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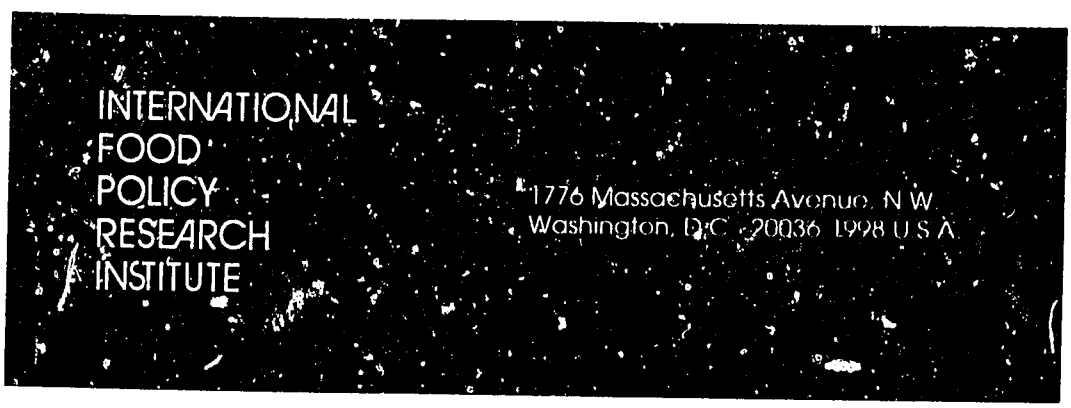

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WHEN PROJECTS COLLAPSE: IRRIGATION FAILURE IN THE GAMBIA FROM A HOUSEHOLD PERSPECTIVE

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Abstract: This paper examines the impact of the failure of an irrigation project on former beneficiary households. The project in question was designed to expand pump-irrigated rice production amongst smallholders in The Gambia. It achieved this aim for a few years; increased farm productivity improved food security for participating households, while at the same time increasing their ability to invest in farm, household and community assets. However, the project subsequently succumbed to numerous technical and institutional problems. The paper considers the reasons for the project's failure, discusses the effects and consequences of project unsustainability from the household perspective, and draws a number of conclusions about minimum requirements in the design of projects of this type.

1 INTRODUCTION

When development projects fail the first losers are the participants themselves. Having risked an investment of resources in the adoption of new technologies, it is they who bear the brunt of a scheme's demise. Yet while technical analyses of intervention performance and causes of project collapse abound, our understanding of how participants are affected by the unsustainability of development projects is limited. This article seeks to broaden our understanding of these issues by examining a case of project failure from the perspective of the rural households that the scheme was designed to serve. The project in question, which aimed at expanding pump-irrigated rice production in The Gambia, was implemented by the World Bank between 1972 and 1977.

Given the poor track record of irrigation schemes in Africa, the role of irrigation in development has come under much scrutiny (Auclert, 1987; Carruthers, 1988). It has been argued that more needs to be known about the grass-roots operation of small projects if mistakes associated with past investments are not to be duplicated in the future (Eicher and Baker, 1982; FAO, 1987). Three main types of study have been identified as being urgently needed for the generation of such information: (1) internal project monitoring, (2) independent *ex-post* evaluation, and (3) retrospective studies of defunct schemes 'to establish how they worked and where problems occurred' (Adams and Grove, 1984). It has been argued that 'of these three [types of study] the

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last is perhaps the least considered and the most immediately promising' (Adams and Grove, 1984).

The present article derives from research that falls into this third category.[1] Focusing on a project that encouraged rice double-cropping for Gambian smallholders, this paper does not simply outline how and why the project failed, but also describes what happened to the participants after the project had come to an end. This is not, therefore, a project evaluation in the usual sense, but rather an examination of the readjustment process forced on households during and after project decline.

The results are based on a questionnaire survey carried out in early 1988 in a village in eastern Gambia. The village was one of 10 surveyed by the author in 1983 during the course of the World Bank's internal evaluation of the project (World Bank, 1984). Knowledge gained from the previous visit permitted verification of household recall data. While the results reported are project-specific, the information gained from this case study sheds some light on the wider problems of project sustainability from a household perspective.

The Research Setting

The Gambia is a riverine enclave surrounded by Senegal, in West Africa. Approximately 70 per cent of the country's 858,000 population depends on farming (Sadik, 1990). Groundnuts are the main agricultural commodity, making up 55 per cent of GDP and over 80 per cent of exports, while rice is one of the principal staple food crops (von Braun *et al.*, 1990; UNCLDC, 1990).

