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# National adaptation planning in Japan

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# Steps for National Adaptation Planning in Japan

Fourth Environment Basic Plan (Cabinet Decision, April 2012) decided to assess impacts of climate change and to promote adaptation measures

"Expert Committee on Climate Change Impact Assessment" was established under Central Environment Council (2 July, 2013)

- Projection of climate change and its impacts in Japan
- Reviews for more than 500 papers by 57 experts
- Assessment for 56 items in 7 thematic areas
- Expert judgement on significance, urgency and confidence levels

Report on Climate Change Impact Assessment in Japan (10 March, 2015)

Inter-Ministry Meeting for Climate Change Adaptation (11 September, 2015)

National Adaptation Plan was draft by the Inter-Ministry Meeting, and called for public comments (23 October, 2015)

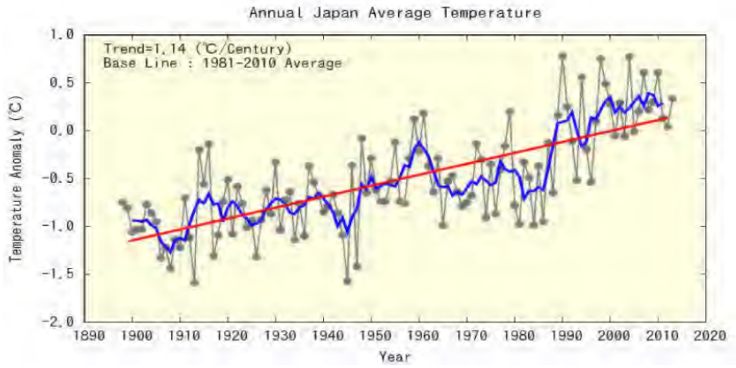
National Adaptation Plan was formulated (Cabinet decision, 27 November 2015)

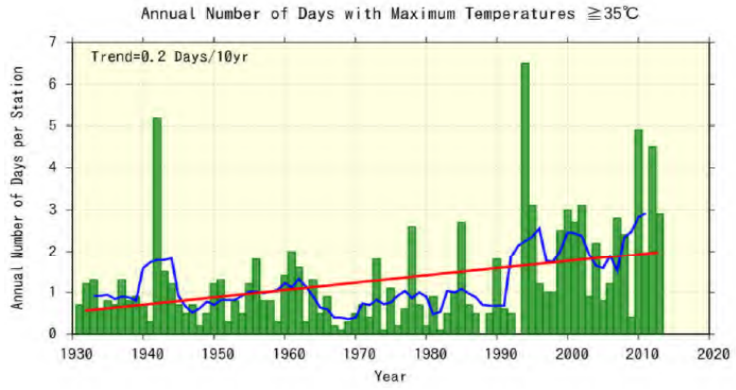
**GOJ communicated Undertakings in adaptation planning in Japan in line with paragraph 12 of decision** 1/CP.20 http://unfccc.int/focus/adaptation/undertakings_in_adaptation_planning/items/8932.php

# Observed climate change in Japan (selected examples)

**Annual mean temperature**

- Annual mean temperature Increased from 1898 to 2013 at a **rate of 1.14°C per 100 years**.
- From 1931 to 2013, number of days with a **maximum temperatures of 35°C or higher was increased.**

