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International Commission on Irrigation and Drainage (ICID)

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Professor Emeritus of Kyoto University, Japan

Water for Resilient Futures
— From Crisis to Collective Action —

2nd Indo Global Irrigation Summit

24-25 June 2026, New Delhi India

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Water for Resilient Futures
— From Crisis to Collective Action
Evolution of Integrated River Basin Management in Japan

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Water Security = Global Security

- Climate extremes are intensifying
- Water crisis is already here
- Risks affect economies, health, and stability

- Water is no longer only a resource issue.
  - It is a security and governance issue.

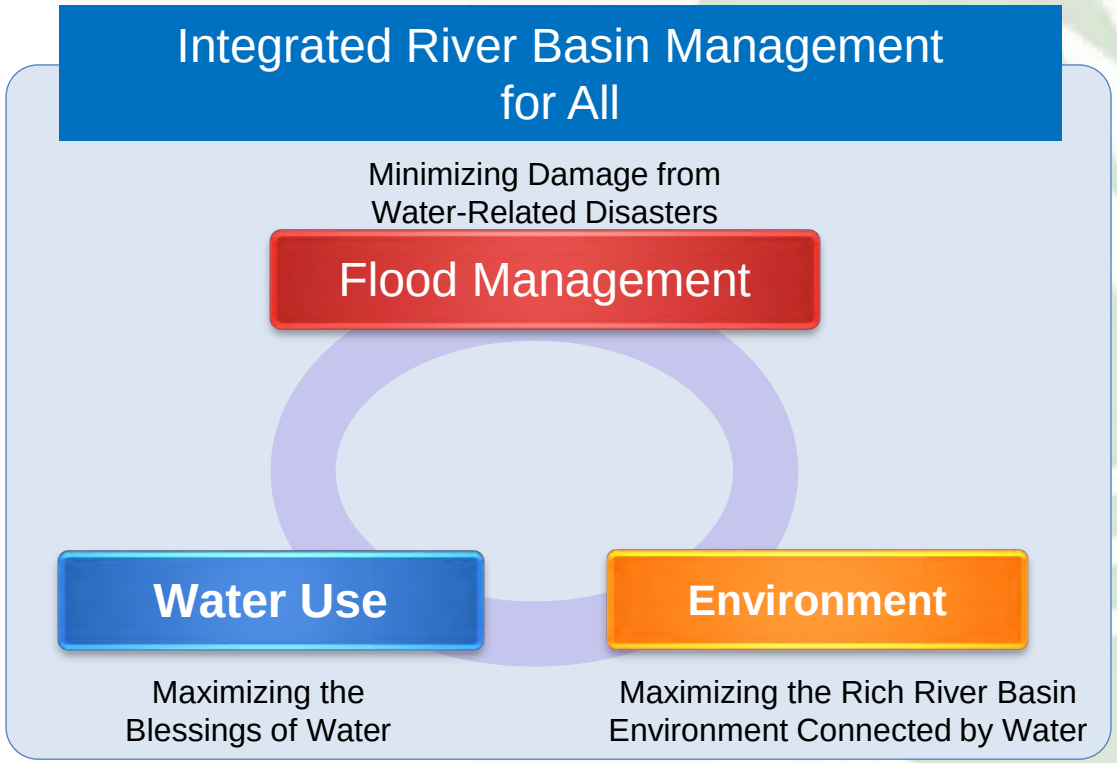
Fragmented Governance = Ineffective Outcomes

- Sectoral fragmentation
- Basin-boundary mismatch
- Limited coordination

➢ We cannot solve basin-scale problems with fragmented systems.

Integrated River Basin Management (Japan)

- MLIT is currently promoting "**Integrated River Basin Management for ALL**".
- All stakeholders in the river basin cooperate not only on **flood control** but also on **water use** and the **river basin environment**.



From individual optimization to **overall optimization**

- Basin-wide coordination (upstream -downstream)
- Nature-based + engineered solutions
- Multi-level governance

➢ Integration delivers resilience.

e.g.
Integrated approach to flood control, water utilization, and the environment
Integrated approach to floods, droughts, and normal conditions
Integrated operation of multiple dams in the river basin.