Most of the rice (61 per cent) is produced in rainfed swamps, and another 7 per cent constitutes upland rice (Kinteh, 1990). The remaining 32 per cent is cultivated by means of pump or tidal irrigation. Irrigated areas have been expanded since the 1950s as part of The Gambia's drive to achieve greater self-sufficiency in rice.[2] Although rice alone represents some 50 per cent of total cereal consumption in most years, domestic production has not been able to keep pace with demand. Cereal imports have accounted for roughly 30 per cent of national consumption since the early 1970s (Johm, 1988). One of the more recent irrigation schemes implemented to counter these imports was the World Bank's Agricultural Development Project (ADP) implemented between 1972 and 1977.

2 PROJECT HISTORY

Costing US$1.5 million (current prices), the ADP was to develop 1200 ha of swamp for irrigated rice cultivation by 3000 farm households divided into 50 separate perimeters. The project design followed that of Taiwanese schemes that had previously been promoting rice double-cropping in central Gambia since 1966. This approach relied on the irrigation of small bunded perimeters by diesel-powered pumps, the provision of mechanical tillers for hire, and the free distribution of seed and fertilizer to participants during their first year in the scheme. The ADP adopted all

[1] This research was carried out by the author as part of a longer-term study organized by IFPRI, in collaboration with the Planning, Programming and Monitoring Unit (PPMU) of the Ministry of Agriculture of The Gambia. For details of the broader survey see von Braun *et al.*, (1989).

[2] For details of earlier projects see Dey (1982), Webb (1986) and Webb (1989).

the Taiwanese components except free input distribution; ADP provided inputs on credit.

When direct World Bank involvement in the project ended in 1977, and the scheme was taken over by the Ministry of Agriculture, results were already below original expectations. Less than two-thirds of the target area had been developed, and although dry season yields had reached an average of 4 tonnes per hectare, only 70 per cent of plots were planted during the dry season and less than 20 per cent during the wet season (Gambia Government, 1979). By 1982, 5 years after the end of ADP, only 30 per cent of the perimeters were being irrigated in the dry season, and less than 10 per cent were producing a wet season crop (World Bank, 1984; Webb, 1986). Furthermore, of the 50 schemes originally established during ADP, fewer than 20 were still operational.

An evaluation by the project donor in 1983 documented the technical and socioeconomic reasons for the limited success of the scheme (World Bank, 1984). However, at that time no attempt was made to assess the impact of the collapse on its former participants. The question remained of what happened to participating villages during the period of yield and output decline, and subsequently when they could no longer produce a pump-irrigated crop at all. It is this question that is considered here in relation to the experience of one of the participating villages, Cha Kunda.

The Village Context

Cha Kunda is on the south bank of the River Gambia, 350 km east of the capital, Banjul. In 1988 it was a village of 380 adults and 390 children inhabiting 29 compounds or extended households.[3] The village is a compact nuclear settlement surrounded by its farmland.[4] Most compounds divide their farms into two parts: a set of fields cultivated communally to provide food for home consumption, and a set of fields that are planted by individuals (both men and women), who wish to grow a private cash crop. As a result, most households cultivate a mix of upland coarse grains (millet, sorghum and maize), cash crops (primarily groundnuts and cotton), and, when located close to the river, a swamp rice crop.

Before pump-irrigation, Cha Kunda's farmers grew swamp rice both as a communal and as a private (cash) crop. Responsibility for production of both types of rice fell mainly to women (Webb, 1989). It was their task to demarcate plots and, since women carried out the bulk of field labours, it was they who directed activities in the field. The harvested rice was stored and dispensed for consumption or sale by the principal woman of the household.

Arrival of the Project

This system of cultivation and storage continued until Cha Kunda was selected by ADP engineers as an irrigation site in 1972. An area of uncultivated mangrove 6 km

[3] At a national level the average size of a household is 17 individuals, ranging from one to over 100 people.
[4] Private ownership of land is rare. Land is held in trust by village communities as a whole, and usufruct rights are distributed to individual compounds by the community leaders. Women traditionally have primary access to swamp lands used for rice cultivation. Both men and women farm 'upland' rainfed fields.

north of the village was cleared in 1973, and 40 ha were levelled and canalized in 1974. A single 25-hp diesel engine (pumping capacity 280 m^3/h) was set in a concrete base in 1974 ready for a first crop to be irrigated in the dry season of 1975.

All compounds joined the project during its first 3 years of operation; 62 per cent of the compound heads report that they participated in order to increase household food security. Only 17 per cent stated that the main reason for participation was a desire to earn cash. The remainder was moved either by the lure of new technology or by peer pressure.