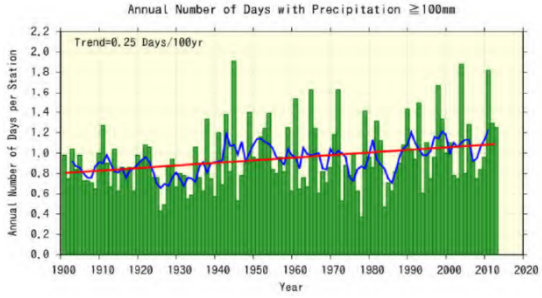


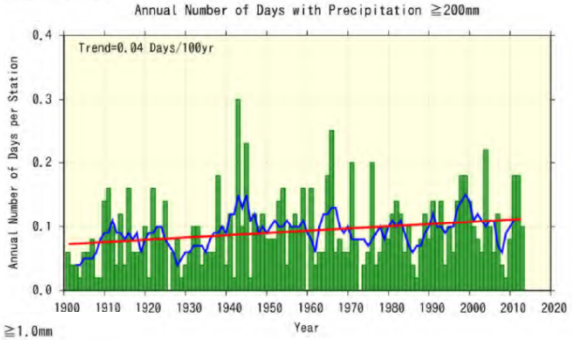



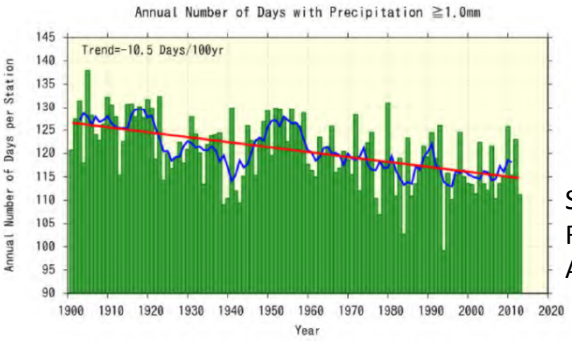

Source: Climate Change Monitoring Report 2013 (Japan Meteorological Agency)

**Precipitation**

- There is a clear trend from 1901 to 2013 showing
  **Increase**: Number of days, **>100 mm/day and > 200 mm/day**
  **Decrease**: Number of days**, no rainfall**




Source: Climate Change Monitoring Report 2013 (Japan Meteorological Agency)

# Projections of climate change in Japan

## Projections for the end of the 21st century relative to the end of the 20th century

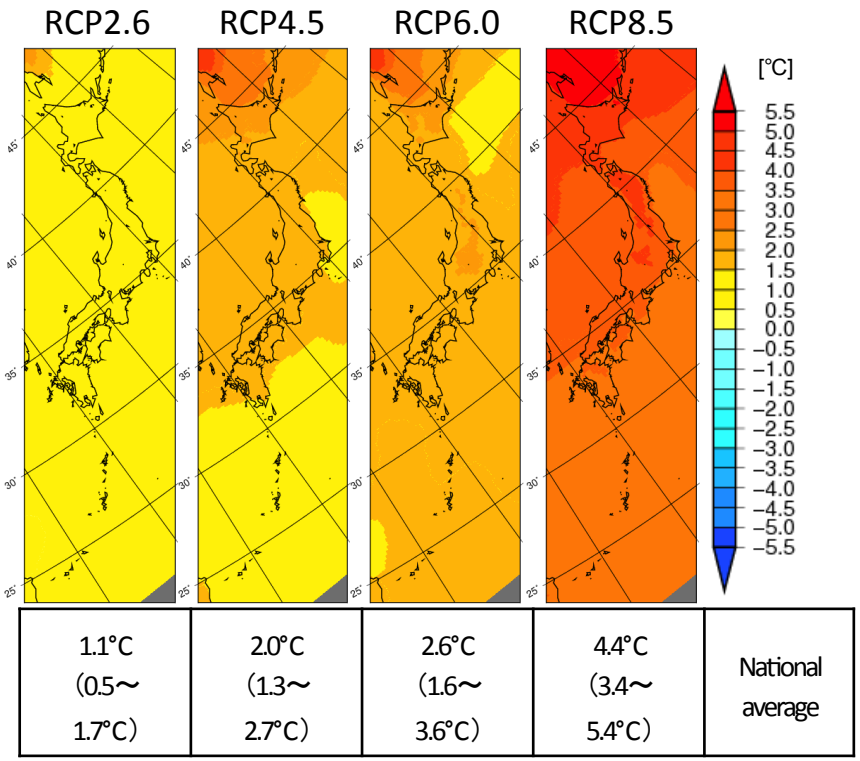
**Projection of annual mean temperature**

- Increase **in 1.1°C (0.5–1.7°C)**, if strict mitigation measures are taken.
- Increase in **4.4°C (3.4°-5.4°C)** if GHGs are emitted at a very high level.

