“Our Future and Biodiversity”
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The current state of biodiversity and how it will be improved in the near future holds key to the future of humanity.

I will discuss the reasoning behind this notion in details later, in the second part of this symposium. Here, let me outline the results of a comprehensive biodiversity assessment, known as the “Japan Biodiversity Outlook,” in order to share the understanding of the “current state of biodiversity” in Japan, which seriously impacts our lives, as well as the lives of our children and grandchildren, whether directly or indirectly. Results of an international biodiversity assessment can be found in the third edition of the Global Biodiversity Outlook (GBO 3), issued in May 2010 by the Secretariat of the Convention on Biological Diversity. GBO 3 assesses how the 2010 target has been achieved, which is the central theme of the 10th meeting of the Conference of the Parties to the Convention on Biological Diversity, and concludes that the world has failed to meet this target, as already reported by the mass media.

Japan is one of the 34 biodiversity hotspots that have been identified worldwide. In this light, conservation of biodiversity in Japan has international significance. A biodiversity hotspot refers to a region that is originally rich in biological diversity and endemic species but that is now exposed to a serious threat of the loss of such diversity. Such original richness in diversity is normally dependent on local geohistorical and natural conditions, but in the case of Japan, the tradition of wet-paddy rice agriculture and the rural lifestyle, which rely on a secondary natural environment known as “satochi-satoyama,” or simply “satoyama”, as well as the way the land has been used for agricultural purpose, have also contributed to the area’s richness.

The Japan Biodiversity Outlook (JBO; http://www.biodic.go.jp/biodiversity/) is a comprehensive assessment conducted to identify the current state of biodiversity in Japan. Assessment was undertaken by the JBO Science Committee established by the Ministry of the Environment of Japan, and the results of the assessment were made public in a JBO report issued in May 2010. The JBO assessment covered the period from the late 1950s to the present and examined the drivers of biodiversity loss (the severity of impacts) and the state of biodiversity itself (the severity of loss) using 30 indicators.

While drivers of biodiversity loss are classified into “three crises” and the “global warming crisis” under the 2010 National Biodiversity Strategy, in the comprehensive assessment, as well, drivers of biodiversity loss are divided into “the first crisis” (development and environmental alteration, direct use, water pollution), “the second crisis” (reduction in human activities in satochi-satoyama areas), “the third crisis” (alien species, chemicals), and the “global warming crisis.” Meanwhile, the Japanese ecosystems
are divided into six types: "Forest and Mountain Systems," "Cultivated Systems," "Urban Systems," "Inland Water Systems," "Marine and Coastal Systems," and "Island Systems." Because of the lack of sufficient data, expert opinions on wildlife and ecosystems were widely sought to ensure assessment would be made objectively from a scientific viewpoint.

Among the drivers of biodiversity loss, the report concludes that "the first crisis," especially, "development and environmental alteration," has resulted in the most serious impact to biodiversity, which is evidenced by the evaluation of the relative severity of crisis factors affecting endangered species in each category. A typical case of "the second crisis" (reduction in human activities in satochi-satoyama areas) is the decline in utilization and management of grasslands, which has led to the extinction of plant and insect species. The most noticeable regarding "the third crisis" (alien species, chemicals) is the expansion of invasive alien species, which is rapidly becoming a serious concern. Though various measures have been taken in response to these crises, the report concludes that these measures have had only limited effects. This is because resources allocated to these measures have proven insufficient, in light of the sheer size of the socioeconomic activities that are indirectly responsible for biodiversity loss.

The JBO assessment also covers biodiversity in marine environments, though less data is available than that regarding terrestrial biodiversity. Japan has a high concentration of population and industry along its coastal areas, and for this reason, coastal ecosystems have suffered huge damage since the beginning of Japan's rapid economic growth period. Development and environmental alteration by means of reclamation, dredging, marine sand and gravel extraction, and the construction of buildings has led to a significant loss of tidal flats, seaweed beds, coral reefs, and natural coastlines, which had provided various shallow-water habitats. Shallow marine areas were reclaimed by about 40 km² annually during the rapid economic growth period from the late 1950s to around 1980, and the volume of marine sand and gravel extracted between the 1970s and the late 1990s amounted to about 70 million to 90 million tons or more a year. Since 1990, reclaimed land and the volume of marine sand and gravel removed were reduced to around 10 km² and less than 40 million tons a year, respectively, but environmental alteration in coastal areas still continues.

Due to repeated extraction of marine sand and gravel, the Seto Inland Sea, Ariake Sea, and Yatsushiro Sea have lost many of the sand banks that had been formed by tidal currents in shallow waters and that had provided ideal habitats for finless porpoises and lancelets. Presumably, such marine sand and gravel extraction also resulted in: the reduction of zostera beds, the occurrence of oxygen-deficient water, and the deterioration of the habitats for marine benthic organisms.

The conclusions of the JBO report can be summarized as follows.
1. In Japan, the loss of biodiversity resulting from human activities has now extended to all ecosystems and is still continuing.
2. The loss is especially large in Inland Water Systems, Marine and Coastal Systems, and
Island Systems.

3. The most prominent driver of biodiversity loss is “the first crisis,” especially development and environmental alteration. “The second crisis” continues to grow, while the impacts of alien species have become increasingly noticeable among the factors of “the third crisis.” Concern is also growing over the impacts of the “global warming crisis,” especially on some fragile ecosystems. While various measures have been taken to cope with these crises, such measures have failed to achieve substantial results, obstructed by the drastic change in Japan’s socioeconomic situation, which is indirectly responsible for such biodiversity loss.

4. Today’s material affluence and the convenience that Japanese society enjoys have been achieved only through the loss of domestic biodiversity over the past 50 years and the required introduction of ecological services from overseas. Further biodiversity loss seems inevitable even after 2010, in light of the likelihood that: the impacts of past development and environmental alteration will continue to affect biodiversity (the first crisis), the decline in the use and management of satochi-satoyama areas will be further accelerated (the second crisis), that some alien species will become more prevalent and widespread (the third crisis), and that global warming will become more apparent (the global warming crisis). In this sense, more effective measures should be devised, while also taking into consideration indirect drivers as well.

5. It is feared that further loss of some of the biodiversity in Inland Water Systems, Island Systems, and Coastal Systems may bring about irreversible changes and other severe damage.

The process of conducting a comprehensive assessment has revealed a conspicuous lack of data on the states of individual species. Biodiversity monitoring to collect detailed data on a nationwide basis requires, among other things, civil participation. Thus, biodiversity monitoring by citizens themselves conducted in a manner that allows them to enjoy in-depth interaction with living organisms is one of the most effective approaches that can put the brakes on biodiversity loss and forge the way to a brighter future.