



# Chapter 1

## Current Situation of Japan and the World

### Section 1 United Nations Conference on Sustainable Development: Rio+20

The United Nations Conference on Sustainable Development (UNCSD, Rio+20) is scheduled to take place June 20-22, 2012 in Rio de Janeiro, Brazil. The Rio+20 name was chosen because it will be the twentieth year since the United Nations Conference on Environment and Development (UNCED, Earth Summit) was first held in 1992. Heads of state and national leaders are scheduled to participate in Rio+20, in addition to individuals and groups representing a variety of viewpoints, including local governments, businesses, and NGOs.

At Rio+20, global initiatives to achieve sustainable development will be discussed. The conference will summarize past initiatives for achieving sustainable development and the progress that has been made towards achieving targets. In addition, the event will work on building shared recognition of the challenges that need to be tackled

and the goals that need to be achieved. Furthermore, the conference has defined one of its goals as being to create political documents that will establish an international agreement for future initiatives. Rio+20 is expected to bring effective results for: (1) the Green Economy in the context of sustainable development and poverty eradication; and (2) institutional frameworks for sustainable development.

This section examines sustainability-related movements in the international community, “the Green Economy in the context of sustainable development and poverty eradication” and “institutional framework for sustainable development” as themes of the conference, as well as institutional frameworks, while providing an overview of the bigger picture of Rio+20 (e.g., past discussions and the perspectives of Japan and other stakeholders).

#### 1 Roadmap to Rio+20

“Sustainable development,” the theme of Rio+20, can be considered to be a common challenge that the whole world must achieve. The term sustainable development became generally and widely known with the publication of the Brundtland Report (Our Common Future) by the UN World Commission on Environment and Development (WCED, the Brundtland Commission) in 1987. This report defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” and defined key policy targets as being: growth recovery; quality improvement; fulfilling fundamental and essential needs of human beings such as the need for employment, food, energy, water, and sanitation; controlling population;

conservation of resource bases; changing the direction of technology; risk management; and integration of the environment and the economy. This served as the catalyst for establishing shared recognition among countries around the world on agreements covering the environment and development. Based on this shared recognition, UNCED was convened in 1992.

Leading up to the popularization of these development-related concepts was a drastic increase in the environmental impact of civic life and business activities associated with accelerated socioeconomic activities. As a result of the excessive pursuit of economic efficiency in the globalized economy, lifestyles and economies of mass production and mass consumption became widespread, while overuse

Table 1-1-2 Major International Actions toward a Sustainable Society

Year	Name of the Treaty, Conference, or Documents and Publication	Summary
1972	The United Nations Conference on the Human Environment (Stockholm Declaration)	First large-scale international conference that worked with the general issue of the environment. Adopted the Declaration on the Human Environment, and an Action Plan. Agreed to establish the United Nations Environment Programme (UNEP)
1972	The Limits to Growth (Club of Rome)	Warned of resource limitations arising from human activity, on sources like iron, oil, and coal, as well as environmental loss and food shortages due to rapid economic growth and population expansion
1980	The Global 2000 Report to the President (United States Government)	Created on the order of then President Carter. Reported serious impacts of population, economic growth, and resources due to environmental impacts expected during the 20 years until 2000
1987	Our Common Future (World Commission on Environment and Development)	Report by the UN World Commission on Environment and Development, a special committee set up after Japan's proposal. Initiated the concept of “sustainable development”, regarding the relationship between the environment and development as satisfying the needs of the current generation without losing those of the next generation
1992	The United Nations Conference on Environment and Development (Earth Summit: Rio Conference)	Global conference that dealt with sustainable development. About 180 countries attended. Achieved many international agreements such as the Rio Declaration on Environment and Development and Agenda 21
	Adopted the Convention on Biological Diversity (CBD)	Main objectives are to protect biodiversity, to use biodiversity without destroying it, and to share any benefits from genetic diversity equally
1992	Adopted the United Nations Framework Convention on Climate Change (UNFCCC)	The ultimate objective is stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system
	The 3rd conference the Parties to the United Nations Framework Convention on Climate Change	Adopted the Kyoto Protocol, obliging quantitative reduction of greenhouse gas emissions by Annex I countries (developed countries) in the First Commitment Period (2008-2012)
1997	The United Nations Millennium Summit	Wide-ranging discussions about conflict, poverty, the environment, and fortifying the UN, under the theme the role of the United Nations in the 21 century. Adopted an United Nations Millennium Declaration. Set up an unified framework of international development goals called the Millennium Development Goals (MDGs)
2000	The World Summit on Sustainable Development (Johannesburg Summit: Rio+10)	Convened in the 10th year after the Earth Summit. Adopted the Johannesburg Plan of Implementation, a Political Declaration, and a Record of Commitments/Partnerships. Designated the 10 years from 2005 as the UN Decade of Education for Sustainable Development, proposed by Japan
2002	The 10th Conference of the Parties (COP 10) to the Convention on Biological Diversity (CBD)	Adopted and agreed to the Aichi Targets on biodiversity from 2011 onwards and the Nagoya Protocol on access and benefit sharing
2010	The United Nations Conference on Sustainable Development (UNCSD) (Rio+20)	Convened in 20th year after the Earth Summit. Will create a political paper under the themes of (1) the Green Economy in the context of sustainable development and poverty eradication (2) institutional framework for sustainable development

Source: Ministry of the Environment

of the environment (e.g., destruction of tropical forests) continues in developing countries. There is a widening gap among developing countries between semi-developed countries (including resource-rich and newly industrialized countries), and the so-called poorest countries (the south-south issue). In these areas, unsustainable development is rapidly spreading due to the spiraling influence of poverty, population growth, and food insecurity.

Since this situation stems from worldwide structural problems, it is critical for every country to make efforts to resolve these problems in line with their diverse perspectives. As we move forward in time, environmental issues become a key challenge that must be overcome by the world as a whole, since the issue has spread in terms of space (as one world) and time (an impact lasting for generations).

At the Earth Summit, participants deliberated on specific methods for working through various conflicts between developed and developing countries. As a result of the conference, the Rio Declaration on Environment and Development was to be observed by countries and international organizations, while Agenda 21 was adopted as a set of action principles aimed at achieving the declaration. Furthermore, the signing of the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD) began as a way to reconfirm that promoting sustainable development

is the road to a safe and prosperous future for humankind.

