

Technical Assistance Cluster Subproject Report

PUBLIC

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Water Balance and Crop Production in Major Asian River Basins

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Asian Development Bank

ABBREVIATIONS

ADB	– Asian Development Bank
HKH	– Hindu Kush Himalaya
RRBI	– resilient river basin initiative
TA	– technical assistance
WFPF-WRTF	– Water Resilience Trust Fund under the Water Financing Partnership Facility

NOTE

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

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TECHNICAL ASSISTANCE AT A GLANCE

Project Data					
Project number	59078-005	Project name	Water Balance and Crop Production in Major Asian River Basins		
Nature of Activity	✓ Capacity Development Project Preparation Research and Development	Modality	Cluster subproject		
Country	REG (15 countries)	Executing or implementing agency	Asian Development Bank		
Department/Office	SD2/SD2-AFNR	Geographical location	Regional		
Sector(s)	✓ Agriculture, natural resources and rural development	Subsector(s)	Water-based natural resources management		
Strategic Focus Area	✓ Climate action Regional cooperation and public goods Resilience and empowerment	Sustainable Development Goals	SDG 6.4		
Financing					
ADB Financing		Amount (\$ million)			
None		0.00			
Cofinancing		Amount (\$ million)			
Water Resilient Trust Fund under the Water Financing Partnership Facility		1.00			
Counterpart		Amount (\$ million)			
None		0.00			
Total		1.00			
ADB Climate Financing					
ADB					
Adaptation		0.00			
Mitigation		0.00			
Cofinancing (ADB-administered)					
Adaptation		1.00			
Mitigation		0.00			
Total		1.00			
Currency of ADB Financing: US Dollar					
Climate Action					
Disaster Risk Management, Environment and Nature		Not Applicable			
Safeguards					
Category	Environment: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input checked="" type="checkbox"/> Not Applicable				
	Involuntary resettlement: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input checked="" type="checkbox"/> Not Applicable				
	Indigenous peoples: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input checked="" type="checkbox"/> Not Applicable				
Gender Equality					
Category	<input type="checkbox"/> Gender equality objective (GEN) <input checked="" type="checkbox"/> Some gender elements (SGE)	<input type="checkbox"/> Effective gender mainstreaming (EGM) <input type="checkbox"/> Indirect gender benefits (IGB)			
Poverty Reduction and Inclusion					
Category	<input type="checkbox"/> Poverty reduction and inclusion focus (PIF) <input type="checkbox"/> Poverty reduction and inclusion elements (PIE) <input checked="" type="checkbox"/> Indirect poverty reduction and inclusion (IPI)				
Regional Cooperation and Public Goods					
Category	<input type="checkbox"/> Pillar 1 <input type="checkbox"/> Pillar 2 <input checked="" type="checkbox"/> Pillar 3 <input type="checkbox"/> Not applicable				

I. THE TECHNICAL ASSISTANCE CLUSTER SUBPROJECT

A. Overall Progress of the Technical Assistance Cluster

1. The financing for the technical assistance (TA) cluster for the Resilient River Basin Initiative (RRBI) was approved on 13 November 2025 for \$5.2 million to (i) conduct research to analyze acute, chronic, and systemic events that pose long-term threats to river basin health; (ii) provide advisory support to the Asian Development Bank (ADB) developing member countries and project teams to identify policy, institutional, and investment opportunities that safeguard the safety, livelihoods, and economic well-being of river basin communities; (iii) support the preparation of new investment projects; and (iv) facilitate knowledge exchange and best practices among river basin managers.¹
2. The overall outcome of the TA cluster will be opportunities for strengthened climate and disaster resilience increased. The outputs of the TA cluster will be (i) knowledge solutions for long-term water security strengthened; (ii) approaches for strengthening river basin governance and financing prepared; (iii) river basin management and water security investment opportunities identified; and (iv) knowledge exchanges on best practices for river basin governance and water security investments enhanced. Currently there are two TA cluster subprojects. Each TA cluster subproject will deliver its target outputs anchored from the TA cluster as specified in each TA cluster subproject proposal. The approvals of TA cluster subprojects 1 and 2 are being processed in parallel.

B. Cluster Subproject Outcome

3. The TA cluster subproject will have the following outcome: knowledge and evidence base on long-term water and food security in major Asian river basins strengthened.

