

**INTERNATIONAL COOPERATION FOR
ADAPTATION TO CLIMATE CHANGE
IN DEVELOPING COUNTRIES
(RECOMMENDATIONS BY EXPERTS COMMITTEE)**

2007

**MINISTRY OF FOREIGN AFFAIRS
JAPAN**

Foreword

Japan's Medium-Term Policy on Official Development Assistance (ODA) issued in February 2005 announced to work on "adaptation to the adverse effects of climate change" through ODA, and the Kyoto Protocol Target Achievement Plan of April 2005 expressed Cabinet's decision to "continue to support appropriate adaptation measures by vulnerable countries with little capacity to respond to global warming, such as small island developing states and least developed countries."

International bodies such as the Inter-governmental Panel on Climate Change (IPCC) have predicted negative impacts of climate change on water resources, agriculture, life and health, ecosystems, infrastructure and the need to support developing countries with respect to the adaptation to climate changes. These have been envisaged by the world community in venues such as the Conference of Parties to the UN Framework Convention on Climate Change (COP), the Organization for Economic Cooperation and Development (OECD) and G8 Summits.

Against this background, the Experts Committee on ODA for Climate Change Adaptation, formed by the Ministry of Foreign Affairs in September 2006 and made up of academic experts, has examined the diverse and technical aspects of what measures will be necessary, where the international community should focus its efforts so that developing countries will adapt to climate change, and how Japan is able to contribute to this process. Based on its deliberations in four meetings, "the recommendations on international cooperation for adaptation to climate change in developing countries" was adopted.

During the period in while the committee of experts was convened, the United Kingdom's "Stern Review: the Economic of Climate Change", the Fourth Assessment Report of the IPCC contributed by the working group I: "The Physical Science Basis" and like documents were released, and international interest in the issue of climate change has grown increasingly, as seen in the popular success of "An Inconvenient Truth", the film provided by former U.S. Vice President Albert Gore. We take this opportunity to express our warm gratitude to the committee members who discussed the new challenge of adaptation with such enthusiasm. We express our thanks also to the ministries and agencies which extended their cooperation to this survey.

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Recommendations on International Cooperation for Adaptation to Climate Change in Developing Countries

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Summary

Recommendations on International Cooperation for Adaptation to Climate Change in Developing Countries

1. Introduction

The Working Group I contribution to the IPCC Fourth Assessment Report “The Physical Science Basis of Climate Change” released in February 2007, concludes it is highly probable that global warming of the climate system is unequivocal due to remarkable increase in global atmospheric concentrations of the anthropogenic greenhouse gases as a result of human activities. Global warming has significant impact on earth systems and human society, and it is a major responsibility incumbent on mankind to cope with its progress. In order to avert the devastating impact that abrupt climate change would have on natural and social systems, there is a great need to reduce emissions of greenhouse gases and also to implement adaptation measures to the risks of climate change that are unavoidable at least for the coming decades, such as increasingly serious water shortages and increases of damages in frequency and scale of such extreme weather events as drought, flooding and tropical cyclones.

Due to variation in phenomena like drought and flooding and also in the vulnerability of social systems, the impacts of climate change and the corresponding adaptation measures are diverse among countries and regions. Developing countries, in particular, have yet to take adequate measures to cope with current climate variability, and their vulnerability exposes them to the danger of being affected by the adverse effects of future climate change. Furthermore, within a given region or a single country, it is the socially disadvantaged and the poor communities, who reside in areas vulnerable to natural disasters and live heavily depending on natural resources, are more likely exposed to environmental changes brought by climate change. The issue of climate change is therefore tightly bound up with the concept of “human security” and with the long-term perspective of “sustainable development.”

Internationally, adaptation is also an important issue in international negotiations on post-Kyoto regime to address climate change beyond the first commitment period (2008-2012) of the Kyoto Protocol. The adaptation has also been an important issue in venues such as G8 Summits and the OECD.

The challenges of climate change are global in scale, and the international community must engage with them as a whole, but while adaptation is an important challenge involving the restructuring of social and economic systems, the international discussion of how it should be implemented and supported remains ongoing. The recommendations herein both set forth the key issues on adaptation approach, and describe required policies to promote adaptation measures in developing countries, and appropriate assistance that the international community including Japan should pursue.

2. Key Issues on Adaptation Approach

(1) Human security and sustainable development

Adaptation in order to improve society’s resilience to climate change and to secure human security also constitutes an important policy towards achieving sustainable development. Adaptation measures are therefore unlikely to be a single policy aimed at adapting to the adverse effects of climate change but a comprehensive policy issue to be addressed in the context of development policies on poverty reduction, agricultural development, water resources development and disaster prevention. Due care must be given to the preservation of the natural environment and the sustainable utilization of natural resources from a long-term perspective when implementing the adaptation measures.

(2) The resilience approach

Enhancing adaptive capacity or resilience to the current climate variability and future climate change at the national and regional levels is one of the most important goals of an adaptation policy. When formulating adaptation measures, it is also necessary to consider how to utilize and enhance the local and indigenous resilience practices and knowledge possessed by local communities.

