Rice Cultivation and Gambian Women

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ABSTRACT

Issues of equity and efficiency dominate current discussions on the impact of neoliberal economic programs within developing countries. As state bureaucracies are downsized in favor of privatization, concern grows over equity issues such as women's access to resources. To date, most research examines gender inequality in women's property rights in land. Only recently is attention focusing on the privatization of water rights and women's access to irrigated land. Even less research has analyzed the erosion of women's water rights in common property resource systems (CPRs) not characterized by private titles. Yet CPRs are especially emerging a casualty of privatization. This paper provides a case study of a CPR wetland system traditionally dominated by female rice cultivation. The individualization of property rights in wetland Gambian rice systems is analyzed over the past 30 years in terms of women's responses to diminished resource control. Emphasis is placed on specific forms of women's negotiation in irrigation schemes to illuminate ways to improve gender equity objectives with privatization.

INTRODUCTION

In the West African country called The Gambia, rice is traditionally grown by women. As the nation's dietary staple, food security objectives have long centered on rice development projects. Over the past 30 years, this emphasis has increasingly focused on pump-irrigated schemes that permit year-round cultivation. But the performance record and utilization of these schemes have proven dismal. In examining the reasons for repeated failure of double-cropped irrigated rice, this paper illuminates the significance of gender issues, especially women's declining access to productive resources and the failure of irrigation planners to build upon women's wetland farming expertise.

Divided into three parts, the first section presents an overview of women's indigenous knowledge of wetland farming. Emphasis is placed on the soil and water management prin-

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ciples regulating rice cultivation in diverse microenvironments, how these principles spread out the labor burden in wetland cultivation, as well as their importance for reducing risk of total crop failure in years of low rainfall. The second section places women's role in rice farming within a historical context, emphasizing the gender division of labor in agriculture as well as the land use system and crop rights that developed within the Gambian farming system. The third section illuminates the significance of gender-based conflicts over labor and crop rights for the poor performance of pump-irrigated rice projects while revealing the significance of macro-economic policy shifts over the past decade for the use of irrigated land. The paper concludes by exploring potential directions for achieving gender equity objectives and appropriate technology development in Gambian rice projects.

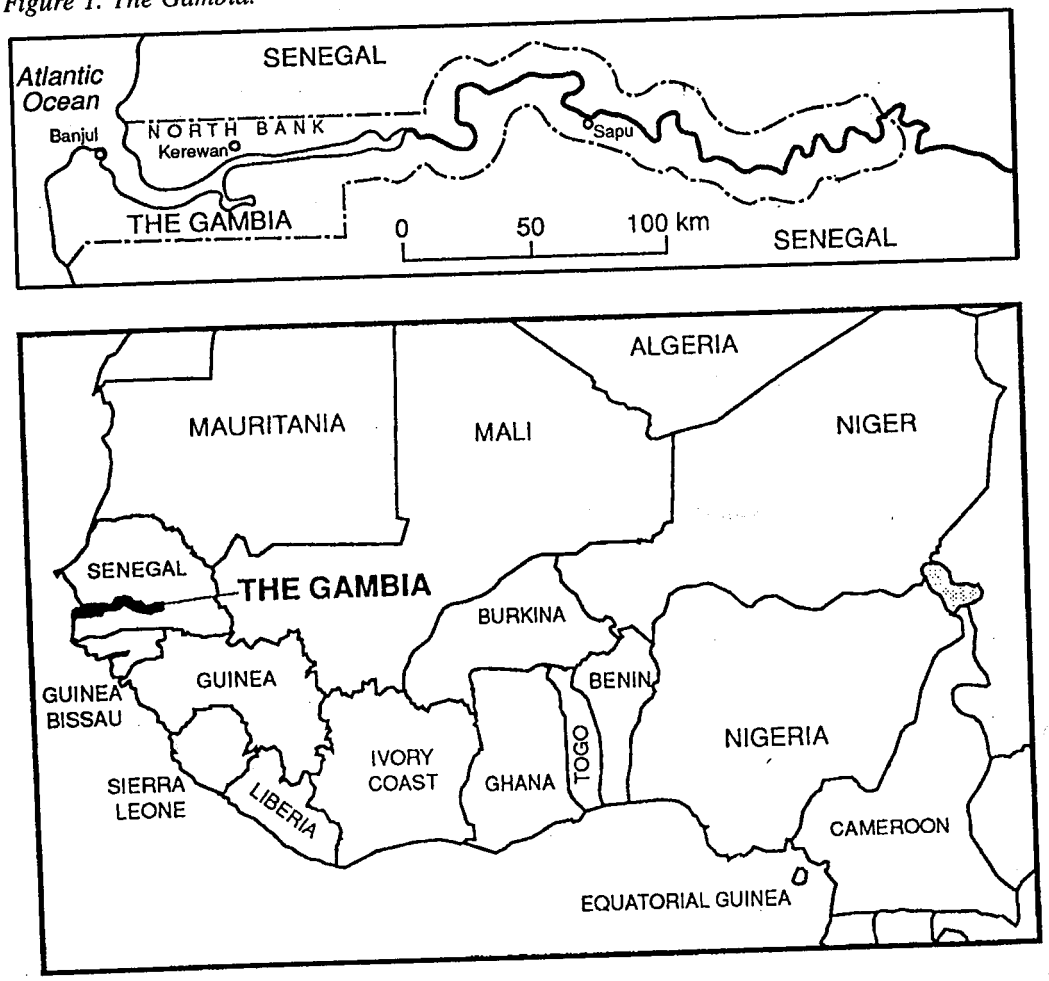
THE GAMBIAN WETLANDS AND WOMEN'S ENVIRONMENTAL KNOWLEDGE

The Gambia, a narrow land strip 24-50 kilometers wide and nearly 500 kilometers long, encloses a low-lying river basin that grades gradually into a plateau, where the altitude seldom exceeds 100 meters (figure 1). The plateau forms about one-third of the country's land base and depends upon rainfall for farming (Carney 1986). Precipitation from June to October averages 800-1,100 millimeters and favors the cultivation of millet, sorghum, maize, and the principal cash crop, peanut. As in neighboring Sahelian countries, the Gambian rainfall regime fluctuates considerably between years and within a season. From the 1940s through the mid-1980s, for example, annual rainfall declined by 15 to 20 percent and became increasingly distributed in a bimodal seasonal pattern (Hutchinson 1983). The recurrence of a 2-week, mid-season dry spell during August increases cropping vulnerability on the uplands and places greater dependence on lowland farming.

The lowlands are critical for understanding human livelihood and survival in the unstable rainfall setting of the West African Sudano-Sahelian zone. Lowland environments permit a multiple land use cropping strategy that utilizes other forms of water availability, thereby freeing agricultural production from strict dependence on rainfall. Constituting nearly 70 percent of the country's land mass, the Gambian lowlands make available two additional environments for agriculture: 1) the alluvial plain, flooded by the river and its tributaries; and 2) a variety of inland swamps that receive water from high water tables, artesian springs, or moisture-holding clay soils. The lowlands, which enable an extension of crop production into the dry season or even year-round, are planted to rice, although vegetables are sometimes grown with residual moisture following the rice harvest.

