunately, as production problems were solved, marketing problems emerged. The high cost high quality onions from Perkerra could not be marketed at prices which would be economic for the Scheme and still compete with onions grown elsewhere. At first a protected market was partly assured by a tariff against onions imported from outside the East African Common Market, particularly from India and the UAR. Then, in 1964, there was increasing pressure from rain-grown onions from Northern Tanzania, the import of which was banned by the Kenya Government in 1965. Then competition was experienced from rain-grown onions from within Kenya itself, from Bungoma and Machakos. Moreover, the 1967 Treaty for East African Co-operation provided for the removal of restrictions on onion imports from Tanzania by December 1970²⁰. The most decisive blow came, however, from large-scale farmers growing irrigated onions near Naivasha in Kenya. With the advantages of good soil conditions, locations closer to the main markets, especially Nairobi, and more diversified economies, they were able to obtain higher yields than the Scheme, could sell their onions more cheaply, and appeared better able to tolerate price fluctuations.

In these competitive conditions, prices received for Scheme onions declined. The mean price for Grade I onions credited to the farmer net of charges for the six year period from July 1961 through June 1967 was 26.38 cents per pound; for the period July 1967 through June 1968 it was only 15.86 cents per pound, having dropped to a derisory 3.24 cents per pound in February 1968²¹. In conditions of free competition and with the East African Common Market it seemed impossible without additional heavy subsidisation, for onions to remain the cash staple of the Scheme. In 1968, after fifteen years of life, Perkerra had once again become a project in search of a crop and an economy.

3. Problems of Tenants and Staff

Many of the difficulties of the Scheme, especially in its early stages, concerned tenant management. Tenants were selected at first by the Provincial Administration, and later by a committee including the Manager and some tenants. The tenants who were selected varied widely in their characteristics and interests and in their degree of commitment to the Scheme. An indication of the early difficulties is given by the instability of early settlement: of

²⁰ *Treaty for East African Co-operation*, printed on behalf of the East African Common Services Organization by the Government Printer, Nairobi, June 1967, Article 13 and Annex III.

²¹ These figures are derived from Perkerra Irrigation Scheme Annual Report for 1967/68.

the first 47 tenants, 17 were evicted for bad work and five left of their own accord; and of the 241 tenants at the end of 1958, only 114 remained at the end of the following year.

This rapid turnover was related to several factors. The terms of settlement were uncertain. It was not clear whether the settlers would be provided with houses, as they expected, or whether they would have to build their own, as official policy came to require. There was indecision over whether the houses should be in villages or on individual plots. There was confusion over the rate that was to be charged to each tenant for his four-acre holding: the original suggestion in the 1936 report had been Shs. 7 an acre, but the authorities in Nairobi proposed Shs. 300 an acre, to the dismay of the tenants who were still disturbed when it was subsequently reduced to Shs. 70. Yet another difficulty was that the cropping requirements of the Scheme conflicted with what the tenants perceived as their interests. Many of the tenants were illiterate and more familiar with a subsistence than with a cash economy. Although maize was expected to be less profitable than various alternative cash crops, the tenants accorded it a higher priority, presumably because it provided them with their food staple, but also in some cases probably because local sale of maize, outside the official machinery which maintained a controlled price, could be very profitable. The divergent interests of tenants and management came to a head in 1958 over the issue of a second crop. The first crop was maize which yielded well. The tenants harvested it, stored some, gave some away to relatives, and probably sold some. The management then sought to persuade them to grow a cash crop of groundnuts, which they were reluctant, indeed mostly refused, to do. This passive resistance was attributed to their having already secured a year's food supply, to the strangeness of the idea of growing a second crop in a year, to groundnuts being unfamiliar and not perceived as a food crop, and to the realisation that the water rate would be deducted from the proceeds whereas otherwise it would be difficult for the management to collect it²². When tenants were subsequently prosecuted for non-payment of water rates, many of them left the Scheme²³.