(3) The relevance between development and adaptation and mainstreaming adaptation

An effective point of departure for adaptation measures is to pursue that adaptive endeavors to current climate variability such as shortages of water resources and foods, prevention of meteorological disasters and health diseases, which will reduce vulnerability to future climate change. Another important perspective is to mainstream adaptation to climate change by proactively taking future climate change risks into account in current development planning and assistance.

(4) Regionality of adaptation approach

Impact, vulnerability and adaptation to climate change can not be predicted and investigated uniformly without considerations on local conditions in a targeted area. Therefore, adaptation approach should be considered with the situation of each targeted area such as the scales and types of impact, the capacity to adapt and vulnerability.

3. International Assistance for Building Adaptation Capacity in Developing Countries

Recommendations:

- (1) Assistance should be participatory, based on the attributes of a region and its residents, and enhance resilience at the level of individuals, especially the socially disadvantaged, and communities adversely affected by climate change.
- (2) Adaptation measures should be integrated into comprehensive development strategies at national and regional levels based on a long-term, cross-sectoral perspective to cope with the compound impacts of climate change. Adaptation policies should also aim at producing benefits in multiple areas at the project level.
- (3) International cooperation in observation, forecasting, impact assessment and other aspects of climate change (in particular, participatory frameworks of cooperation to strengthen the capacity of experts in developing countries) should be pursued to enable developing countries to ascertain and forecast the regional and domestic impacts of climate change and to perceive the risk of climate change.
- (4) Steps should be taken towards the aggregation and sharing of information on adaptation relevant technologies and knowledge.
- (5) Guidelines for mainstreaming adaptation considerations in development assistance projects should be formed. Support should also be provided to build the capacity required for responsible parties in developing countries to mainstream adaptation strategies when drafting and implementing national development plans.
- (6) Training and public education programs should be put in place to raise awareness of climate-change risks among the public.
- (7) Those areas and tasks that are especially urgent, such as water resources, food supplies (agriculture), healthcare, disaster prevention, infrastructure and ecosystems, should be selected on a regional basis, in accord with the regional nature of impacts, vulnerability and adaptation. The selection of priority regions must take into account not only the magnitude of

climate change, but the magnitude of impact risk are also based on regional population density and other factors.

4. International Collaboration on Supporting Adaptation in Developing Country

Recommendation:

It is important to form a common understanding of adaptation strategies among each party responsible for development and for climate change policy worldwide. Developing countries, donor countries, international organizations and like parties should share their expertise in fields relevant to adaptation and investigate cross-sectoral approach. Aid coordination in line with the respective comparative advantages of donors, coordination with NGOs and other community-level actors, and trans-national regional cooperation should also be positively promoted.

5. Conclusion: How Should Japan Contribute?

Recommendation:

Exploiting its experience and expertise based on its past performance in development assistance in fields with relevance to adaptation, Japan should play a leading role in promoting the coordination in the international community with respect to adaptation. To this end, Japan should identify good practices conducive to adaptation from its past aid experience, make intellectual contributions to the international momentum in adaptation to climate change, and exploit outstanding Japanese experience, policies and technologies within the context of international aid coordination. Furthermore, Japan should contribute to stimulating interest in adaptation within the development agencies of developing countries, for example by prioritizing projects that take account of adaptation in future Japanese development aid.

Recommendations on International Cooperation for Adaptation to Climate Change in Developing Countries

1. Introduction

1.1 Importance of Impacts, Vulnerability and Adaptation to Climate Change

The current scientific understanding of impacts of climate change on natural, managed and human systems has been accessed and integrated through the assessment mainly on the latest peer reviewed and published scientific/ technical literature on climate change by the Intergovernmental Panel on Climate Change (IPCC), which comprised of scientists and experts in the field of climate change. In its Fourth Assessment Report contributed by the Working Group I "The Physical Science Basis of Climate Change" released in February 2007 it concludes that global warming of the climate system is unequivocalⁱ and the cause of this warming is almost certainly an increase in global concentrations of the anthropogenic greenhouse gases (GHG) as a result of human activities.

Climate change has a major impact on all regions of the world, and according to the 2007 WGI report, long-term trends from 1900 to 2005 have been observed in precipitation amount over many large regions. Specifically, while precipitation has increased in regions of high latitude, in many tropical and subtropical land regions it has decreased and, since the 1970's, drought has intensified. The report also projects that unless additional climate initiatives are instituted, it is very likely that the frequency of warm spells and heat waves will increase in almost all land areas and that the frequency of heavy rains will increase in almost all land regions. Further, the report notes that even if GHG concentrations were to be stabilized, sea level rise and global warming would continue for centuries.

Ecosystems and other natural systems that underpin the survival of all humanity are vulnerable to changes in climate, and some are considered susceptible to irreversible damage. Human social systems, such as management of the food and water resources that are sustained by natural systems, are therefore also sensitive to changes in climate.