While The Gambia is covered by more than 100,000 hectares of lowland swamps, only about one-third of the area is suitable for farming (ALIC 1981; CRED 1985). This is due in part to hydrological conditions along the Gambia river and its tributaries. Riverine swamps coming under marine tidal influence are permanently saline within 70 kilometers of the coast, seasonally saline up to 250 kilometers, and fresh year-round in the last 230 kilometers of the river's course through The Gambia. Since the 1980s rice cultivation has wavered between 15,000 and 20,000 hectares while pump-irrigation involves only about 1,500 hectares of that amount in the permanently freshwater zone of the Gambia river (PPMU 1993; Carney 1993).

Figure 1. The Gambia.



Lowland cultivation is thus pivotal to the Gambian farming system, enabling crop diversification over a variety of microenvironments and a reduction in subsistence risk during dry climatic cycles. Wetland farming, however, requires considerable attention to forms of water availability as well as edaphic and topographic conditions. In The Gambia, this knowledge is the domain of women, who have specialized in wetland rice cultivation since at least the period of the Atlantic slave trade and have adapted hundreds of rice varieties to specific microenvironmental conditions (Jobson 1623; Moore 1738). This cumulative in situ knowledge of lowland farming underlies The Gambia's regional importance as a secondary center of domestication of the indigenous West African rice, Oryza glaberrima, domesticated in the region at least 3,000 years ago (Porteres 1970:47).[2]

[2]While the Portuguese began introducing Asian sativa rices from the seventeenth century, glaberrima varieties dominated until the twentieth century. In response to food shortages associated with the expansion of cash cropping peanut and cotton on the uplands during colonial rule, government officials emphasized increasing lowland food production. This led to the emergence of rice as the dietary staple and the introduction of numerous higher-yielding Asian varieties, which now dominate the rice cropping system (Gamble 1949; Van der Plas 1956).

Women's knowledge of wetland environmental resources is brought into relief in figure 2, a cross-sectional profile of the main rice production environments of The Gambia.[3]

Women recognize five principal microenvironments for rice cultivation. On the most general level, type of water availability distinguishes their own emic classification system: namely, whether a microenvironment receives water from rainfall, river tides, the groundwater table and/or artesian springs. But rice-growing environments are also nuanced by distinct edaphic properties associated with specific hydrological regimes. Thus, hydromorphic, acid-sulphate, and alluvial soils are identified by their location along colluvial slopes, in the seasonally or permanently freshwater zone of the river, or in areas experiencing occasional, monthly, or daily tidal flooding. The following paragraphs present the emic classification system used by Mandinka women, The Gambia's dominant ethnic group and preeminent rice growers.

Tendako: upland and rain-fed rice, planted by direct seeding of short-duration varieties (<100 days) in sandy clay soils after the onset of the June rainy season. In average rainfall years, yields are between 500 and 700 kilograms per hectare.

Bantafaro: Rice planted in hydromorphic soils, frequently along colluvial slopes. This rice often utilizes supplemental forms of water from the moisture-holding clay soils, a high groundwater table, or underground springs. The plots are frequently ridged to minimize water runoff. This is also the microenvironment where women establish seedbeds for longer duration varieties that will be transplanted to the tidal swamps. Average yields are between 800 and 1,000 kilograms per hectare.

Leofaro: This rice microenvironment occupies the outer edge of the tidal rice zone in the seasonally saline part of the river. Generally directly seeded, leofaros can only be planted in normal rainfall years. Yields seldom exceed rain-fed rice averages even though the fields occasionally receive supplemental water from high tides. Leofaros represent a marginal environment for rice cultivation in drought cycles because the increased period of river salinity can lead to acid-sulphate soil conditions. Potential acid-sulphate soils underlie nearly 13,000 hectares of alluvial plain in the seasonally saline zone located upstream between 70 and 150 kilometers (Thomas, Varley, and Robinson 1979). Normal precipitation cycles prevent their formation by keeping the leofaro wet from rainfall and occasional tidal flooding. Under such conditions, rice can be planted. However, successive years of prolonged drought cause the leofaro to dry out, thereby beginning the process of acidification. If the process is not reversed by a return to normal pluvial conditions, acidification can render an area permanently unsuitable for cultivation. During the drought period of the mid-1980s annual rainfall in The Gambia decreased by 25 percent. The result of several low rainfall years was the formation of large tracts of acid-sulphate soils on the leofaros of central Gambia. Soil measurements taken in the area recorded pH values as low as 3.0 (Carney 1985).

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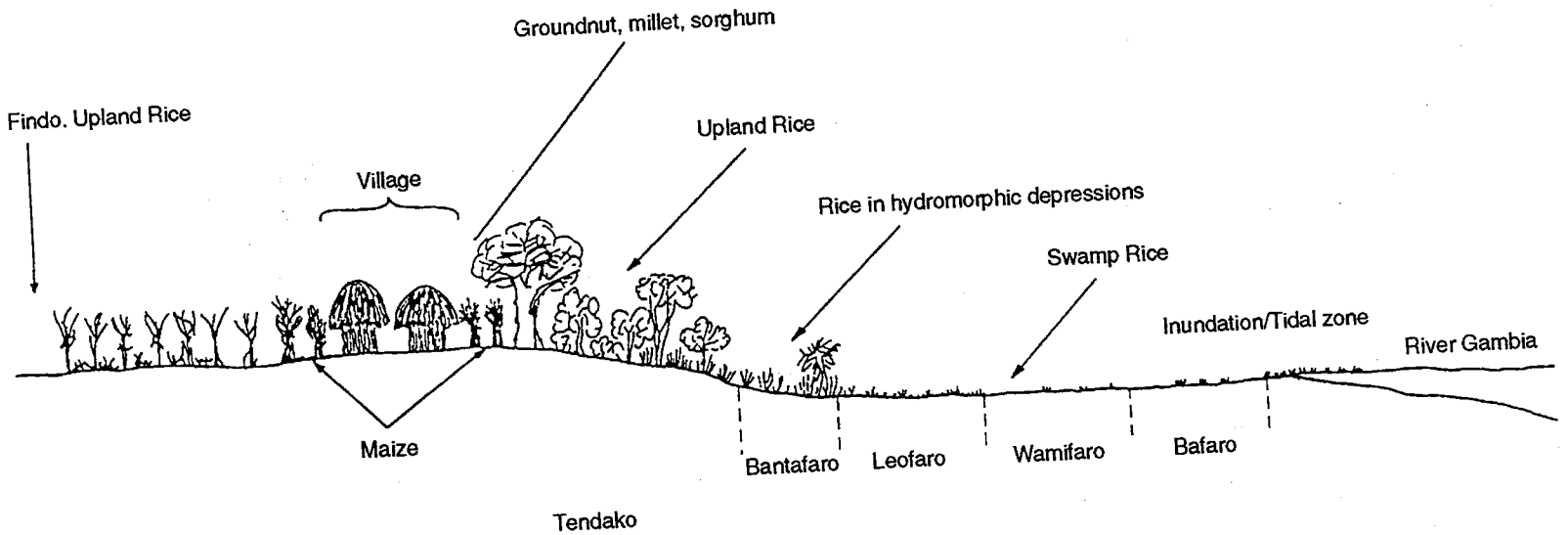
[3]The cross-section is for the seasonally saline zone of the Gambia river, located between 70 and 250 kilometers upstream. This section is represented because it contains all the country's rice production environments

Figure 2. Agro-ecological zonation: Central Gambia.



