ELSEVIER

Ecological Economics 34 (2000) 363–377

ECOLOGICAL ECONOMICS

www.elsevier.com/locate/ecolecon

ANALYSIS

Interrelationships between economic policy and agri-environmental indicators: an investigative framework with examples from South Africa

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Received 3 August 1999; received in revised form 2 December 1999; accepted 23 March 2000

Abstract

A number of methodological approaches to understanding and quantifying the potential impacts of changes in macroeconomic and sectoral policies on the natural resource environment have been developed in recent years. However each has its limitations, resulting in policy change still being implemented without due attention to environmental impacts. Two key drawbacks of those methodologies that do attempt to model these impacts are that they are generally static in their approach, thus may not alert the decision maker to the often quite different long-term implications, and that they attempt to generate rather specific sets of indicators, making them difficult to use and/or interpret outside case study applications. In this paper we expound a framework for addressing these limitations in the context of the agriculture sector. In developing countries in particular the dynamic dimension is critical given the twin pressures of population growth and rising incomes associated with economic growth. In light of the second drawback, it is the propensity of policy to impact upon the natural resource environment via its effect on the type of farming practice adopted that forms the focus of the paper. A methodology is first developed to facilitate the tracing of likely impacts of both price and non-price reforms, via both the incentives and constraints to increased food production. By separating out the impacts on environmental indicators associated with extensification and intensification of agriculture, it is possible to determine which of these indicators are most likely to be affected by policy changes, and to what degree in both the short and longer term. The framework is then applied to case study data from the South African agriculture sector to demonstrate how consideration of the risk of natural resource degradation earlier in the policy dialogue process could result in the implementation of more effective complementary measures.

Keywords: Farming practices; Economic policy; Environmental indicators; South Africa

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0921-8009/00/$ - see front matter
PII: S0921-8009(00)00178-6

1. Introduction

Two central themes of the so-called Global Food Debate, (see, for example, Brown, 1994; McCalla, 1994; Islam, 1995) surrounding the issue of increased agricultural production in poor countries are the influence of the technologies currently deployed and likely to be developed in the future, and the impacts on the natural resource environment as it comes under increasing pressure from attempts to raise the productivity of the resources used in agricultural production. The relationship between the technological choices and the policy environment are well documented, but the link between policy change and the natural resource environment has received much less attention.

While the impacts of specific localised changes in the socio-economic context have received substantial focus, for example, those stemming from the implementation of projects where the association between action and impact are both visible and measurable, the links between sectoral and macro-economic policy and the sustainability of the natural resource environment have received much less attention. In analysing the impact of any policy change, policy makers would ideally take into account these environmental costs and benefits as well as the economic outcomes in terms of increased efficiency. Often, however, it is difficult even to determine whether the impacts associated with such policy decisions will be positive or negative, let alone the magnitude of any effects.

The assessment of the impacts of policy decisions on the natural resource environment has been hindered by the absence of a methodology for tracing these impacts (Munasinghe and Cruz, 1994). Even where such relationships are recognised they are rarely incorporated at the policy design stage, as it is difficult to determine the magnitude of environmental effects until they become apparent. In the context of substantive economic policy reform, this implies that these effects are not taken into consideration until after the reform process has been implemented and the response is reactive rather than proactive. The latter point highlights the importance of both the environmental impact assessment and the analysis of the economic costs and benefits of policy decisions being completed at the same point in the policy formulation process, a theme central to the Action Impact Matrix (AIM) methodology (Munasinghe and Cruz, 1994).

One problem facing researchers is that their attempts to incorporate sustainability issues into policy analysis are likely to be static in nature because both technology and population growth rates are considered to be exogenous influences. However, models that attempt to treat these variables endogenously are likely to be of little use to policy makers due to their being both highly complex and intractable, while more simplified models are likely to prove unreliable. This paper attempts to develop a framework that demonstrates that farmers' supply response to changes in incentives resulting from, for example, changes in population density, is influenced by the existing state of technology and subject to the constraints on innovation imposed by government policy, and that this is likely to result in quite different site-specific outcomes.

In explaining the AIM approach, Munasinghe and Cruz (1994) stress that the eventual impact of policy reform on the incentives faced by farming households is influenced by intervening institutional factors such as those affecting access to and use rights over resources, including land and water. Whilst they suggest that the complexity surrounding these issues implies that country-specific analysis will generally be required, the authors also point out that key reforms have specific identifiable impacts on subgroups of high priority problems. However, the AIM methodology does not appear to distinguish different possible responses to changes in incentives. In the agriculture sector, for example, output can be increased in response to an increase in output price by either extensifying or intensifying production activities, each having different associated impacts. It is therefore crucial to be able to identify the form and propensity to impact. For example, an appreciation in the exchange rate can result in inorganic inputs becoming relatively less expensive. Agricultural producers may respond by intensifying production on their more productive land. By contrast, a depreciation of the currency