

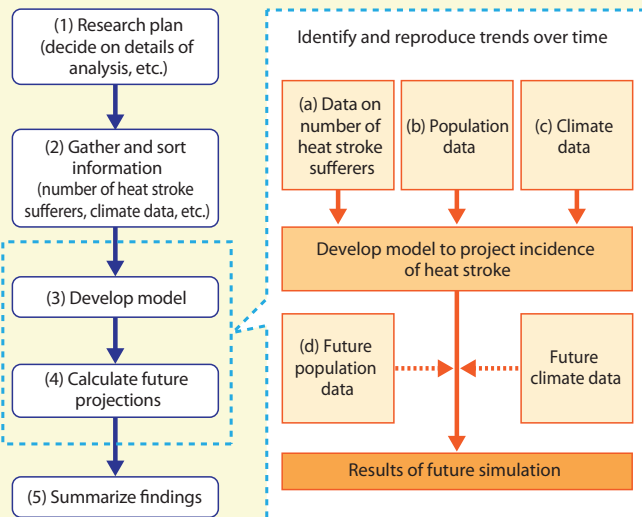
## Adaptation Efforts by Local Governments Have Already Started

Several local governments have already started monitoring, projection and assessment of climate change impacts, as well as implementation of adaptation strategies. This pamphlet introduces some examples of initiatives by local governments and other bodies in Japan.

### Example of Risk Assessments — Tokyo

The Tokyo Metropolitan Government has launched efforts to project and assess the impacts of climate change within its jurisdiction.

In terms of heat stroke, for example, the local government is building a model estimating the incidence of heat stroke from data on population, climate, heat stroke sufferers, and so on, and using this to project the number of future cases of heat stroke.

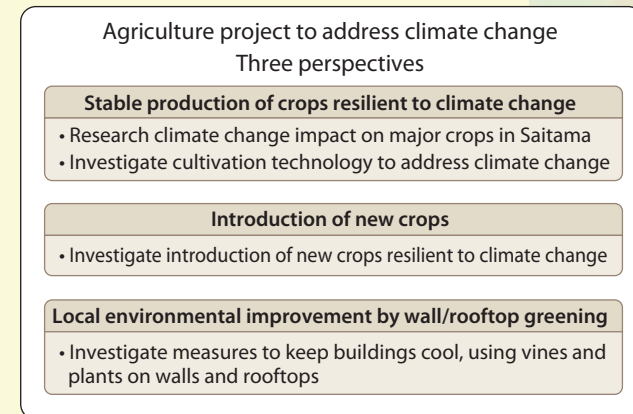


Source: Tokyo Metropolitan Government

### Prefectural Ordinance Includes Adaptation. Urgent Report Released on Impacts — Saitama Prefecture

In 2009, Saitama Prefecture adopted an Ordinance on the Promotion of Global Warming Countermeasures, which includes the concepts of both adaptation and mitigation.

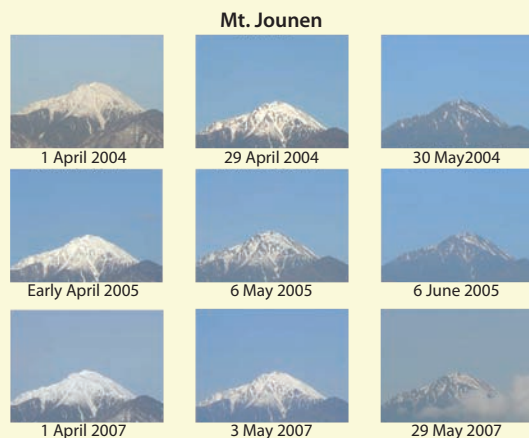
The Center for Environmental Science in Saitama released an urgent report the previous year, summarizing climate change impacts on local agriculture, the natural environment, health, and air pollution. The report gave special attention to agriculture, describing impacts on each crop and practical adaptation measures.



