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Chapter 1

The Problems and Methods of Environmental Economics

Preface

Before we can discuss what is meant by the term 'environmental sustainability', the theme on which this book focuses, we must first, in this opening chapter, look at how earlier studies have dealt with economic approaches to the many dangers that afflict the environment and offer an explanation of how matters relating to the environment have affected and influenced the evolving theories of political economy.

Firstly, we need to ask what the object of the economy and economics actually is. If we look at the etymology of the Japanese translation of 'economy' [経済], we find that it can be translated as "governing the nation and providing relief to the people [経世済民] (文中子礼楽)", a definition which suggests that the function of the economy is to rule the country while protecting and preserving the lives of the citizens, and entails taking into consideration household economics as well as the management of the nation. This implies that the aim of the economy is never simply "money-making". So, while the purposes of the economy are various, the first of these purposes can be said to be an increase in income and utility in order for people to live their lives in greater ease and safety; and if one's income is only a means to an end, we must think about what that end is or should be. A second consideration or purpose would be an increase in one's time and one's opportunities to make suitable choices. A third purpose will then be to expand people's rights and their welfare in order to provide them with sufficient food, clothing and shelter so that they may live their lives to the full. If these three aims are to be satisfied, then it is indispensable that we secure the conditions necessary to sustain the provision of food and resources, which presupposes above all the preservation of an environment capable of sustaining the conditions that will provide such resources even as the world's population continues to increase and so many people go hungry.

After the retreat of socialism during the 1980s and 1990s, "victorious" capitalism, which took 'neo-liberalism' and 'deregulation' as its watch words, appeared to dominate the world, and when not only what are referred to as the emerging economies of Brazil, Russia, India and China (the BRICs) but developing nations as well sought to enter the world market. Since every country then embarked on fierce competition to produce low-price goods, the demand for resources became ever more ruthless; but low prices were achieved by low wages, the low price of raw materials, and at a high cost to the environment. As the demand for resources intensified, much money was

invested and speculation boomed. Strange new words such as “informatization” (not yet in anyone’s dictionary), “securitization” and “globalization” and what they stand for provoked the financial and economic crisis that engulfed the USA and, eventually, threatens to unbalance the whole world.

Under the banner of a reversion of social policy and low-price competition with the developing countries, the developed countries have encouraged the employment of contingent workers, and the gap between the wealthy and the working poor has grown ever wider. While Russia, the former heart of the USSR, is now a resources exporting country, China has become the “world’s factory”, and, paradoxically, though it is still ostensibly a proponent of a socialist market economy, it is seen more and more to function as the nucleus of global capitalism. Apart from the northern countries of the EU (Germany, the Netherlands, France, etc.), where the governments remain committed to social democracy, countries such as the USA and Japan have pushed ahead with deregulation, the extension of working hours and restrictions on workers’ rights. In Japan, one-third of the working population is now composed of contingent workers: workers, that is to say, who are employed only on a short-term or part-time basis and whose jobs are always at risk.

The destructive consequences of global capitalism can be seen in the three dimensions of environment, society, and the economy.

More specifically, these are:

- [1] Environmental damage to the earth, the advance of global warming, the destruction of nature and, in consequence, a serious loss of biodiversity;
- [2] An expansion of the gap between poor people and rich people, and the outbreak of international terrorism;
- [3] Runaway monetary speculation, surplus capital, a financial bubble, and the consequent global financial crisis.

The total income of the 500 world’s richest persons is approximately equal to the total income of the 400,001,600 poorest. It is said that 2,500 million people live on less than two dollars a day (World Watch Institute 2008: Chapter 1). It is clearly apparent that if capitalism continues to operate as it has been doing, it is not sustainable, economically, socially, or environmentally. We have to rethink the nature of globalized capitalism, and we have a bounden duty to look into the causes that have led to the results brought on the world by the capitalist economy. Since Amartya Sen has pointed out that the outcome of the market economy differs greatly from country to country owing to the public policies undertaken by governments in such fields as education, public sanitation, land reform, the microcredit system and legal

protection for the weak, and since the outcome of the global economic relations can often be revised by public policy, we are therefore required to make use of public policy to build a worldwide sustainable society (Sen, *Global Inequality and Human Securities*, Ishizaka Lecture, 2002).

1 What is the environment?

In their daily lives, people are conscious of such features of the 'environment' as the weather, the greenery of mountains and fields, the water they drink and the air they breathe, and when they realize that the quality of water has deteriorated and that the air around them is no longer clean, so they become aware of the increasing damage that is being inflicted upon the environment. Since it is the 'environment' in this sense that environmental economics focuses on, let us first examine the various definitions of the 'environment' that earlier commentators have formulated and discussed at some length.

According to Ken-ichi Miyamoto, "the environment includes all the basic circumstances of life and the survival of human beings, and it is common property of everyone who is human". The environment is thus not simply the natural world in itself, but the natural world as it is changed and adapted by human beings in the pursuit of their social aims. The living environment of a city can be sorted according to [1] the natural living environment (the atmosphere and the air around us, rivers, forests, animals and plants) and [2] the social living environment (houses, streets, green belts, parks, water and sewage) (Miyamoto, 2007: 79–80). This point of view distinguishes 'nature' from 'environment' and makes much of the processes and changes brought about by the actions of human beings. The existing circumstances of the natural world alone do not constitute the environment in this sense, and the environment is not just to be left alone in its natural state: its preservation has to be pursued actively.

Sir Partha Sarathi Dasgupta has said that natural resources provide the staples of a good life, and that society determines how they are to be used. He goes on to argue that it is therefore necessary to evaluate the quality of human life that these natural resources support (Dasgupta, 2001: xix) while questioning society on how it uses them and the consequences that their misuse is likely to have on the quality of human life.