It should not be assumed, however, that all women in the village favoured participation. Although 20 of the head women agreed to support the project because they regarded it as being 'for the betterment of all the community', nine head women were less happy because they had not been consulted about their views. Of the nine women, five finally agreed to support the male compound heads. In the remaining four compounds, including that of the village chief, the women did not support the project. This was reportedly because they suspected that women would not benefit from the new technology. Although Cha Kunda's project did not reclaim existing rainfed swamp, the women's fears were well founded. In other villages where women's fields were incorporated into similar irrigation projects women often lost control of their land and of the rice crop (Dey, 1982; Elias, 1987).

The average area received in 1975 was 0.86 ha per compound (equivalent to 0.08 ha per capita). This offered an irrigated production potential of over 3 tonnes of paddy per harvest, but it also carried with it far-reaching demands for labour. On the one hand, the project competed with wet season crop production. Swamp rice cultivation requires roughly 200 days of labour per hectare. The upgraded irrigation technology introduced by ADP raised labour requirements in rice to around 370 days per hectare (von Braun *et al.*, 1989). The project's managers assumed that farmers would give priority to the irrigated crop over rainfed crops because of its high yield potential. It was recommended, therefore, that every compound give up 0.4 ha of swamp rice and transfer labour from that crop to the pump-irrigated rice.

On the other hand, the scheme also competed with traditional non-farm dry season activities through its extension of farming operations beyond former time limits. In the absence of locally adapted cultivars suited to the coldest period of the year (December–March) adherence to a strict timetable of operations was required in order to make double-cropping feasible. For the dry season crop seedlings must be transplanted before the end of February and harvested in May before the arrival of the rains. After the first crop has been threshed, a second ground preparation needs to be completed in June, enabling a wet season crop to be harvested in December before ground temperatures fall too low. The project management assumed that 'alternative employment opportunities are virtually nonexistent' during the dry season, and that irrigation activities would therefore be uniquely attractive (World Bank, 1972).

During the first 4 years of the project (1975–79) the project's assumptions appeared to be substantiated, at least where the dry season crop was concerned. Most compounds irrigated during the dry season, harvesting average yields of 5 tonnes per hectare — a large increase over yields of less than 2 tonnes per hectare from rainfed swamp rice (World Bank, 1984). However, wet season production never reached the heights predicted by the planners. Wet season yields rarely exceeded 3 tonnes per hectare, and few compounds considered the wet season crop to be as important as that of the dry season. This was because villagers deemed it unnecessary to irrigate when

rain was available. Four compounds never attempted an irrigated wet season crop. The other 25 compounds did pump-irrigate in the wet season during the few first 2 years, but even these pumped only when the plots were almost dry. Often plots were not even ploughed or replanted before a half-irrigated, half-rainfed ratoon crop was left to grow. These plots yielded some 50 per cent less than dry season crops, but produced more than the rainfed swamps and with much reduced labour inputs.

The labour issue was important. Many women transferred labour from their traditional swamp fields to the pump-irrigated fields under their husbands' control. As a result, the proportion of women cultivating private rainfed rice fields fell from 97 per cent before the project, to 26 per cent during the early years of pump-irrigation. Some men also ceased cultivating private groundnut fields in order to give more time to the project.

It should not, however, be assumed that, in a society in which women play an important role as independent producers and consumers, they gave up private rainfed rice production without remuneration. On the one hand, women in 57 per cent of the compounds insisted on access to private plots in the project itself, thereby substituting pump-irrigated production for their former private rainfed production. On the other hand, even where private irrigated plots were not available to women, many secured remuneration from the compound head in return for their work on project plots allocated for communal food production. Almost 38 per cent of women received cash payments for their labour. The amounts paid were slightly below prevailing agricultural wage rates, but it was accepted by the women since they were aware that they would later consume part of the produce themselves. Another 34 per cent of women were compensated partly in cash and partly in kind from the harvest. The remaining 28 per cent of women were not remunerated for labour to communal fields.

Despite these transfers of household labour from swamp to project, and, to a smaller extent, from upland fields to project rice, the burdens of double-cropping still gave rise to shortages of farm labour.[5] These shortages were met primarily by a transfer of labour between crops by Strange Farmers. Strange Farming (a feature of Gambian life dating from the early 1900s) is a symbiotic host–client relationship that provides for a reciprocal exchange of labour against the use of land (Robertson, 1987). The number of Strange Farmers employed in Cha Kunda remained stable during the project period at around 80 each year. The more important change was their new role as helpers in rice production. Prior to the project, Strange Farmers rarely worked in rice production, concentrating instead on upland cereals and groundnuts. During the project, however, 95 per cent of the village's Strange Farmers were allocated by the hosts to work on project plots.