Source: MLIT, Japan

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Concept of Basin Flood Management: “Basin-wide Flood Control” Measures

- In response to climate change impacts and shifting social conditions, “**Basin Flood Management**” - a **collaborative approach** is being implemented, where **all stakeholders within a river basin work together** to implement flood control measures across the entire watershed.
- Flood control plans are being revised to incorporate factors such as increased rainfall due to climate change. The approach now treats the entire watershed - including not only the catchment area and river channel but also the floodplain - as a single basin. Based on regional characteristics, measures are being implemented in a multi-layered, integrated manner combining both physical (hard) and non-physical (soft) approaches: 1) Measures to prevent or reduce flooding as much as possible, 2) Measures to reduce the number of potential victims, and 3) Measures to mitigate damage and enable early recovery and reconstruction.

1)Measures to prevent and reduce flooding as much as possible

2) Measures to reduce the number of affected areas and potential victims

3) Measures to mitigate damage and ensure early recovery and reconstruction

To prevent and reduce flooding

集水域

雨水貯留機能の拡大
[県・市、企業、住民]
雨水貯留浸透施設の整備、
ため池等の治水利用

河川区域

流水の貯留
[国・県・市・利水者]
治水ダムの建設・再生、
利水ダム等において貯留水を
事前に放流し洪水調節に活用

[国・県・市]
土地利用と一体となった遊水
機能の向上

持続可能な河道の流下能力の維持・向上
[国・県・市]
河床掘削、引堤、砂防堰堤、
雨水排水施設等の整備

To reduce the affected area and potential victims

リスクの低いエリアへ誘導／住まい方の工夫
[県・市、企業、住民]
土地利用規制、誘導、移転促進、
不動産取引時の水害リスク情報提供

氾濫域

浸水範囲を減らす
[国・県・市]
二線堤の整備、
自然堤防の保全

To mitigate damage and ensure early recovery and reconstruction

水害リスク情報の空白地帯解消、
多段型水害リスク情報を発信

避難体制を強化する
[国・県・市]
長期予測の技術開発、
リアルタイム浸水・決壊把握

経済被害の最小化
[企業、住民]
工場や建築物の浸水対策、
BCPの策定

住まい方の工夫
[企業、住民]
不動産取引時の水害リスク情報
提供、金融商品を通じた浸水対
策の促進

被災自治体の支援体制充実
[国・企業]
官民連携によるTEC-FORCEの
体制強化

氾濫水を早く排除する
[国・県・市等]
排水門等の整備、排水強化

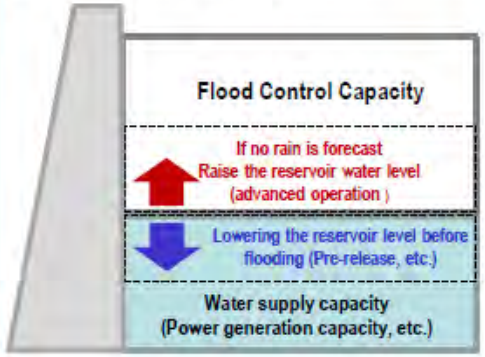
Source: MLIT, Japan

Example of Initiative of
" Integrated River Basin Management for ALL"

- In Japan, we are trying to coordinate between stakeholders (flood control, water use, river basin environment) and maximize synergies.

Flood Control × Water Use

Advanced dam operations improve flood control and power generation capacity



<Adjustment of conflicts of interest>
A low water level is desirable for flood control, but a high water level is desirable for power generation.

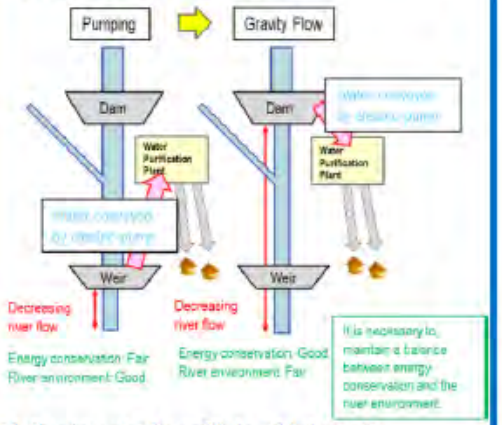
Flood Control × River Basin Environment

Creating an environment suitable for cranes to breed in the retarding basins.

