Chapter 1
Current Environmental Conditions of the Earth and Japan

Our daily lives and their supporting economic activities depend entirely upon the foundation of the earth's environment. Our living and economic activities cannot be sustained into the future if the wealth of the global environment is damaged. A stable climate, clear water and air, diverse ecosystems, and natural environments are vital for human health and cultured living. For humans to benefit from the global environment into the future, current environmental state must be well understood.

This chapter presents the state of the global environment surrounding us, with a compilation of specific data.

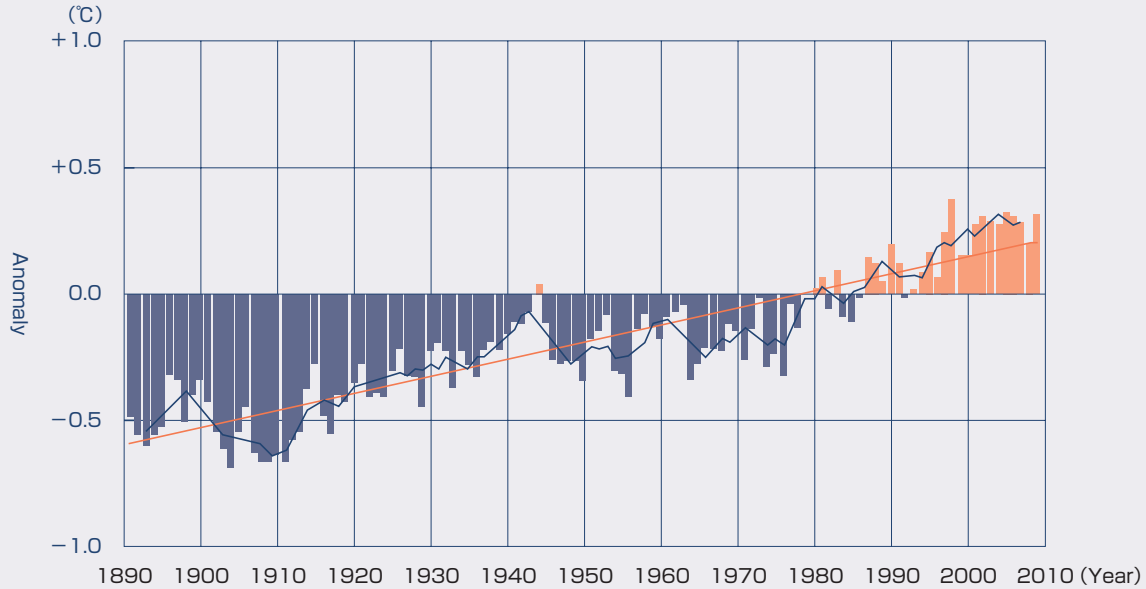
1 State of Global Warming

Advancing global warming can be perceived from the annual global average temperature anomalies. The annual global mean temperature in 2009 was 0.31℃ higher with reference to the 1971-2000 long-term average, and was the third highest since the first records were made in 1891 (Figure 1-1-1). Japan's temperature was 0.58℃ higher from the normal and was the seventh highest since the beginning of statistical record in 1898 (Figure 1-1-2). The global mean temperature increases with 100-year liner trend of 0.68℃, in particular, temperatures have rapidly increased since the mid-1990s. Every year since the beginning of the 2000s, except 2008, is ranked among the 10 warmest years when each of the years from the beginning of statistical record of the annual global mean temperature is sorted by their annual global mean temperature (Table 1-1-1).

Carbon dioxide is the most important driver as greenhouse gasses (GHG) that contribute to the global warming. Atmospheric concentrations of carbon dioxide and anthropogenic gas emissions are increasing constantly (Figure 1-1-3), and is considered to be one of the drivers that contributes to increasing global temperatures. The mean temperature increase in Japan was around 1.1℃ over 100 years. For the same period, data show mean temperature increase of around 3℃ in Tokyo, and in major cities such as Sapporo, Nagoya, Osaka and Fukuoka, around 2℃ or more. These temperature increase in urban areas are thought to be significant with additional impact of the heat island effect to the impact of the global warming (Figure 1-1-4).

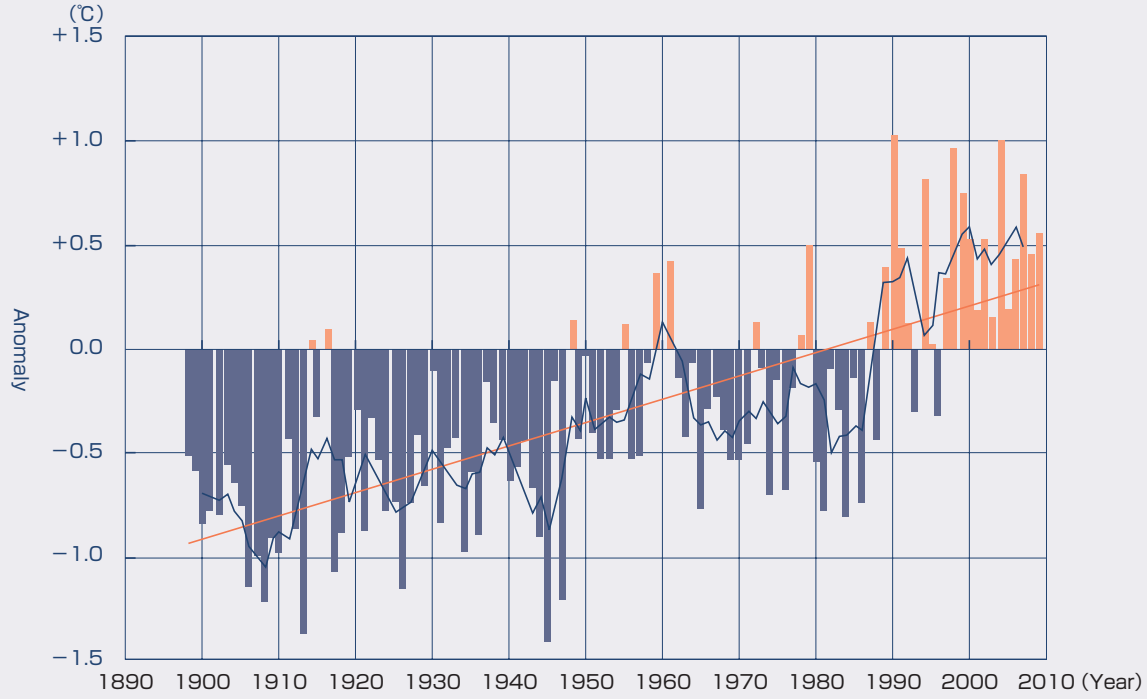
As an event that may reflect the impact of the global warming, the melt of ice sheet is suggested. Arctic sea

Figure 1-1-1 Annual Anomalies in Surface Temperature Globally



Note: The global annual mean temperature since 1891 based on o records observed with instruments. Anomalies are deviations from the normal (i.e. the 1971-2000 average). The bars indicate anomalies in surface temperature for each year. The blue line indicates five-year running means, and the red line indicates the long-term linear trend.
Source: Japan Meteorological Agency, 2009

Figure1-1-2 Annual Anomalies in Surface Temperature in Japan



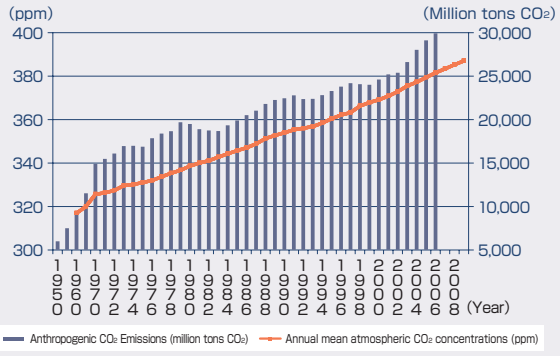
Note: Annual mean temperature using data from 17 stations in Japan. Anomalies are deviations from the normal (i.e. the 1971 – 2000 average). The bars indicate anomalies in surface temperature for each year. The blue line indicates five-year running means, and the red line indicates the long-term linear trend.
Source: Japan Meteorological Agency, 2009

