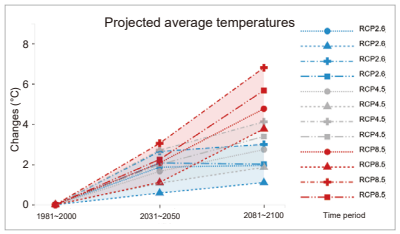
Agriculture and Forestry

Major Factors of Impacts

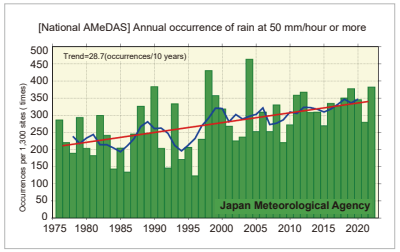
Rising temperatures, changes in precipitation and its patterns, increased heavy rain and large typhoons, earlier snowmelt/reduced snow runoff

Current Situation and Future Projections

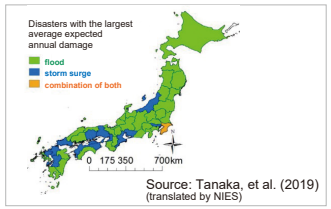
Average temperature in Japan is rising at a rate of 1.24°C per 100 years. Heavy rainfall is also on the increase, and precipitation and its patterns are changing, with an increase in heavy rains and large typhoons predicted.
Such changes in weather can increase damage from weather-related disasters, change crop growth and suitable cultivation areas, increase occurrence and distribution of pests and weeds, affect growth and reproduction of livestock, growth of planted forests, and as a result affect the supply of food and timber, income and production methods of people engaged in agriculture and forestry.



Projected average temperatures (annual average temperature projections based on emission scenarios and climate models (difference from standard period))Source: A-PLAT



Changes in the annual occurrence of precipitation of 50 mm/hour or more in Japan
Source: Japan Meteorological Agency website (translated by NIES)



Types of disasters that cause the greatest damage**

**Note that this figure only shows type of disasters that cause the largest amount of damage between flood, storm surge, and combination of both, but other disasters are also projected to occur.

Adaptation

Efforts should focus on mitigating weather-related disasters—such as torrential rains, typhoons, and floods—along with the effects of drought and temperature fluctuations, including quality degradation and demand shifts. Based on precise risk assessments, a strategic combination of soft and hard measures can be applied to minimize risks effectively.

Factors: Rising temperatures, changes in precipitation and its patterns, increased weather-related disasters, earlier snowmelt/reduced snow runoff

Management resources: Core business | Markets・Customers/Adaptation business

Impacts

Decreased quality/yield	Increased damage from birds and animals/pests	Increased disaster risks	Impacts on production base	Increased health risks/Decreased labor productivity	Changes in market and areas suitable for growing
• Decreased crop quality & yield • Decreased milk composition, egg and meat quality • Decreased milk yield, egg-laying numbers, fertility	• Increased damage by wildlife eating crops/forest • Increased crop damage by harmful pest/fungus	• Suspended shipments due to blockage of logistics networks • Increased risk of damage or collapse of facilities by strong winds, etc.	• Increased water procurement risks from water shortage • Decreased forage crop yield due to rising temperatures	• Increased risk of heat stroke for workers, decreased labor productivity	• Changes in needs due to temperature changes • Shifts in suitable growing areas caused by temperature changes, etc.

Adaptation measures

Decreased quality/yield	Increased damage from birds and animals/pests	Increased disaster risks	Impacts on production base	Increased health risks/Decreased labor productivity	Changes in market and areas suitable for growing
■Install misting systems, coolers	■Capture wild birds and animals	■Install disaster-resilient facilities	■Automated water management, pipeline irrigation	■Manage work conditions	■Survey needs and respond to changes
■Introduce new varieties	■Control pests and diseases	■Inspect/repair facilities	■Effective use of existing water resources	■Introduce robots, ICT	■Produce new crops, develop new products

Agriculture and Forestry

Agriculture and forestry are classified as establishments engaged in crop farming, livestock farming (including poultry, beekeeping and sericulture), and services directly related to agriculture and forestry.

