



Ministry of the Environment

Building Up Knowledge Base for Adaptation in Japan

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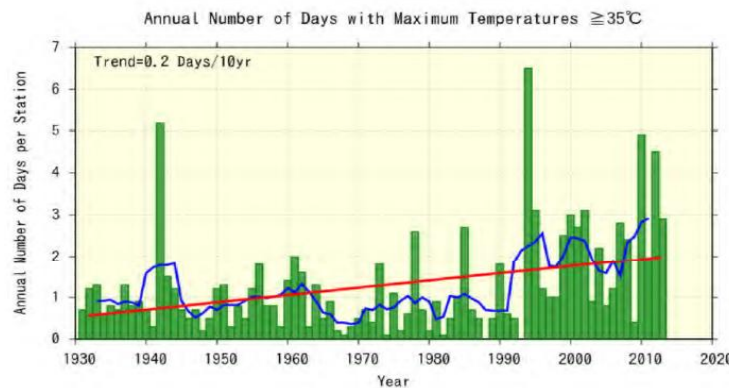
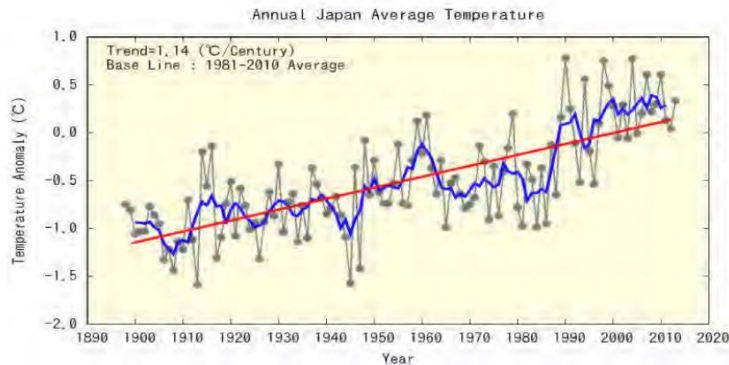
1. Current Status of Climate Change in Japan
2. Process of National Adaptation Planning
3. Climate Change Adaptation Platform
- The Key for Science-based Adaptation –
4. Promoting Adaptation in Local Governments
5. Way Forward



Observed climate change in Japan (selected examples)

Annual mean temperature

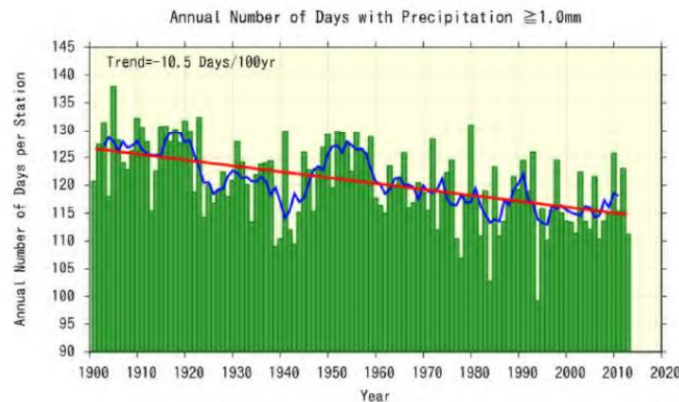
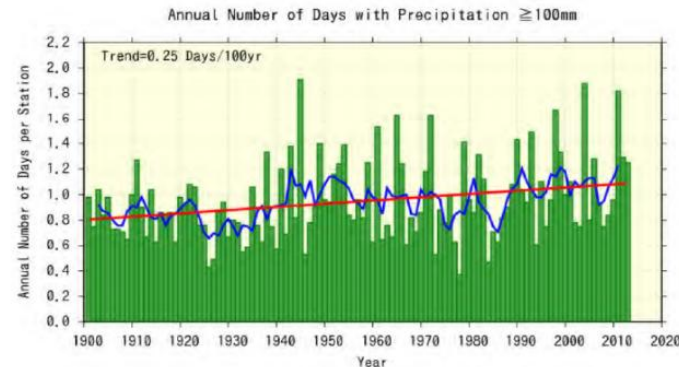
- Annual mean temperature increased from 1898 to 2013 at a rate of **1.14°C per 100 years**.
- From 1931 to 2013, number of days with a maximum temperatures of **35°C or higher** was increased.



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



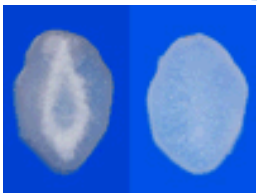
Source: Climate Change Monitoring Report 2013
(Japan Meteorological Agency)



Present Climate Change Impacts in Japan

Paddy field rice/Fruit trees

Degradation of Quality, White-opaque



“Proportion of immature grains” (left) and “Normal grains” (right) (provided by MAFF)

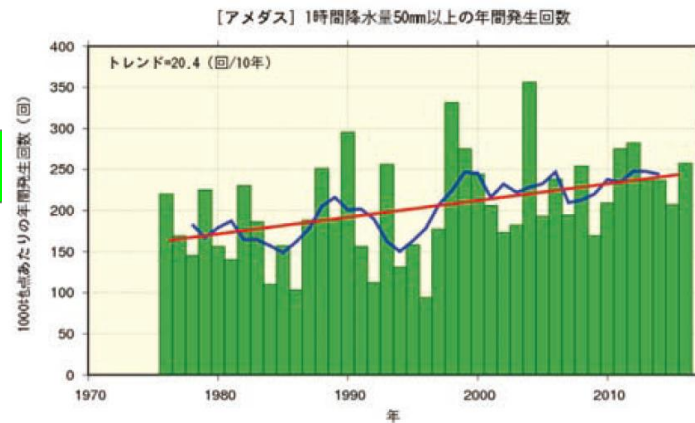
• All or some of unpolished rice are frequently damaged such as white-opaque and immature grains when daily mean temperature of the ripening period (heading, flowering, harvest) is exceeds 27 degree, especially Kyushu district is serious because of rising temperature.