Kerry Turner and his co-writers say "the economy is an open circulation system which is only able to function because of the support of its ecological foundations" (Turner et al., 1994: 15), and that the environment has three functions: [1] supplying new and renewable resources, [2] assimilates waste

products, and [3] providing humans with natural services such as aesthetic enjoyment, recreation and even spiritual fulfillment (as above, 8; Hanley, 1997: Chapter 1). This viewpoint attaches great importance to such service functions of the environment as the ecosystem of which human beings are a part (ref. chart 1-1). A similar viewpoint emphasizes the importance of the social infrastructure that human society finds room for and constructs within the natural system (Heal, 2000).

This use of the term 'environment' understands the word as referring to everything that surrounds and affects human life, and is to be distinguished from nature *per se*. It is also a historic formulation that is continually changing and subject to adaptation by human beings, and is the essential base that supports human life. When we emphasize this side of things, and while we distinguish the artificial environment from the natural environment, we must also remember that the artificial (man-made) environment can exist only on the basis of the natural environment. Such an environment has its own historical associations, commonly experienced external influences, and its own specific local identity.

What has been called the "historicalness" of the environment signifies "the history of a place engraved in the soil", accumulated as stock from the past. What has been termed "commonness" means that people living in a place where pollution occurs cannot avoid having to experience it, whether they want to or not. The "local identity" of a place, which is derived from the historicalness and the commonness of the environment, means that each particular area is unique and has irreplaceable value (Yoshimoto, 2008). In the USA, this idea is articulated in the doctrine of public trust (ref. BOX 1-1).

Landscapes that are thought to be 'natural' are often what the long history of human habitation and use has created. In this sense, the environment is 'public goods' and includes, as well as 'local identity', the notions of 'joint consumption', 'non-excludability', and 'irreversibility' (Ueta, 1996: 6). In the past, the nobility were no more able than the common people to escape from diseases carried by the air and water, proof enough of the "joint consumption and non-excludability" of the environment in the sense that we are giving to it.

As we have said, the environment is what surrounds (enfolds and sustains) the habitations of human beings and is distinguished from nature — and is *to be* distinguished from nature — since it is a historic formation that human beings have altered and adapted for their own human purposes. We can therefore say that environmental problems would not exist if human society did not exist, and, in this sense, what we assume to be a problem of the environ-

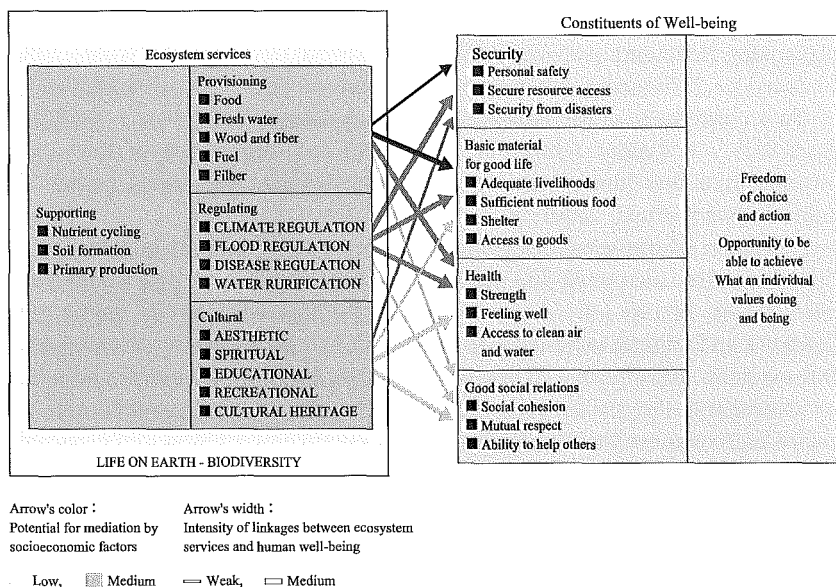


Figure 1-1 Ecosystem services and their relation to “human well-being” (Millennium Ecosystem Assessment 2007 “Ecosystem services and the future of human beings” Chart A).

ment is in fact a problem of the human system. We must therefore consider the following important points: the difference between nature and the environment (this chapter), natural capital and artificial capital (this chapter), commons (Chapter 2), overuse and misuse (Chapter 2), differences of use and operation, management, public goods and the environment (Chapter 5), and so on. The author examines these points in each chapter sequentially.

BOX 1-1 What is the environment? The doctrine of public trust

When we consider the issue of ‘sustainability’, the doctrine of public trust will serve as a reference for defining what the environment is. The doctrine of public trust is understood today to entail the following beliefs: [1] shores, public land, air, water, wildlife, etc. are public property; [2] people are entitled to use them for traffic, recreation, etc.; [3] states (governments, the administration) must respond to the voice and wishes of the people, and must not treat the environment in a way that prevents the people from using and enjoying its benefits.

When we translate the doctrine into ground rules for natural conserva-

tion, we must consider the following important points. Firstly, the people are both the consignor and beneficiary of the public trust, while the trustees are the national and local governments entrusted with management of the property. This includes natural public property (rivers, shores, forests, marshes, areas set aside for recreation, etc.) that are under the care of the national and local governments, public property that is designed for common use (roads, parks, harbors, etc.), and wild animals and plants that are assumed to be goods without owners.

Secondly, although the doctrine was originally meant to protect the people's use of public resources, the term 'use' here should not be interpreted narrowly, since it includes maintaining the balance between the landscape and the needs of ecology for sustainable long-term or perpetual use. Another premise of the word 'use' is the conservation of public resources, and in the case where we say "an environmental right is a right to use the environment", again we must not interpret the term 'use' in any loose or narrow sense, for that would mean our excluding our own abuse and pollution of the environment.

Thirdly, the national and local governments are obliged to maintain the state of public trust for the people's use. We know that even in the USA the transfer of public trust is prohibited absolutely, and it is certainly clear that the disposal of property in any way that disturbs the people's use of it is — or at least should be — very strictly prohibited.

Fourthly, the doctrine of public trust covers all generations. Since the present generation is trusted to take over the management of public resources from past generations and in turn to hand it over to future generations, we must consequently interpret our responsibilities so as to ensure that we only consume the benefits of the environment in ways and within the range that will allow future generations to enjoy such blessings, too; the present author believes that the doctrine of public trust provides the best framework for sustaining an "environmental ethics for the benefit of future generations".