When onions for a time proved a source of relatively high incomes, settlement was more stable, tenant morale was reported to be high, and the management was able to exercise closer disciplinary control over tenant

22 Perkerra Irrigation Scheme Annual Report for 1957/58.

23 It is an interesting possibility that this crisis may have tended to drive away from the Scheme the poorer people who lacked outside sources of money to pay their water rates, while those with outside resources may have tended more to remain through being able to pay their rates. If this happened, it will have acted as a selection mechanism for tenants with outside interests, precisely those whom the management found it more difficult to control and whom it was less important to help.

performance. But high tenant incomes exacerbated other problems. As their income rose, some tenants treated the Scheme more as a business interest than as a place of settlement. Some tenants, through the use of aliases or the names of close relatives, acquired more than one holding; others sublet their holdings; yet others left their holdings in the charge of labourers while they themselves devoted their main attention to off-scheme interests, some of these being no doubt financed by their previous scheme incomes. In all these cases, because the tenant was absent and the labourers might or might not be present, it was difficult for the management to ensure that manual tasks necessary to cultivation were carried out.

Further obstacles to effective management arose from communication and organisation. Especially in the early days, confusion could arise from the use of Swahili, a language foreign to both tenants and management. Moreover, tenant organisation was bedevilled by divisions between the two main tribal groups, Njemps and Tugen. This was complicated by the land having been originally Njemps, but Tugen having a better record of performance as tenants, and in the early 1960s by the two groups supporting rival political parties. Far from providing the Manager with an opportunity to divide and rule, the tribal split made his task more delicate for any appearance of siding with one group or the other might lead to protest within the Scheme or intervention from without.

Managerial staff, too, had their problems. The conflicts of interest between them and the tenants were demoralising, but there were also other adverse factors. In the early days, a hot climate, mosquitoes, social isolation, and the tensions of living in a small expatriate community all took their toll of patience and tolerance. Letters written in these circumstances were sometimes outspoken, and the authorities in Nairobi seemed remote and unsympathetic, for instance when an attempt to obtain a special hardship allowance for staff at Marigat was turned down. Before the formation of a National Irrigation Board in 1966, irrigation was regarded as a backwater, with negligible promotion prospects compared with equivalent work in the Department of Agriculture. Moreover, Perkerra was a lower priority scheme than its more successful and more prestigious twin, the Mwea Irrigation Settlement, and received fewer visits, less staff and less attention. Further, any manager of Perkerra was bound to feel that however hard and ably he worked, the Scheme might ultimately fail or be abandoned, leaving him with an unjustified stigma for the rest of his career. Finally, in the 1950s the stress of management was aggravated by inter-departmental competition and by a confusion of chains of command which meant that the Manager found himself working to several masters, each with different ideas about what the Scheme was for and how it should be run.

4. Problems of Organisation and Control

During the 1950s, although relations between the staff of different departments on the Scheme were often good, there were conflicts of interest to be resolved. For instance, the use of detainee labour was a source of dispute. At first, the DC's prime concern was that labour should be used on road work, while the Engineer required it for development work on the irrigation system, and the ALDEV (African Land Development Organisation) Manager wanted it for cultivation. At the same time, the Prisons Department which controlled the labour was concerned with security, rehabilitation and repatriation, aiming in fact at the removal of the labour force altogether. The preoccupation with security came to a head with the first maize crop, when the Prisons staff would not at first allow detainees to enter maize that was over five feet high for fear they would drop down, crawl away and escape.

Another form of competition was between the Engineer and the ALDEV Manager over the use to be made of the first twenty acres that could be irrigated. The Engineer wanted to carry out water application experiments; the Manager wanted to start crop trials. The Engineer prevailed, and crop trials were delayed.

A more prolonged difference of opinion arose over the form of field layout. The agriculturalists, concerned with ease of management, favoured levelling the ground into a system of basins which could be flooded. This, they argued, would be similar to traditional Njemps irrigation and therefore easy to introduce to the tenants. In addition, water control would be simple. The engineers, however, were interested in water economy. Basin irrigation, they held, would be extravagant with water, while a system of furrow irrigation on evenly graded slopes would be more economical, although water management would be more difficult. Only after four years when it had become clear that basin irrigation would be overrun by a weed called nut-grass was a final decision taken and furrow irrigation adopted.

