

**Japan's views on the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of agricultural systems and food security in all countries, particularly in developing countries**

Japan welcomes the opportunity to submit its views on the current state of scientific knowledge on how to enhance the adaptation of agriculture to climate change impacts while promoting rural development, sustainable development and productivity of agricultural systems and food security in all countries, particularly in developing countries.

Japan recognizes that agriculture is one of the most essential sectors for addressing issues such as food security, poverty eradication and sustainable rural development.

It goes without saying that adaptation is essential, when considering the relationship between agriculture and climate change. It is because agriculture is one of the most vulnerable sectors to climate change. And even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades. Hence, adaptation is essential in agricultural sector.

Japan recognizes that, considering food security, rural development and so on, agricultural practices with co-benefit effects on both agricultural production and climate change are very important. Japan has worked on research and technology development on adaptation in agriculture, on the basis of the Fourth Assessment Report of IPCC, domestic climate change projections, high temperature phenomena and so on. A few examples of international cooperation on adaptation that Japan has supported are shown as follows.

- New Rice for Africa (NERICA) ; NERICA is a group of rice varieties developed by AfricaRice (the former : WARDA). Widely cultivated varieties of upland NERICA have short growth durations, so that they can be applied as rice varieties adapted to climate change such as droughts, and their yields are higher than local varieties. Furthermore, a new project is accelerating development and deployment of the next generation of elite rice varieties, "Advanced Rice for Africa (ARICA)".

- Assessments of Climate Change Impacts and Mapping of Vulnerability to Food Insecurity under Climate Change to Strengthen Household Food Security with Livelihood's Adaptation Approaches (AMICAF) ; The AMICAF is a FAO's project to assess climate change impacts on food security. The AMICAF analyzes climate change impacts on agriculture and food security and indicates food insecurity vulnerability by mapping, and then supports to design adaptation options in the region.

There are some examples of agricultural practices with co-benefit effects on both agricultural production and climate change in the case of mitigation. A few examples of mitigation that Japan has conducted are shown as follows.

- Mitigation of Methane Emission from Paddy Fields by Alternate Wet and Dry Irrigation (AWD) ; In Japan, we have practiced AWD for a long time, in order to increase rice yield by vitalization of rice roots with oxygen. This AWD also has mitigation effects to reduce methane emission from paddy fields and reduces the use of water resources and irrigation costs.

- Farm Household Biogas Project Contributing to Rural Development ; This project is a CDM

project conducted in Viet Nam that reduces GHG emission and contributes to rural development. In this project, biogas digesters for treating farm wastes, sewage and so on were introduced to low-income communities to produce biogas, a renewable fuel that can be used as fuel wood and LP gas substitutes for heating and cooking purposes. This project has co-benefit effects on low-income households (by contributing to livelihood improvement) as well as climate change (by a reduction of GHG emission), although it does not have a direct benefit on agricultural production.

Above-mentioned examples show that there are some agricultural practices with co-benefit effects on both agricultural production and climate change in the case of mitigation. Hence, when considering the relationship between agriculture and climate change, it is necessary to consider agriculture that addresses climate change from not only the adaptation aspect but also the mitigation aspect. The reason why we should think about mitigation is that we should take consideration of the following issues with respect to the relationship between agriculture and climate change.

- Agriculture sector occupies 13.5% in the world total GHG emission.
- Reliance on adaptation alone could eventually lead to a magnitude of climate change to which effective adaptation is possible only at very high social, environmental and economic costs.

Considering these issues, it is very important to address both adaptation and mitigation with respect to agriculture and climate change.

Japan recognizes that the latest projections and impact assessments of climate change based on scientific analysis in the forthcoming Fifth Assessment Report of IPCC will be very important in order to address appropriate adaptation measures on various agricultural fields. In order to establish and conduct agricultural practices with co-benefit effects on both agricultural production and climate change, especially in the case of mitigation, it is necessary to consider them from the perspective of science and technology. Furthermore, the effectiveness of improved agricultural management practices depends on factors such as climate, soil type and farming system. Considering this agricultural characteristic, science and technology including on-site research and development need to be strengthened to establish those agricultural practices with co-benefit effects on both agricultural production and climate change, which are suited to various climate, soil types and farming systems. Japan finds it useful and effective to do collaborative research with developing countries in their lands, in cooperation with researchers and other relevant stakeholders in developing countries. Japan has contributed to doing some collaborative research, through programs such as Science and Technology Research Partnership for Sustainable Development (SATREPS).

Finally, it is important to establish a mechanism through which countries can share knowledge, technologies, activities and human networks on adaptation, mitigation and so on in the field of agriculture, in cooperation with the existing mechanisms. In this regard, accumulating reliable knowledge on emission, mitigation and sequestration is valuable as the basis of the effective approach, which has been discussed in the Global Research Alliance on Agricultural Greenhouse Gases, a voluntary framework established in 2011 and currently joined by 35 countries. Regarding financial resources, it is important to consider the linkage between the above-mentioned mechanism related to agriculture and various types of climate funds such as the Green Climate Fund and the Adaptation Fund, as well as, further availability of all other financial sources.