Back

Factors: Rising temperatures, changes in precipitation and its patterns, increased weather-related disasters, earlier snowmelt/reduced snow runoff

Management resources: Core business | Markets・Customers/Adaptation business

Impacts

Decreased quality/yield	Increased damage from birds and animals/pests	Increased disaster risks	Impacts on production base	Increased health risks/ Decreased labor productivity	Changes in market and areas suitable for growing
(Agriculture) ・Decreased crop quality such as high temperature damage to crops, poor fruit coloration, etc. ・Yield loss from poor germination and faster weed growth caused by high temperatures ・Crop yield loss due to water shortage (Livestock) ・Decline in egg and meat quality in poultry ・Decline in milk and meat quality in livestock ・Decreased milk yield in dairy cows ・Decreased egg-laying numbers, fertility in poultry ・Decreased fertility, more heat-related deaths in livestock and poultry	(Common) ・Increased damage by wildlife eating crops (Agriculture) ・Increased pest/fungal damage to crops (Livestock) ・Higher infection risk for poultry and livestock from expanding wildlife habitat (Forestry) ・Increased tree damage from pests/diseases	(Common) ・Suspended shipments by blockage of logistics networks (Agriculture/Livestock) ・Increased risk of damage or collapse of facilities by strong winds (Agriculture) ・Damage to farmland due to prolonged flooding (Forestry) ・Slope failures by heavy rainfall ・Windthrow by heavy rainfall and strong winds	(Agriculture/Livestock) ・Increased water procurement risk due to water shortage, reduced snowfall, earlier snowmelt (Livestock) ・Decreased forage crop yield due to rising temperatures	(Common) ・Increased risk of heat stroke for workers ・Decreased labor productivity due to deteriorated working environment	[Market changes] ・Changes in consumer needs, preferences due to changing temperatures [Changes in suitable growing areas] ・Changes in suitable growing areas as temperatures rise

Types of adaptation measures / Adaptation measures

Soft	Hard	Soft	Hard	Soft	Hard	Soft	Hard	Soft	Hard	Hard
(Agriculture) ・Introduce heat-tolerant/different early-late varieties ・Stagger crop period/change transplant period ・Adapt to changes in and shortening of harvest season ・Manage soil temperature/oxidation level ・Sufficient irrigation, mulch sheets to control water evaporation ・Weed control by herbicides, field management ・Change fertilizer timing (Livestock) ・Water and lime application to barn roofs ・Avoid overcrowding, shear regularly ・Provide cold water/quality feed to reduce heat stress ・Night feeding for heat relief	(Agriculture/Live-stock) ・Install sprinklers, misters, coolers, fans in barns and greenhouses ・Add shading/sunshades to barns and greenhouses (Livestock) ・Insulate barn roof interiors	(Agriculture/Forestry) ・Capture wild birds and animals (Agriculture) ・Timely pest/disease control (e.g. during drought) ・Introduce pest-resistant varieties ・Pest/vector control by chemicals/natural enemies (Livestock) ・Ensure hygiene, vaccinations and inspections (Forestry) ・Replace tree species	(Agriculture/Forestry) ・Install protective/intrusion prevention fences (Agriculture) ・Install pest control devices (Forestry) ・Establish control zones to limit pest spread	(Common) ・Inspect/repair facilities ・Remove items with risk being blown away by strong winds, roll up vinyl ・Formulate/operate BCP ・Take out damage insurance (Forestry) ・Maintain forests, replace tree species	(Agriculture/Live-stock) ・Install/reinforce disaster-resilient greenhouses and barns ・Install emergency power supply ・Improve drainage channels (Forestry) ・Establish protective forest zones to prevent windthrow ・Improve forest road network	(Agriculture) ・Use ICT for irrigation/water management (Livestock) ・Stagger and extend harvest periods by crop conversion to mitigate decreased forage yield	(Agriculture/Live-stock) ・Automate water management, pipeline water channels ・Effective use of existing water resources through operational changes in reservoirs and agricultural dams	(Common) ・Take in water/salt frequently ・Wear sweat-absorbent, quick-drying clothing ・Improve working hours and environment ・Reduce labor through ICT systems, including water and greenhouse environment management	(Common) ・Install highly efficient air conditioning ・Reduce workload through robotic technologies (e.g., autonomous tractor)	[Market changes] ・Survey needs and respond to changes [Changes in suitable growing areas] ・Produce new crops ・Develop new products

