18th ARRN International Forum
亚洲河流生态修复网络第18届国际论坛
NBS-based Ecological Restoration and Integrated Management of River Basins
基于自然解决方案的流域生态修复与综合治理
Dec. 07, 2022
13:00-17:00 (UTC+8)

"River Basin Disaster Resilience and Sustainability by All"

as Global Warming Adaptation Measures in JAPAN

December 7,2022
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CONTENTS

1. Japan's Recent Disasters

In Recent years, natural disasters occur across Japan as frequently as almost every year.

2015 to 2017

Heavy rains in Kanto and Tohoku regions in Sept. 2015

(1) Flood damage due to embankment collapse of Kinugawa River (Joso City, Ibaraki Pref.)

Kumamoto earthquake in 2016

(2) Landslide disaster caused (Minamiaso Village, Kumamoto Pref.)

Typhoon 10 in Aug. 2016

(3) Flood damage due to flooding of Omoto River(Iwaizumi Town, Iwate Pref.)

Heavy rains in northern part of Kyushu region in Jul. 2017

(4) Flood damage caused by Katsuragawa River (Asakura City, Fukuoka Pref.)

2018

Heavy rains in July

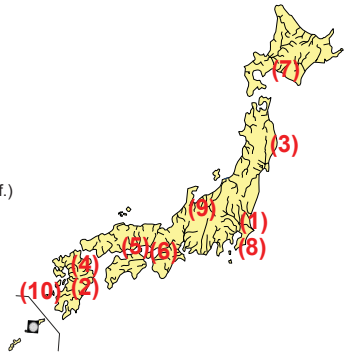
(5) Flood damage caused by Odagawa River (Kurashiki City, Okayama Pref.)

Typhoon 21

(6) Flood damage at Rokko Island, Port of Kobe (Kobe City, Hyogo Pref.)

Hokkaido Eastern Iburi earthquakes

(7) Landslide disaster caused (Atsuma Town, Yufutsu County, Hokkaido Pref.)



2019

Boso Peninsula Typhoon

(8) Utility poles and trees collapsed (Kamogawa City, Chiba Pref.)

Eastern Japan Typhoon

(9) Flood damage caused by Chikuma River (Nagano City, Nagano Pref.)

2020

Heavy rains in July

(10) Flood damage caused by Kuma River (Hitoyoshi City, Kumamoto Pref.)

Damage from the 2019 East Japan Typhoon (Typhoon 19)

○ River collapses and landslides occurred in a very extensive areas due to the heavy rains from the 2019 East Japan Typhoon (Typhoon No. 19), which caused a severe damage including 77 dead, 8 people missing, 7,231 totally or partially collapsed houses and 66,938 inundated houses

*Cabinet Office "Damage conditions related to Typhoon 19 in 2019 (22nd report)" (as of 7:30 on October 25, 2020)

Shinano River system Chikuma River
(Nagano city Nagano pref.)

Inundation of about 25,000 ha in nationally managed rivers

Abukuma River system Abukuma River
(Sukagawa City, Fukushima Pref, etc.)

Arakawa River Oppe River Toki River
(Kawagoe City, Saitama Pref, etc.)

Kuji River system Kuji River Sato River
(Hitachiomiya City, Ibaraki Pref, etc.)

