

Chapter 1

The Nature and Significance of Resource and Environmental Economics

1.1. Introduction

In this book, the term “resource economics” refers principally to natural resource economics. Originally, economists referred to all natural resources as land and vestiges of this earlier usage are retained in the title of a leading academic journal entitled *Land Economics*, which focuses on the economics of the utilization of natural resources. The concept of land adopted by classical economists included not only natural terrestrial resources but also marine and other aquatic resources as well as those below the Earth’s surface, such as minerals.

Originally, economists considered land (natural resources), labor and capital to be the main factors of production and believed their availability to be the prime determinants of national wealth and economic welfare. While this conception of classical economists might have been reasonably appropriate in Europe in the 18th and 19th centuries, it became less relevant as economic growth and changes in the nature of economic activity occurred. As outlined below, this led economists to revise their views about the main resources contributing to economic welfare and to extend their views about what resources are significant for economic welfare.

This chapter commences with a discussion of the relationships between natural resource economics, environmental economics and ecological economics and then outlines changing views about the basic economic problem (the presence of economic scarcity). It then outlines

general factors that add to or ameliorate this problem and indicates how the views of economists about this subject have altered with the passage of time. The penultimate section of this chapter highlights major modern issues (covered in this book) that can be assessed by applying methods developed in natural resource economics or closely related ecological economics. The final section contains general observations about the nature of models used in resource and environmental economics.

1.2. How are the Subjects of Economics, Natural Resource Economics, Environmental Economics and Ecological Economics Related to One Another?

1.2.1. *The subject matter of economics*

Economics has been defined as the science of the administration or management of scarce resources. Its focus is mainly on the social mechanisms used for this purpose and their consequences for the satisfaction of human wants. The satisfaction of human wants is seen as depending primarily on the quantity (and quality) of goods and services available to individuals. Consequently, even though economics is concerned with important factors that influence human well-being, it does not study *all* such factors. For example, it does not take into account the value to individuals of different possible types of social relationships, which may affect their sense of belonging and personal satisfaction. Such aspects are taken into account in sociology, social psychology and similar areas of study.

Economic scarcity exists because collectively individuals want more commodities that can be produced with the resources available to them. Consequently, organizational changes that increase economic efficiency and thereby make it possible to supply a greater quantity of wanted commodities (relative to resources used) are desired by most societies. An important objective of economics is to suggest ways in which the social management (administration) of resources can be

improved to reduce the scarcity of available commodities. For example, to what extent do market mechanisms help to minimize scarcity? In what respects do such mechanisms have shortcomings and what can be done (if anything) to remedy these shortcomings? What effect do different political systems have for the efficient administration of scarce resources?

However, the problem of making efficient use of available resources is not easily solved. One complication is that the use of resources now affects their availability in the future. In some circumstances, this may add to future scarcity but in other cases, it can reduce future scarcity. For example, if a fixed stock of water is available for use over two periods, using more of it in the first period will reduce its availability in the next. How should the available quantity of water be allocated between the periods in order to obtain the greatest economic value from its uses? On the other hand, greater use of resources in a current period need not spell greater scarcity in the future. For example, if resource use is increased in the current period to support research and development efforts and if this results in scientific advances that reduce the quantity of resources needed (or alters the type or resources required) to produce commodities in the future, this can reduce future resource scarcity. Economics is concerned not only with current scarcity but also with features of economic scarcity likely to emerge in the future, such as the nature of economic scarcity that is likely to occur with the advent of global warming. The connection between current resource use and future economic scarcity is one of the subjects studied in economics.

1.2.2. *The nature and coverage of natural resource economics, environmental economics and ecological economics*

The subjects of natural resource economics, environmental economics and ecological economics overlap substantially in their coverage but all are concerned with the analysis of the basic economics of managing resource use so as to reduce economic scarcity. These subjects (all subsets of economics) have evolved and have, to some extent, altered

their content as the economic problems facing society have changed. It is useful to consider the nature of their evolution.

