

Research Terms of Reference

Area-Based Risk Assessment of Isfana Watershed in the Fergana Valley

REG2301a

Kyrgyzstan, Tajikistan (Central Asia)

25/01/2022

Version 2.0

IMPACT Shaping practices
Influencing policies
Impacting lives

1. Executive Summary

Country of intervention	Kyrgyzstan, Tajikistan(Central Asia)					
Type of Emergency	☒	Natural hazard	☐	Conflict	☐	Other (specify)
Type of Crisis	☐	Sudden onset	☐	Slow onset	☒	Protracted
Mandating Body/ Agency	EuropeAID					
IMPACT Project Code	05AXR 0A7 (IMPACT) Acted: 03FSJ (TJK), 05FSJ (KYR)					
Overall Research Timeframe (from research design to final outputs / M&E)	01/09/2024 to 08/30/2024					
Research Timeframe Add planned deadlines (for first cycle if more than 1)	1. Pilot/ training: 04/08/2024		6. Preliminary presentation: 07/22/2024			
	2. Start collect data: 04/15/2024		7. Outputs sent for validation: 08/05/2024			
	3. Data collected: 04/20/2024		8. Outputs published: 08/30/2024			
	4. Data analysed: 06/04/2024		9. Final presentation: 08/30/2024			
	5. Data sent for validation: 06/30/2024					
Number of assessments	☒	Single assessment (one cycle)				
	☐	Multi assessment (more than one cycle) [Describe here the frequency of the cycle]				
Humanitarian milestones Specify what will the assessment inform and when e.g. The shelter cluster will use this data to draft its Revised Flash Appeal;	Milestone		Deadline (can be tentative)			
	☐	Donor plan/strategy	--/--/----			
	☐	Inter-cluster plan/strategy	--/--/----			
	☐	Cluster plan/strategy	--/--/----			
	☐	NGO platform plan/strategy	--/--/----			
	☒	Other (Specify): Other (Specify): Acted and CAAWE	--/--/----			

Audience Type & Dissemination Specify who will the assessment inform and how you will disseminate to inform the audience	Audience type		Dissemination	
	☐ Strategic X Programmatic X Operational ☐ [Other, Specify]		☐ General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors) ☐ Cluster Mailing (Education, Shelter and WASH) and presentation of findings at next cluster meeting X Presentation of findings (e.g. at HCT meeting; Cluster meeting) X Website Dissemination (Relief Web & REACH Resource Centre) ☐ [Other, Specify]	
Stakeholder mapping Has a detailed stakeholder mapping been conducted during research design to identify all actors that could contribute to and/or benefit from the research?	☐	Yes	X	No
General Objective	The overarching objective of the research is to conduct an in-depth study of climate change impacts and human-induced pressures on the conditions of natural resources, including irrigation water and agricultural, pastoral practices. The research will also consider techniques aimed at fostering the resilience of the watershed's community amidst the challenges posed by climate change, disaster risk reduction and cross-cutting issue across considered sectors.			
Specific Objective(s)	SO 1: Examine communities' water and land usage practices (irrigation, agriculture, livestock rearing, industry and tourism etc.) in the Watershed. SO 2: Identify the existing water resources, infrastructures and delivery systems for irrigation water in the Watershed, and map their locations. SO 3: Understand current technical status of water infrastructure by assessing their current conditions, maintenance and map the areas/communities where infrastructure rehabilitation is needed. SO 4: Examine irrigation water and land use management, institutional frameworks, and interactions among key water management stakeholders, focusing on key sectors including irrigation water, agriculture, pasture, industry and other water and land resources users. SO 5: Identify how climate change and anthropogenic (human induced) factors has affected irrigation water resource usage and overall irrigation water supply and management practices in the area. SO 6: Develop policy recommendations and community-led response plans to address key gaps highlighted by the analysis of water and land resources for agriculture purposes management in the Fergana Valley.			

Research Questions	RQ for SO1: 1. What are the socio-economic profiles of communities and their primary water and land use interests, including agriculture, livestock, tourism, and industry? 1.1. What communities (their socio-economic conditions) are situated within the watershed? 1.2. What are their primary water and land use interests (agriculture with irrigated and rainfed land, livestock, tourism, industrial etc.)? 1.3. How much land, livestock, and industry are present in the watershed, and how is their ownership distributed? RQ for SO 2: 2. What are the existing water resources, infrastructure, and irrigation delivery systems, including their ownership status? 2.1. Where are present irrigation water resources, such as water pumping stations, networks, water trucking, public and private boreholes/wells, public handpumps/taps, irrigation canals, reservoirs/dams, etc., located? 2.2. To which communities do these water systems, infrastructures, and delivery mechanisms provide service, and is water accessible to all populations residing in the area? RQ for SO 3: 3. What is the overall condition and coverage of the water infrastructure, what factors affect its functionality, and what technical support is needed to improve it? 3.1. What is the current state of water infrastructure functionality (fully functional, partially functional, or non-functional) in different parts of the watershed? 3.2. How well is the current water delivery system extend its network coverage to reach communities within the watershed? 3.3. What key factors contribute to the functionality or dysfunctionality of water delivery infrastructure, and what technical capacities or tools/equipment are required to support enhanced water infrastructure and service functionality? RQ for SO 4:
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4. What are the key stakeholders and agencies responsible for land resources management at both central and local levels, what are their respective roles and responsibilities, and how do they interact in decision-making processes?
- 4.1. Who are the stakeholders/ agencies in land resources management (at central and local levels) and their responsibilities?
- 4.2. What are the stakeholders/ agencies and their functions/ responsibilities in management and maintenance of water infrastructures and ensuring availability of services?
- 4.3. How do different stakeholders/ agencies on management sectors interact with each other in decision making, carrying out their responsibilities, address the gaps in coordination of water and land resources management?

RQ for SO 5:

5. What are the community perspectives on the impacts of climate and human activities on the quality and accessibility of water and land resources, and how have local communities and stakeholders adapted to these changes?
- 5.1. What are the community perspectives on how climate and weather patterns, and other natural phenomena impact the quality and accessibility of water and land resources?
- 5.2. How do local communities perceive the impact of human practices, including agricultural, pastoral activities (fertilizers, pesticides, and the water infrastructure and dams, grazing patterns, livestock infrastructure), industrial operations, extraction of surface and groundwater on the quality of land and water resources within the Watershed?
- 5.3. How have communities and local stakeholders adapted to these changes?
- 5.4. Are there any differences, between men and women, in the level of access to natural (irrigation water and land) resources and how climate change may affect men and women differently in their access to those resources?

RQ for SO 6:

	6. What recommendations do regional authorities propose for improving water and land management, and what support can development actors provide to address challenges? 6.1. What are the key recommendations from authorities within the region about how to better manage water and land watersheds? 6.2. What do key stakeholders and authorities see as the main challenges to addressing blockages to more effective resources management? 6.3. What type of support can be provided by development actors for sustainable water and land management in the watershed to local government, civil society, and community actors?
Geographic Coverage	The activities will take place in Isfana Watershed in the Fergana Valley. The Isfana Watershed extends across Kyrgyzstan and Tajikistan, encompassing the Jabbor-Ruslov and Spitamen Districts in the Soghdh region of Tajikistan, as well as the Leylek District and Suluktu in the Batken Region of the Kyrgyzstan.
Secondary data sources	Secondary Data sources: 1. UNISDR: In-depth Review of Disaster Risk Reduction in the Kyrgyz Republic, 2010. 2. Acted: Final report. Consultancy services for Hydrological modelling of Ak-Suu and Khojibakirgan for the implementation of the National Water Resource Management Project in Tajikistan, 2015. 3. USAID, CAREC, Report, General characterization of the Isfana River sub-basin (Collecting, analysing and supplementing data, and collaborating with relevant stakeholders for the preparation of the basin plan), 2019. 4. The CADRI Partnership scoping mission to the Kyrgyz Republic, 2021. 5. IMPACT: Ak-Suu and Isfayramsay Watersheds; Watershed profile Kyrgyzstan-Batken region-Kadamjai District, August, 2023. 6. IMPACT: Kozu-Baglan Watershed; Watershed profile Kyrgyzstan-Batken region-Leylek District, September, 2023. 7. IMPACT: Khojabakirgan Watershed; Watershed profile Tajikistan-Sughd region-B. Gafurov and Rasulov District, September, 2023 8. Official data from open sources, information and official inquiries to relevant government agencies. 9. World Bank, Ferghana Valley Water Resources Management – Phase II 10. USAID, Regional Water and Vulnerable Environment Activity 11. USAID, SMART WATERS Regional Water and Vulnerable Environment Activity (completed project) 12. SDC, National Water Resources Management Tajikistan. 13. UNDP, Climate Change and Resilience in Central Asia. 14. Acted, DIPECHO X Disaster Risk Reduction through Trans boundary Integrated Natural Resources Management in the Ak-Suu and Khoja-Bakirgan watersheds 15. EU, WEECOP

	16. GIZ, Green Central Asia 17. Eurasian River Basin Management Portal, 2023. 18. SDC, Sub-ResEAU Eastern Europe and Central Asia, 2023. 19. International ALERT, The impact of climate change on the dynamics of conflicts in the transboundary river basins of Kyrgyzstan, Kazakhstan and Tajikistan, January 2022. 20. Centre for Development and Environment, IWSM Policy Brief: Integrated watershed management in Tajikistan, March 2012. 21. ZOI, Environment and Security: Transforming risks into cooperation, 2006.			
Population(s) <i>Select all that apply</i>	☐ IDPs in camp ☒ IDPs in host communities ☐ Refugees in camp ☐ Refugees in host communities ☒ Host communities	☐ IDPs in informal sites ☐ IDPs [Other, Specify] ☐ Refugees in informal sites ☐ Refugees [Other, Specify] ☐ [Other, Specify]		
Stratification <i>Select type(s) and enter number of strata</i>	☒ Geographical #: 1 Population size per strata is known? ☒ Yes ☐ No	☒ Group #: District/Rayon # 3 Population size per strata is known? ☒ Yes ☐ No	☒ [Other Specify] #: Ayil Aimak/Jamoat #7: Town #2 Population size per strata is known? ☒ Yes ☐ No	
Data collection tool(s)	☒ Structured (Quantitative)	☒ Semi-structured (Qualitative)		
	Sampling method	Data collection method		
Structured data collection tool # 1 <i>Inquired about a series of cross-cutting pieces of information, including demographics, the location and functionality of infrastructure services, farming practices, employment information, and the number of vulnerable individuals</i>	☒ Purposive ☐ Probability / Simple random ☐ Probability / Stratified simple random ☐ Probability / Cluster sampling ☐ Probability / Stratified cluster sampling ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _ _ ☐ Group discussion (Target #):_ _ _ _ _ ☐ Household interview (Target #):_ _ _ _ _ ☐ Individual interview (Target #):_ _ _ _ _ ☐ Direct observations (Target #):_ _ _ _ _ ☒ Other, Key Informant Interview (KII) (Target # 8): Village KIs: 1 in each location (in total 32 locations including 12 Villages and 2 Towns in Kyrgyzstan and 18 Villages in Tajikistan) with Village/Town activists, farmers and water specialist, the Village leadership, 1-4 KIs in per village/town.		
Semi-structured data collection tool (s) # 1	☒ Purposive ☐ Snowballing ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _ _		

Assessing water sources, delivery infrastructures, water management, affecting factors, infratstructure and technical needs (FGD/MFGD)		☐ Individual interview (Target #):_ _ _ _ ☒ Focus group discussion (Target # 1): Mapping focus group discussion. 1 in each location (9 in total); 2-5 participants from each entitites: Ayil Aimak, City Hall, District in Kyrgyzstan and District, Jamoat levels in Tajikistan. ☐ [Other, Specify] (Target #):_ _ _ _
Semi-structured data collection tool (s) # 2 Agricultural lands distribution, ownership, land management, land use practices, possible climate change impacts (FGD/MFGD)	☒ Purposive ☐ Snowballing ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _ ☐ Individual interview (Target #):_ _ _ _ ☒ Focus group discussion (Target # 2): Mapping focus group discussion. 1 in each location (6 in total); 2-5 participants from each entitites: Ayil Aimak/Jamoat levels in Kyrgyzstan and Tajikistan ☐ [Other, Specify] (Target #):_ _ _ _
Semi-structured data collection tool (s) # 3 Focus Group Discussion on assessing the pasture land use practices, management policy, and possible climate change impacts (FGD/MFGD)	☒ Purposive ☐ Snowballing ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _ ☐ Individual interview (Target #):_ _ _ _ ☒ Focus group discussion (Target # 3): Mapping focus group discussion. 1 in each location (7 in total); 2-5 participants from each entitiies: City Hall, Ayil Aimak levels in Kyrgyzstan and Jamoat level in Tajikistan ☐ [Other, Specify] (Target #):_ _ _ _
Semi-structured data collection tool (s) # 4 Understanding the Forestry Unit management, use, factors to forest resources, and practices for the watershed (FGD/MFGD)	☒ Purposive ☐ Snowballing ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _ ☐ Individual interview (Target #):_ _ _ _ ☒ Focus group discussion (Target # 4): Mapping focus group discussion. 1 location; 2-3 representatives from the Leylek Forestry Unit in Kyrgyzstan ☐ [Other, Specify] (Target #):_ _ _ _
Semi-structured data collection tool (s) # 5	☒ Purposive ☐ Snowballing ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _