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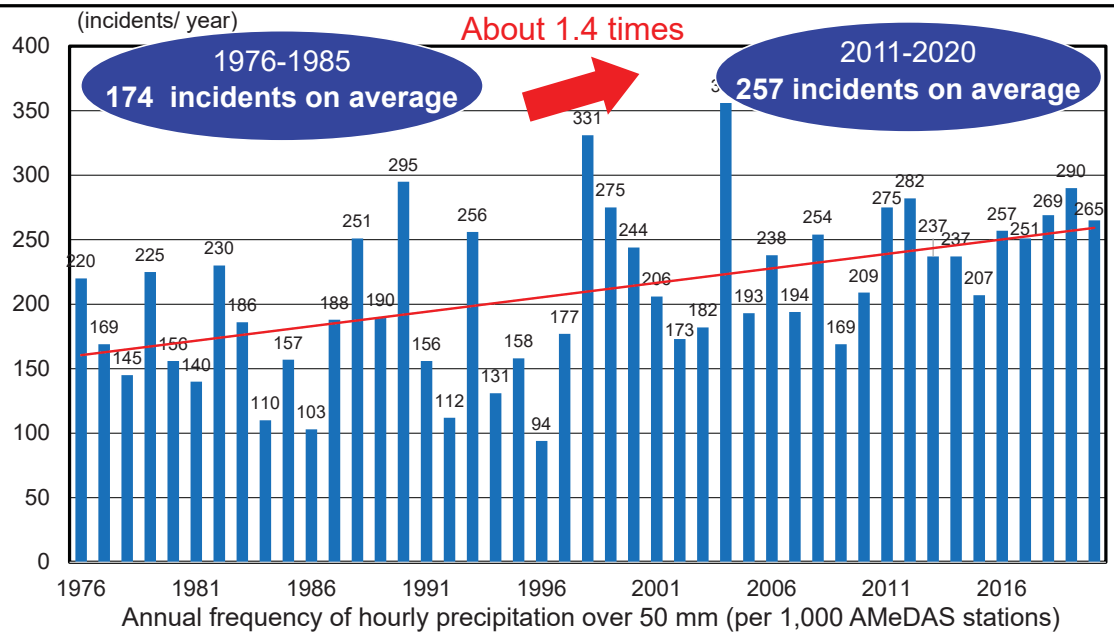
Long-term changes in the frequency of heavy rain of short duration

○ Frequency of heavy rain (over 50 mm/hour) of short duration increased about 1.4 times in 30 years

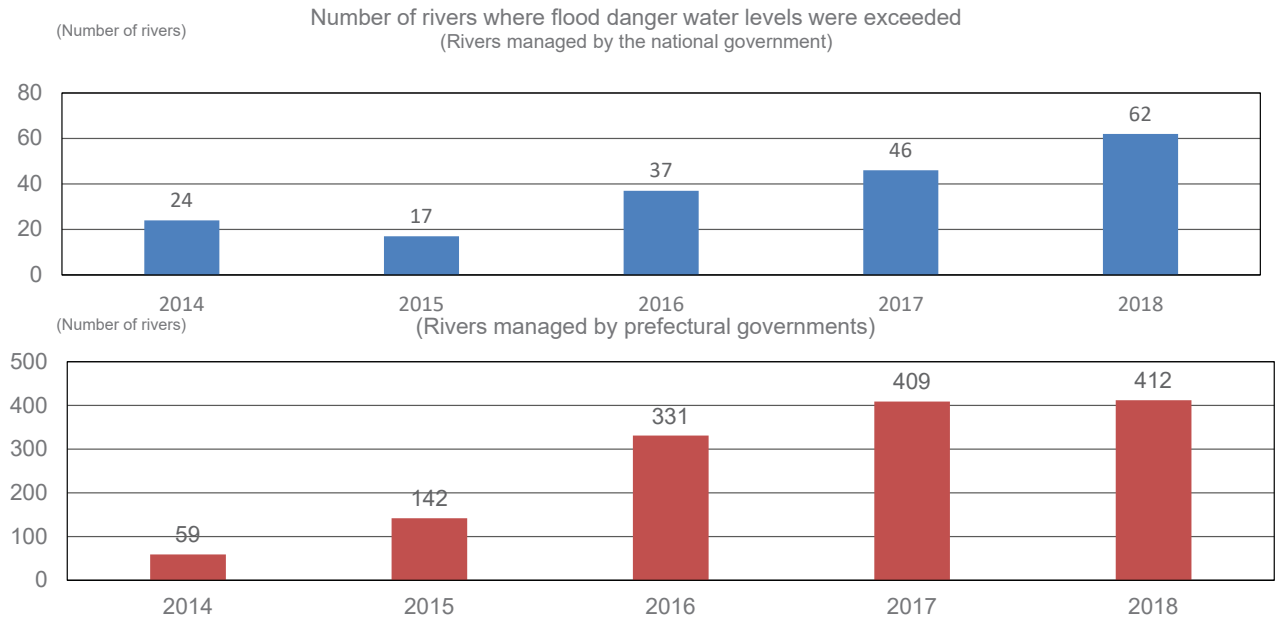


* Data from the previous year is added in January every year.
* There were originally about 800 AMeDAS stations in 1976. The number increased to about 1,300 in 2016. In order to remove the effect of the difference in the number of stations depending on the year, comparison is made after conversion to frequency per 1,000 stations.
* Excluded are radio robot rain-gauge stations that were deployed in mountainous areas but later abolished.