Wamifaro: This microenvironment occupies the middle range of the tidal zone, meaning that the swamp experiences flooding from higher river levels during the wet season and lunar flooding the remainder of the year. The wamifaro is the favored production zone of female rice farmers because water levels in the swamps are not so deep as to make access difficult (which is the case in the swamps nearest the river). While vertisols underlie permanently freshwater swamps, continual tidal flooding prevents the formation of acid-sulphate soils in the seasonally saline zone. In such areas, rice is planted with the return of freshwater conditions from mid-July. The accumulated rainfall causes a steady rise in the level of the Gambia river and its tributaries until October. Women adjust seed varieties and planting techniques to the different water levels and flooding periods of their wamifaro. They consequently either directly seed or transplant medium- and long-duration varieties, which are harvested in December and January. Above approximately 250 kilometers of the Gambia river, year-round freshwater conditions prevail, sometimes permitting the cultivation of two crops of medium-duration varieties. Yields average 1,500-2,000 kilograms per hectare. Most of The Gambia's pump-irrigation projects are concentrated on the wamifaros in the permanently freshwater zone of the Gambia river.

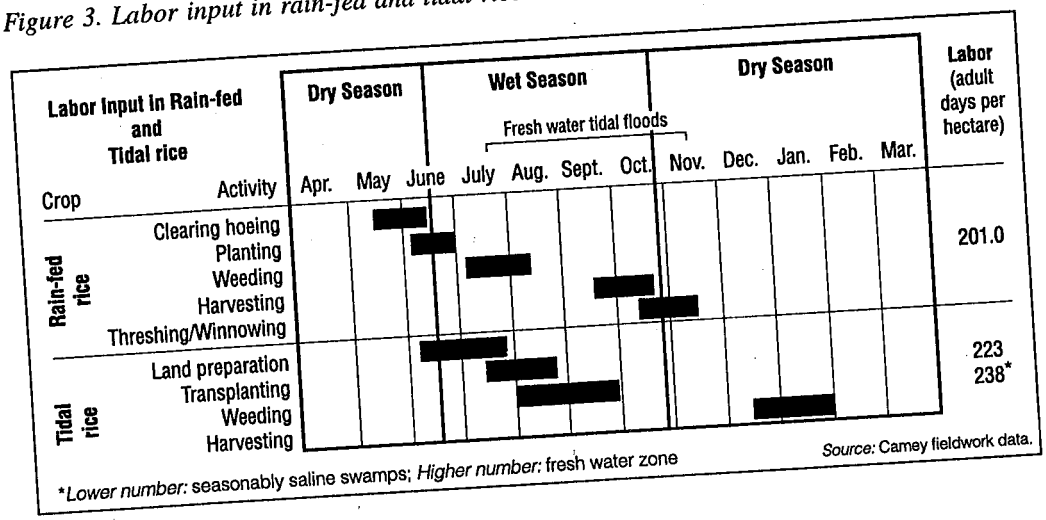
Bafaro: Located nearest the river, this rice microenvironment is subject to daily flooding by high tides of the Gambia river and its tributaries. In both the seasonally saline and freshwater river areas, women grow long-duration (130-145 days) and tall varieties that are transplanted from bantafaro nurseries and ripen from December to January. The bafaro and wamifaro microenvironments are the most productive traditional rice-growing areas. Annually enriched by alluvial deposition, yields generally average 1,500-2,000 kilograms per hectare. As daily flooding from the river requires a greater degree of water control than in the wamifaro, only one pump-irrigation project (Jahaly-Pacharr) with centralized pumping facilities has been implemented on the bafaro.

This description of women's cultivation along an upland to lowland continuum also reveals the logic underlying the West African rice production system (Richards 1996). Female rice farmers face labor shortages in rice cultivation. To even out their labor burden, they plant varieties adapted to different moisture regimes. The rice microenvironments consequently mature in sequence (figure 3). Rain-fed rice, planted first and harvested in October, brings to an end the pre-harvest period of food shortages known in The Gambia as the "hungry season." Proceeding downslope, the bantafaro are next planted, followed by the tidal fields. In the seasonally saline zone, the upland and bantafaro fields are already cleared, planted, and weeded by the time freshwater returns to the river in mid-July, when cultivation begins on the wamifaro and bafaro. By planting along an upland to lowland landscape gradient, females spread out their labor burden in rice production while minimizing the risk of complete crop loss. Thus, in years of low rainfall when the rain-fed crop may fail, a rice harvest is still possible in tidal areas. Through detailed knowledge of water regimes and soil properties as well as the selection of seed varieties adapted to different conditions, Gambian women reduce the risk of farming rice in the Sahel, where precipitation may vary 40 percent annually or be maldistributed within a year.

GENDER, ENVIRONMENT, AND ECONOMY: A HISTORICAL REVIEW

Policy interest in wetland environments actually began in the early decades of the twentieth century when colonial officials began documenting farming practices in diverse lowland settings (Carney 1986). The objective was to improve household subsistence security and generate rice surpluses that would feed an expanding pool of migrant laborers, whose seasonal influx accounted for the pace of peanut expansion on the uplands. Migrant laborers in peanut cultivation, known in The Gambia as "strange farmers," produced nearly half the peanut crop. They numbered about 20,000 in the interwar period and accounted for 1 out of every 20 rural residents (Carney 1986:121).

Figure 3. Labor input in rain-fed and tidal rice and rice microenvironments.



Initial efforts focused on improving swamp accessibility by tree clearing, causeway and footbridge construction, and increasing yields through improved Asian seed varieties. By the 1960s, colonial swamp development projects had culminated in an expansion of rice planting to some 26,000 hectares (Carney 1986:178). But limits had been reached on the degree to which women could carry the subsistence burden. Further gains in food availability rested on altering the gender division of labor by drawing men into rice growing. The colonial government's inability to do so brought swamp rice projects to an end (Carney and Watts 1991:660).

In 1949, the colonial government initiated another approach to surplus rice generation by implementing a large-scale irrigation scheme on the site of the present-day Jahaly-Pacharr project. The Colonial Development Corporation (CDC) scheme departed from the earlier swamp rice improvement project in one important way: land was removed from female rice growers through a 30-year lease program (Carney 1986). But the project failed as a result of

the poorly designed irrigation system as well as the lack of male and female interest in wage work. The colonial government rice projects are notable for adumbrating the post-independence emphasis on irrigated rice as well as the gender-based conflicts that would surface in subsequent wetland development projects.