To further ensure the achievement of the goals of Agenda 21 and other environment-related treaties, the United Nations Commission on Sustainable Development (UNCSD) was newly established under the United Nations Economic and Social Council to conduct follow-up activities. In 2002, a decade after the Earth Summit, the World Summit on Sustainable Development (Johannesburg Summit, Rio+10) was held, and indicated an international agreement for promoting specific initiatives based on achievements following the formulation of Agenda 21.

In September 2007, at the UN General Assembly, the Brazilian government made a proposal to hold a follow-up meeting to the Earth Summit in 2012 in Rio de Janeiro—two decades after the Earth Summit in 1992. In response, UN resolution 64/236 was adopted in 2009 to convene the United Nations Conference on Sustainable Development (UNCSD, Rio+20) in 2012 in Rio de Janeiro.

The resolution defines the objectives of Rio+20 as being to secure a renewed political commitment to sustainable development, to assess progress towards internationally agreed-upon sustainable development goals, and to address new and emerging challenges. As previously described, Rio+20 requires effective achievements to be made regarding: (1) the Green Economy in the context of sustainable development and poverty eradication; and (2) institutional framework for sustainable development.

Table 1-1-1 Primary Agenda of Rio+20

The Green Economy in the context of sustainable development and poverty eradication	The goal is to reach effective agreements to solve various challenges on the way to achieving sustainable development through specific policy statements regarding achievement documents.
Institutional framework for sustainable development	Deliberations on essential challenges, such as the establishment of an international body for handling environmental issues, and strengthening Multilateral Environmental Agreements (MEAs), including the United Nations Framework Convention on Climate Change (UNFCCC)

Source: Ministry of the Environment based on UN resolution 64/236



Rio+20 will define Green Economy goals to obtain effective agreement and resolve a variety of issues. The aim is to achieve sustainable development by getting down to concrete policy discussions. In terms of institutional framework to achieve sustainable development, Rio+20 participants will deliberate on establishing international organizations to comprehensively address environmental issues, and on consolidating/coordinating multilateral

environmental agreements (MEAs).

As stated above, the global trend is to deliberate on specific initiatives to improve human rights and inequalities and achieve economic growth while mitigating resource bottlenecks and environmental risks. In this context, Rio+20 can be considered an important opportunity for countries including Japan to reconsider what kind of socioeconomic structure should be pursued and how to address the issues.

## 2 Inputs for the Outcome Document as Proposed by Japan, after the Great East Japan Earthquake

Rio+20 requires the formulation of an effective Outcome Document to steadily make strides towards achieving sustainable development. The key is therefore to consolidate problem awareness and knowledge from governments, international organizations, non-governmental organizations, and so on, so that they are reflected in the outcome of the meeting.

The United Nations Rio+20 secretariat invited participant suggestions on inputs for the Outcome Document. The goal was to ensure a fair and transparent process for consolidating a wide variety of opinions. As a result, a total of 677 proposals were submitted from countries around the world, including Japan. These inputs will be reflected in the review process to be held later, forming a basis for the Zero Draft (The Future We Want), a draft report of the Rio+20 Outcome Document. Proposals are made publically available and can be accessed on websites related to United Nations Rio+20.

Japan's report proposed nine key Green Economy areas based on the lessons learned from the Great East Japan Earthquake. In the area of disaster prevention, Japan proposed the formulation of a new international agreement as an alternative to the Hyogo Framework for Action (HFA, formulated in 2005) to enhance disaster management systems based on the lessons learned from the Great East Japan Earthquake. In this way, Japan proposed that international society share knowledge and lessons learned from the earthquake. Furthermore, Japan's proposal calls for energy-saving measures that work towards a drastic energy shift that promotes the introduction of renewable energies along with the significance of technological and green innovation. In addition, Japan defined the outcome of the 10<sup>th</sup> Conference of the Parties (COP 10) to the CBD in

**Table 1-1-3 Groups Submitting Proposals for Outcome Document Inputs**

Group	No. of documents submitted
UN member states	100
UN agencies and intergovernmental organizations	74
Political groups	5
Regional preparation meeting	5
Other key groups	493
Total	677

Source: Ministry of the Environment based on Rio+20 website

2010, in which importance should be placed on the position of the sustainable development issue, and served as chair to take the lead in advocating strong initiatives to achieve the Aichi Targets, from the point of view that sustainable development is important issue.

Based on the proposals noted above, the Rio+20 secretariat officially announced a Zero Draft report on the Outcome Document in January 2012. The Zero Draft proposes a reconfirmation of the significance of past global initiatives (the Rio Declaration) as we work to achieve the Green Economy, and strengthening institutional framework while looking at the situation of countries addressing the issues and frameworks for evaluating these issues.

In the Zero Draft, while developing countries call for enhancing ODA commitments and the significance of technology transfers, EU stresses the formulation of a Green Economy roadmap and making the United Nations Environment Programme (UNEP) a specialized

**Table 1-1-4 9 Proposals for Sustainable Development in Japanese Government's Input**

Area	Proposal
(1) Disaster prevention	Formulate post-Hyogo Framework. Integrate disaster prevention into development policy. Share knowledge and lessons learned from disasters such as the Great East Japan Earthquake with international society.
(2) Energy	Promote energy-saving, renewable energy, and clean energy as a way to move towards a drastic energy shift.
(3) Food security	Achieve security with sustainable agriculture, including increased investment for agricultural areas to increase food production, and move forward with responsible agriculture investment, consolidation, and streamlining.
(4) Water	Start considering goals related to comprehensive water resource management as a substitute for the Hashimoto Action Plan II.
(5) Future City initiative	Provide a Future City initiative model for the continued creation of value in the economy, society, and the environmental.
(6) Education for sustainable development	Address the fostering of sustainable citizens by promoting and sharing initiatives for sustainable development education.
(7) Global Earth Observation System of Systems (GEOSS)	Further strengthen the earth observation system network through GEOSS to appropriately address global issues.
(8) Technological innovation and green innovation	Recognize the significance of technological innovation and green innovation for launching initiatives in line with growth phases.
(9) Biodiversity	Reconfirm the importance of the Aichi Targets to encourage participation in international efforts, thereby enhancing activities aimed at achieving the targets.