Analyze the socio-economic environment of the district with a focus on income sources, employment opportunities, and the impact of climate change on livelihoods (FGD)		☐ Individual interview (Target #):_ _ _ _ ☒ Focus group discussion (Target # 5): 1 in each location (3 in total); 2-4 participants from each District level from Kyrgyzstan and Tajikistan. ☐ [Other, Specify] (Target #):_ _ _ _ _
Semi-structured data collection tool (s) # 6 Women's roles in natural resource management of land and water resources within the watershed, and fill critical information on gender related norms and practices in the assessed communities (FGD)	☒ Purposive ☐ Snowballing ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _ _ ☐ Individual interview (Target #):_ _ _ _ _ ☒ Focus group discussion (Target #): : 1 in each location (5 in total); 2-4 participants from each entitites: District, Ayil Aimak levels in Kyrgyzstan and Jamoat level in Tajikistan. ☐ [Other, Specify] (Target #):_ _ _ _ _
Semi-structured data collection tool (s) # 7 Map the key locations of emergency infrastructure and response mechanisms, encompassing rally points, pre-positioning warehouses, and the types and whereabouts of disaster management initiatives aimed at mitigating the effects of natural hazards (FGD/MFGD)	☒ Purposive ☐ Snowballing ☐ [Other, Specify]	☐ Key informant interview (Target #):_ _ _ _ _ ☐ Individual interview (Target #):_ _ _ _ _ ☒ Focus group discussion (Target # 7): Mapping focus group discussion.1 in each location (4 in total); 2-3 participants from each offices at District, City Hall levels in Kyrgyzstan and at District level in Tajikistan. ☐ [Other, Specify] (Target #):_ _ _ _ _
Target level of precision if	NA % level of confidence	NA +/- % margin of error

probability sampling				
Disaggregation by gender and age <i>Are you planning to conduct sex/age disaggregated analysis?</i>	Gender		Age	
	☐	Yes	☐	Yes
	☒	No	☒	No
Data management platform(s)	☒	IMPACT	☐	UNHCR
	☐	[Other, Specify]		
Expected output type(s)	☐	Situation overview #: __	☒	Report #: 2 total, 1 per country
	☒	Presentation (Preliminary findings) #: 1	☐	Presentation (Final) #: 0
	☐	Interactive dashboard #: __	☐	Webmap #: __
	☐	[Other, Specify] #: __		
Access	☐	Public (available on REACH resource center and other humanitarian platforms)		
	☒	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on IMPACT or other platforms)		
Visibility <i>Specify which logos should be on outputs</i>	IMPACT			
	Donor: EuropeAid			
	Coordination Framework: National			
	Partners: Acted, CAAWE			

2. Rationale

2.1 Background

The Syr Darya River Basin, which crosses Kyrgyzstan, Tajikistan, and Uzbekistan at multiple instances as it flows through the Fergana Valley, is relied upon by numerous communities in all three countries, but lacks centralized management, creating a situation in which communities at the end of the basin's complex network of rivers, canals, and dams, are often dependent upon the water policies of other countries' governments. This is particularly severe in the case of water, which many people in the Valley rely upon for agriculture, water for pasture animals, and hydropower.¹

In the Fergana valley within three neighbouring country Kyrgyzstan, Tajikistan, and Uzbekistan water shortages have become increasingly prevalent. This is primarily due to subpar water and land management practices, including inefficient irrigation systems, leaky canals, outdated infrastructure, and inefficient use of agricultural land. These factors have compounded by the affect of climate change leading to a decline in overall water discharge from mountain glaciers and snowfall. Consequently, the region consistently grapples with water scarcity, exacerbating the challenges in meeting agricultural

¹ International Alert, The impact of climate change on the dynamics of conflicts in the transboundary river basins of Kyrgyzstan, Kazakhstan and Tajikistan, July 2021 – January 2022.

and hydropower demands in most watersheds in the Syr Darya River Basin.² This cyclic relationship between suboptimal management, climate change-induced water scarcity, and collapsing water infrastructure perpetuates the challenges faced by communities in the Fergana Valley, emphasizing the urgent need for improved management strategies to adapt to changing environmental conditions and ensure sustainable water availability.

The projected temperature rise due to climate change is expected to increase crop water demand by 5-15% by 2050, exacerbating strain on already scarce water resources, compounded by population growth and economic development, and worsened by inefficient irrigation practices.³ This can have serious implications, including fuelling the outbreak of conflict, which occurred between Kyrgyzstan and Tajikistan between 2021 and 2022.⁴ These most recent clashes highlight the importance of improved natural resource management in the Fergana Valley, particularly as climate change is likely to worsen these trends as time goes on.

To help address climate change challenges to the natural resources management in local watersheds of the Syr Darya River basin that passes through the Fergana Valley, in 2022, Acted, IMPACT and International Alert, with the support of USAID, launched the STREAM project.⁵ Findings of the STREAM project (Ak-Suu and Isfayramsay,⁶ Kozu-Baglan Watersheds in Kyrgyzstan-Batken region⁷ and Khojabakirgan Watershed in Tadjikistan-Sughd region⁸) highlighted the interconnectedness of climate change, anthropogenic activities, and natural resources management. In addition, the evidence-based, tailored approach, integration of advanced technologies, and community involvement findings underscore the need for comprehensive strategies such as implementation of integrated water resources management to address the complex challenges posed by climate change in the greater Syr Darya River basin. The reports will be uploaded to the Resource Centre for internal access only.

Additional support from EuropeAID has allowed for the expansion of the STREAM project to the nearby Isfana Watershed, shared by Tajikistan and Kyrgyzstan. Acted and IMPACT, in cooperation with the Central Asian Alliance for Water and Ecology (CAAWE), will implement the project in the Isfana Watershed within the Fergana Valley in the Sughd region of Tajikistan and the Batken region in Kyrgyzstan to gain a comprehensive and updated understanding of sustainable climate implications on natural resource management in the Isfana Watershed within the Fergana Valley. Building upon lessons learned from its previous STREAM exercise, IMPACT will conduct a detailed assessment of natural resource management in the Isfana Watershed, particularly with regards to the impact of climate change. This will involve focus on hydrological and ecological processes in river and groundwater, rainfed land, agricultural and pasture lands, forests, industry and other water and land uses. The assessment aims to enhance understanding and knowledge of watershed capacities and subsequently propose effective strategies for mitigation and adaptation in water management for agriculture, pasture, livestock, and the sustainability of other water and land resources in the context of evolving climate conditions.

2.2 Intended impact

Within the framework of the STREAM programme, IMPACT and Acted, in collaboration with their partners, will conduct an Area Based Risk Assessment (ABRA) to assess the impact of climate change

² Research Terms of Reference Area-Based Assessment of Sub-River Basins in the Fergana Valley REG2301, Kyrgyzstan, Tajikistan, Uzbekistan (Central Asia), 25.01.2022.

³ Katy Unger-Shayesteh et al., "On the Future of Water Management in the Fergana Valley: Scenarios for Climate Change, Water Resources and Socio-Economic Development," 2015, https://ofzpublic.ofz-potsdam.de/pubman/faces/ViewItemFullPage.jsp?itemId=item_1284947_8.

⁴ [Bellingcat, Mapping the Aftermath of the Kyrgyzstan-Tajikistan Border Clashes, 25 May 2023.](#)

⁵ Concept note. Sustainable Transboundary Resource Allocation Mechanism for Peace (STREAM for Peace). Acted.

⁶ Ak-Suu & Isfayramsay Watersheds, Watershed Profile, Kyrgyzstan - Batken Region - Kadamjay District. August 2023

⁷ IMPACT, Kozu-Baglan Watershed, Watershed Profile, Kyrgyzstan - Batken Region - Leylek District September 2023.

⁸ IMPACT, Khojabakirgan Watershed, Watershed Profile, Tajikistan - Sughd Region - B. Gafurov & J. Rasulov District, September 2023.

on the availability and management of water and land resources in the Isfana Watershed and its associated communities in the Batken Region, Kyrgyzstan and Sughd Region, Tajikistan. The assessment will cover the hydrological and ecological processes in the watershed, including assessing the water and land resources use patterns of communities (rainfed land, agricultural and pasture lands, fishing, industrial zones, facilities, and various other water and land uses) in the basin.

The findings of this study will contribute to building understanding on local land and water resources, their utilization, and the impacts of climate change on watersheds. It aims to identify infrastructure requiring support, map the delivery infrastructure, assess technical capacity, management practices, and sustainability measures to enhance water and land usage for improved sustainability. These insights will shed light on specific challenges and vulnerabilities of natural resources in the region, aiding the development of adaptive and resilient climate change policies and strategies. Furthermore, the research will inform sustainable practices, particularly in hydrological and ecological processes involving river and groundwater, agricultural and pasture lands, industry and various other water and land uses. It will provide policy recommendations and community-led response plans to address key gaps highlighted by the analysis of water and land resources for agricultural purposes management in the Fergana Valley.

3. Methodology

3.1 Methodology overview

IMPACT in close collaboration with Acted and CAAWE will conduct a detailed assessment of information from key informants (KIs) and pursue a mixed-methods approach utilizing a combination of semi-structured focus group discussion (FGD)/ mapping focus group discussions (MFGDs), separate FGD and Key Informant Interview (KII) using eight tools to address the research objectives in 32 settlements (towns, villages) within 3 Districts in Kyrgyzstan and Tajikistan (details in the Table 1) that make up the communities of the transboundary Isfana Watershed. Five methods include the combined method of FGD and simultaneous MFGD on water management, agricultural and pasture land management, forestry unit management, DRR where the same participants will be involved in both discussion and mapping. Two FGD tools will be employed for specific discussions: one will address women's issues in natural resource management and involve representatives from LSG Women's Committees and another will engage the Social Development Department in discussion regarding income sources. In addition, 32 KIIs will be carried out with village heads to gather essential cross-cutting information pertinent to the assessment.

- Activity 1 – FGD/MFGD with Water Managers, river basin council representatives at District, City Hall, and LSG (Ayil Aimak/Jamoat) levels. 1 session will be held in Kyrgyzstan and 2 sessions will be held in Tajikistan at district level.
- Activity 2 – FGD/MFGD Agricultural Land Managers, farmers LSG level. 2 sessions will be held in Kyrgyzstan and 4 sessions will be held in Tajikistan at LSG levels.
- Activity 3 – FGD/MFGD Pasture Land Managers, livestock rearers at LSG level. 2 sessions will be held in Kyrgyzstan and 4 sessions will be held in Tajikistan at LSG levels.
- Activity 4 – FGD/MFGD with Leylek Forestry Unit. 1 session will be held in Kyrgyzstan at district level.
- Activity 5 – FGD with District social affairs specialists. 1 session will be held in Kyrgyzstan and 2 sessions will be held in Tajikistan at district level.
- Activity 6 – FGD with District, LSG Women's Committees. 2 sessions will be held in Kyrgyzstan at LSG and 2 sessions will be held in Tajikistan at district levels.

- Activity 7 – FGD/MFGD with District, City Hall Ministry of Emergency Services. 2 sessions will be held in Kyrgyzstan one at District and 1 at City Hall and 2 sessions will be held in Tajikistan at district levels.
- Activity 8 – KII with head of villages and village activists. 14 sessions will be held in Kyrgyzstan (2 at City Hall and 12 at village) and 18 sessions will be held in Tajikistan at village levels.