Global warming has significant impacts on earth systems and human society, and it is a major responsibility incumbent on mankind to cope with its progress. In order to avert the devastating impact abrupt climate change would have on natural and social systems, all countries, and especially the countries with the largest emissions, need to make the maximum effort to curtail GHG emissions and develop carbon dioxide capture/storage (mitigate measures). Meanwhile, our current social systems are predicated on the current climate, and the need is great to respond (adaptⁱⁱ) to the risks of the impact of warming that are unavoidable for at least the coming decades, such as increasingly serious water shortages and increases in frequency and scale of such extreme weather events as drought, flooding and tropical cyclones.

Adaptation to climate change will require social structural readiness such as physical infrastructure, technology, information, financial resources and managerial capabilities. As developing countries generally lag behind in these areas, however, they have yet to take adequate measures to cope with current climate variability, and the risk is great that they will remain vulnerable to and be affected adversely by future climate change. Furthermore, within a given region or a single country, it is the socially disadvantaged (e.g. the poor, women, children, the elderly), who inhabit in areas vulnerable to natural disasters and live heavily depending on natural resources, that are most exposed to the environmental changes that accompany climate change, such as damage resulting from natural disasters. Supposing environmental changes were to occur that compelled large numbers of people to migrate, it would also entail the risk of triggering social instability. The issue of climate change is therefore tightly bound up with the concept of "human security,"ⁱⁱⁱ which seeks to protect individuals from threats to human lives, livelihoods and dignity and to improve their ability to cope with such threats.

Adaptation to medium- and long-term climate change is also an important element of achieving “sustainable development.”^{iv} Efforts to assure water resources and food supplies, healthcare systems, disaster relief capabilities, civil infrastructure and ecosystem preservation to the end of achieving sustainable development in developing countries also contribute directly and indirectly to adaptation to climate change.

1.2 International Trends in Adaptation to Climate Change

Scientific understanding on climate change has consolidated in recent years, and there is a mounting international concern on adaptation.

The United Nations Framework Convention on Climate Change (UNFCCC) has informed discussion on adaptation until now, and assistance to developing countries has been conducted by means of funds established under the convention. The 11th Conference of the Parties to the UNFCCC (COP11) held in November and December 2005 adopted a “five-year programme of work on impacts, vulnerability and adaptation to climate change and the scientific, technical and socioeconomic aspects^v” and COP12 agreed to the “Nairobi Work Programme” of specific activities for the first half-term of the plan (through 2007). Adaptation is also an important issue in international negotiations on post-Kyoto regime to address climate change beyond the first commitment period (2008-2012) of the Kyoto Protocol.

In addition to the UNFCCC, the G8 Summit held at Gleneagles in the United Kingdom in July 2005 stipulated in its communiqué “Climate Change, Clean Energy and Sustainable Development” the importance of adaptation in developing countries and the provision of assistance by G8 members for improving capacity therein.^{vi} And in April 2006 the OECD Development/Environment Ministerial Meeting adopted a Ministerial Declaration on Integrating Climate Change Adaptation into Development Co-operation.^{vii} In this ministerial declaration, the governments of OECD member countries declare that they will incorporate climate change adaptation into development planning and development assistance within their own governments and in activities with aid-recipient countries.

1.3 Status of the Recommendations

The challenges of climate change are global in scale, and the international community must engage with them as a whole. Aid to developing countries in this area has compiled an assistance record through a variety of frameworks to date with respect especially to such mitigation measures as the promotion of clean energy and energy conservation, and it will now be necessary to pursue mitigation measures of greater effectiveness and efficiency. While adaptation measure is an important challenge involving the restructuring of social economic systems, the international discussion of how it should be implemented and supported remains ongoing. Japan has exhibited leadership in the field of climate change, and while contributing to the formation of policy on international assistance to developing countries in the area of adaptation, it is required to identify, to the extent possible, what kind of support needed and what assistances Japan may contribute through its own proactive practice to support adaptation in developing countries. From this perspective, the proposals herein both set forth the key issues on adaptation approach, and describe required policies to promote adaptation measures in developing countries and appropriate assistance that the international community including Japan should pursue.

2. Key Issues on Adaptation Approach

2.1 Human Security and Sustainable Development

Global warming is caused by human activity and is a problem affecting all people who live on Earth, and all countries and societies must make the maximum effort towards its resolution. Adaptation also constitutes an important policy towards achieving sustainable development in the sense of improving society's resilience to climate change and securing human security. Rather than stand-alone policies with the sole objective of adaptation to climate change; therefore, adaptive measures are intimately involved with such policies as for poverty reduction, agricultural development, securing water resources and disaster prevention and recovery, and these challenges should be engaged comprehensively from the perspectives of human security and sustainable development.

Adaptation to the impact of climate change in many cases will entail human alteration of the natural environment, including ecosystems, and due care must be given to the preservation of the natural environment and the sustainable utilization of natural resources from a long-term perspective so that adaptive measures do not themselves interfere with sustainable development.