The other main sources of non-household labour were daily-hired labourers and extended family. All compounds increased the share of hired labour in their total labour input during the project – both the hire of individuals for cash, and the hire of community work groups paid in cash and in kind. Furthermore, during the dry season (when Strange Farmers and other migrant labourers are fewer), most compounds turned to their extended family in other regions for help. This proved to be a substantial help. Between 1975 and 1980 an average of 151 additional adults arrived in the village each dry season for up to 4 months. This represented a seasonal increase in

[5] The problem of labour shortages during the wet season has also been addressed by Stokke (1988) and von Braun *et al.*, (1989).

village size of 50 per cent. Paid an agreed portion of the harvest, these seasonal workers came from all over the Senegambia region, and lived with relatives while helping with the dry season irrigated cultivation. A few stayed for the wet season crop, but generally when the rains came the village was emptied of its visitors (who returned to their own farms) and the community returned to its normal size.

Benefits of Pump-irrigation

At first the scheme was a success. On the one hand, all compounds reported that the project increased their food security during the 'hungry season' (through the provision of a dry season crop), and increased food consumption overall. This was achieved through increased output, and because farmers rarely marketed more than 30 per cent of their rice crop. On the other hand, all compounds reported that household incomes rose through the increased volume of rice sold, and that this increased income was translated into a boom in expenditures, investment, construction, and trade.

For example, the project's success initiated a form of 'rice rush' for a few years, which transformed the dry season in villages such as Cha Kunda into periods of great farm activity, followed by trading activity. In the train of the migrant labourers came itinerant traders who purchased rice and sold cloth, jewellery and other consumer items. Many were based in small nearby towns such as Basse, but some were drawn from larger towns such as Kaolack and Ziguinchor in Senegal. It is reported that at the height of the project (1979/80), dozens of traders would pass through the village every day, especially at harvest time when lorries would park by the mosque seeking paddy for sale. By the end of each cropping season, Cha Kunda rice was being carried into distant villages of the Senegambia region.

On the other hand, there was a more stable population influx into the village in the form of new wives. Men in 24 of the compounds married a total of 54 new wives during the first 6 years of the scheme, 44 of whom came from other villages. Of these 24 compounds, 11 married only one additional woman into their household, while eight compounds brought in three to six new wives each, both as an investment in labour and future reproduction, and as a conspicuous sign of increased wealth. During the same period only 29 young Cha Kunda women were married out of their own compounds, 10 of them staying within the village and the remaining 19 moving out to other communities. The net increase in village population through marriage was therefore 25.

The second most visible impact of the project on the village was its increased material wealth. At the village level this was manifest in the construction in 1979/80 of a large mosque built through farmers' donations, in the improvement of a village clinic that had been opened in 1962 but was poorly equipped, and in the erection of a large covered *bantaba* (a shaded seating platform used as a meeting place), which is still referred to as the 'World Bank *bantaba*'. There was also a growth in the number of village-run savings societies. Prior to the project there had been two such societies: one for women and one for men. Usually permitting withdrawal only in times of need, these societies functioned more as insurance agencies than as banks. During the project the number of societies doubled - one for women, two for men (adults and youths), and one for Arabic students of the Imam who were attracted in increasing numbers by the new mosque.

At the compound level the new production technology brought not just the

Table 1. Household investments in productive and household assets during the project, and since the project ended.

	Number acquired during project[a]	Number acquired since project[b]
Productive assets		
Donkey cart	21	-
Donkey	29	5
Farm implements[c]	30	1
Groundnut mill[d]	3	1
Sewing machines	2	-
Tool kits[e]	3	-
Household assets		
Thatched huts	41	12
Corrugated-roofed huts	14	8
Bicycle	15	2
Metal bed-frame	3	-

Source: IFPRI survey data, 1988.

[a] Acquired through purchase or on credit between 1976 and 1982.
[b] Acquired through purchase or on credit between 1983 and 1988.
[c] Draught implements (ploughs, weeders and seeders).
[d] A handmill for grinding groundnuts into paste.
[e] Tools for carpentry, such as frame saws, hammers and vices.

potential for increased wealth, but also access to credit on a scale previously unknown. Donkey carts and agricultural equipment, such as ploughs, harrows, and seeders, were made available in large numbers by the Gambian Cooperative Union working in tandem with ADP. Very few of Cha Kunda's households did not avail themselves of the opportunity to acquire implements through credit. Table 1 shows that the volume of farm equipment purchased between 1975 and 1983 has not been matched in the period since 1983. In addition to 21 donkey carts and a total of 29 donkeys, 30 cultivation implements, such as ploughs and weeders, were acquired during the project, plus several handmills used for milling groundnuts into paste. Since 1983 only five more donkeys, one weeder, and one groundnut mill have been newly purchased by the same compounds.

