Preface

The world at the beginning of the twenty-first century must place the highest priority on constructing a sustainable socioeconomic system that can cope with the rapid ageing of populations in developed countries and with the limited environmental resources available in those countries. At first glance, the ageing problem and the environment problem may seem to be quite separate issues. However, they share a common feature: they both deal with intergenerational problems. The essence of the ageing problem is how to find effective ways for a smaller, younger generation to support a larger, ageing generation. The crux of the environmental problem is to find a feasible way to leave environmental resources to future generations. Moreover, in terms of consumption, slower population growth may slow consumption and help environmental problems. On the other hand, a rapidly ageing society may use more energy-intensive technology to compensate for the inevitable labour shortage, and deteriorate the natural environment by doing so.

Today, these concerns are highly applicable in Japan. The pressure created by the rapid ageing of the Japanese population is becoming acute; Japan must construct a sustainable society that does not create intergenerational inequity or deteriorate the public welfare. At the same time, Japan cannot deplete its environmental resources and energy, which would leave future generations with an unbearably heavy burden.

The government of Japan has recognized the vital importance of both problems. To explore and implement solutions for this difficult task, in April 2000 former Prime Minister Keizo Obuchi launched several comprehensive, interdisciplinary and international research projects that he called the 'Millennium Projects'. These projects are now being carried out through collaboration among Japan's governmental ministries. As a part of these projects, the Economic and Social Research Institute (ESRI), Cabinet Office, Government of Japan, initiated a two-year project entitled 'A Study on Sustainable Economic and Social Structures in the 21st Century' in April 2000. While the Millennium Projects cover a wide range of topics and a wide range of disciplines such as natural science and technological innovation, the project conducted by ESRI places major emphasis on social science. While taking into account technological innovation and feasibility, it focuses on ageing and environmental problems. It aims to design a desirable socioeconomic

structure under the pressure of an ageing population and environmental constraints by identifying the necessary policy tools to attain stable and sustainable growth.

This project is being implemented with close collaboration among Japanese as well as foreign scholars and research institutions. Besides Japanese scholars and institutions, foreign participants have joined from, among others, the USA, the UK, Norway, Germany, Austria, Italy, Australia, Korea and Thailand. They amount to ten countries and 30 working groups.

The ageing problems studied in this project can be divided into three main sections. The first concerns macroeconomic problems caused by an ageing population and diminishing young workers. The second concerns problems in the labour market, and the third focuses on problems with the social security system, and emphasizes the reform of the pension system.

The problem of sustainable economic growth was explored in the section on macroeconomic issues. Few researchers are confident of the possibility of future high-speed economic growth, but many are optimistic about the possibility of sustainable economic growth that is supported by an increase in total factor productivity through the information and communications technology (ITC) revolution. Indeed, this view has often emphasized the possibility of correcting the labour force shortage by increasing the employment of females and immigrants. If the economy does develop according to this optimistic scenario, it will achieve the simultaneous resolution of problems of social security and that of the ageing working population. If the growth falls short of our expectations, however, the reform of the social security system will become more difficult.

Until now, developed countries have employed simplified economic welfare indicators such as economic growth and GDP for policy management. According to the convergence of economic growth, developed countries will be expected to slow down their pace of growth. Thus we need an economic and social structure that is capable, even under relatively low economic growth, of alleviating social and economic difficulties such as inequality and the conflict of interests between stakeholders. From a different perspective, this is a classical problem of the division of roles between government and the private sector. The government should provide a minimum safety net for the risks that cannot be covered by individuals without reducing the degree of economic vitality based on private incentives. It is necessary to re-examine simplified quantitative standards such as GDP and growth rates as measures of society's overall well-being, and to explore multidimensional criteria that incorporate concepts like happiness, good lifestyles, peace and healthy environments, none of which can be accurately measured in monetary terms.

Research on environmental problems aimed at the creation of a closed-loop type of economic society addresses four main issues: (1) research on

solid waste management; (2) analysis of waste recycling that incorporates the technological possibility, sustainability and conservation of resources and energy; (3) research on the compatibility of environment protection and macroeconomic policy, especially policies aimed at increasing employment; and (4) an analysis of problems related to climate changes. It should be noted that much empirical investigation has been conducted in the field of waste management.

Japan's environmental problems began with pollution problems. In the early Meiji era (1868–1912), the development of copper mines such as Ashio, Beshi and others was accompanied by the production of noxious gases that polluted the environs, but the problem was resolved by the conclusion of various agreements concerning environmental protection. During the high-growth period following World War II, different pollution problems emerged: mad hatter's disease, water contamination caused by factory operations, and air contamination caused by car exhaust emissions are three examples. Local administrations tried to curtail these bad effects by imposing limits on emissions of harmful substances, concluding pollution control agreements that featured voluntary efforts from companies. This anti-pollution policy did not constitute a constraint on industrial activity and growth. Actually, it had just the opposite effect: the policy and various pollution control restrictions stimulated creativity and technological progress, leading to the further development of industry. A remarkable example of such an effect was the Muskie Act, established to prevent air pollution in the US state of California. It offered effective incentives for technological progress and entailed precedence of the Japanese automobile industry over other countries. Pollution problems were thus controlled.