Source: Japanese Government's Input to the United Nations Conference on Sustainable Development (Rio+20) Outcome Document

agency. The United States emphasized the importance of nongovernmental bodies.

Japan advocates the following points for sustainable development: the “developed” versus “developing” country dichotomy should be reviewed; the transition to the Green Economy is inevitable; it is important to agree and implement concrete measures to improve institutional frameworks, as

well as to discuss a question of reorganization; and human security should be added to the draft.

The achievements of the Outcome Document Meeting will come under the spotlight in terms of how to consolidate deliberations in the future, and what agreements the world can come to in order to achieve a sustainable society.

## 3 Initiatives of Various Parties and the Multi-Stakeholder Process

Rio+20 is committed to actively involving non-government stakeholders such as businesses and NGOs. During the Rio+20 session a People Summit attended by NPOs and businesses will be held in Rio de Janeiro in the same way as the official meetings held by country representatives. Under the People Summit scheme, many of these groups from all over the world will gather for various events and lectures to deliberate on issues related to sustainable development.

Opening this dialogue to a broad range of parties can encourage proactive efforts. This is likely to further boost the legitimacy of the dialogue, as it will now reflect the standpoints and perspectives of participants with diverse backgrounds. At the same time, decisions and

agreements can be reached as a result of these dialogues. These decision-making processes are known as a Multi-Stakeholder Process (MSP), and they demonstrate the effectiveness of comprehensively addressing issues such as the environment, the economy, and the society under the scheme of Agenda 21.

In Japan, the preparatory committee for Rio+20 was established in July 2011 by a suggestion from the United Nations secretariat. The total 5 committees and 2 workshops had been held by March 2012 and offered opportunities for various social groups to have discussions. The preparatory committee submitted an input proposal to the United Nations secretariat in October 2011.

## Section 2 Global Trends for Achieving a Sustainable Environment, Economy, and Society

The previous section described trends in international discussions related to the realization of a sustainable society, focusing on Rio+20. The Green Economy, one of the main themes of the conference, indicates ideal measures and resolutions for simultaneously conquering resource bottlenecks, mitigating environmental impacts, achieving economic growth, and improving the quality of human life and welfare. This agenda is attracting attention from around the world.

This section gives an overview of global trends toward achieving a sustainable environment, economy, and society based on two reports: (1) *Green Economy* published by UNEP in November 2011; and (2) *Towards Green Growth*

published by the Organisation for Economic Co-operation and Development (OECD) in May 2011, as a part of a green growth strategy to review global trends for achieving sustainability of the environment, the economy, and the society.

**Table 1-2-1 UNEP Green Economy and OECD Green Growth**

Green Economy (UNEP)	Improving human well-being and achieving social equality while reducing environmental risks.
Green Growth (OECD)	Simultaneously overcoming resource bottlenecks and mitigating environmental impact while achieving economic growth.

Source: UNEP *Green Economy*, OECD *Toward Green Growth*

## 1 Green Economy for UNEP

UNEP defines the Green Economy as one that results in improving human well-being and achieving social equity, while significantly reducing environmental risks and ecological scarcities. In the Green Economy, goals are set to improve environmental quality in order to ensure that people engage in wholesome activities and maintain their well-being, to achieve economic growth, and to encourage investment in dealing with environmental and social issues. Faced with global problems such as climate change, energy supply, and loss of ecosystems, the report focuses on correcting the wealth disparity among nations and generations.

Policy measures to achieve the Green Economy are suggested: prioritizing governmental investments and expenses in areas that effectively stimulate the transformation to the Green Economy, and reducing expenditures in fields that harm natural capital; tax systems and market mechanisms that attract consumers and promote green investments and technology development; investment for human resource development; strengthening international cooperation; effective regulations; valid evaluation of natural capital; and investments for R&D or technological innovation. Sustainability and equality management are analyzed with a focus on the poor, whose



livelihoods depend on natural resources in areas such as agriculture, fishing, and water. In sectors that consume a relatively large amount of energy and resources (such as transportation, energy conversion, and production) the

## 2 Green Growth for the OECD

### (1) Concept of Green Growth

In the OECD report, Green Growth is considered to be a way for sustainable use of our natural resources, which we rely upon for our livelihood, and reduction of environmental impact, while at the same time achieving economic growth. The decisive factors necessary for achieving Green Growth are enhancing productivity, promoting investments for dealing with environmental issues and technology in the environmental sector, creating new markets, investor trust, and the stability of macroeconomic conditions. Green growth has the potential to reduce the risk of irreversible

potential associated with energy and resource conservation are mentioned. These reports emphasize the importance of environmental considerations, not only for improving economic efficiency, but also for creating social equality.

socioeconomic impacts such as resource limitations that may cause the degradation of investment efficiency; and nature imbalance such as a loss of biodiversity that may cause a cost increase of harvesting or mining natural resources.

To address these challenges, it is considered necessary to have consistent long- and medium-term measures that strengthen economic and environmental policies. In terms of a concrete institutional scheme, the report lists economic approaches including tax systems, fair subsidy policies, and a regulatory approach that includes setting standards. These policies are thought to play a major role in a variety of socioeconomic activities, such as technological innovation, spurring environmentally conscious investments, and innovative approaches to coordinated management.