There was also uncertainty and indeed confusion over financial aspects of the Scheme. Funds were available from two sources – ALDEV, and Emergency funds – but the criteria for allocation between them were not clear. The ALDEV funds, normally administered by local councils, were handled by the Department of Agriculture in the provincial capital 65 miles from the Scheme, but expenditure was incurred principally by the Public Works Department. In these circumstances close accounting control was not easy. Nor at first was there any clear understanding of the financial position of the Scheme. In 1956 the PC wrote:

"To date . . . none of us are aware what part of the funds are loan funds, what we shall be required to pay back and when, and we have never been given a guarantee by the Treasury that the revenue from this scheme will definitely accrue to the

scheme. How (we) can be expected to plan and budget for the future under these circumstances I do not know."²⁴

These uncertainties were highlighted by a prolonged wrangle over the disposal of the first maize crop. The Prisons Department claimed that since detainee labour had grown the maize, it should be allocated to supplement Prisons' rations. The Administration at district and provincial level claimed that since the crop had been grown on Njemps land, it should be sold and the revenue credited to the local council. The Treasury view was that the maize should be sold but the proceeds credited to general Government revenue. At a late stage in the involved correspondence the Director of Agriculture wrote that if the argument continued he would recommend the growing of melons instead of maize. The maize crop was, however, sold, and the proceeds paid into the local council. When faced with a demand that the sum be transferred to Government revenue, the PC gamely replied that the local council had been intending to invest the money and asked if the Treasury would pay interest. He went on:

"I am afraid my officers are still not convinced of the safety of these funds if paid to the Treasury. They feel that the officers of the Treasury and the Minister may change, and that the pressing needs of other Provinces might persuade the Treasury or Legislative Council to vote the money elsewhere."²⁵

But the PC was overruled at a high level and the sum was paid over to the Treasury.

Control and administration of the Scheme were also complicated by departmental attitudes. At the technical level on the Scheme, as we have seen, the engineers and agriculturalists had different priorities. But at a higher organisational level there were deeper differences concerning how the Scheme should be controlled. The General Manager appointed in 1956 to supervise irrigation projects in Kenya argued for the setting up of a largely autonomous central board which would be independent of the Provincial Administration. He wrote:

"If any problem concerning Government administration should arise the Manager of the Scheme would be free to consult with the local District Commissioner or regarding health with the Provincial Medical Officer, etc., but I feel it would be unwise to make your Manager subservient to a local Committee of Management who may have widely diverging views from his. He is the Manager of the Scheme, responsible for running it correctly and he should not need to be told what to do by any local Board... He would naturally follow any policy laid down by the Central Board. Put in a good manager and let him run it. The local Government Officials are constantly changing and there is no real continuity so it is really best to leave them out of it except for consultation when necessary."²⁶

24 Letter, PC Rift Valley Province to Secretary for Agriculture, 4. 6. 56.

25 Letter, PC Rift Valley Province to the Secretary for Agriculture, 17. 4. 56.

26 General Manager, Irrigation Development Projects, Memorandum on the Organisation of Irrigation, ca. April 1956.

He favoured putting in well paid high calibre managers who would work direct to him, as General Manager, in Nairobi, and whose main concern would be efficient production.

The Administration took a very different view. The PC stated that the Perkerra Scheme was "not a Government Estate for making money, growing produce and employing labour" but was "a settlement and land rehabilitation scheme"²⁷. It was part of an integrated policy for moving people out of the forests they were destroying and resettling them where they could irrigate with the water supply thereby preserved and protected. The Administration claimed the right to handle many aspects of the Scheme such as land matters, local council cesses, and tenant selection. In particular, objections were raised to an exclusive managerial staff paid more than other Government officers and encouraged to go its own way. These views prevailed. The proposals for a central board were defeated and during the 1950s the Administration retained considerable influence over Scheme policy.

Table 4. The Perkerra Local Committee

Year	Number of Meetings	Number of Members	Chairman	Membership
1954	4 (Aug-Dec)	4	PAO	PAO DC Divisional Engineer, PWD Manager
1955	7	4	PAO	
1956	3	4-6	PAO	plus Medical Department Representative plus General Manager, Irrigation (GMI)
1957	11	6-7	GMI	plus DO
1958	9	7-8	GMI	plus Tugen Representative
1959	6	8-10	DC	plus Veterinary Representative plus Agriculture Representative

Source: Minutes of the Perkerra Local Committee 1954-1959.

