

## INTRODUCTION

As we have seen in Part I of this book, joint production has a number of systematic implications for ecological-economic systems. Traditionally, the economic consequences of joint production are analysed using the established methods and concepts from environmental and resource economics. These are based in welfare economics and are centred around the concept of externality. There is a large and well-understood body of literature in that strand; authoritative textbook treatments include Baumol and Oates (1988), Dasgupta and Heal (1979), Hanley et al. (1997), Hartwick and Olewiler (1998), Kolstad (2000), Siebert (2004) and Tietenberg (2003). However, this approach systematically leaves open a number of important questions. This part of the book employs the concept of joint production to address some of these issues.

Chapter 6 investigates how the analysis of joint production has influenced the history of economic theory and, vice versa, how in the history of economic theory the concept of joint production was shaped. We show that the concept of joint production is deeply rooted in economics and that there exists a vast body of knowledge on joint production which we can draw upon. We also identify remaining gaps in the current economic understanding of joint production. Chapter 7 then makes recourse to the philosophy of economics in order to explain why certain aspects of joint production are systematically neglected in modern economics.

The thermodynamic analysis of joint production in Chapter 3 has left open the question of the value of joint outputs, that is whether they are desired, undesired or neutral. But this is an important distinction because, traditionally, the character of joint outputs as desired or undesired entails a distinct way of modelling and theorising: desired joint outputs are subject to the theory of industrial organisation, while undesired joint products are subject to the theory of environmental economics. However, there are important examples of outputs which are ambivalent in the sense that they may potentially be desired or undesired. In Chapter 8, we study such ambivalence and draw conclusions for ecological-economic theory and policy.

Introducing the time dimension into the analysis, in Chapters 9 and 10 we employ capital theory to study the investment decision under joint production of consumption and environmental pollution, and the implications for structural change in ecological-economic systems.