Natural resource economics (previously known as land economics) emerged as a focus of interest in the early development of economics. Sometimes the French physiocrat (writing about the mid-1700s) is credited with being the pioneers of natural resource economics (see Cleveland, 2008). Possibly, Quesnay (1694–1774) is the most widely known physiocrat. He tended to stress agriculture and the quality of land as the foundation for the circulation of economic wealth and developed the “Tableau économique” (see, for example, Roll, 1945, pp. 130–138; Quesnay, 1991). However, the European mercantilists who wrote at an earlier time also placed emphasis on natural resources as a source of wealth, particularly the importance of mines. Furthermore, Kautilya writing in (what is now India) about 300 BC gave considerable attention to the importance of natural resources as an influence on national wealth (Shamasastri, 1961; Tisdell, 2006). Therefore, the interest of political scientists and economists in natural resources as influences on economic wealth is one of very long standing. Nevertheless, during the late 18th century and in the 19th century, interest in natural resource economics accelerated as a result of enquiries about whether there are limits to economic growth and if so, what determines these limits. In other words, what are the main factors that determine long-term economic possibilities and the likely extent of economic scarcity in the future?

Two main constraints on economic growth were identified:

- (1) the diminishing marginal productivity of land suitable for agriculture; and
- (2) the need to engage in more marginal mining operations as minerals in the most productive mines are exhausted or become more difficult to recover.

Given the constraints on economic growth posed by what Malthus (1798) called the “niggardliness of nature”, it was thought likely that an increase in income levels would be unsustainable should there be a significant rise in population levels. This led Malthus to suggest policies to restrain population growth. However, the debate did not end there.

An important issue became the extent to which scientific and technological progress could stave off this specter of increasing resource scarcity. Ricardo (1817) recognized that scientific and technological progress could be counteracting force to the effects of diminishing resource productivity or economic scarcity. However, Engels (1959), writing in 1844, was most dismissive of the possibility that limited available natural resources of diverse productive quality would place a limit on economic growth — he optimistically declared that nothing was impossible to science. The debate about the ability of the development of science and technology to offset increasing scarcity of natural resources continues today. It is unresolved because the future development of scientific and technological knowledge is highly uncertain.

In due course, more detailed analysis of the economic exploitation of natural resources emerged. Analysis was extended in relation to the economics of mining, the economics of utilizing natural forests, and wild fish stocks and the role of natural resource use in agriculture. The main focus was on primary production and the production of industries depending heavily on the use of natural resources. At the same time, it was recognized that the production of these industries did not depend only on the natural resources available to them. Other factors of production such as man-made capital, labor, human capital and ingenuity were also important contributors to production. While some attention was given to environmental externalities in later developments of natural resource economics, these were usually limited to negative externalities confined to the primary-industries studies, for instance, the negative economic impacts of open-access to fisheries.

The development of environmental economics resulted in a broadening of economic analysis involving natural resources. It made it clear that the quality of these resources could decline due to pollution and environmental deterioration caused by human activity. Pigou (1932) pointed out how such environmental externalities could add to economic scarcity and reduce economic welfare. The examples that he used were not confined to primary industries but included air pollution caused by manufacturing industries and the risk of fire caused by sparks from steam locomotives. His analysis was based on neoclassical economic analysis and emphasized marginal or small

changes in economic activity. The larger picture was ignored because of his focus on microeconomic analysis. His work, however, became a starting point for the development of environmental economics, which relied heavily on the application of neoclassical economic techniques.

Ecological economics began developing from the late 1960s onwards. It was more eclectic in its use of analytical methods, favored a holistic approach stressing interdependence between economic activity, the natural world and social systems. For example, Boulding (1966) used the spaceship analogy to emphasize the type of situation facing humankind on Earth — those living on a spaceship only have limited resources (many of which are used up during their mission) and they must be careful not to pollute the capsule in which they exist. Boulding's analogy highlighted resource depletion on Earth and pollution as potential limits to economic growth. These theories were further developed by Georgescu-Roegen (1971) and Daly (1973) and other economists. Focus shifted to the sustainability of economic growth and the factors that do (or could) limit this growth. Natural resource depletion and adverse changes in the quality of natural resources (due to human activity such as the emission of air and water pollutants) were identified by ecological economists as major constraints on the sustainability of economic growth. Misallocation of resources (such as may occur when there is open-access to natural resources) also continued to interest ecological economist. In line with their eclectic approach, ecological economists did not reject completely the type of microeconomic analysis used in environmental economics but emphasized its limits.

As a result of these developments, a synthesis of economic thought has emerged that draws on the development of natural resource economics, environmental economics and ecological economics. Such a synthesis was already apparent in some texts that appear in the 1980s, such as Pearce *et al.* (1989). Resource and environmental economics as outlined in this book incorporates material that has been developed by economists who have primarily concentrated on the advancement of ecological economics, as well as more traditional materials covered in natural resource economics and environmental economics.

