Evaluating Flood Control and Drainage Management Systems from a Productive Efficiency Perspective: a Case Study of the Southwest Coastal Zone of Bangladesh 2016

MA Rouf

Abstract

Two competing flood control and drainage management (FCDM) systems, namely, the 'silt-dredging and regulative-drainage management (SRM)' and the 'tidal river-basin management (TRM)' systems were implemented in the Southwest coastal zone of Bangladesh as a safeguard for agricultural production. The fundamental difference between these two FCDM systems is that SRM is characterised as a hard engineering structure based system heavily dependent on routine dredging operation; in contrast, TRM is defined as a system which is a blend of indigenous techniques and modern technology. It requires neither dredging operation nor hard engineering structure in principle, and most importantly, it functions in line with the natural system, unlike SRM. This study evaluates these two contrasting and competing FCDM systems, applying a methodological approach which is novel in the literature of flood management evaluation. Conventionally, FCDM systems are evaluated from the so-called engineering perspectives that relate to assessments of flood protection potentials and/or flood frequency; however, this study evaluates the FCDM systems from the perspectives of agricultural production as well as productive efficiency.

The measures of productive efficiency (both technical and economic) for this evaluation have been estimated from a stochastic frontier analysis (SFA) of econometric models based on production and cost functions. In addition to productive efficiency estimates, some important yardsticks of productivity measures, including yield gap, potential yield increment, cost-gap, potential cost saving ad input usage patterns have also been used in the evaluation process. The results reveal that the SRM system marginally outperforms that of TRM in terms of agricultural productivity. This is despite SRM being more expensive to deliver, as well as the fact that, due to a relative sea-level rise through land elevation by sedimentation in an environmentally friendly way, keeping maintenance costs low. However, this thesis extends previous analysis of FCDM systems to include agricultural productivity and evaluates a unique low cost and sustainable approach to flood management which was developed based on indigenous knowledge. These findings demonstrate the dangers of adopting narrow technology-fix

engineering approaches within flood control and drainage management systems in coastal areas.

This empirical study has three-fold significance in the literature of water resources and flood management in the agricultural sector. First, it addresses a gap in the literature of performance evaluation. In agriculture, FCDM systems are invariably evaluated from narrow engineering perspectives, overlooking the perspective of productivity; however, it is essential to evaluate FCDM systems from bot perspectives for a holistic evaluation. Second, by looking into a unique FCDM system, the TRM, with reference to a conventional system, and the SRM, this study contributes to an increase in existing knowledge in the literature of water resources and flood management. Third, the methodological approach applies to this analysis helps distinguish the benefits of competing FCDM systems, providing further understanding about the systems which in turn has significant policy implications.