5

Intensification of disasters due to climate change, etc.
(Number of rivers where flood danger water levels were exceeded)

○ Owing to the increase in heavy rains due to climate change, etc., relative safety levels may be declining.
○ Through dams and retarding basins or river channel dredging, measures to lower river levels are systematically implemented, but the number of points where floods exceed the **flood danger water level** (water level at which a river may flood) has tended to increase.



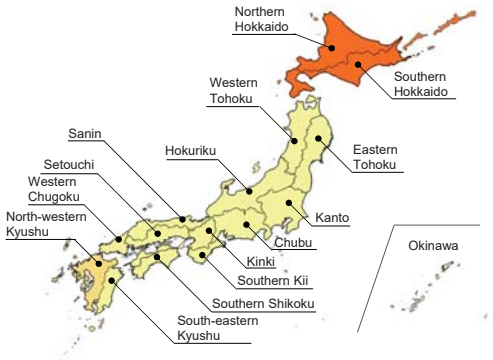
*According to disaster information announced by the Ministry of Land, Infrastructure, Transport and Tourism (posted on the MLIT website)

Change in the amount of rainfall and frequency of flooding due to climate change

○ The future rainfall change rate is calculated for each region with similar rainfall characteristics, and the rainfall change rate is set based on an evaluation of the breadth of the future sea surface temperature distribution and average values etc.
○ The rainfall change rate for a rise of 2˚C is 1.15 times for Hokkaido and 1.1 times for other areas (including Okinawa), and the precipitation change rate for a rise of 4˚C is 1.4 times for Hokkaido and North-western Kyushu and 1.2 times for other areas (including Okinawa).
○ When temperatures rise by 4˚C, there is a significant impact on small basins and short-term rainfall, so change of rainfall rate is set separately.

<Rainfall change rate for each region>

Area classification	2˚C rise	4˚C rise	
			Short time
Northern and Southern Hokkaido	1.15	1.4	1.5
North-western Kyushu	1.1	1.4	1.5
Other areas (including Okinawa)	1.1	1.2	1.3



<Reference> National average changes in flow rate and flood frequency in class A river systems, calculated based on rainfall change rate

Climate change scenario	Rainfall	Flow rate	Flood frequency
Rise of 2˚C	Approx. 1.1 times	Approx. 1.2 times	Approx. 2 times
Rise of 4˚C	Approx. 1.3 times	Approx. 1.4 times	Approx. 4 times

2. “River Basin Disaster Resilience and Sustainability by All”

流域治水

Direction of River Basin Disaster Resilience and Sustainability by All

- Comprehensive and Multi-layered Water-related Disaster Risk Reduction Considering Climate Change -

- Shift to mainstream disaster prevention and mitigation for society
- Promote the transition to River Basin Disaster Resilience and Sustainability by All, including businesses and households

Conventional Measures

- Rebuilding Flood-Conscious Societies
- Combination of Structural and Non-structural Measures

Changes

Impacts of Climate Change	Social Trends	Technological Innovation
Need to enhance measures for early improvement of safety	Need to achieve safe and secure Compact Plus Network urban planning	Need to utilize 5G, AI, Big Data, and IT technologies in disaster risk reduction

Important Perspectives for Measures

Resilience | Inclusion | Sustainability

Future Measures

Revise plans considering climate change

Transition to **River Basin Disaster Resilience and Sustainability by All**

Revising Plans to Consider Climate Change

● Revise plans considering the future impacts of climate change

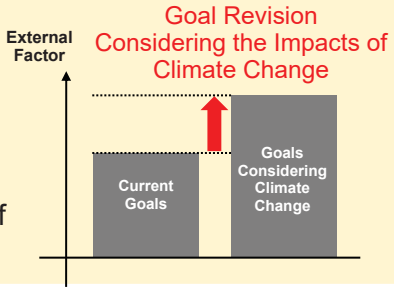
Plan Revision

The current defense plans against floods, inland floods, landslides, storm surges, and high tides were developed based on **past records of precipitation and tide levels**

However,
they may not be able to secure safety considering the impacts of climate change, such as increased rainfall and rising sea levels

For the future,
revise plans to **consider the impacts of climate change such as increased rainfall* and rising sea levels**

* In the scenario, hold global average temperature increase to well below 2°C (the target scenario of the Paris Agreement on Climate Change), precipitation is likely to increase by a factor of 1.1



Background and need for legislation

Impact of Climate Change

Prompt response

○ **Promptly implement "River Basin Disaster Resilience and Sustainability by All projects" which clarify the overall structural and non-structural measures of national, prefectural and municipal governments to respond to intensifying flood disasters**
(Formulated for all 109 Class A water systems in FY 2020)

(Respond to inland flood damage from recorded maximum scale rainfall in urban function consolidation areas for the largest floods since WWII in nationally managed rivers)

Review flood control plans in anticipation of future climate change (increased rainfall etc.)