Figure 1.1 provides a rough sketch of the historical development of natural resource economics, environmental economics and ecological

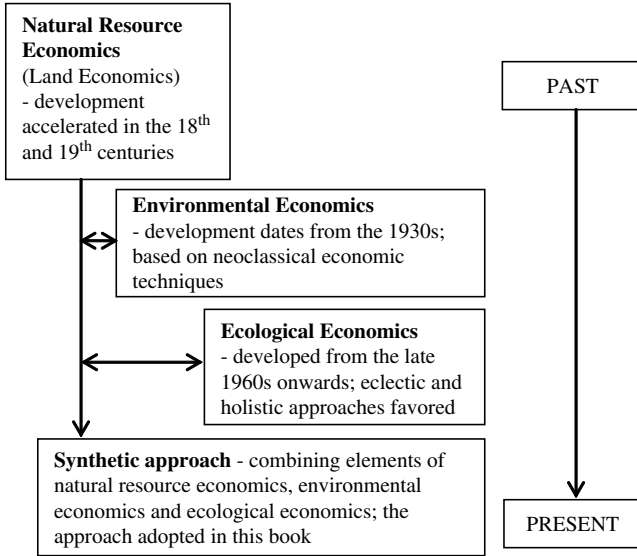


Fig. 1.1. A sketch indicating the pattern of historical development of natural resource economics, environmental economics and ecological economics and the emergence of a synthesis of these subjects.

economics. It indicates that a synthesis of these approaches seems to be emerging. This book is based upon this eclectic synthesis.

1.3. Further Observations on the Development of Economic Thought about the Significance of Natural Resources and Environmental Conditions

1.3.1. *Changing emphasis on the relevance of natural resources for economic growth and scarcity*

As mentioned above, classical economists in the 18th and 19th centuries emphasized the importance of the supply and quality of natural resources as constraints on economic growth and as major determinants of economic supplies. The main constraint to economic growth

and production was, in their view, the operation of the laws of diminishing marginal returns and declining marginal productivity.

In their view, the main reasons why these laws apply to economies are that most natural resources (for example, land for agriculture) are in fixed supply and are of uneven quality in terms of their productive potential. However, it was conceded that some natural resources (for example, minerals) are depletable and not reusable, and that as superior grades of these resources are depleted, inferior stocks of these are exploited. Nevertheless, the finiteness of the availability of such resources did not obtain emphasis. Diminishing marginal returns from increased economic activity was seen as arising

- (1) from the intensified exploitation of natural resources already utilized; and
- (2) the extension of economic activity to involve the use of previously unused natural resources of lower productivity than those already utilized.

Although classical economists emphasized the role of natural resource availability as limiting growth, they did not stress exhaustion of natural resources as a serious barrier to economic growth and they paid no attention to the possibility that environmental pollution would inhibit economic growth. Because these did seem to be serious problems at the time, the economic implications of biodiversity loss and global warming received no attention.

Economists, during most of the 20th century, retreated from the view that the availability and quality of natural resources posed a significant impediment to economic growth. In fact, the expansion of manufacturing industry led to the view that increasing returns to expanded economic activity rather than decreasing returns might be more characteristic of expanding economies (Young, 1928). Emphasis now shifted to the availability of man-made physical capital (the produced means of further production) as being the most significant determinant of economic growth. Economic models were developed that no longer took natural resources into account as a determinant of economic growth. These models include the Harrod–Domar growth model (Harrod, 1948; Domar, 1946) and the models of Solow (1956)

and Swan (1956). Solow (1957) later extended his model to include exogenous technological progress as an important influence on economic growth. Further extensions to these types of growth models were, for example, made by Romer (1986). Studies by Denison (1962) found that economic growth in many countries depended not only on the supply of physical capital but also on human capital (for instance, the level and quality of the education of their populations) as well as technological progress.

Nevertheless, beginning around the early 1970s, a small group of economists (for example, Boulding, 1966; Mishan, 1967; Georgescu-Roegen, 1971; Daly, 1973, 1999, 2007) plus some noneconomists (for example, Meadows *et al.*, 1972, 2005; Ehrlich *et al.*, 1973, 1977) began to emphasize the possibility that depletion of natural resources and the pollution and degradation of natural environments could become serious impediments to sustained economic growth. Thus, a significant group of economists (and some influential noneconomists) have reasserted the importance of natural resources (assets) for economic processes. Pearce (1988), in particular, stressed the vital economic role of the availability of natural capital (resource stocks) as a complement to man-made capital. The views of these scholars are given particular attention in Chap. 7 of this book but these concerns are also reflected in other chapters such as Chaps. 10 and 11.

