Toward the reduction of loss and damage from climate impacts!

Climate risk assessment and management utilizing climate information

Climate risks impact on various fields.

Impacts on
Agricultural products

- Cold/heat waves hinder the growth of agricultural products.
- Heavy rainfall or drought causes destruction of crops.

Impacts on
Retail selling

- Cold/heat waves damages the selling of clothes and electric appliances.

Impacts on
Human Health

- Heat waves Increase the risk of heat stroke.

What are “climate risks”?

Climate risks mean the possibility of occurrence of loss or damage resulting from climate change or extreme weather/climate events, and can be expressed like the following formula.

Climate risks = (Possibility of occurrence of extreme weather/climate event)
x (degree of its impact)

Climate risks exist in many fields, and seem very likely to increase in the future. For example, global warming and urbanization may lead to increasing “the possibility of occurrence of heat waves” more than past frequency of their occurrence.

How can we effectively reduce climate risks?

The following steps are effective to reduce climate risks.

Assessment of climate risks

Assess possible impacts of climate risks quantitatively.

Development of countermeasures

Develop countermeasures against climate risks.

Management of climate risks

Manage climate risks based on reasonable decision-making using scientific knowledge.

Japan Meteorological Agency targets on reducing climate risks utilizing climate information such as seasonal prediction.

September, 2012 Japan Meteorological Agency (JMA)

1. To assess climate impacts

The first step to reduce climate risks is to assess impacts from climate.

Examples:

In cool summer, consumption of beer dose not increase.

Qualitatively investigate the relationship between temperature and consumption.

In warm winter, winter wear is not sold well.

Investigate the trend of temperature.

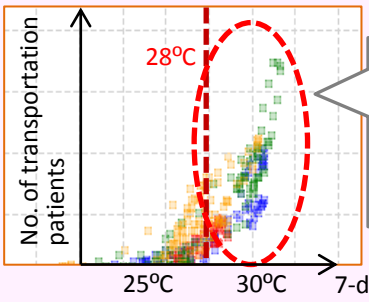
Climate risks can be estimated by assessing climate impacts quantitatively. If you assess climate impact on a matter, you would be able to find out that climate risks are involved in the matter.

How to assess climate impacts in a quantitative manner.

Let's probe the relation between socio-economic data (e.g., sale volume, the amount of damage) and meteorological observation data (e.g., temperature).

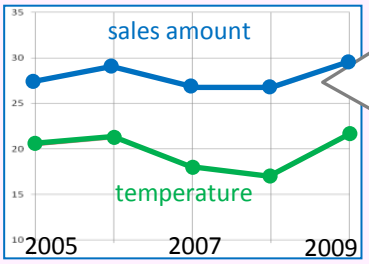
Examples of quantitative assessment

<Health>
A scatter diagram of the number of heat stroke patients (vertical axis) and seven-day mean temperatures (horizontal axis)



When average temperatures exceed 28°C, the number of patients soars.

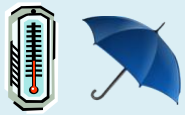
<Retail selling>
Interannual variations of monthly averaged temperatures and monthly sales amounts for August



The relationship between them can be formulated like the following:
Sales amount = temperature (°C) x a + b

Climate risks can be estimated by assessing climate impacts qualitatively and investigating the possibility of occurrence of related climatic events.

Please visit the following websites to access past meteorological statistics and seasonal prediction.



Japan Meteorological Agency: http://www.jma.go.jp
Searching past meteorological data: http://data.jma.go.jp/obd/stats/etrn/index.php

2. To address climate risks

Loss and damage due to climate change and variability can be avoided or reduced by utilizing knowledge and information on their impacts.

Assuming that you had the following knowledge through **quantitative assessment of climate impacts**.

- **An impact begin to emerge when temperature exceeds ○○ ºC.**
- **There is a distinct relationship between the degree of an impact and temperature (e.g., when temperature is △△, the degree of the impact is □□)**

For example, the sales amount of a seasonal commodity in a retail selling and the number of heat stroke patients in the medical field are influenced by the change and variation of temperature.

Practical examples of climate risk management utilizing quantitative assessment and information on climate.

Using long-term climate data

(e.g., past 30-year-average monthly temperatures)

It is able to estimate the impacts of climate in normal climate conditions.