**Projection of precipitation**

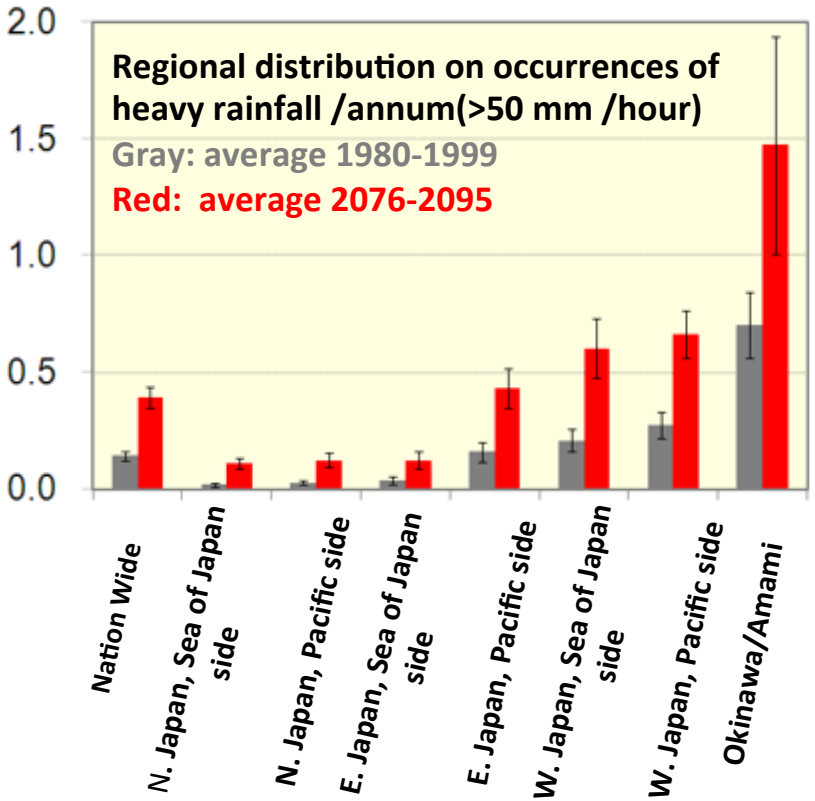
- Increase in the frequency of heavy rainfall, with higher amount, and the number of days with no precipitation.

**Distribution of changes of annual mean temperature**




※Map of distribution of changes shows partial results of calculations (SST1 and YS cases)

Source: Results of Climate Change Projections in Japan Considering Uncertainty (Announcement) (December 12, 2014) (Japan Meteorological Agency, Ministry of the Environment)




Source: Japan Meteorological Agency

# Assessment of climate change impacts (summary)

【Significance】 Very High / Not "Very High" / —: N/A(currently cannot be assessed)
【Confidence】 High / Medium / Low / —: N/A(currently cannot be assessed)
【Urgency】 High / Medium / Low / —: N/A(currently cannot be assessed)