<Adjustment of conflicts of interest>
For flood control, retarding basins are necessary. However, for the environment, it is necessary to preserve and create habitats and habitats for living creatures.

Water Use × River Basin Environment

Energy conservation by intake water from upstream



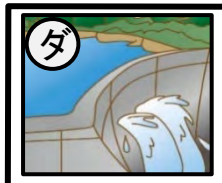
<Adjustment of conflicts of interest>
While intaking water from upstream can save energy, adjustments must be made to address the impact of low water levels on river flow.

Maximizing the effectiveness of initiatives for "River Basin Disaster Resilience", "Water Use", and "Conservation of the River Basin Environment"

Source: MLIT, Japan

Utilization of Farmland and Agricultural Water Facilities in Basin Flood Management

Utilization of Agricultural Dams



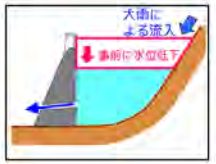
①国営かんがい排水事業
②水利施設整備事業
③基幹水利施設管理事業
④水利施設管理強化事業

農業用ダムの活用

○ 大雨が予想される際にあらかじめ水位を下げること等によって洪水調節機能を発揮。

○ 降雨をダムに貯留し、下流域の氾濫被害リスクを低減。

（各地区の状況に応じて、放流水を地区内の調整池等に貯留）



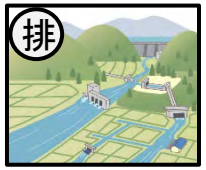
【施設の整備等】
○ 施設改修、堆砂対策、施設管理者への指導・助言等

Utilization of Drainage Facilities

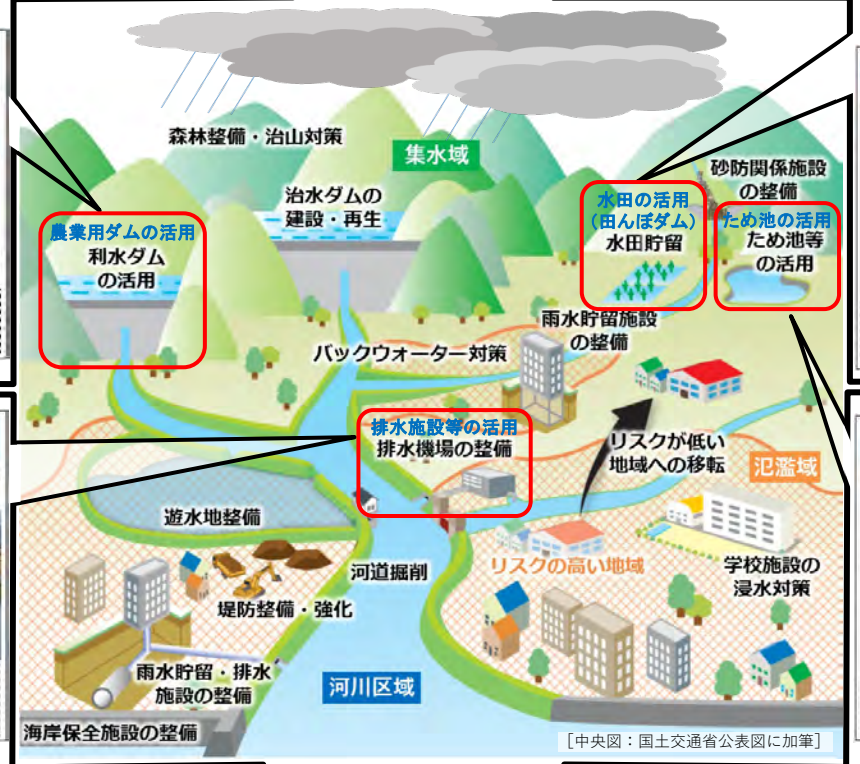
排水施設等の活用

○ 農業用の用排水路や排水機場・樋門等は、市街地や集落の湿水も防止・軽減。

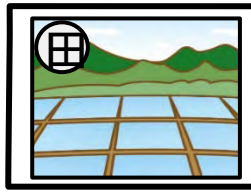
【施設の整備等】
○ 老朽施設改修、ポンプ増設、降雨前の排水操作、危機管理システムの整備等