Table1-1-1 Rankings of Global Annual Mean Temperature

Ranking	Year	anomaly℃
1	1998	+0.37
2	2005	+0.32
3	2009	+0.31
〃	2006	+0.31
〃	2003	+0.31
〃	2002	+0.31
7	2007	+0.28
8	2004	+0.27
〃	2001	+0.27
10	1997	+0.24
11	2008	+0.20
12	1990	+0.19
13	1995	+0.16

Source: Japan Meteorological Agency website

Figure1-1-3 Atmospheric CO_2 Concentrations and Anthropogenic CO_2 Emissions

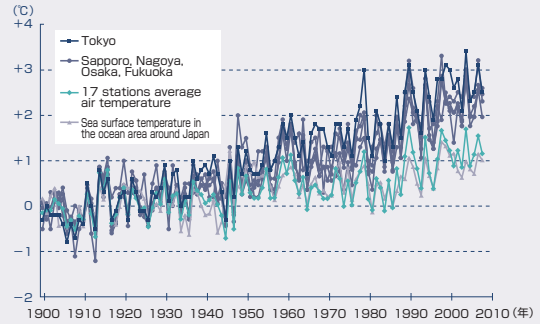


Note 1: Basic observation point: Mauna Loa Island, Hawaii (19º32' N, 155º35' W)
2: The annual mean concentrations are from Earth Systems Research Laboratory (ESRL) website, under the National Oceanic and Atmospheric Administration (NOAA)/United States (http://www.esrl.noaa.gov/gmd/ccgg/trends/)
3: ppm signifies 1 part per million in dry air (volume ratio)
Source: NOAA/ESRL, Oakridge National Laboratory, United States

ice extent is tend to reduce in recently, and in September 2007, the summer minimum sea ice extent is lowest in the instrumental record, according to the satellite observation. The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), released in 2007, states that satellite data since 1978 show that annual average Arctic sea ice extent has shrunk by 2.7 [2.1 to 3.3] % per decade, with larger decreases in summer of 7.4 [5.0 to 9.8] % per decade (Numbers in square brackets indicate a 90% uncertainty interval around a best estimate.) The report also indicates that some projections, arctic late-summer sea ice disappears almost entirely by the latter part of the 21st century. In addition, it states that there is medium confidence that at least partial deglaciation of the Greenland ice sheet, and possibly the West Antarctic ice sheet, would occur over a period of time ranging from centuries to millennia for a global average temperature increase of 1-4℃ (relative to 1990-2000), causing a contribution to sea-level rise of 4-6 m or more. Furthermore, a compendium by the United Nations Environmental Programme (UNEP) cites certain studies that suggested the faster timing of Arctic ice loss or the higher sea level rise than the projections shown in the IPCC AR4.

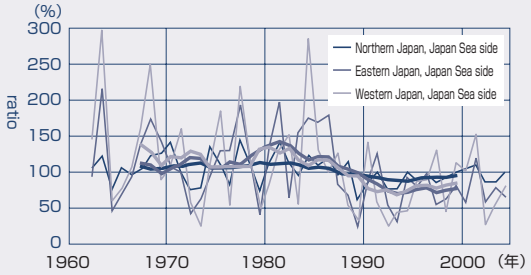
Recent snowfall patterns in some Japanese regions are

Figure1-1-4 Time series in temperature of large cities, 17-station average, and sea surface in the oceans area around Japan



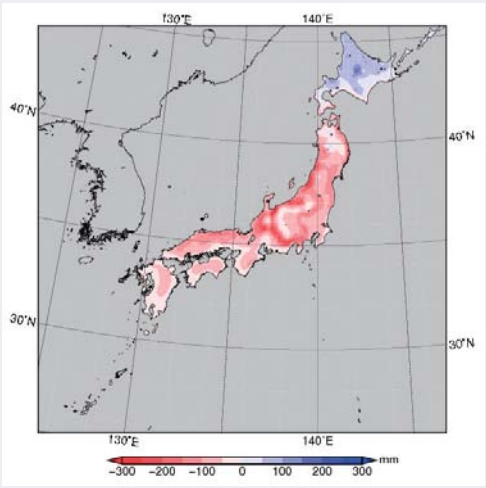
Note: Annual mean temperature in Japan is calculated from data of 17 stations. All values are annual average anomalies from the 30 year average from 1901 to 1930.
Source: Japan Meteorological Agency website

Figure1-1-5 Annual Maximum Snow Accumulation ratio to the normal (i.e. the 1971-2000)



Note: In each region, the thin line indicates the values for individual years and the thick line indicates the 11 year running mean value
Source: Report on Climate Change 2005 (Japan Meteorological Agency, 2005)

Figure1-1-6 Difference in the 20-year average of the amount of total snowfall in the cold season (December to March) from 2081 to 2100 and from 1981 to 2000.



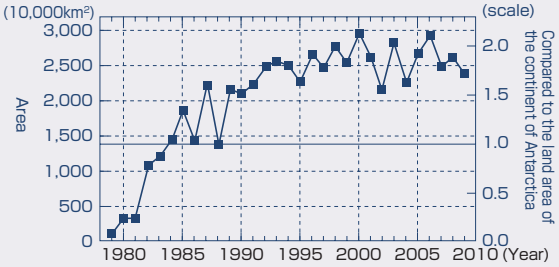
Note: The amount of total snowfall is converted into precipitation (mm). It is a projected result under the A1B scenario with coupled atmosphere-ocean regional climate models.
Sources: MEXT, Japan Meteorological Agency, Ministry of the Environment "Climate Change and its Impacts in Japan." (October, 2009)

changing. As shown in Figure 1-1-5, the annual maximum snow depth has significantly decreased until the beginning of the 1990s since the peak at the beginning of 1980s. Though slight upward trend is observed since then, it remains at levels much lower than those of the early 1980s. The long-term changes per decade in years between 1962 and 2004 exhibit an unmistakable downtrend in the Japan Sea side of northern, eastern, and western Japan, which declined 4.7%, 12.9%, and 18.3% respectively. The downtrend was significant for eastern and western Japan. This trend can be attributed mainly to the dramatic rise in mean winter temperatures from northern to western Japan since the mid-1980s.

Multiple causes underlie these changes in snowfall volume, including temperature increases stemming from global warming as well as long- and short-term climate changes. According to Volume 7 of the Global Warming Projection issued by the Japan Meteorological Agency, in a scenario where the temperature rises around 2.8℃ over the course of the current century, decreased regional snowfall volumes are predicted for all of Japan's regions except Hokkaiko (Figure 1-1-6). The causes include precipitation events in which rain falls instead of snow due to higher temperatures in the Tohoku region and southward. Hokkaido, in contrast, is cold enough for precipitation to continue to fall as snow even if the temperature rises, and its snowfall volume will increase because higher temperatures will result in greater levels of atmospheric water vapor.