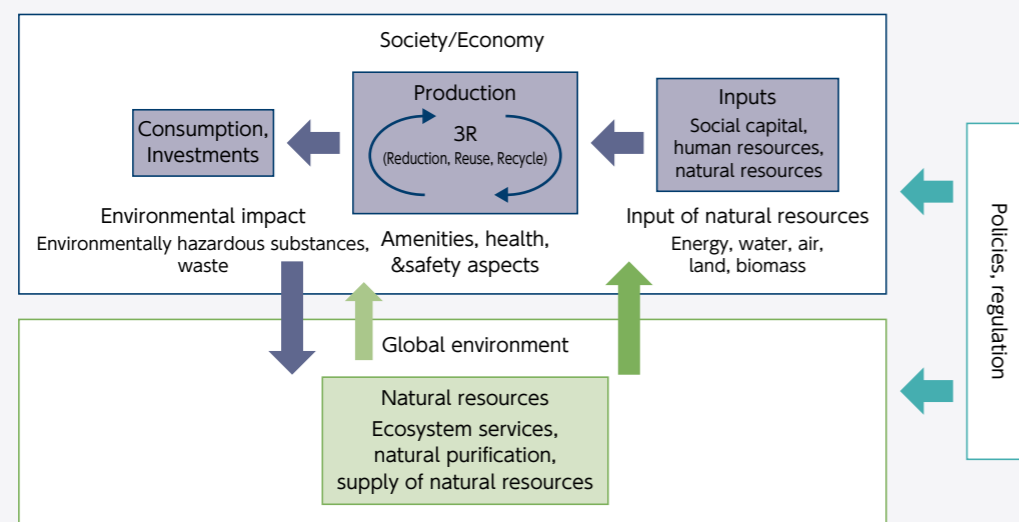
The significance of paying attention to socioeconomic transition is emphasized, since new markets are created during the transition to Green Growth, causing widespread effects on employment, markets, and households. In terms of employment, job creation can be expected, however, some forms of employment would be exposed to risk. Therefore, improving skills to catch up with the new technology is required. Business concerns, such as changes in the climate of competition during the transition, ought to be addressed through multilateral policy coordination. Transitional changes can also affect product prices, which can have an impact on consumption behavior and households, and thus they require careful consideration.

**Table 1-2-2 Critical Factors for Green Growth**

Improvement of productivity	Incentives for greater efficiency in the use of resources and natural assets: enhancing productivity; reducing waste and energy consumption.
Technical innovation in environmental sector	Opportunities for technical innovation, spurred by framework conditions that allow for new ways of addressing environmental problems.
Creation of new markets	Creation of new markets underpinned by green technologies, thus creating the potential for new job opportunities.
Confidence in stable policies	Boosting investor confidence by reinforcing the predictability and stability of environmental policy
Balanced macroeconomic conditions	Secure more balanced macroeconomic conditions by reducing resource price volatility and supporting fiscal consolidation
Resource bottlenecks	Prevent undermining of the ability to sustain future economic growth, due to the loss of natural resources exceeding the gains generated by socioeconomic activity
Stability in ecosystems	Avoid imbalances in ecosystems that raise the risk of irreversible effects

Source: Ministry of the Environment based on information from the OECD's *Towards Green Growth* (2011)

**Figure 1-2-1 Assessing the Green Growth System**



Source: Created by Ministry of the Environment based on the OECD's *Towards Green Growth: Monitoring Progress*

### (2) OECD Measurement Framework for Green Growth Indicators

The OECD proposed and established a set of twenty-five indicators to assess the progress of Green Growth initiatives. The set of monitoring indicators consists of four groups, categorized according to their relationship between economic growth and the environment: (1) the level of productivity and efficiency; (2) the level of natural resources that remain unused; (3) the possibility of socioeconomic activities having a negative impact on human health and the environment; and (4) the implementation of effective policies to support Green Growth. The assessment is carried out using statistical methods (Figure 1-2-1).

Indicators for carbon productivity and resource

productivity are used to measure productivity. Loss of biodiversity and the abundance of forest resources and underground resources are used to measure the amount of natural resource assets. The impact on human health and the environment is assessed according to hazardous material conditions and air pollution. Policies related to Green Growth are measured using socioeconomic indicators for research and development budgets and employment.

These indicators can also be interpreted as a means of expressing the goals of OECD Green Growth using statistical data. To further promote Green Growth initiatives, it is absolutely imperative to carry out assessments using these kinds of objective numerical data in addition to developing medium- to long-term policies.

### Column

#### Relationship among the Environment, the Economy, and the Society from the Perspective of Ecological Footprints

The future vision of the OECD's Green Growth and the UNEP's Green Economy can be considered to be the same, since both of them view resource bottlenecks and environment issues as critical risks, and pursue sustainability for the environment, the economy, and the society based on this view.

At the same time, the Green Growth and Green Economy are different in terms of the priority placed on these three aspects. The OECD's concept can be interpreted as particularly focusing on the interaction between the environment and social issues, since it simultaneously seeks to conquer resource bottlenecks and reduce environment impact while achieving economic growth. This interpretation is based on the fact that for developed countries entering a socioeconomically mature phase, achieving future growth and mitigating environmental impact are indispensable. The position of the UNEP, on the other hand, can be interpreted as placing importance on the interactions between the environment and social issues as well for human welfare and improvement of inequalities while mitigating environmental risks, based on the fact that in developing countries, resolving poverty and environmental issues are considered critical.

This discussion interprets the interactions between the environment and the economy and between the economy and the society using the concept of the Ecological Footprint (EF). The EF is a figure that converts the demand quantity of a biological product to

bolster human livelihood into a virtual two-dimensional space called a "global hectare" (Gha). The Gha reminds us that human socioeconomic activities impact the earth as a whole. In other words, as Gha value increases, the earth sustains greater environmental impact through the consumption of more natural resources.

The figure shows EFs with country Gross Domestic Product (GDP) indicated on the horizontal axis. It shows that developed and other countries with higher per-capita GDP tend to have a higher EF value. This suggests that developed countries are still involved in socioeconomic activities that heavily impact the environment. It further suggests that future environmental impact is most likely to increase in BRICs and other emerging countries where there is significant economic growth, unless their current socioeconomic structures change.