2.2 The Resilience Approach

What impact climate change may have on natural and social systems depends on the extent of progress in its mitigation and is of great uncertainty. One response to the uncertainty of the impact of climate change that has been advocated in recent years is the resilience approach, which seeks to enhance the capacity for recovery and resistance. Resilience, or adaptive capacity, refers to the capacity of natural and social systems to adapt to any manner of environmental change, including human resources, levels of scientific and technical knowledge, ability to access technology and information, social systems and infrastructure, community risk management capabilities, and financial capacity. Enhancing resilience on the basis of climate change, and forecasts of climate change, at the national and regional levels is one of the most important goals in adaptation policies. In particular, accumulation of scientific knowledge on climate change and its impacts is essential and benefits the society to select and implement cost-effective policies across a wide range of areas of concern.

Resilience further encompasses traditional skills and practices indigenous at national and community levels. Although a framework for mutual assistance in disaster recovery is present within communities in the Pacific island states, for example, interpersonal ties are weakening and resilience is vanishing with the modernization of local lifestyles. In devising adaptive strategies, it is also necessary to consider how to utilize and enhance the adaptive capacity possessed by such local communities.

2.3 The Relevance between Development and Adaptation and Mainstreaming Adaptation

Important objectives in conducting development assistance, the Millennium Development Goals (MDGs) set forth the main development tasks that international community should work on with respect to such issues as poverty and famine, the spread of communicable diseases, the insufficiency of safe drinking water, and the loss of natural resources. While these vary greatly with population pressure and what social systems obtain, it is more difficult to address many of those issues in developing countries, and as a result, developing countries are unable to adapt appropriately to their current climatic variability. An effective point of departure for adaptation measures; therefore, is to strengthen efforts to achieve such MDG as relevant to the current climate in order to join these efforts to the reduction of vulnerability to future climate change. It is also important from the perspective of adaptation specifically for developing countries to bolster their measures to contain current risks entailed by extreme weather events, health hazards and water

resource and food shortages.

Another important perspective is that of “mainstreaming” adaptation in development, i.e. taking future climate change risks into account in the proposal and implementation of proactive development policies so that current development may adapt to future climate change. Mainstreaming will require devising development plans based on future climate changes and incorporating the adaptation perspective into wide-ranging programs and projects. In concrete terms, this may entail taking into account available projection of future climate during the planning and designing stages through processes for environmental- and social- impact assessments of such infrastructure like emergency shelters.

2.4 Regionality of Adaptation Approach

The kind and magnitude of the impacts of climate change, and the capacity to adapt to it, vary greatly with region, and vulnerability to climate change also varies greatly among regions, countries, communities, etc. Regions that suffer from great water stress, for example such as Central Asia, sub-Saharan Africa and the Mediterranean littoral, are projected to suffer further decreases in their utilizable water, and there is concern that regions of high population density, such as the riverine deltas of Asia, may suffer greater damages from flooding and increasing high sea level. Examination of the impacts of climate change and adaptations to it must be responsive to local conditions, rather than producing uniform projections and analysis.

3. International Assistance for Building Adaptation Capacity in Developing Countries

3.1 Importance of Supporting Adaptation at Community Level

The impacts of climate change are significant threats to lives and livelihoods at the individual and community levels. From the perspective of human security; therefore, assistance should reach beyond the national level to focus on the socially disadvantaged and communities that are vulnerable to environmental changes ensuing from climate change and seek to protect individuals, build their capacities and enhance the resilience of local communities.

Recommendation: Assistance should be participatory, based on the attributes of a region and its residents, and enhance resilience at the level of individuals, especially the socially disadvantaged, and communities adversely affected by climate change.

3.2 Importance of Comprehensive Adaptation at National and Regional Levels

The impacts of climate change on natural and social systems are compound and correlative. Therefore, adaptive strategies that take up only measures coping with direct impacts of climate change are unlikely to be effective solutions. The effective approach is thus to incorporate adaptive policies for a range of impacts resulting from climate change, while examining comprehensive development strategies from a long-term and cross-sectoral perspective, including enhanced demographic policies, resource management, environmental risk management and social resilience.

Cross-sectoral policies that should take particular account of the impacts of climate change would include land use planning and natural resource management. Among such policies, migration from unsafe areas (planned retreat) based on medium- and long-term projections needs to be sought if necessary. It is likewise necessary to take cross-sectoral approaches and to introduce measures that will produce benefits in multiple areas, e.g. a project to improve drainage functions incorporating contributions to anti-malaria measures.^{viii}

Transnational challenges such as flooding caused by glacial melting or water resource management in international river catchments, entail necessary adaptation measures at regional level. What is essential here is to pursue south-south cooperation and regional cooperation while countries within the region should regard these issues as their common concern and seek solutions from a long-term, cross-sectoral perspective.

Recommendation: Adaptation strategies should engage the compound impacts of climate change and be integrated into comprehensive development strategies at national and regional levels from a long-term, cross-sectoral perspective. Adaptation measures at project level should have the goal of producing benefits in multiple areas.

3.3 Assistance Policies Conducive to Enhancing Adaptation Capacity in Developing Countries

3.3.1 Climate Change Observations and Impact Projections at National and Regional Levels

Since the impacts of climate change emerge over a variety of time scales, appropriate adaptation measures to those impacts must be implemented at each stage and with an understanding of their ripple effects. In order to formulate development strategies with due consideration on climate change at the national and regional levels, scientific projection on national and regional scales must be improved in order to grasp accurately the information on climate change risks.