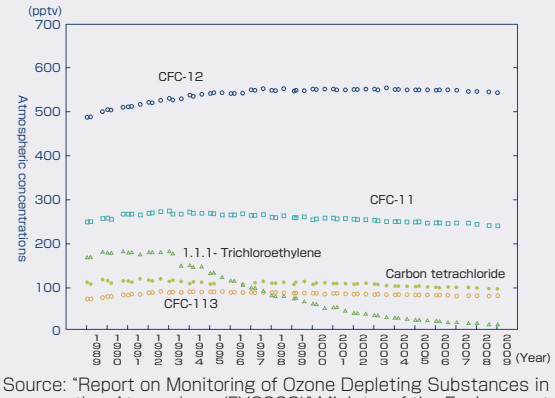
2 Statuses of the Global Environment, Atmosphere, Water, and Soil

Figure1-2-1 Chronological Changes of the Size of the Ozone Hole over the Antarctic Region



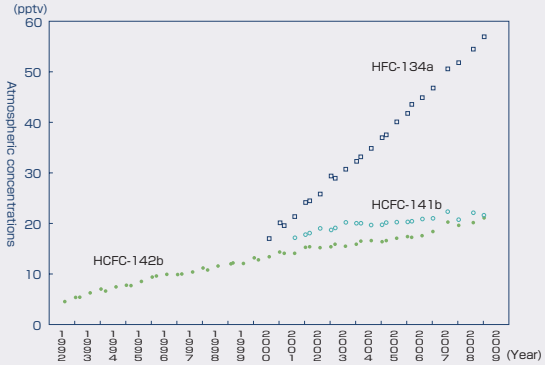
Note: Shows that annual maximum value of the ozone hole Area. The horizontal line is the land area of the continent of Antarctica (approximately 14 million km²).
The Japan Meteorological Agency produced this figure based on satellite data from the National Aeronautics and Space Administration (NASA) of the United States.
Source: Japan Meteorological Agency "Ozone Layer Observation Report: 2008"

Figure1-2-2 Changes in Average Atmospheric Concentrations of Ozone Depleting Substances in Hokkaido



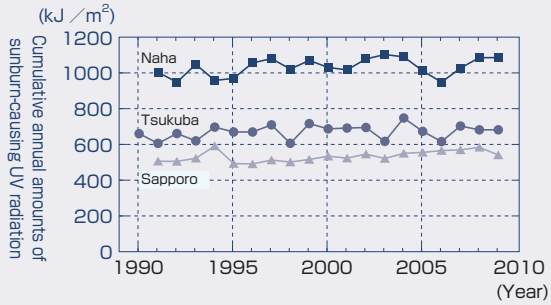
Source: "Report on Monitoring of Ozone Depleting Substances in the Atmosphere (FY2008)" Ministry of the Environment

Figure1-2-3 Changes in Past Year Atmospheric Concentrations of HCFC-141b, HCFC-142b, and HFC-134a in Hokkaido



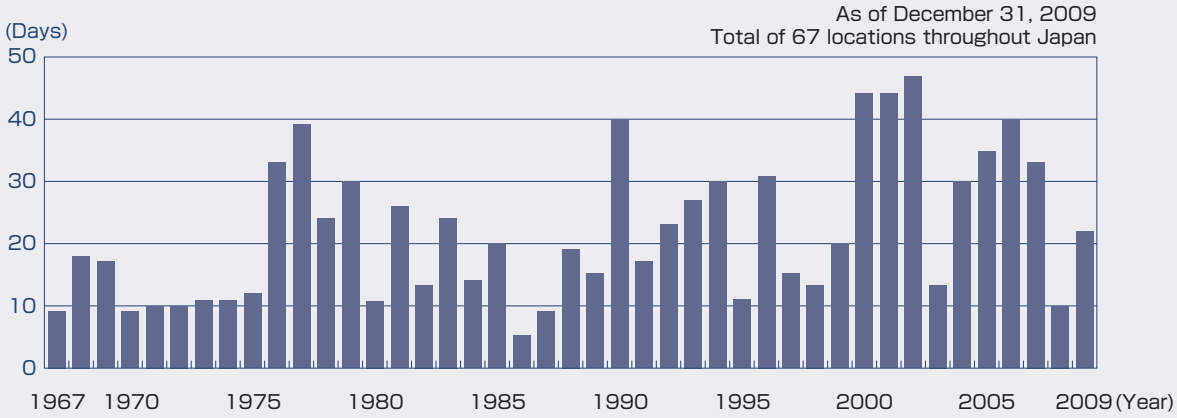
Source: Ministry of the Environment FY2008 Annual Survey of Observations of Fluorine and other Low -Volume Gasses that Impact the Ozone Layer

Figure1-2-4 Changes in Cumulative Annual Amounts of Sunburn-causing UV Radiation



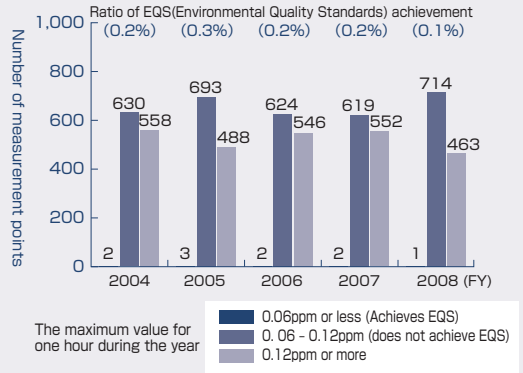
Note: Changes are from annual cumulative amounts of sunburn-causing UV radiation from the start of measurement until 2009.
The cumulative annual amount of sunburn-causing UV radiation was found by measuring the cumulative amount every day, finding the daily average for each month, then finding the daily average for the year, then multiplying by the number of days in a year.
Source: 2008 Ozone Layer Observations Report, Japan Meteorological Agency

Figure1-2-5 Number of days yellow dust was observed for individual years



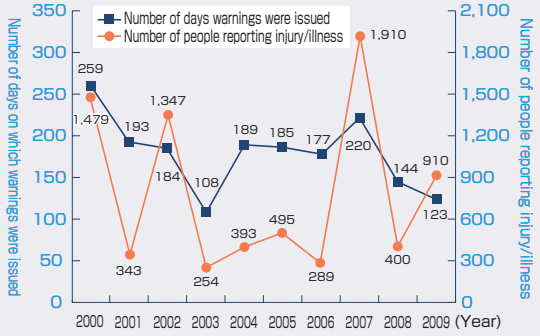
Source: Japan Meteorological Agency website

Figure1-2-6 Changes in Number of Stations Reporting Each Level of Photochemical Oxidant Concentrations (Total of Ambient Stations and Roadside Stations) (FY2004 to 2008)



Source: "FY2008 Air Pollutants Status Report" Ministry of the Environment

Figure1-2-7 Number Of Days on Which Warnings Were Issued and Number of People for Whom Injuries/Illnesses were Reported(From 2000 to 2009)

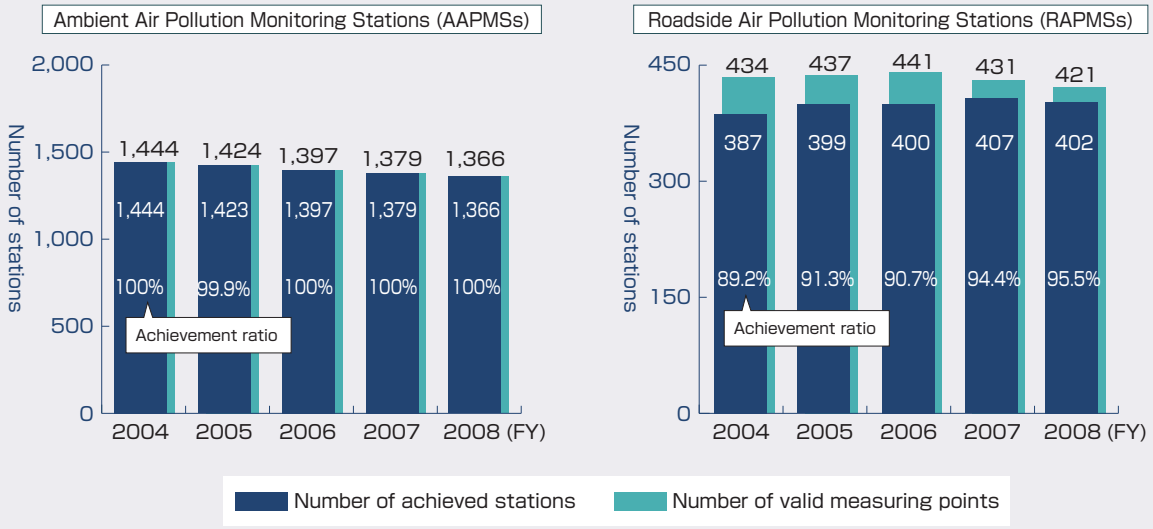


Source: "2009 Photochemical Air Pollutant Related Documents," Ministry of the Environment

In addition to global warming, the problems of ozone layer depletion, acid deposition, dust and sandstorms, ocean pollution, deforestation, desertification and the Antarctic are examples of global environmental problems. Changes in the size of the ozone hole in the Antarctic upper atmosphere indicate the degree of ozone layer depletion. Though the total volume of ozone-depleting substances is gradually declining in the stratosphere, thanks to government regulation, there is no current evidence of the ozone hole shrinking (Figure 1-2-1). Ozone-depleting substances are monitored in Japan. The results indicate that CFCs and other substances are either declining or holding steady, however, concentrations of HCFCs and HFCs are increasing rapidly (Figures 1-2-2, 1-2-3).