C. Cluster Subproject Outputs, Methods, and Activities

4. **Output 1: Knowledge solutions for long-term water security strengthened.** This output will: (i) review publicly available information and programs on water balance and crop production in Asia's major Hindu Kush Himalayan (HKH) river basins, identifying data and research gaps, overlaps, and opportunities for RRBI to address²; (ii) apply the *Spatial Processes in Hydrology* model and the *Lund-Potsdam-Jena managed Land* model³ to develop detailed water balance and crop production assessments for the HKH river basins; and (iii) undertake assessments of current and projected future conditions, including long-term integrated multi-hazard risks such as climate change impacts from glacier and snowmelt on water availability, as well as projected changes in groundwater and rainfall affecting crop production demand. This output contributes to Output 1 of the TA cluster, *knowledge solutions for long-term water security strengthened* to support the development of high-level strategic management plans for the HKH

¹ ADB. 2025. *Technical Assistance for the Resilient River Basin Initiative*.

² The design and monitoring framework is in the Appendix. For the purposes of this TA cluster subproject, HKH river basins are defined broadly to include basins originating not only from the Himalayan range but also from the wider Central Asian Mountain systems, including the Karakorum, Pamir, and Tien Shan mountains. These river basins span the following ADB developing member countries: CWRD: KAZ, KGZ, PAK, TAJ, TKM, UZB; EARD: PRC; SARD: BAN, BHU, IND, NEP; and SERD: CAM, MYA, LAO, THA, and VIE.

³ The *Spatial Processes in Hydrology* model is a spatially distributed hydrological model used to simulate water balance components—including glacier and snowmelt, surface runoff, evapotranspiration, and groundwater recharge—at basin scale. The *Lund-Potsdam-Jena managed Land* model is a global dynamic vegetation and crop production model that simulates crop growth, irrigation water demand, and agricultural yields under different climate and land-use scenarios.

basins as well as roadmaps for future investment projects under subsequent TA cluster subproject or other TAs.

5. Output 2: Knowledge exchanges on best practices for river basin governance and water security investments enhanced. This output will support knowledge sharing activities by (i) coordinating the TA cluster's activities among relevant ADB activities, (ii) advising on TA cluster subproject's activities and outputs, and (iii) assisting with organizing and implementing knowledge events and preparing knowledge products, including those produced under Output 1.

D. Cluster Subproject Cost and Financing

6. The TA cluster subproject financing amount is \$1,000,000, which will be financed on a grant basis by the Water Resilience Trust Fund under the Water Financing Partnership Facility (WFPF-WRTF) and administered by ADB.⁴ The key expenditure items are listed in Annex 1.

7. The total TA cluster subproject amount is broken down per output in Table 1.

Table 1: Cost Breakdown per Output

Output	Indicative Cost (\$)	Percentage of Total Amount (%)
Output 1: Knowledge solutions for long-term water security strengthened	850,000	85.0
Output 2: Knowledge exchanges on best practices for river basin governance and water security investments enhanced	150,000	15.0
Total	1,000,000	100.0

TA = technical assistance.

Source: Asian Development Bank.

E. Implementation Arrangements

8. ADB will administer the TA cluster subproject. The Agriculture, Food, Nature, and Rural Development Sector Office, Sectors Department 2 (SD2-AFNR) will select, supervise, and evaluate consultants and resource persons, and lead all implementation activities. SD2-AFNR will coordinate with the regional departments, resident missions, other sector offices (e.g., Water and Urban Development Sector Office) and other ADB supporting departments (e.g., Climate Change and Sustainable Development Department) to implement the TA cluster subproject.

9. Implementation arrangements are summarized in Table 2.

Table 2: Implementation Arrangements

Aspects	Arrangements		
Indicative implementation period	November 2025 – December 2027		
Executing and implementing agency	ADB		
Consultants	To be selected and engaged by ADB		
	Firm: Direct contracting	Joint venture of Wageningen University	\$750,000

⁴ Financing partner: the Government of the Netherlands.

Aspects	Arrangements		
		and Research and FutureWater	
	Individuals: Framework agreement, individual selection and resource persons	International and national experts	\$250,000
Procurement	To be procured by ADB or consultants		
	Request for quotations	Nonconsulting works (studies, surveys, workshops), goods, licenses, software	\$55,000
Advance contracting	Advance contracting will be undertaken with the recruitment of Joint Venture of Wageningen University and Research and FutureWater		
Disbursement	Disbursement of TA resources will follow ADB's <i>Technical Assistance Disbursement Handbook</i> (2020, as amended from time to time).		
Asset turnover or disposal arrangement upon TA completion	Fixes assets (including software and license) acquired under the TA cluster subproject will be turned over to the relevant government agencies upon completion of the TA cluster subproject.		

ADB = Asian Development Bank, TA = technical assistance.

Source: Asian Development Bank.