Fifthly, we can extend this perspective to include the natural world as well as the world of human beings, taking the consignor and beneficiary as all the creatures that constitute the natural world, human beings to be understood as the trustees. Human beings are entrusted by other creatures with the eco-management of the nature world, and are required to fulfill the advanced obligation to consume nature in a way and within a range that does not threaten the survival of those other creatures (Hatakeyama, 2001: 44-45).

2 Environmental problems on the global level

In order to clarify the present environmental problems on the global level, let us look at some of the findings of the "Millennium Ecosystem Assessment", the most recent report prepared by the United Nations, in which 1,300 scientists from 95 countries participated. We shall then be in a position to understand not only the problems of environmental pollution, but also the dangerous situation that has resulted from severe deforestation, overgrazing, natural disasters, ecocide, and other causes besides.

One of the important conclusions reached by the Assessment's evaluation of the ecosystem is that "Over the past 50 years, the humans have changed the ecosystem more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demand for food, fresh water, timber, fiber, and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth" (Millennium Ecosystem Assessment Board, 2005: 2). This fact and the number of recorded changes to the ecosystem reveal that more unreclaimed land has been converted to cultivated land since 1945 than was cultivated during the whole of the 18th and 19th centuries. At the present moment, about a quarter of the surface of the earth has been converted to cultivated land, and since 1980, approximately 35% of mangrove swamps have been lost, 20% of the world's coral reefs destroyed, and a further 20% of them seriously damaged or lost. Since 1860 the amount of nitrogen flowing into the sea from sewage has doubled. At least a quarter of marine fish species have been overfished almost to extinction, and, at the latest count, the number of extinct species had grown a hundredfold over those remaining in their natural state, while in only 20 years the total populations of wildlife fell by 40% (UNEP, 2007). 16,928 kinds, equal to 38% of the 44,000 or so kinds of creatures in the world of whose habitats we have knowledge, are now endangered (IUCN "The list of endangered species 2008").

As for the relation between the worsening ecosystem and human poverty, in 2001 more than 1 billion were living on an income of less than 1 dollar a day, and approximately 70% of them had to depend for their livelihoods almost exclusively on agriculture, the raising of livestock, and hunting. About 1.1 billion people cannot tap into improved water systems, and more than 2.6 billion people have no access to improved public sanitation facilities (proper sewers, septic tanks, and so on).

We should, it is obvious, pay close attention to the "Millennium Ecosystem Assessment", for it reveals in stark detail that the people who do not

enjoy even the minimum living conditions are in general vulnerable to the worsening natural system. It naturally follows that we should regard how we deal with the threat to the natural assets of the earth as part and parcel of the challenge to eradicate poverty.

The "Global Environment Outlook 2002", published by the United Nations Environment Program (UNEP), points to four 'gaps' in our distribution of the world's resources (UNEP, 2002, original publication, Synthesis: 9).

[1] **The gap in the environment:**

between the stable, generally improved environmental conditions in such regions as Europe and North America and the worsening environment in other areas (often in developing countries).

[2] **The gap in politics:**

between different dimensions in policy making and operating ability: some areas are capable of accomplishing both, and some are not.

[3] **The gap in vulnerability:**

between societies, internationally and inter-regionally: the more vulnerable an area is the more likely it is to be exposed to changes in the environment and to the dangers of natural disasters. We can see this particularly clearly when we consider the Sumatra earthquake in December 2004 and the Haiti earthquake in January 2010.

[4] **The gap in lifestyle:**

between the one-fifth minority of the world's population that appropriates to itself nearly 90% of the goods consumed by individuals and the most impoverished class of 1.2 billion people whose income is less than 1 dollar a day.

Since these gaps seriously threaten sustainable development, it becomes essential to close the gap between the wealthy 'North' and the impoverished 'South' if we hope for environmental remediation on a global scale. This entails a simultaneous solution to the global environmental problem and to the North-South problem.

In considering the environmental problems faced by the earth, we also need to note that the standard of living of most of the earth's people is quite different from the standard of living that the Japanese people, for instance, take for granted.

As the "State of the Village report" (see BOX 1-2) clearly shows, the premise on which the story depends could not be more different from the situation (again, as in Japan) where everyone is literate, is able to drink safe

water, has a house to live in, where the birthrate is low and the society is ageing.

BOX 1-2 State of the village report

- Let us compare the earth of 6.3 billion people to a village with a population of 1,000 people, 584 of whom are Asians, 123 Africans, 95 Europeans, 84 Hispanics, 55 former Communists, 52 North Americans, 6 Australians.
 - It is difficult for the villagers to communicate with each other verbally: 165 of them speak Chinese, 86 English, 83 Hindi-Urdu, 64 Spanish, 58 Russian, and 27 Arabic.
 - They hold a variety of religious beliefs: 300 are Christians (183 Catholics, 84 Protestants, 33 members of the Eastern Orthodox Church), 175 are Muslims, 128 Hindus, and 55 are Buddhists.
 - 330 inhabitants of the earth village (one-third of the 1,000) are children, only 60 are older than 65, 28 babies are born every year, but ten persons die for each child who survives, amongst every three of whom two die in an epidemic, of cancer or by starvation, while one of the 1,000 villagers is infected with the human immunodeficiency virus.
 - In the community of 1,000 villagers, 20% of them possess 75% of the total income in hand, while at the other end of the scale 20% receive only 2% of the total income.
 - Only 70 villagers own a car; some of them possess more than two cars.
 - Approximately one-third of the villagers have no access to clean and safe water.
 - Half of the 670 adult villagers are illiterate.
 - The total land area covered by the village is 2,400 ha (2.4 ha *per capita*), 280 ha of which is cultivated, 560 ha is pastureland, 760 ha is forest, while 800 ha is desert or barren land, including tundra.
 - Deforestation is continuous and spreading, and as the area covered by forest shrinks rapidly so the area of sterile land grows wider.
 - 83% of the manure is allotted to only 40% of all the cultivated land, which the richest 270 villagers own. Superfluous manure flows out of this land and pollutes lakes and wells.
 - Of the 1,000 villagers, 5 are soldiers, 7 are teachers, and 1 is a doctor.
- (Dennis L. Meadows 1990, co-author of "The Limits to Growth" (see p.17))