Extreme climatic events/ Disasters



Flood damage “Hirota river, Aichi” (provided by MLIT)

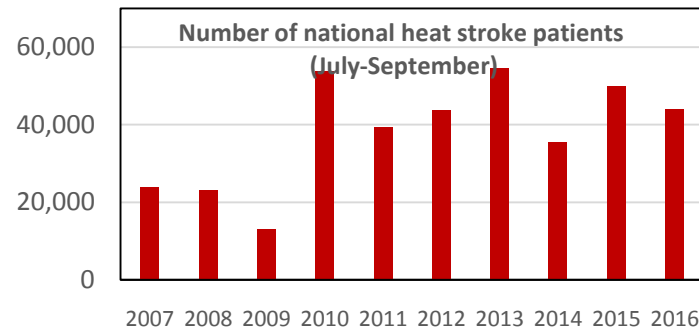
Increase observation of short-time rainfall intensity



(Source: Climate change monitoring report2016 (provided by JMA))

Heat Stroke/ Infectious diseases

Total national heat stroke patients transported by ambulance has remained between 40,000 and 50,000 since 2010



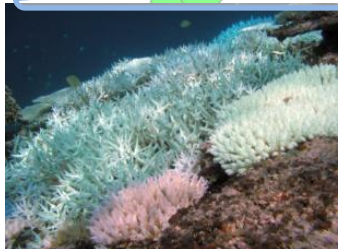
(Source: Fire and Disaster Management Agency, Heat stroke transported patients, provided by MOEJ)

Suitable habitat for tiger mosquitoes, vector of dengue fever is going up north



Tiger mosquitoes (provided by: National Institute of Infectious Diseases)

Coral whitening/expansion of suitable habitat for Japanese deer



Coral whitening (provided by MOEJ)



Feeding damage to agriculture, forests, and alpine plants

Depopulation in rural districts, decrease of hunting, decrease of snow cover

Ecosystems



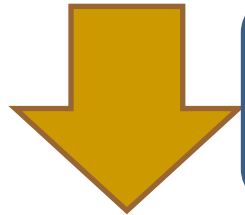
Orange rind puffing (provided by MAFF)

Pericarp and pulp are separated due to high temperature and increase rainfall after ripening (quality and shelf stability degradation)



Steps for National Adaptation Planning in Japan

“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)

Inter-Ministry Meeting for Adaptation to the Impacts of Climate Change

September 11, 2015 agreed by the relevant ministries and agencies
October 23, 2015 Partial Revision

1. **Inter-Ministry Meeting for adaptation** to the impacts of climate change (Hereinafter referred to as “Inter-Ministry Meeting”) shall be held to promote the necessary measures comprehensively and systematically regarding adaptation to the impacts of climate change in close cooperation with the relevant ministries and agencies
2. The composition of Inter-Ministry Meeting is as follows. A chairman may request to increase members as required

Chairman

Cabinet Secretariat

Members

Cabinet Secretariat Cabinet Office Financial Services Agency
Ministry of **Internal Affairs and Communications**
Ministry of **Foreign Affairs**
Ministry of **Finance**
Ministry of **Education, Culture, Sports, Science and Technology**
Ministry of **Health, Labour and Welfare**
Ministry of **Agriculture, Forestry and Fisheries** of Japan
Ministry of **Economy, Trade and Industry**
Ministry of **Land, Infrastructure and Transport**
Ministry of the **Environment**

3. General affairs of Inter-Ministry Meeting shall be handled by **Ministry of the Environment**
4. In addition to those listed in the preceding items, concerning the operation of Inter-Ministry Meeting and other necessary matters should be determined by the chairman

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



< Basic concept (Part1) >

■ Vision

○ Promoting adaptation measures to climate change impacts, to build a safe, secure and sustainable society that is able to minimize and avoid damages for life of citizens, properties, economics, and natural environment due to its impacts, and to be resilient against damages.

■ Basic Strategy

1. **Mainstreaming adaptation** into government policies
2. Enhancement of **scientific findings**
3. Promotion of understanding and cooperation through sharing and **providing information on climate-related risks**
4. Promotion of adaptation in **local governments**
5. Promotion of **international cooperation** and contribution

■ Period

○ Considered with long-term perspective till the end of 21st century, showing the basic direction in about coming 10 years.

■ Basic approach

○ Because of uncertainties, implement iterative risk management for decision making based on changes in social environment.



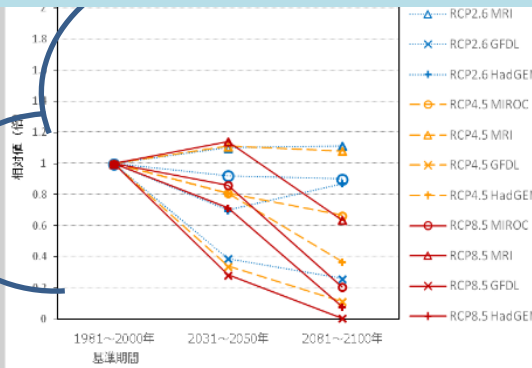
Climate Change Adaptation Platform (A-PLAT)



- Aims at being a basis for **adaptation actions** of **local governments**, **businesses**, and **citizens**.
- **Collects and provides climate risk information** and best practices; develops tools to promote adaptation actions.
- Operated by the National Institute for Environmental Studies (**NIES**) with cooperation of relevant ministries.

e.g. National and Local Information

> Nigata (District) > Projection for Rice Quality



予測。
 基準期間の高温に因る品質低下リスクが「低」（品種：コシヒカリ）の収量を1とした場合の相対値
 凡例：予測に利用した排出シナリオと気候モデルを表しています

●影響評価手法

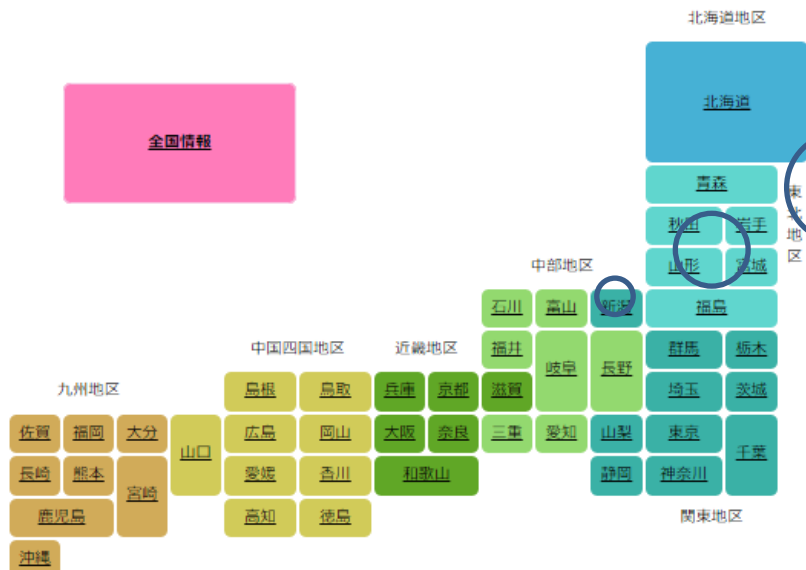
水稻の生長する速さを予測するモデル、コメ以外の部分も含めた植物としての総量を予測するモデル、そしてコメ収量を予測するモデルの3つのモデルを組み合わせて影響評価を実施。移植日は将来に渡って一定と仮定している。

