“Adaptation” to Climate Change: The Emergence of Impacts and the Need for Strategic Responses

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1.What is "Adaptation" to Climate Change?

Action on climate change is generally based on two pillars: "mitigation" and "adaptation". The former involves efforts to limit the progress of climate change by reducing greenhouse gas emissions and increasing absorption capacity. While mitigation is critical to controlling climate change, its effects may not be immediately apparent due to the accumulation of greenhouse gases emitted in the past. This highlights the importance of “adaptation”. Adaptation refers to efforts to reduce the impacts of current or inevitable future climate change on human societies and ecosystems, and to enable flexible responses to these impacts.

Specifically, adaptation measures include infrastructure development, land use reassessment, agricultural technology change, and strengthening of public health systems to minimize damage from risks posed by phenomena such as rising temperatures, more frequent heavy rains, sea level rise, droughts, and floods.

The importance of adaptation was also mentioned in the Paris Agreement, and as climate change has become an inevitable reality, it is increasingly recognized internationally as a necessary policy issue, not just an option. The United Nations Framework Convention on Climate Change (UNFCCC) positions adaptation as an important pillar alongside mitigation. However, unlike mitigation, which has clear targets such as the 1.5°C goal, there are no universally agreed clear targets for adaptation.

2. The emergence of climate change impacts and the development of adaptation strategies

In many countries, including Japan, the effects of climate change have become evident through the increasing frequency and intensity of extreme weather events in recent years. For example, according to analyses by the Japan Meteorological Agency, the average annual temperature in Japan has been on a long-term upward trend, increasing by about 1.3°C over the past century. As a result, there has been an increase in the risk of heatstroke due to extreme heat and flooding and landslide disasters caused by heavy rainfall.

In response to this situation, the Japanese government formulated a "Climate Change Impact Adaptation Plan" in 2015 and revised it in 2021. The revised plan outlines specific measures in seven sectors: agriculture, forestry and fisheries; natural ecosystems; health; water environment and resources; national land conservation; industrial and economic activities; and citizens' lives and urban living.

Furthermore, under the Climate Change Adaptation Law (enacted in 2018), local governments are also promoting the formulation of "regional climate change adaptation

plans." According to the Ministry of Environment, as of March 2025, 47 prefectures, 20 designated cities, and 311 municipalities have already formulated such plans, with a total of 378 local governments implementing these strategies.

However, there are also numerous challenges at the implementation stage. For example, local governments often lack the systems and personnel to effectively use climate data, making it difficult to develop adaptation measures based on scientific evidence. In addition, financial constraints hinder the long-term investments needed to develop infrastructure.

3.Examples of Adaptation and Future Prospects

Both domestically and internationally, advanced adaptation efforts are gradually accumulating. In Japan's agricultural sector, concerns about declining rice quality due to warming (heat damage) have prompted research institutions such as the National Agriculture and Food Research Organization (NARO) to work on developing heat-resistant varieties and disseminating cultivation techniques that adjust flowering times. In addition, urban infrastructure initiatives such as Tokyo's "Cool City Tokyo" project include measures such as increasing the planting of street trees and using highly reflective pavement to mitigate the urban heat island effect.

An example from abroad is the Dutch "Room for the River" policy. This innovative approach mitigates flood risks not by raising dikes, but by giving rivers room within their basins. Its emphasis on ecosystem conservation and community participation has been recognized as a model for other countries.

Going forward, challenges to further scaling up adaptation efforts include: (1) improving regional climate risk assessments; (2) supporting policy formulation based on scientific evidence; (3) mobilizing funding through public-private partnerships; and (4) strengthening adaptive capacity by working with local residents. Especially in a country like Japan with diverse natural conditions, optimizing adaptation measures through a "local approach" is essential.

With regard to mobilizing finance, this is becoming a critical issue internationally. According to OECD reports, adaptation financing needs in developing countries are projected to reach $160 billion annually by 2030. Mechanisms that leverage public funds alongside private investment will be needed to bridge this financing gap.

The impacts of climate change are no longer a future concern, but an ongoing reality. In this context, adaptation is an essential strategy to reduce societal vulnerabilities and build sustainable economic and social systems. Ongoing collaboration between science, policy, business and local communities is expected to drive adaptation efforts, along with continuous knowledge updates.

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