Effect	Low ~ High	Low ~ High	Low ~ Medium	Low ~ Medium	Medium ~ High	High	High	Medium ~ High	High	High	-
Cost	Low ~ Medium	High	Low ~ Medium	Medium ~ High	Low ~ Medium	Medium ~ High	Medium	Medium ~ High	Low ~ Medium	High	-
Time span	Short	Short	Short ~ Long	Short	Short ~ Long	Short ~ Long	Short	Short ~ Medium	Short	Short ~ Medium	-

How to proceed with adaptation measures

【Current approach】 Promote measures against weather-related disasters (heavy rains, typhoons, floods, etc.), as well as against quality decline and demand changes caused by droughts and temperature changes.

【Climate change-aware approach】 Risk assessment should be conducted for each impact of concern, and a combination of soft and hard measures should be taken to mitigate risks based on results of the assessment.

【References】Ministry of Agriculture, Forestry and Fisheries (2024) "Trends in Smart Agriculture" https://www.maff.go.jp/j/kanbo/smart/attach/pdf/index-165.pdf, Ministry of Agriculture, Forestry and Fisheries (2023) "Climate Change Adaptation Plan of Ministry of Agriculture, Forestry and Fisheries" https://www.maff.go.jp/j/kanbo/kankyo/seisaku/climate/adapt/attach/pdf/top-4.pdf, Ministry of the Environment (2020) "Assessment Report on Climate Change Impacts in Japan (Detailed)" https://www.env.go.jp/press/files/jp/115262.pdf, Ministry of the Environment (2022) "Climate Adaptation Guide for Private Sector: Preparing for Climate Risks and Surviving" https://adaptation-platform.nies.go.jp/private_sector/guide/index.html, Japan Meteorological Agency "[National AMeDAS] Annual occurrence of rain at 50mm/hour or more" https://www.data.jma.go.jp/cpdinfo/extreme/extreme_p.html, Japan Meteorological Agency (2020) "Climate Change Monitoring Report 2019" https://www.data.jma.go.jp/cpdinfo/monitor/2019/pdf/ccmr2019_all.pdf, Yukako Tanaka et al. (2019) "Assessment on the Risk of Flood and Storm Surge with Flood Control Facilities" https://doi.org/10.2208/jscejhe.75.2_I_109, Forestry and Forest Products Research Institute (2018) "Forest Winds" https://www.ffpri.affrc.go.jp/thk/research/publication/thk/documents/fw_72_1-2.pdf, Ministry of Agriculture, Forestry and Fisheries (2018) "Guidelines for Livestock Disease Prevention" https://www.maff.go.jp/j/syouan/douei/katiku_yobo/attach/pdf/index-304.pdf, Jun' ya Takakura et al. (2018) "Limited Role of Working Time Shift in Offsetting the Increasing Occupational Health Cost of Heat Exposure" https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2018EF000883, Agriculture department, Yamanashi Prefecture (2015) "Fruit Tree Weather Disaster Countermeasure Manual" https://www.pref.yamanashi.jp/documents/65774/04_kazyusaigaitaisaku.pdf, National Institute for Environmental Studies "H08 Water Risk Tool" https://h08.nies.go.jp/h08/viewer_j.html, National Institute for Environmental Studies "Climate Change Observation and Projection Data" Climate Change Adaptation Information Platform (A-PLAT) https://a-plat.nies.go.jp/webgis/national/index.html

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