※利用する気候/パラメータ：気温（日平均、日最高、日最低）、日射量（日積算）、相対湿度（日平均）、風速（日平均）

●留意点

- ・移植日の移動や品種の変更は考慮していない。
- ・気候変動に伴う水需給や病虫害発生形態、台風などによる大規模災害の発生の変化などといった間接的に影響を与える要因は考慮していない。

全国情報



MODEL	MIROC			MRI			GFDL			HadGEM			
	YEAR	1981-2000	2031-2050	2081-2100	1981-2000	2031-2050	2081-2100	1981-2000	2031-2050	2081-2100	1981-2000	2031-2050	2081-2100
RCP 8.5													
RCP 4.5													
RCP 2.6													



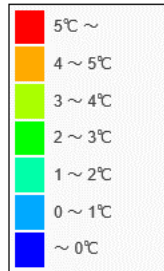
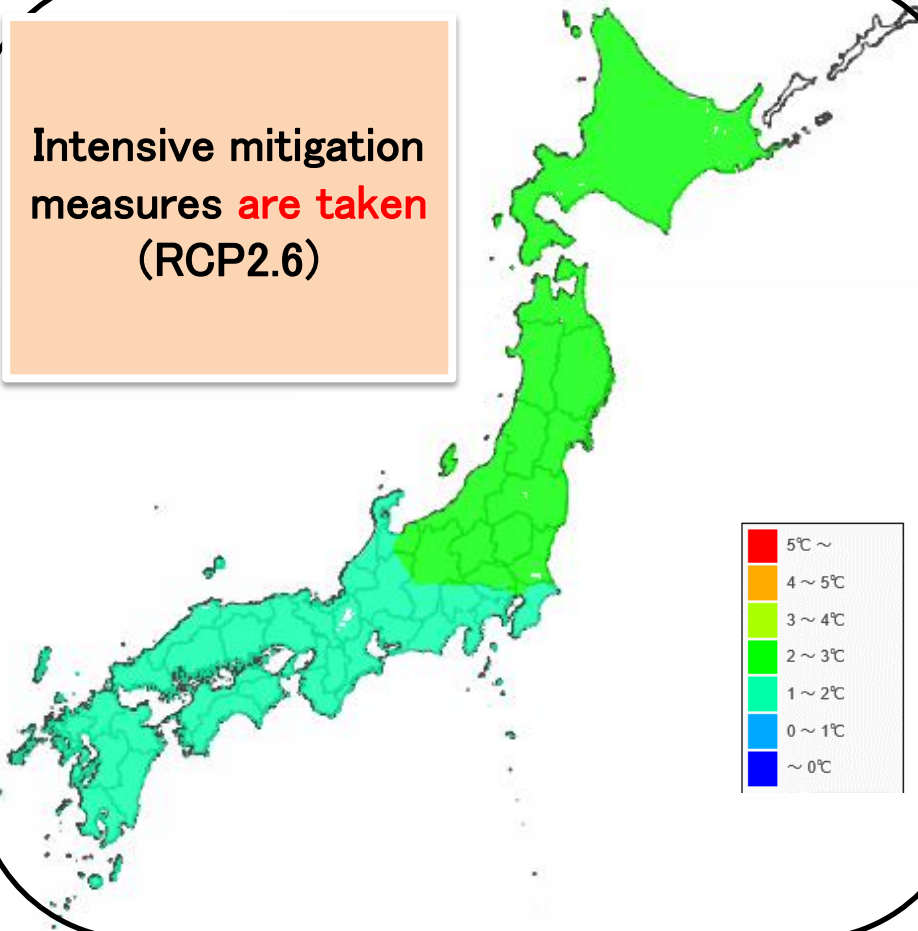
National & Prefectural Information

–Future projection on annual average temperature–

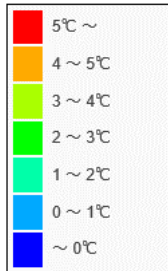
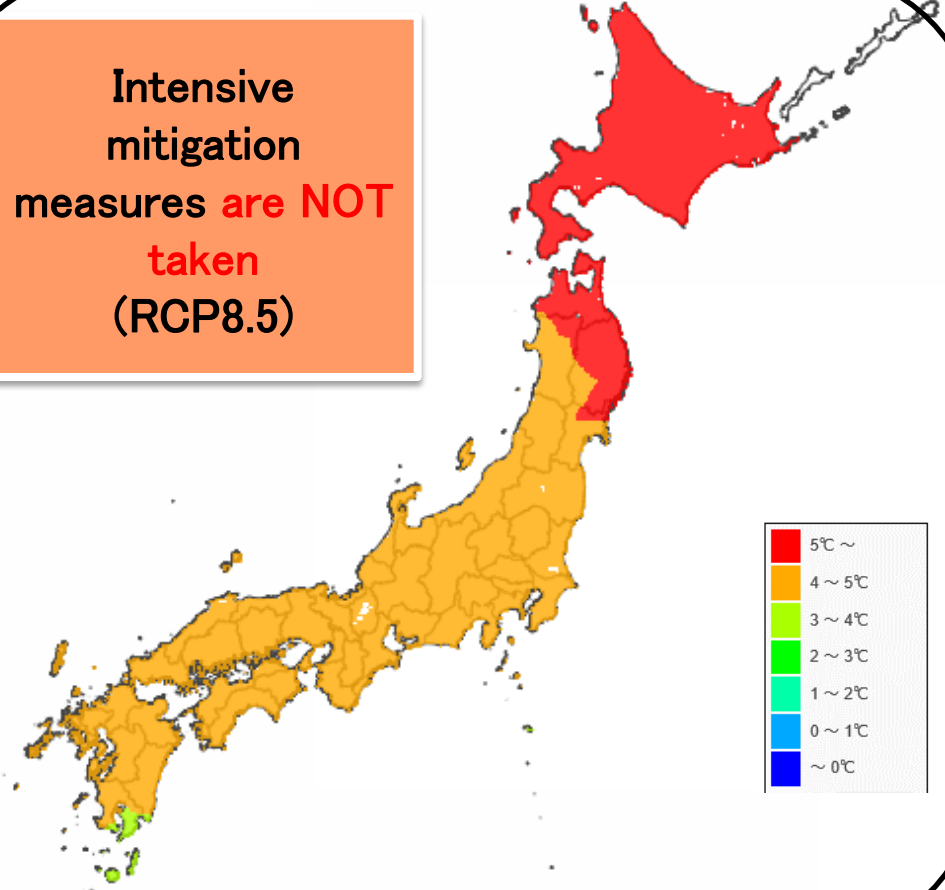
○Result

Area : Increase of annual average **temperature** Duration : By the end of 21st Century (2081 ~ 2100)

Intensive mitigation
measures **are taken**
(RCP2.6)



Intensive
mitigation
measures **are NOT**
taken
(RCP8.5)



※ All results which this site provides are from projections based on specific scenarios and there is uncertainty between the climate models used and the actual phenomenon.