These conflicts center on the invocation of customary tenure "laws" by male household heads and village elites to reduce women's land and labor rights in rice farming or, in Mandinka nomenclature, the conversion of land with individual use rights *(kamanyango)* to land whose product is controlled by the male household head or senior males *(maruo).*[1] When colonial swamp development schemes improved access and productivity, male household heads and village patriarchs called into question women's customary use rights. In one case that reached the colonial authorities, men argued that "if women mark the land and divide it, it would become 'women's property' so that when a husband dies or divorces his wife, the wife will still retain the land, which is wrong. Women must not own land" (Rahman 1949:1). Women's land access was clearly being contested by male claims that female use rights would alienate swamp land from the patrilocal and patrilineal kin-residence system. The significance of the maruo designation for resources struggles is that when applied to developed land, females experience an erosion of their customary labor rights without a reduction in their work burden.

A brief review of the meaning of the terms for property access and labor rights illuminates the issues that continue to be disputed in Gambian irrigation projects. The household landholding is termed maruo and cannot be alienated from the residence group. Maruo, however, also refers to a set of labor obligations and crop rights. All able family members are expected by custom to provide labor on household land for family subsistence needs. Men's maruo work responsibility is traditionally met on the uplands through cultivation of millet, sorghum, maize, and peanuts, which may be traded to purchase cereals in deficit years. Rice production frequently fulfills women's maruo obligations, especially among the Mandinka, who are noted rice farmers. A key aspect, then, of the maruo designation is that the crops are produced for household subsistence.

Men's maruo production is organized through the *dabada,* the basic work unit for male family members. A household may have more than one dabada if it is large (> the 17 member average) or friction exists between adult males within the kin-residence group. The product of male maruo labor is in turn distributed by either the male household or dabada head to smaller subunits, or women's cooking units, the *sinkiro.* The basic consumption subunit, the sinkiro refers to all who eat from the same pot, generally the co-wives and children of one adult male. The sinkiro forms the basis for women's maruo labor in the household. Women's maruo production consequently is controlled either by the senior woman in the group or by individual co-wives who contribute rice when it is their turn to cook.

A second, and important, type of tenure relationship also operates on a subset of the land that composes a household's landholding. In exchange for providing labor toward household subsistence, junior males and all adult females are given access to some of the family's landholding for farming. These individual land rights and plots are known as kamanyango. As long as the farmer remains a member of the household, she or he controls the decision

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[1]Following the convention established above, Mandinka terms are used to describe land and labor rights. The principles are similar within the farming systems of the three other major Gambian ethnic groups (Wolof, Fula, and Serrahuli), who have also been included in irrigation projects.

making over the plot's use and the benefits derived from its labor. Men's kamanyango plots are in upland, rain-fed areas; women's kamanyango, like their maruo fields, are planted to rice in the swamps. Kamanyango labor rights and plots thus provide subordinate family members the means to obtain cash from farming, as they control the rights to the crop produced as well as the money gained from its marketing. While kamanyango plots are less numerous than maruo ones, they are a critical issue in The Gambia, where rural society is largely polygynous, male and female budgets frequently separate, and each mother is traditionally responsible for purchases of clothing and supplemental foods crucial for the well-being of her children.

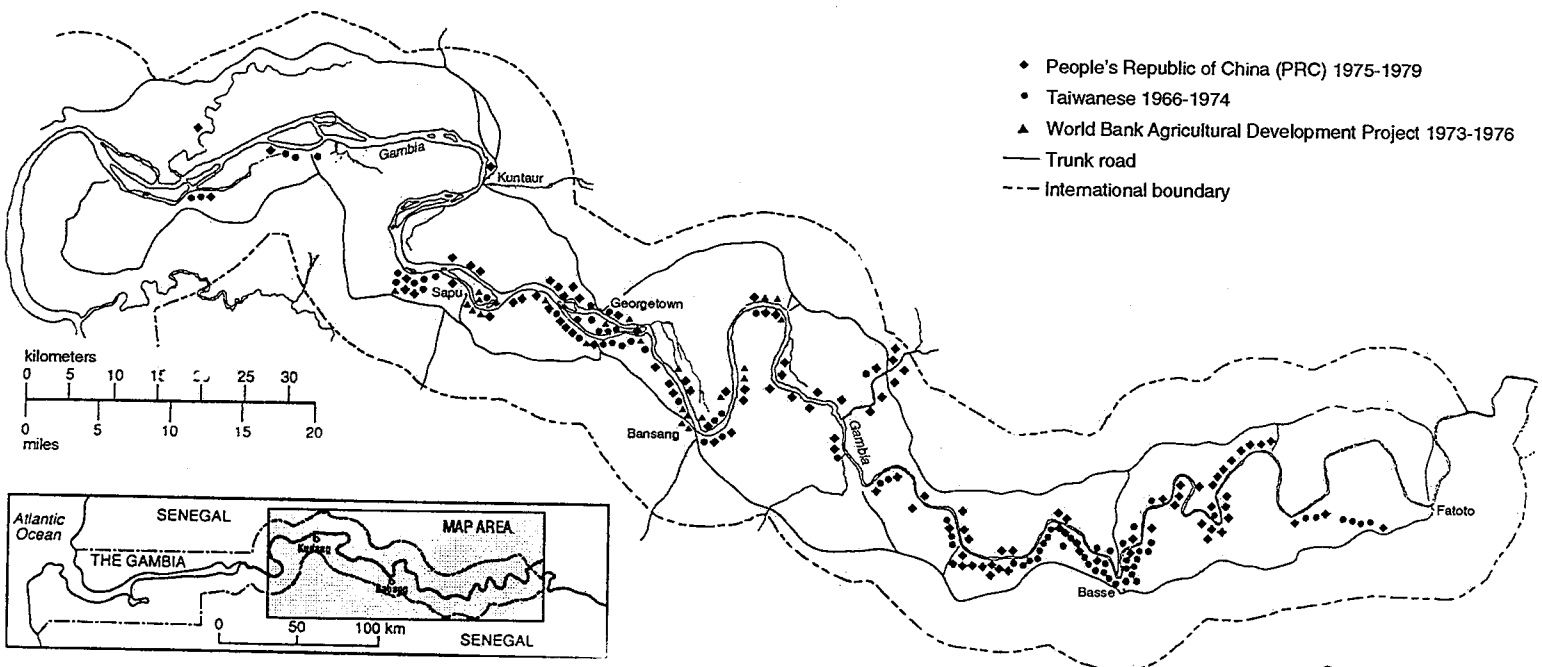
IRRIGATED RICE DEVELOPMENT AND GENDER CONFLICT

Subsistence security served as the rationale for donor funding and support of pump-irrigated rice projects in The Gambia. Implemented in 1966, just 1 year after independence from Britain, and 2 years before the 1968-73 Sahelian drought, the Gambian government obtained foreign aid to promote import-substitution by encouraging domestic rice production. Rice imports had reached 9,000 tons per annum, and foreign exchange reserves had seriously eroded with declining global commodity prices for peanut. From 1966 to 1984, the Taiwanese and mainland Chinese governments, the World Bank, and the International Fund for Agricultural Development (IFAD) were all involved in implementing double-cropped irrigated rice schemes in The Gambia. These resulted in developing the irrigation infrastructure on some 4,000 hectares of women's tidal swamps. But by the 1990s, only one-third of the land remained in irrigation, with just 10 percent double-cropped.