3 An economic approach to environmental problems

An economic approach to environmental problems can be traced as far back as Sir William Petty's "Political Arithmetic" (1676). The approach was taken up later by Thomas Malthus in "An Essay on the Principle of Population" (1798), by Friedrich Engels in "The Condition of the Working Class in England in 1844" (1845), by John Stuart Mill in "A Theory of Steady State" (1848), by Karl Marx in "A Theory of human-nature metabolism" (1867), by Arthur Pigou in "External Diseconomies Theory" (1920), by K. William Kapp in "A Theory of Social Costs (1950)", and by the Institutional School (1960) of Ronald Coase, whence the path has finally led to the establishment of the current school of environmental economics. We need a fresh study of the details of what we may then be entitled to call the history of the theory of environmental economics.

Shun-ichi Teranishi has classified the various current theories that take an economic approach to the environment as a theory of environmental rights (an economic theory of environmental rule), a theory of external diseconomies (an economic theory of pollution control), a theory of environmental resource management (an economic theory of the conservation of nature), a theory of characteristic value (an economic theory of amenity maintenance), a theory of social costs (an economic theory of environmental damage and cost), a theory of metabolism (a theory of the relationship between the environment and the economy), a theory of economic systems (an economic system theory prescribing how to care for the environment), the Instinct of Workmanship and the State of the Industrial Arts (an economic theory of the criticisms leveled against modern civilization), and so on (Teranishi, 1995). We have no room to mention the representative works in detail, however, and all we can do here is summarize the current academic situation as simply as we can, our focus shifting from a neoclassical viewpoint (microeconomics and macroeconomics) to the development and criticism of a theory of environment economics.

The neoclassic theory is an approach that attaches great importance to utility and market equilibrium and, basically, it sees environmental problems as a matter of market externality and public goods. (*The Shorter Oxford English Dictionary* glosses the term 'externality' as "A side effect or consequence (of an industrial or commercial activity) which affects other parties without this being reflected in the cost or the price of the goods or services involved.") It provides a policy tool for the consideration of 'efficiency' and 'feasibility' in order to solve the problems caused by 'market failure' and

'government failure'. Charles D. Kolstad has said that "environmental economics is concerned with the impact of the economy, and the appropriate way of regulating economic activity so that balance is achieved among environmental, economic, and other social goals" (Kolstad, 1999: 1). Policies such as a carbon tax and emissions trading or the CVM (Contingent Valuation Method) — techniques recently and regularly adopted for an economical evaluation of environment so as to accomplish the targets of the Kyoto Protocol — are all based on the framework of neoclassical economics. It is therefore essential, when seeking to evaluate these policies, to have a clear view of neoclassical environmental economics and the theoretical/empirical criticisms that are now being leveled against it.

In Japan, pioneer work such as that of Ken-ichi Miyamoto (1967) and Shigeto Tsuru (1972) looked at the issue from a historical perspective as a practical/theoretical battle with the problems of pollution, and their findings established a base for further work. Confronted by the reality of the serious pollution problems that Japan was by then having to face, they amalgamated Marx's theory of capital and Kapp's theory of social costs and in this task they were truly world pioneers. In the light of their studies, the present author attempted a theoretical elucidation of Japan's pollution problems, based on "a theory of the metabolic inter-relationships that exist between human beings and nature" and on his reading of Marx's *Capital: a critique of political economy* (Yoshida, 1980).

In modern economics, where neoclassical economics still occupies the commanding heights, those theories that criticize it insist on asking what kind of significance it can have in the field of environmental economics (Yoshida, 2000).

We must first consider what we shall be able to contribute to a historical analysis of the historic character of capitalistic forms of production on which to base our understanding. Serious environmental problems erupted during the Industrial Revolution, were exacerbated by the creation of monopolies, and intensified hereafter by both World Wars, and what then followed. With regard to global environmental problems it is particularly important to look carefully at historic social analyses of mass production, mass consumption and mass disposal. This issue needs to be tackled in conjunction with an analysis of the forms of production in the USA (Yoshida, 1998). Such a point of view can also be applied to an analysis of environmental damage done under the aegis of "the socialist system" (see Chapter 2).

We must also consider the contribution made to the analysis of environmental problems from historically oriented perspectives such as "the theory of

the metabolic inter-relationships that exist between human beings and nature". Such perspectives, based as they are on the history of the earth and the place of human beings on that earth, command a wide prospect, one that sees beyond the individual human being as having mere economic existence to a broader and deeper view of nascent problems from garbage to global warming. From such a vantage point, we can recognize the problems that have so often been dismissed by the neoclassical theory as "outside (the concerns of) the market". It can help us to see how we may be able to reach a solution that will realize sustainable development by severing the "vicious circle of the environment and poverty".

This approach can, in the third place, provide an overall framework for economic and social analyses that are capable of covering policy processes, distribution patterns, expense burdens, and so on. It is able to focus upon the role played by persons and agencies concerned with policy: politicians, the political system itself, the industrial structure and international relations, and the very nature of democracy. We should follow the lead of such pioneer studies as "Intermediate System Theory" (Miyamoto, 1989, 2007), "Capacity Building for Environmental Policy" and "The Theory of Environmental Governance" (Jänicke, 1995, 2006). As for this point, the interest that Japanese scholars have shown in Marxian economics and social economics shares Marxian methods of critical analysis and shows a concern for modern society that was first explored by political scientists and sociologists both in Europe and the USA. We can learn much from their work.