①国営かんがい排水事業
　国営総合農地防災事業
②水利施設整備事業
③基幹水利施設管理事業
④水利施設管理強化事業
⑤農業水路等長寿命化・防災減災事業
⑥農村地域防災減災事業



［中央図：国土交通省公表図に加筆］



②水利施設整備事業
⑦農業競争力強化農地整備事業
　農地中間管理機構関連農地整備事業
　国営農用地再編整備事業
　農地耕作条件改善事業
⑧多面的機能支払交付金

水田の活用（田んぼダム）

○ 「田んぼダム」（落水口に流出量を抑制する板等を設置し、水田に降った雨をゆっくりと排水）の取組によって湛水被害リスクを低減。

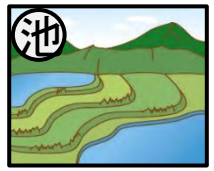
【施設の整備等】
○ 水田整備、「田んぼダム」の取組促進

ため池の活用

○ 大雨が予想される際にあらかじめ水位を下げることによって洪水調節機能を発揮。

○ 農業用水の貯留に影響のない範囲で、洪水吐きにスリット（切り欠き）を設けて貯水位を低下させ、洪水調節容量を確保。

【施設の整備等】
○ 堤体補強、洪水吐き改修、施設管理者への指導・助言等



④水利施設管理強化事業
⑤農業水路等長寿命化・防災減災事業
⑥農村地域防災減災事業

Utilization of Rice Fields (Paddy Field Dams)