The Gambian irrigated rice development can be divided into two phases. The first one (1966-79) centered on small-scale community-controlled perimeters averaging 10–20 hectares (figure 4). The second phase (1984-), is represented by the large-scale Jahaly-Pacharr irrigated rice project (1,500 hectares, of which 560 are pump-irrigated) with centralized water delivery (figure 5). The small-scale projects, funded by Taiwan (1966-74), the World Bank (1973-79), and mainland China (1975-79) were developed at a cost of US$7,500 per hectare; the Jahaly-Pacharr project, capitalized at nearly $17 million, averaged $46,500 per hectare (CRED 1985:273). In contrast, improved swamp rice projects developed for Gambian women by a German nongovernmental organization The Freedom From Hunger Campaign financed by the Deutsche Welthungerhilfe during the same period averaged US$2,000 per hectare.

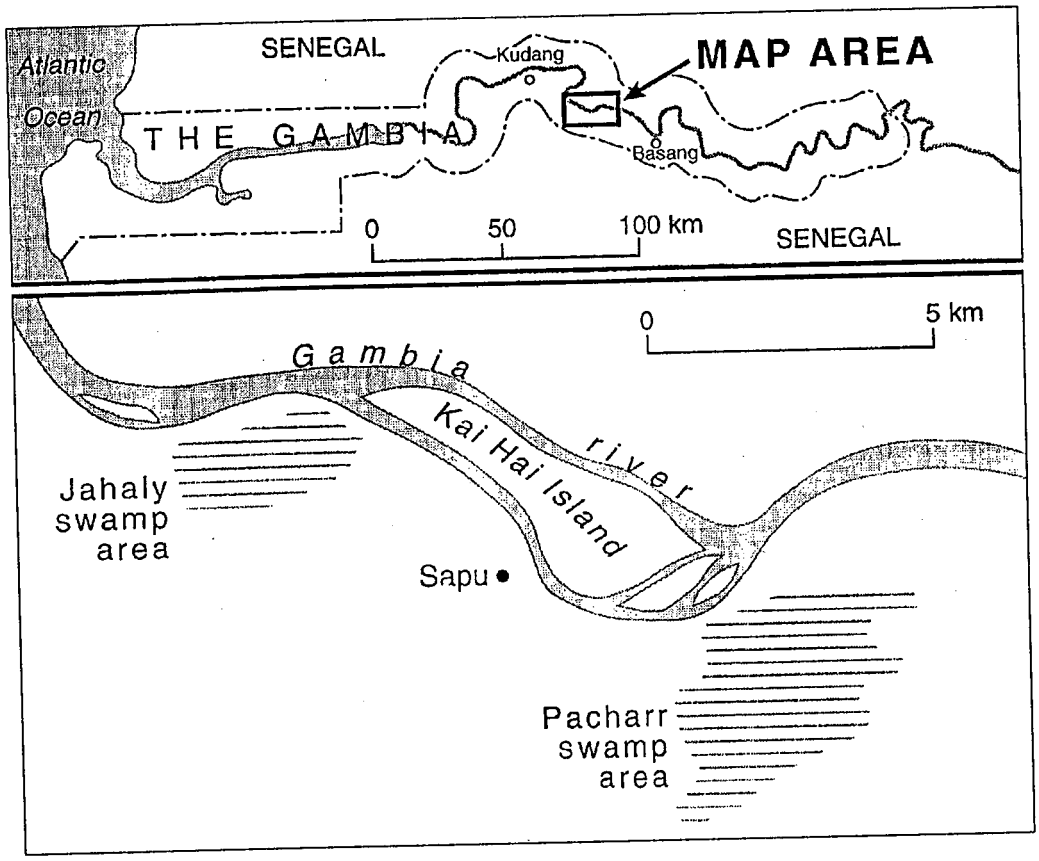
Each project adhered to a similar technological package: the introduction of high-yielding dwarf rice varieties, the construction of irrigation canals, and reliance on pumps for water delivery during the dry season or during water-deficient periods in the wet season. The principal differences in the two phases of irrigation were in the form of perimeter control and land allocation. The small-scale projects remained under customary tenure within the jurisdiction of a single community while the Jahaly-Pacharr scheme operated on a 30-year lease, which legally permitted the management to evict unproductive farmers. The large-scale scheme provided a centralized water delivery system in each of the two swamps, involving nearly 2,000 households in 65 villages. The canal infrastructure in the small-scale perimeters served 0.4 hectare; it was divided into 4 to 10 plots, which were allocated to different village families.

Figure 4. Small-scale irrigated rice schemes: The Gambia, 1966–1979.



Source: Carney 1986

Figure 5. The Jahaly-Pacharr irrigated rice project.



The water delivery system in Jahaly-Pacharr reached 10-hectare blocks, with plot size and land allocation averaging 0.5 hectare.

These differences in water delivery system and land control between the two types of irrigation systems serve as the backdrop for the gender issues that erupted in the projects. Each project credited farmers the seeds, fertilizers, pesticides, and fuel oil costs for water delivery. Credit repayment depended upon meeting anticipated productivity rates. Double-cropping, however, required mobilization of male as well as female family labor for year-round farming. To overcome male aversion to farming rice—the problem that had plagued colonial swamp development projects—development strategies adhered to a remarkably similar course by introducing the technical package for irrigated rice to male household members (Dey 1981; Carney 1993). Yet the sequence of cropping activities depended upon the availability of male and female family labor. By placing men in charge of technologically improved rice production, the donors hoped to encourage male participation; instead, they unwittingly legitimized male control over the surpluses gained from double cropping.

Control over the disposition of marketable surpluses proved pivotal to the gender-based conflicts that erupted within project households over which family members were to assume the increased workload. Male household heads claimed female labor under the customary category, maruo, but irrigated farming spelled a fundamental shift in the labor obligations

regulating the traditional cropping system. Maruo labor claims had developed in the context of a 5-month agricultural season; double-cropped irrigated rice required invoking the maruo obligation for year-round labor. There was thus no precedent for women to perform maruo subsistence labor during two cropping periods when production would yield men a marketable surplus.