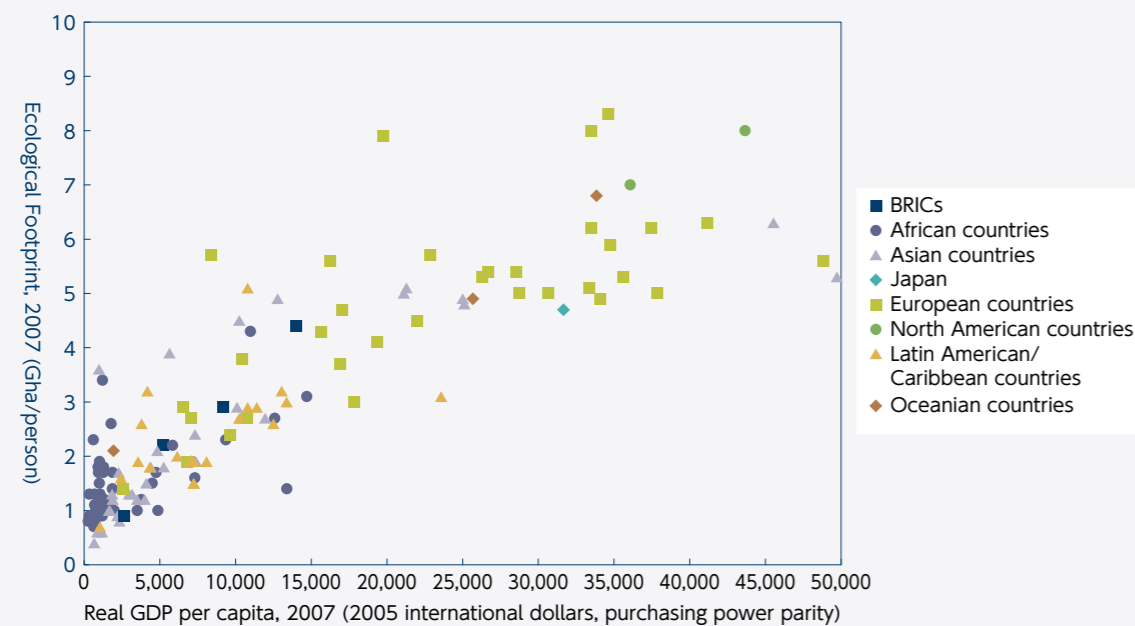
The diagram shows EFs on the vertical axis and the Human Development Index (HDI) on the horizontal axis. The HDI is an integrated indicator representing the degree of quality of life and development, calculated by weighting indicator values of GDP, average life expectancy, literacy rate, and educational standards. The diagram shows the actual conditions in today's world—regardless of whether countries are developed or developing—as being far removed from an ideal society where good quality of life is achieved with less environment impact. Specifically, in a significant portion of developing countries (particularly African countries), the environmental impact is low, but quality

of life is also low, while developed countries have a high quality of life but also a high degree of environmental impact.

Therefore, both the OECD's Green Growth and the UNEP's Green Economy can be understood as

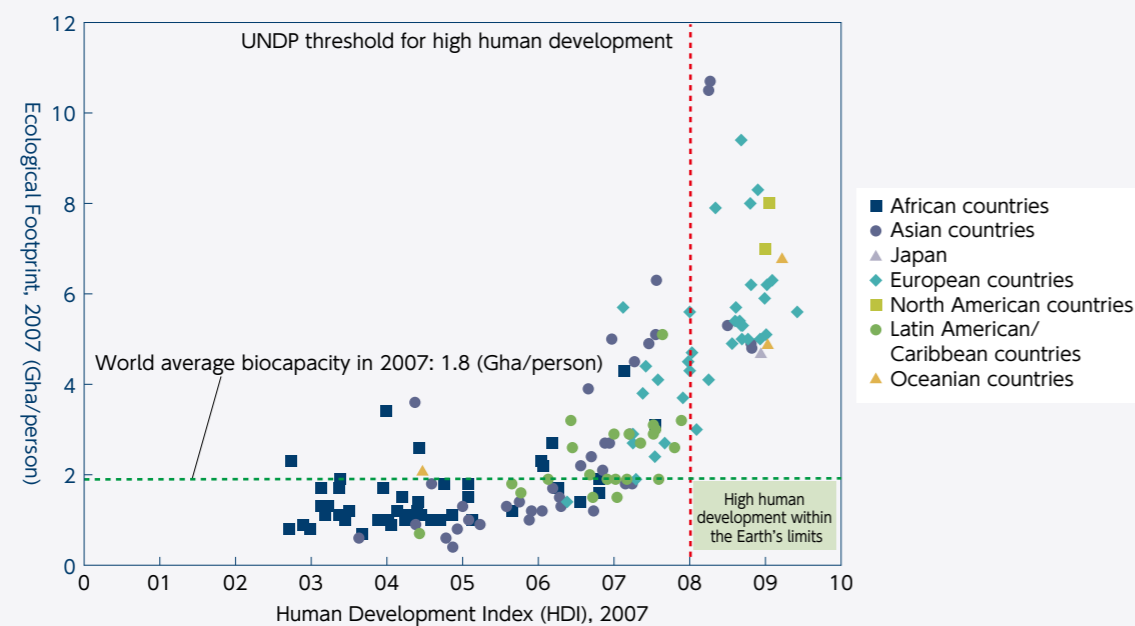
proposing an ideal process for achieving a sustainable society, based on a view of the troubled global situation of the environment, the economy, and the society. Faced with these global trends, defining socioeconomic structure is a critical issue for Japan.

Relationship between Economic Affluence and Ecological Footprint



Note: Some large value countries are eliminated to facilitate visualization  
Source: Ministry of the Environment based on the UN database

Relationship among Environment, Economy, and Society from the Ecological Footprint Viewpoint



Source: Global Footprint Network (2010), UNDP (2009)

## Section 3 Socioeconomic Activities and Environmental Impacts in Japan

Efforts to reduce environmental impacts while achieving economic growth has become a global trend. To achieve these goals, Japan can learn from the Green Economy and Green Growth proposals by the UNEP and the OECD in terms of promoting initiatives that support sustainable

development for the Japanese environment and economy. The following provides an overview of Japan's environment, economy, and society through statistical data related to the environment and the economy and the entire globe.

### 1 Socioeconomic Activities and Emissions of Substances with Environmental Impact

Measuring environmental impact can provide basic information to understand the integrated progress of the environment and the economy.

In this regard, the relationship between GDP growth and emissions of substances causing environmental impact such as carbon dioxide, sulfur oxides, nitrogen oxides, or waste since 1990 is examined (Figure 1-3-1). In terms of the relationship between the emission of carbon dioxide and other impact substances and socioeconomic activity in Japan, this shows that carbon dioxide tends to fluctuate with GDP. On the other hand, sulfur oxides show a downward trend (decoupling) in spite of economic growth. Nitrogen oxides and waste have shown this decoupling trend since the first half of the 2000s.