○Climate Model : MIROC5

○Grid size : 1 km

○Relative value on the basis from the duration 1981–2000



National & Prefectural Information

–Future projection on rice production–

○Result

Area : **Rice production and quality**

Duration : By the end of 21st Century (2081 ~ 2100)

○Climate Model : MIROC5

○Grid size : 10 km

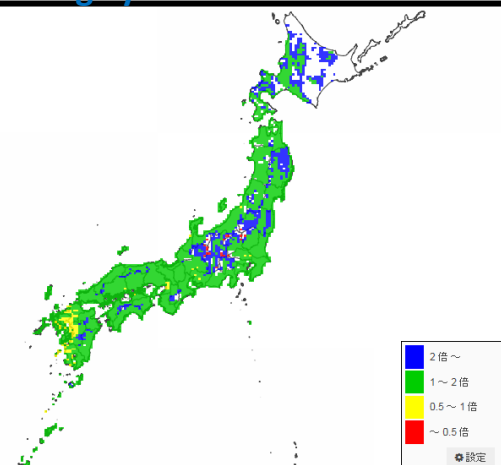
○Based duration (1981–2000)

Impact to Yield

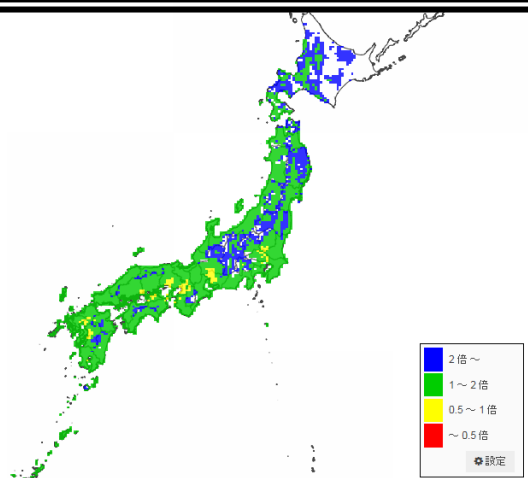
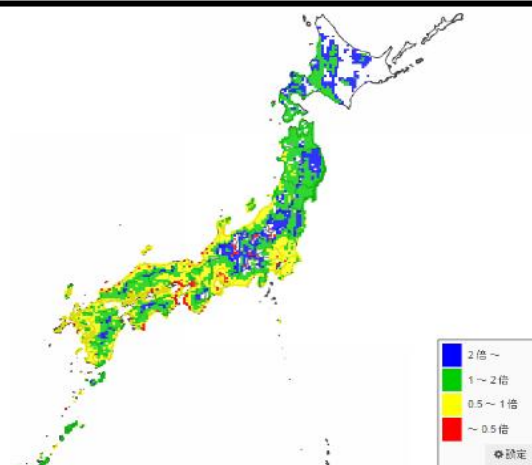
When average yield from 1981 to 2000 is “1”

Impact to Quality

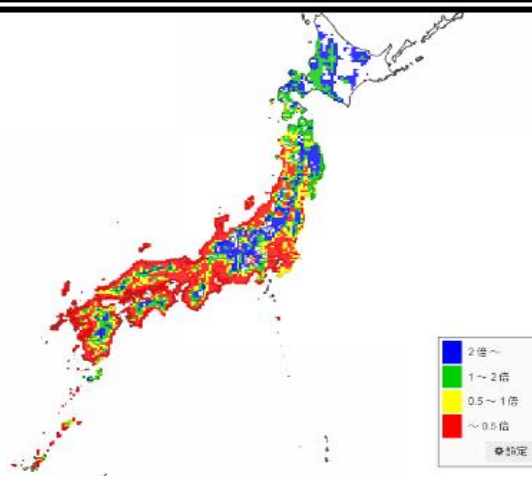
When average quality from 1981 to 2000 is “1”



Intensive mitigation
measures **are**
taken
(RCP2.6)



Intensive mitigation
measures **are NOT**
taken
(RCP8.5)





National & Prefectural Information

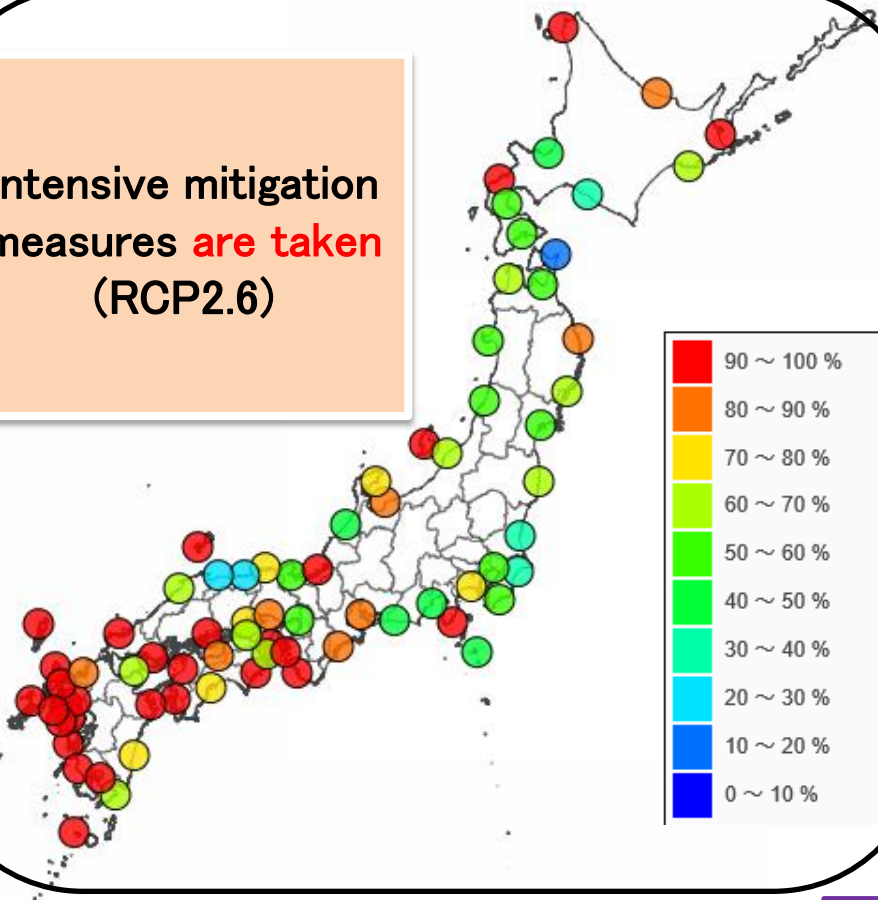
–Future projection on sandy beach disappearance–