| Chapter | Section | Sectors | Significance | Urgency | Confidence |
|---|---|---|---|---|---|
| Agriculture, Forest/ Forestry, Fisheries | Agriculture | Paddy field rice | ● | ● | ● |
| | | Fruit trees | ● | ● | ● |
| | | Barley/Wheat, Soybean, Feed crops.. | ● | ▲ | ▲ |
| | | Vegetables | — | ▲ | ▲ |
| | | Livestock Farming | ● | ▲ | ▲ |
| | | Plant Pests, Weeds | ● | ● | ● |
| | | Water, Land and Agricultural Infrastructure | ● | ● | ▲ |
| | Forest Forestry | Sediment, Landslide.. | ● | ● | ▲ |
| | | Storm surges Tidal waves | ● | ● | ● |
| | | Coastal Erosion | ● | ▲ | ▲ |
| | | Water supply (Surface water) | ● | ● | ▲ |
| | | Timber production (e.g. Plantations) | ● | ● | ■ |
| | | Planted forests | ● | ▲ | ▲ |
| | | Natural forests/ Secondary forests | ● | ▲ | ● |
| | | Non-wood forest products (e.g. Mushrooms) | ● | ● | ■ |
| | Fisheries | Migratory fish stocks (Ecology of fishes..) | ● | ● | ▲ |
| | | Marine ecosystems | ● | ▲ | ■ |
| | | Coastal ecosystems | ● | ● | ▲ |
| | | Propagation and Aquaculture.. | ● | ● | ■ |
| | | Freshwater ecosystems | ● | ▲ | ■ |
| | | Sea-level rise | ● | ▲ | ● |
| | | Storm surges, Tidal waves | ● | ● | ● |
| | | Coastal Erosion | ● | ▲ | ▲ |
| | Others | Risk of Mortality | ● | ● | ● |
| | | Heat stroke | ● | ● | ● |
| | | Damage from Wildlife | ● | ● | — |
| | | Shifts in Distribution and Populations | ● | ● | ● |
| Water environment, Water resources | Water environment | Lakes/Marshes, Dams(Reservoir) | ● | ▲ | ▲ |
| | | Rivers | ◆ | ■ | ■ |
| | | Coastal areas & Closed sea areas | ◆ | ▲ | ■ |
| Water environment, Water resources | Water resources | Water supply (Surface water) | ● | ● | ▲ |
| | | Water supply (Groundwater) | ◆ | ▲ | ■ |
| | | Water demand | ◆ | ▲ | ▲ |
| Natural Ecosystems *Only Described "assessment for Ecosystems" | Terrestrial ecosystems | Alpine / Subalpine zone | ● | ● | ▲ |
| | | Natural forests/ Secondary forests | ● | ▲ | ● |
| | | Countryside-landscape (Satochi-Satoyama) | ◆ | ▲ | ■ |
| | | Planted forests | ● | ▲ | ▲ |
| | | Damage from Wildlife | ● | ● | — |
| | | Material Balance | ● | ▲ | ▲ |
| | Freshwater ecosystems | Lakes / Marshes | ● | ▲ | ■ |
| | | Rivers | ● | ▲ | ■ |
| | | Marshlands | ● | ▲ | ■ |
| | Coastal ecosystems | Subtropics | ● | ● | ▲ |
| | | Temperate / Subarctic | ● | ● | ▲ |
| | Marine ecosystems | Marine ecosystems | ● | ▲ | ■ |
| | Phenology | Phenology | ◆ | ● | ● |
| | Shifts in Distribution and Populations | Native species | ● | ● | ● |
| | | Alien species | ● | ● | ▲ |
| Natural disasters, Coastal areas | Water-related disasters | Floods | ● | ● | ● |
| | | Inland waters | ● | ● | ▲ |
| | | Storm surges, Tidal waves | ● | ● | ● |
| | Storm surges, Tidal waves | Sea-level rise | ● | ▲ | ● |
| | | Storm surges, Tidal waves | ● | ● | ● |
| | | Coastal Erosion | ● | ▲ | ▲ |
| | Sediment-related disasters | Sediment, Landslide.. | ● | ● | ▲ |
| | Others | Strong wind.. | ● | ▲ | ▲ |
| Human health | Heat stress | Risk of Mortality | ● | ● | ● |
| | | Heat stroke | ● | ● | ● |
| | Infection | Vectorborne diseases | ● | ▲ | ▲ |
| | | Water- and food-borne diseases | — | — | ■ |
| | | Other infectious diseases | — | — | — |
| | Others | Combined impacts (warming and air pollution) | — | ▲ | ▲ |
| | | Impacts on vulnerable populations | — | ● | ■ |
| | | Health impacts without leading to clinical symptoms | — | ■ | ■ |
| Industrial / Economic activities | Industrial / Economic activities | Manufacture | ◆ | ■ | ■ |
| | | Energy Demand and Supply | ◆ | ■ | ▲ |
| | | Commerce | — | — | ■ |
| | | Construction | — | — | — |
| | | Medical | — | — | — |
| | Finance, Insurance | Finance, Insurance | ● | ▲ | ▲ |
| | Tourism | Tourism | ● | ▲ | ● |
| | Others | Other impacts (e.g. Overseas impact) | — | — | ■ |
| Life of Citizenry, Urban Life | Urban Infrastructure, Lifeline | Water supply, Transportation.. | ● | ● | ■ |
| | Life with sense of culture & history | Phenology | ◆ | ● | ● |
| | | Traditional events / Local industry | — | ● | ■ |
| | Others | Impact on life due to Heat stress | ● | ● | ● |

# NAPJ, Contents

# Part I : Basic concept - Vision, Term, and Strategy

## 1) Vision

- By promoting adaptation measures, to build a secure, safe and sustainable society that enables us to minimize/avoid and swiftly recover from damage for human life, properties, economy and natural environment caused by impacts of climate change.