The donors' uninformed view of the Gambian household-based production system resulted in gender conflict that frustrated double-cropping objectives. In the two phases of the Gambian irrigation development, female rice farmers responded in three principal ways to the loss of their rice fields and efforts to augment their rice burden through the maruo designation on irrigated land: 1) by providing maruo labor for one cropping season and relocating kamanyango production to unimproved swampland where they could generate small surpluses for sale; 2) when alternative swampland for rice farming was not available, by agreeing to perform maruo obligations on irrigated rice plots during the dry season cycle in exchange for using the same plot as kamanyango without irrigation during the rainy season; or 3) by laboring year-round on irrigated schemes but demanding remuneration in rice for their labor during one cropping season (Carney 1993). All but the first response involved an increase in women's labor. Conflict resolution, however, was to profoundly affect double-cropping objectives.

The first two responses characterized small-scale irrigated rice development, which usually confined pump-irrigation to the dry season. The third proved more common in the IFAD-funded Jahaly-Pacharr scheme, which had effectively absorbed all available rice fields into the project. Seeking to enforce compliance with the year-round cropping calendar and production targets, the Jahaly-Pacharr project lease permitted the government to tie plot use to repayment of the credited inputs and mechanization charges (2.4 tons unhusked rice per annum or half the anticipated average annual production) (IFAD 1988).

The project's mandate to double crop as a condition for participation, and the larger plot allocation in the Jahaly-Pacharr scheme, placed intense pressure on household labor. Previous irrigation schemes had accommodated women's kamanyango claims by not adhering to year-round pumped production. As Jahaly-Pacharr had absorbed most of the available rice swampland in the region, women depended on the project to reassert preexisting kamanyango land access (figure 5). But Jahaly-Pacharr was a more costly scheme than its predecessors and its credit package expensive. Both the government and IFAD were determined to prevent nonpayment of credit, a problem that repeatedly characterized earlier irrigation projects (CRED 1985). Only by a firm labor commitment from both male and female family members could the cropping calendar be followed, productivity kept high, and eviction from the project avoided. Because compliance with the cropping calendar depended on adult labor availability, the management did not champion women's kamanyango land claims in the project's pumped fields. Females now faced enormous pressure within the household to augment their labor burden.

Failing to gain management support for their kamanyango claims in the pumped plots, women pressed for their individual crop rights on the 700 hectares of the project being developed for improved tidal irrigation. If the tidal plot was the only land received in the Jahaly-Pacharr scheme, they were often unsuccessful; if the household received multiple plots, their effort to have one designated kamanyango frequently succeeded. But there were fewer fields than female claimants and tidal rice development only involved about a fourth of the project

villages—those with preexisting land claims in the area. Households not receiving tidal rice land in addition to the irrigated plot faced new demands by women: labor remuneration on the pumped plots in a share of unhusked rice. This demand was easily accommodated in the 25 percent of project households that had received more than one irrigated plot. In those households females were generally awarded the second irrigated plot as their kamanyango in exchange for providing maruo labor on the first.

Female demands for land access or labor compensation, however, could not be met in the households that were forced to share an irrigated plot. In such cases no marketable surplus was being produced; men and women worked the plot for subsistence requirements and struggled to repay the credit. The pattern of conflict resolution was more complicated in the remaining project households with just one irrigated plot. Women forced the issue of their crop rights when they failed to receive income benefits after the first irrigated rice harvest. During the second cropping season in 1984, they began to refuse to go to the irrigated fields. Because of their militancy the majority of households agreed to negotiate with women, generally agreeing to remunerate their labor at a rate of about 10 percent of rice production.

However, about one-fifth of the households that controlled one pumped plot failed to uphold women's kamanyango rights through remuneration of unhusked rice. A major reason why these households failed to offer women compensation of unhusked rice is related to intra-household friction within some kin-residence groups between dabada heads and the senior male household head. The Jahaly-Pacharr project registered the plot allocation in the name of the male household head under the assumption that all family members would be available for labor. However, many households were already divided into several dabada. Project development thus meant that control over the marketable surplus would be in the hands of the senior male household head and not necessarily divided with the male heads of the dabada. Women's ability to receive compensation of unhusked rice in such households consequently depended on the resolution of intra-household conflict over the disposition and control of surplus production.

As a result of the failure to uphold women's kamanyango rights, women withdrew their labor from the project's irrigated fields. They began forming work groups for hire to carry out the project's labor-demanding tasks like transplanting, weeding, and harvesting. By organizing into hired work groups, women managed to bid up the daily wage rate for a single laborer from US$0.70 per day to $1.12 per day. Thus, the exodus of female labor from some households and their efforts in others to maintain maruo and kamanyango production during the wet season, when the labor of males turned to peanut cultivation, resulted in many households experiencing problems in adhering to the irrigation calendar. By the 1991 dry season, the problem had magnified with crop development varying as much as one month between plots irrigated in the same 10-hectare block. As a result, water deliveries were not arriving in a timely fashion for crop needs, and yields fell. During the 1991 dry season, average rice yields declined to just 2 tons per hectare from the 4.5 tons average of the 1984 dry season.

By 1991, labor shortages within the household, exacerbated by male concentration on peanut cultivation during the wet season, had led to an increasing emphasis on the dry season cultivation cycle when men could help in rice cultivation. Facing considerable noncompliance with cropping schedules and credit repayment, the project management decided to evict unproductive and indebted households. However, this long-threatened disciplinary action could not be enforced. Too many households were affected, including powerful village and regional

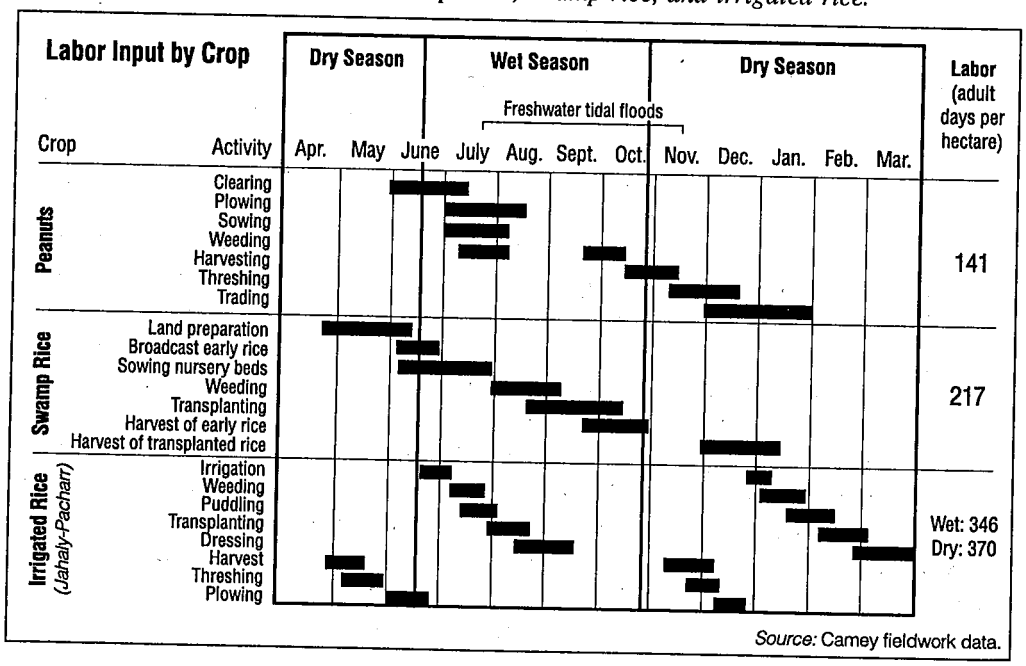
elites. The attempt to alienate project land from household control proved politically unworkable.

