



Technical Assistance Report

Project Number: 50023-001
Capacity Development Technical Assistance (CDTA)
October 2016

Kingdom of Thailand: Strengthening Integrated Water Resource Planning and Management at River Basin Level

(Financed by the Japan Fund for Poverty Reduction)

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Asian Development Bank

CURRENCY EQUIVALENTS

(as of 3 October 2016)

Currency unit	–	baht (B)
B1.00	=	\$0.03
\$1.00	=	B34.61

ABBREVIATIONS

ADB	–	Asian Development Bank
DWR	–	Department of Water Resources
GIS	–	geographic information system
IWRM	–	integrated water resources management
JFPR	–	Japan Fund for Poverty Reduction
TA	–	technical assistance

NOTE

In this report, “\$” refers to US dollars.

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CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data		Project Number: 50023-001	
Project Name	Strengthening Integrated Water Resource Planning and Management at River Basin Level	Department /Division	SERD/TRM
Country	Thailand	Executing Agency	Department of Water Resources, Ministry of Natural Resources and Environment
2. Sector		Financing (\$ million)	
✓ Agriculture, natural resources and rural development	Water-based natural resources management		1.00
		Total	1.00
3. Strategic Agenda		Climate Change Information	
Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Climate Change impact on the Project	Low
Environmentally sustainable growth (ESG)	Disaster risk management Natural resources conservation		
4. Drivers of Change		Gender Equity and Mainstreaming	
Governance and capacity development (GCD)	Civil society participation Institutional development	No gender elements (NGE)	✓
Partnerships (PAR)	Civil society organizations Official cofinancing		
5. Poverty and SDG Targeting		Location Impact	
Project directly targets poverty and SDGs	No	Not Applicable	
6. TA Category:		B	
7. Safeguard Categorization Not Applicable			
8. Financing			
Modality and Sources		Amount (\$ million)	
ADB		0.00	
None			0.00
Cofinancing		1.00	
Japan Fund for Poverty Reduction			1.00
Counterpart		0.00	
None			0.00
Total		1.00	
9. Effective Development Cooperation			
Use of country procurement systems		No	
Use of country public financial management systems		No	

I. INTRODUCTION

1. Environmentally sustainable development is one of the four core programs of the Asian Development Bank (ADB) country partnership strategy, 2013–2016 for Thailand.¹ This capacity development technical assistance (TA) was included in the ADB country operations business plan for Thailand, 2016–2018.² During the 2016 country programming mission, the Government of Thailand confirmed the request for technical support to strengthen the country's integrated water resources planning and management at the river basin level. The government is finalizing the 12th National Economic and Social Development Plan, 2017–2021;³ and water resources management remains high on Thailand's development agenda under the plan. The TA impact, outcome, outputs, implementation arrangements, cost estimates and financing agreements, and terms of reference were agreed during a TA fact-finding mission from 6 to 15 July 2016. The design and monitoring framework is in Appendix 1.⁴

II. ISSUES

2. The 2011 severe floods affected almost 14 million people in 65 of Thailand's 77 provinces. The Ministry of Finance estimated the total economic damage and loss caused by the floods at approximately \$45 billion. One important lesson learned from the 2011 floods was that integrated water resources management (IWRM) needed to be strengthened as flood management is closely linked with broader issues of water resources management. Without an integrated and balanced approach to manage both demand and supply of water, Thailand will not be prepared for future flooding.

3. The IWRM principles were first recognized in Thailand's 8th National Economic and Social Development Plan, 1997–2001.⁵ In IWRM, the basin is recognized as a natural and practical hydrological unit for water resources planning and management. Using the basin as a planning unit allows for holistic basin solutions to be developed to address problems in the basin, including upstream–downstream controversies. A strong integrated water resources planning and management process at the river basin level is not only important to the entire water resources management system, but it is also essential in improving the livelihoods and economic well-being of communities along the river basins. In Thailand, however, river basin organizations were not legal entities and their roles in conjunction with central water management agencies were not well-defined. Planning and implementation capacity of river basin organizations are also lacking. As a result, water resources planning and management have been rather centralized.

4. The National Water Resource Management Strategic Plan, 2015–2026⁶ approved by Cabinet in May 2015, recognizing the importance of IWRM at river basin level, clearly defines roles and responsibilities of river basin committees and calls for the development of operation plans at the river basins. A river basin committee comprises representatives from the Ministry of Interior, local government units, communities, the private sector, and academia, with

¹ ADB. 2013. *Country Partnership Strategy: Thailand, 2013–2016*. Manila.