- Understanding the time period of temperature exceeding ○○ºC in a normal year helps identify:
  - [Retail selling] the best term for sales campaign and the best term;
  - [Health] the best term for enlightenment and warning about heat stroke.
- Understanding the average temperature for August △△ºC in a normal year helps identify:
  - [Retail selling] the sales amount is □□ in August;
  - [Health] the number of heat stroke patients is □□ in August.

Using information and data on present climatic conditions

(e.g., current conditions of temperature and precipitation)

It may be necessary to reconsider an initial plan considering the deviations from normal climate conditions.

- When above-normal temperatures have persisted recently, it is required to:
  - [Retail selling] advance the timing of sales, review the volume of purchase;
  - [Health] advance the timing of warning, review preparation for a countermeasure.

Using climate prediction information

(e.g., early warning information on extreme weather, seasonal prediction)

It is possible to avoid or reduce climate risks by appropriate countermeasures using climate prediction.

- When it is predicted that temperature will exceed ○○ºC, it is expected to:
  - [Retail selling] adjust the volume of purchase based on sales prediction utilizing the volume of inventory and temperature prediction;
  - [Health] implement appropriate measures (e.g., procurement of tents used for outside event, preparation of drinking water).
- When it is predicted that temperature will not exceed ○○ºC, it is expected to
  - [Retail selling] prepare for “special sale” not to leave inventory.

Japan Meteorological Agency (JMA) assists climate risk management!

JMA will improve its website to facilitate assessing the impacts of climate.

JMA plans to improve its website in order to increase convenience for climate impact assessment that is the first step to reduce climate risks.

- Displaying meteorological data for selected elements (e.g., temperature), time periods and observation points.
- Providing data with format compatible to any spreadsheet software.

	A	B
Date	Temp.	Temp.
28 Apr, 2012	19.0	18.8
29 Apr, 2012	19.6	19.8
30 Apr, 2012	18.3	17.7
01 May, 2012	21.5	21.2
02 May, 2012	20.4	18.6
03 May, 2012	19.0	16.7
04 May, 2012	18.1	17.0
05 May, 2012	19.6	21.7
06 May, 2012	20.5	21.9

An example of posting data on the JMA website (under development)

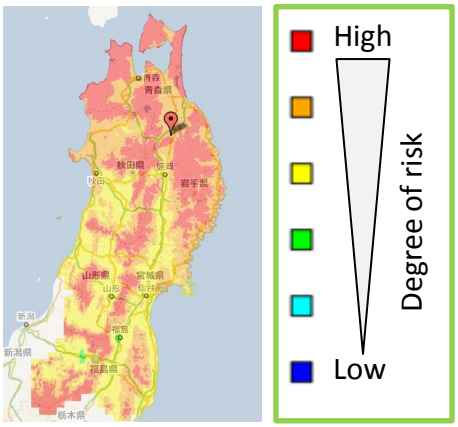
JMA will introduce best practices in climate risk reduction.

- Through dialogues with experts in various sectors such as agriculture, JMA is making efforts to develop best/good practices in climate risk reduction using climate information appropriately based on knowledge on these sectors and on characteristics and accuracy of climate information.
- JMA will open these results to the public to facilitate climate risk management.

A practical example of climate risk management in agriculture

In cooperation with the agricultural research institution*, JMA experimentally produced agricultural weather information in two weeks to help make decision in implementing measures for paddy rice against damage from cold and hot weather (i.e., water management). The experimental information was developed based on the institution's knowledge on the relation between damage and temperature and JMA's prediction on temperature.

* The National Agriculture and Food Research Organization (NARO) / Tohoku Agricultural Research Center (TARC)



Alarming temperature, impacts and countermeasures for rice crop

Time periods	Alarming temperatures (seven-day mean)	Risks	Countermeasures
The middle of July – the beginning of August	20 °C or below	Sterility	Deep-water management
August	27 °C or above	Poor grain filling	Water management

気象庁 Japan Meteorological Agency

Contact information
Climate Prediction Division, Global Environment and Marine Department
Japan Meteorological Agency (JMA)
1-3-4, Otemachi, Chiyoda-ku, Tokyo 100-8122, JAPAN Phone: +81-3-3212-8341