Here is a more detailed look at carbon dioxide as a cause of global warming. Carbon dioxide emissions tend to increase with global economic growth. Developing countries in particular will increasingly need to take countermeasures against climate change due to their rapidly increasing carbon dioxide emissions accompanying their economic growth.

Figure 1-3-2 shows the trend in the relationship between GDP per capita and carbon dioxide emissions by country. Higher inclinations of the lines represent greater emissions of carbon dioxide against economic growth. In China, there has been a notable increase in carbon dioxide emissions with economic growth. Korea also shows a similar tendency of economic growth accompanied by uncontrolled emissions of carbon dioxide.

Some developed countries such as Sweden are reducing their carbon dioxide emissions despite economic growth. In

Japan, carbon dioxide emissions tended to increase slightly until 2007, however, as a whole, Japan has been controlling carbon dioxide emissions relatively well even in times of economic expansion or improvement.

A sustainable society for the world to seek is a low carbon society without compromising economic growth. The data does not indicate the decoupling of economic growth with increase in carbon dioxide emissions, however, does indicate the possibility to reduce the environmental impact and the climate change with economic growth as shown in some countries. On the other hand, significantly growing countries such as China are drastically increasing their emissions of carbon dioxide, thus have a great deal of potential to contribute to countermeasures against climate change.

Economic disparities among developing countries are an emerging global issue. The reduction of these disparities and the environmental issues need to be dealt with as a package.

The effect of economic growth shows the similar tendency in carbon dioxide emissions and in waste. In Asia, the waste production seems to increase with economic growth (Figure 1-3-3). However, waste production in Japan has not increased much despite economic growth.

These global conditions, especially in Asia, suggest that Japan should pursue a society that can achieve both economic growth and low environmental impact, by system and technological innovation and demand restructure that contribute to constructing a low carbon society. Japan's leading and advanced technologies and systems can contribute to the global Green Economy.



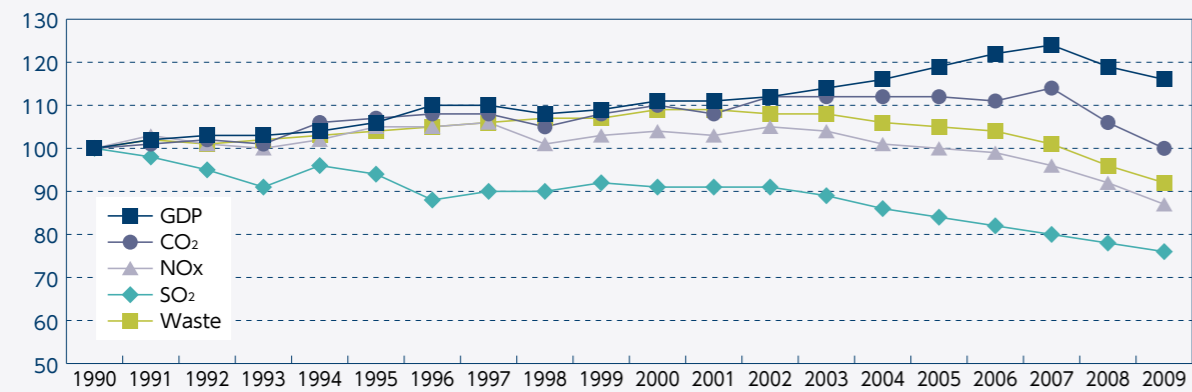
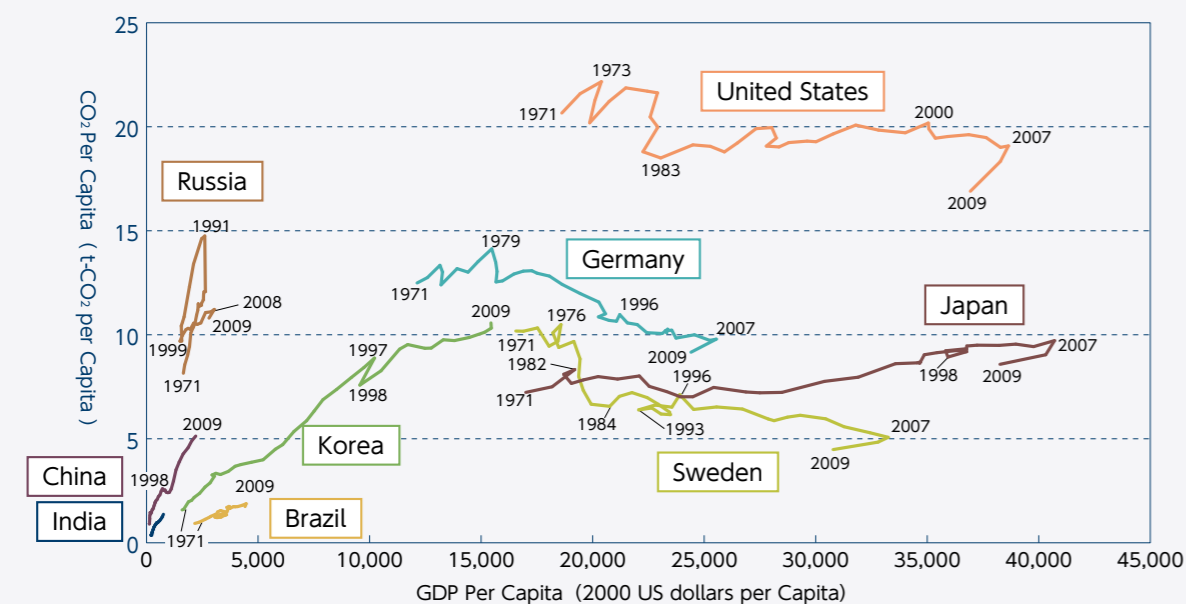
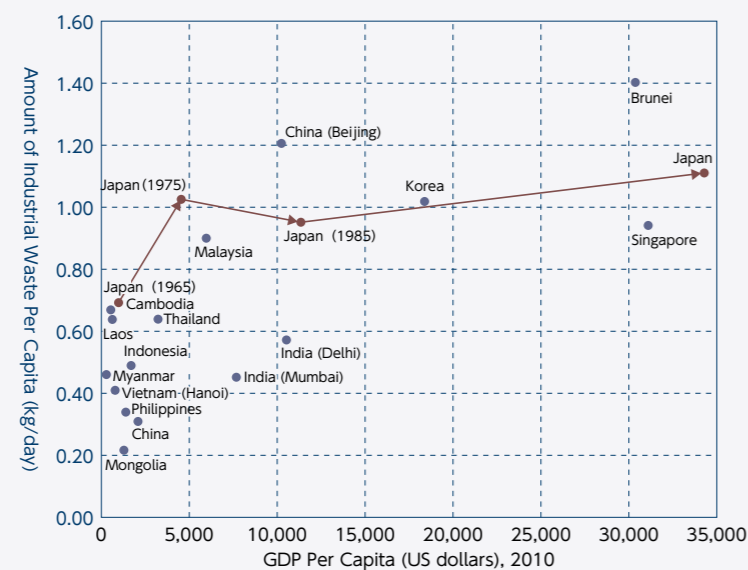
Figure 1-3-1 GDP Growth and Emissions of CO<sub>2</sub> or Other Substances with Environmental Impact (versus 1990 results)Figure 1-3-2 Economic Growth and CO<sub>2</sub> Emissions (1971-2009)