1.3.2. Changing emphasis on the significance of material versus nonmaterial goods for economic welfare

On the whole, classical scholars only ascribed economic value to material commodities and tended to dismiss nonmaterial commodities as a source of economic value. In line with this view, labor producing physical goods was described as productive labor whereas that supplying services was designated unproductive labor. Thus, labor helping to supply grain was considered productive but that supplying tourist services fell into the unproductive category of labor.

This may have been a reflection of the fact that classical economists wrote at a time when per capita incomes were low and possibly in those

times, increased supplies of basic necessities were valued most by society. This implied that in the hierarchy of wants or needs (Anon, 2009; Maslow, 1987) goods (for example, food) to satisfy *basic* physiological needs were valued most highly, and services and nonmaterial goods were regarded as unessential luxuries. However, even the poor appear to have a demand for nonmaterial goods. This accords with the theory of Max-Neef (1992) that a *strict* hierarchy of wants does not exist. It cannot be taken for granted that the poor place no economic value on intangible commodities. Depending on their cultures and religions, even the poor in some developing countries value the conservation of living things (see Bandara and Tisdell, 2003).

During the early 20th century, there was growing emphasis by economists on subjective valuation of economic commodities as a basis for economic theories of rational choice. Cardinal scaling of consumer preferences based on the medium measurement of utility was replaced by the mere ordering of preferences (ordinal utility). This has been described as the ordinal revolution (Little, 1957). Probably as a result of this and because of rising incomes, the concept (accepted by the community) of what had economic value began to widen. It soon became accepted that any item (tangible or intangible) could have economic value provided some individuals are willing to pay for its supply. The desired commodity could be of a material or a nonmaterial nature as pointed out by Robbins (1937).

This changed outlook provided an opening for new developments in natural resource economics and in environmental economics. For example, the way was now open for assessing the value of natural resources (such as national parks) for outdoor recreation and methods developed for valuing wild species taking into account such intangible attributes as their existence value, option value and bequest value (see Chaps. 6 and 10). It was shown that species and environments possessing little material economic value could have considerable economic value in view of the value placed on their intangible attributes.

In general, the evolution of economic thought has widened the scope of economic enquiry and enriched it. This evolution has also influenced the development of resource and environmental economics (and closely related studies in ecological economics). Further evolution of these subjects can be expected in the future.

1.4. Notes on the Coverage in this Book of Modern Issues in Resource and Environmental Economics

This book is divided into two parts. Part I focuses on general issues and economic principles relevant to resource and environmental economics, and Part II applies these general principles to specific topics of current concern. These specific topics include the development of agriculture and its impacts on environments and resource availability, water management, biodiversity conservation, global warming and air pollution, recycling and solid waste management, and environmental health.

Several important general issues are covered in Part I. For example, Chap. 2 outlines varied theoretical perspectives that can be used to analyze issues involving environmental and resource economics, and 2 is intended to emphasize the following points:

- (1) No single economic approach is suitable for solving all problems in resource and environmental economics. The most appropriate method can change with the purpose of the analysis and the availability of data.
- (2) Often it is useful to examine issues in resource and environmental economics from several different perspectives.
- (3) Economic thought offers a variety of approaches to economic analysis, and resource and environmental economics can be strengthened by drawing on all of these different types of analyses.
- (4) The body of economic thought is not static but has evolved and continues to do so. This evolution is partly a response to the need for new and improved analyses to address novel and emerging issues, such as global resource and environmental issues that have become apparent in modern times. These include global warming and biodiversity loss. Nevertheless, many economic scarcity problems have been studied for a long time and are of enduring concern, as will also be clear from the coverage in Part I of this book.
- (5) In addressing the complexities of contemporary environmental and natural resource challenges, it is beneficial for economics to draw on the knowledge, value systems and analytical methods of other

disciplines such as ecology, psychology and sociology. Furthermore, the solution to most environmental and natural resource problems requires account to be taken of knowledge provided by natural scientists. Consequently, economists need to interact with scholars in other disciplines and take account of their knowledge to solve economic problems and advance economic theory.

In addition, Part I provides a detailed account of why social systems (principally economic and political systems) may fail to use natural resources and the environment in ways that minimize economic scarcity. It gives particular attention to how market systems may fail in that regard and considers the extent to which laws and property rights can be used to rectify these failures. Government policies for regulating natural resource use and pollution emissions are given particular attention in light of the fact that markets and the bestowal of private property rights can fail to minimize economic scarcity. However, there are also limits to the extent to which governments can rectify this situation and this is kept in mind in the text.

