

Collective Action in Canal Irrigation Systems Management: The Case of Doho Rice Scheme in Uganda

D. Sserunkuuma, N. Ochom and H. Ainembabazi¹

Policy Brief

This brief is based on the results of a research project funded under the competitive grants program of the 2020 Vision Network for East Africa. A research report with the same title is available on IFPRI's website (www.ifpri.org) and also upon request.

Background

Most of Uganda's agriculture is rain-fed. Low and erratic rainfall is increasingly reducing crop yields and causing food insecurity. Irrigation is one option for enhancing agricultural production. Whereas in the past, many African governments provided agricultural inputs and services to farmers, inadequate funds and mismanagement have compromise these services. As a result, there is an emerging policy shift towards devolution of management of such services and resources from governments to user groups on the premise that local users have comparative advantage in maintaining, monitoring and managing resources that their livelihoods depend upon.

Rice production started in the Doho swamps of Uganda in 1942 to feed World War II soldiers. But several constraints including flooding of River Manafwa, water scarcity during the dry season, pests and diseases, and lack of appropriate crop varieties hindered expansion of rice production. In 1974, farmers appealed for government assistance, which responded by buying the Doho Swamps and constructing the Doho Rice Irrigation Scheme (DRS) with the help of Chinese experts. The objectives of the DRS are to popularize rice production and provide irrigation water, better seeds, farm tools as well as rice marketing and milling facilities.² After the Chinese left in 1989, the government managed DRS but are now in the process of shifting that responsibility to the local Doho Rice Scheme Farmers' Association

Currently, the DRS is facing lack of sufficient irrigation water for its 2380-acre land because of siltation of River Manafwa and the canals. In the past, the irrigation canals were regularly de-silted by the government. To date, farmers are unable to meet this cost even though the government supplements the staff salaries. To overcome this challenge, starting in 1994 the DRS recommended that all member farmers pay a user fee of 5,000 Uganda shillings (approximately US\$ 2.50) per acre per season to be used to de-silt the canals. The arrangement worked for less than a year and failed for lack of sufficient funds, corruption and poor enforcement of the fee bylaw.

¹ Department of Agricultural Economics and Agribusiness, Makerere University (Uganda).

² Farmers in the DRS can produce two crops of rice a year unlike their non-DRS counterparts whose production is entirely dependent on rain.

Study Objectives and Methodology

The objectives of this study are to examine the extent and determinants of farmers' participation in the collective maintenance of the DRS irrigation system through payment of the user-fee. Using 2001 data from a survey of 411 rice farm households in the DRS that were selected using a stratified random sampling technique, descriptive data analysis employed to answer three questions. First, what are the existing incentives or benefits for participation at DRS? Second, to what extent do they motivate collective action? Third, how effective is enforcement of existing bylaw on irrigation fee payment. Using the same data, an ordered logit regression model is constructed and used to analyze factors influencing farmer compliance with the fee bylaw.

Hypotheses

To answer these questions, the analysis focused on the following hypotheses:

Perceived direct economic benefits from de-silting, which include increased irrigation water supply, motivate irrigation fee-payment as a collective action. The amount of irrigation water available is directly proportion to the distance of field plot from irrigation canals, with an inverted U-shaped relationship between water scarcity and participation in collective action. As a result, farmers receiving plenty of water tend not to be active participants and the same applies to those expecting too little water.

Land ownership or tenure security promotes conservation of natural resources, especially land and water. Most farmers at DRS own their land but others lease, borrow or sharecrop their land. The latter regard payment of rental and irrigation fees as incentives to retain access to the land. In other words, compliance guarantees access to land. But weak bylaws and poor enforcement may compromise that relationship such that the effect of land ownership on participation becomes ambiguous.

Wealth or asset endowment might reduce the incentive to participate in collective action. This is especially true when wealth provides alternative investment choices. Also, some wealthy farmers lease-out or sharecrop their land, making them unlikely to participate in the collective action. But wealth may also enhance participation in collective action through greater access to technology, land or other services. Wealth also facilitates fee-payment where cash-contributions are made, increasing participation. Thus, the wealth status of a household has an ambiguous effect on participation in collective action.³

The effect of age of household head (as a proxy for experience in rice production) on compliance may be positive or negative. Older farmers are expected to have better understanding of the consequences of non-compliance with irrigation fees payment. But experience may make them less willing to comply, especially if the experience was bad. Further, since older farmers entered rice farming when the government paid for de-silting canals, they may be more likely to resist a new fee arrangement and refuse to comply.⁴

³ Six variables were used to proxy wealth: number of rice plots owned; total area of land owned; value of oxen owned; value of other livestock owned; owns a cemented-floor house; and owns metal-roofed house. Only number of rice plots owned and owns cemented-floor house were used in the regression analysis.

