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Journal of Forest Economics 11 (2005) 141–160
Journal of FOREST ECONOMICS
www.elsevier.de/jfe

Economic efficiency and shadow prices of social and biological outputs of village-level organizations of joint forest management in Gujarat, India

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Received 13 June 2004; accepted 20 June 2005

Abstract

Joint forest management (JFM) has been argued as an optimal institutional arrangement for economic, ecological, and social sustainability, and village-level organizations (production units) are responsible for all the productive activities of JFM. A deterministic output distance function characterizing the production structure of JFM production units, in the Gujarat state of India, is calculated using the production data from 50 village-level organizations and employing a deterministic linear programming technique. The distance function includes economic, biological, and social outputs, and conventional and non-conventional factors. The results are used to calculate the efficiency and relative shadow prices of social and biological outputs of different village-level JFM organizations. Policy and management implications of efficiency and shadow prices are discussed.

JEL classification: Q150; 230
Keywords: Joint forest management; Joint production; Output distance function; Production possibility frontier; Shadow price

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doi:10.1016/j.jfe.2005.07.002

Introduction

In the last decade, sustainable forest management (SFM) has emerged as a dominant paradigm of forest management. The main feature of SFM paradigm is the recognition of biological (ecological) and social values of forests, in addition to its economic values. Joint forest management (JFM) or co-management forest regime has emerged the most promising approach to address the issues associated with SFM. As a result, it has attracted the attention of diverse people such as research scholars, forest managers, bureaucrats, and the donors. The focus of resource economists has been on the conventional cost–benefit analysis of JFM (Hill and Shields, 1998; Datta and Varalakshmi, 1999; Ligon and Narain, 1999), theoretical economic models of JFM (Kant and Nautiyal, 1994; Ligon and Narain, 1999), and discussion of property rights arrangement in the context of JFM (Kant, 1996; Zhang et al., 2000; Kant and Berry, 2001).[1] However, no attempt has been made to quantify the economic efficiency of the production units (organizations) of JFM, and in the absence of such analysis it is impossible to design production-unit-level interventions.

Most of the economic research dealing with economic efficiency of production units is based on a production function which incorporates capital and labor as the factor inputs that are occasionally supplemented by land, materials or energy as factor inputs. Only a few economists, such as Leibenstein (1966, 1982) and Mefford (1986), have argued that such a production function is not fully specified. Leibenstein's theory of X-efficiency makes the case that effectiveness of use of resources (factors) is as important as allocation of resources (factors) in a production process. Firm's management functions – the organization of the work process, motivation and supervision of employees, and the monitoring and controlling of the operations – make up X-efficiency, and a difference in how well these management functions are performed should result in substantial differences in the amount of output given the same quantities of capital, labor, energy, and land. Mefford (1986) included production unit's management, measured as a performance ranking of each plant compared to all other plants, as a factor in production function and concluded that the omission of management as a factor will leave a fairly sizable portion of output or productivity unexplained as well as biasing the coefficients of the included variables. Unfortunately, even after such outcomes, economic efficiency studies of production units rarely include management-related variables in their studies. In the case of village-level organizations and production processes of JFM, management-related factors seem even more critical than in the case of conventional economic firms.

The second shortcoming of conventional productivity and economic efficiency analysis is that they account for only marketed outputs and factors. Environmental

[1]Sociologists have examined social issues such as caste composition and gender distribution of Forest Protection Committees (FPCs) established under JFM [Das, 1994, Ahmed, 1995, Ray, 1996;] Brahmi et al., 1997) and foresters have confined themselves to silvicultural or technical issues such as regeneration of species, effect of leaf harvesting on soil nutrients and forest health (Chaturvedi, 1993).