BASIC POLICY ON DEVELOPMENT COOPERATION IN THE FIELD OF CLIMATE CHANGE

-RECOMMENDATIONS BY EXPERTS' PANEL FOR REALIZATION OF "COOL EARTH"-

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MINISTRY OF FOREIGN AFFAIRS

JAPAN

Foreword

In May 2007, Japan's then-Prime Minister Shinzo Abe announced "Cool Earth 50," a proposal that included new financial mechanisms to extend wide-ranging support to developing countries with high aspirations to make efforts to limit greenhouse gas emissions and achieve economic growth in a compatible manner.

In response, the Ministry of Foreign Affairs established the Experts' Panel on Development Cooperation in the Field of Climate Change, comprised of the academic experts listed below. The Panel discussed the goal and principles to be shared by the international community, including developed and developing countries as well as international organizations, and actions to be taken by each of those actors in promoting development cooperation in the field of climate change. Building on previous work done by the Experts Committee on ODA for Adaptation to Climate Change in the fiscal 2006, the Panel expanded the scope of discussion from only assistance for *adaptation* to climate change, to also include measures for *mitigation*, actions that should be taken by developing countries themselves, and the basic policy that should be held in common by all actors in the context of development cooperation in the field of climate change. This report is the outcome of discussions held by the Panel on four separate occasions, and compiled as *Basic Policy on Development Cooperation in the Field of Climate Change: Recommendations by Expert's Panel for Realization of "Cool Earth."*

During the period in which the Panel was doing its work, there was also progress in the international situation relating to climate change; among other things, the Intergovernmental Panel on Climate Change (IPCC) issued its Fourth Assessment Report, and an agreement was reached in the Bali Action Plan (outcome of the 13th Session of the Conference of the Parties to the UN Framework Convention on Climate Change (COP13) in Bali) to establish an Ad Hoc Working Group tasked with discussing a post-2012 framework under the Convention and completing its work in 2009. Meanwhile, in January 2008, at the World Economic Forum's Annual Meeting in Davos, Japanese Prime Minister Yasuo Fukuda, chair of the upcoming G8 Summit in Japan this year, expressed his resolve to work towards the establishment of a framework in which all major emitters participate as well as the setting of fair and equitable emissions targets, and proposed the "Cool Earth Promotion Program" which will consist of three pillars: (1) a post-Kyoto framework, (2) international environmental cooperation, and (3) innovation. It is my hope that the ideas articulated in this report will make a valuable contribution in the process of promoting the second pillar (international environmental cooperation) in partnership with developing countries and international organizations.

The Panel's discussions covered a wide array of topics, ranging from mitigation of emissions to water, biodiversity, and disaster reduction, and its outcomes have already provided the government with food for thought in many different ways. For this, I express my deepest appreciation to the members of the Panel. My gratitude also goes to the representatives of other ministries and agencies that participated as observers in the discussions.

Experts' Panel on Development Cooperation in the Field of Climate Change
(in Japanese syllabary order)

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March 2008
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Basic Policy on Development Cooperation in the Field of Climate Change:

Recommendations by Experts' Panel for Realization of "Cool Earth"

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Summary

1. Challenges

Adverse impacts of climate change are already being felt worldwide, and this presents unavoidable risks to developing and developed countries alike in the coming decades.

Responses to climate change are often delayed, especially in developing countries, due to a lack of financial resources, technologies and expertise, or concerns that they may slow economic growth. Such delays could constitute a major hindrance to the achievement of the Millennium Development Goals (MDGs) and sustainable development in developing countries.

It is therefore important to utilize the financial resources, technologies and expertise of developed countries, for adaptation measures in developing countries that are vulnerable to the impacts of climate change as well as for mitigation measures in emerging economies that are experiencing rapid growth.

2. Goal

○ **To realize a global sustainable society, and to formulate mechanisms for achieving this objective.**

When promoting development cooperation in the area of climate change, the shared goal of the international community, including developed countries, developing countries and international organizations, should be the achievement of a global sustainable society. To that end, it is necessary for each and every country in the world to collaborate with one another to formulate a flexible, diverse and effective post-2012 framework on climate change in which they will take actions and work together towards a significant reduction of global greenhouse gas emissions from a long-term perspective.

3. Underlying Principles

In order for all countries of the world to collaborate with each other and take actions, it is important to have common principles that can be shared by all. The following are three underlying principles that should be shared by the international community, including developed countries, developing countries and international organizations, in promoting development cooperation in the area of climate change.

3.1 Taking on Climate Change as a Universal Challenge

Climate change is an urgent issue for all of humanity, with impacts on human security. Accordingly, all actors including national governments, private sector and individuals must make conscious efforts to address this issue. All national governments, organizations (including the private sector) and individuals must work together and take action worldwide.

3.2 Making Climate Change Management and Economic Development Compatible

Measures to address climate change should be perceived not as barriers but as a contribution to economic development, and the following efforts should be given priority based on that perception.

(1) Demonstrate a path toward development that will bring co-benefits, in order to ensure that implementation of measures to tackle climate change will have a positive effect on the economy.

(2) Promote the transfer and dissemination of existing technologies and expertise, and develop innovative technologies.

(3) Promote a comprehensive approach in carrying out measures against climate change, harmonizing them with efforts made to address other issues such as biodiversity, water, agriculture, health and disaster reduction, as well as the need for harmonization between mitigation and adaptation.

3.3 Self-Reliance and Mutual Cooperation

Each actor involved in the efforts to address climate change, from the community level up to the national level, should play its role with a clear sense of responsibility in their respective positions, and act under the principles of ownership and self help effort, and at the same time, seek out effective and efficient ways of reaching solutions through mutual cooperation.

4. Basic Policy Directions

The following basic policy directions should be pursued in promoting effective development cooperation in the area of climate change.

4.1 Promotion of Comprehensive Environmental Conservation

We should create a “low carbon society,” in which a drastic reduction of greenhouse gas emissions is achieved through the prevention of environmental pollution as well as the development of adequate systems and infrastructure for energy conservation. At the same time, creation of a “sound material-cycle society” in which resources are not wasted, as well as a “society in harmony with nature” in which ecosystems are protected as the basis of human existence, should also be pursued to ensure comprehensive and balanced environmental conservation.

4.2 Introduction of a Medium- to Long-Term Perspective

Mitigation and adaptation measures should be taken from a medium to long-term perspective, in order to avert serious potential impacts of climate change on society.

(1) Mitigation:

Set the target of cutting global greenhouse gas emissions at least by half by 2050, and implement effective mitigation measures in order to achieve this target

(2) Adaptation:

Build up medium- to long-term resilience of society to climate change, by taking short-term measures to respond to climate disasters as well as incorporating measures to address climate change into development plans of developing countries, particularly in Least Developed Countries and small island countries.

4.3 Stepping Up Partnership Based on a Participatory Approach

We should promote active participation and develop partnership among various actors such as communities, regions, national governments of developing and developed countries, international organizations, the business sector, NGOs, and experts.

4.4 Flexible and Diverse Response

We should promote flexible measures suited to the natural, social, and economic context of each country and region, paying due respect to the uniqueness and diversity of their respective traditions and cultures.

5. Cooperation Based on Policy Dialogue

In order to ensure fruitful results, the goals and principles should be shared at the outset among the donor countries, organizations and partner countries. Partner countries should then formulate comprehensive climate change management programs through policy dialogue, and donors should respond by providing assistance to help implement priority measures in line with those programs.