Figure 1-3-3 Relationship between the Amount of Industrial Waste Per Capita and GDP Per Capita



## 2 Use of Resources and Socioeconomic Activities

Human beings require a variety of natural resources, including fossil fuels, minerals, biomass, and water to survive. Knowing the resources is learning how much we rely upon the earth's resources and how effective our resource productivities are. This section gives an overview of changes in the total amount of resources put in socioeconomic activity, focusing on resource productivity, biodiversity, water and mining resources.

### (1) Resource Productivity and Material Flow

Our socioeconomic activities use a variety of resources (including fossil fuels, mineral, biomass, and water etc.), as well as producing, consuming, and disposing of materials. The flow of materials expressed in weight is known as material flow. Material flow is a key to understanding the total amount of natural resources used in socioeconomic activity and statistically locating material waste.

Reducing waste around us to conserve natural resources can be a critical goal in a sustainable society. To achieve this, it is essential to ensure that resources are effectively used, as well as to reduce the absolute quantity of input resources. How effectively resources are being used is assessed via resource productivity, which indicates the amount of economic value created per unit of resources. Resource productivity tends to be lower in countries that produce resources and higher in countries with an active service industry. In general, however, the efficiency of production activities is higher in countries with higher

resource productivity. Figure 1-3-4 shows that Japan has the world's highest resource productivity.

Figure 1-3-5 compares the growth rates of Japan's material flow and GDP using 1990 performance as an index. This figure shows more detailed information supporting the overall trend, and indicates that fossil fuel inputs increase as GDP grows, while mineral, biomass, and water resources inputs decrease. In looking at the details of the relationship between the reduction of the material volume input and socioeconomic activity, we see a significant reduction in nonmetallic mineral inputs and reduced

Figure 1-3-5 GDP and Material Flow in Japan

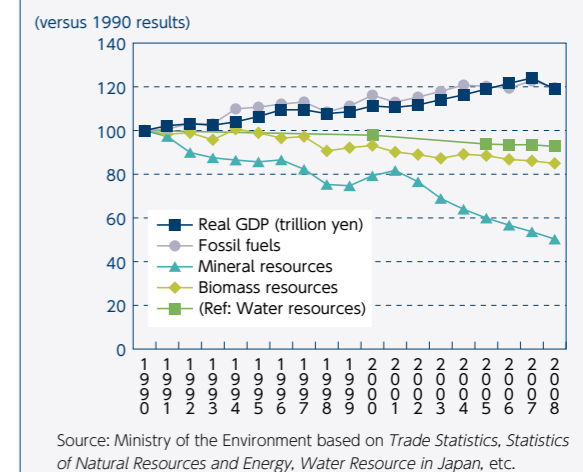


Figure 1-3-4 Resource Productivity of Major Countries (excl. non-metallic minerals)