## 2) Term

- 10 year plan with consideration of long-term perspective towards the end of 21st century

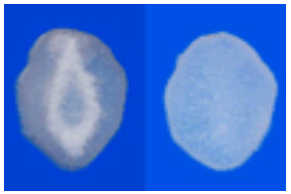
## 3) Basic strategy

1. To mainstream adaptation into Government's policies and measures
2. To enhance scientific knowledge
3. To promote communication with stakeholders through share and provision of climate risk information
4. To promote adaptation in the local level
5. To promote international cooperation and contribution

# Part II :Impacts and adaptation measures
# 1. Agriculture, Forest/Forestry, Fisheries

## Impacts

- **Paddy field rice**: The Ratio of first-class rice will decrease nationwide, if a shift to high-temperature-resistant varieties does not proceed.
- **Fruit trees**: Regarding apples and grapes, poor coloring is reported.
- **Plant pests and weeds**: Damage to agricultural crops may increase due to increasing occurrence of pests and diseases, and the expansion of their distribution areas.
- **Mountain disaster**: Disasters such as intensive landslides and debris flow will frequently occur.
- **Marine fisheries**: The distribution area is mostly ~~projected to go north.~~



Cross-section of paddy field rice --- White immature grain (left), normal grain (right)


Poor coloring of apples

Severe damage from mountain disaster due to torrential rainfall

Feeding damage to seaweed beds

## Basic Measures

- **Paddy field rice**
  - Develop and disseminate high-temperature-resistant varieties.
- **Fruit trees** (Examples of apples and grapes) :
  - Promote the introduction of superior-colored varieties.
  - Undertake development and diffusion of cultivation management technologies.
- **Plant pests and weeds**
  - Implement a pest forecasting program applicable to the specified pests continuously.
- **Mountainous disaster**
  - Promote implementation of forest conservation facilities and forest management work.
- **Marine fisheries**
  - Improve the precision of fishing ground prediction.
  - provide real-time monitoring information.

# 4. Natural Disasters, Coastal Areas

Impacts

- **Flood, water-related disasters**

Ddisasters exceeding capacity of facilities frequently occur,

Disasters in an extremely large scale, exceeding capacity of facilities.

- **Storm surges and tidal waves**

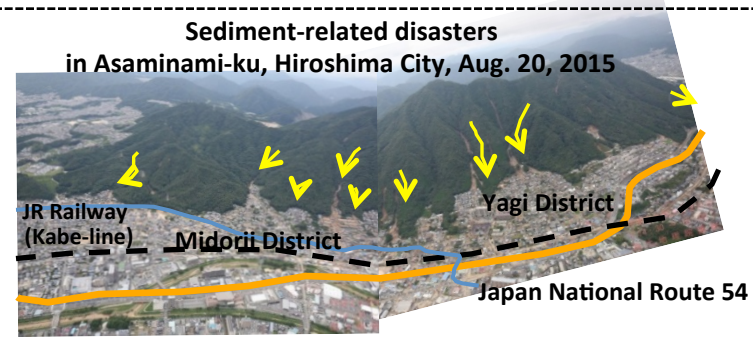
Increase in coastal erosion,

Sea level rise will damage ports and industries at waterfront.

- **Sediment-related disasters**:

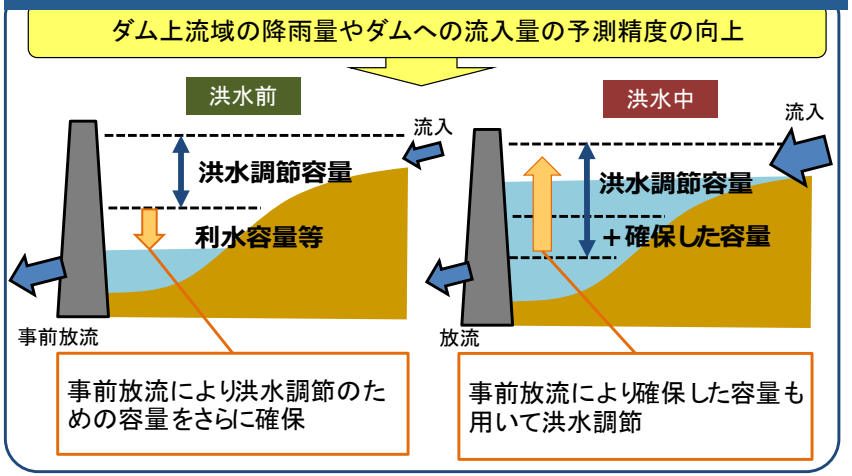
Overtopping of Formerly Kumanogawa River Ohhashi Bridge (photo taken from the right bank)

The discharge of the Shingugawa river-system exceeded its peak run-off and eventually, the highest river discharge in the recorded history of Japan came about (about 24,000m $^3$/s).