The most pressing tasks at present are to generate more precise observations and projections of the climate change as well as reliable impact and vulnerability assessments, which are now conducted on a global scale, to promote understanding of climate change among responsible parties. In doing so, it is not sufficient merely for countries and institutions possessing this information to disclose projection results to developing countries. It is important to encourage the active involvement of developing countries as of the projection process, and help the policymakers in those countries to perceive the climate change risks. An effective means to this end will be a framework for collaboration on observation, projection and impact assessment in partnerships of experts from the countries concerned and improving the capabilities of developing countries.

An existing international effort in the field of observation is the Global Earth Observation System of Systems (GEOSS),^{ix} whose purpose is to establish an earth observation system with societal benefit. Among the objectives of GEOSS are to “understand, assess, predict, mitigate and adapt to climate variability and change.” Regional networks such as the Asia-Pacific Network for Global Change Research (APN)^x are conducting joint projects to implement common policies among advanced and developing countries and to develop research capabilities in such areas as modeling and impact and vulnerability assessment.

3.3.2 Information Sharing in Adaptation Technologies

The impacts of climate change and adaptation strategies for them are diverse, and the importance of the issues involved varies with region. Rather than circumscribing uniform “adaptation technologies,” it is important to make the necessary information available to people who need it by aggregating and sharing the variety of technologies that are relevant to adaptation. Under the auspices of the UNFCCC, the technology transfer experts meeting released a technical report on adaptation-relevant technologies in October 2006. Diverse international cooperation schemes and networks, including such existing efforts, should be combined and utilized efficiently and effectively to promote understanding in the developing countries that will be severely affected by climate change.

3.3.3 Mainstreaming Adaptation in Development Assistance

Mainstreaming adaptation is an approach that is to consider the risks of climate change and incorporates adaptation strategies at the stages of development policy, program, project planning, execution, monitoring and assessment in a range of sectors. It is also important to mainstream adaptation in the various sorts of development aid projects that have conventionally been conducted. Concretely, it is required to create guidelines for how to reflect strategies for adaptation to future changes in the climate and environment in the planning and design stages of development assistance projects and in environmental impact assessments.

Mainstreaming adaptation in development assistance projects further permits indirectly imparting a beneficial influence on the development policies of aid-recipient countries. It is important, however, to go further by assisting developing countries to build capacity so that they themselves are able to develop and implement policies for the risks and impact of climate change including infrastructure and planning considering the prediction on demographic and economic conditions.

3.3.4 Training and Public Education to Raise Climate Change Risk Awareness

Understanding of the impacts of climate change must be promoted not only among policymakers, but also broadly among the public. Migration to coastal areas in many cases, proceeds due to inadequate awareness of climate change risks such as those from sea level rise; therefore, some impacts could be checked by public education.

In associating mitigation measures paired with adaptation measures, raising public awareness of the adverse effects of climate change is effective in containing GHG emissions in residential sector.

Recommendations:

- * International cooperation in observation, projection, impact assessment and other aspects of climate change (in particular, participatory frameworks of cooperation that seek to improve the capacity of experts from developing countries) should be pursued to enable developing countries to ascertain and project the regional and domestic impacts of climate change and recognize the risk of climate change.
- * Steps should be taken towards the aggregation and sharing of information on technologies relevant to adaptation.
- * Guidelines for mainstreaming adaptation considerations in development assistance projects should be formed. Support should also be provided to build the capacity required for responsible parties in developing countries to mainstream adaptation strategies when drafting and implementing national development plans.
- * Program for public education and enlightenment programs should be put in place to raise awareness of climate-change risks among the public.

3.4 Concrete Efforts in Relevant Sectors

3.4.1 Water Resources

There are 1.7 billion people, or one-third of the world's population, living in countries that suffer water stress, and 1.1 billion people lack access to safe drinking water. Amid concerns over increased water stress resulting from population growth in many developing countries, the circumstances of access to water resources, including drinking water, are forecast to deteriorate as a result of climate change, especially in densely populated regions. Further efforts are required to assure adequate water resources, both in quantitative and qualitative respects. In Africa, for

example, there are concerns that water shortages resulting from drought will grow in severity on the periphery of the Sahara desert. Integrated water resource management based on IWRM principles, especially at the catchment-wide level, will be important to enable efficient and sustainable use of water resources. It is also important to promote efficient use of water resources through policies and technologies for recycling industrial water and the utilization of resources, such as by rainwater harvesting.

Extreme drops in precipitation in heavy snow areas represent forfeiture of the stock of water resources and have an extremely large impact. Consideration must be given to adaptation strategies for such significant changes.