The same pattern applied to the acquisition of housing and household goods. During the project 55 new dwellings were built in the village, 14 of these roofed with corrugated metal sheeting (prior to 1975 only six buildings had been covered with metal roofs). Since 1983, however, only 20 new huts have been erected, eight of which are topped with metal roofs. Table 1 similarly shows that, compared with 15 bicycles purchased during the project years, only two more were purchased since 1983.

Other uses for income generated by the project were the purchase of jewellery and small ruminants, the purchase of air tickets to Mecca (two men went on pilgrimage during the project), and the settlement of debts. Two respondents reported that the newly acquired ability to settle old debts in full was the most important benefit that the project could ever have brought to them.

3 PROJECT CONTRACTION AND COLLAPSE

The boom in Cha Kunda's fortunes did not last. The first major setback was that pumping and ploughing machinery was prone to mechanical failure. Despite a

predicted working life of 7 years, the original pump broke down frequently after only 2 years of operation. Typically, the pump failed as many as 15 times each cropping season, causing seedlings to be starved of water at critical stages in their maturation. The duration of stoppages varied from 1 day to 3 weeks. During Cha Kunda's last cropping season (the dry season of 1983), the pump broke down 10 times, once for over 2 weeks.

The immediate causes of this problem were poor operation and maintenance, inadequate protection from the elements, and a lack of standardized spare parts (World Bank, 1972). The pumps belonged to the Ministry of Agriculture, and were leased to communities participating in the irrigation scheme. Responsibility for repair and maintenance of these pumps fell to mechanics stationed at the regional Ministry headquarters 50 km from Cha Kunda. Since no programme of training and extension was set up to teach villagers how to grease and lubricate the machinery (shielded from rain and dust only by an open canopy of stretched canvas), stoppages lasted as long as it took to find a mechanic, to find the necessary spare part and to bring both to the village. Bribes came to be accepted as necessary running costs.

The problem with spare parts arose because the ADP project imported a wide variety of pumps, engines and mechanical tillers, few of which matched those previously imported by the Taiwanese. What is more, neither of these types matched the machinery imported after 1977 by the People's Republic of China. For example, between 1976 and 1979 roughly 140 mechanical tillers were available for hire locally from the Ministry of Agriculture. However, it was found that most were unsuited to Gambian conditions. Many tillers were too heavy for local soils, and others (having been designed for working on the contour ridges of Southeast Asia) were too heavy to climb over the innumerable bunded plots and, therefore, easily broke their axles. Unfortunately, more than three different makes had been imported, and none were the same as previous models which might have been dismantled for parts. As a result, in 1981 there were only 11 tillers still working to serve all irrigated plots in the eastern half of the country. In that year Cha Kunda had only 25 per cent of its plots mechanically ploughed; all others were hoed by hand.

The second major problem was that canal structures and drainage systems were poorly designed. On the one hand, over 6 ha of project land (15 per cent of the original 40 ha), flooded each wet season, partly because water seeped through unlined canals, and partly because ponded rainfall could not be removed completely even when the pump was made to drain water out of the perimeter rather than into it. Seedlings in the flooded plots perished.

On the other hand, an additional 2 ha suffered from a *lack* of water because insufficient water reached the far end of the perimeter due to leakage from canals close to the pump. Farmers attempted to patch cracks using compacted clay mixed with soil from termite mounds (containing a natural bonding agent secreted by the insects). If damage was too great, however, cement had to be purchased by the users. Despite a predicted life-span of 16 years, the canal structures were in serious need of comprehensive rehabilitation after only 8 years.[6]

The third major setback was attacks on the rice by pests. Attracted by the concentration of green shoots (especially in the dry season when other crops are not

[6] In the mid-1980s UNDP funded a rehabilitation of small irrigation projects that included some of the World Bank perimeters as well as those established by the Taiwanese and Chinese (see UNDP, 1985).

Table 2. Numbers of compounds cultivating rice between 1975 and 1983, by cultivation technology and type of plot.

Years	Pump-irrigated dry season crop	Pump-irrigated wet season crop	Rainfed crop in project plot	Rainfed crop in swamps
1975[a]	28	25	1	6
1976	28	25	1	6
1977	28	19	6	6
1978	28	15	8	10
1979	20	4	11	16
1980	9	4	6	23
1981	4	2	-	29
1982[b]	-	-	-	29
1983[c]	2	-	-	29

Source: IFPRI Survey data, 1988.