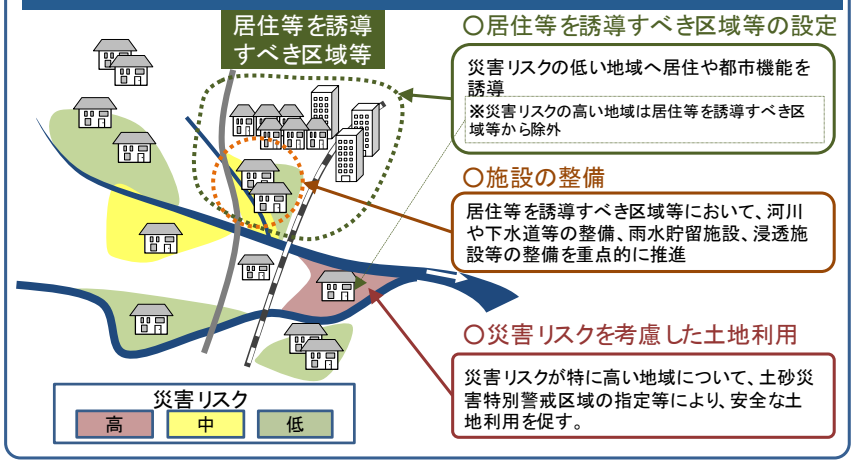



Basic Measures (example)

## To maximize performance of existing infrastructures



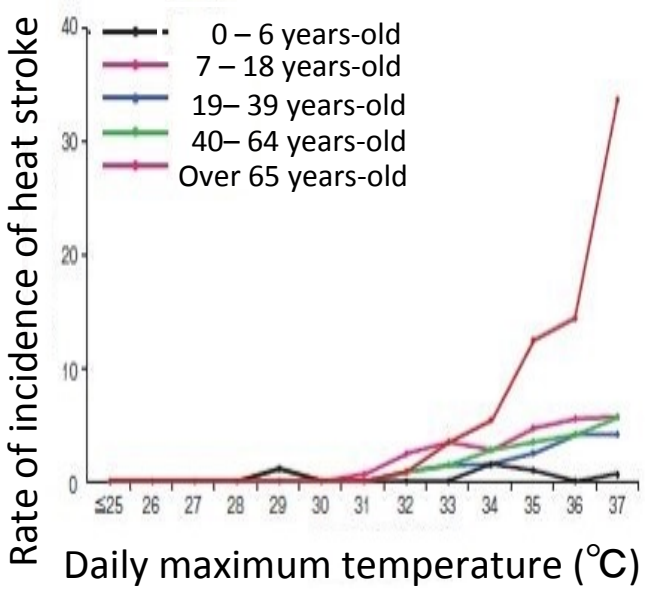

## Land use planning taking into account disaster risks



# 5. Human Health

Impacts (Examples)

- **Heat stroke**
  - Heat stroke patients will increase in number due to warming
- **Vector-borne diseases**
  - Areas suiting habitat of arthropods which are vectors for infectious diseases, will extend northward due to warming and changes in precipitation patterns.




**Figure, Ratio of occurrence of heat stroke patients, by age group & maximum daily temperature**
Source: National Institute of Environmental Studies, Japan, Kankyo-gi No. 32

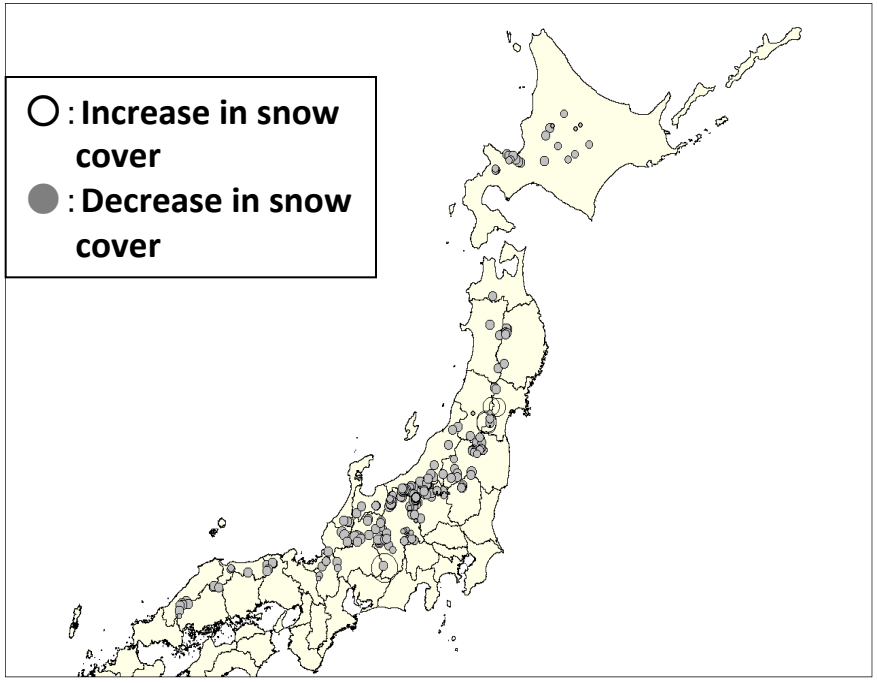
Basic Measures (Examples)