Economic valuation of commodities plays a central role in procedures for determining how well natural resources (including environments) are used to minimize economic scarcity. Consequently, Chap. 6 gives considerable attention to economics methods for valuing environmental spillovers and natural resources.

Environmental and economic sustainability have become major issues and there are fears that scarcity reduction now may result in unwanted economic and environmental impoverishment in the future. Chapter 7 of this book provides a realistic analysis of the issues involved.

1.5. Concluding Comments

While neoclassical economic theory is not rejected in this book as a means of appreciating some important issues in environmental and resource economics, it is nevertheless considered to be a special case, which needs to be supplemented or complemented in many cases by other economic theories and perspectives. Therefore, in order to provide a better understanding of several important modern issues

involving the use of natural resources and environments, the coverage in this book also draws on perspectives provided by new institutional economics and behavioral economics, for example. A useful test of the value of any theory is whether it improves our perception or understanding of observed phenomena. This is the basic test, which has shaped the presentation of materials in this book.

1.6. Keywords

Cardinal utility; classical economics; decreasing economic returns to scale; diminishing marginal productivity; ecological economics; economics; economic scarcity; economic value of intangibles; environmental economics; factors of production; future economic scarcity; hierarchy of wants; increasing economic returns to scale; land; limits to economic growth; material goods; natural resource economics; non-productive labor; ordinal utility; productive labor.

1.7. Questions for Review and Discussion

1. What factors of production were considered by classical economist to be the main determinants of economic production? What factor of production was regarded by classical economists as being the main constraint on economic growth?
2. What is the basic economic problem and how does it influence the nature of economic studies? How do the subjects of natural resource economics and environmental economics relate to the basic economic problem?
3. Compare and contrast the subjects of natural resource economics, environmental economics and ecological economics and outline and discuss their historical evolution.
4. The theories that classical economists developed to predict limits to economic growth (and therefore, limited prospects for reducing economic scarcity) differed in important respects to modern theories (such as those developed by ecological economists), which also predict limits to economic growth. Explain.

5. Several economic growth theories developed since the 1930s fail to include natural resource availability and environmental conditions as influences on economic growth. Do you consider this to be a shortcoming? Why?
6. Why do you think that classical economists only considered material goods to be of economic value? Do you agree with the views of classical economists that labor employed in the production of material goods in production but that employed in the supply of services is unproductive? Why do you think that economists extended their views about the type of things that possess economic values? How did their altered perception influence the development of resource and environmental economics?
7. Do you think it is useful to conceptualize human events as being hierarchical? In such a system of hierarchy, higher-order wants are only satisfied once lower-order ones are satisfied to an “adequate” extent. Does this mean that the poor are only interested in satisfying basic physical wants? What implications could this have for environmental conservation?
8. Do you think it is important to realize that economic thought about resource and environmental economics has evolved and altered with the passage of time? Why do you think this? To what extent do you believe that the theories involving resource and environmental economics are responses to major economic issues of their times?
9. Why is it beneficial to realize that there are a variety of theories and economic perspectives that can throw light on issues involving resource and environmental economics? Outline the type of benefits that could be obtained by making use of different theories dealing with the same economic phenomenon.

Readings* and References

Anon (2009). Maslow’s hierarchy of models. http://en.wikipedia.org/wiki/Maslow’s_hierarchy_of_needs [Accessed 3 June 2009].

*The highlighted items can constitute suitable readings for students. Some are also references. This identification procedure applies to all subsequent chapters.