In total 12 sessions at district level out of 4 in Kyrgyzstan, 8 in Tajikistan; 14 sessions at LSG level (6 in Kyrgyzstan and 8 in Tajikistan); 3 at City Hall level in Kyrgyzstan; 30 at village level out of 12 in Kyrgyzstan, 18 in Tajikistan will be conducted. More detailed information is shown below in Table 1.

Table 1 Information about the survey

Activities	Target participants/KI	The skills and expertise required for participants	Target audience levels			
			District	Ayil Aima k/Jamoat	City Hall	Village
Activity # 1: MAPPING FOCUS GROUP DISCUSSION - WATER MANAGERS FGD/MFGD technique (3 sessions)	2-6 water resource managers District Water Department staff (Water engineers and technicians) City Hall water management staff (Water engineers and technicians) Specialists from river basin councils Water User Associations Ayil Aima k/Jamoat	Irrigation water management and infrastructure, networks(s) in the area	1 KG 2 TJ			
Activity # 2: MAPPING FOCUS GROUP DISCUSSION – AGRICULTURE LAND MANAGERS FGD/MFGD technique (6 sessions)	3-5 participants Farmers, Land specialist at Ayil Aima k/Jamoat	Agriculture, irrigation management for land sources used by the in and around the area		2 KG 4 TJ		
Activity # 3: MAPPING FOCUS GROUP DISCUSSION – PASTURE LAND MANAGERS FGD/MFGD technique (6 sessions)	3-5 Pastureland management (Pasture committee); Livestock owners; Breeders, and herders	Pasture land management in and around the area		2 KG 4 TJ		

Activities	Target participants/KI	The skills and expertise required for participants	Target audience levels			
			District	Ayil Aima k/Ja moat	City Hall	Village
Activity # 4: FOCUS GROUP DISCUSSION - FORESTRY UNIT MANAGEMENT FGD/MFGD technique (1 session)	2-3 representatives from the forestry unit; Deputy director of the forestry unit, Forest engineers of the Leylek Forestry Unit representative in Kyrgyzstan	The forest management	1 KG			
Activity # 5: FOCUS GROUP DISCUSSION: EMPLOYMENT & VULNERABILITY FGD (3 sessions)	2-4 participants from district social affairs department and local branch of statistical committee	Labour market, employment, and social protection services, including those for disabled, elderly, and retired	1 KG 2 TJ			
Activity # 6 : FOCUS GROUP DISCUSSION – WOMEN'S COMMITTEES FGD (4 sessions)	2-4 Women's Committee Members Land access; Water management Community leadership participation; Government stakeholder advocacy	The issues related to women's advocacy and involvement in natural resource management in the Watershed at district, LSG (Ayil Aimak and Jamoat) levels	2 TJ	2 KG		
Activity # 7: MAPPING FOCUS GROUP DISCUSSION – DISASTER RISK MANAGERS FGD/MFGD technique (4 sessions)	2-3 disaster risk management staff; Disaster risk managers; Emergency response staff	Emergency infrastructure and response mechanisms, as well as awareness of the types and locations of disaster management initiatives designed to	1 KG 2 TJ		1 KG	

Activities	Target participants/KI	The skills and expertise required for participants	Target audience levels			
			District	Ayil Aima k/Jamoat	City Hall	Village
		reduce the impacts of natural hazards				
ACTIVITY # 8 KEY INFORMANT INTERVIEW (KII) KII – (32 sessions)	1-4 - Village KIIs key leaders; Village activists; Farming and water specialist (not in each village available); Village leadership; Representatives from Jamoats	The series of cross-cutting pieces of information, including demographics, the location and functionality of infrastructure services, farming practices, employment information, and the number of vulnerable individuals in the village they live			2 KG	12 KG, 18 TJ
In total:			4 KG 8 TJ	6 KG 8 TJ	3 KG	12 KG, 18 TJ

Note: KG – Kyrgyzstan; TJ – Tajikistan.

To evaluate the impact of climate change on water and land resource management in the Isfana Watershed, and assess the vulnerability of communities dependent on these resources the data collection will consist of: FGDs sessions to provide a platform for in-depth discussions with targeted groups; mixed FGDs/MFGDs sessions will combine discussion and mapping activities, ensuring broader participation with the same participants; KIIs will provide participation from community members to understand their experiences and perceptions related to water and land resource management. In addition, the assessment methodology will involve a detailed secondary data review.

The names of the administrative bodies for the assessment are detailed in the Table 2.

1. FGD/MFGD coverage area:

The semi-structured qualitative and structured quantitative methodologies involving the FGD/MFGD techniques will be utilized to assess the management of water and land (agricultural, pastoral and forest under the Forestry unit administration) resources and emergency response administration, who works closely with local water managers to understand the watershed's dynamics and potential

hazards to predict flood risks and develop response plans to effectively mitigate water-related emergencies and protect life and property; mapping of the locations of water infrastructure, agriculture and pasture lands, forests under the Forestry unit administration, as well as identify key stakeholders, decision-making structures, and key challenges faced in managing key resources. Interviews will be conducted with District, City Hall, and LSG level (Ayil Aimak in Kyrgyzstan and Jamoat in Tajikistan). This will include the following separate Interviews with:

- a. Water Managers including water users;
- b. Agriculture Land Managers and farmers;
- c. Pasture Land Managers and pasture users, breeders, herders;
- d. Forest Managers;
- e. Disaster Risk Managers.

2. FGD coverage area:

Semi-structured qualitative tool with using FGDs technique considers the gender aspects in natural resources management within the watershed amidst evolving climatic conditions and income source and employment data and trends and women's roles in natural resource management, as well as additional information on vulnerability and gender dimensions. This information will be captures at District, City Hall and LSG levels including the following separate interviews with:

- a. Social Development Department;
- b. Women's Committees.

3. KIIs coverage area:

Key informant interviews (KII) will be conducted in each Village using a quantitative methodology to assess demographic, and infrastructure data at settlement level. Interviews will be quantitative and conducted with settlement leadership including farming and water specialist and not limited to. In addition, Village level feedback on household coping and adaptational capacities, as well as specific vulnerability information will be collected.

4. Secondary data

This primary data collection will be conducted alongside a desk review of secondary data and a detailed remote sensing analysis using GIS analysis. The desk review will include the collection of key statistical information on agriculture, land use, and demographic statistics for communities in the assessed areas. This will also involve the review and evaluation of information from policy documents on roles and responsibilities of relevant governmental bodies on water and natural resources management as well to understand the legal frameworks around resource management that are available. The desk review will also include the collection of water discharge and key meteorological information needed to conduct the hydrological analysis and remote sensing assessments for the watershed.

Following data collection and desk review, IMPACT's GIS staff will conduct a detailed remote sensing assessment of the watershed, to identify major natural hazards and understand more about the impact of climate change on water and land availability within the watershed as well as on cropland extent, vegetation health-based drought assessed through Normalised Difference Vegetation Index – NDVI (i.e., indicator for plant health and vegetation density), rainfall based drought indicators, ground water trends over time, etc. would be added on to the area profiles/ outputs. Climate modeling will be developed based on meteorological data.

Key Definitions:

- **Agricultural lands:** land plots used for the production of agricultural products, namely: arable land, fallow land, lands occupied by perennial plantings, hayfields, and pasture land;
- **Area-based Approach:** Area-based Approach or ABA is a geographically targeted, multi-sectoral, and participatory approach which may be applied in both urban and rural settings.⁹
- **Disaster Risk Management:** The application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk, and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses.¹⁰
- **Disaster Risk Reduction:** Activities aimed at preventing new and reducing existing disaster risk, managing residual risk, and which contribute to strengthening resilience and the achievement of sustainable development.¹¹
- **Early Warning Systems:** an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.¹²
- **Exposure:** The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.¹³
- **Functionality of water infrastructures:**
 - Fully-functional – An infrastructure is fully functional when it can work and function as expected, in its full capacity, and with little or no issues.¹⁴
 - Partially-functional – An infrastructure is partly or partially functional when it works but not at its full capacity, and with significant issues that ultimately affect the quality/ availability of its services. Partially functional infrastructures can be made fully functional with repair and maintenance of certain parts and machinery of the full system.
 - Completely non-functional – An infrastructure is considered non-functional when it exists in the area but doesn't function or operate at all. These infrastructures are unable to provide any service unless they are completely fixed/ rehabilitated/ overhauled to restore their functionality.
- **Hazard:** A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.¹⁵

⁹ IGI Global, [Handbook of Research on Future Opportunities for Technology Management Education](#), June 2021

¹⁰ Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction, UNGA, 2016. [50683_oiewgreportenglish.pdf \(preventionweb.net\)](#).

¹¹ Ibid

¹² Ibid

¹³ UNDRR, Hazard Definition & Classification Review: Technical Report, 2020.

¹⁴ Law Insider Definition. <https://www.lawinsider.com/dictionary/fully-functional#:~:text=fully%20functional%20means%20the%20service,as%20expected%20in%20every%20way>

¹⁵ Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction, UNGA, 2016. [50683_oiewgreportenglish.pdf \(preventionweb.net\)](#).

- **Integrated Water Resource Management Strategy:** Integrated water resources management strategy refers to a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.¹⁶
 - **Land resources:** include agricultural and non-agricultural land and shall be subdivided into the following categories in accordance with their intended purpose: agricultural lands; lands of settlements; lands of industry, transport, communication, energy, defence and other purposes; lands of protected areas; forest; water areas; lands of the reserve.
 - **Local Self Government (LSG) Unit (Ayil Aimak/Jamoat):** An administrative layer in Kyrgyzstan and Tajikistan that lies between the District and Village level. These are typically clusters of 3-8 villages that share common resources, and are in geographically similar areas. Districts typically have about 10 Ayil Aimak per district, of which about 5 fall within the part of an Watershed that lies inside their national boundaries (for about 10 Ayil Aimak/Jamoat per watershed).
- Non-agricultural lands:** household plots; collective gardens and orchards; forest lands, trees, and shrubs; lands under water, roads, passages, buildings, yards, streets; degraded lands; other lands.
- **One household** will be considered to include parents and underage children, sometimes adult family members with their families if they live in the parental home with their parents, and who share the same resources.
 - **Risk:** the potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity¹⁷.
 - **Service Area:** Service area is a catchment area for services. These are often, but not necessarily, linked to administrative and/or geographical boundaries and denote which and what services are being catered to particular neighbourhoods/ communities/ sub-areas within a larger area.¹⁸
 - **Vulnerability:** the conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.¹⁹
 - **Water Governance and Management:** Water governance refers to the political, social, economic and administrative systems in place that can influence water use and management.

¹⁶ IGI Global, Handbook of Research on Future Opportunities for Technology Management Education, June 2021

¹⁷ Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction, UNGA, 2016. [50683_oiewgreportenglish.pdf \(preventionweb.net\)](#).

¹⁸ IMPACT Initiative, Area Based Assessment with Key Informants- A Practical Guide, December 2018

¹⁹ Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction, UNGA, 2016. [50683_oiewgreportenglish.pdf \(preventionweb.net\)](#).

It determines the equity and efficiency in water resource and services allocation and distribution, and balanced water use between socio-economic activities and ecosystems.²⁰

- **Water Infrastructure:** Water infrastructure refers to a broad term for systems of water supply, water resource management, flood prevention and hydropower. The term also includes water-based transportation systems such as canals, pipelines, etc.²¹
- **Water Resilience:** Water resilience is commonly understood as the ability of water systems to withstand a variety of water-related shocks (floods, droughts, changes in water quality) without losing their ability to support key functions, as well as the ability of water systems to transform and adapt to new hydrologic systems.²²
- **Water Resources:** Water resources means all waters of the state occurring on the surface, in natural or artificial channels, lakes, reservoirs, or impoundments, and in subsurface aquifers, which are available, or which may be made available to agricultural, industrial, commercial, recreational, public users²³
- **Water Resource Management:** Water resources management (WRM) is the process of planning, developing, and managing water resources, in terms of both water quantity and quality, across all water uses. It includes the institutions, infrastructure, incentives, and information systems that support and guide water management.²⁴
- **Watershed:** A watershed is the area of land that, "drains all of the streams and rainfall to a common outlet," which can refer to any body of water, including a reservoir, lake, river, or canals, and is sometimes used interchangeably with a drainage basin or catchment.²⁵

3.2 Population of interest

The assessment will encompass 32 settlements: 13 – in the Lylek District and Suluktu of the Batken Region, in total 14 in Kyrgyzstan; 18 – in Spitamen and J. Rasulovin Districts the Sughd Region, Tajikistan. Interviews will be conducted at various administrative levels, including District, City Hall (for towns in Batken Region), Local Self-Government (Ayil Aimak/Jamoat), and Village. These details are outlined in Table 2 below.