Finally, one tradition of radical economics has consistently questioned the problem of 'externality', the external or collateral effects, that is, which economic activity produces, and has focused instead on the rights and claims for justice of the socially vulnerable, in contrast to the neoclassical or mainstream line of modern economics, which has focused on an analysis of utility and efficiency. In *A Theory of Justice* (1971, revised edition, 1999), the American political scientist and philosopher John Rawls argued for what he called "the difference principle" to improve the lot of persons in the most disadvantaged positions. While critical of some aspects of Rawls's thinking, Amartya Sen developed Rawls's views in economics and for his work was awarded the Nobel Prize in economic science (1998). Japanese pollution studies, triggered by Japan's own pollution problems, are firmly tied to the views of these two notable thinkers. By its very nature, Sen's "equality theory" cannot avoid examination of the basic problem of what equality is and what it is for, and the argument has now been broadened to include discussions of sustainable development as scholars discuss how to "increase the well-being of the least

advantaged people in societies today, while at the same time ensuring that the prospects of future generations are not seriously impaired (intra-generational and intergenerational equity objectives)" (Turner et al., 1994: 33). Heal has proposed a green golden rule of sustainable development (growth of income, capital, consumption and population) that applies Rawls's difference principle to the relations between generations (Heal, 1998: 43-44).

Apart from these distinguished writers in the field of political economics, other scholars are now producing a flood of works in ecological economics that take a critical view of neoclassical economics. Such works regard the increasing human dominance of the natural world as the root of environmental destruction. More than forty years ago, the late Kenneth E. Boulding introduced the concept of "Spaceship Earth", which emphasizes the importance of maintaining the stock in hand, rather than, say, increasing the flow of the GNP. He focused on 'The Law of Entropy-Increase' to show that consumption of energy generated from fossil fuel combustion and the consequent disposal of the heat is an irreversible process (Boulding, 1968). This is the position that holds the view that sooner or later energy sources and material resources that are useful to begin with are in the end converted into waste. Nicholas Georgescu-Roegen based his own work on entropy upon this concept and proposed an economics that views entropy as the prime cause of economic scarcity (Georgescu-Roegen, 1971). The theory of entropy as an economic law pays attention to the dynamic energies of "the metabolic relationship between human beings and the natural world". We may hope that it will be effective in an analysis of the limitations imposed upon the environment by such catastrophes as global warming.

Although the present book does not focus exclusively on Marx's economic theories, it does refer to Marxian economics as systematically and as clearly as it is able to in the context of the results of a social economical analysis of the environment.

4 The political economy of environmental problems

Political economists hold the view that the origin, conditions and the policies that give rise to environmental problems are governed by the state of the political economy. We need to view these relationships in terms of [1] economic change, [2] the environment and its amenities, [3] environmental policy (Miyamoto, 2007: Chapter 1).

Let us look at how the origin, conditions and effect of environmental problems on policy decisions are prescribed, or governed, by the state of

political economy. In the early history of Japanese capitalism, the mining industry (coal and metals) played an important role not only as a supplier of solid-fuel domestic energy but also as an early exporter of its products. At the same time, however, mining activities also caused air pollution and the pollution of such essentials as water, thus damaging crop production, at all times a key activity; and so, from the very beginning of Japan's own industrial 'revolution', pollution came to be known as "mine pollution" ('Kogai' in Japanese). It was a difficult problem and the Meiji government was hard pressed for a solution. Those affected by it made their own views felt, too: one of the most significant social movements of the Meiji period was initiated and led by Shozo Tanaka in response to the pollution caused by the industrial company Furukawa Zaibatsu, a disaster that was known subsequently as the 'Ashio mining pollution incident' (a scandal that lay behind Furukawa Zaibatsu's contribution to the Furukawa lecture hall of Hokkaido University).

Subsequent incidents of air pollution reveal the significance of the mining industry's support for Japan's early industrial efforts. We may note the case of air pollution caused by smoke emitted by the Besshi copper mine run by Sumitomo Zaibatsu, air pollution from smoke emitted by the Hitachi copper mine, and pollution caused by the Kamioka lead and zinc mine owned by Mitsui Zaibatsu, all original Zaibatsu from whose roots grew the industrial giants Mitsui, Mitsubishi, Sumitomo and Furukawa, as well as the corporate group Hitachi. Furukawa produced copper wire, and Furukawa Electric later became Fuji Electric, the "fu" taken from Furukawa and the "zi" taken from Siemens, since it was a joint company with Siemens of Germany. From these beginnings grew Fujitsu, a company that manufactured telephones; later, this in turn gave birth to a company that now makes computers and another that makes robots. These developments chart the changes in 100 years of Japanese capitalism. As for the country's environmental policy, the government at first approached water pollution and pollution-abatement measures as separate issues, but during the late 1960s a rash of environmental problems led to the enactment in 1970 of 14 environment related laws in a session of the Japanese parliament that came to be known as the 'Pollution Diet', and, in 1971, to the foundation of the Environment Agency. All this helps us to see immediately how intimately the outbreak of environmental problems has played its part in the development of the country's political economy.

Although economic analyses of environmental problems have tended to focus on "pollution control", we have already noted that as well as environmental pollution the rate of deforestation, overgrazing, natural disasters and ecocide has also been accelerating, and that we should therefore widen the

object of our analysis to cover as well both 'amenities' and "the conservation of nature". Let us therefore look at how economics describes 'amenity', which is usually translated as "quality of life" or "the comfortableness of living".

This book views environmental problems basically in terms of "the metabolic inter-relationship between human beings and the natural world", where change in one brings about change in the other, and it interprets 'the environment' as the interactions of water, air and land as they affect and are affected by the living standards of human society. Consequently, the author places "the amenities of the environment" in a context that embraces conditions of 'historicalness', 'commonness', and 'local identity'.

According to Ken-ichi Miyamoto, the concept of amenity has to do with both living things and their habitat. "The environment in which we live and its contents constitutes what we are calling amenity, and it includes things that cannot be evaluated by market value, such things as the natural world, historic cultural assets, a row of houses along a city street, scenery, the neighborhood culture, the community's sense of solidarity, human feelings, regional public services (education, medical care, welfare, the prevention of crime), ease of traffic flow, and so on" (Miyamoto, 2007: 129). A good amenity represents the satisfying life that the people create in collaboration with each other and their surroundings: it is a mirror that reflects a picture in which the natural landscape and the human inhabitants live together in harmony.