Source: Saitama Prefecture website

### Snow Monitoring Trial in Mountainous Areas — Nagano Prefecture

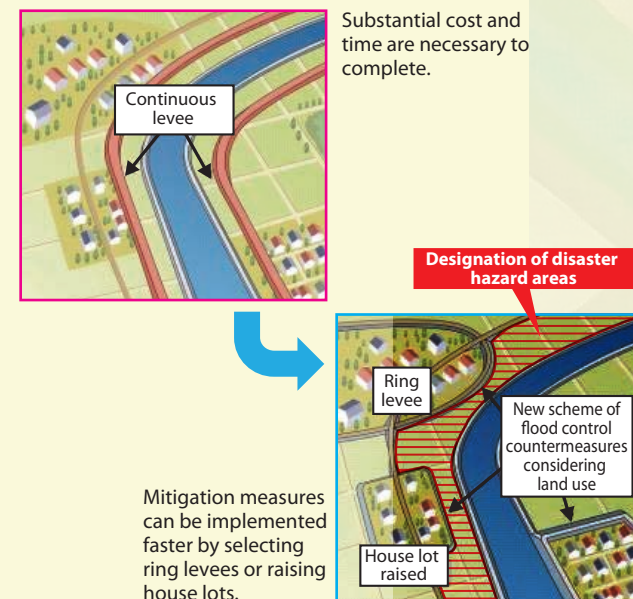
For better understanding of global warming impacts on changing snow accumulation in mountainous areas, the Nagano Environmental Conservation Research Institute is considering a monitoring technique using digital photo images. The area of remaining snow on a mountain is counted based on the processed digital images. Citizen cooperation by providing photographs makes it possible to collect much photo data from many observation points.



Examples of photos by citizens  
Source: Nagano Environmental Conservation Research Institute, 2008.

### Flood Control Projects Coupled with Land-Use Regulation

Where flood control is difficult, there are some cases in which measures to prevent the flooding of homes can be implemented effectively and efficiently by considering land use and other factors.



Source: Climate Change Adaptation Strategies to Cope with Water-related Disasters due to Global Warming (Policy Report) Reference (MLIT, 2008).

## Report Summary

# "Climate Change Adaptation: Approaches for National and Local Governments"

The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC) pointed out that even the most stringent mitigation efforts (i.e., reduction of greenhouse gases (GHGs)) cannot avoid further impacts of climate change in the next few decades. It is therefore essential to carry out not only initiatives for the long-term mitigation of climate change, but also initiatives to adapt to climate change.

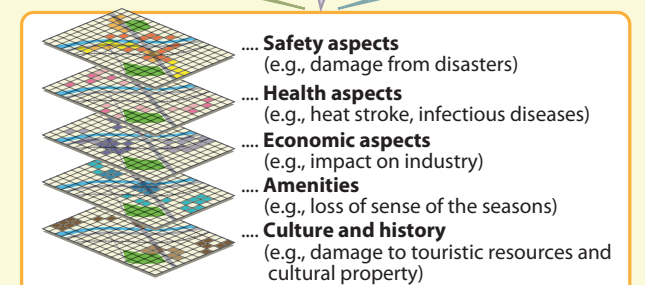
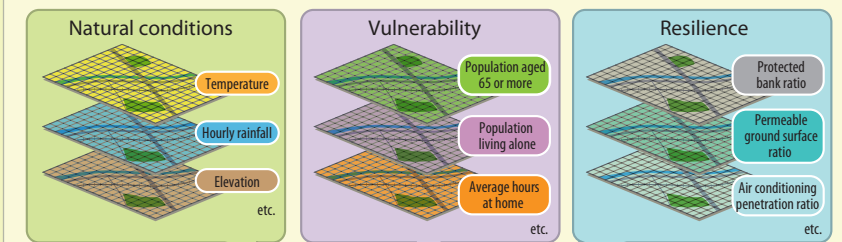
Japan has already pursued energy conservation for many decades, and has been progressive in its climate change mitigation efforts. In parallel with those efforts, Japan has recognized the significance of the impacts of global warming and climate change, and has been engaged in extensive research, studies and policy discussions since the 1990s.

In 2008, MOEJ released **"Wise Adaptation to Climate Change."** That report summarized the scientific knowledge available to date on the impacts of, and adaptation to, climate change in Japan and Asian developing countries, and to present concepts of "wise" (effective and efficient) adaptation. Together, various MOEJ reports provide the latest information on the impacts of and adaptation to climate change, and propose further research necessary, taking into account the need to contribute to decision making. Scientific studies continue to go further, including initiatives such as "Comprehensive Assessment of Climate Change Impacts to Determine the Dangerous Level of Global Warming and Appropriate Stabilization Target of Atmospheric GHG Concentration (S-4)\*" (FY 2005 - 2009), and "Comprehensive Study of Climate Change Impacts Assessment and Adaptation Policy (S-8)" (FY 2010 - 2014) under Environment Research and Technology Development Fund.