Table 2. Table of administrative bodies in the Watershed

Country	Region	District	Ayil Aimak/Jamoat	Village/Town
Kyrgyzstan	Batken	Lylek	Razzakov	1) Razzakov City Hall
				2) Golbo
				3) Samat
				4) Chimgen

²⁰ IGI Global, [Handbook of Research on Future Opportunities for Technology Management Education](#), June 2021

²¹ Ibid.

²² Lucy Rodina, Water resilience lessons from Cape Town's water crisis, July 2019 <https://edges.sites.olt.ubc.ca/files/2019/08/Rodina-2019-Wiley-Interdisciplinary-Reviews-Water.pdf>

²³ Law Insider Definition. <https://www.lawinsider.com/dictionary/water-resources>.

²⁴ IGI Global, [Handbook of Research on Future Opportunities for Technology Management Education](#), June 2021

²⁵ A watershed is the area of land that, "drains all of the streams and rainfall to a common outlet," which can refer to any body of water, including a reservoir, lake, river, or canals, and is sometimes used interchangeably with a drainage basin or catchment. For more information please see: [USGS: Watersheds and Drainage Basins, 2019](#).

Tajikistan	Sughd	Spitamen	Toguz-Bulak	5) Taylan
				6) Ak-Bosogo
				7) Ak-Bulak
				8) Toguz-Bulak
				9) Ai-Kol
				10) Kara-Bulak
				11) Aibeke (Madaniat)
				12) Ming-Jygach
				13) Gordoï
				Suluktu
	J.Rasulov	Istiklol	1) Safedteppa	
			2) Saidqal'a	
		T. Uljaboev	3) Yangiobod	
			4) Andarsoy	
			5) Nov	
			6) Unknown	
			7) Samgar	
			Hayoti Nav	8) Qurghoncha
9) Khitoy				
10) Gulafshon				
11) Navruz				
12) Kavsar				
Gulyakandoz	13) Samiev			
	14) Bahtovar			
	15) Gulyakandoz			
	16) Zarkhez			
	17) Nurafzo			
	18) Mehrgon			
Total	2	3	7	32

3.3 Secondary data review

Several key secondary sources will be used to understand the current water sources, hydrology, weather conditions, well permit documents, well capacities, and infrastructure conditions and needs in the selected locations. Details on primary sources (but are not limited to) described in the following Table 3:

Table 3 Information on secondary sources

Secondary source	Purpose of source
Olga Yu Kalashnikova et al., "Kyrgyz Transboundary Rivers' Runoff Assessment (Syr-Darya and Amu-Darya River Basins) in Climate Change Scenarios," Central Asian Journal of Water Research 9, no. 1 (2023).	- Contextual understanding
Mirzakhayot Ibrakhimov et al., "Understanding Surface Water-Groundwater Interactions for Managing Large Irrigation Schemes in the Multi-Country Fergana Valley, Central Asia," Agricultural Water Management 201 (2018): 99–106.	- Verify/triangulate primary data and findings

Radchenko et. Al., Climate Change Impacts on Runoff in the Fergana Valley (Central Asia), Water Resources, 2017.	- Contextual understanding
A.D. Nikanorova et al., "Estimation of Water Deficit under Climate Change and Irrigation Conditions in the Fergana Valley of Central Asia," Arid Ecosystems 6, no. 4. 2016 (13) Estimation of Water Deficit under Climate Change and Irrigation Conditions in the Fergana Valley of Central Asia Elena Milanova - Academia.edu	- Contextual understanding
IMPACT, "Water Area Based Assessments in Northeast and Northwest Syria," accessed January 11, 2024.	- Inform appropriateness of methodology
United Nations, In-depth Review of Disaster Risk Reduction in the Kyrgyz Republic, 2010.	- Contextual understanding - Key definitions
CADRI Partnership, Capacity for Disaster Reduction Initiative: Scoping Mission Report: Kyrgyz Republic, 1-4 June 2021.	- Contextual understanding
UNECE & INBO, Water and Climate Change Adaptation in Transboundary Basins: Lessons Learned and Good Practices, 2015.	- Contextual understanding
UNOCHA, Emergency Response Plan: Kyrgyzstan, Executive Summary, 2023.	- Contextual understanding - Key definitions
Blue Peace Central Asia, Climate-Cryosphere-Water Nexus: Central Asia Outlook, 2018. https://zoinet.org/wp-content/uploads/2018/08/FINAL-Glaciers-Leaflet.pdf	- Contextual understanding
IFAD, Introduction to Community Pasture Management Plans in Kyrgyzstan: Synthesis of the Country's rural pastoral development and lessons learned through IFAD-funded projects, October 2022.	- Contextual understanding - Key definitions
Centre for Development and Environment, IWSM Policy Brief: Integrated watershed management in Tajikistan, March 2014. Policy Brief Tajikistan Integrated Watershed Management 2014 CDE.pdf (shareweb.ch)	- Contextual understanding
Iskandar Abdullaev and Shavkat Rakhmatullaev, "River Basin Management in Central Asia: Evidence from Isfara Basin, Fergana Valley," Environmental Earth Sciences 75, no. 8 (April 2016): 677. River basin management in Central Asia: evidence from Isfara Basin, Fergana Valley Environmental Earth Sciences (springer.com)	- Contextual understanding - Key definitions
Global Shelter Cluster, Settlements Approach Guidance Note: Where Boundaries and Action Merge, December 2020. Settlements approach guidance note: where boundaries and action merge Humanitarian Library	- Contextual understanding
Acted, HELVETAS & GIZ, Transition of Tajikistan Water Sector from Irrigation Water Management to Integrated Water Resources Management, 22 November 2018.	- Contextual understanding
Acted, HELVETAS& GIZ, Integrated Watershed Management in Tajikistan context, 2018.	- Contextual understanding
Acted, HELVETAS, GIZ, National Water Resources Management Project in Tajikistan, Disaster Risk and Watershed Assessment of Aksu Watershed: Final Report, January 2016.	- Contextual understanding
Acted, HELVETAS, GIZ, Isfana Watershed Management Plan: Tajikistan, 2021-2025., 2018.	- Contextual understanding

Acted, HELVETAS, GIZ, Additional Assessments of Risks of Natural disaster in Ak-Suu and Khoja-Bakyrangan River Watersheds, 2014.	- Contextual understanding
Online early warning system for weather and hydrometeorological hazards in pasture areas in the Kyrgyz Republic (https://sropasture.kg/).	- Contextual understanding
National Database of Wild Animals of Kyrgyzstan (Information on protected areas, hunting concessions, wildlife) (http://wildlife.caiag.kg).	- Contextual understanding
Interactive map of the Forests of the Kyrgyz Republic (https://forest.gov.kg/ru/forestries?id=8).	- Contextual understanding - Data on forestry Units and area maps
Geoportal for Water Resource Management of the Kyrgyz Republic GIS Portal. GIS Portal (water.gov.kg)	- Contextual understanding - Key definitions - Data on some water infrastructure and area maps

Table 4 below shows the proposed sourced for datasets to use for the data analysis for GIS analysis.

Table 4: Proposed data sources for differing hazards and climate change indicators to be assessed

Hazard/Indicator	Data sources
Earthquake	National Almanac of Seismic Belts, manually digitized from print documents, from Academy of Sciences: Epicenter data is from United States Geological Survey (USGS)
Pasture Degradation	Data Sources based on IFAD Analysis of Pasture Degradation in Kyrgyzstan (2022), which are all measures taken from LANDSAT satellite imagery: Normalized Difference Vegetation Index; Enhanced Vegetation Index; Soil Adjusted Vegetation Index; Modified Soil Adjusted Vegetation Index; Normalized Difference Moisture Index; Normalized Burn Ratio; Vegetation Condition Index; Vegetation Health Index.
Flooding	Digital Elevation Model (DEM) from ALOS PALSAR (ALOS PALSAR); Road Network, Rivers, and Drainage Density data from Open Street Map (OSM); Normalized Difference Vegetation Index (NDVI) from Sentinel-2 data; Soil map of the KB watershed prepared with accordance SDC project in 2013. (as it was in PDF format in was digitized and converted into GIS format); Land Use Land Cover data from ESA WorldCover, derived from Sentinel-2
Drought	VCI Data from MODIS EVI (2001 - 2022); SMI Data from the European Commission; SPI Data from Copernicus European Drought Observatory
Landslides	Normalized Difference Vegetation Index (NDVI) from Sentinel-2 Satellite; DEM slope data from ALOS PALSAR; Distance from Roads - Open Street Map (OSM); Distance from Streams - DEM & OSM; Precipitation: NOAA
Water Discharge	All Indicators calculated through Soil and Water Assessment Test (SWAT) Modeling, developed by the University of Texas A&M, using the following data: Temperature & Precipitation data (1981 - 2021); from National Oceanic
Water Yields	
Precipitation	

Soil Erosion	and Atmospheric Administration; Water Discharge data (2013-2022): RuVH & Open Sources; World Meteorological Organization; Digital Elevation Model from ALOS PALSAR; Soil Map - National Sources from FAO Land Cover Classification System (LCCS)
Sedimentation	
Snow Melt	Landsat Collection 2 Satellite data using Normalized Difference Snow Index (NDSI), 1991 - 2023
Glaciers	Glacier Volume Change is from Famine Early Warning Systems Network (FEWSNET) Land Data Assimilation System (FLDAS) data provided by by NASA; Glacier Area Change is from Global Land Ice Measurements from Space (GLIMS) Datasets
Climate Change	Historical bio-climatic variables and model for the future 2041-2060 from WorldClim.
General datasets	Administration boundaries from Ministry of Emergency Services (MoES). Rivers, Roads, Buildings from OSM.

Additionally, IMPACT will contact government bodies for the secondary data collection for the specific categories outlined below (details in the 5Table).

Table 5 Secondary data to be collected and name of the data providing organization

Research Question	Sub-Research Question	Data to be collected	Providing organisation
RQ 1 What are the socio-economic profiles of communities and their primary water and land use interests, including agriculture, livestock, tourism, and industry?	1.1. What communities (their socio-economic conditions) are situated within the watershed?	Population data for each village, including gender breakdown, number of people employed by economic activity	Human development departments, statistics department of District and Ayil Aimak/Jamoat administrations
		Social facilities in settlements	Social development department at District level
	1.2. What are their primary water and land use interests (agriculture with irrigated and rainfed land, livestock, tourism, industrial etc.)?	Data regarding the size of agricultural and non-agricultural lands, as well as information concerning the types of crops and their respective territories, production of the main types of agricultural products	Land resources department of the district.
	1.3. How much land, livestock, and industry are present in the watershed, and how is their ownership distributed?	Number of livestock farms, number of livestock	Department of Agriculture at District
		Mining activities, water wells	Land resources department of the district and Ayil Aimak/Jamoat administrations and Ministry of Natural Resources, Environment, and Technical

Research Question	Sub-Research Question	Data to be collected	Providing organisation
			Supervision of the Kyrgyz Republic
		Information about forest covered land and forestry unit in the Leylek district	Forestry Service of Ministry of Emergency Situations of the Kyrgyz Republic respectively and its local branches.
RQ 5. What are the community perspectives on the impacts of climate and human activities on the quality and accessibility of water and land resources, and how have local communities and stakeholders adapted to these changes?	5.1. What are the community perspectives on how climate and weather patterns, and other natural phenomena impact the quality and accessibility of water and land resources?	Meteorological data for the Isfana watershed	The Agency of Hydrometeorology of Kyrgyzstan and Tajikistan.

3.4 Primary Data Collection

During this phase, IMPACT will carry out profiling assessment of Isfana Watershed irrigation water and land (agricultural, pastoral and forest under the Forestry administration unit) resources and their uses, management and policy implementation (details are in the Table 5Table 5):

Table 5 Data to be Collected and Rationale

Research Question	Sub-Research Question	Data to be collected	Why this information is needed
RQ 1 What are the socio-economic profiles of communities and their primary water and land	1.1. What communities (their socio-economic conditions) are situated within the watershed?	Labour market, employment, and social protection services, livelihoods, access to services, and perceptions of natural resources management.	Data offers grasp of vulnerable populations' welfare and resilience, crucial for disaster risk reduction and climate resilience efforts.

