Agroforestry: Science, Policy and Practice

This book is based on papers presented in the agroforestry sessions of the 20th World Congress of International Union of Forest Research Organizations (IUFRO) held in August 1995 in Tampere, Finland. It contains a total of 13 papers, each of which is adequately illustrated by data tables, figures, and references. It is a comprehensive and a state-of-the-art review of the emerging science of agroforestry, relevant policy issues, and practical considerations in technology transfer. This hard bound book contains 21 tables, 36 figures, 652 references, 15 equations, 3 appendices, and 14 notes.

Agricultural sustainability is a major issue of the modern era, especially for densely populated regions of the tropics and subtropics. In the context of subsistence agriculture, sustainability is concerned with four issues (Fig. 1): (1) productivity per unit input of the most limited resource (e.g., land, labor, off-farm inputs, plant-available water), per unit loss of the nonrenewable resource (e.g., topsoil depth) or conservation-effectiveness of the land use and farming system for soil and water resources, and nonnegative trends in per capita productivity over a long-time period; (2) environmental impact of agricultural practices with regard to eutrophication of surface water and contamination of groundwater, emission of heat-trapping gases and carbon sequestration in soil to mitigate the greenhouse effect; (3) socioeconomic equity including equal access to all resources; and (4) political stability and strengthening of institutions that enhance productivity. There is a tremendous effort to develop land use and farming system that meet these criteria. Agroforestry is one such system, which has received a considerable attention since the 1980s.

The science of agroforestry is new, and just as in any rapidly developing scientific discipline, there are several myths that contrast to scientific realities. Common myths with agroforestry are: high yields regardless of the nature and magnitude of competition among species and possible allelopathic effects; improvements in soil fertility regardless of the nutrient uptake by trees and nutrient profile of the subsoil; and pest control even though the tree species may be prone to and serve alternate host to numerous pathogens. It is in this context that this book is a welcome addition to the literature, because it addresses the relevant issues objectively and critically.

The opening chapter by Pedro Sanchez is a comprehensive review, addressing the emerging science of agroforestry. The chapter addresses four key issues of agroforestry: competition, complexity, profitability, and sustainability. There is a need to develop systems to minimize the competition between trees and crops/livestock for light, water, and nutrients by understanding the interaction among species. The interaction is the net effect of the soil fertility improvements due to addition of nutrient-rich biomass and the competition effect for light, water, and nutrients. Magnitude of the interaction depends on species, soil factor, climatic environment, and the management. In addition to biophysical factors involving interaction, complexities are based on socioeconomic and ecological considerations. Socioeconomic complexities are important because of the scale factor ranging from farm household to watershed or national/international scale. Ecological complexities deal with issues of productivity to meet the demands of rapidly increasing population, and of environmental protection in relation to water quality and greenhouse gas emissions. Technological adoption depends on profitability and sustainability. Profitability involves issues relevant to marketing, institutional support, and policy considerations. Sustainability is also concerned with soil conservation, biodiversity, and environmental quality.

The opening chapter addressing scientific issues is followed by three chapters dealing with policy issues, economic evaluations, and case studies on costs and benefits analysis from Central America and the Caribbean. Supportive land use policies are extremely important to a widespread adoption of agroforestry. The policy chapter highlights recent policy assessment initiatives in developing and developed countries. Household land use decisions are affected by individual, community, and governmental legal conformity based on economic (market forces), social (institutional consideration), and environmental (laws) issues. The chapter on economic evaluation indicates the importance of financial and nonfinancial values, and discusses the value of sustainability from physical and economic view points in short- and long-term perspectives. The author highlights the ecologic benefits of biodiversity, and individual’s or society’s willingness to pay for it. The chapter concludes that, as it now stands, agroforestry does not offer extraordinary benefits of the financial or nonfinancial kind. The author strongly and justifiably recommends the “no mystique, no propagandizing” approach based on “systematic and quantitative investigation of the claimed benefits and admitted disadvantages.” The case study from Central America and the