² ADB. 2015. *Country Operations Business Plan: Thailand, 2016–2018*. Manila.

³ Government of Thailand, Office of the National Economic and Social Development Board. 2016. *The Twelfth National Economic and Social Development Plan*. Bangkok.

⁴ The TA first appeared in the business opportunities section of ADB's website on 17 August 2016.

⁵ Government of Thailand, Office of the National Economic and Social Development Board. 1996. *The Eighth National Economic and Social Development Plan*. Bangkok.

⁶ Government of Thailand, Office of the Strategic Committee for Water Resource Management. 2015. *The National Water Resource Management Strategic Plan, 2015–2026*. Bangkok.

Department of Water Resources (DWR) personnel at the provincial level serving as the secretariat. River basin committees will prepare river basin operation plans. However, the planning capacity, as well as participatory mechanism, is still lacking at the river basin level. Stakeholder engagement and involvement processes need to be strengthened to ensure meaningful consultations during all phases of river basin planning and development. Modeling applications to assess individual and cumulative impacts should be introduced to support decision-making process.

5. To facilitate decision-making among stakeholders in the river basin planning process, the IWRM modeling tool was pilot tested for Yom River basin and Mae Ta sub-basin under the Technical Assistance for Strengthening Integrated Water and Flood Management Implementation funded by the Japan Fund for Poverty Reduction (JFPR).⁷ The modeling tool provided a technical and scientific basis for integrated social, economic, and environmental assessments of water management scenarios in the basin. As an open-source model, trained personnel can update and manipulate the modeling tool to understand the impact of changing management scenario. Graphic displays demonstrated through the modeling tool helped stakeholders at Mae Ta sub-basin of Yom River basin to better understand flood, drought, and water allocation issues in the basin. Such demonstration of the possible impacts of different water management scenarios helped the stakeholders reach agreement on how to manage the sub-basin to minimize the risk of future floods and improve the livelihoods of Mae Ta sub-basin communities.

6. The DWR requested technical support to create a base IWRM modeling tool based on the approach demonstrated at Yom River basin. The base IWRM modeling tool can be used as the basis to develop planning scenarios and river basin operation plans in all 25 river basins in Thailand. Using the IWRM modeling tool as a decision-support tool will enhance the capacity of DWR officers—along with members of river basin committees—to develop spatially driven and integrated river basin management plans. The deployment of quality and effective river basin operation plans will improve the livelihoods of communities along river basins in the medium to long term. These communities will be able to make informed decisions regarding water resource use and develop coping strategies to deal with flood, drought, and weather-related extreme events.

III. THE CAPACITY DEVELOPMENT TECHNICAL ASSISTANCE

A. Impact and Outcome

7. The impact will be improved overall efficiency of the water management system. The outcome will be integrated river basin management strengthened in 25 river basins.

B. Methodology and Key Activities

8. **Output 1: Base river basin integrated water resource management modeling tool established.** The IWRM modeling tool is a computer-based hydrological model that enables users to test the hydrological impact of different water resources management approaches in a river basin. The IWRM model pilot tested under the Technical Assistance for Strengthening Integrated Water and Flood Management Implementation will be further developed as a base IWRM simulation tool at the river basin level. A user-friendly results interpretation module will be

⁷ ADB. 2012. *Technical Assistance to Thailand for Strengthening Integrated Water and Flood Management Implementation*. Manila.

added to the modeling tool. This module will help enhance understanding among stakeholders of the possible impacts of development options and climate change on the flow regime, and enable community-based stakeholders to negotiate satisfactory trade-offs and find optimal ways to achieve objectives. The TA will also support the development of the cumulative impacts assessment feature of the modeling tool to facilitate water resource management decision-making at the national-wide level. A user-friendly manual on how to carry out the simulation and interpret results will be developed.

9. **Output 2: Capacity of river basin personnel in river basin integrated planning increased.** As vital links in community-based multi-stakeholder involvement, DWR personnel at the provincial level, covering 25 river basins, will be trained to collate and coordinate hydro-meteorological data and carry out simulations to assess alternative strategies. With these trained personnel, the DWR will use the simulation tool to roll out community-based, multi-stakeholder participation programs at river basins nationwide. The training will also involve how to demonstrate and communicate simulation results to stakeholders, and guide discussion on options for river basin management to achieve consensus on rational solutions. In addition, the TA will propose guidelines for a decision-making procedure, based on stakeholder participation for the development of water management solutions within river basins and cross-river basins.