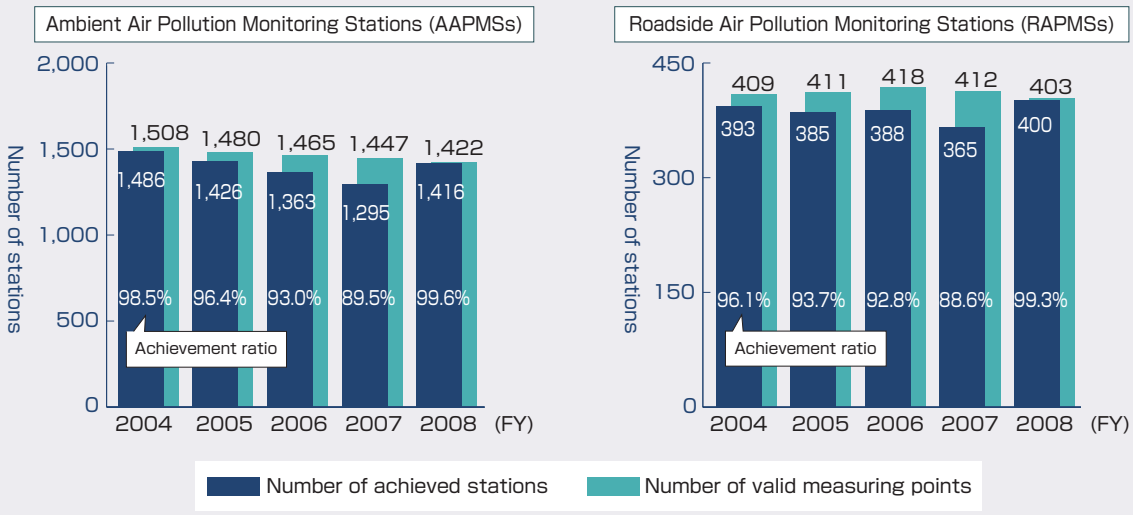
Ozone layer depletion is a concern because it can lead to an increase in harmful ultraviolet (UV) radiation at the surface. However, at present there are no reports of a pronounced increase in the amounts of UV radiation,

Figure1-2-8 Changes in Achievement of EQSs for Nitrogen Dioxide (FY2004 to 2008)



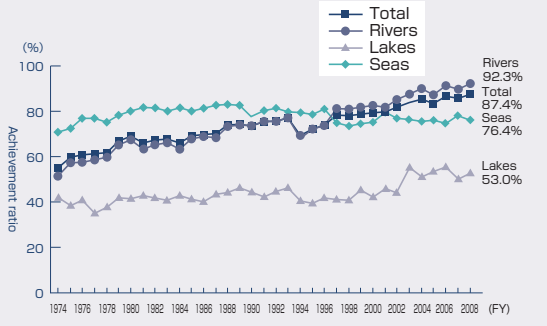
Source: "FY2008 Air Pollutant Status Report," Ministry of the Environment

Figure1-2-9 Changes in EQS Achievement Status for Suspended Particulate Matter (FY 2004 - 2008)



Source: "FY2008 Air Pollutant Status Report," Ministry of the Environment

Figure1-2-10 Changes in Achieving EQSs (BOD or COD)



Note 1: Rivers: BOD, Lakes and Seas: COD

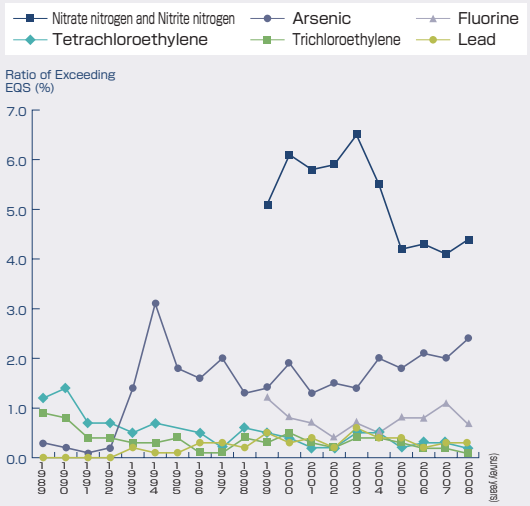
Note 2: Achievement rate (%) = $\left(\frac{\text{The number of water areas applicable}}{\text{The number of water areas achieving the standards}} \right) \times 100$

Source: "Measurement results of the quality of public water areas in FY2008," Ministry of the Environment

which can cause severe sunburn in humans (Figure 1-2-4). The problem of dust and sandstorms, also known as Asian dust, is increasingly frequent and harmful across the Northeast Asia. The number of days it was observed in Japan has increased in recent years, but the long-term trend remains unclear due to large annual variation (Figure 1-2-5).

Regarding Japan's air pollution status, constant monitoring were conducted at 1,549 Ambient Air Pollution Monitoring Stations ("AAPMSs") and at 438 Roadside Air Pollution Monitoring Stations ("RAPMSs"), in total 1,987 monitoring stations nationwide as of year-end FY2008. In FY2008, with regard to photochemical oxidants, one of the substances for which Environmental Quality Standards (EQS) have been set, achievement rate of EQS was very low (0.1% for AAPMSs and 0% for RAPMSs). Further countermeasures are required to address air pollution conditions (Figure

Figure1-2-11 Changes in Rates of Exceeding EQS for Ground Water Pollution(General Survey)



Note 1: The general survey is conducted by measuring different wells each year (they are not measuring the same wells every year)
2: The EQS for ground water pollution were established in 1997, and standards prior to that time were regarded as assessment standards. In addition, in 1993, the assessment standard for arsenic was reduced from "0.05mg/l or less" to "0.01mg/l or less" and the assessment standard for lead was reduced from "0.1mg/l or less" to "0.001mg/l or less."
3: Nitrate nitrogen, nitrite nitrogen, fluorine, and boron were added to the EQS in 1999.
4: This figure shows only the items that had relatively high rates of exceeding the EQS
Source: FY2008 Ground Water Quality Measurement Results," Ministry of the Environment