Research Question	Sub-Research Question	Data to be collected	Why this information is needed
use interests, including agriculture, livestock, tourism, and industry?	1.2. What are their primary water and land use interests (agriculture with irrigated and rainfed land, livestock, tourism, industrial etc.)?	Communities' water and land usage practices, encompassing irrigation, agriculture, livestock rearing, industry and tourism etc. in the watershed.	Gain a comprehensive understanding of resource utilization.
	1.3. How much land, livestock, and industry are present in the watershed, and how is their ownership distributed?	Land ownership data could include: public, private land and District and Self- government ownership data.	Understand the composition of the watershed and how ownership is distributed across different land uses, livestock populations, and industries.
RQ 2. What are the existing water resources, infrastructure, and irrigation delivery systems, including their ownership status?	2.1. Where are present irrigation water resources, such as water pumping stations, networks, water trucking, public and private boreholes/wells, public handpumps/taps, irrigation canals, reservoirs/dams, etc., located?	Specific irrigation resources, type of resource, for canals and water distribution network, identify the resource is public or private (government owned, community managed, or individual ownership etc.), data on the capacity of pumping stations, wells.	By analysing this data we can create comprehensive picture of where different irrigation water resources are located and their characteristics needed for managing water resources efficiently, planning agricultural development.
	2.2. To which communities do these water systems, infrastructures, and delivery mechanisms provide service, and is water accessible to all populations residing in the area?	Maps the area (villages) served by each water system (distribution network) physical reach of the existing pipes and canals.	By collecting this data we can gain clear understanding of which communities benefit from the water systems and identify any disparities in accessibility across different populations.
RQ 3. What is the overall condition and coverage of the water infrastructure, what factors affect its functionality, and what	3.1. What is the current state of water infrastructure functionality (fully functional, partially functional, or non-functional) in different parts of the watershed.	Assessing the infrastructure technical conditions and functionality within the watershed.	This information is for prioritizing maintenance and investment needs.

Research Question	Sub-Research Question	Data to be collected	Why this information is needed
technical support is needed to improve it?	3.2. How well is the current water delivery system extend its network coverage to reach communities within the watershed?	Perceptions of water users on the efficiency of irrigation canals	Assess how efficient the current water delivery system.
	3.3. What key factors contribute to the functionality or dysfunctionality of water delivery infrastructure, and what technical capacities or tools/equipment are required to support enhanced water infrastructure and service functionality?	Infrastructure maintenance activities; data on the frequency and severity of natural disasters (e.g., floods, earthquakes) that can damage infrastructure; water resource availability.	Understanding the types of maintenance required, both preventive and corrective.
RQ 4. What are the key stakeholders and agencies responsible for land resources management at both central and local levels, what are their respective roles and responsibilities, and how do they interact in decision-making processes?	4.1. Who are the stakeholders/ agencies in land resources management (at central and local levels) and their responsibilities?	Land resources management, institutional frameworks and their responsibilities.	Understand coordinating the responsibilities of various stakeholders involved in land governance and stewardship.
	4.2. What are the stakeholders/ agencies and their functions/ responsibilities in management and maintenance of water infrastructures and ensuring availability of services?	Data on policymakers, planners, and water managers, stakeholders involved in water infrastructure management, their functions, responsibilities.	To gain a better understanding on the stakeholders in the irrigation water management.
	4.3. How do different stakeholders/ agencies on management sectors interact with each other in decision making, carrying out their responsibilities, address the gaps in coordination of water and land resources management?	Communication mechanisms in decision-making processes within and between different management sectors, with a focus on key sectors such as irrigation, agriculture, pasture, forestry unit, industry.	To understand how different stakeholders and agencies in management sectors interact with each other and coordinate the irrigation water and agricultural and pasture land resources and forest ecosystem management.

Research Question	Sub-Research Question	Data to be collected	Why this information is needed
RQ 5. What are the community perspectives on the impacts of climate and human activities on the quality and accessibility of water and land resources, and how have local communities and stakeholders adapted to these changes?	5.1. What are the community perspectives on how climate and weather patterns and other natural phenomena impact the quality and accessibility of water and land resources?	Local observations on changes in water quality and land productivity.	Understand the community's perspectives on the complex interactions between climate, and other natural phenomena, and their impacts on water and land resources.
	5.2. How do local communities perceive the impact of human practices, including agricultural, pastoral activities (fertilizers, pesticides, and the water infrastructure and dams, grazing patterns, livestock infrastructure), industrial operations, extraction of surface and groundwater on the quality of land and water resources within the watershed?	Perceived changes in water quality (taste, color, clarity) and land productivity. Areas experiencing water pollution or land degradation. Locations of agricultural fields, livestock grazing areas, and water infrastructure.	Understand the picture of how the local community perceives the impact of human practices on their water and land resources.
	5.3. How have communities and local stakeholders adapted to these changes?	Innovative water conservation techniques. Sustainable land management practices. Community-based resource monitoring systems. Collaborative efforts between stakeholders.	Insights into the resilience of local communities and encourage experience exchange and collaboration between communities facing similar challenges.
	5.4. Are there any differences in women's access to natural (irrigation water and land) resources and how climate change may affect men and women differently in	Specific organizations and groups responsible for women's committees, key actors involved in supporting women in the watershed interact with governmental departments, traditional	Understand the roles of specific organizations and groups, key actors supporting women in the watershed, traditional women's roles in farming and animal husbandry, and their involvement in

Research Question	Sub-Research Question	Data to be collected	Why this information is needed
	their access to those resources?	role of women plan in farming, animal husbandry, and the use of water for livelihoods purposes, women's involvement in natural resource management.	natural resource management.
RQ 6. What recommendations do regional authorities propose for improving water and land management, and what support can development actors provide to address challenges?	6.1. What are the key recommendations from authorities within the region about how to better manage water and land watersheds?	Data on major challenges in water and land resource management for agriculture (drought, salinization, soil erosion etc.) will be collected during the interview. In addition, the National agricultural development plans, water resource management strategies, and climate change adaptation policies will be revised.	For developing policy recommendations and community-led response plans addressing identified gaps in water and land resource management for agricultural purposes.
	6.2. What do key stakeholders and authorities see as the main challenges to addressing blockages to more effective resources management?	Stakeholder perspectives on resource management challenges in similar contexts.	Understanding of the key roadblocks to more effective resource management.
	6.3. What type of support can be provided by development actors for sustainable water and land management in the watershed to local government, civil society, and community actors?	Specific needs of each stakeholder group, development actors.	Contribute to achieving sustainable water and land management within a watershed.

The Data Collection will involve 3 different types of data collection techniques FGD, FGD/MFGD and KII. Research tool with techniques including information about target participants describing the specific target area; desired specific number of participants required from each target group; identifying relevant government agencies or organizations and resources users with required skills and expertise from participants; target audience levels defining the different administrative levels (e.g., District, LSG, City Hall, Village) and number of the sessions per area to be held in each targeted area described in Table 1. Type of data collection session featuring key informants and including components like service mapping, interest in resource use, and infrastructure quality with related research questions and sub-questions are detailed in the Table 6.

FGD technique utilization:

IMPACT teams will utilize a semi-structured interview guide with the FGD will be used to explore the income source opportunities, and access to social protection services in the Watershed, including those for people with disabilities, elderly, and retired individuals and issues related to women's advocacy and involvement in natural resource management at the District and Ayil Aimak levels.

MFGD technique utilization:

To comprehend natural resources management, covering water, agriculture, pasture, and forests, alongside emergency response in changing climatic conditions, we'll utilize a mixed-tool approach FGD/MFGD with mapping exercises with the same participants in a single session (based on the initial STREAM mapping of the watersheds conducted during Phase 1 of the STREAM project inception phase in 2023) at District, City Hall or LSG levels. The reference maps would have some marked identifying points (known canal networks, water infrastructure, settlements, irrigation lands, emergency response facilities etc.) visible through satellite imagery to help the participants situate themselves, and will be produced by IMPACT GIS team at different scales and levels dependent on the target audience in the discussion. The participants under each type of session will be able to locate and mark different types of water infrastructures and their service areas on these reference maps. At the end of each session for each activity, the enumerators will de-brief with IMPACT field managers, document the mapping process, and then share the summary documents with the Senior Assessment Officer (SAO) in the form of photographs and scanned copies of final maps which will then be digitalized by the IMPACT GIS officer.

KII technique utilization:

At the village level IMPACT will use quantitative structured questioning route with KII technique. Enumerators go to each of the 32 villages and towns within the watershed, and conduct quantitative interviews with village heads, authorities and village activists. These interviews utilize a structured questionnaire with detailed questions and responses around the demographics, vulnerabilities, and services present within each community. This will provide the key vulnerability data necessary to conduct risk analysis of the watershed's populations and understand how resources managed at district and LSG level are distributed and managed at village level, which is often lacking in official datasets. Enumerators will also share/ upload online on the KoBo servers the forms filled during the KII session, to be accessed by the AO. All key measures specified in the IMPACT SOPs and Data Protection Policy will be taken where relevant.

Training on the data collection tools

Assessment staff will provide a comprehensive training on the data collection tools before the commencement of data collection activities. This will be conducted on site, in Leylek District for Kyrgyzstan, and in Khujand City for Tajikistan. Extensive guidance and training will be provided to the enumerators on how to conduct the semi-structured FGD/MFGDs using the questioning route for each type of activity, and the structured KIIs using dedicated KoBo tools, again, for each type of activity noted under the methodology section. All KoBo tools will be checked before official data collection begins to ensure that they are working correctly, that the indicators capture the desired information, and that no final adjustments are necessary. Depending on training schedules and time constraints, the IMPACT team will also try to dedicate an additional training day with the field teams for data collection simulation which would have the field teams involved in data collection enact the scenarios that could take place in the FGD/MFGDs and the KIIs, especially focusing on how to manage and facilitate the discussions if certain disagreements or differences in opinions/ perspectives of sessions participants occur.

I. KI/participant selection process:

The key informants/participants will be selected for specific interviews based on their local responsibilities (roles) and areas of expertise.

I.1. Participant selection for the FGD:

To gain insights into specific topics on income sources and women's advocacy in natural resource management we will invite participants for FGDs based on their local roles and areas of expertise.

I.1.1. Labor Market, Employment, and Social Protection to understand these areas, particularly services for disabled, elderly, and retired individuals, we will invite staff from the District social affairs department, Local branch of the statistical committee.

I.1.2. Women's Advocacy in Natural Resource Management

For this topic, we will seek participants knowledgeable about women's involvement and challenges regarding land access, water management, participation in community leadership, advocacy with government stakeholders.

We will target participants at both the District and Ayil Aimak levels.

I.2. Participant selection for the FGD/MFGD:

I.2.1. Understanding Water Resources and Infrastructure Management:

We will interview staff (water engineers and technicians) from the District Water Department and City Hall water management department also specialists from River Basin Councils and Water User Associations at the Ayil Aimak/Jamoat levels.

I.2.2. Understanding Agricultural Land Management:

Interview will be conducted with agricultural land specialists at the Ayil Aimak/Jamoat levels and with farmers themselves.

I.2.3. Understanding Pasture Land Management:

To understand pastureland management practices, we will interview representatives from the pasture management committee, livestock owners, breeders, and herders.

I.2.4. Understanding Forest Management:

Interviews regarding forest management knowledge will be conducted with relevant individuals from the Leylek Forestry Unit, including the Deputy Director and Forest Engineers.

I.2.5. Understanding Emergency Infrastructure and Response:

To understand emergency infrastructure and response mechanisms, we will interview disaster risk managers and emergency response staff from both the District and City Hall levels. They will be

chosen for their knowledge of disaster management initiatives designed to lessen the impact of natural hazards.

Alongside these, local organizations engaged in water, land, agriculture, industry, mining, tourism, and hydropower management sectors will also be sought out as sectoral experts to obtain their additional feedback.

1.3. KI selection for the KII:

To understand various aspects of village life, we will conduct interviews with key informants selected based on their local knowledge and expertise. These individuals can provide insights into a range of topics, including demographics, infrastructure, agriculture, employment, and vulnerable populations.