\*S-4 was implemented under former Global Environment Research Fund.

It is in this context that the Committee on Approaches to Climate Change Adaptation (chaired by Professor Nobuo Mimura of Ibaraki University) was established in 2010, and—based on trends in Japan and internationally relating to adaptation—examined approaches and steps for the national and local governments to take when dealing with adaptation. The committee was comprised of researchers in fields relating to climate change impacts, experts in various sectors, and responsible government personnel. Their findings are summarized in a report entitled **"Climate Change Adaptation: Approaches for National and Local Governments."**

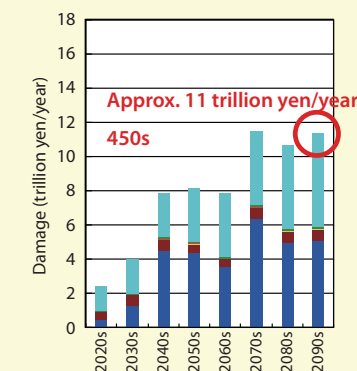
The "Wise Adaptation to Climate Change" report refers to the importance of regional vulnerability assessments.



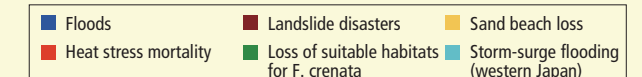
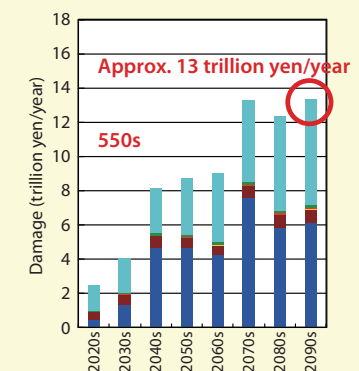
### Integrated assessment of vulnerability from citizens' perspective

Regional vulnerability assessments (conceptual)  
Source: Wise Adaptation to Climate Change (MOEJ, 2008)

Research projects of the Environment Research and Technology Development Fund have estimated the cost of damage in Japan from a variety of impacts under each scenario for the stabilization of GHG concentrations.



Costs of damage by scenario and by index



Source: "Comprehensive Assessment of Climate Change Impacts to Determine the Dangerous Level of Global Warming and Appropriate Stabilization Target of Atmospheric GHG Concentration (S-4 Project Team, 2009)"



## Objectives and Audience

This study report is mainly intended for national and local government departments responsible for adaptation. It summarizes basic approaches common across multiple sectors, with the following three objectives:

- (1) to indicate various approaches to adaptation, based on the latest scientific knowledge and level of uncertainty;
- (2) to indicate the basic factors of adaptation measures common to all sectors, relating to the consideration, planning, and implementation of adaptation measures; and
- (3) to raise awareness about adaptation and its necessity.

## Approaches to Adaptation based on Current Scientific Knowledge

Below is a summary of the types of adaptation measures the Committee found to be reasonable for implementation at this point in time.

### Urgent response measures (short-term adaptation measures)

Urgent response and protection measures for impacts that have a high likelihood of arising from climate change already occurring, e.g., crisis management improvements to deal with intense rainfall.

### Medium and long-term (adaptation measures in specific sectors)

Measures implemented with the intention of adapting to predicted impacts in specific sectors. It is essential to use an integrated approach to evaluating the risk-reduction effects, costs, and so on.

### Medium and long-term (integrated adaptation measures, infrastructure enhancement measures)

Measures that involve a more unified approach to carry out in more integrated ways measures that would typically be done separately. They also involve enhancement of basic “infrastructure”—technologies, institutions, financing, human resources, and so on—of regions and sectors. These should be advanced with a systematic and consistent approach.

### Information consolidation

Institutional arrangements and methodology development for the purposes of gathering, storing, managing, and utilizing basic information relating to the target areas and sectors.

### Awareness raising

Efforts to raise the awareness and understanding of the general population as well as government personnel responsible for adaptation measures. It is important to identify the responsible organizations at the national and local government levels, and to have the involvement and collaboration of all players.