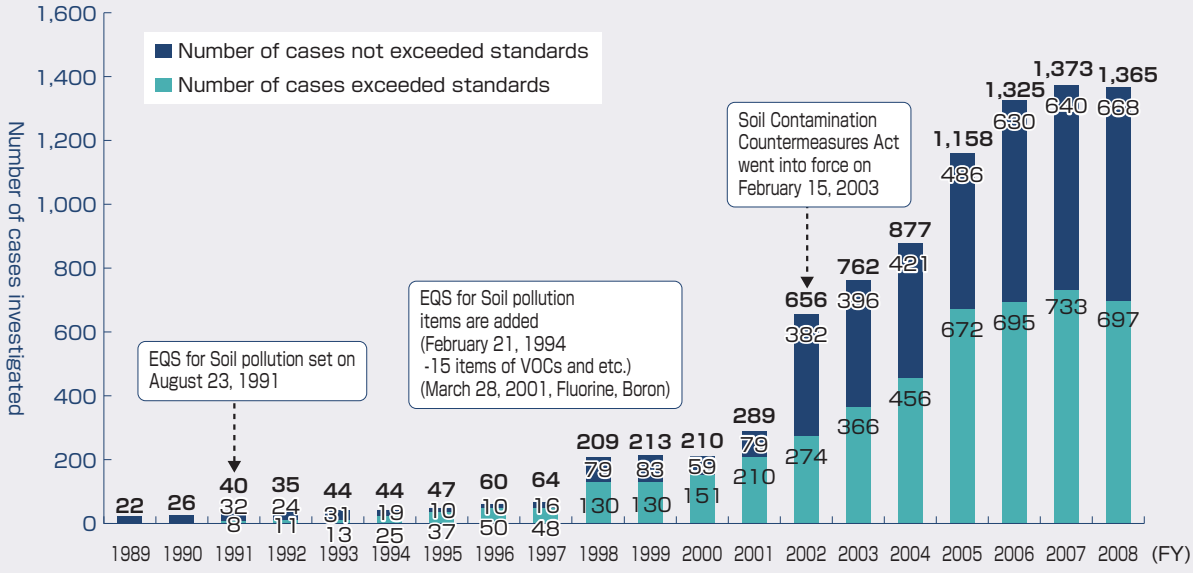
1-2-6). Photochemical oxidant alarm is issued when concentration of this substance exceeds EQS. This alarm was issued on 123 days in FY2009, slightly fewer than the 144 days in FY2008 (Figure 1-2-7).

In terms of nitrogen dioxide, EQS levels were achieved at almost all AAPMSs in recent years. In FY2006, FY2007 and FY2008, EQS levels were achieved at all AAPMSs and in 2008 EQS levels were achieved at 95.5% of RAPMSs (Figure 1-2-8). For suspended particulate matter, 99.6% of the AAPMSs and 99.3% of the RAPMSs met EQS levels. These values were improved compared to those of FY2007 (Figure 1-2-9).

Turning to the water environment, almost all points achieved EQS levels for substances related to human health protection (health items), from among the water pollution related EQS. But among the items pertaining to the living environment (living environment items), the EQS levels for chemical oxygen demand (COD) in lakes was achieved only 53.0% of the time. Due to conditions such as excessive organic matter, there still remain water areas with a low achievement rate (Figure 1-2-10). Furthermore, EQS levels for nitrate nitrogen and nitrite nitrogen are still often exceeded in groundwater (Figure 1-2-11).

Next, turning to the soil environment, in recent years there has been an increase in the number of verified soil contamination incidents. In FY2008, there were 697 verified incidents in which contamination exceeded EQS levels for soil pollution or the standards designated in the Soil Contamination Countermeasures Act (Act No. 53 of 2002) (Figure 1-2-12).

Figure1-2-12 Number of Verified Incidents of Soil Contamination for Individual Years



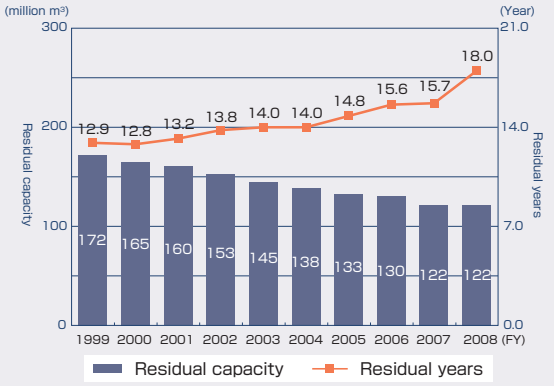
Source: "FY2008 Survey Results on Enforcement Status of Soil Contamination Countermeasures Act and Cases of Soil Contamination Status Survey and Countermeasures," Ministry of the Environment

3 Status of Waste Generation

Past socioeconomic activities based on mass production and mass consumption are thought to be linked to the resulting massive amounts of waste materials. Environmental protection and appropriate cycling of materials are critically needed.

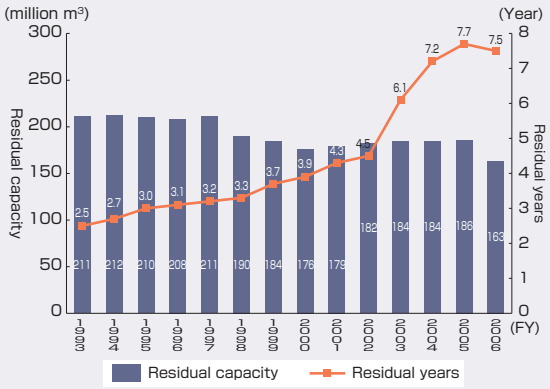
The residual years of final waste disposal sites, an important indicator of waste, stood at 18.0 years for municipal solid waste and at 7.5 years for industrial

Figure1-3-1 Changes in Residual Capacity and Residual Years at Final Disposal Sites(Municipal Solid Waste)



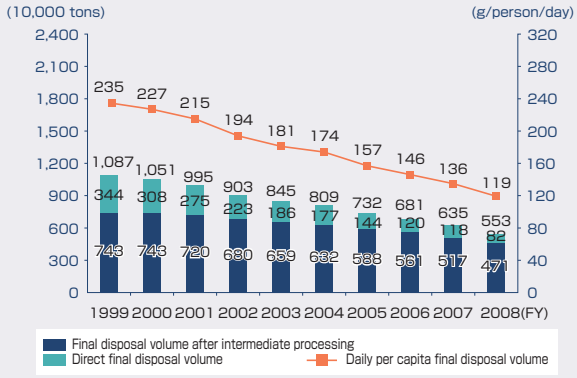
Source: Ministry of the Environment

Figure1-3-2 Changes in Residual Capacity and Residual Years in Final Disposal Sites (Industrial Waste)



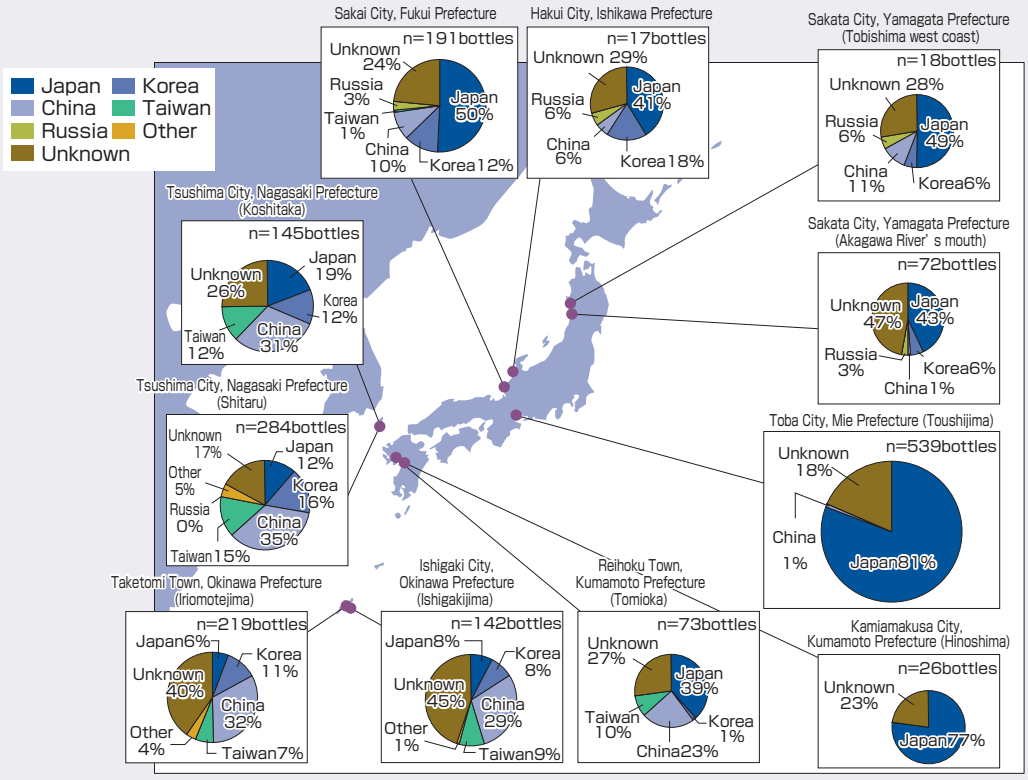
Source: Ministry of the Environment

Figure1-3-3 Changes in Final Disposal Volume and Daily per Capita Final Disposal Volume