[a] Year of first pump-irrigated crop.
[b] Pump removed by management due to loan repayment defaults (replaced in 1983 for one more year).
[c] Last year of pump-irrigation in Cha Kunda.

growing), wild boar, hippopotami and weaver birds often damaged large areas. The only defence was a 24-hour guard over the paddy fields, for which some farmers were willing to pay 50 kg of rice per crop to local hunters.

The fourth problem was periodic fuel shortages. Operating during years when the country's foreign exchange reserves were particularly low and variable, the project suffered from supply uncertainties. Sometimes when fuel reserves were empty, entire harvests relied upon the next tanker docking at the coast on schedule.

The cumulative effect of these setbacks manifested itself in various ways at the household level. The first warning sign was that yields began to fall. From 1975 to 1977 dry season averages were 6 tonnes per hectare, dropping to 4.5 tonnes per hectare in 1979 (UNOSRO, 1980). In 1985/86 a survey of yields in similar World Bank and Taiwanese schemes still operating in the region recorded averages of only 2.8 tonnes per hectare (von Braun *et al.*, 1989).

While yields were failing, farmers found themselves unable to adhere to the biannual cropping timetable. Given delays in ploughing and pumping, the dry season crop was often not completed before the rains arrived in June, thereby impinging on the wet season irrigated crop and on the cultivation of rainfed crops. As a result, many farmers decided to suspend the wet season pump-irrigated rice crop and to return to former patterns of rainfed agriculture.

Three distinct stages can be identified in this gradual shift away from double-cropping to single-cropping during the 9-year life of the project. In the first stage, from 1975 to 1978, a majority of compounds engaged in pump-irrigated double-cropping, and almost completely suspended traditional rainfed rice cultivation. Table 2 shows that, in order to cope with increased labour demands, 23 of the 29 compounds adjusted labour allocations between rice crop types by suspending their rainfed rice production during the first 3 years of the project's operation. Only in six compounds did women continue rainfed rice production throughout the project.

Yet women only moved out of rainfed rice cultivation for as long as the project wet season crop was fully pump-irrigated. As soon as double-cropping became more

difficult and yields began to fall, women returned to their swamp rice cultivation. This second stage is clearly defined in Table 2. Between 1978 and 1980 the number of compounds irrigating a wet season crop fell from 15 to four, while the number returning to rainfed rice cultivation rose from 10 to 23.

There was also a short-lived initiative by some women aimed at growing a purely rainfed rice crop in the project plots, rather than return to the swamps. The 11 compounds that attempted this in 1979 did so for three reasons: mechanical tillers could still be hired to prepare the ground; plot bunds would retain precipitation longer than swamp plots; and it was believed that residues of fertilizer used on irrigated plots would benefit later crops. In fact, since tillers proved to be difficult to obtain, and the project plots were 3 km further than the swamp, all women abandoned this initiative after the wet season of 1980.

The third and last stage of the project (1981–84) is characterized by its decline: during this period only a minority of compounds engaged in pump-irrigation (even during the dry season), and all 29 compounds returned to rainfed rice farming in the swamps.

The consequent decline in yields and in the double-cropping schedule had an immediate effect on marketed surplus and loan repayments. Firstly, although the planners expected participants to market the bulk of their harvest, so that producers would increase cash incomes as well as increase the quantity of local rice on the market, Cha Kunda's farmers retained the largest portion of their rice for domestic consumption. Between 1975 and 1980 only 30 per cent of the dry season crop was sold, while little was ever sold of the wet season crop.[7] Yet as the project progressed and the output of paddy diminished, so did the marketed surplus. Thus, by 1981 less than 20 per cent of the produce was being marketed by the few compounds still participating.

This originally low, and later declining, marketed surplus led directly to problems in loan repayments. Each compound was expected to pay for use of the pump, ploughing fees, fuel, oil and fertilizer. To be paid in cash or in kind at the end of harvest, in 1983 this cost represented 25 per cent of the value of harvest, assuming yields of 3.5 tonnes per ha and 1983 prices for paddy (World Bank, 1984). Yet loan recovery was always difficult. While the first input costs for the first crop in 1973 were repaid in full, loan recovery in 1974 at a regional level had dropped to 68 per cent (World Bank, 1984). In response, the project's Quarterly Progress Report for December 1974 notes the following:

> due to the decline in repayment levels, rulings have been issued to farmers that no further credit will be given unless repayment is up to date. In one case management decided to withdraw the pumping machines from a scheme which had shown very poor results for the past two seasons. It is hoped that this will serve as an example for other schemes (World Bank, 1974).

