Conference Outline

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Biodiversity is the source of various ecosystem services we need, and also is a treasure house of enormous useful wisdom and strategies having been accumulated through 400 million years of continuation and evolution of life, which can provide us deep insights and/or practical methods to solve any challenge we will face. However, biodiversity loss is continuing or even has been accelerated at every level, spatially from local to global, and hierarchically from gene to ecosystem. Different from the past five mass extinctions, this sixth mass extinction event we are now facing is mainly ascribed to the activities of our own species *Homo sapiens,* being overwhelmingly dominant on the current globe. Comprehensive measures are needed to deal with this crisis of the Earth's life support systems, since it is likely to be the most serious among various difficult crises we face, especially from the long-term perspective.

We, the Science Council of Japan, has chosen "Conservation and Sustainable Use of Biodiversity" as this year's theme for the "Sustainability Conference", since this year is the International Year of Biodiversity (IYB) declared by the United Nations, and 10th Conference of the Parties to the Convention on Biological Diversity (COP 10) was to be held in Nagoya in last October.

In the COP 10, parties of the convention successfully established a new strategic plan including 20 targets to be completed by 2020, after admitting the failure in the achievement of "2010 Target," that is, "to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth."

In order to successfully implement 20 targets of the strategic plan, named "Aichi Target", which are not only more realistic but also more ambitious than the 2010 Target, enormous efforts and collaboration of various sectors, and also significant scientific endeavor will be required. Especially, in order to lessening the anxiety about irreversible dramatic changes of biodiversity and ecosystem services, we have to gain a better understanding of tipping points to reduce the uncertainty of prediction.

The information sharing on ecosystem services is likely to be important, in order to stimulate economic and/or social interests affecting decisions. On the other hand, involvement of a wide range of academic communities is needed to evaluate full spectrum of values of biodiversity.

Global climate change is already having significant effects on ecosystems and human societies. Near-future increase in the impacts is scientifically predicted and policies to lessen the impacts are being extensively discussed at international and national levels. As counter-measures to mitigate climate change, high priority should be given to conservation and restoration of forests, wetlands, soils, and oceans, which retain enormous organic carbon pools. Protecting ecosystems such as tropical rain forests or wetlands with rich biodiversity and high carbon storage capacity is a win-win policy option, since the conservation not only decreases both the rate and magnitude of climate change, but will also mitigate biodiversity loss. On the implementation of the policy to adapt to climate change, full consideration is needed to be given for preventing biodiversity loss. Considering the high capability of riparian and coastal vegetation such as mangrove forests to protect human communities from natural disasters by providing physical barriers, conservation and restoration of natural vegetation are assumed to be effective measures to adapt climate change. Counter-measures against climate change and conservation and sustainable use of biodiversity have to be planned and implemented in mutually synergistic manners. Scientific investigation for designing such synergies based on the understanding the inter-linkage between these systems is urgently needed.

As for speed of change, artificial alteration of nitrogen cycle far surpasses that of carbon cycle leading to global climate change. Agricultural input of enormous amount of nitrogen fertilizer produced by industrial fixation of atmospheric nitrogen has increased biologically active nitrogen of the globe more than twice during recent half a century. Together with phosphor increased also through fertilizer application, excessive amount of active nitrogen results in extensive eutrophication leading to drastic impairment of aquatic ecosystems including rivers, lakes, inland seas, and coastal waters through exhaustion of oxygen, leading to loss of biodiversity and ecosystem services.

Development of agricultural lands at the cost of natural forests and wetlands, modern farming as high chemical-input monoculture, and expanding the effects of invasive alien species have been compounded to cause decrease and/or extinction of native species, and to render ecosystems less stable and less resilient. Extensively uniform selective pressures resulting in rapid evolution of chemical-resistant pests and pathogens, as well as mass

extinction, make our time an extraordinary point along global history of life. In order to secure our life-supporting system, business-as-usual methods or techniques have to be replaced by innovative sustainable ones with biodiversity as tools and indicators. New integrative approaches to management of ecosystems and land should be scientifically clarified through multi-disciplinary processes, in which learning from traditional systems such as Satoyama is likely to be useful.

In order to share information and to discuss the scientific contribution on these issues, this "Conference on the Science and Technology for the Sustainable Society 2010" focus: 1) values of biodiversity including ecosystem services, 2) climate change and biodiversity and ocean biodiversity, and 3) approaches to management and restoration of ecosystems.