

Water, Agriculture and Sustainable Well-being
Edited by : Unai Pascual; Amita Saha and Jayanta Bandyopadhyay, Published by : Oxford University Press, Jai Sing Road, New Delhi-110001, Hard Board Binding, Pages 301, Price Rs. 750/-

'Water, Agriculture and Sustainable Well-being : Ecological Economics and Sustainable Well-Being', edited by Unai Pascual, Amita Shah and Jayanta Bandyopadhyay provides a collection of 12 interesting papers that grapple with several dimensions of the complex issue of sustainable water use and agricultural practice. The book begins with an introduction that summarizes and places the question in the broader contemporary context that increasingly looks at natural resources as scarce placing limits on unconstrained supply augmentation as a credible policy. This raises simultaneously questions about valuation of natural resource, such as water – both on quantity and several dimensions of quality, and the question of access for the poor and vulnerable sections of society. This broad tension in the discipline of ecological economics finds an expression in this book in the contribution of several authors.

The first three papers in the book look at the issue of arsenic pollution in the Gangetic Delta of Bangladesh and West Bengal, providing an account of the causes of environmental and health damage. The paper explore different methods of estimating what has come to be described as the Willingness to Pay (WTP) for services such as arsenic free water supply. One approach argues for estimating the household demand for quality water from the indirect utility function that model household defensive expenses incurred to reduce chances of illness (and the resulting disutility). Along with a dose-response-function that establishes the link between arsenic exposure level and illness probability, this approach provides a way of estimating value of services from arsenic removal/reducing technologies. Another paper argues for use of hyperbolic discount rates to value arsenic removal technologies/investment, since household use very low discount rates for events far away into the future. Another paper argues that arsenic contamination is part of an

overall crisis in agriculture and the incentivized adoption of unsustainable techniques. It calls for a revival of traditional surface water management practices.

The fourth paper reports on an interesting experiment in a watershed of the Appalachian Mountains in the USA. It describes an innovative institutional framework for handling ecosystem service payments, where farmer groups in the watershed were rewarded according to the quantity and quality of water flowing from their watersheds. This provides a way of handling quality degradation due to human activity from non-point sources that has significant spatial externality. The institutional framework created a system of payment to individual farmers based on the water quality – with the regulator setting the marginal benefit from polluting input use to the marginal earnings from pollution abatement as ecosystem service payment. The experiment remains within a small spatial limit involving just a handful of farmers; moreover, group investments and compensation has not yet been tried – though it may be the next agenda of the project.

The fifth paper provides an approach to evaluating the value of physico-chemical properties of water, using principles of physical hydromonics. The basic argument is something like this. The thermodynamic value of a water body, characterized by its specific properties such as structure or concentration, is defined as the minimum energy (called exergy) required to produce it from common material in the reference environment. The sea water is used as a reference sink from which water of any specified quality (chemical composition), or state (such as height, temperature) can be obtained with application of technology (or energy). Using these principles, with profuse generation of data to monitor system characteristics, one can do an accounting of a specific water body, and decompose the contribution of different human activities towards quality degradation in a uniform energy unit.

The sixth paper reports on another interesting experiment evaluating the yield and farm productivity in four types of sample farms : i) using standard chemical fertilizer based paddy monoculture, ii) integrated nutrient management, iii) organically managed farm, iv) integrated

intensive farming system with paddy-legume-aquaculture integration. Data shows that productivity goes up from category i) to iv); as the authors argue, as complexity increases, the greater is the throughput of the ecosystem to the economic system through improved farm output and profits. Integrated intensive farming is a complex practice. Legumes, organic fertilizers, biological organisms and livestock are integrated with each other; chemical fertilizers are used minimally and pesticides used for cotton. Cropping intensity is 200% or 300% in wetlands; poly-fish cultivation and surface water management (through ponds) is integrated in a system of pond-bund vegetation (with vegetable and green manure trees). Total species intensity is 8.4 per acre and an area diversification index of 1.74. The flow of mass within the on-farm system is the source both of conservation and enhanced throughput to the economic system.

The paper by Amita Shah raises the question of the influence of international trade and places the question of crop specialization in developing countries within a North-South framework. Developing countries face a complex task, partly because of own resource scarcity, partly through new valorization of environment norms (such as through non-tariff barriers) and partly because of non-consonance between the crops that they have specialized in and their relative resource endowments. As pointed out, water poor developing countries often emerge as net water exporters by concentrating on water intensive crops.

The next set of papers examine various dimensions of sustainable agricultural practices. The cycle of increased pesticide usage, growing disease resistance, degrading soil quality, which leads to a spiral of further increased pesticide usage along with falling productivity brings out the dynamics of a debt trap which several producers have fallen into the Andhra Pradesh. due to significant non-linearity in costs of transition to more

sustainable practices, left to own private decisions, the system appears to be incapable of emerging out of the low technology trap. Other papers show that current high productivity of certain crops become suspect when environmental costs are factored in. Another paper looks at the impact of climate change, particularly its differential effect on vulnerable population through increased incidence of natural disasters.

While the papers cover a wide gamut of issues, so to say, an explicit articulation of the institutional dimension of natural resource generation, usage and sustenance remains unclear. As long as valuation remains an exercise within the neo-classical construct, it would fail to express the multi-dimensionality of the resource, since equivalence would need to be established within a cardinal utility articulation. The papers on hydronomics based valuation, Catalonia experiemnt of ecosystem service and most importantly the paper on the complex nature of integrated-intensive farming system are closer to the institutional concern. Under what institutional set-up would the dimensions of complex intro-system flows in the integrated-intensive farming system be valorized; would a reduction of the multi-dimensions of mass flows in the sub-system to money value reduce the incentive to manage such intricate flows? Aren't such resource flow management an asset that retains its value to the local asset holders precisely because of the non-existence of a standard market for it? Why has the standard chemical based agriculture under market or state driven price based incentives smothered all complexities? Ecological economics, as a field, has inadequately dealt, as it is, with these issues. Few papers in this collection raise those issues, and make us think. Hopefully some of the authors would engage with these questions and take the debate forward. □

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