

ENVIRONMENTAL ECONOMICS: 1994

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Preamble

Since time immemorial, human societies have exploited their environment in a manner which has depleted its resources and which has often led to disasters. However, in the past, the effects of this exploitation have usually been localised and the depletion of resources has led to impoverishment only on a local or a regional scale.

Thus, for example, some African communities in sparsely populated equatorial environments were able, in pre-colonial times, to pursue a system of forest-fallow cultivation whereby plots of land were cleared in forests and sown or planted for a year or two, after which the land was left fallow for a number of years sufficient for the forest to regain the land. An over-exploitation of the forest led, typically, to the migration of the farmers. Even when migration proved impossible, the effects of hunger and disease experienced by the local population did not necessarily spread to neighbouring regions.

Nowadays, when the world has experienced a dramatic increase in population together with widespread industrialisation and the advent of large-scale international trade, the effects of the environmental damage caused by over-exploitation are, in many cases, neither containable in small areas nor reversible within a few human lifetimes.

Examples of the damage of unsustainable exploitation are all too easy to provide. Tropical forests are being destroyed at an extraordinary rate. Marine populations are being fished to extinction. Countless animal and plant species are likewise endangered. The aridification of large areas of equatorial and tropical Africa is proceeding at a rate unprecedented in human history. At the same time, the dumping of waste products into the air, the sea and the land has become a severe international and global problem.

The purpose of this course is twofold. In the first place, it aims to describe the mechanisms in the environment which are being subjected to the stress of over exploitation and to represent the best current opinion as to their likely responses. This entails passing references to the sciences of biology, chemistry, agronomy and meteorology. It also involves the methodology of scenario analysis. That is to say, a variety of plausible outcomes are described which embody differing assumptions about the likely human responses in the face of threatened disasters.

The second purpose of the course is to use economic analysis to describe how rational individuals acting in pursuit of their individual economic objectives, without restraint and without reference to collective objectives, can be impelled to damage the environment. We use economic analysis to suggest ways in which such behaviour can be modified, if necessary, by instruments of economic regulation.

Much of this analysis is developed in the context of specific problems. Thus, for example, in considering how best to regulate fisheries, we show how rational

individual actions can lead to irrational collective practices resulting in catastrophic overfishing. Unilateral acts of public-spirited restraint cannot overcome this problem, and the task of achieving concerted international action has, so far, proved singularly intractable.

We combine analysis and description in a similar manner when we conduct a theoretical and empirical enquiry into the economics of pollution. This leads into a discourse on the economic theory of externalities. We also consider the strengths and weaknesses of various policy instruments proposed to control pollution such as taxes, subsidies, marketable permits and direct controls on technology or emissions.

It is in the nature of a short course that only a few of the many important issues of environmental economics can be considered. Nevertheless, we hope to demonstrate a methodology which should be widely applicable.

A Topical Outline of the Course

Introduction: Sustainable and Unsustainable Development

The Bruntland Report, Limits to Growth, North and South. Population Growth. Urbanisation. Energy Use. The Industrialisation of Agriculture. World Commodity Prices.

Population and Demographic Trends

Birth Rates, Death Rates and Fertility. Infant Mortality and Public Health. Industrialisation and the Demographic Transition. Economic Determinants of Family Size. Policies for Contraception. Neo-Malthusianism. The Catholic Church. Aids.

Intertemporal Resource Management

Renewable Resources. Exhaustible Resources. Optimal Resource Depletion Policies. Optimal Pricing. Prospecting for Marine Mineral Resources. World Commodity Prices.

Global Warming, Ozone Depletion and Acid Rain

Atmospheres and Climatic Change. Ozone, CFC's and Ultraviolet Light. Greenhouse Gasses and Global Warming. Property Rights and Externalities. The Theorem of Coarse. Carbon Taxes and Subsidies, Command and Control Measures, Tradable Permits. International Policy Coordination.

Forest Resources and Deforestation

Forest Resources. Maximum Sustainable Yield. Agriculture, Population and the Intensification of Land Use. Deforestation and Fuel Needs. Forests, the Carbon Cycle and the Cycle of Evaporation and Precipitation.

The Exploitation of the Sea

The Law of the Sea, The Optimal Rate of Extraction and the Stock of Fish. The Common Property Problem, Territorial Waters, Rights of Passage and Rights to Exploitation. Mineral Resources of the Oceans.