Village leaders, activists (people actively involved in community issues), older people, women's council representatives, youth council representatives, sector-specific specialists (may not be available in every village), farming and water specialist (combined role if available). Representatives from Jamoats (administrative divisions) may also be included for broader context. The availability of sector-specific specialists (farming/water, land, agronomist, pasture, water) may vary by village.

By interviewing KIs from these categories, we can gain a comprehensive understanding of the village's strengths, challenges, and get acquainted on their perception on climate change and human induced issues in natural resources management.

Table 6 Overview of Research Questions and Respective Data Collection Methodologies

Research Question	Sub-Research Question	Type of KI	Type of data collection session/ component
RQ 1. What are the socio-economic profiles of communities and their primary water and land use interests, including agriculture, livestock, tourism, and industry?	1.1. What communities (their socio-economic conditions) are situated within the watershed?	Social affair expert	FGD (Service mapping)
		Sector experts	
	1.2. What are their primary water and land use interests (agriculture with irrigated and rainfed land, livestock, tourism, industrial etc.)?	Water User Associations	MFGD, (Service mapping); FGD (Resources use interest)
		Water engineers and technicians	
		Water management staff	
		Specialists from river basin councils	
		Water stations specialists	
		Land specialist	
		Pasture specialist	
	1.3. How much land, livestock, and industry are present in the watershed, and how is their ownership distributed?	Head of village	KII (Land cover type and ownership)
		Farming specialist	
		Land specialist	
		Village activists	
RQ 2. What are the existing water	2.1. Where are present irrigation water resources, such as water	Water User Associations	MFGD (Service mapping)

Research Question	Sub-Research Question	Type of KI	Type of data collection session/ component
resources, infrastructure, and irrigation delivery systems, including their ownership status?	pumping stations, networks, water trucking, public and private boreholes/wells, public handpumps/taps, irrigation canals, reservoirs/dams, etc., located?	Water engineers and technicians	
		Water management staff	
		Specialists from river basin councils	
		Water stations specialists	
	2.2. To which communities do these water systems, infrastructures, and delivery mechanisms provide service, and is water accessible to all populations residing in the area?	Water User Associations	MFGD (Service mapping); FGD (Discussion on water accessibility)
		Water engineers and technicians	
		Water management staff	
		Specialists from river basin councils	
		Water stations specialists	
RQ 3. What is the overall condition and coverage of the water infrastructure, what factors affect its functionality, and what technical support is needed to improve it?	3.1. What is the current state of water infrastructure functionality (fully functional, partially functional, or non-functional) in different parts of the watershed.	Water User Associations	MFGD (Service mapping)
		Water engineers and technicians	
		Water management staff	
		Specialists from river basin councils	
		Water stations specialists	
	3.2. How well is the current water delivery system extend its network coverage to reach communities within the watershed?	Water User Associations	MFGD (Service mapping); FGD (Infrastructure quality)
		Water engineers and technicians	
		Water management staff	
		Specialists from river basin councils	
		Water stations specialists	
	3.3. What key factors contribute to the functionality or dysfunctionality of water delivery infrastructure, and what technical capacities or tools/equipment are required to support enhanced	Water User Associations	FGD (Needs assessment)
		Water engineers and technicians	
		Water management staff	

Research Question	Sub-Research Question	Type of KI	Type of data collection session/ component
	water infrastructure and service functionality?	Specialists from river basin councils Water stations specialists	
RQ 4. What are the key stakeholders and agencies responsible for land resources management at both central and local levels, what are their respective roles and responsibilities, and how do they interact in decision-making processes?	4.1. Who are the stakeholders/ agencies in land resources management (at central and local levels) and their responsibilities?	Water management staff	MFGD (Stakeholder mapping)
		Water specialists	
		Pasture land management	
		Land specialists	
		Forestry unit	
		Farmers	
		Livestock owners	
	4.2. What are the stakeholders/ agencies and their functions/ responsibilities in management and maintenance of water infrastructures and ensuring availability of services?	Water User Associations	MFGD (Responsibilities mapping)
		Water engineers and technicians	
		Water management staff	
		Specialists from river basin councils	
		Water stations specialists	
	4.3. How do different stakeholders/ agencies on management sectors interact with each other in decision making, carrying out their responsibilities, address the gaps in coordination of water and land resources management?	Water management staff	FGD (Understanding the coordination mechanisms for decision making)
		Water specialists	
		Pasture land management	
		Land specialists	
		Forestry unit	
		Livestock owners	
		Farmers	
	4.4. Are there any differences in women's access to natural (irrigation water and land) resources and how climate change may affect men and women differently in their access to those resources?	Women's Committee Members	FGD (Exploring the differences in access to natural resources and the impact of climate change on men and women)
		Community leadership participation	
RQ 5. What are the community perspectives on	5.1. What are the community perspectives on how climate and weather patterns, geological	Water management staff	FGD (Natural impacts discussion)
		Water specialists	

Research Question	Sub-Research Question	Type of KI	Type of data collection session/ component
the impacts of climate and human activities on the quality and accessibility of water and land resources, and how have local communities and stakeholders adapted to these changes?	formations (minerals or contaminants), and other natural phenomena impact the quality and accessibility of water and land resources?	Pasture land management	
		Land specialists	
		Farmers	
	5.2. How do local communities perceive the impact of human practices, including agricultural, pastoral activities (fertilizers, pesticides, prevailing crop / horticulture types and the water infrastructure and dams, grazing patterns, livestock infrastructure), industrial operations, overextraction of surface and groundwater on the condition of land and water resources within the watershed?	Water management staff	FGD (Human practices' impacts examining)
		Water specialists	
		Pasture land management	
		Land specialists	
		Farmers	
	5.3. How have communities and local stakeholders adapted to these changes?	Water management staff	FGD (Adaptation measures)
		Water specialists	
		Pasture land management	
		Land specialists	
		Farmers	
RQ 6. What recommendations do regional authorities propose for improving water and land management, and what support can development actors provide to address challenges?	6.1. What are the key recommendations from authorities within the region about how to better manage water and land watersheds?	Water management staff	FGD (Recommendations)
		Water specialists	
		Pasture land management	
		Land specialists	
		Forestry unit	
	6.2. What do key stakeholders and authorities see as the main challenges to addressing blockages to more effective resources management?	Water management staff	FGD (Discussion the challenges)
		Water specialists	
		Pasture land management	
		Land specialists	
		Farmers	
		Forestry unit	
	6.3. What type of support can be provided by development actors for sustainable water and land	Water management staff	FGD (Needs assessment)
		Water specialists	

Research Question	Sub-Research Question	Type of KI	Type of data collection session/ component
	management in the watershed to local government, civil society, and community actors?	Pasture land management	
		Land specialists	
		Farmers	
		Herders	

Kis/participants in each area will be selected on their functions, knowledge, and will be based on the KI selection note. The results from all data collection activities will only serve as indicators and will be aggregated at the area level for final analysis. This aggregation aims to represent the prevailing conditions of water and land use practices and management in each specific location. For a detailed description of the purpose of each activity, please refer to Annex 2 (KI/Participant Selection Note).

3.5 Data Processing & Analysis

- 4 To gather focused information seven FGDs sessions; twenty mixed FGDs/MFGDs sessions and thirty-two KII sessions will be conducted (Country-level Data Collection Plan presented in the Table 7 and **Error! Reference source not found.**). Data will be collected tentatively within 12 days in Kyrgyzstan and 11 days in Tajikistan including travels to the project target areas and training of enumerates (details shown in the Table 8 Isfana Watershed Assessment Timeframe). The Kyrgyzstan team plans to employ one enumerator, while three staff members (two from IMPACT and one from Acted) will participate in data collection at the site. Similarly, the Tajikistan team intends to hire two enumerators, with three staff members engaging in the data collection process at the site.

Table 7 Data Collection Plan

Tool	Number of sessions	Total participants number	Enumeration number	Staff number*
Kyrgyzstan				
FGD	3	4-8	1	1
FGD/MFGD	8	13-24	1	1
KII	14	1-4		2
Tajikistan				
FGD	4	4-8	1	1
FGD/MFGD	12	10-19	1	1
KII	18	1-4	1	1

*Acted/Impact Staff

The data collection team will go through extensive training on each tool by the Senior Assessment Officer (SAO) and the Assessment Specialist (AS) and will engage in practice and simulation sessions during trainings in order to become well-accustomed to the questioning route, mapping procedures, and their respective roles and responsibilities.

Also, during the training, all questionnaires will be tested on participants for the data collection process to ensure their effectiveness, identify any potential flaws or ambiguities, and refine them accordingly for optimal data gathering.

Table 8 Isfana Watershed Assessment Timeframe

Kyrgyzstan												
Tasks	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12
Travel to Isfana												
Enumerators training												
Quant data collection												
Qual data collection												
Travel to Bishkek												
Tajikistan												
Tasks	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12
Travel to Khujand												
Enumerators training												
Quant data collection												
Qual data collection												
Travel to Dushanbe												

3.1. Semi-structured tools:

All qualitative data collection and analysis activities for the assessment will be conducted in accordance with IMPACT's Minimum Standards Checklist for Semi-Structured (Qualitative) Data Processing and Analysis.

The data collection team will also be provided with reference/ base map for outlining the boundaries of the area to locate the water sources, infrastructures indicating their current conditions.

The same map will be used for outlining external boundaries of the land agricultural and pastoral purposes with identification of boundaries of irrigated and rainfed lands.

Pasture land management interview cover the pasture land use practices identifying on map the livestock shifting routs and seasons.

For the forest and non forest land under the Leylek Forestry unit will be used another map. MFDG with forestry unit staff will furnish maps designating areas allocated for agricultural or pasture purposes. They will delineate the actual usage areas on the map, specifying the time of year they are utilized. This includes both forested and non-forested zones, encompassing agricultural lands, pasture areas, and rocky terrain. Moreover, they will document the utilization patterns within the forested areas, noting any unique or protected ecosystems.

The qualitative discussions will be transcribed and at the end of each day the staff will de-brief with the relevant field staff to ensure that all necessary information was obtained, using a de-brief form in MS Word or Excel designed to reflect the questionnaire to capture key features of the discussion. With

the assistance of the field staff, the team will then translate notes from Kyrgyz into English and share a digitalized anonymised copy with the Senior Assessment Officer (SAO), Assessment Officer (AO), Country Coordinator (CC) using a Word or Excel document.

For the MFGDs, the data collection team will also provide GIS Officers with photographs of the marked base maps which will be digitalised using ArcGIS in order to produce materials in accordance with the requirement indicated in the relevant questionnaires. These maps will be included in the final area profiles/ outputs as part of the final findings.

The original notes, raw data documents, and maps will be securely managed and stored and will be discarded once they have been transformed into digital copies to mitigate any potential misplacement or mishandling. All key measures specified in the IMPACT SOPs and IMPACT Data Protection Policy will be taken as needed. The qualitative data gathered will be analysed using IMPACT's Data Saturation and Analysis Grid (DSAG). Subsequently, the analysis will undergo review by IMPACT HQ's Research Design and Data Unit (RDDU) for data processing and analysis validation. Additionally, MFGDs will contribute written responses, with mapped data will be digitized, and stakeholder data will be presented as a labelled flowchart.

3.2. Structured tools:

KII with head of village and village activists.

All data will be collected by the same set of staff conducting the MFGDs through Open Data Kit (ODK) and will be uploaded to the IMPACT Kobo server. During the training, tools will be tested before official data collection begins in order to ensure that KoBo forms are working correctly, that the indicators are able to capture the desired information, and that no final adjustments are necessary.

The staff will go through extensive training with the IMPACT Country Coordinator on how to work with the KIs, facilitate a discussion on each question where there are differences in answers/ responses by KIs and to ultimately select in KoBo the common answer choices agreed by all, resulting in a pre-triangulation of data. As one staff is facilitating the discussion, the other staff would be taking notes on the nuanced information provided by the KIs. To ensure full transparency, and note all the responses and perspectives of the KIs there would be an open space after each structured question which would capture the process of how the responses were noted by the KIs where a majority of participants could not agree to the responses or had differences in opinions, and even if one KI had a dissenting opinion/ response that other KIs did not agree to/ acknowledge. The staff will be trained as such that if an agreement cannot be reached by all participants regarding selection of any pre-defined answers choices, the option on which the majority of participants agree will be selected, but in the following open space the dissenting/ alternate opinion/ answer would also be noted down.²⁶

The submitted data will be checked regularly for inconsistencies by the IMPACT CC and SAO using macro-enabled excel to ensure data quality and to send follow-ups to enumerators where needed. All data collection and cleaning activities conducted will be in line with IMPACT's minimum standards requirements and checklist. Once all data is cleaned, the raw and cleaned dataset and the change log will be stored according to the Data Management Plan.

