

Natural Resource Management and Policy

David Zilberman
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Dirk Pfeiffer *Editors*

Health and Animal Agriculture in Developing Countries



 Springer

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NATURAL RESOURCE MANAGEMENT AND POLICY

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EDITORIAL STATEMENT

There is a growing awareness of the role that natural resources, such as water, land, and forests, as well as environmental amenities play in our lives. There are many competing uses for natural resources, and society is challenged to manage them to improve social well-being. Furthermore, there may be dire consequences to natural resources because of mismanagement. Renewable resources, such as water, land, and the environment, are linked, and decisions made with regard to one may affect the others. Policy and management of natural resources now require an interdisciplinary approach, including natural and social sciences to correctly address our societal preferences.

This series provides a collection of works containing the most recent findings on economics, management, and policies of renewable biological resources, such as water, land, crop protection, sustainable agriculture, technology, and environmental health. It incorporates modern thinking and techniques of economics and management. Books in this series will combine knowledge and models of natural phenomena with economics and managerial decision frameworks to assess alternative options for managing natural resources and the environment.

The Series Editors

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Part I

Introduction and Background

Chapter 1

Introduction

David Zilberman, Joachim Otte, David Roland-Holst, and Dirk Pfeiffer

Throughout history, animal husbandry has been a central component of agriculture and livestock has been central to agrofood systems. Animals have provided rural societies with a broad spectrum of products and services, including food, energy, fertilizers, traction and transport, pest control, security, etc. Despite the immense benefits enjoyed by humans from this symbiotic relationship, coexistence with domestic animals also poses serious risks. Most important among these are infectious diseases of animal origin that can affect humans (zoonoses). These have been prominent among the many pandemics that have wiped out millions of people and communities since the earliest human settlements. To cite a relatively recent example, the 1918–1920 Spanish Flu Pandemic, caused by a virus with Avian origins, was responsible for tens of millions of deaths worldwide (Murray et al. 2006). Recent research on the human genome suggests that we have acquired resistance to such diseases over a much longer history of recurrent viral threats.

While humans are gradually shifting away from reliance on animal traction and related services, rising incomes and population have built momentum for drastic changes in livestock consumption and production patterns, heralding a new “food revolution” (Delgado et al. 1999) driven by the emergent middle classes around the world. In response to such demanding forces, the livestock sector is changing at every level. Industrial livestock production systems are being introduced or expanded throughout the world while hundreds of millions of individual farmers

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continue to raise livestock in traditional production systems. These two archetypes and all production systems in between are evolving under rapidly changing and intensifying forces, including expanding markets, global competition, increased supply chain complexity, food safety and other product standards, disease risk management, etc. Global food trade has risen more than 400% over the last generation and, with this increased product mobility, has come rapid diffusion of disease risks.¹

As this process has accelerated, several large-scale outbreaks, such as Highly Pathogenic Avian Influenza (HPAI type H5N1) or Avian Flu, Swine Flu (H1N1), Severe Acute Respiratory Syndrome (SARS), and Bovine Spongiform Encephalopathy (BSE or “Mad Cow” disease), have asserted themselves in less than a decade. Effective responses to these new threats have to be based on better public and private understanding of zoonotic-risk generation and transmission, and these insights must be integrated into a new generation of policies and practices governing animal production, processing, supply chain management, and public health. Given the complexity and socioeconomic extent of agrofood systems, meeting these challenges successfully requires multidisciplinary research, insights, and policy guidance.

This book introduces such an approach, applied to one of the leading modern pandemic threats, HPAI. While the work reported, here, is of general relevance to past, present, and future zoonotic diseases, HPAI, itself, remains a very serious threat to animal and human populations. The present research was part of a leading international effort to understand and address this disease’s emergence and the larger implications of policy responses to it. The HPAI is extremely contagious and deadly to poultry, much less contagious but very deadly to people, and is still undergoing rapid mutation and reassortment in an established reservoir of tens of billions of domestic animals/poultry. To better understand this threat and devise more socially effective defenses against it, the UK Department for International Development supported our multidisciplinary HPAI research project for Southeast Asia and Africa.

The results of this research are reported in five thematic sections below. Part I provides an historical perspective on zoonotic-disease control, reviewing experience with one of the most significant zoonotic diseases—Bovine Tuberculosis. This section also presents a conceptual framework to characterize the evolution of livestock production and supply chains using Viet Nam’s poultry sector as a case study. Part II presents different perspectives on managing animal disease. Zilberman et al. present a farm-level model that reveals how incentives, including penalties for selling sick animals, will affect production level, monitoring, and culling choices. While this model can be applied to traditional as well as modern livestock operations, Hennessy and Wang investigate how adoption of industrial livestock methods affects the economics of livestock production. Modern systems

¹ Indeed, some of the most deadly modern zoonotic diseases, such as HIV and the Ebola virus, were apparently long endemics in local animal populations but have only recently become larger human health threats.