○Result

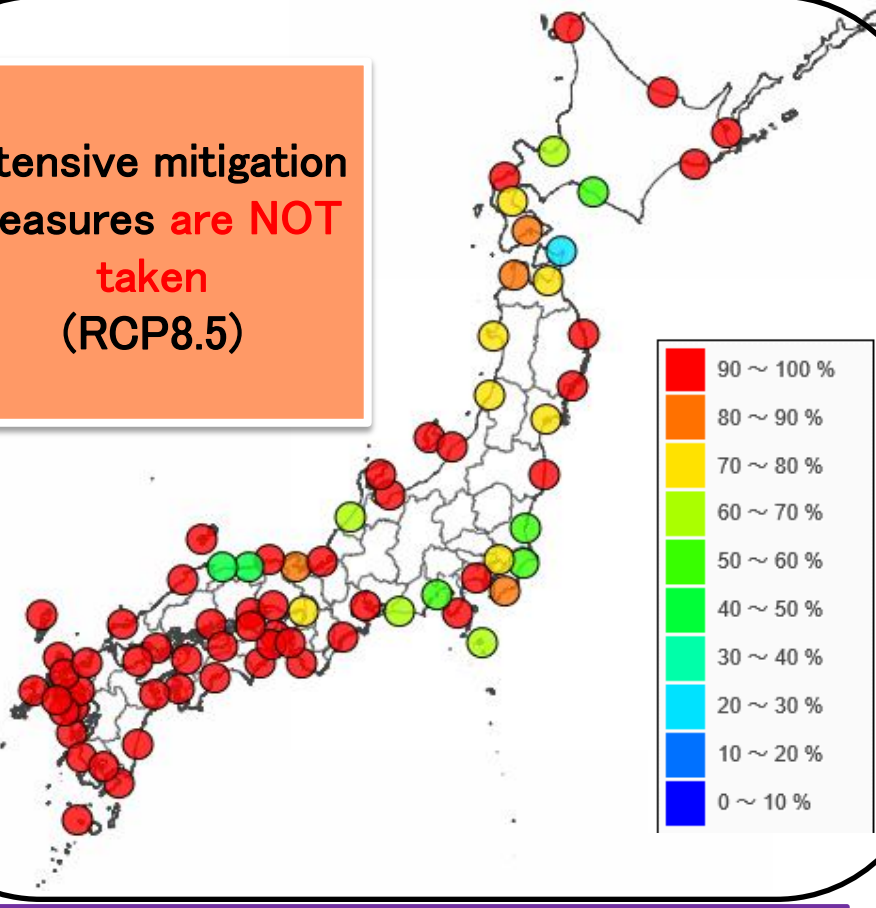
Area : Rate of sandy **beach disappearance**

Duration : By the end of 21st Century (2081 ~ 2100)

Intensive mitigation
measures **are taken**
(RCP2.6)



Intensive mitigation
measures **are NOT**
taken
(RCP8.5)



※ All results which this site provides are from projections based on specific scenarios and there is uncertainty between the climate models used and the actual phenomenon.

○Climate Model : MIROC5

○Grid size : Point

○Sandy beach erosion calculated based on sea level raise using Bruun rule which formula is considering wave, beach incline and sand diameter

* Climate parameter used: Raise in Sea levels



National & Prefectural Information

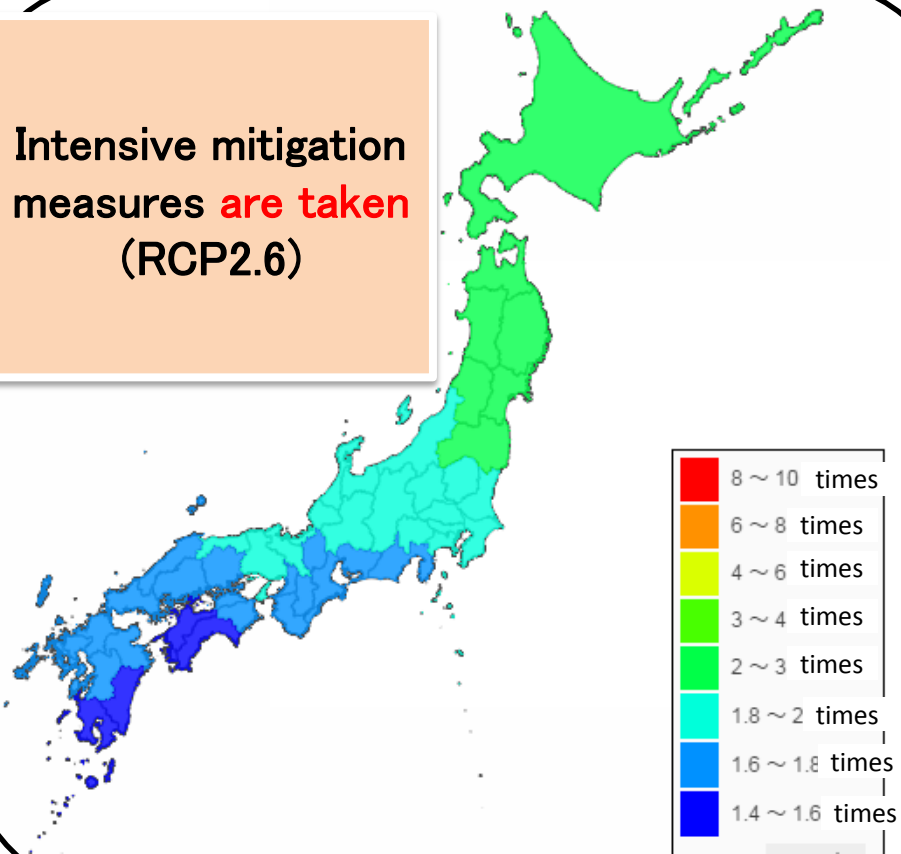
–Future projection on the number of heatstroke patients–