### Foundations for the Implementation of Adaptation Measures

The items below are essential foundations to implement the adaptation measures listed on the left.

- (1) Clarification of responsibilities among national and local government bodies
- (2) Performance of roles and collaboration of each entity

**National governments** Monitoring of measures and projects implemented at the national level; projections at the national level; implementation of risk assessments; sharing of information with citizens; formulation and implementation of adaptation measures, promotion of research and development; awareness-raising.

**Local governments** Monitoring of measures and projects implemented at the local level; projections at the local level; implementation of risk assessments; sharing of information with local citizens; formulation of adaptation measures.

**Citizens** Implementation of adaptation measures that can be done by citizens and households in daily life; participation in and cooperation with adaptation initiatives of local governments.

**Businesses** Awareness of and responses to global warming impacts in business activities (including changes in demand; increased frequency and severity of disasters, etc.); consideration of adaptation in business activities; development of new businesses that contribute to adaptation.

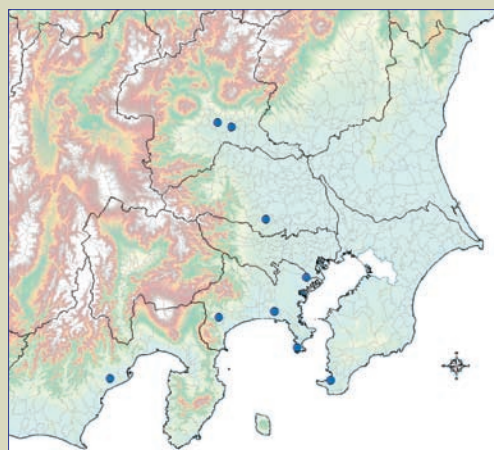
- (3) Sharing information with citizens
- (4) Training and utilization of human resources
- (5) Promoting research and technological development that can be used in the next several years (3 to 5 years)

### Northward trend of sites where *Narathura bazalus* was observed in the Kanto Area (Japan)

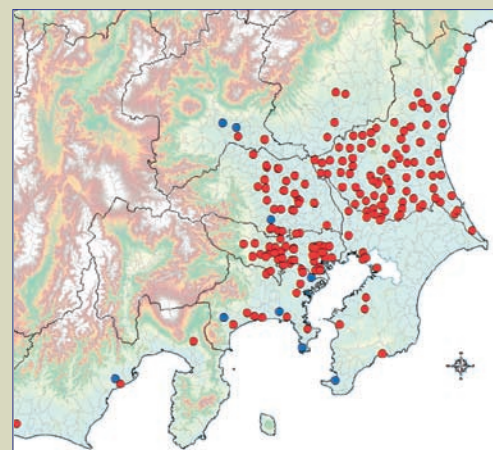
The *Narathura bazalus*, a species of butterfly, was traditionally found in southern regions of Japan, but their distribution has moved north in recent years. This type of monitoring of flora and fauna is an important activity for the accumulation of data and information.



*Narathura bazalus* (female)