3.4.2 Food Supplies and Agriculture

Some 800 million people in the world are thought to suffer from malnutrition. As population growth places increasing stress on agricultural, forestry and fishery resources, just as it does on water resources, there is concern that reduced food security will be compounded by impacts of climate change such as drought and soil salinization. Output falls of 30% are predicted for some parts of Asia by 2080. There are concerns over adverse effects on agriculture in Africa and island nations as well, due to drought and sea level rise. Possible adaptation solutions include risk mitigation through multiple farming and irrigation works, modified cultivation schedules and other improvements to agricultural systems, and systemic improvements concerning food supplies, such as in supply-demand planning and stockpiling programs. It will also be important to promote the development of environmentally resistant crops, the development of new technologies, including improved cultivation techniques, and such measures as the conversion of fisheries to fish farming.

3.4.3 Human Health

Regarding impacts of climate change on human health, there are concerns of the spread of heatstroke, famine and malnutrition and expansion of the range and extension of the outbreak timeframe of communicable diseases as a result of higher temperatures and increased flooding.

Possible adaptation solutions include improvement of sanitary conditions through improved public health systems, promotion of preventative measures against communicable diseases, construction of early-warning systems for the spread of communicable diseases, and public education on the prevention of heatstroke. These efforts have much in common with currently prioritized policies for developing country assistance in the healthcare field, and bolstering current assistance programs will also be of importance for adaptation to climate change.

3.4.4 Disaster Reduction

Impacts of climate change that are of concern include such developments as the submersion of coastal regions, coastal erosion, increased tropical cyclones, flash floods and mudslides resulting from glacial melting, and increased flooding. It is predicted that several tens of millions of people living in densely populated low-lying coastal regions will be compelled to migrate in Asia, where large population growth is expected. Even away from coastal regions, the number of disaster victims may rise due to large populations in, for example, cities located along rivers in the Middle East. Building societies that are resilient in the face of disaster is a highly effective means of mitigating vulnerability to climate change and disaster reduction is thus highly compatible measures for adaptation.

3.4.5 Socioeconomic Infrastructure

Socioeconomic infrastructure ranges widely across road networks, shore protection, water supply and sewerage systems, for example, and since it typically has a long service life extending

over several decades, must receive due attention in the conceptual and planning stages so that it achieves long-term utility in view of future climate-change risks.

3.4.6 Ecosystems

Climate change may lead to the decline and relocation of such ecosystems as wetlands, mangrove forests and coral reefs; an increased number of extinct species; and loss of biodiversity. An important perspective is not only the preservation of affected ecosystems, but how human society can adapt to the ecosystems modified by climate change. What is important in this respect is the sustainable management of natural resources.

The environmental impact assessments of adaptation strategies must be examined so that such efforts themselves do not adversely affect ecosystems in new and significant ways.

3.4.7 Other

Compelled migration by planned retreat must receive appropriate consideration so as not to induce social unrest. Experience with relocation has been accumulated in implementing large infrastructure projects, and utilization of such know-how is one approach that can be adopted.

Recommendation: Those areas and tasks which are especially urgent, such as water resources, food supplies (agriculture), health, disaster relief, infrastructure and ecosystems, should be selected on a regional basis, in accord with the regional nature of impacts and adaptation strategies. The selection of priority regions must take into account not only the magnitude of climate change, but the magnitude of impact and risks are also based on regional population density and other factors.

4. International Collaboration on Supporting Adaptation in Developing Countries

4.1 Coordinating Development with Climate Change

While adaptation to climate change is an important aspect of climate change in the sense that it is premised on scientific understanding on the impact of global warming, enabling developing countries, which are especially vulnerable, to adapt to climate change can be considered an extension of development issues as conventionally understood.

In order for the international community to address these questions in an integrated fashion, a consensus on adaptive strategies must first be formed by the parties responsible for development and the environment, both in developing countries and developed countries. It will be especially important to form a common understanding on adaptation among the development experts and climate change experts who form the core of such parties within the UNFCCC, where the debate is carried out on international frameworks for responding to climate change.

4.2 Integrated Efforts and Coordination with Relevant Sectors

Adaptive strategies must be integrated over a variety of relevant sectors from a long-term, cross-sectoral perspective. In this sense, adaptive strategies that prove beneficial in multiple areas are unlikely to emerge from debate on adaptation to climate change conducted solely among experts in one particular field, and further, there is also a danger that different sectors may arrive at different conclusions about what policy measures should be devised for adaptation.

It is extremely important, therefore, for developing countries, donor countries, international organizations, institutions of regional cooperation and like parties to work to share their respective

experience and expertise in sectors relevant to adaptation, to review existing measures and to conduct cross-disciplinary studies of what efforts should now be bolstered with respect to adaptation. Existing international frameworks capable of examining priority policy measures at the project level with a comprehensive grasp of the relevant sectors include the Global Environment Facility (GEF)^{xi} and the Global Facility for Disaster Reduction and Recovery (GFDRR)^{xii} of the World Bank.

4.3 Strengthening Donor Coordination and Partnerships

No donor country or international organization is able to achieve significant results on its own in carrying out assistance to developing countries in the fields of adaptation. International collaboration and coordination are essential. In their pursuit, it is important to take advantage of the technologies, disciplines and social systems in which different aid organizations and donor countries have their own comparative advantages while bearing in mind the respective characteristics of the recipient countries and regions devising the adaptive strategies.