○Result

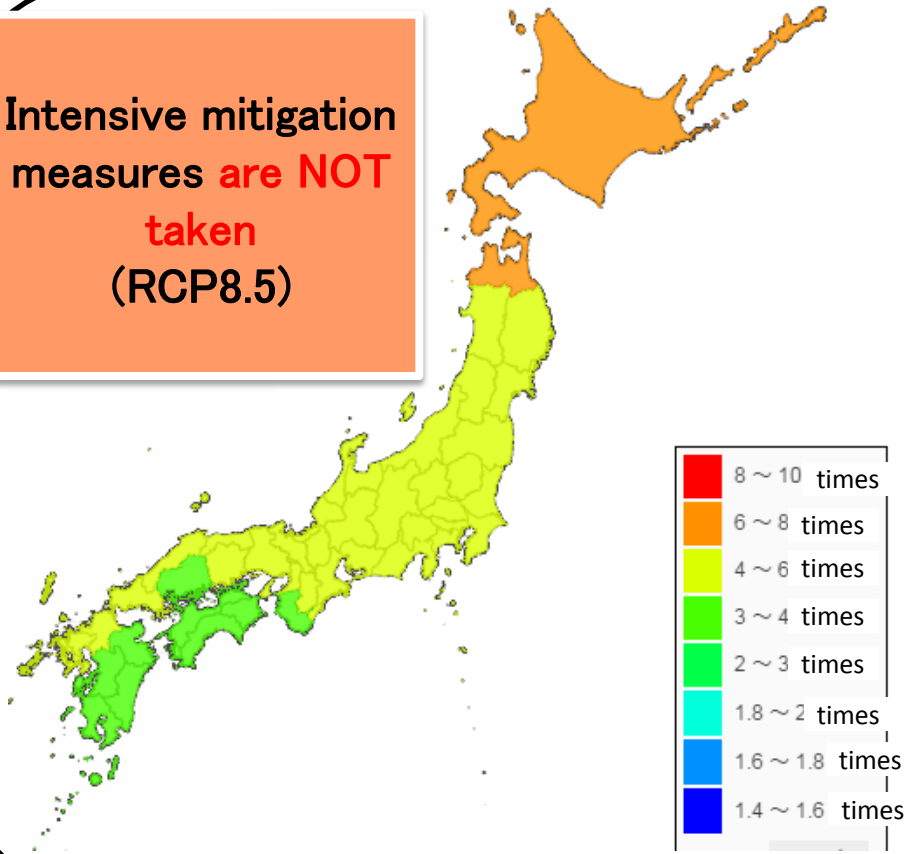
Area : Number of **heatstroke patients** transported by ambulance

Duration : By the end of 21st Century (2081 ~ 2100)

Intensive mitigation
measures **are taken**
(RCP2.6)



Intensive mitigation
measures **are NOT**
taken
(RCP8.5)



※ All results which this site provides are from projections based on specific scenarios and there is uncertainty between the climate models used and the actual phenomenon.

○Climate Model : MIROC5

○Grid size : Prefecture

○Relative value when average number from 1981 to 2000 is "1"

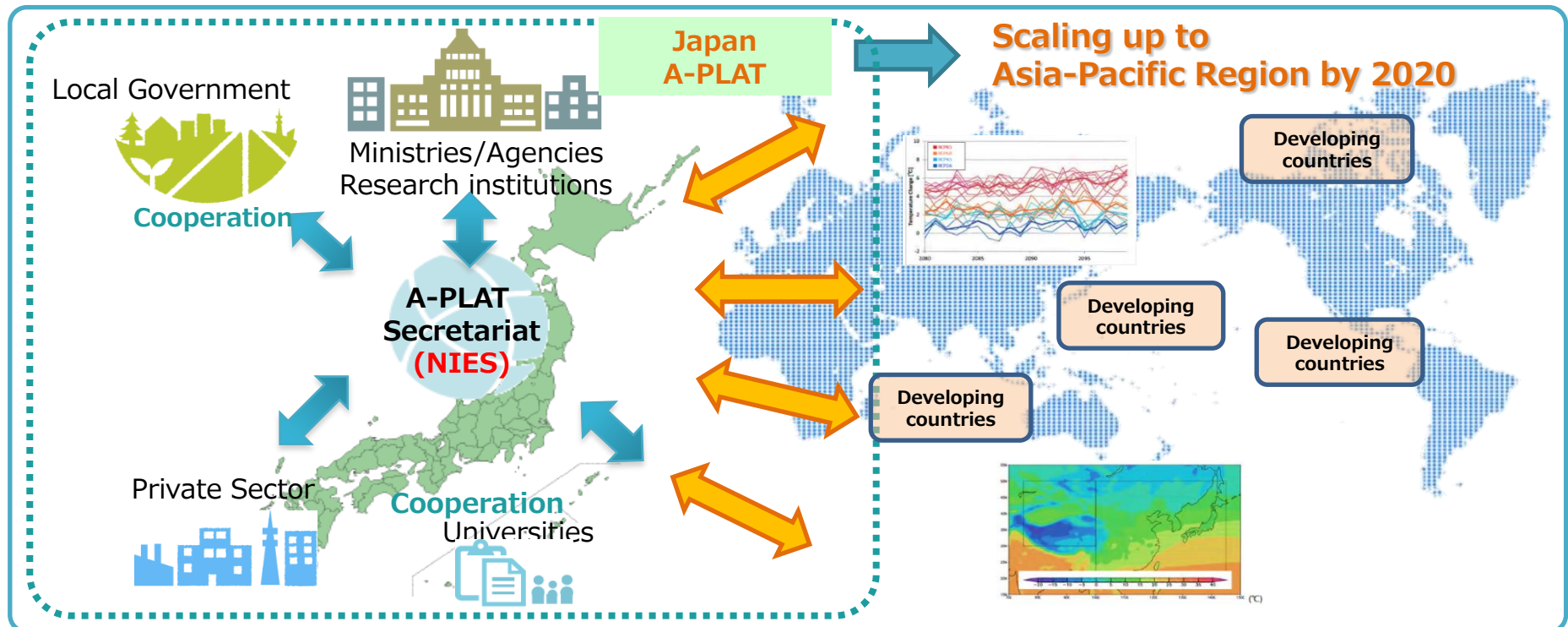


Asia-Pacific Adaptation Information Platform (AP-PLAT)



- **Asia Pacific Adaptation Information Platform** will be established by 2020 to share **climate risk information** via online with research institutes/universities in both developing/developed countries.
- To support adaptation measures by providing advanced scientific climate risk information
- Japan will take a lead in the following activities under the Platform