Further response in anticipation of climate change

○ **To cope with more rainfall (external force) than current plans, further expand River Basin Disaster Resilience and Sustainability by All by related parties with an overall perspective of the upstream and downstream, and main/branch rivers basins, including enhancing river measures**

Need to develop a framework for a "Bill for River Basin Disaster Resilience and Sustainability by All "

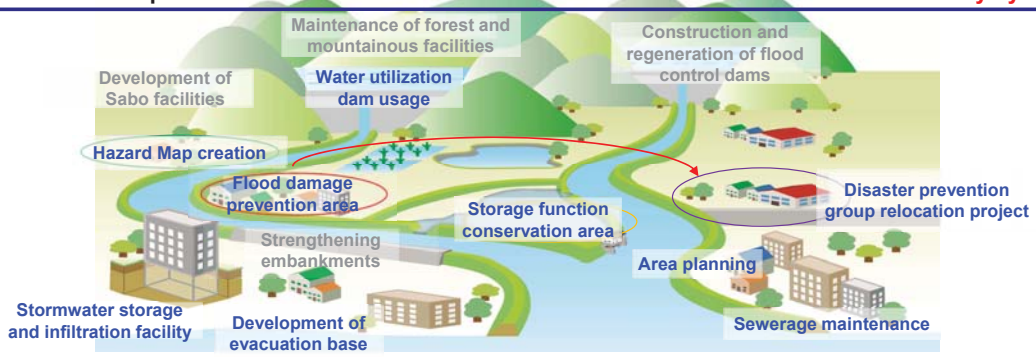


Illustration of River Basin Disaster Resilience and Sustainability by All

Image of River Basin Disaster Resilience and Sustainability by All

- Transition to River Basin Disaster Resilience and Sustainability for All, a new concept of flood management with the cooperation of all stakeholders around basins
- Upgrade flood management plans with consideration for the impact of climate change
- Promote the following integrated and multilayered measures: 1) Flood Prevention, 2) Exposure Reduction, and 3) Disaster Resilience

1) Flood Prevention

Catchments

- Improve rainwater storage functions

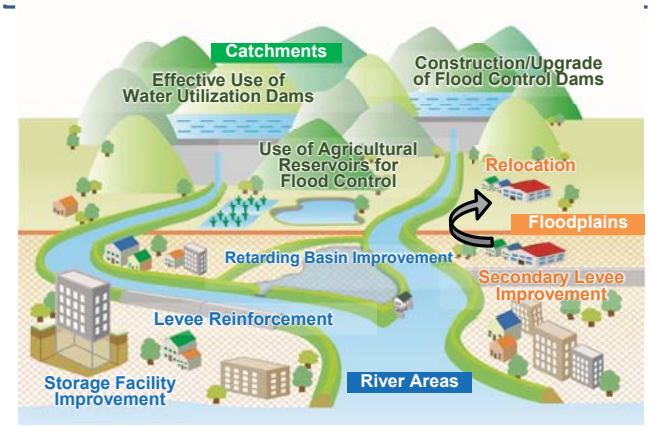
River Areas

- Store flowing water through construction/ upgrades/effective use of dams, etc.
- Ensure and improve the discharge capacity of river channels
- Reduce overflow

2) Exposure Reduction

Floodplains

- Guide residents to lower risk areas
- Promote safer ways of living
- Localize inundation areas