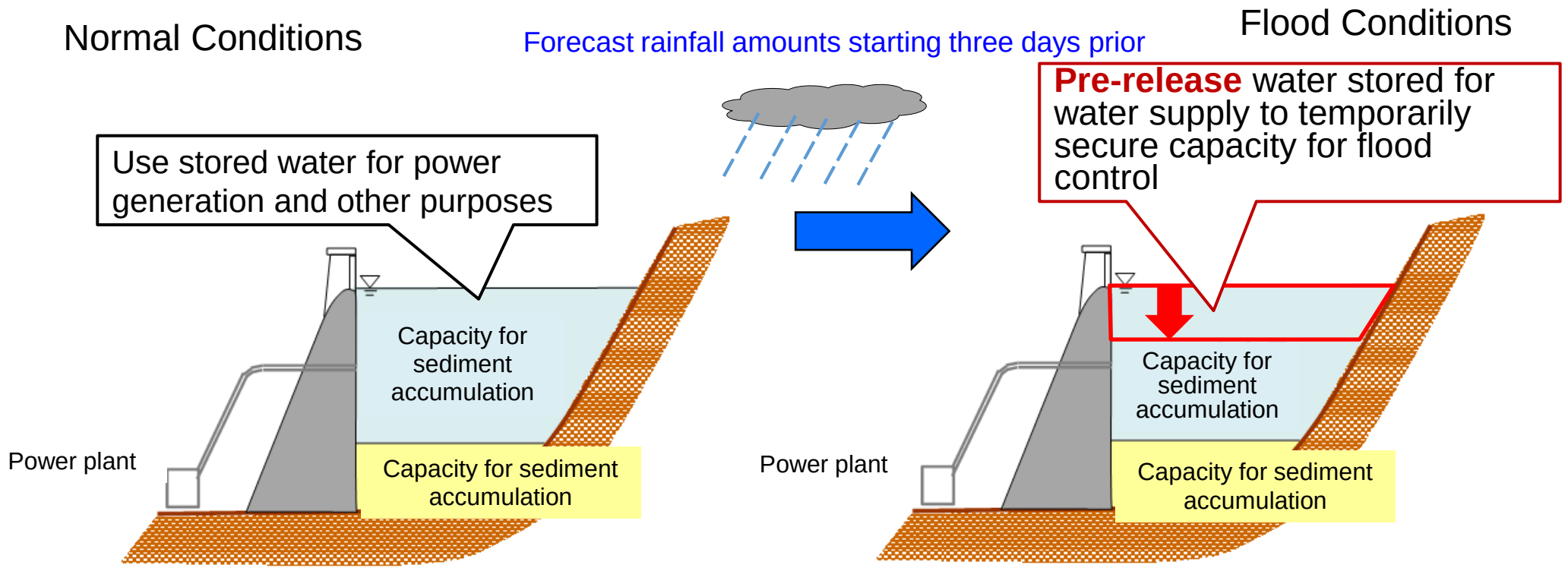
Utilization of Irrigation Ponds

Source: MAFF, Japan

Further promotion of the effective utilization of existing dams, with the cooperation of water users

- Dams include those under the jurisdiction of the MLIT for flood control purposes, as well as dams primarily for water utilization such as power generation and irrigation (water utilization dams).
- For water utilization dams, utilizing rainfall forecasts from the Japan Meteorological Agency