10. To calibrate IWRM model for each river basin, geographic information system (GIS) data should be available in the appropriate resolution. Modifying GIS data to an appropriate resolution takes time, but the executing agency is of the view that river basin staff can complete the simulation after the TA is closed if they are trained to follow the standard user manual. The river basin operation plans may take longer than envisaged to achieve the outcomes if the government does not provide the river basin committees with the necessary resources.

C. Cost and Financing

11. The TA is estimated to cost \$1,500,000, of which \$1,000,000 will be financed on a grant basis by the Japan Fund for Poverty Reduction. The government will provide counterpart support in the form of remuneration and per diem of counterpart staff, land transportation at river basins for the TA team, office space and supplies, training venues and equipment (in Bangkok and at river basins), necessary GIS and hydrological data, and other in-kind contributions.

D. Implementation Arrangements

12. The TA will be implemented from October 2016 to June 2018. The DWR, Ministry of Natural Resources and Environment will be the executing agency. The DWR will set up a working group to work closely with the TA project team. The director general of the DWR will provide direction and guidance to the working group and the TA project team. ADB's Southeast Asia Department will be responsible for administration of the TA through its Thailand Resident Mission.

13. ADB will engage a consulting firm using fixed-budget selection with a biodata technical proposal, and a national water resources advisor as an individual consultant. About 14 person-months of international and 27 person-months of national consulting inputs are estimated to be required. Consulting services to be engaged through a firm will include (i) three international consultants: (a) an IWRM expert (4 person-months), (b) a modeling specialist (5 person-months), and (c) a GIS specialist (5 person-months); and (ii) three national consultants: (a) a hydrological modeler (5 person-months), (b) a hydrological researcher (8 person-months), and (c) a project coordinator (10 person-months). A national water resources advisor will be

engaged as an individual consultant for 4 person-months. ADB will engage the consultants in accordance with its Guidelines on the Use of Consultants (2013, as amended from time to time). The TA team will conduct at least five training workshops for the executing agency and relevant stakeholders. The proceeds of the TA will be disbursed in accordance with ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time) in compliance with the 2016 Policy Guidelines for TA Grant.⁸

14. The DWR, as the secretariat for the National Water Resources Committee and all river basin committees, will be responsible for the completion of the river basin operation plans. Based on the outputs of the proposed TA, the DWR will guide the discussion on options for river basin management to achieve consensus on rational solutions, and work with each river basin committee to complete river basin operation plans. The DWR will maintain access to updated GIS and hydrological data, and use the base IWRM modeling tool to guide the review and update of river basin operation plans.

IV. THE PRESIDENT'S DECISION

15. The President, acting under the authority delegated by the Board, has approved ADB administering technical assistance not exceeding the equivalent of \$1,000,000 to the Government of Thailand to be financed on a grant basis by the Japan Fund for Poverty Reduction for Strengthening Integrated Water Resource Planning and Management at River Basin Level, and hereby reports this action to the Board.

⁸ ADB. 2016. *Japan Fund For Poverty Reduction 2016 Policy Guidelines for Technical Assistance Grant*. Manila.

DESIGN AND MONITORING FRAMEWORK

Impact the TA is Aligned with			
Overall efficiency of the water management system improved (Eleventh National Economic and Social Development Plan, 2012–2016) ^a			
Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Integrated river basin management strengthened in 25 river basins	River basin management consensus forged in each of the 25 river basins through multi-stakeholder consultative dialogue by 2018	DWR Reports to NWRC	Low priority given by the government and other stakeholders
Outputs 1. Base river basin IWRM modeling tool established	Cumulative impact assessment module and a result interpretation module integrated in the base river basin IWRM modeling tool (Baseline 2016: NA) River basin IWRM modeling tool package endorsed by DWR by 2017 (Baseline 2016: NA)	DWR Annual Report	Required GIS and hydrological data not readily available in appropriate resolution
2. Capacity of river basin personnel in river basin integrated planning increased	40 DWR technical officers trained to run the standard IWRM modeling tool (Baseline 2016: NA) IWRM simulation results communicated to multi-stakeholder groups at 25 river basins by 2018 (Baseline 2016: NA)	DWR Reports to NWRC	
Key Activities with Milestones			
1. Base river basin IWRM modeling tool established			
1.1 Review the pilot IWRM modeling software and the model calibrated for Yom River basin to identify further development needed (November 2016–January 2017)			
1.2 Enhance the model further to include a user-friendly visualization feature, cumulative impact assessment module, and a result interpretation module (January–June 2017)			
1.3 Test run the base IWRM model (May–June 2017)			
1.4 Develop a user-friendly manual (May–September 2017)			