Such a concept of amenity is said to be the aim of British city planning: in other words it seeks to create "a city space that is ecologically healthy, aesthetically comfortable, culturally significant, and economically efficient" (Nishimura, 2002: 149). City planning in Germany and the Netherlands is called *Raumordnung* (an ordering of space), and it makes much, for instance, of the harmonious matching of the color and height of the buildings. Such harmonizing of public and private interests in city planning is hugely important, and the whole issue of amenity thus raises the question of what "environmental richness" actually is and how it might be achieved.

The urban development of modern Japan, which is characterized by the habit of "demolish and rebuild", lacks both harmony and unity. It has been responsible for "the pollution of the visual environment" (Hundertwasser), and as a result world-renowned scenes of natural beauty, city landscapes and many cultural amenities have been irretrievably lost. At the root of the problem lies adherence to a "scrap economy" born of 'developmentalism', which regards stock as a flow and so uses it up (Ishiwata, 2005: 78). The result is accumulated scrap, a fiscal deficit, and a diminishing cultural heritage. Japan is in desperate need of urban renewal and environmental restoration.

A start, of course, has been made: it was, for example, as a result of a review and reevaluation of the hometown environment of Minamata in the wake of the Minamata disease (see Chapter 7) that the local citizens took the first steps that have led to the city's environmental restoration. The review recorded the origin of area water and confirmed the close relationship that exists between the life of the local people and the local environment. It set in motion a process of rediscovering the environment and the scope for amenity, and it formulated a policy of preservation that led to the setting up of a "Regional Study Committee" (Chapter 7). The issue of amenity brings clearly into focus the importance of the relationship that necessarily exists between the citizens as actors and the problems that they may create for the environment.

We must also note the importance of the difference between economic growth and economic development as a difference that is basic to the political economy's approach to the environment. The concept of economic growth stands for a scale increase in the physical dimension of the economy, and is calculated by a quantitative index of money (GNP, GDP). On the other hand, the range of economic development includes such qualitative improvements as are needed in the structure of physical stock, in designs and their constitution, and in the quality of their contents (as well as general considerations such as life expectancy, the rate of literacy and income, the quality of life, liberty, and so forth) (Daly, 1991: Chapter 12). Other issues of economic development include social fairness and social efficiency, care of and respect for the environment and of resources (Hamilton, 2003: Chapter 8). We cannot, of course, deny the importance of economic growth in itself, but we should always bear in mind that the true purpose of economic growth is to enable everybody to find work and live a peaceful life, as Adam Smith argued long ago (Dome, 2008: 202). It is often pointed out, especially these days, that the GDP is not a sufficient index of human "well-being" or of "sustainability" (Stiglitz et al., 2009).

In its famous report "The Limits to Growth" (1972), the Club of Rome gave warning that there are limits to the growth of populations, industrialization, pollution, food and resources, particularly oil. The report nevertheless concluded that "condition of ecological and economic stability" could be established, and that systems can be designed that offer "the basic material needs of each person are satisfied and each person has an equal opportunity to realize his human potential" (Meadows et al., 1972: 29). This overlaps with the main object of the economy given by the author at the start of this chapter.

On the other hand, the neoclassical view regards such features of the

environment as water and air as having no market value: they are therefore free goods. Consequently, we tend to waste them and pricing becomes necessary, which, in turn, requires the setting of proprietary rights. It has been said that the problem of pollution conflicts with the "complete property rights" because all the benefits or costs must accrue to the agent holding the property right for good or bad (negative goods) (Kolstad, 1999: 62). Yet the neighbors of a factory that emits soot cannot help but be themselves the 'owners' of soot (negative goods). The difficulty lies in setting proprietary rights for the air, and this has provoked the criticism that the root of environmental destruction is not a "market failure" resulting from a vacuum in pricing or property rights, but is a consequence of the economic activities undertaken for the development of the market system that is a feature of capitalism itself (Tsuru, 1972: 98, 130).

It has often been pointed out that environmental destruction occurs, in economic terms, when [1] what is destroyed are free goods that are not priced, [2] the victims are socially/biologically vulnerable, or are future generations who will not be able to reverse the damage, and [3] there is lack or asymmetry of available information, thus causing uncontrollability (Ueta, 1996: 19-20). We should be able to deal with [1] by using market mechanisms such as pricing, [2], by overhauling the global social system, and [3], by improving such social infrastructures as information disclosure or by correcting the information asymmetry. Yet while market mechanisms may solve problem [1], they will not be able to tackle the problems of the vulnerable [2] or of insufficient information [3]. It will therefore be necessary to construct social systems that will provide a base upon which to build the means to solve them: that will be difficult and take time, but we must not give up the struggle. These problems will be explored more extensively and deeply in Chapter 3 (the capabilities approach), Chapter 4 (the theory of environmental governance), and Chapter 6 (the theory of environmental policy means).

5 What is sustainability?

A century and a half ago, John Stuart Mill, the outstanding classical economist of his time, warned against the unlimited increase of wealth and population: "If the earth must lose that great portion of its pleasantness which it owes to things that the unlimited increase in wealth and population would extirpate from it, for the mere purpose of enabling it to support a larger, but not a better or a happier population, I sincerely hope, for the sake of posterity that they will be content to be stationary, long before necessity compels them to it" (*Principles of Political Economy*, Book IV, 1871). Mill's own hope for

a pause in the pursuit of wealth and population does not imply, however, that human development should cease or that human beings should take no further action. Since Mill went on to say that there is space for every kind of spiritual, culture and moral social progress, the wish that humanity "will be content to be stationary" must correspond with what today we call "sustainable development", and how to achieve sustainability thus becomes the question, for the status quo may only lead to future bankruptcy. Hence, we face the problem of how to define and index sustainability, a concept that overlaps with the three domains of environment, economy and society.

