Climate Change Impacts and Adaptation Measures (Businesses)

😽 Fisheries

Major Factors of Impacts

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

2



Factors

Management

resources

Impacts

Adaptation

measure

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

120'E 140°E 130°E 150°F 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



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.

Projected average temperatures RCP2.6 RCP2.6 RCP2.6 RCP2.6 RCP4.6 RCP4.5 RCP4.5 RCP4.5 RCP8.5 RCP8.5 + RCP8.5 . RCP8.5 1981~2000 2031~2050 2081~2100 Time period

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



· Changes in distribution Changes in suitable · Expansion of sea · Increased damage areas, fishing seasons aquaculture species desertification from storm and grounds of · Northward migration of surges/extreme Changes in aquaculture migratory fishes, seaweed-eating fish weather events operations/shorter leading to income fishing seasons Expansion of distribution Increased risks in instability Increased risk of fish and increased securing materials and

mitigate risks based on accurate risk assessment.

Increased risks in

aquaculture

diseases

hours Establish supply Land-based system aquaculture Changes in landed fish species

Changes in marine

isheries environment

· Increased costs due to

longer fish search

Introduce new equipment, IoT-based fish detection

technologies



Multi-species integrated farming management







Promote adaptive production activities in response to environmental changes, supported by the proactive use

feed

networks

Increased

disaster risks

Disruption of logistics

Access to weather

information

Strengthening

nets and

mooring, hauling

up vessels, and

removing fishing

aquaculture gear

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

Adaptation of information and technology, and collaboration with local communities. Combine soft and hard measures to

Core business

Changes in coastal

and inland water

frequency of pests

inland fish

· Impacts on river environments/eco-

Create/restore

seaweed beds

· Decrease of cold-water

systems from heavy rain

sheries environmen





creased health risks/

Decreased labor

productivity

· Increased risk of heat

stroke/hypothermia

Decreased labor

productivity

Health

management



Survey needs and

adapt to changes

Secure rest areas. reduce workload

Use underused fish



Markets · Customers

Adaptation business

Changes in market/

Changes in

target fish species

Reduced consumer

prices

species

inland fish

· Faster growth of

demand due to rising

· Changes in landed fish

Increase of warm-water

warm-water farmed fish

National Institute for Environmental Studies, Center for Climate Change Adaptation, December 2024

😴 Fisheries

Fisheries are classified as establishments that harvest aquatic plants and animals that naturally reproduce in marine and inland waters, as well as those that operate aquaculture facilities in these environments. It also includes businesses that provide services directly related to these activities.

Factors Rising temperatures, rising sea surface temperatures, rising sea levels, rising inland water temperatures, increased extreme weather events Markets · Customers/ Management Core business resources Adaptation business Increased health risks/ Changes in market/ Increased risks in Changes in marine Changes in coastal and inland **Increased disaster risks** Impacts Decreased labor Changes in target fish fisheries environment aquaculture water fisheries environment productivity species · Changes in distribution areas, fishing seasons · Unsuitability of summer aquaculture for · Decline in seaweed beds, changes in seaweed Flood damage to work sites by storm surges. · Increased risk of heat [Market changes] and grounds of migratory fishes due to rising certain fish and shellfish due to rising water bed constituent species due to sea desertification damage to fishing boats, fixed nets and stroke/hypothermia by · Decreased consumer demand due due to rising water temperatures to rising seafood prices caused by sea water temperatures temperatures aquaculture facilities by extreme weather sudden rain water temperature changes · Increased damage from northward migration of events · Income instability caused from changing · Changes in aquaculture operations/shorter · Decline in labor productivity seaweed-eating fish [Changes in target fish] due to worsening working fishing seasons fishing seasons for shellfish/seaweed due to · Increased risks in securing materials and · Mass outbreaks of harmful species (seaweed, · Changes in landing areas of rising sea water temperatures feed due to soaring raw material prices conditions · Increased fuel costs due to extended fish plankton, jellyfish), and northward expansion of migratory species due to water affected areas by their migration due to rising search hours · Increased risk of fish diseases from · Disruption of the logistics networks due to temperature shifts sea water temperatures and ocean heat waves extreme events, leading to the stagnation of deteriorating water quality due to rising sea Increase in warm-water inland fish · Decrease of cold-water inland fish water temperatures fisherv products Easter growth of warm-water · Impacts on river environments/ecosystems from farmed fish flooding and sediment inflow due to torrential rain Types of Soft Soft Hard Soft Hard Soft Hard Soft Hard Hard adaptation Hard measures Establish a council Introduce Select/breed fish Improve aquaculture Remove sea Create/restore · Check weather updates, Strengthening [Soft] [Market changes] warnings and cautions mooring, hauling up with experts to labor-saving tools in with characteristics rafts/materials urchins/fish that seaweed beds Regular health checkups · Survey needs and respond to Take out fishing boat ensure the proper response to to live/reproduce at feed on seaweed vessels, removing · Nets/fences to block develop products based on Land-based insurance/fishery mutual · Hydration and salt intake distribution of fishing nets and changing landed high water aid aquaculture in Supply mature seaweed-eating fish market trends landed fish aquaculture gear to · Manage work hours fish species temperatures, breed Act safety first before. coolable tanks parent seaweed Reproduce water [Changes in target fish] during and after genome-edited fish prevent damage Use EC platforms Improve gear to [Hard] Replace farmed fish · Add nutrients to storms/unusual runof currents using Use underused fish Adaptation Secure emergency and local support to adapt to changes in Obtain water Have multiple species restore seaweed stones/blocks to Secure onboard cooling rest measures power supply for procurement sources, · Farm new fish varieties reflect fisher's input migratory fishes temperature via beds reduce damage areas diversify them aquaculture and enhance PC/mobile phone Install IoT from sea urchins geographically, request Monitor, assess, facilities/refrigerators · Prepare blankets and warm high-value product them to prepare for technologies to Manage diversified and seaweed-eating and implement drinks to prevent hypothermia climate change impacts sales Keep freezers and reduce fish search operation with fish countermeasures Share disaster awareness fridges closed Introduce workload-reducing hours multi-species on fisheries and preparedness among · Conserve/improve during blackouts equipment shipping and logistics farming environments rivers companies Effect Low ~ Medium Low ~ Medium Low ~ Medium Low ~ High Medium ~ High Low ~ High High Low Low ~ Medium Low ~ High Low ~ High High Low ~ Medium Medium Low ~ Medium Low ~ Medium Low ~ High Cost Low ~ Medium Short ~ Medium Time span Short ~ Long Short ~ Long Short ~ Medium Medium Short ~ Medium Medium Short Short [Current approach] Promote adaptive production to address environmental changes through proactive use of information and technology, and local community collaboration How to proceed with adaptation [Climate change-aware approach] Conduct risk assessment for each anticipated impact and implement a balanced mix of soft and hard measures for effective mitigation measures

[References] Ministry of the Environment (2020) "Assessment Report on Climate Change Impacts in Japan (Detailed)" https://www.env.go.jp/press/files/jp/113282 pdf, Toholu National Fisheries Research Institute (2018) "Forecasting Water Temperature Variability in Spawning Grounds for Mackerel, Sardine, and Pacific Saury" https://www.nerv.go.jp/press/files/jp/113282 pdf, Toholu National Fisheries Research Institute (2018) "Forecasting Water Temperature Variability in Spawning Grounds for Mackerel, Sardine, and Pacific Saury" https://www.nerv.go.jp/press/files/jp/113282 pdf, Toholu National Fisheries Revision31/http://datation.india/fisher/ex/sat/s45%46%36%36%36%46%36%