Cha Kunda's project was initiated in that same year, but it would appear that the threat had little effect. During the first years, repayment at the village level ranged between 40 and 60 per cent. In 1979 and 1980 all loan repayments were waived by the government because of a nationwide drought. In 1981 all input deliveries to Cha

[7] Because of the net increase in rice production between 1975 and 1980 a marketed surplus of only 30 per cent was sufficient to raise household incomes considerably.

Kunda were suspended during the wet season because repayments fell below 20 per cent – partly because the farmers were waiting to see if debts would be cancelled once again, and partly because most compounds were no longer irrigating a wet season crop. Instead, farmers were keeping the dry season rice for home consumption, and repaying the loan 9 months later out of their groundnut cash crop. In 1982 there were no repayments. Consequently, the project's two pumps were removed by the Ministry of Agriculture. Cha Kunda has not pump-irrigated a crop since 1983.

Cha Kunda's experience in this respect was not unique. During the 1970s a total of 182 ha of land were developed for pump-irrigation by 13 villages in Cha Kunda's immediate locality; in 1988 less than 10 ha were still producing a pump-irrigated rice crop.

4 THE READJUSTMENT PROCESS

The impact of the project's demise on the community has been profound. At the village level the mosque today stands dilapidated for want of funds to repair the roof and walls. The village clinic was closed in 1982 when it became clear that early increases in the village's population and wealth were not to be sustained. The dry season no longer attracts many outside labourers: in 1988, 5 years after the project had ended, the number of Strange Farmers arriving in Cha Kunda had declined to 40, and far fewer worked in rainfed rice fields than before the project. And since the end of the project the number of savings societies has fallen from four to two.

At the household level some compounds warded off the worst effects of the collapse better than others, but none escaped completely. Firstly, most compounds faced a reduced workforce, which larger compounds could cope with better than smaller ones. Between 1983 and 1988 a total of 20 women divorced out of the village. While comparable data relating to annual divorce rates in The Gambia are not available, this figure was claimed by villagers to be unusually high. That so many wives left the village after only a few years implies a high degree of dissatisfaction with unfulfilled expectations, and possibly also to equity issues concerning the sharing of scarce and diminishing resources between women of the same household.

Secondly, as the women were leaving Cha Kunda 27 young men also left home to find employment elsewhere. Of these, 17 per cent went to Europe or North America and 33 per cent to other parts of West Africa. The remaining 50 per cent sought employment in the urban areas on the coast of The Gambia. Many of these migrants send remittances home to their families. However, most household heads argue that these are too small to hire sufficient labour to make up for the loss represented by the absence of male family members.

There was also an impact on the ownership of agricultural equipment. While the acquisition rate of productive assets declined after the project failed (Table 2), the dispossession rate of previously acquired assets rose. Due to an inability to maintain loan repayments for goods obtained on credit, six donkey carts and two ploughs were repossessed by the Cooperative Union in 1984/85. The farmers involved have since been unable to repay their debts in full, or even to obtain replacements for the lost equipment from other sources. What is more, another nine households found themselves obliged to resell at least one major item acquired during the project. Not only were six plough attachments, one donkey cart and one bicycle resold, but two

compounds even had to pull down their metal roofs and sell them at a loss. This was done to obtain cash to pay off debts accumulated in the declining years of the project and, in many cases, to purchase rice for compound consumption in 1986 and 1987.

To purchase rice? It might have been expected that even with the loss of the project, women returning to cultivate rice in the swamps would have been able to produce paddy as they had done before the project. In fact, even this proved to be difficult. By unfortunate coincidence the village's post-project loss of labour, equipment, credit rating, and status have been compounded by other problems not related to the project itself. While there has been no pump-irrigation in Cha Kunda since 1983, there was also no rainfed rice cultivation between 1985 and 1988. The village, which is located near a swamp that 20 years ago supported 150 women farmers, did not produce any rice at all in 1986 or 1987. The reason was not drought but flood. The early rains in 1986 and 1987 were so heavy that they flooded marshland separating the village from the swamp. Few women can swim, and no causeways or bridges existed, so they were forced to abandon rice production during these years and to concentrate instead on upland crops and on their own private groundnut fields. All of the rice consumed in the village during those years was purchased out of income from the groundnut harvest.

5 CONCLUSIONS

This paper has examined the impact of the failure of a pump-irrigation scheme on the households which formerly participated in its operation. A number of conclusions may be drawn from the findings.

The first of these relates to the reasons for the unsustainability of the project. From the planners' point of view there was no question that the cause of this project's collapse was the 'failure of farmers to make 100 per cent loan repayment' (World Bank, 1983). On a superficial level this is true. Cha Kunda's pumps were removed in 1983 because its loan repayment had fallen behind schedule. But on a more profound level the loan problem was merely a symptom of deeper ills relating to other areas of project design and implementation.