- **Heat Stroke**
  - To provide information related to heat Stroke and cautionary alerts.
  - To promote awareness raising regarding prevention and treatment
    - ✓ Under the Inter-Ministerial/Agency Liaison Committee on Heat Stroke and through collaboration among the relevant ministries and agencies,
    - ✓ In various situations including emergency response, education, health care, labor, agriculture, forestry and fisheries industries, and everyday life
- **Vector-borne diseases**
  - To conduct spot monitoring of mosquito vectors
  - Calling attention to mosquito-prevention measures.

# 6. Industrial and Economic Activity

Impacts (Examples)

- **Finance and Insurance**
  - Increases in insured losses associated with growing number of natural disasters.
  - Increases in insurance payments.
  - Increases in reinsurance premiums.
- **Tourism**
  - A reduction of snow cover depth due to an increase of temperature.
  - The erosion of sandy beaches by rises in sea levels.




**Projected changes in snow cover at ski resorts**

Source: Nakaguchi, 2009, Projections of global warming induced changes in snowfall and number of possible skiing days at ski resorts, utilizing Japan Meteorological Agency RCM20 (in Japanese).

Basic Measures

- **Finance and Insurence**
  - Continue to pay attention to initiatives to improve risk management among insurance companies, and efforts of the General Insurance Association of Japan.
- **Tourism**
  - Facilitate adaptation planning by local governments. Because it is important to consider adaptation measures in the tourism industry such as skiing and coastal leisure based on local characteristics.

# Part III :Basic and international measures

## 1. Observation, Monitoring, Studies and Research

- **Observation and Monitoring** : e.g., Promote land-, ship-, aircraft-, and satellite-based observation.
- **Projection Technologies**: e.g., Enhance modeling technology and simulation technology using supercomputers and other equipment.
- **Studies and Research**: e.g., Promote studies and research relating to policies/measures that have co-benefits with adaptation.

*[Related Ministries] CAO, MIC, MEXT, MAFF, MLIT, MOE, and other ministries*

## 2. Sharing and Providing Information related to Climate Risk

- To establish **climate risk information platforms**
- To provide climate risk information in a manner that are **accessible and usable for stakeholders**
- **To develop and provide tools** so that they can facilitate stakeholders, in particular local governments, to conduct impact assessments, to formulate adaptation plans and other actions for adaptation.

*[Related Ministries] CAO, MEXT, MAFF, MLIT, MOE, and other ministries*

# Part III :Basic and International measure

## 3. Promoting adaptation in local states

- To assist local governments to conduct impact assessments and to formulate local adaptation plans
- To provide high-resolution data including down-scaled projections, impact data in local scales and other information related to climate risk to local governments
- To promote outreach activities in local states

*[Related Ministries] MIC, MEXT, MAFF, MLIT, MOE, and other ministries*

## 4. Promoting International cooperation

**< Support for Developing Countries >**

- To assist developing countries to conduct **climate change impact assessments and to formulate adaptation plans**
- To support developing countries **to promote adaption actions** in the areas with high risk on climate change impacts including **water resources disaster risk reduction, food and agriculture, ecosystem services, based on experience and the latest technologies in Japan**
- **For small island states**, to implement comprehensive support by providing necessary equipment and making use of Japan's experience and knowledge.