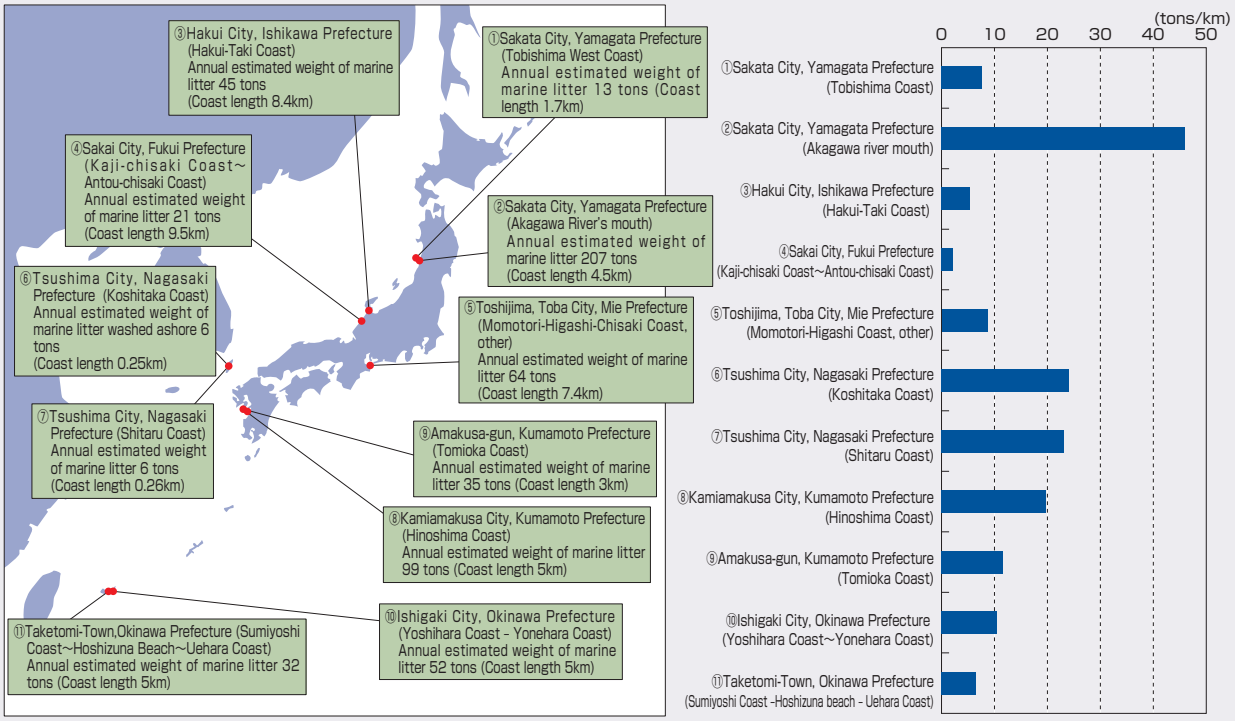
Source: Ministry of the Environment

Figure1-3-4 Country-Specific Aggregate of Plastic Bottle



Source: "FY2007, 2008 Surveys of Drifting and Marine Litter, and Japan Reduction Policy Model," Ministry of the Environment

Figure1-3-5 Annual Estimated Volumes of Marine Litter



Source: "Model Surveys in FY2007 · 2008 for Reducing Marine Litter in Japan," Ministry of the Environment

waste as of the end of FY2008, due to the growing difficulty of securing new disposal sites. The tough situation continues (Figures 1-3-1, 1-3-2).

About 5.53 million tons of municipal solid waste were deposited in final disposal sites in FY2008 (total of waste directly deposited in final disposal sites plus waste that underwent intermediate processing prior to disposal), and the final disposal volume was 119 grams per person per day (Figure 1-3-3). The per capita waste volume continues to decline.

To understand current situation of marine litter issue, which is a serious problem in coastal zone of Japan, a set of on-the-spot survey was conducted in 2007 and 2008 at model areas on 11 coasts in 7 prefectures nation wide. PET bottles collected by the surveys on Tsushima in Nagasaki prefecture, Ishigakijima and Iriomotejima islands in Okinawa prefecture, and other outlying islands were almost entirely of foreign origin, while half or more of the bottles found in other areas were from Japan (Figure 1-3-4). The litter characteristics varied by region. For example, plastic material comprised 30% to 40% of the litter found on the Japan Sea coasts, drift wood and brush comprised 70% to 90% in Yamagata, Mie, and Kumamoto prefectures, and a diverse mix was found in Okinawa prefecture. In addition, Figure 1-3-5 shows the estimated annual marine litter volume based on the marine litter surveys conducted throughout one year.

4 Statuses of Chemical Substances and Environmental Risks

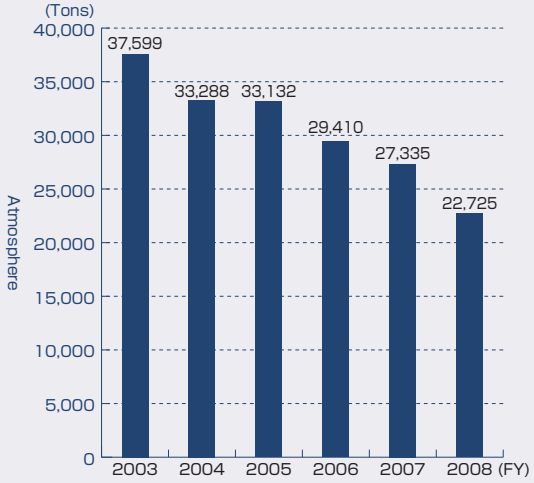
We are surrounded by various chemical substances and products containing chemical substances. They make our

Table1-4-1 FY2008 Hazardous Air Pollutants Environmental Quality Standards Achievement Status

Substance name	Number of monitoring points	Number of monitoring points exceeding EQS	Average value at all monitoring points (annual average value)	EQS (annual average value)
Benzene	451 [459]	1 [3] monitoring points	1.4 [1.5] $\mu g/m^3$	3 $\mu g/m^3$ or less
Trichloroethylene	399 [399]	0 [0] monitoring points	0.65 [0.76] $\mu g/m^3$	200 $\mu g/m^3$ or less
Tetrachloroethylene	399 [395]	0 [0] monitoring points	0.23 [0.25] $\mu g/m^3$	200 $\mu g/m^3$ or less
Dichloromethane	397 [402]	0 [0] monitoring points	2.3 [2.3] $\mu g/m^3$	150 $\mu g/m^3$ or less

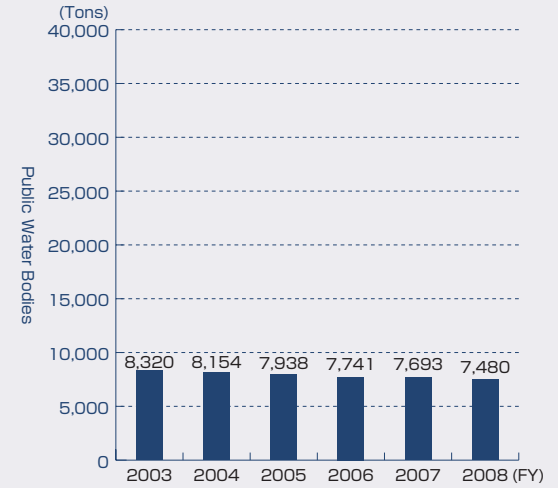
Note 1: The annual average value is the average of the measured values taken once a month, or at least 12 times per year
Note 2: Values in brackets [ ] are actual results from FY2007
Source: FY2008 Report on the State of Air Pollution (Hazardous Air Pollutants Monitoring Research Results), Ministry of the Environment