3) Disaster Resilience

Floodplains

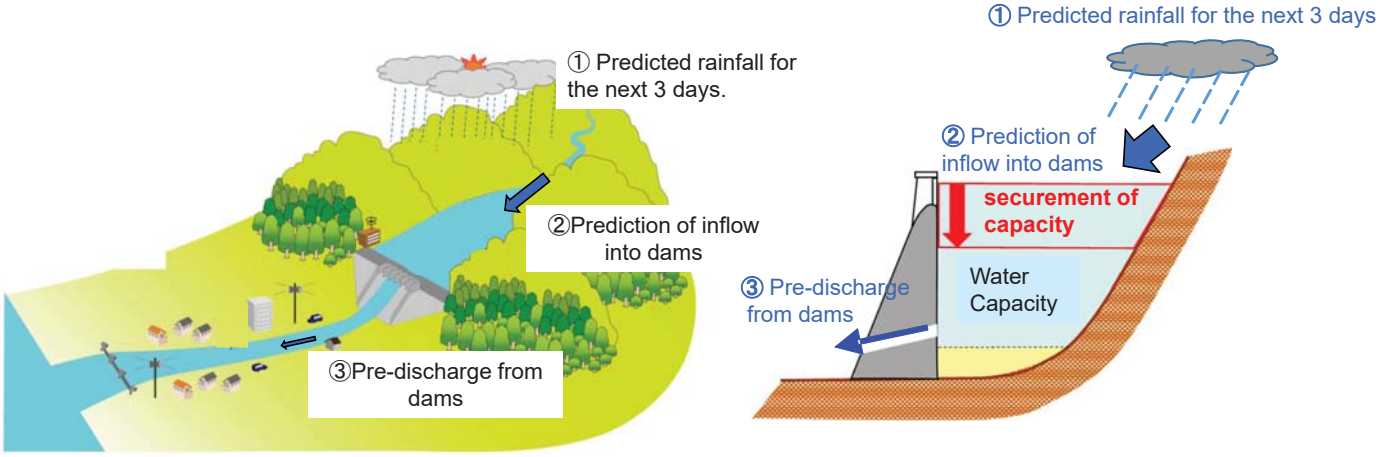
- Improve land risk information
- Reinforce evacuation systems
- Minimize economic damages
- Promote safer ways of living
- Improve support systems for affected local governments
- Eliminate inundation promptly

3. Major Efforts in "River Basin Disaster Resilience and Sustainability by All"

(1) Flood Prevention～upgrades/effective use of dams～

・There are approximately 570 dams for flood control purposes, and approximately 900 dams exclusively for water use, such as power and agricultural water.

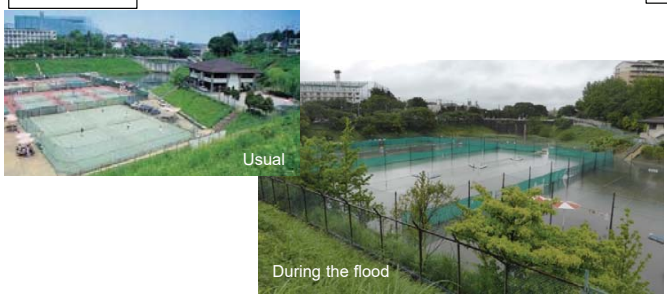
・With the cooperation of water users, pre-discharges of water storage for water use are released in advance to temporarily provide capacity for flood control.



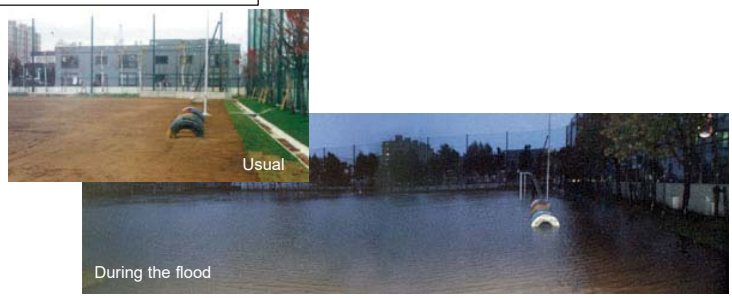
(1) Flood Prevention ～Development of storage facilities～

・Runoff control measures using existing stock to temporarily store rainwater during flooding.

Reservoir



Schoolyard storage



Pond

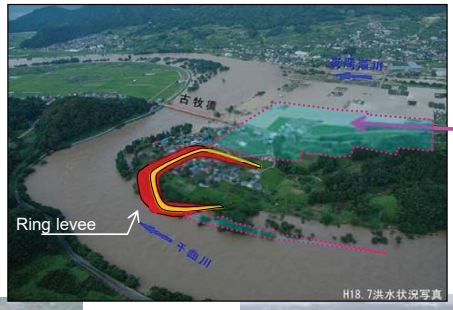
Paddy field

Infiltration trout and pipes

(2) Exposure Reduction～Promote safer ways of living～

○ Effective flood control measures are implemented by building a ring levee that allows flooding in some areas, taking into account land use conditions, rather than building a continuous levee.