6. Priority Actions to be Taken in Developing Countries

6.1 Overall Measures

(1) Incorporation of environmental and social considerations into all development programs

(2) Promotion of efforts at all levels (including development of legal instruments, program formulation, awareness-raising and education)

(3) Ensuring of transparency of national policies and plans on environment and climate change

6.2 Mitigation

(1) Measures related to energy supply and demand

- ○ Demand-side (formation of socio-economic systems that achieves low carbon/sound material cycle, energy conservation)
- ○ Supply-side (renewable energy, improvements in energy-supply efficiency, use of low-carbon energy sources, etc.)
- ○ Access to modern and cleaner energy (rural electrification, etc.)

(2) Measures related to carbon sinks (forest conservation, land management)

(3) Curbing of GHG emissions from non-energy sources (ozone-depleting substances, methane)

(4) Promotion of a co-benefit approach which satisfies development needs and addresses climate change at the same time

6.3 Adaptation

(1) Enhancement of adaptive capacity of local communities: Enhancing the adaptive capacity of communities and individuals based on the human security approach and taking into account regional and community characteristics, including their vulnerabilities, in particular

(2) Highlighting of adaptation measures in the formulation of development plans

- ○ Mainstreaming adaptation measures into development plans from a long-term and cross-sectoral perspective
- ○ Identification of sectors and issues in need of urgent attention based on regional differences in the impacts of climate change and measures for adaptation
- ○ Enhancement of existing measures and implementation of measures to address emerging impacts

(3) Sector-specific measures and coordination between sectors (water resources, food and agriculture, human health, disaster reduction, social and economic infrastructure, ecosystems)

(4) Needs assessment and flexible responses based on scientific knowledge

- ○ Improvement of technical capacity for observing and projecting climate change and for impact assessment, at national and regional levels
- ○ Collection, management, disclosure and sharing of information relating to climate change impacts and adaptation
- ○ Formulation of plans on adaptation based on scientific knowledge, and enhancing institutional flexibility to implement them

(5) Training of experts on adaptation

(6) Establishment of cooperative systems to function in the event of any climate-related disaster (insurance etc)

7. Implementation of Assistance

7.1 Actions to be Taken by Donor Countries and Organizations

(1) Overall measures (assessment of the situation and challenges in developing countries; assistance for capacity development; technical assistance)

(2) Mitigation measures (development and transfer of innovative technologies, co-benefit approach, etc.)

(3) Adaptation measures (mainstreaming adaptation, provision of assistance based on assessment of vulnerabilities and risks, etc.)

7.2 Actions to be Taken Especially by International Organizations

(1) Global observation and data provision on climate change and its impacts

(2) Establishment of information-sharing platforms for good practice, etc.

(3) Enhancement of collaboration among relevant actors and environmental conventions

Basic Policy on Development Cooperation in the Field of Climate Change:
Recommendations by Experts' Panel for Realization of "Cool Earth"

Challenges

Goal
To realize a global sustainable society, and to formulate mechanisms for achieving this objective

Underlying Principles
- **(1) Taking on Climate Change as a Universal Challenge**
- **(2) Making Climate Change Management and Economic Development Compatible**
- **(3) Self-Reliance and Mutual Cooperation**

Basic Policy Directions
- (1) Promotion of Comprehensive Environmental Conservation
- (2) Introduction of a Medium- to Long-Term Perspective
- (3) Stepping Up Partnership Based on a Participatory Approach
- (4) Flexible and Diverse Response

Cooperation Based on Policy Dialogue
- The goal and principles should be shared at the outset among the donor countries, organizations and partner countries.
- Partner countries should then formulate comprehensive climate change management programs through policy dialogue, and donors should respond by providing assistance to help implement priority measures in line with those programs.

Priority Actions to be Taken in Developing Countries
(1) Overall Measures
- Incorporation of environmental and social considerations into all development programs
- Promotion of efforts at all levels
- Ensuring of transparency of national policies and plans on environment and climate change

(2) Mitigation
- Measures related to energy supply and demand
  -- Demand-side, supply-side, access to modern and cleaner energy
- Measures related to carbon sinks
  -- Forest conservation, land management
- Curbing of GHG emissions from non-energy sources
- Promotion of a co-benefit approach which satisfies development needs and addresses climate change at the same time

(3) Adaptation
- Enhancement of adaptive capacity of local communities
- Highlighting of adaptation measures in the formulation of development plans
- Sector-specific measures and coordination between sectors
- Needs assessment and flexible responses based on scientific knowledge
- Training of experts on adaptation
- Establishment of cooperative systems to function in the event of any climate-related disaster

Implementation of Assistance
(1) Actions to be Taken by Donor Countries and Organizations
- Overall measures (assessment of the situation and challenges in developing countries; assistance for capacity development; technical assistance)
- Mitigation measures (development and transfer of innovative technologies, co-benefit approach, etc.)
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- Global observation and data provision on climate change and its impacts
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Basic Policy on Development Cooperation in the Field of Climate Change:

Recommendations by Experts' Panel for Realization of "Cool Earth"

This paper presents a set of recommendations by an Experts' Panel established by the Ministry of Foreign Affairs of Japan concerning development cooperation in the field of climate change. In recognition of the global nature of efforts to address climate change, the Panel has, in this paper, set forth its views on the basic policy directions to be shared by the international community, including developed and developing countries as well as international organizations, and on actions to be taken by each actor in promoting development cooperation in the field of climate change.

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Part 1: Goal, Underlying Principles, Basic Policy Directions

1. Challenges

Adverse impacts of climate change are already being felt worldwide, and this presents unavoidable risks to developing and developed countries alike in the coming decades.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) concluded in the Working Group I report of its Fourth Assessment Report (AR4) that the climate system is warming and that most of the observed increase in global average temperatures is very likely due to the observed increase in anthropogenic greenhouse gas (GHG) concentrations. The Working Group II report of AR4 showed that the Earth's natural environment is being affected by global warming.

Adverse impacts of climate change are evident around the world, and damage is already occurring in various forms. It is widely thought that climate change presents unavoidable risks to developed and developing countries alike over the next several decades. Long-term projections indicate that global potential food production will begin to decline if global average temperatures increase by more than the range of 1 to 3 degrees Celsius; by the 2080s several million more people will be affected by floods each year due to rising sea levels; and by mid century average annual river flow volumes and water availability will drop by 10 to 30 percent in many parts of middle-latitude and dry tropical regions. Other projections include a higher frequency of hot extremes, heat waves, and heavy precipitation, as well as an increase in the intensity of tropical cyclones.

Response to climate change is often delayed, especially in developing countries, due to lack of financial resources, technologies, and expertise, or concerns for deceleration of economic growth. Such delay would constitute a major hindrance to the achievement of the Millennium Development Goals (MDGs) and sustainable development in developing countries.

In order for societies to deal with climate change effectively, a variety of social and economic factors must be put in place, including infrastructure, technology, information, financial resources, and administrative capacity. Response to climate change is often delayed, however, especially in developing countries due to a lack of financing, technologies and expertise. Some countries take a negative attitude towards dealing with climate change because of their concerns that such actions may drag down economic growth.

Meanwhile, if no action is taken, the impacts of climate change are likely to

hamper sustainable development in developing countries. In its *Human Development Report 2007/2008*, the United Nations Development Programme (UNDP) has pointed out that a large number of the world's poorest population faces adverse impacts of climate change in developing countries. The report has also pointed out that climate change is hindering efforts to achieve the Millennium Development Goals, and that how the world deals with climate change now will have a direct impact on future prospects for human development for many people on the Earth.