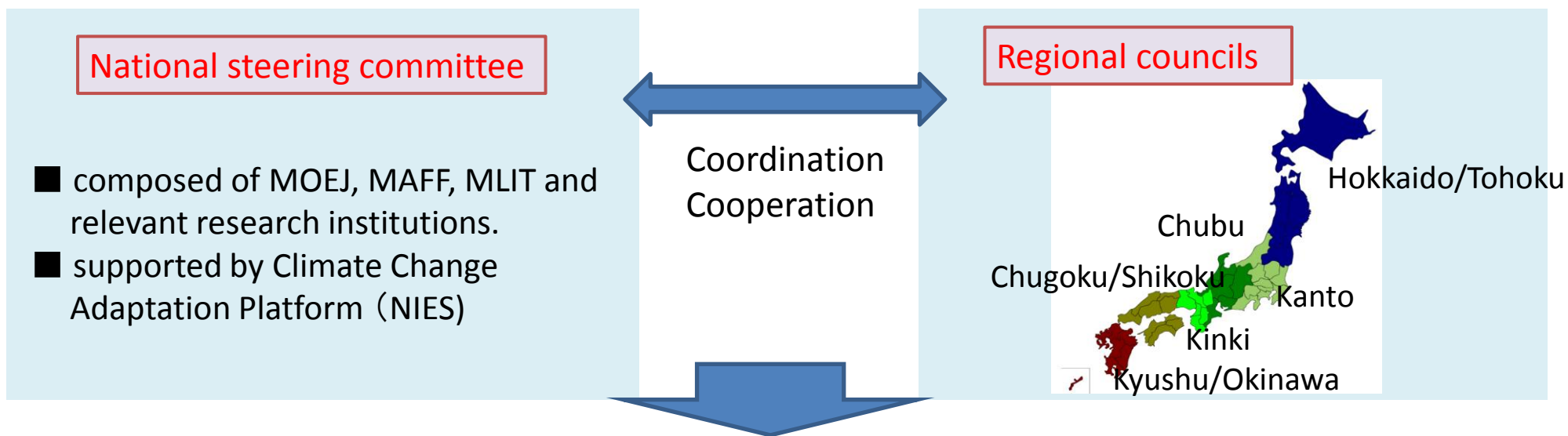
- ① **Develop dataset** on **projection of climate change impacts** in the region through bilateral & intensive studies
- ② **Develop supporting toolkits** for officials and stakeholders engaged in adaptation planning
- ③ **Build capacity** on climate change **impact assessment/ adaptation planning**





Supporting Local Governments: Regional Adaptation Consortium

- MOEJ- MAFF-MLIT partnership project.
- 2017-2019 three-year implementation period.
- Establishment of **Regional Adaptation Consortium** consisted of national and local governments, local research institutions etc.
- Main topics of study and discussion
 - Sharing experience and knowledge on adaptation among regional council members.
 - Implementation of **impact assessment** on the specific **needs of local governments**.
 - Discussion concrete adaptation measures based on scientific findings.



- Promotion of formulation and implementation of concrete adaptation measures in region.
- Making use of scientific findings to “**Second Climate Change Impact Assessment**” which will be achieved by 2020.



Study Topics of the Regional Adaptation Consortium

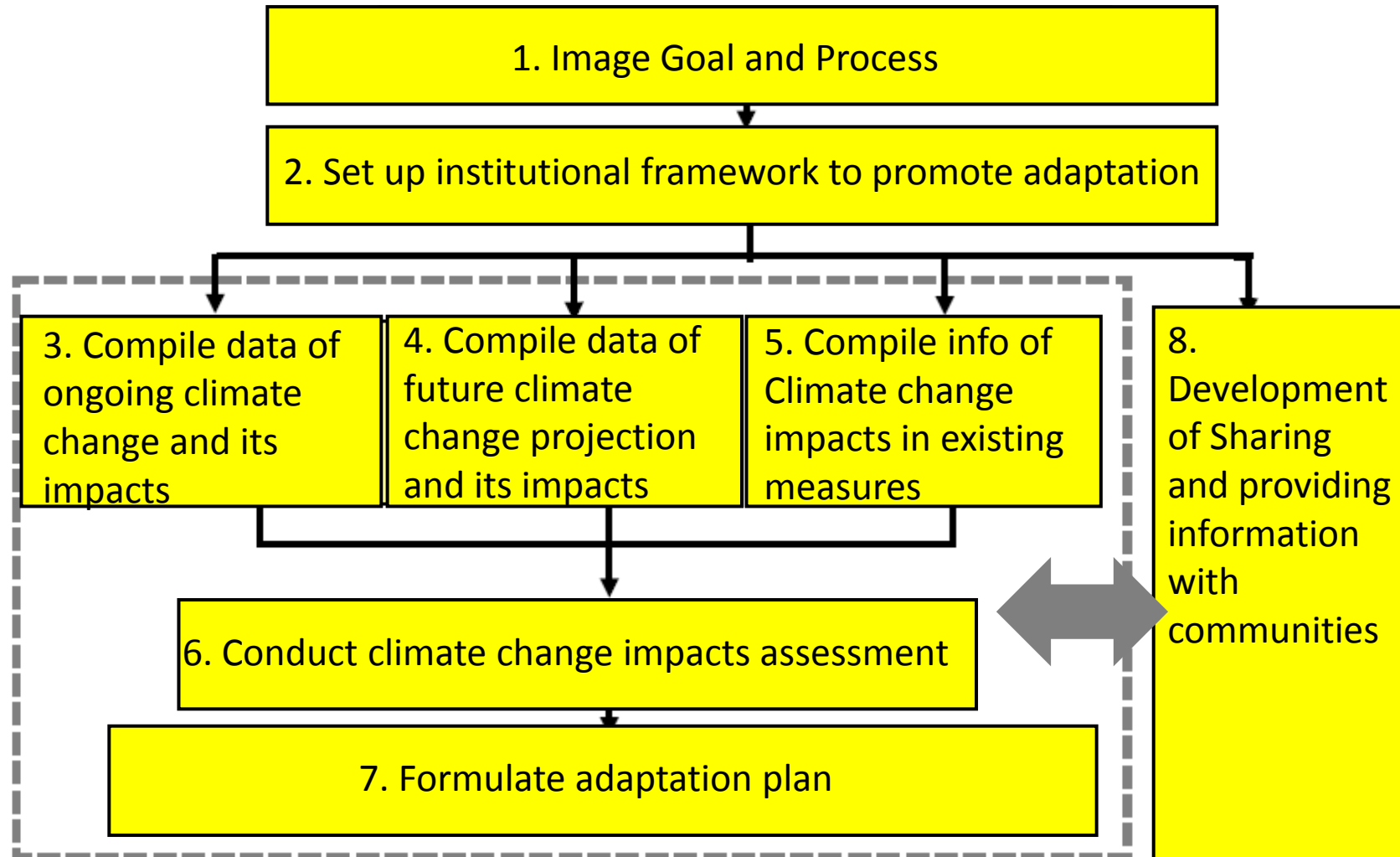
Study topics were decided depending on local governments needs for climate change impact assessment.