On the one hand, there were technical deficiencies. The gap between the irrigation needs of Cha Kunda and the equipment provided to meet those needs was large. The appropriateness of the Taiwanese irrigation model in this location (countless small bunded perimeters, served by many different types of pumps), needed to be fully evaluated before a duplicate scheme was set in place. Instead, the Taiwanese approach was simply copied, resulting in major water losses and/or flooding through unlined canals and inadequate drainage. There was considerable under-investment in the protection of pumping machinery, and in ensuring the durability of physical infrastructures. No provision was made for guaranteeing a stable fuel supply, or for ensuring the availability of essential spare parts. And no attention was paid to the need for protecting crops from pest damage.

On the other hand, there were institutional or management problems. The first of these was a project design that left ownership of, and responsibility for, pumping equipment entirely in the hands of the state. No provision was made for eventual private ownership of the machinery. This resulted in misuse of pumps by untrained users, and a perception amongst the users that if their harvests were poor then this was the fault of the government. The result was increasing defaults on loan repayment.

Secondly, there was a lack of user participation in the planning of the project, which gave rise to a gap in understanding between planners and participants about the role of the project in the local economy. An FAO report states that 'one of the key lessons that has been learned about planning irrigation is that it is vital to identify the roles that irrigation and rainfed agriculture are intended to play in food production and in national development' (FAO, 1987). Cha Kunda provides a case in point. In order to achieve national food security objectives, and at the same time for the project to be economically viable, farmers were expected to cultivate two irrigated crops per year and to sell most of their harvest on the open market. The farmers, on the other hand, equally concerned about food security, decided that irrigated rice yields during the wet season were too unpredictable, and that most of the rice should be consumed in the household rather than be sold. As a result, the double-cropping schedule was never achieved, and debts accumulated from the very first season.

The consequences of these design and operational problems have weighed heavily on the participants. But when asked if they would join such a scheme again, almost all of Cha Kunda's farmers answered in the affirmative. 'We would participate again even expecting the project to collapse after 5 years. But next time we would pay back less of our debts at the start, because we would know in advance that long-term investments are unrealistic.'

Do frequent scheme failures in the same region, therefore, result in a form of 'project fatigue'? Is this the real long-term price to be paid for project instability? The answer to both questions from this example would appear to be a tentative yes. Not in the sense that farmers might refuse to participate in future initiatives. Rather, because such participation may well be coloured by a cynical belief in the predetermined fate of the project. In this sense, Adams and Grove's comment that 'failed irrigation schemes are worse than useless' rings true; the collapse of one project is bad enough, but its repercussions on future projects are in many ways much worse (Adams and Grove, 1984).

Yet the message of this article is not intended to be a pessimistic one. The three important lessons learned from Cha Kunda's experience are: (1) that the development of irrigation systems requires a long-term commitment, with adequate investments in structures, training, and support systems, few of which past donors have been willing or able to guarantee; (2) that the impact of failures brought about by inadequate investments in, and time commitments to, agricultural projects needs to be considered from the viewpoint of the participant as well as the donor; and (3) that the irrigation project in Cha Kunda did function well for a number of years.

The question now is, how can those years be extended? A number of propositions can be put forward with the inestimable benefit of hindsight. On the technical side the canals might be cement-lined (provided that the quality of lining is sufficiently high to prevent cracking), pumping equipment could be better protected, and individual plots should be much larger in order to capture economies of scale in ploughing; there clearly needs to be a standardization of machine parts, with adequate investment in the supply of required spare parts; the supply of fuel to such projects needs to be secured through predetermined import quotas; the number of participants sharing a pump and irrigated area might be smaller, thereby reducing the size of loan repayment groups; and some measure of pest control is a high priority (through adequate fencing, the use of pesticides, and/or decoy crops).

On the management side, the usage and resultant life-span of equipment might be

enhanced if irrigation structures and machinery were owned by the villagers themselves rather than by the state. The participants have been quick to learn that loan repayment does not always pay. This leads to ever-increasing running costs for the project, which might be avoided if investment in the capital assets, as well as in maintenance and replacement, were the responsibility of the users themselves. Improved extension activity (particularly in the management of savings funds at a village level, and in the logistics of inputs procurement), would also be a prerequisite for successful participative development.

Finally, it is not being suggested that development projects should last for ever. However, the shortness of most investment time-horizons and the resultant briefness of project life-expectancy have been identified as constraints to sustaining the short-term productivity gains offered by irrigation (Walton, 1984; USAID, 1984; FAO, 1987). Given current limits on capital available for project investment in Africa it is essential that the long-term value of investments that have been made should be protected and enhanced.

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