As only 1 KII per activity/ group of KI will be conducted in each area, the individual KII datasets will provide a sufficient/ appropriate means for examining findings for that activity in each area. Data will also not be aggregated for analysis across different areas. However, themes and responses across all KIIs grouped by each location will be reviewed, analysed, and synthesized in "Summary documents"

which will serve as a basis for the findings narrative which will be included in the final outputs. These “Summary documents” will outline relevant indicators and tool questions linked to the core research questions outlined in this ToR. All analysis will be reviewed by the IMPACT HQ Research Design and Data (RDD) Unit before the output production.

Additionally, the SAO, in collaboration with the IMPACT GIS Officer (GISO), will include relevant analysis conducted by the GISO through remote sensing on cropland extent, vegetation health-based drought assessed through Normalised Difference Vegetation Index – NDVI, rainfall based drought indicators, ground water trends over time, etc. in the final area profiles/ outputs, to present a full and comprehensive picture of the situation of water systems in each area.

3.3. Geospatial Analysis of Watersheds:

Following the collection of the Primary data, IMPACT will conduct a detailed geospatial analysis of population risk to natural hazards and human-induced activities within the Isfana Watershed. This will include analysis of the 1) hydrological watershed modelling, 2) climate change projections, and 3) hazard risk modelling.

Hydrological modelling will rely on the Soil and Water Test (SWAT) methodology,²⁷ which simulates a river basin and can be used to assess changes in water flow, precipitation, soil erosion, and sedimentation both as a baseline and also climate change projections. This can also incorporate a variety of scenarios, including

This will be supplemented by climate change analysis using the WorldClim database,²⁸ which uses CMIP6 climate change scenario modelling to look at different possible scenarios for climate change on the larger Fergana Valley area.

Finally, Satellite Imagery analysis of key hazards in the Fergana Valley will be conducted. This will use IMPACT’s Area-Based Risk Assessments (ABRA) model, developed in Ukraine²⁹ and Armenia. ABRA’s utilize a methodology adapted from the World Risk Index³⁰ multi-hazard risk equation. This falls within the Global Facility for Disaster Risk Reduction and Recovery (GFDRR) framework, which aims to help countries better understand and reduce their vulnerability to natural hazards and climate change.³¹

Figure 1 IMPACT Multi-Hazard Risk Model

$$Risk = \sqrt{Exposure \times Vulnerability}$$

The model, shown in Figure 1, above, outlines the overall stressors on a given watershed by calculating the exposure to particular stressors that a population in a given area shares against that population’s overall vulnerability, if relevant, to those hazards. Vulnerability is further broken down into a population’s susceptibility, coping capacities, and adaptive capacities. The specific hazards relevant to

²⁷ <https://swat.tamu.edu/>

²⁸ <https://www.worldclim.org/>

²⁹ IMPACT Ukraine, Area Based Risk Assessment: Bakhmut Raion, Donetsk Oblast, Eastern Ukraine, August 2020.

³⁰ [Bundnis Entwicklung Hälfete World Risk Report, 2022..](#)

³¹ [GFDRR, Guide to Developing Disaster Recovery Frameworks: Sendai Conference Version, March 2015.](#)

the Isfana Watershed will be identified in the SDR and will be aligned with UNDRR's Hazard Classification scheme.³²

Risk will be assessed at village level to provide a granular picture of population exposure and vulnerability to different risks. In addition to each risk, a composite indicator will be developed based on the overall risk that populations face to all hazards together, to provide a quick overall understanding of risk to the population for advocacy purposes.

The specific types of relevant to a particular context vary, making each risk model different depending upon the needs of the assessment. The specific hazards relevant to the Fergana Valley will be identified in the SDR and will be aligned with UNDRR's Hazard Classification scheme.³³ The risks identified thus far are outlined in Annex 3 of this document.:

Using a simple analytic framework, each inceptor will be given a score by the severity for each village in the watershed. This analysis will be used to provide an overview of key risks within the watershed. specifically:

1. Pasture Degradation
2. Drought
3. Flooding
4. Earthquakes
5. Landslides

All satellite imagery analysis will be combined with data collected on the ground to account for population exposure, vulnerability and coping capacity of the local population in each village of the watershed.

4.1 Limitations

There are some potential limitations for the assessment to consider:

Methodology wise, all interviews will be done based on purposive sampling, which means that results will be indicative, rather than representative of the population. Key Informants will be selected based on their knowledge of key community-level information, to mitigate the lack of repetitive data and increase the accuracy of the results.

In addition, during the data collection phase, the data collection team may encounter challenges, including engaging the local target group at the village level for interviews might prove difficult due to their involvement in seasonal activities like planting. This could affect the time management, resource availability, and other practical considerations.

Finally, GIS hydrological modelling primarily relies on open-source data. However, as the government hydromet agencies can sometimes charge exorbitant sums of money for such data, IMPACT may need to rely on less accurate open sources of data, only procuring the specific data that they cannot find through open sources, and potentially lowering the accuracy of the hydrological models.

³² [UNDRR, Hazard Definition & Classification Review, 2020](#)

³³ [UNDRR, Hazard Definition & Classification Review, 2020](#)

4. Key ethical considerations and related risks

The proposed research design meets / does not meet the following criteria:

The proposed research design...	Yes/ No	Details if no (including mitigation)
... Has been coordinated with relevant stakeholders to avoid unnecessary duplication of data collection efforts?	Yes	
... Respects respondents, their rights and dignity (specifically by: seeking informed consent, designing length of survey/ discussion while being considerate of participants' time, ensuring accurate reporting of information provided)?	Yes	
... Does not expose data collectors to any risks as a direct result of participation in data collection?	Yes	
... Does not expose respondents / their communities to any risks as a direct result of participation in data collection?	Yes	
... Does not involve collecting information on specific topics which may be stressful and/ or re-traumatising for research participants (both respondents and data collectors)?	Yes	
... Does not involve data collection with minors i.e. anyone less than 18 years old?	Yes	
... Does not involve data collection with other vulnerable groups e.g. persons with disabilities, victims/ survivors of protection incidents, etc.?	Yes	
... Follows IMPACT SOPs for management of personally identifiable information ?	Yes	

5. Roles and responsibilities

Task Description	Responsible	Accountable	Consulted	Informed
Research design	Senior Assessment Officer, GIS Officer, Programme Volunteer	Senior Assessment Officer	IMPACT Country Coordinator, Acted Programme Team, IMPACT HQ RDDU	Acted Coordination
Supervising data collection	Senior Assessment Officer, Programme Volunteer, Acted MEAL Team	Senior Assessment Officer	IMPACT Country Coordinator, Acted Operations	Acted Coordination
Data processing (checking, cleaning)	Senior Assessment Officer, GIS Officer, Acted MEAL Team	Senior Assessment Officer	IMPACT Country Coordinator, IMPACT HQ RRU	Acted Coordination, IMPACT HQ RDDU
Data analysis	Senior Assessment Officer, GIS Officer	Senior Assessment Officer	IMPACT Country Coordinator, IMPACT HQ RDDU	Acted

Task Description	Responsible	Accountable	Consulted	Informed
Output production	Senior Assessment Officer, GIS Officer	Senior Assessment Officer	IMPACT County Coordinator, IMPACT HQ RRU	Acted
Dissemination	Senior Assessment Officer	IMPACT Country Coordinator	Acted Programme Team, Acted KII, IMPACT HQ RRU	IMPACT HQ, Acted Country Director
Monitoring & Evaluation	Acted MEAL Team	Senior Assessment Officer	IMPACT HQ RDDU	IMPACT Country Coordinator
Lessons learned	Senior Assessment Officer	Senior Assessment Officer	IMPACT Country Coordinator	Acted, EuropeAid, IMPACT HQ RDDU

Responsible: the person(s) who executes the task

Accountable: the person who validates the completion of the task and is accountable of the final output or milestone

Consulted: the person(s) who must be consulted when the task is implemented

Informed: the person(s) who need to be informed when the task is completed

Drafting tips: Only one person can be Accountable; the only scenario when the same person is listed twice for a task is when the same person is both Responsible and Accountable.

6. Data Analysis Plan

The Data Analysis Plan for both the Geospatial Analysis and the Key Informant Data Collection will be completed following the completion of the Secondary Data Review, in order to ensure that both are developed based on a complete understanding of the current context and existing information. The Key Informant Interviews from Qualitative data will be analysed using data saturation grid methodology, in which findings will be disaggregated by community, watershed, and national findings. The quantitative datasets will be disaggregated and analysed by Community, watershed, and national findings as well. As the quantitative data will come from secondary government sources, and is collected as descriptive data, the findings will largely be presented at face value, and analysed in Microsoft Excel. Some of the quantitative data will be used with Geospatial data to help to calculate risk modelling as part of an Area-based risks assessment, expanding on the assessment work done in Phase 1, but more granularly, for the Isfana Watershed.

Research questions addressed with Semi-structured, Structured tools and Secondary Data collection tool enclosed: ABA_of_Isfana_Sub-River_Basins_DAP_Tools_tk-jv.xlsx.

7. Data Management Plan

Administrative Data		
Research name	Cycle	Area-Based Risk Assessment of Isfana Watershed in the Fergana Valley, REG2301 Kyrgyzstan, Tajikistan (Central Asia)
Project Code		16ASE
Donor		EuropeAID

Project partners	CAAWE			
Research Contacts	Ari Weiss, ari.weiss@impact-initiatives.org Nazgul Turdumatova < nazgul.turdumatova@acted.org >			
Data Management Plan Version	Date: 25/03/2024		Version: 2.0	
Related Policies	All data is uploaded and stored on IMPACT-owned server, to which only IMPACT focal points will have access in order to download, clean, and analyse data. If requested by EuropeAid, only final, clean and anonymized data sets will be shared based on the MoU between IMPACT, Acted and EuropeAid.			
Documentation and Metadata				
What documentation and metadata will accompany the data? <i>Select all that apply</i>	☒	Data analysis plan	☒	Data Cleaning Log, including: ☐ Deletion Log ☐ Value Change Log
	☐	Code book	☐	Data Dictionary
	☐	Metadata based on HDX Standards	☒	Raw and clean dataset
Ethics and Legal Compliance				
Which ethical and legal measures will be taken?	☒	Consent of participants to participate	☐	Consent of participants to share personal information with other agencies
	☐	No collection of personally identifiable data will take place	☐	Gender, child protection and other protection issues are taken into account
	☒	All participants reached age of majority	☒	All information collected from participants will be confidential and anonymised – personal identifiers such as names, name of local departments of the participants, positions will be removed from the final datasets
Who will own the copyright and Intellectual Property Rights for the data that is collected?	IMPACT, Acted, EuropeAID			
Storage and Backup				
Where will data be stored and backed up during the research?	☒	IMPACT/REACH Kobo Server	☐	Other Kobo Server: <i>[specify]</i>
	☒	IMPACT Global Physical / Cloud Server	☒	Country/Internal Server
	☐	On devices held by REACH staff	☐	Physical location <i>[specify]</i>

	☐	[Other, Specify]		
Which data access and security measures have been taken?	X	Password protection on devices/servers	X	Data access is limited to <i>[specify, e.g. REACH staff]</i>
	X	Form and data encryption on data collection server	☐	Partners signed an MoU if accessing raw data
	☐	[Other, Specify]		

Kobo Access Rights

Account Name(s)	Person(s)	Type of Kobo access	
ari.weiss@impact-initiatives.org nazgul.turdumatova@acted.org ikramidin.zhakypaliev@acted.org zaynura.kaykovusova@acted.org	Ari Weiss Nazgul Turdumatova Ikramidin Zhakypaliev Zaynura Kaykovusova	X View ☐ Edit	☐ Submit Data ☐ Download Data
nazgul.turdumatova@acted.org zaynura.kaykovusova@acted.org	Nazgul Turdumatova Zaynura Kaykovusova	☐ View X Edit	☐ Submit Data ☐ Download Data
nazgul.turdumatova@acted.org zaynura.kaykovusova@acted.org ikramidin.zhakypaliev@acted.org	Nazgul Turdumatova Zaynura Kaykovusova Ikramidin Zhakypaliev	View ☐ Edit	X Submit Data ☐ Download Data
uks-82@mail.ru	<i>Enumerator</i>	View ☐ Edit	X Submit Data ☐ Download Data
ari.weiss@impact-initiatives.org	Ari Weiss	View ☐ Edit	☐ Submit Data X Download Data