Today, however, the improvement of living standards and development of the world economy is leading to global environmental degradation. Moreover, economic growth has caused new environmental problems such as increases in waste.

Japan – taking into account its geographic location in the monsoon climatic zone and its sanitation – opted for the landfill method of waste disposal. However, its landfill site capacity was not enough to absorb the sharp increase in waste the country was producing. The incineration method was thus applied as the intermediate disposal procedure to reduce the quantity of landfill waste. After the quantity of waste had been reduced by burning, the landfill method was reapplied. But at the end of twentieth century it became obvious that landfills were facing an impasse, and that this policy was little more than a stop-gap measure. From the 1990s onward, the government of Japan explored different measures and encouraged efforts to cope with the waste problem by implementing closed-loop social measures, that is, using fewer resources, recycling used materials and reusing the waste as energy and

other inputs. Some people have argued that the creation of closed-loop social measures is a specific problem for Japan, faced with the shortage of landfill sites. Nevertheless, the waste problem will sooner or later become acute for high-growth countries. Even in countries that have vast territories, the adoption of these closed-loop measures is meaningful because of the scarcity of resources. Moreover, closed-loop measures that effectively dispose of waste are a way to reduce the emission of greenhouse gases. By employing resources-efficient and energy-efficient technologies, at least according to our optimistic scenarios, we may eventually attain sustainability.

By forming this kind of closed-loop socioeconomic system, it will become possible to save energy and to reduce emission of greenhouse gases through the reuse of natural resources. Moreover, it will become possible to prevent the greenhouse effect by more effective use of fossil energy and other alternative energy sources. By employing this 'bottom-up' approach, we will create jobs in environmental protection, and in the use of alternative sources of energy such as wind. As we shift to the closed-loop type economic society, the beneficial effects on the labour market will become evident.

Some argue that environmental problems constitute constraints on macro-economic growth. However, employment of resource-effective technologies and the reuse of waste to the fullest extent possible will lower the possibility of resource shortages. At the same time, it will contribute to the minimization of environmental impacts. The necessity to build a closed-loop type economic society was triggered by Japan's urgent need to examine the problem of waste management. In this sense, building a closed-loop society is a way to attain Japanese-style sustainable development.

To repeat, the problems examined here should not be considered separately. Research on the problems of population ageing and environmental degradation has a common thread. That is, these studies are concerned with how to use the market mechanism to solve them. Many propose the use of the market mechanism and economic tools to solve problems in the medical care system, in pensions, and in the labour market that are caused by an ageing population, climate change, and waste disposal. Unfortunately, many of these problems arise in areas that are noted for their frequent market failures. Here, the market mechanism in its pure form often fails to produce efficient outcomes. Therefore, making the market mechanism work effectively is difficult and preconditioned by the exact identification of externalities. At the same time, we must face classical trade-off problems between efficiency and equity, as well as the problem of the best relationship between the public and private sectors.

In this project, we explore optimal solutions to problems in terms of social science. After taking into account the political and social constraints we face, and after alignment and coordination with the results of other studies, we will

sketch out an ideal design and examine the possible direction of further research.

This project came to an end in March 2002. It solved many theoretical and empirical issues, but has created new debates. Twice a year, all the members of the project, along with selected participants, met to discuss the results of the research. Regretfully, it has not been possible to reproduce these fruitful discussions in the present volume.

Overall, the papers presented in this project were extremely challenging, and covered a wide range of topics. In the near future I strongly hope we will have a chance to discuss the research once more from a common standpoint. I would like to acknowledge the ceaseless efforts of the members of ESRI, especially those of the Department of Administrative Affairs, headed by Mr Mitsuo Hosen.

The results of this research will appear in print from Edward Elgar Publishing Ltd as an ESRI study series, available to policy makers, academics and business people with a keen interest in these subjects. The series on environmental problems covers climate change, waste disposal problems, sources of energy and technology, and environmental and macroeconomic policy. Unfortunately, because of space limitations we regret that we are able to publish only selected papers from the total research effort.

The timing seems right to publish the first volume of the ESRI Studies Series on the Environment, *Firms, Governments and Climate Policy*, while research in this field is encouraged by the Marrakesh Agreement.

The research papers to be published were selected by Carlo Carraro of Venice University, Frank Convery of University College Dublin, Christian Egenhofer of CEPS, and Koichi Hamada and Hiromi Kato of ESRI. We are especially grateful to Professor Carraro, who initiated our association with Edward Elgar. Last but not least, we would like to thank Dymphna Evans from Edward Elgar.

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