While gender conflict erupted in all Gambian irrigation projects, it was exacerbated in the Jahaly-Pacharr project by the large plot size and the focus of male labor on the cash crop, peanut, during the wet season. An examination of comparative labor requirements between peanut, swamp rice, and irrigated rice cultivation reveals the labor demands of each crop (figure 6). Imposing labor-intensive technologies on a rural society already overburdened with farm work and where the indigenous rice system had developed to spread out the labor burden, attest to the problem posed by irrigation schemes. Appropriate technology development would require a rethinking of the demands on labor as well as the form of technology transfer.

Government documents, IFAD reports, and those of the Dutch technical team involved in project design do not reveal the reason for increasing the average irrigated plot size in Jahaly-Pacharr over earlier schemes. Perhaps it facilitated a more efficient water delivery system. The decision to increase basic plot size proved even more puzzling given the widely published research by Jennie Dey (1981, 1982) on labor scarcity and gender issues in Gambian small-scale irrigated rice projects.

The profound changes underway in the Jahaly-Pacharr project by 1991, however, involved more than just gender issues. An understanding of the patterns outlined above improves by situating the scheme within the changing policy arena of the late 1980s and early 1990s. From 1986, The Gambia experienced several structural adjustment programs, which removed the government's artificial support price for domestic rice.[2] Trade liberalization resulted in the import of cheaper broken rice from Thailand and the removal of the fertilizer subsidy, which resulted in a price hike of 11 percent and higher charges for the imported diesel oil to

Figure 6. Labor requirements between peanut, swamp rice, and irrigated rice.



run the irrigation pumps, tractors, and land leveling equipment upon which Jahaly-Pacharr depended (Schroeder 1997; Johm 1990; Puetz and von Braun 1990). While the subsidy on rice was removed, the producer price of peanut was raised 16 percent to stimulate exports and increase foreign exchange earnings (McPherson and Posner 1991). These policy measures encouraged an emphasis on peanut cultivation over rice in the project area during the wet season while discouraging investments in the costly inputs needed to keep rice yields high. Nonetheless, the IMF support price for peanut was regarded as a temporary measure until The Gambia developed its comparative export advantage in fruit and vegetable marketing (Harvey 1990; McPherson and Posner 1991).

By the 1990s, Jahaly-Pacharr households had received the macroeconomic signal. Noting the vast expansion in banana cultivation underway in Senegal during the 1980s, some enterprising farmers began introducing the seedlings to the Jahaly-Pacharr area. Banana, cultivated without fertilizer, was widely grown on project fields by 1993; market demand originated from the coastal tourist sector and across the border in Senegal.[3] Rice production continued in the dry season on women's tidal fields, as well as with rainfall on unused pump-irrigated plots during the wet season by females.

CONCLUSION

The evolution of irrigated rice projects in The Gambia illustrates the types of intra-household conflicts that can develop with labor intensification in a gendered crop and a complex tenure system. The discussion also reveals the significance of macroeconomic policy shifts for agriculture, especially their implication for subsistence security objectives. A final theme addressed in this review of Gambian rice farming is the importance of women's role in food production and its linkage to specific knowledge systems of environmental resources. For centuries, rice cultivation in The Gambia has depended on women's detailed knowledge of rice farming environments and the transmission of that knowledge from mothers to daughters. However, this indigenous knowledge system requires access to the wetlands that permit its continuity. The Gambian wetlands are increasingly becoming the focus of vegetable and fruit projects designed to improve the country's foreign exchange earnings (Schroeder 1997; Carney 1993). During the 1990s, rice production dropped below 15,000 hectares and the index of food production per capita for the country fell in the decade after 1980 from 156 to 109, a decline of 30 percent (McPherson and Posner 1991:36). While the specter of another major drought

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[2]During the heyday of irrigated rice projects, the Gambian government dramatically increased the producer support price. At the onset of the 1968–74 Sahelian drought, the official price was 118 dalasis per ton; by the implementation of the Jahaly-Pacharr project the producer rice price had reached 580 dalasis per ton.

[3]Banana cultivation in the area, however, had been introduced by the Taiwanese on a few of the irrigated rice schemes they funded. The bananas formed a crucial component of an agro-forestry system and were planted on the embankments enclosing the plots. On the growth of the Gambian horticultural market and its encouragement with structural adjustment, see Carney 1992.

haunts, an important question emerges: what might be an appropriate irrigation strategy for one of the world's poorest nations with a rural per capita annual income of US$130?

This review of Gambian irrigated rice projects illustrates the significance of the social organization of production and consumption within a farming system for transferring irrigation technologies to women. One striking contrast between African and Asian farming systems is the frequent absence in Africa of the family farm as understood in the West and Asia, where family members pool labor, and each dependent receives benefits from the overall effort. In contrast, African farming systems are often developed in societies with high rates of polygyny where each mother is expected to provide directly for the specific needs of her children. African farming systems are marked by a strong gender division of labor, sometimes by crop, other times by task, as women perform specialized operations like sowing, weeding, and transplanting (Guyer 1980; Whitehead 1981; Richards 1983; Jones 1986; Moore 1988; Linares 1992). While Asian farming systems, once characterized by specialized gender-based activities, are becoming more flexible with broader economic change (Merrey personal communication), this pattern is not strongly evident in sub-Saharan Africa.

Appropriate irrigation development consequently depends on understanding that African farming systems are deeply gendered and frequently do not operate within a joint-utility framework. Other considerations are also vitally important. Of particular significance is the issue of access to and control over resources. In many African countries women may actually establish individual land rights by the act of clearing and cultivating unclaimed swamp land (Guyer 1980; Whitehead 1981; Linares 1992). In The Gambia, a woman also possesses the right to transfer individual plots to co-wives, daughters-in-law and sometimes, to daughters if their marriages keep them in the same village (Dey 1981; Carney 1986).[4] In countries where women's individual land rights exist in the farming system, appropriate irrigation development means a commitment to incorporating and safeguarding these rights in irrigation planning.

Any irrigation project that develops with a crop that is traditionally gendered, or reliant on skilled female labor, should link gender equity to productivity goals. This may involve pursuing innovative land allocation approaches, like distributing plots to sinkiro rather than to the dabada or household. As the fundamental unit of women's production in The Gambia, and perhaps elsewhere in the continent, cooking units could in fact become the basis for irrigated plot allocation. But this would require a return to the smaller landholdings that served as the basis of project design in earlier irrigation projects. By allocating plots to cooking units within an extended household, plot control would be placed directly in the hands of women. Direct female control over the use and distribution of the rice surplus would improve the likelihood that rice is first targeted for subsistence before it is marketed.[5]

The design of irrigation projects with gender equity objectives also involves a consideration of alternatives to pump-irrigation, like tidal irrigation. In resource-poor and debt-encum-

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[4]The transfer of individual land rights to daughters is less frequent because patrilocal residence patterns usually mean that a daughter is married outside the village and unable to farm land in her natal village.