⁴ Because age and experience in rice growing are highly correlated, only experience is used in the regression model.

Education directly influences adoption of improved technologies. Combined with *influence and external recognition*, education enhances successful organization towards collective action. However, because it also increases people's opportunities outside agriculture, education may lower participation in collective action. On the other hand, educated farmers may have other non-agricultural income sources that make it easier for them to pay the irrigation user-fees, enhancing their participation in the collective action, as do households with *alternative major income sources* rather than rice-production.

Agricultural training and extension on soil and water conservation increases farmers' awareness of siltation problems and appreciation of the need to pay the user-fees to overcome the problem.

A *high dependency ratio* translates into a higher subsistence burden and less money to pay user-fees.

Female-headed households tend to have limited access to services and resources, and are less likely to pay the user-fees, although they may be hard-pressed to participate as custodians of food security.

A *high share of a household's food and income from rice* will likely enhance participation in collective action to increase irrigation water supply and rice output.

Access to credit and farmers' own savings enhance the ability of users to pay fees.

Findings

Descriptive analysis indicates that a majority (60-68 percent) of all farmers perceived their benefits from participating in DRS were greater than the costs. Nearly all of them singled out irrigation water supply as the greatest benefit from the scheme. One-half of the sample cited extension and technical advice as additional benefits. However, most farmers reported declines in DRS benefits in the past decade, especially in delivery of irrigation water and the extension services. Reasons for such deterioration include breakdown of the excavator, causing higher siltation of the irrigation canals and fewer extension staff. The depreciation and poor maintenance of private rice mills, and poor rice prices were also to blame.

85 percent of the farmers received adequate irrigation water throughout the first season in 2001 but only about half during the second season. As expected, there is a significant correlation between adequacy of water and higher crop yields, and the latter and payment of the irrigation user-fees in both crop seasons. Farmers cited the following reasons, among others, for non-compliance with the fee-payment bylaw: they received inadequate or no water; they lacked money to pay their fees; fees were not collected; they thought fee was payable only once; service for which fee paid the previous season was not provided.

Almost 50 percent of interviewed farmers ranked the fee collection procedure as fair to poor. This suggests there are flaws in the fee collection procedure that need fixing to increase compliance. But also, only one-quarter of the farmers understood the existing fee-payment bylaw and consequences of non-compliance, while other had different interpretations. More education and information increases awareness, aids participation and deters defaulting. One-third of the farmers felt enforcement of the bylaw was seriously flawed, citing cases of defaulters who went unpunished. Three-quarters of all the farmers ranked the current DRS administration's performance as fair to poor, citing poor management, corruption and lack of attention to farmers' problems as the major reasons.

The regression results show there significant positive relationships between participation in collective action and household's income share of rice, male-headed households, high dependency ratio, training in soil and water conservation, cemented-floor housing, alternative income source and access to credit. Compliance has significant negative relationships to wealth (number of rice plots owned), tenure security (land ownership), experience in rice farming and the perception high cost to benefit ratio.

Implications

Benefits from participation at DRS, which often serve as incentives for further involvement, have declined over time. This coupled with limited awareness and poor enforcement of the user-fee payment bylaw, diminished compliance and collective action to contribute towards the cost of de-silting the irrigation canals in 2001. Stronger bylaws, better education, and enforcement of the bylaws are likely to improve compliance.

The finding of a significantly negative relationship between compliance and perception that the cost of participation exceeds the benefits suggests that improved services—especially delivery of water and extension advice—are likely to change the perception and increase participation. The finding that households depending primarily on rice for income are more likely to participate in collective action suggests that commercializing rice production—which is consistent with the government's Plan for Modernization of Agriculture—is one way to enhance compliance. Training in soil and water conservation, access to credit also increases compliance, underscoring the importance of supportive services such as extension education and credit.

The results suggest that to stimulate greater participation by DRS farmers, stronger and more effective bylaws governing fee payment, collection procedures and efficient use of resources must go hand in hand with evidence of improved services and benefits to stimulate greater participation by DRS farmers. This finding is clearly relevant for other agricultural development initiatives dependent on collective action among smallholders to achieve anticipated objectives.