*[Related Ministries] MOFA, MEXT,METI, MLIT, MOE, and other ministries*

**< Contribution through International Frameworks >**

- Human resource development through international networks such as the APAN,GAN.
- Intergovernmental Panel on Climate Change (IPCC)
- International Organization for Standadization (ISO)

*[Related Ministries] MOFA, MOF, MEXT, MAFF, METI, MLIT, MOE, and other ministries*

# Implementation

- To develop methodologies on monitoring and evaluation, leaning from experience in other countries
- To aim at establishing cyclic risk management;
  - ✓ observation, projection, assessment
  - ✓ planning, implementation, monitoring and evaluation
- To review implementation of the NAP every 5 years for revising the Plan as appropriately.

Impacts

- **Water Environment**: Increase of water temperature, deterioration of water quality, and change of characteristics of runoff (including nutrients from watersheds).
- **Water Resources**: Increases in the number of no-rain days and decrease in the total amount of snowfall are projected. There are concerns about droughts becoming more frequent, lasting longer, being more severe, and causing more drought damage, due to climate change.

Basic Measures

- **Water Environment**

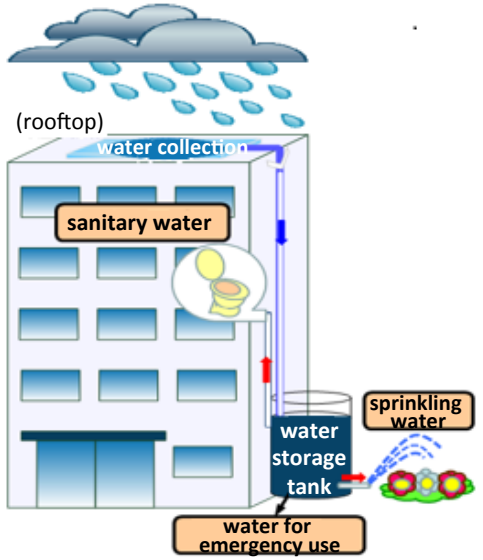
✓ To reduce the loads flowing into water bodies,
  - Wastewater from factories and building,
  - Domestic wastewater,

- **Water Resources**

✓ To prevent damage from droughts,
  - Fully utilization of existing facilities
  - Encouraging utilization of rainwater and reclaimed water.

✓ To mitigate damage from droughts that exceed capacity of facilities,
  - Consider water sharing and special water delivery systems during times of drought.
  - Develop organizational systems for drought management in collaboration with the stakeholders.

Utilization of rainwater




Rainwater collected in water storage tank is used for sanitary water and sprinkling water.

# 3. Natural Ecosystems

Impacts

- Areas at high risk: Inland water and marine ecosystem

✓ Distribution of corals, flora and fauna will be shifted northward, with some spices' distribution shrinking

✓ Wetland will decrease due to aridification

✓ Distribution of reef-building coral will decrease or extinct

Basic Measures

- To enhance monitoring and assessing risk of climate change in high risk areas
  - ✓ **alpine zones, tidal flats, salt marshes, seagrass beds, and coral reefs**
- To reduce stresses from development, environmental pollution, overuse, invasion by alien species.
- To build ecological networks
- To restore deteriorated ecosystems if necessary

**Coastal ecosystems**
Mangrove forests are expected to serve a variety of functions for adaptation

# 7. Life of Citizenry, Urban Life

Impacts (Examples)

- **Urban infrastructure and critical services**: There are concerns about impacts on infrastructure and critical services if climate change results in an increase in impacts such as an increase in short-term intense rainfall events and droughts, and an increase in the occurrence of strong typhoons.
- **Heat island effect**: There are concerns about an even greater range of temperature increases in urban areas in the future, due to the combination of the urban heat island effect and increased temperatures from climate change.

Basic Measures (Examples)

- **Urban infrastructure and critical services**
  - Prevent inundation in places such as underground stations.
  - Prepare business continuity plans (BCPs) for ports and harbors.
  - Improve to make waste treatment facilities more resilient to natural disasters.
- **Heat island effect**
  - Promote improvements in ground cover by greening and utilizing water surfaces.
  - Reduce artificial exhaust heat.

Entrance and exit of underground station

**Water stop board**

**Tide protection door**

**Greening of private lands, buildings and public spaces**

- **Promote greening on grounds of private buildings through Urban Green Space Conservation Act, and greening of public spaces such as urban parks and roadways.**

**Greening of private lands**