Figure1-4-1 Release Amounts into the Air of Substances for which EQS or Guideline Values were Set, from among Substances Subject to the Law for PRTR



Source: Produced by the Ministry of the Environment from PRTR (Pollutant Release and Transfer Register) Data Overview

Figure1-4-2 Release Amounts to Public Water Bodies of Substances for which EQS or Guideline Values were Set, from Among Substances Subject to the Law for PRTR



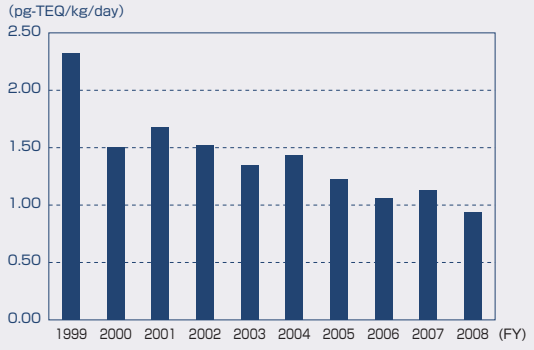
Source: Produced by the Ministry of the Environment from PRTR Data Overview

Table1-4-2 FY2007 Environmental Conditions Survey of Chemical Substances related to PCBs (Table of Detection Status)

Water (ng/L)	Sediments (ng/L)	Living organisms (ng/L)	Atmophere (ng/L)
0.18 [0.0029]	6.1 [0.0015]	8.47 [0.018]	0.16 [0.00013]

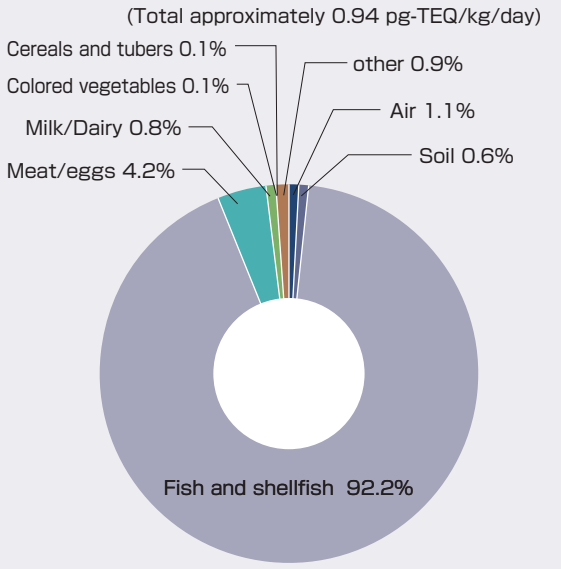
Note 1: Numeric values are rounded average values, and when the lower detection threshold is not reached, ½ of the lower detection threshold is used as the value for calculation
2: The values in brackets [ ] are the lower detection thresholds (total values of each homologue)
3: Shellfish, fish, and birds were taken in equal amounts
4: The air samples were taken half in warm season and half in the cold season
Source: FY2008 Edition "Chemical Substances and the Environment"

Figure1-4-3 Changes in Per Capita Daily Intake of Dioxins in Japan



Note: TEQ/kg/day was converted to daily per capita intake volume of dioxins per 1kg of body weight.
Source: Produced by the Ministry of the Environment from materials of the Ministry of Health, Labor, and Welfare and of the Ministry of the Environment

Figure1-4-4 Daily Per Capita Dioxin Intake Volume in Japan (FY 2008)



Source: Produced by the Ministry of the Environment from materials of the Ministry of Health, Labor, and Welfare and of the Ministry of the Environment

lives convenient. However, because some chemical substances are harmful to human health or ecosystems, the environmental risk (possible interference with environmental conservation) of chemical substances must be associated and appropriate measures must be taken.

The FY2008 Hazardous Air Pollutants Monitoring Research results are listed in Table 1-4-1. The table shows the annual average value, the numbers of monitoring points exceeding Environmental Quality Standards (EQS) values, for four substances whose EQS values are set. With regard to Benzene, the results of monitoring at only 1 monitoring point exceeded EQS values (in FY2007 the number of monitoring points at which the results exceeded EQS values were 3). Regarding other three substances, monitoring results at all monitoring points met the EQS in 2007 and 2008.

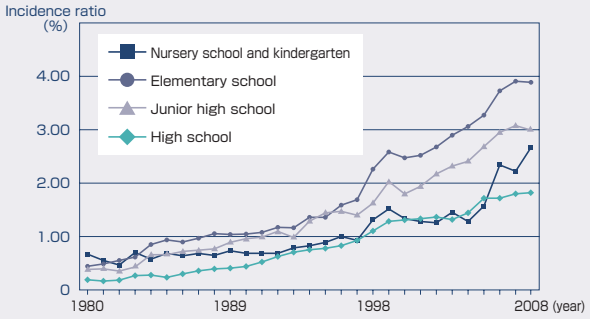
As for the release amounts of chemical substances, a total of around 22,700 tons of specific substances were released into the air in FY2008, which represents a declining trend (Figure 1-4-1). These substances are those for which environmental quality standards or guideline values were set, from among the substances subject to the law for PRTR (Pollutant Release and Transfer Register) (Act No.86 of 1999). The same year, release amounts of such substances into the public water bodies totaled about 7,500 tons, continuing the previous downward trend (Figure 1-4-2).

The manufacture, import, and use of high environmental risk substances are banned. PCBs are one example among them. It has an environmental concentration of the equivalent of 0.18 ng/L in water (Table 1-4-2). From the

findings of the FY2008 survey, it is estimated that the average dioxins intake from food and the environment per capita per day is around 0.94pg-TEQ per 1kg of body weight. This numeric value is not far removed (in terms of g/L) from the declining trend of previous years, and is less than the tolerable daily intake (Figures 1-4-3, 1-4-4).

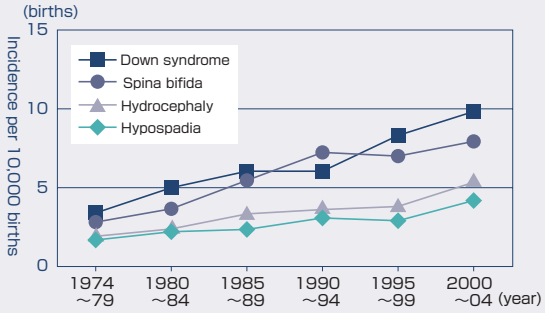
The deterioration in children's health in various countries has been reported in recent years (Figure 1-4-5, 1-4-6). In an ongoing effort, investigators are attempting to establish a clear relationship between health and the surrounding environmental conditions. In Japan, the Japan Environment & Children's Study was officially launched in FY2010 to survey and track children continuously from birth to age around 13 in an attempt to prevent environmental factors from adversely impacting children's health.

Figure1-4-5 Changes in Asthma Incidence among Japanese Children



Source: "School Health Statistics" published by the Ministry of Education, Culture, Sports, Science and Technology, "MEXT")

Figure1-4-6 Changes in Birth Defects Incidence in Japan



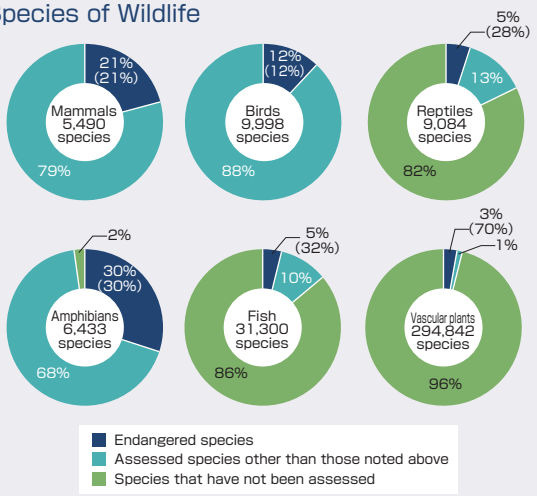
Source: International Clearinghouse for Birth Defects Surveillance and Research(ICBDSR)

5 Status of Biodiversity

(1) Status of Global Biodiversity

It is said that the earth holds around 30 million species of living organisms, including those unknown to science. Among them, we know only around 1.75 million. The Red List of threatened species published in November, 2009 by the International Union for the Conservation of Nature (IUCN) shows that 17,291 species out of the 47,677 assessed species of wildlife, or around 36% of the total species evaluated, are identified as endangered

Figure1-5-1 Global Proportion of Endangered Species of Wildlife



Note 1: Endangered species are designated as Critically Endangered (CR), Endangered (EN), or Vulnerable (VU).
2: The center of each round graphs is the already-known number of species in each individual taxonomic group
3: In parentheses is percentage of endangered species within the number of assessed species
4: Vascular plants are a total of the ferns, gymnosperms, and angiosperms that appear in the IUCN Red List categories.