- Bandara, R and C Tisdell (2003). Use and non-use values of wild Asian elephants. *Sri Lankan Economic Journal*, 4 (2), 3–30.
- Boulding, KE (1966). The economics of the coming spaceship Earth. In H Jarrett (ed.), *Environmental Quality in a Growing Economy*, pp. 3–14. Johns Hopkins University Press, Baltimore.
- Cleveland, CJ (2008). Biophysical economics. In CJ Cleveland (ed.), *Encyclopedia of Earth*. Environmental Information Coalition, National Council for Science and the Environment. Washington, DC. Available from http://www.eoearth.org/article/Biophysical_economics [Accessed 11 March 2009].
- Costanza, R, HE Daly and JA Bartholomew (1991). Goals, agenda and policy recommendations for ecological economics. In R Costanza (ed.), *Ecological Economics: The Science and Management of Sustainability*, pp. 1–20. Columbia University Press, New York and Chichester, West Sussex.
- Daly, HE (1973). *Toward a Steady-State Economy*. Freeman, San Francisco.
- Daly, HE (1999). *Ecological Economics and the Ecology of Economics: Essays in Criticism*. Edward Elgar, Cheltenham, UK, Northampton, MA, USA.
- Daly, HE (2007). *Ecological Economics and Sustainable Development: Selected Essays of Herman Daly*. Edward Elgar, Cheltenham, UK, Northampton, MA, USA.
- Denison, EF (1962). *Sources of Economic Growth and the Alternatives Before Us*. Committee for Economic Development, New York.
- Domar, E (1946). Capital expansion, rate of growth and employment. *Econometrica*, 14(2), 137–147.
- Ehrlich, PR, AH Ehrlich and JP Holdren (1973). *Human Ecology, Problems and Solutions*. W. H. Freeman, San Francisco.
- Ehrlich, PR, AH Ehrlich and JP Holdren (1977). *Ecoscience, Population, Resources Environment*. W. H. Freeman, San Francisco.
- Engels, F (1959). Outlines of a critique of political economy. In K Marx (ed.), *Economic and Philosophic Manuscripts of 1844*. Foreign Languages Publishing House, Moscow.
- Georgescu-Roegen, N (1971). *The Entropy Law and the Economic Process*. Harvard University Press, Cambridge, MA.
- Harrod, RF (1948). *Towards a Dynamic Economics*. Macmillan, London.
- Little, IMD (1957). *A Critique of Welfare Economics*, 2nd Ed. Oxford University Press, Oxford.
- Malthus, TR (1798). *An Essay on the Principle of Population as it Affects the Future Improvements of Mankind*. Reprint 1976, Norton, New York.

- Maslow, AH (1987). *Motivation and Personality*, 3rd Ed. Harper and Row, New York.
- Max-Neef, M (1992). Development and human needs. In P Ekins and M Max-Neef (eds.), *Real-Life Economics: Understanding Wealth Creation*. Routledge, London, New York.
- Meadows, DH, DL Meadows and J Randers (1972). *The Limits to Growth*. Universe Books, London.
- Meadows, DH, J Randers and D Meadows (2005). *The Limits to Growth: The 30-Year Update*. Earthscan, London.
- Mishan, EJ (1967). *The Costs of Economic Growth*. Staples, London.
- Pearce, D (1988). Economics, equity and sustainable development. *Futures*, 20, 598–605.
- Pearce, D, A Markandya and EB Barbier (1989). *Blueprint for a Green Economy*. Earthscan Publications, London.
- Perman, R, Y Ma, J McGilvray and M Common (2003). *Natural Resource and Environmental Economics*, 3rd Ed. Pearson Education, Harlow, UK [Chapter 1].
- Pigou, AC (1932). *The Economics of Welfare*, 4th Ed. Macmillan, London.
- Quesnay, F (1991). In J Cartelier (ed.), *Physiocratie: Droit naturel, Tableau économique et autres textes*, GF-Flammarion, Paris.
- Ricardo, D (1817). *The Principles of Political Economy and Taxation* Reprint of 1955. Dent, London.
- Robbins, L (1937). *An Essay on the Nature and Significance of the Economic Science*. Macmillan, London.
- Roll, E (1945). *The History of Economic Thought*, 2nd Ed. Faber and Faber, London.
- Romer, PM (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94, 1002–1087.
- Shamasastri, R (1961). Translator, *Kautilya's Arthashastra*. Mysore Printing and Publishing House, Mysore, India.
- Solow, RM (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70, 65–94.
- Solow, RM (1957). Technical change and the aggregate production function. *Review of Economics and Statistics*, 3, 312–320.
- Swan, TW (1956). Economic growth and capital accumulation. *Economic Record*, 32, 334–361.
- Tisdell, C (1990). *Natural Resources, Growth and Development*. Praeger, New York, Westport, CT, London, UK [Chapters 1, 3 and 4].

- Tisdell, C. (2005). *Economics of Environmental Conservation*, 2nd Ed. Edward Elgar, Cheltenham, UK, Northampton, MA, USA [Chapter 1].
- Tisdell, C (2006). Arthasastra as a basis for economic science? In RK Sen and RL Basu (eds.), *Economics in Arthasastra*, pp. 36–49. Deep and Deep Publications, New Delhi.
- Young, AA (1928). Increasing returns and economic progress. *The Economic Journal*, 38, 527–542.