It is therefore important to utilize financial resources, technologies and expertise of developed countries for taking adaptation measures in developing countries vulnerable to the impacts of climate change, and for promoting mitigation in emerging countries that are experiencing rapid growth.

It is crucial that effective initiatives be promoted in developing countries where response to climate change is often delayed due to various constraints, through the utilization of financial resources, technologies and expertise of developed countries.

Climate change immensely affects particularly vulnerable regions and the people living there, such as small-island states, coastal areas and arid regions, as well as the poor and countries with large populations of the poor. Climate change is therefore an issue that affects not only sustainable development but also human security. For these reasons, adaptation measures should be taken in developing countries at the earliest possible time.

Meanwhile, some developing countries that are going through a high level of economic development have become major GHG emitters, and they are in a position to have a real impact on the progress of global warming in the future. In addition to adaptation measures, it is important that mitigation measures be actively promoted in these countries.

2. Goal

○ **To realize a global sustainable society, and to formulate mechanisms for achieving this objective**

When promoting development cooperation in the area of climate change, the shared goal of the international community, including developed countries, developing countries and international organizations, should be the achievement of a global sustainable society. Global sustainable society can be achieved through actions taken by the entire international community with a long-term perspective. To that end, it is necessary to formulate a flexible, diverse and effective post-2012 framework for international cooperation on climate change in which every country in the world will take actions and work together towards a significant reduction of GHG emissions.

3. Underlying Principles

In order for all countries of the world to collaborate with each other and take actions, it is important to have common principles that can be shared by all. The underlying principles in promoting development cooperation in the area of climate change that should be shared by the international community, including developed countries, developing countries and international organizations, include (i) taking on climate change as a universal challenge, (ii) making climate change management and economic development compatible, and (iii) self-reliance and mutual cooperation.

3.1 Taking on Climate Change as a Universal Challenge

Climate change is one of the most important issues facing humanity today. It must be addressed based on the shared recognition and in the mode of action indicated below.

(1) Shared Recognition

We must share the recognition that climate change is an urgent issue for all of humanity, with impacts on human security, and all actors must make conscious efforts to address this issue.

(2) Mode of Action

All actors, including national governments, organizations, including the private sector and individuals, must work together and take early action worldwide toward the solutions of problems.

3.2 Making Climate Change Management and Economic Development Compatible

In the long run, climate change can have profound impacts on economic growth and development, and on the global economy. Putting in place measures to address climate change soon and continuing to implement them over a long period of time, however, will make it possible to minimize the negative impacts. Measures to address climate change should be perceived not as barriers but as contributions to economic growth, and the following measures should be prioritized.

(1) Seek co-benefits from climate change measures:

It is important to ensure that implementation of measures to tackle climate change will have a positive effect on economic activity. Climate change measures should demonstrate a path toward development based on a co-benefit approach that can also boost the economy.

(2) Promote the use of existing and innovative technologies:

The development, transfer and dissemination of technologies to developing countries are essential for the implementation of climate change measures. Innovative environmental and energy technologies should be developed, and the transfer and dissemination of a wide range of technologies and expertise should be promoted—from existing to innovative technologies relating to energy conservation, etc.

(3) Promote climate change measures in a comprehensive way:

In the implementation of climate change measures, consideration should be given to harmonization with efforts made to address other environmental issues (such as the loss of biodiversity) and efforts in other areas (such as water, agriculture, health, and disaster reduction). An effort should also be made to harmonize between mitigation and adaptation measures, and all of these should be promoted using a comprehensive approach.

3.3 Self-Reliance and Mutual Cooperation

Climate change is an issue that requires efforts from all of humanity with a sense of ownership as well as cooperation, and actions should be taken in the spirit of self-reliance and mutual cooperation.

(1) Self-Reliance: Self-assistance and independence

Each actor involved in efforts to address climate change, from the community level up to the national level, should play its role with a clear sense of

responsibility in its respective position, and act under the principles of ownership and self help effort.

(2) Mutual Cooperation: Mutual assistance

When implementing climate change measures, all actors should also seek out effective and efficient ways of reaching solutions through mutual respect and cooperation.

4. Basic Policy Directions

Based on the principles stated above, the Panel presents the basic policy directions in promoting development cooperation in the area of climate change towards realizing the vision of a global sustainable society.

4.1 Promotion of Comprehensive Environmental Conservation

In order to realize a global sustainable society, it is necessary to create a *low carbon society* that drastically reduces GHG emissions, through the prevention of environmental pollution as well as the development of adequate systems and infrastructure for energy conservation. It is also necessary to restore the soundness of the global material cycle (including carbon) and strive for comprehensive and balanced conservation of the environment, by creating a *sound material-cycle society* in which resources are not wasted, and a *society in harmony with nature* in which ecosystems are protected as the basis of human existence.

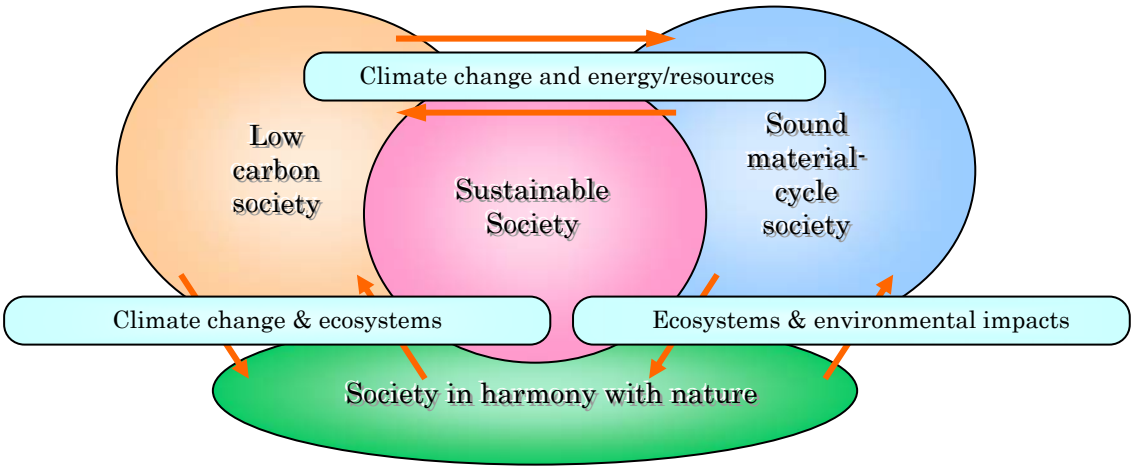

Figure 1. Integrated approach to sustainable society

Source: *21st Century Environmental Nation Strategy* (Ministry of Environment, 2007, in Japanese)

4.2 Introduction of a Medium- to Long-Term Perspective

Climate change mitigation measures should be implemented based on a medium to long-term perspective—in order to avoid serious impacts on society, based on a hundred-year timeframe. A wide range of *adaptation* measures are also needed—including not only those urgently required in regions that are most vulnerable, but also others that should be started now and continued with a medium- to long-term perspective.

(1) Mitigation measures

We should set the target of reducing global GHG emissions at least by half from the current level by the year 2050, and carry out mitigation measures in order to achieve this target.

(2) Adaptation measures

Efforts should be made to build up the medium- to long-term resilience of society to climate change, by mainstreaming the perspective of *adaptation* in every development effort—for example, by taking short-term measures to respond to climate disasters, as well as by incorporating measures to address climate change into development plans of developing countries, particularly in least-developed countries (LDCs) and small-island states.