and with the cooperation of water users such as power generation and water supply utilities, water stored for water utilization is preemptively released. This temporarily secures capacity for flood control regulation, preventing and mitigating flood damage.

Pre-flood Release from Water Conservation Dam (Illustration)



Establish a system for pre-release at approximately 900 water supply dams nationwide

Source: MLIT, Japan

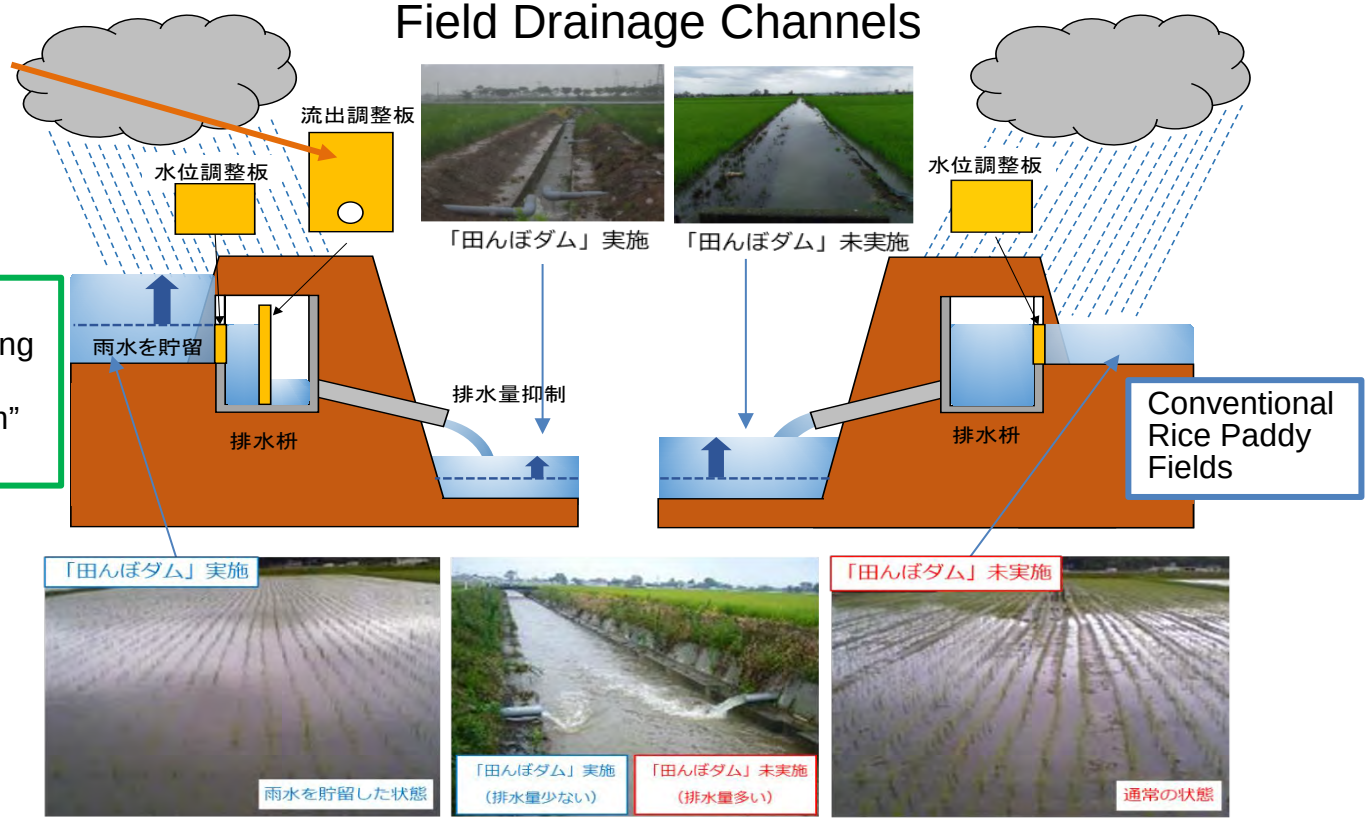
“Paddy Field Dam”