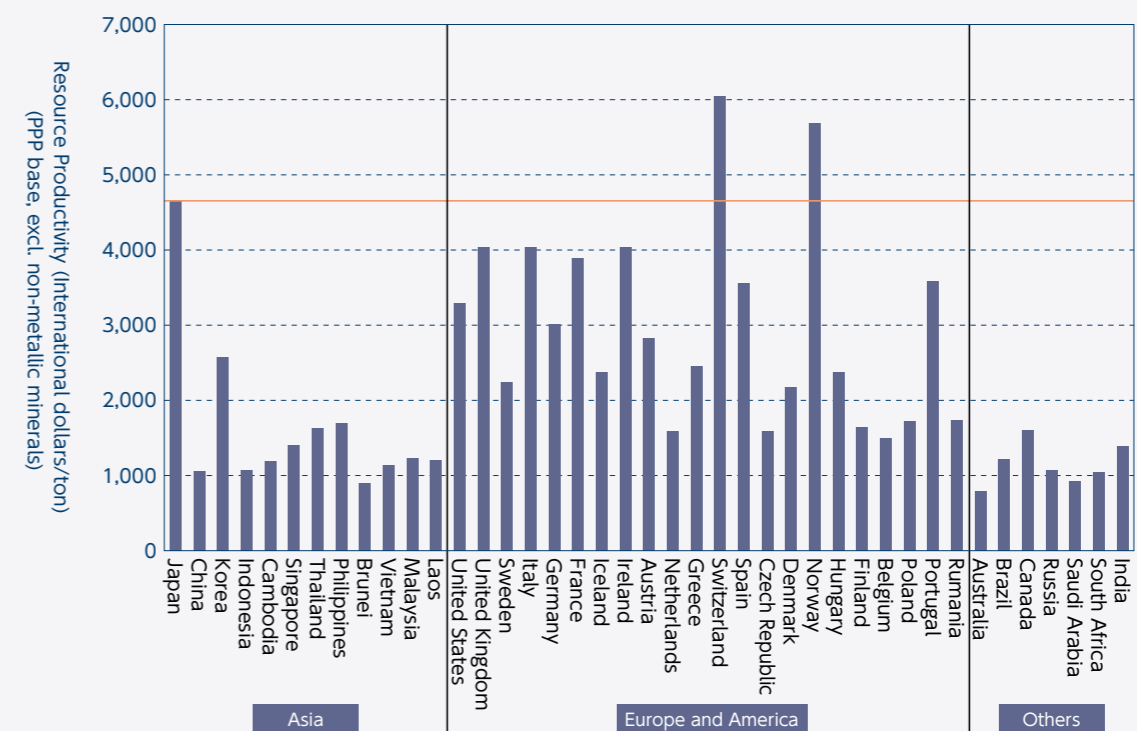
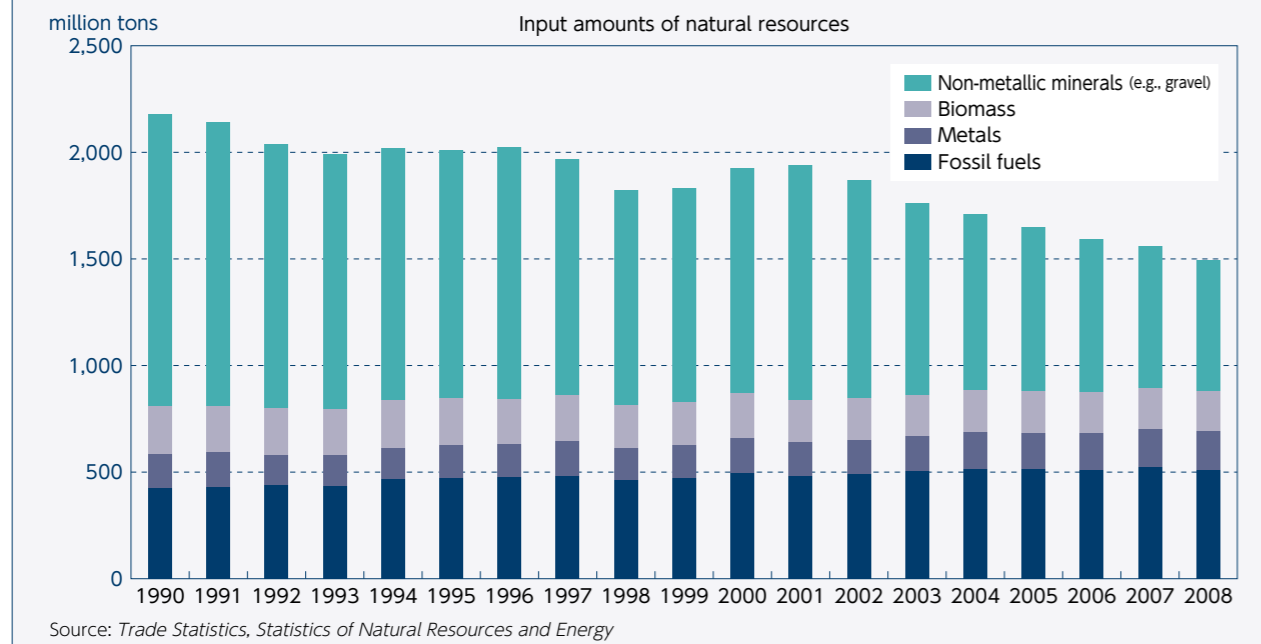


Figure 1-3-6 Input Amounts of Natural Resources in Japan



biomass inputs (such as wooden materials) (Figure 1-3-6). The most significant factor contributing to this reduction is constraints on new resource inputs due to sluggish social infrastructure investment in public works. In Japan, the material inputs to socioeconomic activities are decreasing while the consumption of energy derived from fossil fuels continues to grow.

## (2) Biodiversity and Socioeconomic Activities

### a) Species diversity as the basic unit of ecosystems

Biomass resources (forest resources, foods, fibers, pharmaceutical products, and so on) provided by ecosystem services are absolutely essential to our livelihood. Therefore, how we are able to use these biomass resources sustainably is one of the fundamental issues behind raising awareness of biodiversity loss and socioeconomic activity.

Issues related to biodiversity loss broadly include environmental, economic, and social problems, making it more difficult to obtain an overall picture of them. The problems associated with biodiversity are approached from three points of view: (1) ecosystem diversity; (2) species diversity; and (3) genetic diversity.

The second aspect, species diversity, means species of living organisms: one of the most fundamental components of an ecosystem. All living species take in nourishment from the place where they live, breed, and leave their offspring. Therefore, information on the habitats and population sizes of species is the most basic and critical point in understanding biodiversity issues. The following explains the global distribution of mammals and amphibians (Figure 1-3-7).

According to the International Union for Conservation

of Nature (IUCN), there are about 5,500 mammalian species and about 6,700 amphibian species on earth. Many mammals and amphibians are distributed in the tropical regions. The country with the largest number of mammals is Indonesia (about 670 species), followed by Brazil (about 650) and China (about 550); Japan is seventy-fourth in the world, with 144 species. In terms of amphibian species, Brazil has the largest number of species at about 800, followed by Colombia (about 710) and Ecuador (about 470); Japan ranks fifty-fourth, with 56 species.

For a deeper understanding of country-specific characteristics, one of the best approaches is to look at the distribution of endemic species by country. Since endemic species live exclusively in one country, there should be a strong relationship between those species and the country's ecosystem and geographic characteristics.

Madagascar has the largest proportion of endemic mammalian species in the world (81%), followed by Australia (71%) and the Philippines (55%). With 30% of its mammalian species being endemic, Japan is eighth in the world. In terms of the ratio of amphibian endemic species by country, island countries such as Jamaica and the Seychelles have a 100% endemic species ratio. Japan is ranked eleventh in the world in terms of amphibian endemic species (80%). As these figures show, Japan has a very high ratio of endemic species.

As seen above, maps can be viewed in different ways according to their focus: either the number of endemic species per country, or the ratio of endemic species per country. Focusing on the countries that have many endemic species seems to imply that the richness of a country's ecosystem diversity is due to the size of its national territory. Focusing on countries that have high ratio of endemic species seems to depend on the uniqueness of a country's

Figure 1-3-7 Global Distribution of Endemic Species of Mammals and Amphibians (No. of Endemic Species/Habitats by Countries)