4.3 Stepping Up Partnership Based on a Participatory Approach

We should promote active participation and develop partnership among various actors (communities, regions, national governments of developing and developed countries, international organizations; the business sector; NGOs; and experts), in order for the entire world to effectively address climate change.

4.4 Flexible and Diverse Response

In promoting development cooperation in the area of climate change, we should promote flexible measures suited to the natural, social, and economic context of each country and region, paying due respect to the uniqueness and diversity of their respective traditions and cultures.

5. Cooperation based on Policy Dialogue

In order to tackle climate change effectively on a global scale, there is a need for donor countries and international organizations to collaborate with each other and complement the lack of financial resources, technologies and expertise, especially in developing countries.

In order to ensure fruitful results from assistance, the goal and principles stipulated in the sections above should be shared at the outset among the donor countries, organizations and partner countries. Partner countries should then formulate comprehensive climate change management programs through policy dialogue with donor countries or international organizations, and donors should respond by providing assistance to help implement priority measures in line with those programs.

Part 2: Concrete Actions

6. Priority Actions to be Taken in Developing Countries

Many developing countries and regions are vulnerable to the impacts of climate change, while some are also expected to experience a rapid increase in GHG emissions in the near future due to rapid economic growth. Not only are environmental problems like air pollution, water pollution, and the loss of biodiversity becoming more serious in many developing countries, but many other challenges also need to be addressed in those countries relating to water, agriculture, health, disaster reduction, and so on. It is therefore necessary for climate change mitigation and adaptation measures in developing countries to be promoted in a manner that will also contribute to various other issues relating to sustainable development.

6.1 Overall Measures

(1) Incorporation of environmental and social considerations into all development programs

GHGs are emitted from activities in every sector in a country, including energy supply, industry, transport, household/commerce, and agriculture, and are closely linked with the economic and human activities of any country or region. Economic and human activities also trigger other environmental problems such as air and water pollution and biodiversity loss, as well as problems relating to water, agriculture, health, disaster prevention, and so on. Thus, consideration of climate change adaptation and mitigation measures alone will not be effective. It is therefore important to incorporate environmental and social considerations, including measures to address climate change, into any planning related to development, be it on energy, natural resources, land development, transportation, or population.

(2) Promotion of efforts at each of the following levels

Tackling climate change requires all actors to implement measures at all levels. In order to ensure that specific mitigation and adaptation measures are implemented effectively, cross-sectoral efforts need to be made at each of the national, regional, and community levels.

a. Efforts at the national level

Examples of measures

- Enactment and execution of basic laws and/or programs to address climate change and environmental conservation in a comprehensive manner
- Enactment and execution of specific laws that effectively address climate change (such as Act concerning the Rational Use of Energy)
- Development of economic instruments that allow measures to cope with climate change to be compatible with economic growth
- Development and promotion of educational programs on environment and climate change for the use of public/civic education
- Provision of support to regional or community-based activities related to environment and climate change

b. Efforts at the regional level

Examples of measures

- Formulation of regional plans on addressing climate change and on basic environmental policy
- Ensuring that regional society functions efficiently through collaboration between actors within the region
- Provision of support to community-based activities related to environment and climate change

c. Efforts at the community level

Examples of measures

- Promotion of education that utilizes networks within communities
- Dissemination of information and awareness-raising among local residents to facilitate their proactive and continued participation
- Establishment of a framework that can efficiently pool the knowledge and address the needs of the community as well as disseminate information

(3) Ensuring of transparency of national policies and plans on the environment and climate change

It is important that the formulation of national policies and plans relating to the environment and climate change, which is an important part of country-level efforts, be conducted in a transparent manner, and that its outcomes be shared with the international community, so as to promote international policy coordination and obtain assistance for the implementation of such plans.

6.2 Mitigation

In order to cut global GHG emissions by half by 2050, it is essential that climate change mitigation measures be promoted in developing countries where a large increase in GHG emissions are expected in the coming years. It is especially important to take measures targeting carbon dioxide (CO_2) emissions related to

energy supply and demand, which account for more than 60 percent of GHG emissions in developing countries. Thus, a co-benefit approach should be promoted that achieves GHG emissions reductions while at the same time bringing benefits that contribute to sustainable development in those countries, including improvements in the state of air and water pollution.

Furthermore, forest-related measures in developing countries are vital in terms of natural resource management and biodiversity protection, and they can facilitate even greater results if measures are taken, taking into account the function of forests as carbon sinks.

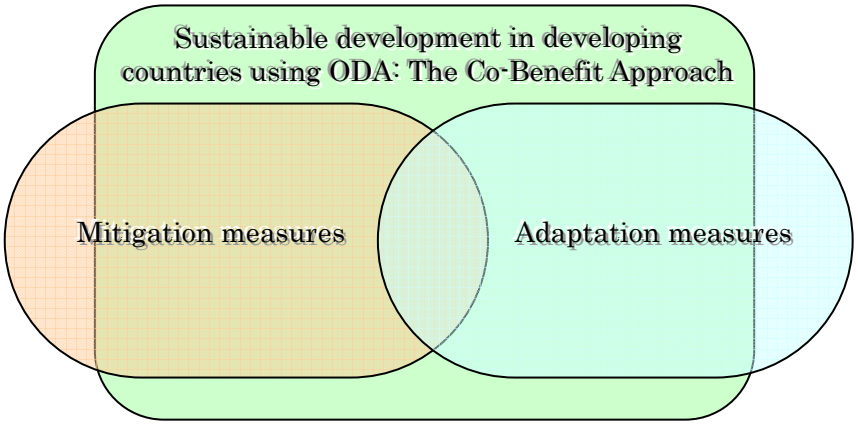

Figure 2. Use of ODA for sustainable development in developing countries

Source: Adapted from *JICA Cooperation and Climate Change Mitigation Measures* (Japan International Cooperation Agency, Nov. 2007, in Japanese).

The following mitigation measures should be implemented.

(1) Measures related to energy supply and demand

Generally speaking, energy supply systems in developing countries tend to be more fragile and inefficient than in developed countries, and the improvement of their efficiency is needed in order to ensure stable supply of electricity. Furthermore, energy utilization systems on the demand side (industry, transport, residential and commercial sectors, etc.) are often not efficient enough, which makes it important for many developing countries to take demand-side measures such as energy conservation.

a. Demand side

In many developing countries, industrial development, population growth, and the concentration of population in urban areas have brought about the development of transport infrastructure including railways, roads and ports, and

urban infrastructure. It is a major challenge to determine how to make these socio-economic systems have low carbon emissions and sound material cycles. That is to say, when planning urban and rural development, or creating systems for transport or waste management, it is essential to adequately consider ways to steer a society towards a low carbon path with sound material cycles, instead of the traditional path that developed countries followed and led to high GHG emissions.

Examples of measures

- Formation of socio-economic systems that achieves low carbon/sound material cycle
  - Urban development, regional development
  - Rural development
  - Transportation
  - Environmental management (waste management, 3R (reduce/ reuse/ recycle), etc.)
- Energy conservation
  - Industrial sector
  - Household/commercial sector (housing, construction, etc.)

b. Supply side

In developing countries, due to technical and financial constraints, people often continue to use inefficient power generation facilities and are unable to shift to low carbon fuels, leaving them to rely upon fuels with high CO_2 emissions. Thus, it is necessary to take measures to curb GHG emissions from their energy supply systems, as an integral part of efforts to secure stable supplies to meet energy demand,.