At the national level, in particular, coordination must be strengthened among the local donor community so that aid for adaptation is delivered in the most effective way while respecting the ownership of the country. And from the perspective of human security, these efforts must ultimately bring benefits at the individual and community level. In this sense, coordination with local organizations, NGOs and other groups working at the individual and community level is also important.

So that adaptive strategies are implemented effectively at the regional level among countries facing common, trans-national challenges, countries outside the region should also actively support south-south cooperation and regional cooperation.

Recommendation: It is important to form a common understanding of adaptive strategies among parties responsible for development and for climate change policy worldwide. Developing countries, donor countries, international organizations and like parties should share their expertise in fields relevant to adaptation and take cross-sectoral approaches. Aid coordination in line with the respective comparative advantages of donors, collaboration with NGOs and other community-level actors, and trans-national regional cooperation should also be positively promoted.

5. Conclusion: How Should Japan Contribute?

On the basis of such policies including the Kyoto Initiative^{xiii} announced in 1997, Japan has contributed to the furtherance of mitigation measures in developing countries through the transfer of energy conservation technologies, assistance for the introduction of new and renewable energy sources and like activities. In disaster prevention and relief, water and sanitation, agriculture and forestry, environmental protection and other fields deeply involved with adaptation, Japan can be termed a leading donor with a strong track record of assistance. Japan should promote international sharing of experience and expertise^{xiv} in sectors relevant to adaptation and play a leading role in coordination of the international community.

Japan, for example, has made an active contribution to climate-change observation and forecasting efforts at the global level. Japan should now consider how that expertise and technology might be exploited to contribute in observation and forecasting at the national and regional levels in order to build the adaptive capacities of developing countries.

On the other hand, adaptation to climate change is itself a new element in Japanese development assistance and due to the diversity of adaptive strategies, the policy development

process may not be fully prepared to address them. It will be advantageous, therefore, both to identify and compile good practices conducive to adaptation from Japan's past aid experience and to work to build an inventory of model projects relevant to adaptation at the community level. In this respect, the results of the study conducted this year by the Japan International Cooperation Agency (JICA) on its approach to adaptation to climate change will prove useful.

Based on its experience compiled and organized, Japan should now extend its examination of how to situate adaptation to climate change within the planning and design stages, and environmental impact assessments of specific project design and express its view in this regard as an intellectual contribution to the international community, including providing input to the OECD guidance drafting process. Japan should also make extensive use of its outstanding experience, policies and technologies in international aid coordination with respect to adaptation. Japan should also consider to take measures to raise awareness of adaptation among the responsible parties in developing countries, including such possibilities as prioritizing projects that take account of adaptation in its development aid activities.

Recommendation: Exploiting its experience and expertise based on its past performance in aid in fields relevant to adaptation, Japan should play a leading role in promoting the coordination of the international community with respect to adaptation. To this end, Japan should identify good practice conducive to adaptation from its past aid experience, make intellectual contributions to international studies in these fields, and exploit outstanding Japanese experience, policies and technologies within the context of international aid coordination. Japan should also contribute to raise awareness of adaptation among the responsible parties in developing countries, for example by giving preferential treatment in future Japanese aid to projects that take account of adaptation.

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- i “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”
 - ii Adaptation refers to changes in processes, practices, and structures to avert or moderate potential damages or to benefit from opportunities associated with climate change. (IPCC, 2001)
 - iii With an emphasis on protection and capacity building, the concept of human security stresses the individual perspective in order to protect individuals from threats to human lives, livelihoods and dignity and to realize their respective abundant potentials. Specifically, the aim is to protect individuals from the fear of conflict, the spread of communicable diseases, environmental disruption and disaster, and from the threat of privation, including poverty, famine and the loss of educational and healthcare services, and also to enhance people's capability to make choices and act on their own in order to cope with such threats.
 - iv As discussed in the World Commission on Environment and Development's 1987 report “Our Common Future,” sustainable development refers to “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” This concept engages development and the environment as potentially compatible rather than antagonistic to each other and takes the approach that what matters is development in moderation that takes environmental safeguards into account.
 - v The five-year adaptation working plan was adopted at the 11th Conference of the Parties to the UNFCCC (COP11) in December 2005. The objectives of this plan are to enhance national understandings of the impact of, and vulnerability and adaptability to, climate change, to improve their assessments, and to enable decision-making on adaptation actions grounded in scientific and socio-economic opinion. (IPCC, 2001)
 - vi The “Climate Change, Clean Energy and Sustainable Development” communiqué makes the following statement on adaptability: “9. Adaptation to the effects of climate change due to both natural and human factors is a high priority for all nations, particularly in areas that may experience

the most significant change, such as the Arctic, the African Sahel and other semi-arid regions, low-lying coastal zones, and small island states also subject to subsidence. As we work on our own adaptation strategies, we will work with developing countries on building capacity to help them improve their resilience and integrate adaptation goals into sustainable development strategies.”