[5]One of the oft-cited complaints by Jahaly-Pacharr project women in the scheme's first years was that the male plot owner would sell the rice produced by their labor, placing pressure upon them to use the kamanyango share they received in unhusked rice for subsistence rather than sale.

bered countries like The Gambia, appropriate technology development by nongovernmental organizations has focused on improving tidal rice production. While these projects cost considerably less than pump-irrigation schemes and may be capable of less spectacular yields, they have proven sustainable in The Gambia for two reasons: they build upon women's knowledge of wetland farming, and they target females as beneficiaries. The continued cultivation of the tidal irrigated plots in the Jahaly-Pacharr project underscores the potential of appropriate technology development. But the success of any appropriate technology approach depends on a policy framework that views food security as a crucial issue in drought-prone environments.

Given the poor performance record of African irrigation schemes and their contribution to debt, national and international pressures are mounting to make existing irrigation projects economically viable. The neoliberal policies enshrined in structural adjustment by the International Monetary Fund encourage the export of nontraditional crops like fruits, vegetables, and flowers (Mbilinyi 1988; Mackintosh 1989). In the Sahel most of these economic developments are unfolding on wetland environments, long-prized for food cropping (Mackintosh 1989; Adams 1992; Carney 1993; Schroeder 1997). Somewhat buffered from rainfall instability, wetlands are increasingly being converted to horticultural development. Appropriate wetland development will prove central to addressing the continental food crisis.

LITERATURE CITED

Adams, W.M. 1992. *Wasting the rain.* Minneapolis: University of Minnesota Press.

Arid Lands Information Center (ALIC). 1981. *Environmental profile of The Gambia.* Tucson: ALIC, Office of Arid Lands Studies.

Carney, J. 1985. Field notes (unpublished).

Carney, J. 1986. The social history of Gambian rice production: An analysis of food security strategies. Ph.D. diss. (Geography). Berkeley: University of California.

Carney, J. 1992. Peasant women and economic transformation in The Gambia. *Development and Change* 23(2):67-90.

Carney, J. 1993. Converting the wetlands, engendering the environment: The intersection of gender with agrarian change in The Gambia. *Economic Geography* 69(4):329-49.

Carney, J. and M. Watts 1991. Disciplining women? Rice, mechanization and the evolution of mandinka gender relations in Senegambia. *Signs* 16(4):651-81.

Center for Research on Economic Development (CRED). 1985. *Rural development in the Gambian river basin.* Ann Arbor, Michigan: CRED.

Dey, J. 1981. Gambian women: Unequal partners in rice development projects? *Journal of Development Studies* 17(3):109-122.

Dey, J. 1982. Development planning in The Gambia: The gap between planners' and farmers' perceptions, expectations and objectives. *World Development* 10(5):377-96.

Gamble, D. 1949. *Contributions to a socio-economic survey of The Gambia.* London: Colonial Office.

Guyer, J. 1980. Food, cocoa, and the division of labor by sex in two West African Societies. *Comparative Studies in Society and History* 22(3):355-73.

Harvey, C. 1990. *Improvements in farmer welfare in The Gambia: Groundnut price subsidies and alternatives.* Discussion Paper 277. Brighton, England: Institute of Development Studies.

Hutchinson, P. 1983. *The climate of The Gambia.* Banjul: Ministry of Water Resources and Environment.

International Fund for Agricultural Development (IFAD). 1988. *Small-scale water control program.* Rome: IFAD.

Jobson, R. 1623 [1904 ed.). *The golden trade.* Teignmouth, England: E. E. Speight and R. H. Walpole.

Johm, K. 1990. Policy issues and options for agricultural development in The Gambia. In *Structural adjustment, agriculture and nutrition: Policy options in The Gambia,* ed. J. von Braun, 84–91. Washington D.C.: International Food Policy Research Institute (IFPRI).

Jones, C. 1986. Intra-household bargaining in response to the introduction of new crops: A case study from North Cameroon. In *Understanding rural Africa's households and farming systems,* ed. J. Moock, 105–23. Boulder, Colorado: Westview.

Linares, O. 1992. *Power, prayer and production.* Cambridge: Cambridge University Press.

Mackintosh, M. 1989. *Gender, class and rural transition.* London: Zed.

Mbilinyi, M. 1988. Agribusiness and women peasants in Tanzania. *Development and Change* 19(4):549–83.

McPherson, M., and J. Posner 1991. Structural adjustment and agriculture in sub-Saharan Africa: Lessons from The Gambia. Paper presented at the 11th Annual Symposium of the Association of Farming Systems Research-Extension, Michigan State University, Oct. 5–10.

Moore, F. 1738. *Travels into the inland parts of Africa.* London: Edward Cave.

Moore, H. 1988. *Feminism and anthropology.* Cambridge: Polity.

Porteres, R. 1970. Primary cradles of agriculture in the African continent. In *Papers in African prehistory,* ed. J. D. Fage and R. A. Oliver, 205–25. Bloomington: Indiana University Press.

Public Planning and Monitoring Unit (PPMU). 1993. *Annual agricultural reports 1983–1993.* Banjul: Government of The Gambia.

Puetz, D., and J. von Braun 1990. Price Policy Under Structural Adjustment: Constraints and Effects. In *Structural adjustment, agriculture and nutrition: Policy options in The Gambia,* ed. J. von Braun, 40–54. Washington D.C.: International Food Policy Research Institute.

Rahman, A. K. 1949. Land tenure in Genieri (Unpublished notes made available by David Gamble).

Richards, P. 1983. Farming systems and agrarian change in West Africa. *Progress in Human Geography* 7(1):1–39.

Richards, P. 1996. Culture and Community Values in the Selection and Maintenance of African Rice. In *Indigenous people and intellectual property rights,* ed. S. Brush and D. Stablinsky, 209–36. Washington D.C.: Island Press.

Schroeder, R. 1997. "Reclaiming" land in The Gambia: Gendered property rights and environmental intervention. *Annals of the Association of American Geographers* 87(3):487–508.

Thomas, P., J. A. Varley, and J. E. Robinson 1979. *The sulphidic and associate soils of The Gambia estuary above the proposed barrage at Yelitenda, The Gambia.* Surrey, England: Overseas Development Administration.

Van der Plas, C.O. 1956. *Report on second survey on rice areas with special regard to the problem of marketing.* Banjul: National Archives of The Gambia.

Whitehead, A. 1981. "I'm hungry mum": The politics of domestic budgeting. In *Of marriage and the market,* ed. C. Young, C. Wolkowitz, and R. McCullagh, 88–111. London: Methuen.