Investing in Water-Scarce Agricultural Systems: A Framed Decision Analysis

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The rain-fed agricultural systems pose limitations on the use of water. In the Sri Lankan Dry zone settings, rain-fed agriculture uses several human-made infrastructures to moderate these limitations. One clear example is the village tank. In this study, a decision analysis is carried out through an experiment which frames the decision to invest in the village tank improvement, village pasture improvement, forest patch improvement, or fish stock improvement. The objective of the study is to identify the tradeoff between private and public gains in a water-scarce setting. The participants in the experiment have to make decisions on the levels of investment as a member of a group of three randomly assigned roles. These roles are paddy farmer, dairy herder and fisherperson. The decision making happens in two stages. The first stage involves investing from a private endowment and the second stage involves investing from a public endowment. From a menu of investment choices that are linked to private and public benefits, participants made choices on how much to invest in each resource from private endowment first and from the residual public endowment sequentially. The findings of the decision analysis from 246 implementations of the experiment reveal several key relationships. Private investments in tank improvement and in pasture improvement are associated positively (P value = 0.001 and 0.016, respectively) with private benefits while investments in forest improvement and fish stock improvement are not significantly related to private benefits on average. The magnitude of partial contribution to private benefit is 1.50 LKR for every rupee invested in tank improvement and 1.36 LKR for every rupee invested in pasture improvement. In contrast, the public benefits are significant only for investments in tank improvement (P value = 0.090). Partial contributions from other three resources to public benefit are not statistically significant. In contrast to private benefits, the magnitude of partial contribution from investments in tank to public benefits is quite low (i.e., 0.49 LKR for every rupee invested in tank improvement). These findings highlight that even in a framing that highlights the connectedness between private and public welfare in tank-based systems, marginal expectations on private gains are approximately three times that of public gains. We conclude that the intensity of private motive hinders the joint improvement of private and public gains in water use.

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