Examples of measures

- Promotion of renewable energy (solar, wind, geothermal, biomass, etc.)
- Improvement of efficiency in energy supply (power generation, supply systems, etc.)
- Utilization of low-carbon energy sources (clean coal, nuclear energy, etc.)
- Promotion of fuel switching (renewable energy, low carbon fossil fuels, etc.)
- Regulatory improvements, etc. (e.g., maintain fair energy prices in order to promote the measures above)

c. Access to modern and cleaner energy

Developing countries often face problems such as unstable electricity supply and only limited electrification outside the cities, and rural areas have many energy supply problems, including the unsustainable use of fuelwood. In cases where people have limited or no access to modern energy sources, measures must be urgently taken to improve the situation. In doing so, rather than

depending only on fossil fuels, it would be preferable to take advantage of renewable energy, such as solar, wind, and hydropower, as well as clean modern energy sources that utilize livestock manure and other waste.

Examples of measures

- Rural electrification using renewable energy
- Reduction of poverty and stabilization of social and economic activities in rural areas through stable supply and efficient use of energy

(2) Measures related to carbon sinks

Materials such as timber and fuelwood are important sources of energy in many developing countries. Excessive fuelwood collection and other forms of inappropriate forest management, however, can lead to the loss of forests and vegetation, to the extent that they end up functioning as CO_2 emission sources rather than CO_2 sinks. This situation also results in the loss of the multi-faceted functions of forests and other natural resources, such as the preservation of biodiversity, water conservation, and soil conservation. Therefore, it is essential to create a framework in which natural resources can be used sustainably, and the balance between the improvement in rural livelihood and development on the one hand, and the environment on the other, can be maintained. When implementing projects to this end, an effective approach is to adopt participatory methods with the proactive involvement of rural populations.

a. Forest conservation

Many developing countries have concerns about the loss of forests as a result of the conversion of forests into agricultural and urban lands, due to population growth, economic development, and urbanization. Other problems, caused by inappropriate forest management, include use of forest resources in an unsustainable manner, as well as forest deterioration due to pests and forest fires. In order to address these problems, forest conservation measures are needed that are practicable even in the context of complex and interlinked forest ownership rights and forest use rights.

Examples of measures

- Practice of sustainable forest management
  - Sound management of forests
  - Prevention of uncontrolled or illegal logging
  - Prevention of forest fire
- Development and conservation of carbon sinks
  - Afforestation
  - Reforestation
- Locate and monitor forest resources

b. Land management

In addition to forests, a wide variety of land resources have an impact on GHG emissions and sinks, and are also closely connected with the livelihoods of human populations. This includes arid and semi-arid lands, which are vulnerable to the impact of human activities, and as a result of deterioration from inappropriate land use and excessive resource exploitation, many of them have become CO_2 emitters. In order to conduct sustainable land management in such areas, it is necessary to adopt specific measures that are designed to suit local conditions.

Examples of measures

- Creation of a societal system that is in harmony with nature (e.g., prevention of desertification / land degradation due to uncontrolled cultivation and grazing, etc.)
- Establishment and appropriate management of protected areas

(3) Curbing of GHG emissions from non-energy sources

In developing countries, almost 40 percent of GHG emissions come from non-energy sources including methane from agriculture and waste, and leakage of CFCs from industrial processes). Among these, CFCs and other ozone-depleting substances happen to have significant greenhouse effects, so efforts to reduce their emissions would bring about the co-benefits of preventing global warming and protecting the ozone layer. Meanwhile, some methane emissions come from sources that are difficult to control such as paddy fields and livestock, although emissions from waste treatment sites (landfills) can be controlled with proper waste management practices.

Examples of measures

- Recovery and destruction of ozone-depleting substances with high greenhouse effects
- Control of methane emissions through appropriate waste management and the 3R

(4) Promotion of a co-benefit approach which satisfies development needs and addresses climate change measures at the same time

Many developing countries urgently need to address their worsening environmental problems, such as air pollution, water pollution, and waste problems arising from rapid economic growth. It is necessary for them to take measures based on a co-benefit approach that can deliver environmental improvements at the local level as well as GHG emissions reductions in a wider sense at the same time. For example, thermal electric power plants and

automobiles are not only sources of air pollution but also of GHG emissions. Improvement of efficiency in aging thermal electric power plants, vehicle fuel-efficiency improvements, and the use of hybrid vehicles can therefore serve as an effective means not only of reducing air pollution but also of mitigating global warming.

Examples of measures

- Environmental management
  - Air pollution prevention and reduction of GHG emissions
  - Water pollution prevention and reduction of GHG emissions
  - Waste management and reduction of GHG emissions
- Conservation of the natural environment
  - Biodiversity protection, reduction of GHG emissions, and enhancement of sinks
- Rural development
  - Livelihood improvements, poverty alleviation, reduction of GHG emissions, and enhancement of sinks
- Water resources
  - Water utilization/flood control, reduction of GHG emissions, and enhancement of sinks

6.3 Adaptation

The impacts of global warming and adaptation measures to address them differ considerably by country and region, depending on the characteristics of natural phenomena such as drought or flooding, and on different degrees of vulnerability of social systems. In particular, developing countries tend to be ill prepared even to respond to current weather conditions, and therefore run a high risk of being adversely affected by future climate change because of their vulnerability.

(1) Enhancement of adaptive capacity of local communities

The impacts of climate change can seriously threaten the lives and livelihoods of individuals and communities. Because of this, it is essential to enhance the adaptive capacity of communities and individuals based on the human security approach, taking into account regional and community characteristics, including their vulnerabilities, in particular.

In this respect, it is necessary to promote participatory measures that encourage self-reliant efforts of communities and individuals.

(2) Highlighting of adaptation measures in the formulation of development plans

a. Mainstreaming adaptation measures into development plans from a long-term and cross-sectoral perspective

It is necessary to "mainstream" adaptation into development－in other words,

to consciously take into consideration future climate change risks when planning and implementing development policies, so that current development efforts will be able to adapt to future impacts of climate change.

Because climate change can influence natural and social systems in a complex and inter-related manner, adaptation measures that only address the immediate impacts of climate change cannot be effective. An effective approach would be to incorporate adaptation measures for a variety of climate change impacts into the consideration of comprehensive development strategies, from a long-term and cross-sectoral perspective, including on population-related policies, resource management, environmental risk management and improvement of adaptive capacity of societies.

Furthermore, sometimes the impacts of climate change can be far-reaching, beyond the borders of one country, as seen in the case of flooding due to glacial melting, and water resource problems in international watersheds. In order to promote measures at the regional level and beyond national boundaries, it is essential to establish a common understanding between countries within a given region that climate change is an issue that requires solutions from a long-term cross-sectoral perspective, and to promote broader regional cooperation as well as “South-South” cooperation.

b. Identification of sectors and issues in need of urgent attention based on regional differences in the impacts of climate change and measures for adaptation

The magnitude of the impact of climate change, and the capacity to adapt to it, differ from region to region. In particular, adaptation measures should be implemented promptly where severe impacts are predicted, such as mega-deltas and other coastal zones, small-island states and regions, and arid zones.