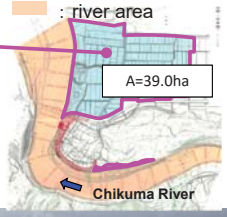
＜Elimination of house flooding damage caused by a ring levee in Nagano Prefecture (Chikuma River).＞



● hazard area

: hazard area

: river area



(2) Exposure Reduction ～Guide residents to lower risk areas～

○ Take comprehensive measures for safe community development, such as controlling development in disaster hazard areas, promoting relocation, and strengthening the linkage between site optimization plans and disaster prevention.

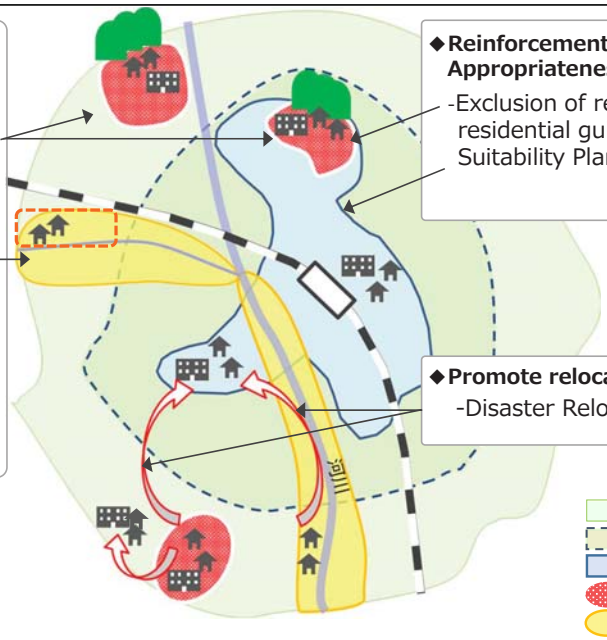
◆Development control in disaster hazard areas

< Red Zone >

-Development of residences and private business facilities (stores, hospitals, social welfare facilities, inns/hotels, factories, etc.) are prohibited throughout the entire city planning area.

<Flood Hazard Area>

-Stricter development permits for housing in urbanization control zones (permits will be granted if safety and evacuation measures are taken).



◆Reinforcement of the Location Appropriateness Plan

-Exclusion of red zones from the residential guidance zones in the Location Suitability Plan

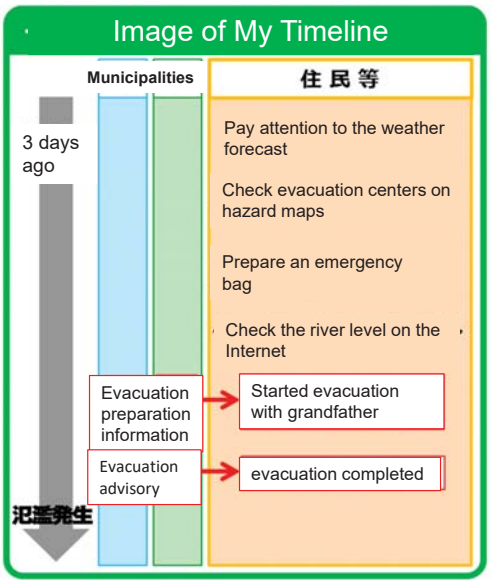
◆Promote relocation from disaster hazard areas

-Disaster Relocation Planning by Municipalities

Urbanization control zones
Municipalization area
Residential zone
Red Zone
Flood Hazard Area

(3) Disaster Resilience～Create My Timeline～

○ **"My Timeline"** is a personal disaster preparedness action plan that includes a timeline of "when" and "what" to do in advance, depending on the approach of a typhoon
○ **"My Timeline"** is an initiative that is expected to increase the effectiveness of evacuation by making each resident aware of local flood risks through the use of flood hazard maps



In the process of reviewing My Timeline.

「 Recognize risk 」 Realizing
・ My house will be flooded.

「Know when to run away」 Consider
・ When will you run away?
・Who are you running away with?

「Expanding the circle of communication」
・ Get to know each other through exchanges of ideas, etc.


Workshop


Disaster prevention education

(4) Promotion of Green Infrastructure in "流域治水"

Green Infrastructure refers to efforts to promote sustainable and attractive national land, cities, and regions by utilizing the diverse functions of the natural environment in both hard and soft aspects such as social infrastructure development and land use.