Notes: PAO = Provincial Agricultural Officer; DC = District Commissioner; GMI = General Manager, Irrigation Development Projects; DO = District Officer.

Actual attendances were usually slightly larger than the formal membership as a result of persons being present by invitation.

Much of this influence was exercised through the Perkerra Local Committee, the composition and attendances of which from 1954 through 1960 are summarised in Table 4. Initially a small policy-making and executive body

²⁷ Letter, PC Rift Valley Province to Secretary for African Affairs, 20. 6. 56. (PC's underlining).

which directed the Scheme, it grew in size in response to external pressures for representation, and as it grew its functions shifted from decision and direction to discussion and advice. When tenant representatives were added in 1963, its meetings became less regular, but its form was retained in an executive committee consisting only of officials. By 1968 it had lapsed. During the 1950s, however, it was a forum for expressing and attempting to resolve differences of opinion and policy and it represented scheme interests to the authorities in Nairobi. Despite the existence of this committee, however, there was still a tendency for officers of different departments in the course of their unsynchronised visits to issue conflicting instructions to staff on the Scheme so that the Manager in particular sometimes found that he had to work to different masters with different ideas of what should be done. In the early 1960s, however, the Manager came more clearly under the Director of Agriculture, and with the creation of the National Irrigation Board in 1966 the process of detachment from local officials was carried even further, leaving the Manager with a freer hand in pursuing his technical agricultural objectives.

III. Some Concluding Lessons

Many lessons could be culled from the Perkerra experience. Only some of the more obvious and important will be mentioned here.

In the first place, the high costs and risks of hasty development with inadequate surveys are abundantly clear. To embark upon a major irrigation project with little knowledge of river flows and with what limited knowledge there is indicating unreliability; without any assurance that a cash crop can be grown and marketed; without experience of tenants' performance; and without any pilot project – these are to court disaster. Moreover, one effect of such ignorance is to encourage overinvestment in unprofitable directions which have then to be abandoned: the 430 acres of basin irrigation which were overrun by nutgrass, and the extensive cultivation, before adequate trials had been carried out, of tomatoes, groundnuts and even onions. When, as has occurred at Perkerra, most of the experimental work is carried out not on a research station but with tenants on their plots the risks of failure are multiplied by the dangers of tenant dissatisfaction, of loss of confidence in the management, of absenteeism, and ultimately of permanent departure from the scheme.

Second, when a complex project requiring a favourable coincidence of several interdependent factors begins to run into trouble, difficulties tend

to compound one another. On Perkerra, lack of water has sometimes limited the acreage that can be irrigated, in turn limiting returns to tenants and revenue to the Scheme, increasing the dependence of the Scheme on subsidy and aggravating the problems of tenant management. Unstable onion prices have affected tenant and staff morale as well as revenue. Evictions and other disciplinary measures to secure effective tenant performance may be partly self-defeating by reducing the tenants' sense of security on a scheme and encouraging them to spend more time and energy on their off-scheme activities. Such chain reactions as these make heavy demands both on managerial skill and patience and on the financial resources of a parent organisation. Where a scheme has, like Perkerra, a generally unfavourable physical environment and narrow technical limits of tolerance, able management may reduce or cushion some of these reactions but is unlikely always to overcome them. In these circumstances, financial support of various forms becomes the variable that is easiest to manipulate, with the result that a scheme is maintained but at a heavy cost to the rest of the economy.

A third lesson emerges from the process of creeping commitment to the Scheme, starting with the first ideas of replacing the indigenous irrigation which had been destroyed, leading to preliminary surveys and then to a situation in which the idea of irrigation was at large and ready to be seized on whenever an opportunity presented itself. There was never any meeting or moment at which a decision to implement the Scheme was clearly taken. Even the siting of the camp at Marigat was only partly associated with the possibility of irrigation. But the very presence and use of the labour; the posting in of staff; the allocation of funds; the physical developments such as building the camp, construction of the weir, and land preparation; the deepening enthusiasms of individual officials and the increasing involvement of departmental interests; the visits of VIPs to inspect progress; the selection, induction and management of tenants; the growing and marketing of crops – all these in multiple ways progressively secured the Scheme as a permanent entity and strengthened its capacity to survive. It became increasingly difficult to close it down. To abandon the Scheme would have meant to accept failure, to write off heavy government expenditure, and to have to resettle tenants, transfer staff, and save a number of faces. It was always easier and involved less immediate acceptance of responsibility to allow the Scheme to continue. The chance in 1962 when the tenants could have been resettled in the former European highlands was allowed to slip, and by 1968, with some 500 tenants to varying degrees dependent on the Scheme, closure had become politically and humanly difficult even to contemplate.