The identification of sectors and issues to be prioritized as adaptation measures should be made based upon scientific knowledge, taking into account regional characteristics.

c. Enhancement of existing measures and implementation of measures to address emerging impacts

Efforts should be made to reduce the vulnerabilities to future climate change impacts by strengthening existing adaptation measures to address predicted climate change risks. At the same time, it is also necessary to take measures against future emerging risks such as flooding from glacial melting.

Adaptation to climate change sometimes entails making human alteration to

the natural environment, so it is necessary to ensure that adaptive measures do not hinder sustainable development.

(3) Sector-specific measures and coordination between sectors

The report of the IPCC's Working Group II predicts impacts in various sectors. Adaptation measures for each of these sectors, as well as coordination between related sectors, are needed.

a. Water resources

The amount of precipitation is projected to rise globally due to future climate change, but some regions will experience a decrease in rainfall while others changes in rainfall patterns, and regional disparities in water resource availability are expected to grow. More regions will be adversely affected by drought, but some regions will face the risk of flooding due to the increase in the frequency of intense rainfall events in some regions will increase the risk of flooding. In addition, decreases are predicted in river flow volumes in arid zones in middle latitudes and dry tropical regions. Decrease in the amount of available water are also predicted for mountainous areas, due to the decline of glaciers and snowfall.

In developing regions with low water resource availability, a variety of programs are already being provided for water resource management and development, but these efforts need to be strengthened further. Since challenges over water resources are closely related to many other development sectors, cross-sectoral efforts should be carried out.

<u>Examples of measures</u>

- Assessments on vulnerabilities and risks regarding the impacts of climate change on water resources
- Development of prevention plans and emergency action plans for disasters such as drought, floods, based on the above
- Development and enhancement of infrastructure for the purpose of water resource conservation and management, and water resource development
  - Short-term infrastructure development such as water storage reservoirs, that can handle a worsening of droughts and floods.
  - Medium- and long-term water resource developments
- Water resource management on a watershed basis, based on integrated water resource management (IWRM)
- Consideration of climate change in national water management plans
- Efficient use of water resources, including water for agricultural and urban uses in arid regions
- Improvement of water use efficiency by promoting the use of recycled water
- Expanded use of traditional technologies for use of rainwater and water conservation

- Community strengthening (e.g., warning systems, disaster prevention training)

b. Food supplies and agriculture

Although food production potential may increase in some areas with a moderate increase in average temperatures as a result of climate change, in lower latitudes such as tropical regions that have annual dry seasons, even a one or two degree increase in average regional temperatures will likely reduce crop productivity and increase the risk of famine. In addition, there are concerns about impacts on rain-fed cultivation as a result of changes in precipitation associated with water resources.

Agriculture, forestry and fisheries in developing countries are already highly susceptible to the impacts of changes in weather conditions, and measures required for stable operation of these activities are not in place. In particular, small-scale subsistence farmers and fishers are highly vulnerable, so improvements in agricultural systems are needed in order to strengthen their adaptive capacity.

Examples of measures

- Risk reduction by development of integrated management and irrigation facilities in regions where there are frequent water shortages or frequent floods
- Development of agricultural systems, such as modifications in cultivation schedules
- Development of new technologies (e.g., development of environmentally robust varieties for arid and saline soil), and improvements in cultivation technologies
- Shifting of fishing sector activities toward fish cultivation, and aquatic resource management
- Regulatory development relating to food supply, including supply and demand planning, stockpiling programs, and so on
- Risk reduction of food production by utilizing seasonal weather forecasts

c. Human health

The direct impacts of climate change on human health could include an increase in fatalities, disease and injury from heat waves and other large-scale weather-related disasters. Indirect impacts could include an increase in water-borne and other infectious diseases, compounded impacts of air pollution, and social disruption caused by weather-related disasters.

In promoting development in the health and sanitation sectors in developing countries, measures are required that take into account the impacts of climate change. Also, collaboration with other related sectors such as improved water supply coverage ratio and improved nutrition through stable food supplies are

important.

Examples of measures

- Improvement in hygiene conditions by strengthening public sanitation systems including improved access to safe water
- Prevention of infectious diseases, and development of early warning systems for the spread of infectious diseases
- Development of systems to provide public information for the prevention of heat stroke

d. Disaster reduction

Coastal areas are among the most vulnerable to the impacts of climate change, as predicted impacts including land erosion due to submergence, and damage from storm surges and typhoons, are likely to worsen. There are also concerns about greater tropical cyclone intensity, flash floods and landslides caused by glacial melting, and increased floods. Flooding and other impacts are also predicted in regions with large and medium-sized watersheds.

It is necessary to significantly strengthen disaster prevention in regions that are highly vulnerable to natural disasters.

Examples of measures

- Seawalls, breakwaters, and bank enhancements to address coastal erosion and storm surges, etc.
- Levies, watercourses, catchment ponds, as measures to deal with river flooding.
- Sediment control dams to reduce the risk of mudslides.
- Preparation of disaster-response master plans and damage scenarios that take climate change risks into account.
- Formulation of national action plans and programs, etc., including acquisition and transfer of land in areas at risk from sea-level rise
- Awareness-raising campaigns for land-owners in coastal areas, and implementation of participatory risk assessments
- Non-structural measures such as warning systems and evacuation activities

e. Socio-economic infrastructure

Social and economic infrastructure such as road networks, seawalls, and water supply and sewage systems, which have a long useful life of several decades, are usually built to withstand a variety of weather-related damage that can be foreseen at the time when the structures were designed. In promoting the development of this type of infrastructure which is highly needed especially in developing countries, it is necessary to consider future climate change risks, right at the conceptual and planning phase, so that they can function for the long-term.

Examples of measures

- Consideration of land use planning to withstand climate change impacts, assistance for the preparation of urban and regional development master plans
- Infrastructure development that takes into account climate change impacts, in regions with high risk to climate change

f. Ecosystems

It is predicted that climate change impacts, combined with development pressures and other factors, may reduce the resilience of ecosystems. There are concerns over the loss and migration of ecosystems such as wetlands, mangrove forests and coral reefs; changes in distribution and migration times of certain species; and increased risk of species extinction. These are predicted to adversely affect recharge of water sources, soil formation, and other functions that provide an important basis for human life.

Natural resources should be managed sustainably, from the perspective of protecting ecosystems, as well as the perspective of how society should adapt to ecosystem changes caused by climate change. It is also important to ensure that infrastructure development done as part of adaptation measures do not result in new adverse impacts on ecosystems.

Examples of measures

- Mangrove conservation/planting and coral reef conservation, as measures against flooding and high storm surges, as well as tsunamis, caused by climate change
- Measures to prevent forest fires due to changes in precipitation patterns
- Restoration of degraded areas in arid and semi arid regions, tree planting to prevent desertification
- Enhancement of resilience to climate change impacts by taking measures in advance to problems other than climate change (prevention of habitat destruction and fragmentation, environmental pollution, invasion of alien species, etc.)
- Institutional improvements for continuous monitoring as well as data collection and data utilization of vegetation and marine life

(4) Needs assessment and flexible responses based on scientific knowledge

a. Improvement of technical capacity for observing and projecting climate change, and for impact assessments, at national and regional levels

It is necessary to carry out at micro levels (e.g., national or regional) the observation and projection of climate change as well as impact and vulnerability assessment that are already underway at the global scale.

It is important to develop human resources required for this work, to encourage the voluntary participation of the relevant persons in developing

countries, and to ensure that actual policymakers in each country become directly aware of climate change risks.