To suppress sudden rises in water levels in rivers and waterways and reduce the risk of flooding damage in downstream areas, initiatives are being implemented to enhance the temporary rainwater storage capacity of paddy fields by installing weir boards and drainage outlets to control runoff volume.

Outlets in Rice Paddy Fields

Runoff Control Board

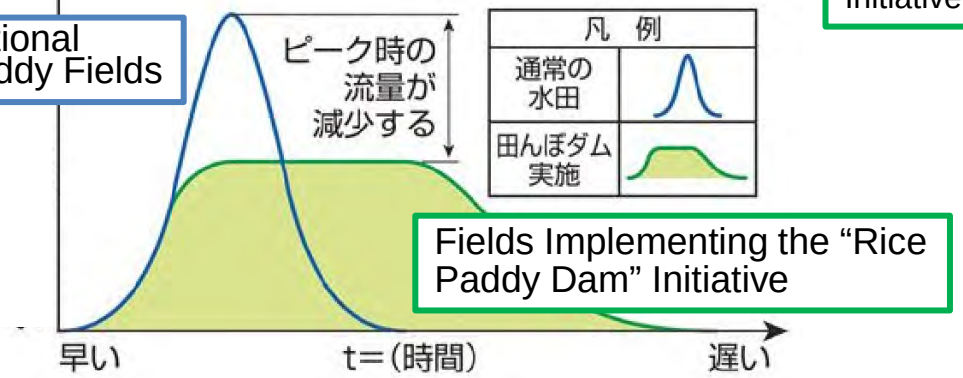
Field Drainage Channels



Fields Implementing the “Rice Paddy Dam” Initiative

Conventional Rice Paddy Fields

Runoff from Rice Paddy Fields



Fields Implementing the “Rice Paddy Dam” Initiative

Conventional Rice Paddy Fields

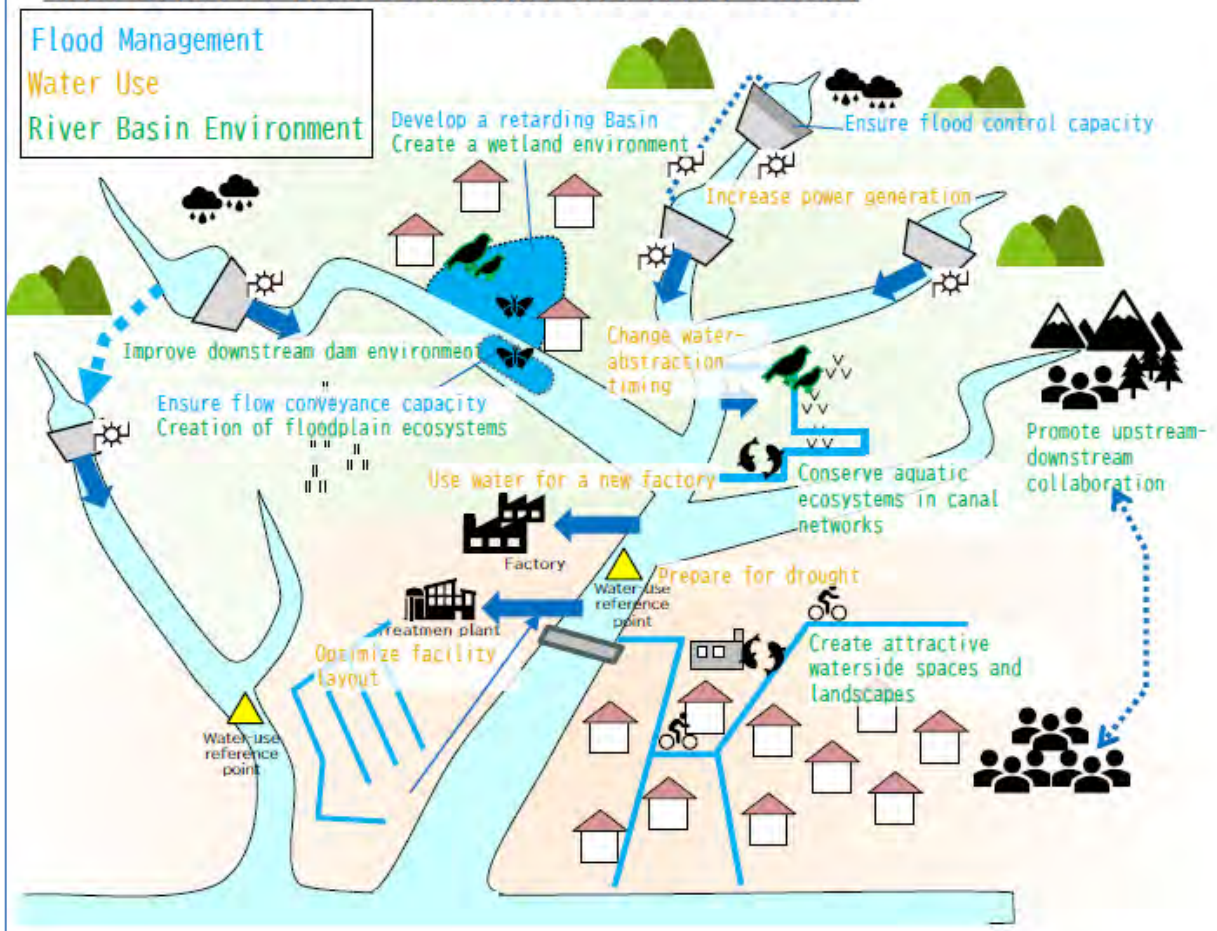
Natsuki Yoshikawa and Naoko Koshiyama (2024) Potential of Tambo Dam implementation as a flood control measure, Irrigation and Drainage, DOI 10.1002/ird.3036 DOI https://doi.org/10.1002/ird.3036 URL https://onlinelibrary.wiley.com/doi/pdf/10.1002/ird.3036

Source: MAFF, Japan

Sharing of challenges and diverse needs in the river basin

○ Because river-basin stakeholders vary widely and their needs differ by role, a mechanism is needed that enables them to share information, exchange opinions on challenges and diverse water-related needs, and discuss a future vision for the region.

A conceptual image of the challenges and diverse needs within the river basin



Secure industrial water in five years – what is the current water-use situation in this area?

Make flexible use of currently unused dam storage capacity

Create a community biotope using river water

Sharing of basin challenges, water-related needs, and future visions among stakeholders.

