3.4 Overall recommended solutions for the water resource management sector

It is important to start with regulation and policy formulation for water resource management to ensure the consistency of the operation. Related policies and regulations should be revised by integrating public or stakeholder opinions. Moreover, water resource management knowledge should be included in a school curriculum to develop the understanding and ability of the locals to protect and manage their water resources.

In addition, to facilitate collaboration across the ministries and to follow up on performance, the roles and responsibilities of the departments within each ministry should be allocated based on their missions. These missions can be divided into eight groups: (1) policy formulation, assessment and evaluation; (2) managing main community water systems, headwater or upstream areas; (3) managing core irrigation systems; (4) managing subsidiary irrigation systems; (5) managing community water management systems; (6) managing water supply systems; (7) managing disaster prevention and alleviation systems; and (8) managing supporting systems.

4. Technology action plan, project ideas, and IPR issues in the water resource management sector

4.1 Technology action plan

The overall solutions to overcoming the capability and economic barriers can be grouped into four strategic plans: capability development, investment, organization structure development, and policy and regulation revision/formation. In this section, the technology action plan of each strategy is analyzed. The plan includes the activities, timelines, stakeholders, and indicators (both qualitative and quantitative) to facilitate the technology's implementation.

4.1.1 Technology action plan for the networking and management of water infrastructures

The capability development of water infrastructure management emphasizes on developing educational programs for both local people and researchers. In terms of investment, a budget for developing and maintaining local water infrastructure should be provided and allocated to local administrative organizations. The organizational structure should be rearranged to avoid redundant work; importantly, the central and local organizations should work cooperatively. Most of the activities cover 1-3 years, except for organization structure management and policy and regulation, which requires 3-5 years. Technology action plans for the networking and management of water infrastructures is summarized in Table 47.

Table 47 Technology action plans for the networking and management of water infrastructures

Strategies	Activities	Timeline (year)	Stakeholders	Indicators
Capability Development	**A1.** Arranging educational activities/exhibitions in the local areas/learning from local wisdom	1-3	- Communities - Local authorities - Educational institutes	- Participants' responses to survey questions
	A2. Encouraging schools to include water resource management subjects at the high school level	1-3	- Educational institutes - Local authorities	- Number of subjects on water resource management - Number of educational institutes teaching subjects related to water resource management
	A3. Increasing the local water storage capacity	1-3	- Communities - Local authorities	- Number of water storage facilities
	A4. Developing experts in analyzing data and advanced water situation predictive models	1-3	- Educational institutes	-Number of specialists/experts
Investment	**A5**. Allocating funding for the development of high-resolution geo-informatics series	1-3	- Government agencies - Educational institutes	- Number of high resolution geo-informatics series
	A6. Investing in system/measuring devices and a database system for decision making	1-3	- Government agencies -Local authorities	- Budget for measuring devices and a database system
	A7. Allocating budget from local administration for developing and maintaining local water infrastructure	3-5	- Thailand Local Administration	- Number of water resource projects and maintenance programs
Organisational structure development	**A8**. Listening to the problems and working with local communities on water resource management	1-3	- Communities - Local authorities	- Number of water management collaborations
	A9. Assigning the Royal Irrigation Department as the core agency for operation and collaboration with the	3-5	- the Royal Irrigation Department - Local Administration	- Number of communities that can connect their water sources to the irrigation waterways

Strategies	Activities	Timeline (year)	Stakeholders	Indicators
	local administrative organizations to connect the community water sources to the irrigation waterways		- Communities	
	A10. Encouraging collaboration between government agencies and educational institutes to develop research works and technology to support water structure management, water traffic maps, and databases	3-5	- Government agencies - Educational institutes	- Number of research and technologies that support water structure management
Policy and law	**A11**. Reducing duplicate work between governmental agencies by reviewing missions and duties and clearly describing responsibilities	3-5	- Central agencies - Local authorities	- Performance evaluation
	A12. Clearly describing the legal rights and duties of the local administration on community water management	3-5	- Thailand Local Administration - Communities	- Duty description
	A13. Preparing a water structure maintenance calendar	3-5	- Central agencies - Local authorities	- Maintenance calendar

4.1.2 Technology action plan for seasonal climate prediction

The capability development of seasonal climate prediction highlights increasing the number of programmers, model developers, and mathematicians. The major investment in this technology group is on training programs (which includes the user manuals), not on advancing the technology. Policywise, an adjustment is required on the tax waiver criteria for modeling instruments and databases. The technology action plans for seasonal climate prediction is summarized in Table 48.