An effective way do this is to share information efficiently by creating networks of experts in the relevant countries, and to build capacity by implementing joint projects relating to observation, projection, and impact assessment.

b. Collection, management, disclosure and sharing of information relating to climate change impacts and adaptation

Information relating to adaptation tend to reflect local characteristics, but there is much that other regions under similar circumstances can draw from. It would be valuable to gather information about successes and failures of adaptation measures and, to the extent possible, make the information available to anyone who needs it.

Developing countries should also promote the collection and management of information in adaptation-related areas and share it with donor countries, international organizations, regional cooperation organizations, and so on.

c. Formulation of plans on adaptation based on scientific knowledge, and enhancing institutional flexibility to implement them

Actual adaptation efforts are conducted mainly at the community and local levels. It is therefore crucial to establish systems and organizations in which officials dealing with policy and implementation at the local level are able to understand the latest scientific knowledge and prepare and implement adaptation plans based on them. It is also important that such organizations should be flexible enough to enable smooth cooperation between departments responsible for different areas.

(5) Training of experts on adaptation

Experts need to be trained with knowledge and experience in the wide variety of areas required for adaptation measures, and experts in each related area should incorporate the perspective of adaptation into their area of expertise. In particular, it is important to train local experts in developing countries who are well-informed about their own national or regional circumstances.

(6) Establishment of cooperative systems to function in the event of any climate-related disaster (insurance, etc.)

If damage relating to water resources or food becomes chronic or becomes frequent as a result of climate change, cooperative systems should be established in order to promptly assess the impacts and implement appropriate

adaptation measures. It is also important to consider creation and introduction of new frameworks, such as climate change insurance to compensate for unavoidable damage.

7. Implementation of Assistance

7.1 Actions to be Taken by Donor Countries and Organizations

(1) Overall Measures

a. Assessment of the situation and challenges in developing countries

Effective assistance programs should be created, building on assessments of the current situation in developing countries relating to the Millennium Development Goals and development priority areas, as well as challenges in development that can be expected due to the impacts of climate change.

Examples of measures

- Fostering common understanding between experts in climate change and those in development
- Survey and analysis for observation, projection, and impact assessment on climate change
- Support for the development of infrastructures and institutions for assessing the situation and outstanding challenges

b. Assistance for capacity development

Training local experts who are knowledgeable about local conditions of their country, region or community is both an urgent task as well as a challenge that requires long-term and continuous efforts. Furthermore, since climate change is still a relatively new challenge for developed and developing countries alike, it is important that developed countries also train their own personnel for carrying out assistance to developing countries in the area of climate change.

Examples of measures

- Human resource development aimed at government officials, experts and researchers in developing countries
- Sharing social systems (governance including laws and other institutions), experiences and knowledge of developed countries with developing countries
- Awareness-raising of citizens in developing countries on global environmental issues

c. Technical assistance

It is effective to provide assistance for the development, transfer and dissemination of climate change-related technologies that can be easily adopted locally, working in collaboration with personnel in developing countries. Assistance should be provided not just for the latest technologies, but also for a wide range of technologies, including conventional low-cost ones that are easy to propagate and ones that utilize traditional knowledge.

Examples of measures

- Enhancement of science and technology diplomacy (transfer and dissemination of technologies)
- Support for the development of “hardware” that has a direct effect as mitigation and adaptation measures, and transfer of its operation and management technique (“software”)

d. ”Tailor-made” assistance

An enormous amount of time and financial costs would be required in order to offer tailor-made assistance that responds to the actual situation at each of the national, regional, or community levels. It is therefore crucial to identify priorities and select target projects in a timely and appropriate manner.

Examples of measures

- Feeding scientific data obtained from monitoring back into policy-making on assistance in order to provide better support

(2) Mitigation measures

a. Development and transfer of innovative technologies

When providing assistance for mitigation measures in developing countries, it is important not only to apply existing technologies that are commonly used in developed countries, but also to develop innovative new technologies and transfer them to developing countries.

b. Support through co-benefit approach

In developing countries where a variety of environmental problems such as air and water pollution are getting increasingly serious as a result of economic development, it is effective to employ a co-benefit approach, in which assistance offered helps to resolve these problems while also reducing GHG emissions. It is necessary to formulate guidelines, standards, frameworks so as to apply this approach also to the conventional type of development cooperation.

c. Utilization of the Clean Development Mechanism (CDM) and support for mitigation measures that are not covered by the CDM

As a result of incentives for small-scale CDM projects, many projects are contributing to sustainable development at the local level, including through small-scale hydropower generation and biomass electricity generation. Yet these projects tend to be heavily concentrated on certain countries and regions. Donor countries and organizations should make the greatest possible use of the CDM, while also providing assistance for mitigation measures that are not covered by the CDM.

(3) Adaptation measures

a. Mainstreaming adaptation into all development assistance programs and projects

It is important to mainstream adaptation into all types of development assistance projects including traditional ones implemented by donor countries and organizations. Guidelines need to be drawn up specifying how to reflect considerations on adaptation to future changes in the climate and environment in the planning and design phase of development assistance projects, and in environmental impact assessments.

b. Enhancing assistance in sectors related to adaptation

Sectors that are most susceptible to climate change, such as water, agriculture, health, and disaster prevention, should be given priority in the provision of assistance, based on a preventive perspective.

c. Detailed and accurate assessment of vulnerabilities and risks and the assistance corresponding to it

In order to provide effective assistance for adaptation measures, it is necessary to first have the results of vulnerability and risk assessments, but the required data, expertise, or technology are often lacking. Thus a phased approach should be taken in the implementation of assistance; initial assistance should be provided for a detailed and accurate assessment on vulnerabilities and risks, and then, building on its results, tailor-made assistance should be provided for specific adaptation projects to respond to the actual local conditions.

7.2 Actions to be Taken Especially by International Organizations

(1) Global observations and data provision on climate change and its impacts

The existing Global Earth Observation System of Systems (GEOSS) aims to establish global observation systems for the benefit of society, and one objective is to “understand, assess, project, mitigate and adapt to climate variability and change.” Also, The World Meteorological Organization (WMO), Intergovernmental Oceanographic Commission (IOC) of United Nations Educational, Scientific and Cultural Organization (UNESCO) and other organizations are engaged in observation of climate change and its impacts. It is essential that efforts be made to share the observation data obtained from these existing initiatives as widely as possible.

(2) Establishment of information-sharing platforms for good practice, etc.

Climate change initiatives of developed countries include a wide range of efforts, from comprehensive initiatives including vulnerability assessment methodologies and planning, to specific adaptation technologies. Success stories or “good practices” among these, as well as good practices of climate change measures adapted to the local conditions in developing countries, are valuable information for other developing countries and donor countries.

International organizations should establish platforms to facilitate the sharing of information relating to these good practices around the world.

(3) Enhancement of collaboration

a. Collaboration among relevant actors

International organizations should play a central role in facilitating collaboration among a variety of actors, in order to improve the effectiveness and efficiency of actions by a wide range of actors worldwide, including not only governments, government-related agencies and international organizations, but also private corporations, NGOs, experts, and so on.

b. Collaboration among conventions related to environment

It is important not only to promote mutual collaboration between related fields at the development program and project levels, but to promote collaboration at the international level as well. To that end, collaboration should be strengthened between the UNFCCC (climate change) and other multilateral environmental agreements (Convention on Biological Diversity, Convention to Combat Desertification, etc.).