A fourth observation is that the true costs of a project like Perkerra may usually be greater than their apparent costs. To evaluate any scheme is, of course, a complex operation with several quantifiable and many un-

quantifiable factors to be taken into account; and, to be sure, even with Perkerra there have been hidden benefits – learning on the part of the tenants, including their introduction to a cash economy; experience gained by government officials; investment of incomes generated by the Scheme; indirect government revenue; and seasonal employment, among others. But schemes which are heavily committing in terms of capital expenditure, departmental and individual involvement, and political interest and support tend to receive a perverse protection: the levels of external support and of tolerance in evaluation vary inversely with their economic performance. Except in stringent economic evaluations, “success” for a scheme like Perkerra is defined in less exacting terms than for an economically more viable scheme such as Mwea. Protective standards of assessment and hidden subsidies are easily combined to give a false impression of favourable economic performance. Moreover, a scheme such as Perkerra has to be evaluated not just in isolation but in terms of benefits foregone from alternative uses of the resources involved – especially capital, managerial competence and effort, and labour. Had the sum of over £500,000 and the human resources invested in Perkerra by 1968 been used in other ways, the results might have been substantial benefits instead of continuing indefinite liabilities.

These four lessons – the costs and risks of haste and ignorance; the compounding of problems in complex projects; the irreversibility of the creep of commitment; and the high true costs of poor projects – combine in a criterion applicable to choices in agricultural development. The Perkerra Irrigation Scheme, with its requirement from the start of complex and continuing organisation involving government support, can be contrasted as a policy with the implications of an incident in the history of the Scheme. In 1961 the Manager noted that “A tenant was given a sample of Taboran maize seed which ripened about four weeks earlier than the local variety and yielded at a rate of 11 bags per acre. The tenant concerned was besieged by others wanting seed to plant”²⁸. This was, of course, an event on an irrigation scheme, but the implications are wider and apply to non-irrigated agriculture. The contrast here is between on the one hand a major project like Perkerra which requires on-going government involvement, and on the other programmes like the introduction of a new seed variety which can be one-shot efforts. In a major project the risks and liabilities are shouldered by govern-

²⁸ Perkerra Irrigation Scheme Annual Report for 1961.

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ment: if the project succeeds, government is obliged to continue to service and manage it; if it fails, it may prove politically and administratively impossible to abandon it. In the one-shot programme, however, the risks and liabilities are accepted by the individual farmers: if the innovation succeeds, it is propagated without further government intervention; if it fails, it is quickly and easily abandoned by the farmers without additional cost or administration for government. There are, of course, a great many other considerations which bear on policy choices; but capital and administrative capacity are typically scarce resources to be used sparingly; and in choosing between alternative approaches to agricultural development there is a case, other things being equal, for preferring those which are cheap, simple, administration-sparing and easy to withdraw from to those which are expensive, complex, administration-intensive and committing.

It is not enough merely to be aware of these considerations; there must also be a climate and machinery in government to make sure that they are taken into account. In British colonial government in East Africa in the 1950s there was a relative absence of economic criteria in official thinking and a readiness to support the initiative of officers at the local level when they promoted projects. There was sympathetic backing in the Kenya central government for the vision and enthusiasm of the civil servants at provincial and district level who energetically launched the Perkerra Irrigation Scheme. Entrepreneurial capacity of the sort which they demonstrated is certainly an asset to a government, but as the Perkerra story shows it can be dangerous unless it is controlled. What is needed is a powerful and perceptive presence in governments which, while not stifling local initiatives, ensures that schemes as unpromising as Perkerra are never begun; for it is far easier to prevent a bad project than, once it has been started, to close it down.