Source: Produced by the Ministry of the Environment from the IUCN "Red List 2009"

Figure1-5-2 Trends shown by agreed indicators of progress towards the 2010 Biodiversity Target in the Global Biodiversity Overview, Third Edition (GBO-3)

Priority areas	Headline indicators	Indicator changes
Status and trends of the components of biological diversity	Trends in extent of selected biomes, ecosystems, and habitats	↙
	Trends in abundance and distribution of selected species	↙
	Changes in status of threatened species	↙
	Trends in genetic diversity in domesticated animals, cultivated plants, and fish species of major socio-economic importance	↙
	Coverage of specified protected areas	↗
Ecosystem integrity and ecosystem goods and services	Marine Trophic Index	↕
	Connectivity-fragmentation of ecosystems	↙
	Water quality of aquatic ecosystems	↕
Threats to biodiversity	Nitrogen deposition	↗
	Trends in invasive alien species	↗
Sustainable use	Area of forest, agricultural and aquaculture ecosystems under sustainable management	↕
	Ecological footprint and related concepts	↗
Status of traditional knowledge, innovations and practices	Status and trends of linguistic diversity and number of speakers of indigenous languages	↙
Status of access and benefit sharing	Indicator of Access and benefit sharing to be developed	?
Status of resources transfers	Official development assistance (ODA) provided in support of the Convention	↗

↙↗ : Negative changes
↗ : Positive changes
↕ : No clear global trend. Positive and negative changes are occurring depending on the region or biome considered
? : Insufficient information to reach a definitive conclusion

Source: Produced by the Ministry of the Environment from the "Global Biodiversity Outlook" (GBO-3) published by the Secretariat of the Convention on Biological Diversity

species. Among them, amphibians, mammals, and birds, for which evaluations are relatively advanced when compared to other taxa, comprise 30%, 21%, and 12% respectively of the endangered species (Figure 1-5-1).

The Global Biodiversity Outlook 3 (GBO-3) published by the Secretariat of the Convention on Biological Diversity (CBD) in May, 2010, concluded that the "2010 Biodiversity Target" of the CBD, adopted at the 6th meeting of the Conference of the Parties (COP6) to the CBD, namely, "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global" had not been achieved (Figure 1-5-2). In addition, GBO-3 points out that ongoing habitat changes, overfishing, indiscriminate development, pollution, invasive alien species, and the effects of climate change contribute to tropical forest reduction, lake and marsh eutrophication, ocean temperature rises, and fishery resource overfishing, and that these will threaten human existence in the future.

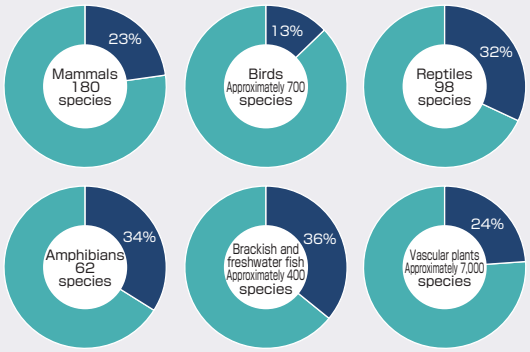
(2) Status of Biodiversity in Japan

Japan is bounded on all sides by water, and consists of an archipelago of over 6,800 islands. Japan's land area totals around 380,000km^2 and coastline measures around 35,000km, a length nearly 90% of the earth's circumference. Another of Japan's unique features is its complex topography from the sea coast up through its mountainous regions. The entire country is blessed with abundant precipitation and most of its regions have four seasons. Numerous and diverse climate zones, from subarctic to subtropical, exist along Japan's 3,000km north-south length and its 3,800m elevation differential. The diverse natural environments harbor around 90,000 species of wildlife, and around 40% of land mammals and 80% of amphibians have been confirmed as native to Japan. According to the Ministry of the Environment's Red List, 3,155 endangered species are listed. Over 30% of the reptile, amphibian, brackish and freshwater fish, and shellfish species in Japan, over 20% of the mammal and vascular plant species, and over 10% of the bird species are endangered (Figure 1-5-3).

The Japan Biodiversity Outlook issued in May, 2010, by the Ministry of the Environment's Japan "Biodiversity Outlook Science Committee" assessed the condition of Japan's biodiversity over the past 50 years, and found that biodiversity loss extends to all ecosystems and that the trend is continuing even today. In particular, the biodiversity of rivers, lakes and marshes, seacoasts, maritime environments, and islands has been greatly lost over these 50 years, and there is a risk that today's ongoing impacts will become irreversible in the future (Table 1-5-1).

One primary cause of widespread species loss was the impact of the "First Crisis" (development, direct use, and water pollution)" midway during the period of rapid development that occurred from the 1950s through the 1970s, although the rate of species loss has slowed somewhat at present. On the other hand, the "Second Crisis" (diminished use and management of Satochi-Satoyama (rural landscapes)) is now softly having a widespread impact. In addition, during the currently unfolding "Third Crisis" (alien species and chemical substances), the impact of alien species has become notable. Finally, the threats of global warning are of particular concern for high mountains, coral reefs, and islands.

Figure 1-5-3 Proportion of Endangered Species of Wildlife in Japan (Ratio of Species Assessed)



Note 1: The center of each round graph contains the number of species (including subspecies) assessed from that taxonomic group according to "A List of Wildlife Species in Japan" edited by the Environment Agency in 1993, 1995, and 1998
Note 2: Vascular plants are the total number of species assessed by the Japanese Society for Plant Systematics
Source: Ministry of the Environment

Table 1-5-1 Japan's Losses of Biodiversity from the Latter Half of the 1950s through 2010

	Loss status and trends		Drivers of losses (magnitude of impact) and current trends			
	Degree of losses from original ecosystems	Degree of losses relative to conditions in the latter half of the 1950s, and current trends	First crisis: Development, direct use, and water pollution	Second crisis: Diminished use and management	Third crisis: Invasive alien species and chemical compounds	Crisis of Climate Change
Forest ecosystems	■	→	◔	◔	◔	◔※
Agricultural ecosystems	–	↘	◔	◔	◔	◔
Urban ecosystems	–	→	◔	–	◔	◔
Inland water ecosystems	■	↘	●	◔	●※	◔
Marine and coastal ecosystems	■	↘	●	–	◔※	◔
Island ecosystems	■	↘	●	–	●	◔

Assessment targets		Legend			
States	Size of current losses	Not lost	Not significantly lost	Lost	Significantly lost
	Trends of current losses	Recovering ↗	Holding steady →	Being lost ↘	Being rapidly lost ↓
Drivers	Magnitude of the impact during assessment period	Weak ○	Moderate ◔	Strong ◔	Very strong ●
	Current trends of the driver's impact	Decreasing ↖	Holding steady ←	Increasing ↙	Increasing rapidly ↓

Note 1: A dotted line indicates there is insufficient data to assess the magnitude of the impact
2:※indicates that the factors and data used to assess each indicator are complex. Therefore, it is particularly necessary to bear in mind that there exist some factors and data contrary to the overall impact, size of losses, and trends assessment.
Source: "Japan Biodiversity Outlook" produced by the Japan Biodiversity Outlook Science Committee