Appendix: Examples of Mitigation, Adaptation, and Other Measures

Overall Measures

Area	Examples of Measures
Efforts to be Promoted at Each Level	
National level	Enactment and execution of basic laws and/or programs to address climate change and environmental conservation in a comprehensive manner
	Enactment and execution of specific laws that effectively address climate change (such as Act concerning the Rational Use of Energy)
	Development of economic instruments that allow measures to cope with climate change to be compatible with economic growth
	Development and promotion of educational programs on environment and climate change for the use of public/civic education
	Provision of support to regional or community-based activities related to environment and climate change
Regional level	Formulation of regional plans on addressing climate change and on basic environmental policy
	Ensuring that regional society functions efficiently through collaboration between actors within the region
	Provision of support to community-based activities related to environment and climate change
Community level	Promotion of education that utilizes networks within communities
	Dissemination of information and awareness-raising among local residents to facilitate their proactive and continued participation
	Establishment of a framework that can efficiently pool the knowledge and address the needs of the community as well as disseminate information

Mitigation

Area	Examples of Measures
Measures Related to Energy Supply and Demand	
Demand side	Formation of socio-economic systems that achieves low carbon/sound material-cycle
	・ Urban development, regional development
	・ Rural development
	・ Transportation
	・ Environmental management (waste management, 3R (reduce/ reuse/ recycle), etc.)
	Energy conservation
	・ Industrial sector
	・ Household/commercial sector (housing, construction, etc.)
Supply side	Promotion of renewable energy (solar, wind, geothermal, biomass, etc.)
	Improvement of efficiency in energy supply (power generation, supply systems, etc.)
	Utilization of low-carbon energy sources (clean coal, nuclear energy, etc.)
	Promotion of fuel switching (renewable energy, low carbon fossil fuels, etc.)
	Regulatory improvements, etc. (e.g., maintain fair energy prices in order to promote the measures above)
Access to modern and cleaner energy	Rural electrification using renewable energy
	Reduction of poverty and stabilization of social and economic activities in rural areas through stable supply and efficient use of energy
Carbon Sinks	
Forest conservation	Practice of sustainable forest management
	・ Sound management of forests
	・ Prevention of uncontrolled or illegal logging
	・ Prevention of forest fire
	Development and conservation of carbon sinks
	・ Afforestation
	・ Reforestation
	Locate and monitor forest resources
Land management	Creation of a societal system that is in harmony with nature (e.g., prevention of desertification / land degradation due to uncontrolled cultivation and grazing, etc.)
	Establishment and appropriate management of protected areas
Curbing of GHG Emissions from Non-Energy Sources	
Ozone-depleting substances	Recovery and destruction of ozone-depleting substances with high greenhouse effects
Methane	Control of methane emissions through appropriate waste management and the 3R
Promotion of a Co-Benefit Approach	
Environmental management	Air pollution prevention and reduction of GHG emissions
	Water pollution prevention and reduction of GHG emissions
	Waste management and reduction of GHG emissions
Conservation of the natural environment	Biodiversity protection, reduction of GHG emissions, and enhancement of sinks
Rural development	Livelihood improvements, poverty alleviation, reduction of GHG emissions, and enhancement of sinks
Water resources	Water utilization/flood control, reduction of GHG emissions, and enhancement of sinks

Adaptation

Area	Examples of Measures
Water resources	Assessments on vulnerabilities and risks regarding the impact of climate change on water resources
	Development of prevention plans and emergency action plans for disasters such as drought, floods, based on the above
	Development and enhancement of infrastructure for the purpose of water resource conservation and management, and water resource development
	・ Short-term infrastructure development such as water storage reservoirs, that can handle a worsening of droughts and floods.
	・ Medium- and long-term water resource developments
	Water resource management on a watershed basis, based on integrated water resource management (IWRM)
	Consideration of climate change in national water management plans
	Efficient use of water resources, including water for agricultural and urban uses in arid regions
	Improvement of water use efficiency by promoting the use of recycled water
	Expanded use of traditional technologies for use of rainwater and water conservation
	Community strengthening (e.g., warning systems, disaster prevention training)
Food supplies and agriculture	Risk reduction by development of integrated management and irrigation facilities in regions where there are frequent water shortages or frequent floods
	Development of agricultural systems, such as modifications in cultivation schedules
	Development of new technologies (e.g., development of environmentally robust varieties for arid and saline soil), and improvements in cultivation technologies
	Shifting of fishing sector activities toward fish cultivation, and aquatic resource management
	Regulatory development relating to food supply, including supply and demand planning, stockpiling programs, and so on
	Risk reduction of food production by utilizing seasonal weather forecasts
Human health	Improvement in hygiene conditions by strengthening public sanitation systems including improved access to safe water
	Prevention of infectious diseases, and development of early warning systems for the spread of infectious diseases
	Development of systems to provide public information for the prevention of heat stroke
Disaster reduction	Seawalls, breakwaters, and bank enhancements to address coastal erosion and storm surges, etc.
	Levies, watercourses, catchment ponds, as measures to deal with river flooding.
	Sediment control dams to reduce the risk of mudslides.
	Preparation of disaster-response master plans and damage scenarios that take climate change risks into account.
	Formulation of national action plans and programs, etc., including acquisition and transfer of land in areas at risk from sea-level rise
	Awareness-raising campaigns for land-owners in coastal areas, and implementation of participatory risk assessments
	Non-structural measures such as warning systems and evacuation activities
Socio-economic Infrastructure	Consideration of land use planning to withstand climate change impacts, assistance for the preparation of urban and regional Development master plans
	Infrastructure development that take into account climate change impacts, in regions with high risk to climate change
Ecosystems	Mangrove conservation/planting and coral reef conservation, as measures against flooding and high storm surges, as well as tsunamis, caused by climate change.
	Measures to prevent forest fires due to changes in precipitation patterns

Area	Examples of Measures
	Restoration of degraded areas in arid and semi arid regions, tree planting to prevent desertification
	Enhancement of resilience to climate change impacts by taking measures in advance to problems other than climate change (prevention of habitat destruction and fragmentation, environmental pollution, invasion of alien species, etc.)
	Institutional improvements for continuous monitoring as well as data collection and data utilization of vegetation and marine life.
Other, cross-sectoral initiatives	Needs assessment and flexible responses based on scientific knowledge
	・Improvement of technical capacity for observing and projecting climate change, and for impact assessments, at national and regional levels
	・Collection, management, disclosure, and sharing of information relating to climate change impacts and adaptation
	・Formulation of plans on adaptation based on scientific knowledge, and enhancing institutional flexibility to implement them
	Training of experts on adaptation
	Establishment of cooperative systems to function in the event of any climate-related disaster (insurance, etc.)

Actions to be Taken by Donor Countries and Organizations

Area	Examples of Measures
Assessment of the situation and challenges in developing countries	Fostering common understanding between experts in climate change and those in development
	Survey and analysis for observation, projection, and impact assessment on climate change
	Support for the development of infrastructures and institutions for assessing the situation and outstanding challenges
Assistance for capacity development	Human resource development aimed at government officials, experts and researchers in developing countries
	Sharing social systems (governance including laws and other institutions), experiences and knowledge of developed countries with developing countries
	Awareness-raising of citizens in developing countries on global environmental issues
Technical assistance	Enhancement of science and technology diplomacy (transfer and dissemination of technologies)
	Support for the development of “hardware” that has a direct effect as mitigation and adaptation measures, and transfer of its operation and management technique (“software”)
“Tailor-made” assistance	Feeding scientific data obtained from monitoring back into policy-making on assistance in order to provide better support