The Brundtland Commission, which was the first official body to point out that there was a problem of description, defined as "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987: 66). This definition focused on the hopes, wishes and abilities of both current and future generations, taking up the idea of the Pareto Optimum, and formulating it anew. To think of "the ability of future generations" is to think about the "life of the generations of one's offspring", and of our children's offspring in their turn. As the Chinese put it, we have to consider the future of "宝宝 (a precious baby)", and we need therefore to review our current methods of production and consumption.

When we consider carefully what the notion of sustainability presupposes, we can see that there are two ways, roughly speaking, of defining it: strong sustainability and weak sustainability. A prescription of strong sustainability entails that the total environmental assets or the physical quantity of the stock of natural resources should be maintained at a constant level throughout all time. The ecological economist Herman Daly has formulated the three conditions of strong sustainability as being [1] that the discharge of pollutant does not exceed the amount which nature can absorb, [2] that the rate of extracting renewable resources does not exceed the rate of recycling, and [3] that the rate of extracting non-renewable resources is equal to the rate of creating renewable substitutive resources (Daly, 1991: 256).

The now fashionable idea of an "ecological footprint" proposes a measurable index of strong sustainability (Wackernagel and Rees, 1996). This evaluates the influence of human activities upon the environment by calculating the income (the area of productive land) and expenditure (the required area of productive land). A comparison of the "ecological footprint" of the human race as a whole to the area of productive land on earth (11.4 billion ha, or a quarter of the earth surface area) reveals that in 1980 it balanced out as being of the same degree (that is, it equaled what the earth could sustain in

equilibrium), but that in 2000 it was 1.2 times greater. The human race has already consumed more resources than the environment can endure. If the rest of the world were to copy American habits of consumption, we should need 5.3 earths.

Herman Daly and John Cobb suggested not only an index of strong sustainability, but also an index of sustainable economic welfare (Daly and Cobb, 1989: Appendix), and on the basis of this proposal they proposed to extract from the GDP those items that do not lead to "richness of life" (such as the cost of repairing damage to one's home) while adding to it those activities that lead to "richness of life" (in the form of housework and child care). This is called the GPI (the "Genuine Progress Index", 1995). We may note that even though the GDP has increased, the GPI has decreased. The problems of the arbitrariness of the index and of monetary conversion methods still remain.

On reaching a decision over an assessment of the environment, Yale University, Columbia University and the World Economic Forum devised an ESI (Environmental Sustainability Index) that attempts to provide a stronger analytical base by making use of environmental indicators and statistics. It calculates a "sustainability score" for each country by 21 indexes divided over five categories. The five categories are "the environment system", "an environmental load reduction", "the alleviation of human vulnerability", "social/systematic ability", and "global leadership". They take the actor's capability and governance into consideration, and, as judged by the indexes, the Nordic countries are those most highly evaluated. The developed countries face the major problems of pollution and over-consumption, while the developing countries face the even bigger problems of the exhaustion of resources and the inability to prevent pollution. Since the indexes are relative, however, they do not tell us whether they are sustainable at any level, and consequently, in a report produced by Stiglitz and Sen on the measurement of economic performance and social progress, a study of the environmental aspects of sustainability entrusted to them by the French government, they propose that a physical index is necessary, one that will show dangerous levels of environmental damage such as global warming and the exhaustion of fishery resources (Stiglitz and Sen, 2009: Recommendation 12).

In "The Wellbeing of Nations" (The World Commission on Environment 2001), the International Union for Conservation of Nature and Natural Resources makes a similar proposal: this would integrate the indexes and classify them as [1] the human richness index, [2] the ecological richness index, [3] the richness index that integrates them both, and [4] the richness/

Table 1-1 Categories and indexes of ESI.

No.	Category	Index
1	Environmental system	Air, biodiversity, land, and water quality and quantity
2	Environmental load reduction	Air pollution reduction, ecosystem load reduction, population growth restraint, waste and consumption reduction, water load reduction, natural resources management
3	Alleviation of human vulnerability	Environmental hygiene, basic human life, alleviation of vulnerability to natural disaster
4	Social/systematic ability	Environmental governance, environmental efficiency, correspondence to the third sector, science and technology
5	Global leadership	International action and participation, greenhouse gases reduction, trans-boundary environmental load movement reduction

stress index, which shows a ratio of human richness to ecological stress: sustainability is measured by the four indexes in combination. It is obvious that countries with high standards of living burden the environment with much heavier loads than do the poorer countries, while the ecological stress index [4] is not the result of human richness level but of how human beings pursue it, and is related, so it has been said, to a combination of freedom, good governance and a sound general education.

Weak sustainability, on the other hand, requires that, economically speaking, the total market value of artificial capital stock and natural capital stock do not decrease over time. 30 years ago, John Hartwick showed that by investing total rent from non-renewable resources in artificial capital, the maximum utility can, over time, be achieved (Hartwick, 1977). This is called "Hartwick's rule". Rent here is profit attributed to the suppliers of goods and service, amongst which goods and services the extent of useable land and the possessors of rare ability are of a fixed quantity.

Later, David W. Pearce and others laid down an index of weak sustainability for 18 countries (Pearce and Atkinson, 1993). They estimated the net investment by looking at changes in the artificial capital stock and in the natural capital stock, and calculated a shadow price (the price that has the attribute of an equilibrium price) as a means to clarify the significance of the term "a genuine saving". To calculate "a genuine saving", the World Bank

estimates "the adjusted net saving" by adding educational expenses to the national net saving, then extracting from it reductions in energy resources, reductions in mineral resources, deforestation, damage caused by the emission of carbon dioxide, and damage to suspended particulate matter (World Bank, 2006).

Weak sustainability presumes the 'substitutionality' of artificial capital and natural capital, while if the presumption is not upheld, then, conversely, it cannot be an index of sustainability. Furthermore, in evaluating natural capital in money, it uses the market value. This holds only as long as the rarity of natural capital is reflected in the real market price (Sasaki, 2007).