10. Consulting services. ADB will engage consultants following the ADB Procurement Policy (2017, as amended from time to time) and its associated staff instructions.⁵ A joint venture of Wageningen University and Research and FutureWater will be engaged using the direct contracting selection method. This selection method is justified as the assignment is a continuation and expansion of their previous research work in HKH's high mountain hydrology and its impact on downstream crop production. Individual experts and resource persons will also be recruited to provide technical inputs as identified during TA cluster subproject implementation. Procurement of goods and nonconsulting services related to studies, surveys, and workshops will use request for quotations.

11. Cofinancier requirements. SD2-AFNR will furnish periodical updates on the TA cluster subproject progress, policy discussions, capacity building initiatives and back-to-office reports to the WFPF-WRTF Secretariat. The TA cluster subproject will comply with the WFPF-WRTF implementation guideline and ensure that its visibility requirements are observed over the course of its implementation.

⁵ Terms of Reference for Consultants (Annex 2).

DESIGN AND MONITORING FRAMEWORK

Impact the TA is aligned with: Foster climate and disaster resilience for water and food security ^a			
Results Chain	Performance Indicators	Data Sources and Reporting Mechanisms	Risk and Critical Assumptions
Outcome Knowledge and evidence base on long-term water and food security in major Asian river basins strengthened	By 2028 Integrated assessment of long-term water balance and crop production and at least two knowledge exchange events completed (2025 baseline: no assessment prepared) (DR 7, 8)	a. Consultant reports and knowledge products.	A: Timely collection, access, and validation of accurate climate, hydrology, and crop production data
Outputs 1. Knowledge solutions for long-term water security strengthened 2. Knowledge exchanges on best practices for river basin governance and water security investments enhanced	By 2027 1a. Assessment of the long-term water balance and crop production in 10 river basins prepared (2025 baseline: no assessment prepared) ^b 1b. Approach for integrating planning tools on hydrology and food security with hydro-economics model developed (2025 baseline: 0) 2a. Capacity development and knowledge sharing programs implemented for at least 100 participants (of which at least 30% being women) with increased knowledge in river basin resilience (2025 baseline: 0) 2b. At least one knowledge product on the long-term water balance and crop production of the HKH river basins published (2025 baseline: 0).	1a–b. Consultant reports 2a–b. Consultant reports, technical papers, and questionnaires	A: Qualified experts and knowledge institutions support the technical process
Key Activities with Milestones <p>Output 1: Knowledge solutions for long-term water security strengthened</p> 1.1. Organization undertaking the water balance and crop production assessment recruited (Q4 2025) 1.2. Individual experts to advise on IWRM, river basin management, and hydro-economics modelling recruited (Q1 2026) 1.3. Assessment of the region's approaches to river basin management, the tools used, and opportunities for strengthening completed (Q1 2026) 1.4. Assessment methodology report finalized (Q1 2026) 1.5. Water balance modelling and crop production assessment completed (Q2 2027) <p>Output 2: Knowledge exchanges on best practices for river basin governance and water security investments enhanced</p> 2.1 Individual consultants to support TA administration and coordination with ADB programs recruited (Q1 2026)			

2.2. Relevant regional and international forums to gather additional insights and disseminate RRBI's activities and findings conducted (Q4 2027)

2.3. Regular internal community of practice meetings convened (Q4 2027)

2.4. Technical reports and journal papers on findings and recommendations prepared (Q2 2027)

TA Management Activities

Mobilization of consultants (Q4 2025)

Inception Workshop (Q1 2026)

Mid-Term Workshop (Q4 2026)

Final Workshop (Q4 2027)

Regular TA and governance meetings as needed

Input

Water Resilience Trust Fund under the Water Financing Partnership Facility: \$1,000,000 (grant)^c

A = assumption, ADB = Asian Development Bank, DR = development result, HKH = Hindu Kush Himalaya, IWRM = integrated water resources management, Q = quarter, R = risk, SDG = Sustainable Development Goal, TA = technical assistance.

^a ADB. 2022. [Strategy 2030: Water Sector Directional Guide](#) and ADB. 2024. [Strategy 2030 Midterm Review: An Evolution Approach for the Asian Development Bank](#).

^b River basins include: Amu Darya, Brahmaputra, Indus, Irrawaddy, Ganges, Mekong, Salween, Tarim, Yellow, Yangtze.

^c Financing partner: the Government of the Netherlands. Administered by ADB.

Contributions to ADB's Development Results and Alignment with SDGs

A summary of the TA contributions to ADB's development results and alignment with SDGs are presented in the Contributions to Strategy 2030 Development Results page in eOperations. This information may be requested from the TA team upon request.

Source: Asian Development Bank.