<p>2. Capacity of river basin personnel in river basin integrated planning increased</p> <p>2.1 Develop guidelines for decision-making procedure for the development of water management solutions within river basins and cross-river basins (June–September 2017)</p> <p>2.2 Conduct training workshops for executing agency personnel on the calibration, verification, and interpretation of the IWRM model (September–December 2017)</p> <p>2.3 Provide support to the executing agency to roll out community-based multi-stakeholder participation program at selected river basins based on the IWRM modeling and develop effective decision-making procedures (December 2017–March 2018)</p>
<p>Inputs</p> <p>JFPR (grant): \$1,000,000</p> <p>Note: The government will provide counterpart support in the form of remuneration and per diem of counterpart staff, land transportation at river basins for the TA team, office space and supplies, training venues and equipment (in Bangkok and at river basins), necessary GIS and hydrological data, and other in-kind contributions.</p>
<p>Assumptions for Partner Financing</p> <p>Not applicable.</p>

DWR = Department of Water Resources, GIS = geographic information system, IWRM = integrated water resources management, JFPR = Japan Fund for Poverty Reduction, NA = not applicable, NWRC = National Water Resources Committee, TA = technical assistance.

^a Government of Thailand, Office of the National Economic and Social Development Board. 2011. *The Eleventh National Economic and Social Development Plan (2012–2016)*. Bangkok.

Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Amount
Japan Fund for Poverty Reduction^a	
1. Consultants	
a. Remuneration and per diem	
i. International consultants	350.0
ii. National consultants	240.0
b. International and local travel	80.0
c. Reports and communications	18.0
2. Training, seminars, and conferences	120.0
3. Surveys	30.0
4. Miscellaneous administration and support costs ^b	60.0
5. Representative for contract negotiations	2.0
6. Contingencies	100.0
Total	1,000.0

Note: The technical assistance (TA) is estimated to cost \$1,500,000, of which contributions from the Japan Fund for Poverty Reduction are presented in the table above. The government will provide counterpart support in the form of remuneration and per diem of counterpart staff, land transportation at river basins for the TA team, office space and supplies, training venues and equipment (in Bangkok and at river basins), necessary GIS and hydrological data, and other in-kind contributions. The value of government contribution is estimated to account for 33% of the total TA cost.

^a Administered by the Asian Development Bank.

^b Miscellaneous administration and support costs include expenses related to consultation meetings and translation costs.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1. A consulting firm will be engaged in accordance with the Guidelines on the Use of Consultants (2013, as amended from time to time) of the Asian Development Bank (ADB). Consultants will be recruited to provide technical expertise for the following outputs under this technical assistance (TA) project: (i) base river basin integrated water resources management (IWRM) modeling tool established, and (ii) capacity of river basin personnel in river basin integrated planning increased. The consultants will be engaged for a total of 37 person-months using the fixed-budget selection method. A national water resources advisor will be engaged as an individual consultant for 4 person-months.

A. International Consultants

2. **Integrated water resources management expert and team leader** (4 person-months, intermittent, through a consulting firm). The expert will have a relevant degree and 15 years of experience related to IWRM. The expert should be familiar with IWRM development and policy direction in Thailand. The expert will be responsible for coordinating team inputs and producing reports and deliverables. The expert will perform the following tasks:

- (i) lead the consultation with the executing agency to facilitate the model adjustment process;
- (ii) guide the development of a result interpretation module for the stakeholder participation process;
- (iii) complete the river basin IWRM modeling tool package;
- (iv) organize and conduct training workshops;
- (v) provide support to the executing agency in rolling out the community-based multi-stakeholder participation program at river basins;
- (vi) prepare an inception report, progress reports, and final report; and
- (vii) coordinate overall work under the TA.