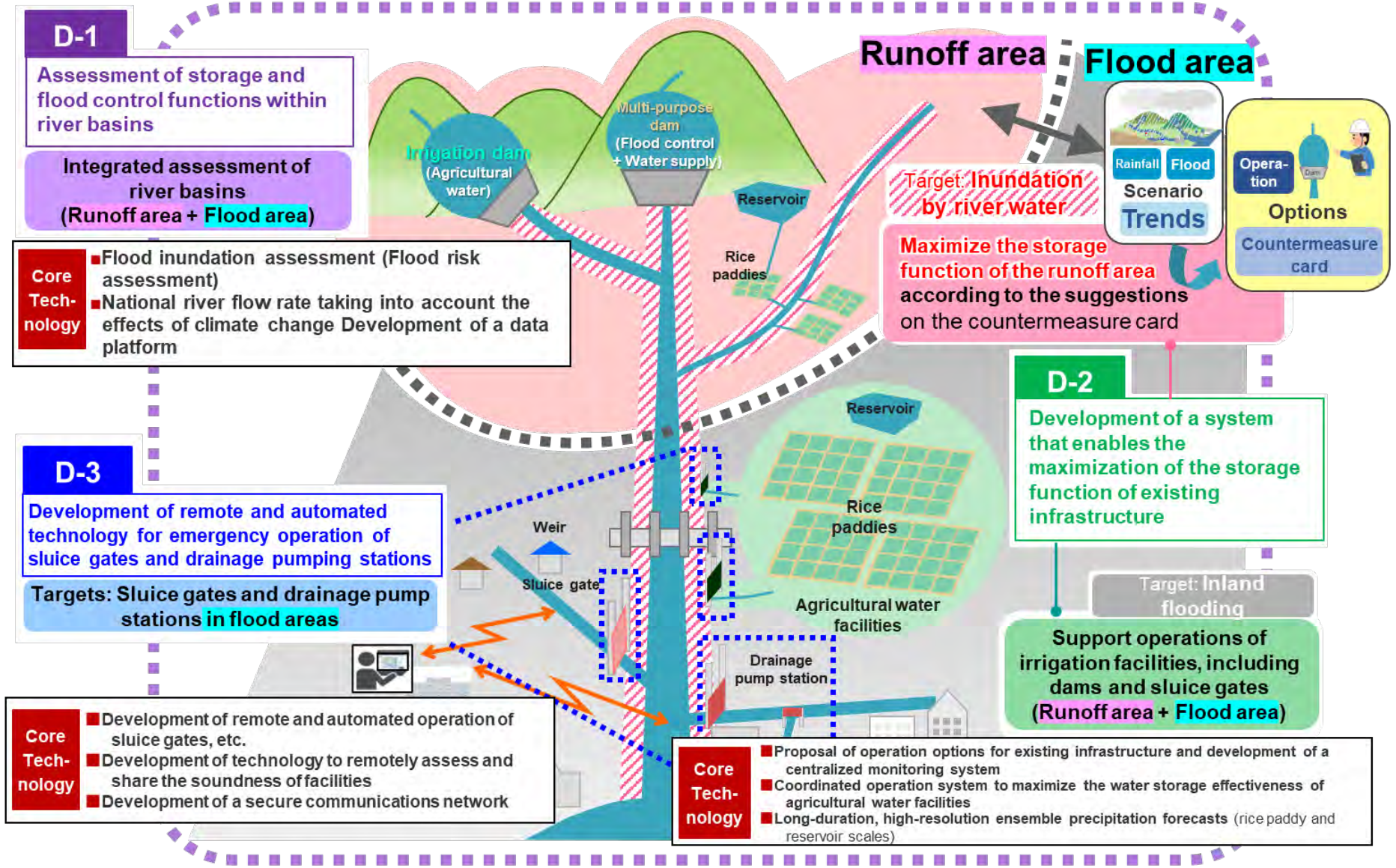
Source: MLIT, Japan

Cross-ministerial Strategic Innovation Promotion Program (SIP) 3rd Period
Theme 8: Development of Resilient Smart Network System against Natural Disasters

Subtheme D: Realizing Damage Mitigation by Maximizing Storage Functions within River Basins

Smart Drainage

Roles of R&D Themes (D-1 through D-3) and targeted areas in the river basin.



Integrated River Basin Management (Japan)

Managing Floods and Droughts Together

- Floods and droughts occur in the same season
- Coordinated operation of multiple dams
- Integration of flood control and water supply
  - Utilizing agriculture and nature in flood management (e.g., paddy fields, irrigation ponds)

➢ From individual optimization to overall optimization

From National Practice to Global Action

- Strengthen coordination
- Share data and knowledge
- Invest in long-term resilience
- Empower local stakeholders

- Water cooperation is foundational to global stability.
- By aligning governance, technology, and community action, **we can move from crisis response to risk management, and from fragmented efforts to collective action**.

Thank You