(Examples of studies of climate change impact assessment in regions)

- **Yield change** in local **farm products** (Apples, Tea)
- **Catch changes** in local **marine products**
(Japanese flying Salmon, Oysters, Seaweed laver)
- **Water quality** changes in **lakes** and **marshes**
- Impacts on **vulnerable species** (Alpine plants)
- Changes in **urban inland water flooding** risk due to heavy rain
- Changes in **urban heat stroke** risk
- Climate change impacts on regional tourism



Guideline for Climate Change Adaptation Planning in Local Governments





Local Governments Case Study: Agriculture and Fisheries



Agriculture, Forest/Forestry,
Fisheries

Development of new technologies against high temperature and disasters

Outline

Agriculture

- **Development and introduction of new varieties of rice and fruits** endured high temperature.
- **Introduction of various high temperature control technologies** such as heat ray reflective material, simple cooling, dry mist and endured construction against typhoons.

Fisheries

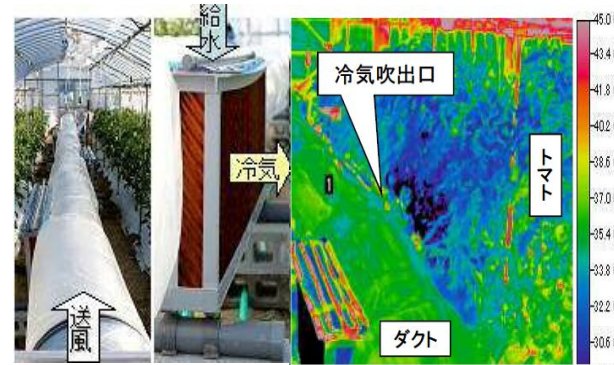
- The problem of changes in the distribution of fishes and shellfishes due to high water temperature and shore-burning.

Source:

• Kanagawa Prefecture Global Warming Measures Action plan (revised October, 2016)
Plan <http://www.pref.kanagawa.jp/uploaded/attachment/849037.pdf>
• Hyogo Prefectural Agriculture, Forestry and Fisheries Technology Center
http://hyogo-nourinsuisangc.jp/18-panel/pdf/h24/24_30.pdf

Source: Climate change adaptation information platform

Various high temperature control technology (Hyogo prefecture)



blower cooling

Facility (left) and Cooling Humidifier condition(right)

Install of cooling humidifier device in house facility against rising temperature in a high temperature season. The relevancy between temperature rise suppression and the growth of tomatoes is confirmed.

Research for utilization of warm water fishes and shellfishes (Kanagawa prefecture)



Warm water fish, "Rabbitfish"

Seaweed damage by warm water fishes and shellfishes in Kanagawa is spreading through the prefecture. Even if Rabbitfish is landed in large quantities, there is no economic value. Development of processed food and technology are necessary.



Local Governments Case Study: Disaster Management



Natural Disasters/
Coastal Areas

Preparation of natural disasters information and Improvement of the Mutual aid insurance

Outline

- It is expected to increase heavy rainfall caused by climate change. It makes flood from rivers or inland waters due to infiltration of rainwater to the ground and insufficient drainage. Sediment disasters are also likely occurred.
- In order to prepare such disasters, it is important to provide a **hazard map** including expected flood, inland waters, sediment area.
- Promotion of utilization of the **mutual aid insurance** covering a wide range of natural disasters such as strong wind and flood, heavy snowfall, tornado for minimizing disasters

Source:

• Sendai city living map

<http://www2.wagmap.jp/sendacity/top/mapselectgroup.asp?mct=9>

• Hyogo Prefecture Phoenix Mutual Aid (Hyogo Prefecture Housing Reconstruction Mutual Aid System)

<https://web.pref.hyogo.lg.jp/kk41/phoenixkyosai.html>

Source: Climate change adaptation information platform

Providing a hazard map (Sendai City)



A flood hazard map including dangerous sediment hazard area, flood history is provided in “Sendai living map” in Sendai city webpage on internet.

Utilization of the mutual aid pension covering a wide range of natural disasters (Hyogo prefecture)

Promotion of the Mutual aid insurance “Phoenix Mutual Aid” covering a wide range of natural disasters such as earthquakes, tsunami, strong wind and flood, heavy snowfall, tornado based on lesson learned from the Great Hanshin-Awaji Earthquake in Hyogo prefecture.





Local Governments Case Study: Human Health



Human Health

Countermeasure of heatstroke and infectious diseases

Outline

- Promotion of measures such as providing information attention to heatstroke. Improvement of medical care system and registration of rest sites for heatstroke patients caused by rising summer temperature.
- Rising temperature and change of rainfall cause expansion of the mosquitoes vectors and increase the risk for infectious diseases. It is important to improve research and studies about infectious diseases, promote public awareness of prevention methods.

Providing information on infectious diseases by mosquitoes vectors (Ehime Prefecture)



Ehime prefectures publishes leaflets summarized explanation and prevention methods of mosquitoes vectors of infectious diseases. "Dengue fever consultation dial" at each public health center offers information to administrators and medical institutions settled.

Registration of temporary rest sites against heatstroke (Saitama prefecture)



Saitama prefecture has registered and announced the rest sites "Cool Oasis" against heatstroke to the public, in cooperation with private companies and public facilities.

Source:

• Saitama Prefecture Health and Medical, health and long life division

Cool oasis cooperating facilities list in the town

<https://www.pref.saitama.lg.jp/a0704/netsuchusyo/cool-oasis-list.html>

• Ehime Prefecture Health and Welfare, health and sanitary, Health promotion division

<http://www.pref.ehime.jp/h25500/dengue/index.html>

http://www.pref.ehime.jp/h25500/dengue/documents/160510_kabaikaikateimuke.pdf



Recommendations for Strengthening Adaptation Measures

June, 2017 from the Liberal Democratic Party

① Promotion of adaptation measures in each field

- Promotion of adaptation measures such as prevention of agricultural disaster, anti-disaster management with full consideration of future climate change impacts
- Development of domestic and foreign adaptation business

② Development of information infrastructure based on scientific adaptation

- Enhancement of adaptation information infrastructure: collect, analyze and provide climate risk information (Climate Change Adaptation Platform (A-PLAT) operated by the NIES)

③ Promotion of adaptation measures in local governments

- Promotion of adaptation measures based on local needs in cooperation with local stakeholders

④ International cooperation on adaptation

- Support for developing countries and promote overseas adaptation business by establishment of Asia-Pacific Adaptation Information Platform (AP-PLAT) by 2020

⑤ Legal framework for adaptation measures

- The government shall promptly consider legal framework and conduct necessary legislation actions

Summary

- Climate change impacts have already been observed in several areas in Japan.
- The National Adaptation Plan was formulated based on scientific findings of the Climate Change Impacts Assessment.
- Climate Change Adaptation Platform which provides stakeholders with climate risk information is the key for science-based adaptation measures.
- Japan is promoting adaptation in local governments by constructing regional networks and providing local impact assessment data, adaptation planning guideline and good practices.
- Japan tries to set up legal framework to strengthen adaptation measures based on science.