We have been working on disaster prevention and mitigation, regional development, and environmental conservation by utilizing the functions of the natural environment.

With green infrastructure relax


Utilizing open space Health Event (Tachikawa City, Tokyo)

COVID-19, Taking the opportunity, **Formation of healthy living spaces in a comfortable environment rich in nature** and More and more needed

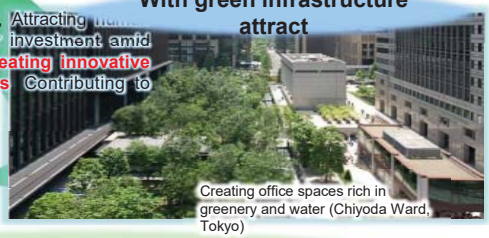
With green infrastructure protect

Contributed to the **response to severe and frequent disasters resulting from climate change** by, for example, storing water in the Tsurumi River through a recreational water area integrated with a park to prevent disasters after the 2019 East Japan Typhoon


Tsurumi River Multipurpose Recreational Area (Yokohama City, Kanagawa Prefecture)

With green infrastructure attract

Investing in SDGs and ESG, Attracting resources and private sector investment amid growing interest in SDGs, **Creating innovative and attractive urban spaces**, Contributing to society


Creating office spaces rich in greenery and water (Chiyoda Ward, Tokyo)

With green infrastructure connect


Maintenance and management of green spaces by local residents (Mitsuke City, Niigata Prefecture)

Green infrastructure functions better with time, such as plant growth. **Participation of local residents from planning to maintenance and management** possible efforts

Aim to realize a sustainable and attractive society that contributes to disaster prevention and mitigation, building national resilience, new lifestyles, and SDGs by utilizing green infrastructure

(4) Promotion of Green Infrastructure

Promoting environmental initiatives such as the conservation and creation of diverse habitats and the formation of landscapes that are in harmony with the local natural environment with all stakeholders in the basin

By devising the excavation shape of the river channel, wetland environment that serves as a habitat, growth and breeding ground for organisms, and form an ecosystem network is conserved and created.

Image of a retarding basin (Maruyama River)

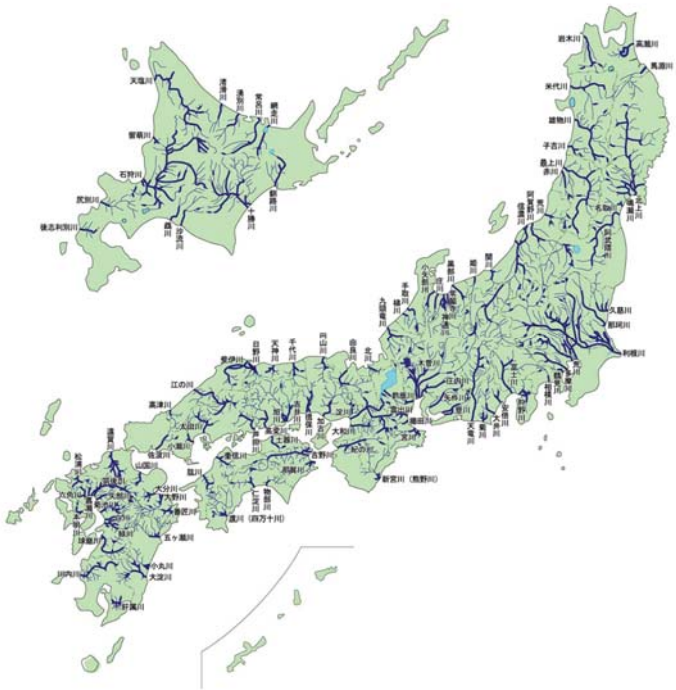
Image of river channel excavation (Hino River , Kuzuryu River Basin)

By properly maintain the open levee, the continuous environment for fish and other species that live in rivers and basins are preserved and biodiversity maintained. (Kitagawa)

Developing levee and revetment in unison with community development, preserveing and creating landscapes that harmonize with the history, culture and tourism infrastructure of the region, and revitalizing the region.

(4) Promotion of Green Infrastructure

Visualization of the efforts of stakeholders in River basin managed by Central Government



(4) Promotion of Green Infrastructure

"River Basin Disaster Resilience and Sustainability by All" in Ara River Basin < Location Map >

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Thank you for your kind attention.

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