- vii The OECD Development/Environment Ministerial Meeting was held in Paris in April 2006 to assemble and coordinate cabinet-level officers of OECD member countries for organs responsible for the environment and for development aid. This meeting adopted a Ministerial Declaration on Integrating Climate Change Adaptation into Development Co-operation and a Framework for Common Action around Shared Goals. The ministerial declaration on adaptation proclaimed support, on the basis of cooperation between both such organs, for the promotion of understanding of the impact of climate change, the articulation of necessary adaptive measures and efforts to reduce vulnerability.
- viii Examples follow of measures producing benefits in multiple areas.
- * Land use planning
Agriculture and forestry, disaster-prevention and –relief infrastructure, urban infrastructure, ecosystem management and many other planning fields are linked with land use planning. Coordinated land use planning at the national level based on future climate change may provide multidisciplinary adaptation strategies.
 - * Sustainable natural resource management and utilization efficiencies
Water resources, for example, both provide drinking water and are also relevant to agricultural production, energy production, ecosystem conservation and other areas.
 - * Anti-flooding measures
These are disaster prevention and relief efforts, but also contribute to the preventative measures against infectious diseases.
 - * Introduction of vegetation zones having disaster-prevention, biodiversity preservation and warming mitigation functions.
- ix The ten-year implementation plan to construct a Global Earth Observing System of Systems (GEOSS) was approved over the course of three Earth Observation Summits proposed by then-Prime Minister Koizumi at the Evian Summit in 2003. Regions, countries and institutions around the world are collaborating in the compatible linkage of existing and newly deployed earth observation systems with the aim of establishing a comprehensive earth observation system. 66 countries, the European Commission and 46 international organizations currently participate, and Japan is exhibiting leadership by serving on the executive committee of 12 countries.
- x The Asia-Pacific Network for Global Change Research (APN) is an inter-governmental network that aims to encourage global change research in the Asia-Pacific region, increase participation in this research by developing countries and enhance coordination between scientific research and policy. The 21 member countries are Australia, Bangladesh, Cambodia, Russia, China, Fiji, India, Indonesia, Japan, Laos, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, the Philippines, South Korea, Sri Lanka, Thailand, the United States and Vietnam.
- xi The Global Environment Facility (GEF) is a financial mechanism to provide grant assistance for incremental costs incurred when developing countries and countries in transition to market economies undertake projects in forms that address global environmental problems. Resources are contributed to the GEF trust funds set up at the World Bank by donor countries, and the International Bank for Reconstruction and Development (IBRD), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP) and other institutions carry out the projects.
- xii The World Bank’s Global Facility for Disaster Reduction and Recovery (GFDRR) is a fund to support disaster risk mitigation and recovery in low- and middle-income countries vulnerable to disaster in support of the implementation of the Hyogo Framework for Action 2005-2015 (HFA) adopted by the UN’s World Conference on Disaster Reduction in January 2005.
- xiii The 1997 Kyoto Initiative expresses, with an ODA focus, the support of the Japanese government for measures addressing global warming. It primarily covers mitigation measures (energy conservation, new and renewable energy sources, forest conservation and improvement, atmospheric

pollution measures, waste measures).

^{xiv} The table below gives specific examples of Japanese expertise and technology.

Sector	Japanese Expertise & Technology
Water resources	* Effective utilization of water resources through water treatment technologies (recycling of industrial water, wastewater purification, rainwater utilization) * Integrated catchment management technologies * Hydroelectric dams
Food supplies & agriculture	* Irrigation drainage technologies, with a focus on rice cropping, and agricultural facilities in general (e.g. paddy construction) * Crop development technologies, including biotechnology * Environment-friendly cultivation technologies (greenhouse gas reduction, low-input agriculture, multiple cropping, agro-forestry, rotational cropping technologies) * Food security policies (supply-demand planning, stockpiling, etc.) * Farmer organization and community support * Integrated rural planning, land use planning * Afforestation and greening technologies, forest management * General fishery technologies, including fish farming * Alley cropping (the cultivation of annual crops between rows of planted trees; combining wooded areas and grasslands in silvo-pastoral systems, with promising applications in Africa) * Fishery resource management, fishing harbor and fishing grounds improvement, etc.
Human health	* Protection against communicable diseases after flooding, health management for large events * Monitoring of harmful organisms (e.g. mosquitoes) * Airport and other quarantine systems * Installation and improvement of water supply and sewerage systems, other public sanitation system support * Installation and improvement of waste collection and processing systems * Provision of heatstroke-prevention information
Disaster prevention & relief	* Risk (hazard) mapping (earthquake, flooding, landslide and other micro-zoning) * Integrated disaster planning (applicable to the preparedness-response-aftermath cycle) * Building community disaster-response capabilities (public education and organization of local residents) * Building construction and operational capabilities in observation and communications systems
Social infrastructure	* Enhancement of disaster-capability functions in critical infrastructure * Urban planning and coastal management planning
Ecosystems	* Afforestation and vegetation restoration technologies * Vegetation mapping, biota surveys, ecosystem observation * Sanctuary planning and construction
Other	* Application of experience in social considerations (policy measures for migrants when building large infrastructure projects)