3. **Modeling specialist** (5 person-months, intermittent, through a consulting firm). The international modeling specialist will have a relevant degree and more than 10 years of professional experience working in hydrological modeling. The specialist should be familiar with IWRM modeling tools. Knowledge of river basins in the region and Thailand is preferred. The specialist will perform the following tasks:

- (i) review the existing IWRM modeling tool and the model calibrated for Yom River basin;
- (ii) identify a standard set of information and data required to run the river basin IWRM model for 25 river basins in Thailand;
- (iii) enhance the model so it can be used as a base IWRM simulation tool at river basin level in close consultation with the executing agency;
- (iv) enhance the visualization of the modeling result to be more user-friendly;
- (v) develop a result interpretation module so that stakeholders can easily understand result of different scenarios;
- (vi) develop a cumulative impact assessment feature for the modeling tools with the executing agency to facilitate water resource management decision-making at the national level;
- (vii) develop a user-friendly manual on how to carry out the simulation and interpret results; and
- (viii) conduct training workshops for the personnel of the Department of Water Resources on the calibration, verification, and interpretation of the IWRM model.

4. **Geographic information system specialist** (5 person-months, intermittent, through a consulting firm). The international geographic information system (GIS) specialist should have a master's degree in remote sensing or spatial analysis, with more than 10 years of experience. Knowledge of river basins in Thailand is preferred. The GIS specialist will perform the following tasks:

- (i) conduct a review of the existing IWRM modeling software and the model calibrated for Yom River basin;
- (ii) determine and gather (together with the executing agency) the data required for GIS representation of the historic climate and expected climate changes, and for other parameters required for the IWRM model;
- (iii) develop a user-friendly graphic display of (a) past and expected climate-related events such as droughts and floods and (b) climate information including the geographic extent and magnitude of expected climate changes;
- (iv) prepare maps and figures for clear description and analysis of development and management options;
- (v) assist in developing a user-friendly manual on how to carry out the simulation and interpret results;
- (vi) train Department of Water Resources personnel on the calibration, verification, and interpretation of the IWRM model; and
- (vii) provide relevant inputs to all required reporting.

B. National Consultants

5. **Hydrological modeler** (5 person-months, intermittent, through a consulting firm). The hydrological modeler should have a relevant degree and 10 years or more of experience in water resources management. The modeler should have good knowledge of computer-based hydrological models and will perform the following tasks:

- (i) assist in reviewing the existing IWRM modeling software and the model calibrated for Yom River basin;
- (ii) gather (together with the executing agency) the data required for GIS representation of the historic climate and expected climate changes, and for other parameters required for the IWRM model;
- (iii) assist in developing IWRM simulation result interpretation approaches for multi-stakeholder consultation;
- (iv) participate in the conduct of training workshops; and
- (v) assist in translating documents to facilitate the implementation of outputs 1 and 2 of the TA.

6. **Hydrological researcher** (8 person-months, intermittent, through a consulting firm). The researcher should have a relevant degree, with at least 3 years of research experience. They should be familiar with GIS data in Thailand. The researcher will perform the following tasks under the guidance of the national hydrological modeler:

- (i) work closely with the executing agency to gather data required for GIS representation of the historic climate and expected climate changes, and for other parameters required for the IWRM model;
- (ii) work closely with the executing agency to adjust the data gathered to fit for model calibration;
- (iii) participate in the conduct of training workshops; and
- (iv) assist in translating documents to facilitate the implementation of outputs 1 and 2 of the TA.

7. **Project coordinator** (10 person-months, intermittent, through a consulting firm). The national project coordinator will have a degree in business administration, economics, or a related discipline; and at least 3 years of experience in project assistance and management. Experience in working for international organizations is preferred. The coordinator will perform the following tasks:

- (i) assist in the arrangement and organization of meetings for the TA activities and ADB missions;
- (ii) assist in the preparation of materials for reports, meetings, and workshops;
- (iii) provide written and oral translation from English to Thai and Thai to English as required and appropriate, and participate in meetings and workshops;
- (iv) provide assistance to the TA consultants on specific technical matters as requested;
- (v) provide assistance to the TA consultants on administrative matters; and
- (vi) perform other work in connection with the project as may be reasonably requested by the TA consultants and ADB project team.

8. **Water resources advisor** (4 person-months, intermittent, individual consultant). The advisor should have a master's degree related to water resources management and 15 years or more of professional experience. The advisor should have good knowledge of water resources policy and river basin management in Thailand and will perform the following tasks:

- (i) guide the consultation process with key stakeholders;
- (ii) guide a situation analysis of IWRM simulation in the context of integrated river basin management in Thailand;
- (iii) support the development of a standard user manual;
- (iv) participate in the conduct of training workshops; and
- (v) support the executing agency in rolling out the community-based multi-stakeholder participation program at river basins.