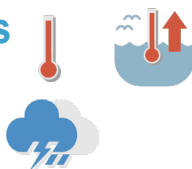


Fisheries

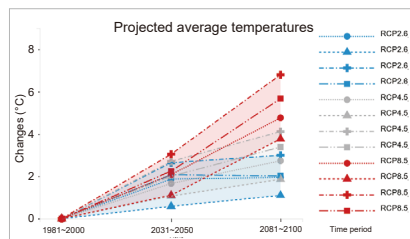
Major Factors of Impacts

Rising temperatures, rising sea surface temperatures, rising sea levels, rising inland water temperatures, increased extreme weather events

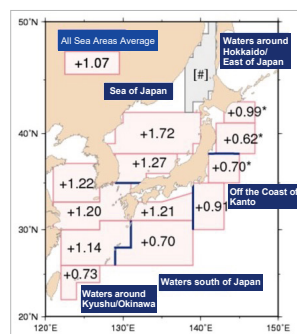


Current Situation and Future Projections

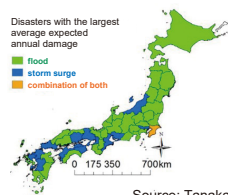
Average temperatures in Japan are increasing at a rate of 1.24°C/100 years. The average sea surface temperature (annual average) in the seas near Japan over approximately 100 years up to 2014 has increased by +1.07°C/100 years, and long-term trends toward the end of the 21st century project an increase of around 0.6°C to 3.1°C per 100 years. In addition, heavy rainfall capable of causing floods is projected to increase in major river basins by the end of this century.



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



Long-term Trend of Sea Surface Temperature (Annual Average) in Waters Surrounding Japan (°C / 100 years)
Source: Fisheries Agency, Guidelines for Fishing Ground Development in Response to Climate Change



Source: Tanaka, et al. (2019)
(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

Promote adaptive production activities in response to environmental changes, supported by the proactive use of information and technology, and collaboration with local communities. Combine soft and hard measures to mitigate risks based on accurate risk assessment.

Factors

Rising temperatures, rising sea surface temperatures, rising sea levels, rising inland water temperatures, increased extreme weather events

Management resources

Impacts

Adaptation measures

Core business

Markets · Customers/ Adaptation business

Changes in marine fisheries environment

- Changes in distribution areas, fishing seasons and grounds of migratory fishes, leading to income instability
- Increased costs due to longer fish search hours

Increased risks in aquaculture

- Changes in suitable aquaculture species
- Changes in aquaculture operations/shorter fishing seasons
- Increased risk of fish diseases

Changes in coastal and inland water fisheries environment

- Expansion of sea desertification
- Northward migration of seaweed-eating fish
- Expansion of distribution and increased frequency of pests
- Decrease of cold-water inland fish
- Impacts on river environments/eco-systems from heavy rain

Increased disaster risks

- Increased damage from storm surges/extreme weather events
- Increased risks in securing materials and feed
- Disruption of logistics networks

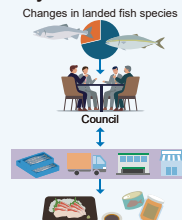
Increased health risks/ Decreased labor productivity

- Increased risk of heat stroke/hypothermia
- Decreased labor productivity

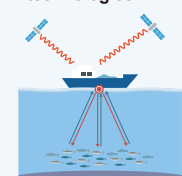
Changes in market/ Changes in target fish species

- Reduced consumer demand due to rising prices
- Changes in landed fish species
- Increase of warm-water inland fish
- Faster growth of warm-water farmed fish

Establish supply system



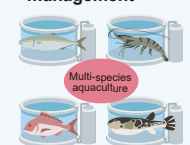
Introduce new equipment, IoT-based fish detection technologies



Land-based aquaculture



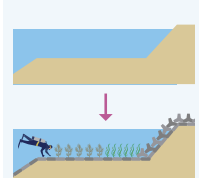
Multi-species integrated farming management



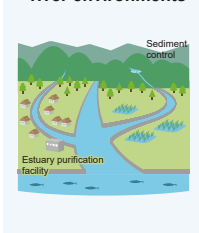
Genome-edited breeding



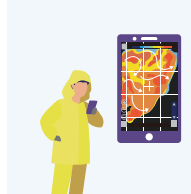
Create/restore seaweed beds



Conserve/improve river environments



Access to weather information



Strengthening mooring, hauling up vessels, and removing fishing nets and aquaculture gear



Health management



Secure rest areas, reduce workload



Survey needs and adapt to changes



Use underused fish



Farm new fish species