Sites where observed until 1999



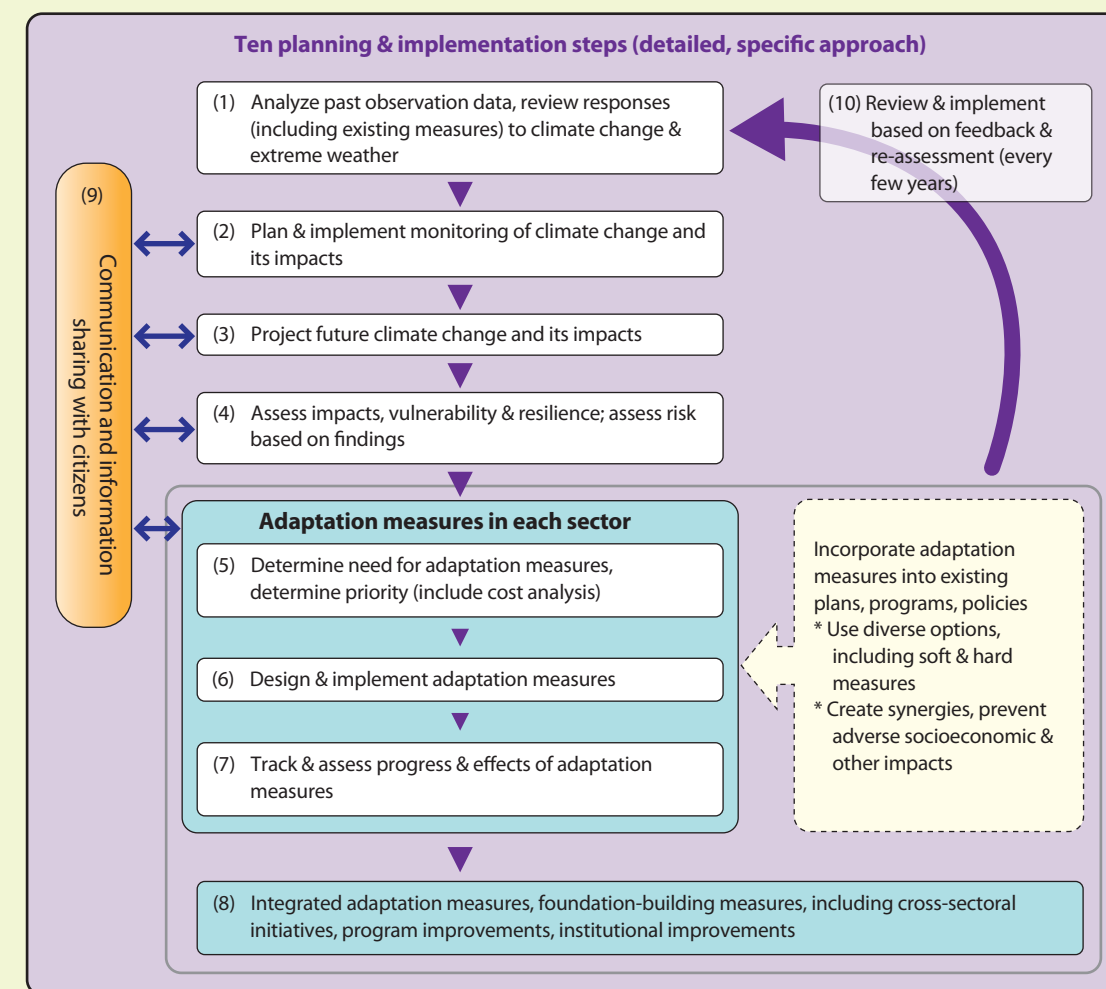
Sites where observed until 2004

## Steps for Specific Initiatives

This study report presents steps for the planning and implementation of adaptation measures.

It also provides a simplified set of steps to begin with in situations where adaptation measures are being undertaken for the first time or where only limited information is available.

### Overview of design & implementation of adaptation measures



### Examples of planning and implementation of monitoring

Main actors are national and local governments. Citizens can also participate in implementation of these activities. Some local governments already provide good examples of monitoring, considering their local characteristics. (Please see next page for an example from Nagano Prefecture in Japan.)

### Examples of projections about future climate change and its impacts

Many scientific studies are ongoing at the national level that can be used in the next several years, including “Innovative Program of Climate Change Projection for the 21st Century (Ministry of Education, Culture, Sports, Science and Technology (MEXT)),” “Research on Prediction of Climate and Environmental Change to Contribute to Mitigation Plan Decision against Climate Change (Japan Meteorological Agency),” “Comprehensive Study on Climate Change Scenario for Policy Support and Awareness Raising of Global Warming (S-5) (MOE),” “Comprehensive Study of Climate Change Impacts Assessment and Adaptation Policy (S-8) (MOE),” and “Initiative for Strategic Adaptation to Climate Change (MEXT).”

### Examples of risk assessments

Some local governments are conducting risk assessments—some comprehensive and in specific sectors, and some focusing on priority sectors. Please see the next page for an example from Tokyo.

### Important points for the planning and implementation of adaptation measures

Adaptation planning should be carried out based on an understanding of the necessity and priority rank of adaptation strategies. Rather than starting completely from zero, it is often better to start by integrating the concepts and approaches of adaptation into existing plans and measures. Adaptation strategies will be more effective and efficient if an effort is made to utilize existing structures and frameworks to the greatest extent possible. Please see the next page for examples from Saitama Prefecture and flood control from Ministry of Land Infrastructure, Transport and Tourism (MLIT).