Alongside the notion of "a genuine saving", Sir Partha Dasgupta has proposed the idea of "a genuine investment". The national wealth is a collection of artificial capital, human capital, natural capital, and knowledge. This is called "comprehensive wealth", and only when there is net investment will the wealth increase. Dasgupta has estimated that from 1970 to 1993 Bangladesh and Nepal among the developing countries experienced negative "genuine saving", while every country other than China has demolished capital assets *per se* (Dasgupta, 2001: Japanese translation, Table 9-2). In reality, even when the substitutionality of artificial capital and natural capital is merely presumed, we are still able to confirm weakening sustainability.

Various sustainability indexes have been frequently proposed, not only for the environment but also for society and the economy. Bhutan, say, is a special case in a special place, a small kingdom tucked away in a vulnerable environment within the Himalayan mountain mass, and the Bhutanese Gross National Happiness index (GNH) is globally famous. The Bhutanese do not hurry development along, but seek to make sure that everyone is provided with "adequate clothing, medical care, food, jobs, and housing" (Imaeda, 2008). Bhutan's GNH comprises four basic categories: "economic growth and development", "environmental preservation and sustainable development", "maintenance and promotion of the cultural heritage", and "good governance". These are sub-divided into nine items: basic life, cultural variety, mental health, physical health, education, occupations, the natural environment, the vitality of the community, and good governance. The GNH does not seek "individual happiness" alone: it makes much of security, relief, and the stability of social infrastructure, and the three tenets of sustainability, capability and governance are realized in the national character of Bhutan.

In Japan, NGOs and local governments have made suggestions for establishing a sustainable society. Among them, in particular, "Consideration of a sustainable society for Japan" (Japan for Sustainability, ed., 2007) lays down

the five necessary conditions for achieving sustainability (adequate capacity/resources, a fair dispensation of time, a fair dispensation of space, diversity, a strong will and good connections) and four criteria to be catered for, the environment, economy, society and individuals. It created five indexes for each (20 in total) and has subsequently evaluated them (ref. Figure 1-2).

The quantification exercise enables us to analyze the results in terms of international comparison and diachronic change, and the result of the estimation shows that while some of the indexes relating to Japan are moving in a positive way, Japan as a whole is losing sustainability. We can read multiple indications of a worsening state of sustainability in Japan's environmental index of global warming, in its economic index of outstanding financial claims, in its social index of the crushing situation of its traditional industries, in the individual index of the increase of suicide and the widening gap between the rich and the poor.

Germany, Sweden, Canada and Australia have all established systems of evaluation and strategies for sustainability at the national level. In 2002, Germany announced its sustainability strategy at the Johannesburg summit as "The German Perspective" (The Office of the German Council for Sustainable Development, 2002). The Perspective, based on a referendum, does not distinguish the criteria as environment, economy, and society, but as "fairness between generations", "quality of life", "social unity", and "international responsibility". It proposed 21 indexes and targeted their value, and in 2006

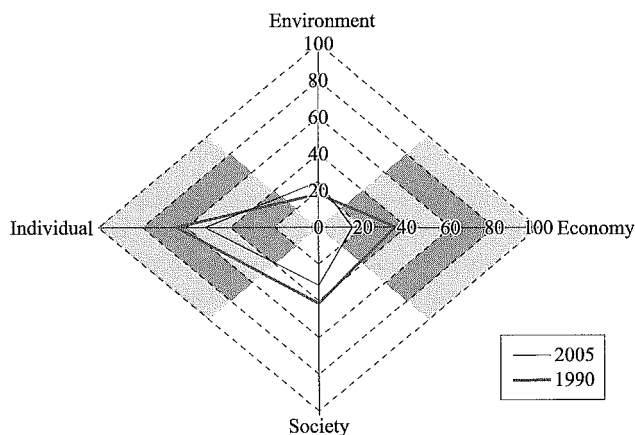


Figure 1-2 Indexes used in consideration of a sustainable Japanese society (Japan for Sustainability).

reported on its progress, where Germany seems to perform badly in indexes such as closing the gap in financial status and imports from developing countries.

In 2005, Sweden established a Ministry of Sustainable Development, which has initiated noteworthy policies on transverse sustainability while examining its national strategy of sustainability. In 2006, the Swedish Government listed 6 domains and 12 indexes for examination: the domains are [1] health/life/violence, [2] types of sustainable consumption, production/energy and efficiency/investment, [3] economic development/employment/fiscal deficit/growth, [4] social unity/risk of poverty/support for low birthrate and an aging population, [5] environment and climate/greenhouse gases/toxic substances, [6] world development/international collaboration (The Government of Sweden, 2006). Yet in spite of the increase of garbage and the ageing of society, the percentage of renewable energy is actually increasing. The EU has followed Sweden's lead and is examining, as indexes of sustainable development, [1] social economic development, [2] sustainable consumption and production, [3] social inclusion, [4] population change, [5] public health, [6] sustainable development, [7] sustainable transportation, [8] natural resources, and [9] global partnership (Eurostat, 2007).

As we have said above, the concept of sustainability is based on the environment's ecosystem and the sustainability of the climate. It takes fairness within and between generations into consideration and fosters the development of individual ability and social governance. Since the concept will soon include the environment, society, and an economy that aims at true economic development, we shall need to establish an integrated theory of the three concepts of sustainability, capability, and governance.

Summary

Regardless of whether one's theories are neoclassical or Marxist, the range of established economic theories that can be applied to solve the problems of the environment is limited. Consequently, we need to develop specific economic theories that are capable of dealing with the real environmental problems, and we must seek for true economic development, since it is important to provide equal opportunities for people everywhere (not only in Japan) so as to satisfy their basic physical needs and realize their human capabilities. We ought never to forget that in *The Wealth of Nations*, one of the foundational texts of economics as a discipline, Adam Smith made his aim the "richness of all the people", not simply the wealth of one nation (Dome, 2008:

274).

As a methodological instrument designed to aid that purpose, this book attempts to provide a social economic analysis of environmental problems as well as one of sustainability. It begins with a plea to balance "the metabolism of human beings and nature", and goes on to develop the capability theory of Amartya Sen, a theory that focuses on individual ability and freedom, with further chapters on the regime/actor analysis in politics, and the theory of environmental governance.