Raw Data Access Rights

Raw Data Access	Reason	Person
Accountable	<i>Accountable</i>	Ari Weiss
Access	<i>She is in charge of managing the View and Edit Form, viewing Forms, and submitting data.</i>	Nazgul Turdumatova

Preservation

Where will data be stored for long-term preservation?	X	IMPACT / REACH Global Cloud / Physical Server	☐	OCHA HDX
	☐	REACH Country Server	☐	[Other, Specify]

Data Sharing

Will the data be shared publically?	☐	Yes	X	No, only with mandating agency / body
Will all data be shared?	☐	Yes	X	No, only anonymized/ cleaned data will be shared
	X	No – If requested, only anonymized/ cleaned/ consolidated data will be shared with the mandating agency		
Where will you share the data?	☐	REACH Resource Centre	☐	OCHA HDX
	☐	Humanitarian Response	X	Not applicable

Data protection risk assessment

Have you completed the Indicators Risk Assessment table below?	☐	Yes		No, no information that potentially allows identification of individuals is to be collected.
[Please complete the first 4 columns in the Indicators Risk Assessment table below]				

Risk indicator (including direct and indirect identifiers)	Type of identification risk	Disclosure implications	Benefits	Class	Required mitigation
What is the name of the organisation/ agency/ department/ company to which the KIs belong?	Identification of the organisation/ agency/ department / company interviewed	Loss of privacy; Indirect association with that agency	For accountability purposes, to ensure that knowledgeable KIs were selected.	[To be completed by IMPACT HQ]	[To be specified by IMPACT HQ]
What is the position/ role of the KIs in the organisation/ agency/ department/ company?	Identification of the respondent	Loss of privacy	For accountability purposes, to ensure that knowledgeable KIs were selected.		

Responsibilities

Data collection	Nazgul Turdumatova/Zaynura Kaykovusova
Data cleaning	Nazgul Turdumatova/Zaynura Kaykovusova
Data analysis	Nazgul Turdumatova/Lukman Dadojonov
Data sharing/uploading	Ari Weiss

8. Monitoring & Evaluation Plan

Drafting tips: Please complete the M&E Plan column in the table and use the corresponding Tools in the Monitoring & Evaluation matrix to implement the plan during the research cycle.

IMPACT Objective	External M&E Indicator	Internal M&E Indicator	Focal point	Tool	Will indicator be tracked?
Humanitarian stakeholders are accessing IMPACT products	Number of humanitarian organisations accessing IMPACT services/products Number of individuals accessing IMPACT services/products	# of downloads of x product from Resource Center	Country request to HQ	User_log	☐ Yes
		# of downloads of x product from Relief Web	Country request to HQ		☐ Yes
		# of downloads of x product from Country level platforms	Country team		☐ Yes
		# of page clicks on x product from REACH global newsletter	Country request to HQ		☐ Yes
		# of page clicks on x product from country newsletter, sendingBlue, bit.ly	Country team		X Yes
		# of visits to x webmap/x dashboard	Country request to HQ		☐ Yes
IMPACT activities contribute to better program implementation and coordination of the humanitarian response	Number of humanitarian organisations utilizing IMPACT services/products	# references in HPC documents (HNO, SRP, Flash appeals, Cluster/sector strategies)	Country team	Reference_log	Cluster/Working Group Strategy, coordination, and planning documents
		# references in single agency documents			Partner strategy, coordination, and planning documents

Humanitarian stakeholders are using IMPACT products	Humanitarian actors use IMPACT evidence/products as a basis for decision making, aid planning and delivery	Perceived relevance of IMPACT country-programs	Country team	Usage_Feedback and Usage Survey template	<i>Qualitative feedback survey included in Water Area Profile Outputs and noted during dissemination.</i> <i>Direct feedback from partners and coordination during dissemination and presentations.</i>
	Number of humanitarian documents (HNO, HRP, cluster/agency strategic plans, etc.) directly informed by IMPACT products	Perceived usefulness and influence of IMPACT outputs			
		Recommendations to strengthen IMPACT programs			
		Perceived capacity of IMPACT staff			
		Perceived quality of outputs/programs			
		Recommendations to strengthen IMPACT programs			
Humanitarian stakeholders are engaged in IMPACT programs throughout the research cycle	Number and/or percentage of humanitarian organizations directly contributing to IMPACT programs (<i>providing resources, participating to presentations, etc.</i>)	# of organisations providing resources (i.e.staff, vehicles, meeting space, budget, etc.) for activity implementation	Country team	Engagement_log	☐ Yes
		# of organisations/clusters inputting in research design and joint analysis			☒ Yes
		# of organisations/clusters attending briefings on findings;			☒ Yes

ANNEX 1: METHODOLOGY NOTES (IF RELEVANT)

1.1 to 1.7: Data Analysis Plans

Annex 2: KI Selection Note

Types of KIs, information needed from them and what each KI activity information would address

Activity 1: Water Managers

Who: Water managers from the District Water Department (RUVKh), City Hall, and Water User Associations (WUAs), representatives and support staff.

What: Information regarding Irrigation water infrastructure, their condition and functionality, usage, and management structures and practices.

Why: This will help to provide details on how the in the identification of the key infrastructure and areas of the water network in the assessed watersheds in need of rehabilitation, to guide the implementation of canal and water rehabilitation projects., identify relevant stakeholders, strengthening management and maintenance practices, and note any need for additional support on required equipment and operational costs.

The sector experts would include personnel who are responsible for the management of water infrastructure, including canals, pump stations, gates, and other key infrastructure. The sessions will be also participated by irrigation water users. The discussions with these participants will provide a comprehensive understanding of the water network, infrastructure quality, management hierarchy, and key issues and challenges faced in providing sufficient water accessibility among general populations living in the assessed areas covering questions under specific objective (SO) 1: Examine communities' water and land usage practices (irrigation, agriculture, livestock rearing, industry and tourism etc.) in the watershed); SO 5: Identify how climate change and anthropogenic (human induced) factors has affected irrigation water resource usage and overall irrigation water supply and management practices in the area and SO 6: Develop policy recommendations and community-led response plans to address key gaps highlighted by the analysis of water and land resources for agriculture purposes management in the Fergana Valley.

In the mapping session, participants will update water infrastructure maps, marking stations, canals, springs, gates, and noting functionality. They will also conduct stakeholder mapping, detailing main decision makers, management structures, functions, and interactions from highest decision-making entities to service providers questions pertaining to SO 4: Examine irrigation water and land use management, institutional frameworks, and interactions among key water management stakeholders, focusing on key sectors including irrigation water, agriculture, pasture, industry and other water and land resources users). Participants will be asked about water resources, infrastructures and delivery systems for irrigation water in the watershed, and map their locations related to the research questions under SO 2: "Identify the existing water resources, infrastructures and delivery systems for irrigation water in the watershed, and map their locations". Additionally, they will assess the current technical conditions of water infrastructure, map the areas needing rehabilitation under the SO 3: "Understand current technical status of water infrastructure by assessing their current conditions and map the areas/ communities where infrastructure rehabilitation is needed". Furthermore, participants will discuss the water usage practices, key challenges, and areas of improvement which can be used to improve the overall water management network and SO 6 "Develop policy recommendations and

community-led response plans to address key gaps highlighted by the analysis of water and land resources for agriculture purposes management in the Fergana Valley”.

Activity 2: Land Managers

Who: Agricultural Land specialists within the district departments of agriculture at LSG level, local experts and farmers with knowledge of land allocation, use, crop growing practices.

What: General information on agricultural practices, areas of irrigation and rainfed lands, and common crops grown, as well as changes over time. Climate change impacts and any adaptational practices will also be explored.

Why: Understand main uses for water from irrigation network, and the linkage between water and livelihoods within the watershed. Develop an understanding of any adaptational practices to manage impacts from climate change and market shifts in demand for particular crops and how they are grown. Identify any adaptational strategies and where they are implemented to inform Acted interventions. The sector experts would include agriculture land experts, who have detailed understanding of agriculture land use practices with the watershed. This will include the locations of irrigated and rainfed lands for agricultural purpose. The discussions with these participants will provide a detailed understanding of the locations of productive land, growing and harvesting practices to assemble a picture of general agrarian livelihoods practices by a majority of the population relying on the watershed. Participants will also be asked about crop choices and changes in agriculture trends over time due to market pressures and climate change, a technologies that have been adopted or abandoned to cope with these changes. To triangulate the data we collect, we will also use satellite imagery data for accuracy. Discussions will be in accordance with SO 1; SO 4; SO 5 and SO 6.

This mapping session with agriculture land managers and resource users will build upon the findings from Activity 1. Using the mapped water infrastructure from activity 1, participants will add land issues to the same maps, to provide information on how the water infrastructure will be used. Session participants update land information from secondary sources, marking the locations of irrigated, rainfed and identifying the major crops grown on each. This will be triangulated with secondary datasets obtained from government statistics committees and Activity 8, KII with Village Leadership. The discussion will be conducted with staff from LSG level, to ensure that multiple layers of management are accounted for. Like activity 1, the participants would also be asked to conduct a stakeholder mapping to provide information on how land is managed and who managed it (including for different land types). The discussion will focus on topics covered in the research questionnaire of the specific objectives SO 1; SO 4; SO 6. Examine irrigation water and land use management, institutional frameworks, and interactions among key water management stakeholders, focusing on key sectors including irrigation water, agriculture, pasture, industry and other water and land resources users.

Activity 3: Pastureland Managers

Who: Pasture union (Jaiyt) committee members at LSG level, local experts, herders with knowledge of pastureland allocation, use, pasture management, and herding patterns.

What: General information on locations and migration patterns for herding of livestock within the watershed, pasture land use practices, as well as changes over time. Climate change impacts and any adaptational practices will also be explored.

Why: Understand main uses for pastoral activities, and the linkage between pastoralism and livelihoods within the watershed. Develop an understanding of any adaptational practices to manage impacts from climate change and identify any adaptational strategies and where they are implemented to inform Acted interventions.

The focus group discussion will involve pasture management experts at LSG level and local pastureland users, who have in-depth knowledge of how pastures are used within the watershed. By talking to both staff and land users, we can ensure we consider all levels of pasture management. These discussions will help us understand current pasture use practices, including livestock rotation techniques (sifting approaches). This will provide a clear picture of how the majority of people living near the watershed manage their livestock for breeding purposes. In addition to traditional knowledge about sustainable pasture management, we will also ask participants about haymaking, herding methods, and how they've seen pasture conditions change over time due to factors like markets and climate change. This FGD will directly address research questions for Specific Objectives 1, 4, 5 and 6 of the study.

Following the FGD, we'll hold a mapping session (MFGD). We'll use the same maps created in Activity 1 that showed water infrastructure. The KIs will mark the seasonal boundaries of pastureland on these maps. This will help us understand how pastures are used in different seasons. We will combine this information with data from government statistics and discussions with village leaders (Activity 8 KII). Similar to Activity 1, we'll also ask participants to identify key stakeholders involved in pasture management by mapping their hierarchy and responsibilities. This additional data will help us investigate the factors related to research SO 1, 4, 5 and 6.

Activity 4: Forestry Unit

Who: Representatives (managers, engineers) from Leylek Forestry units (The session will be conducted only in Kyrgyzstan site as there is no Forestry units in the Project site in Tajikistan).

What: Information on forest uses, divisions for different uses, and management structures and stakeholders will be identified and mapped. Linkages with pasture management and any stakeholders and their management structures will also be covered.

Why: This will help in understanding forest usage and provide additional information on pasture and herding practices and their management structures, as forest management is often involved in the management of pastures for communities.

This FGD would be conducted with representatives (deputy director, forest engineers) from the Leylek Forestry Unit in Kyrgyzstan to understand the management of forested areas including non-forest resources under the Leylek Forestry Unit, as well as to understand what factors influence the forest management. We'll be asking them questions about: forest management practices, how they involve the community in using forest and non-forest resources (pasture land, medical herbs, wild fruits and nuts and ecotourism). The KIs will also be asked about climate change anthropogenic impacts on the forest ecosystem. The information gathered here will address research questions related to SO 1, 4, 5 and 6 of our study. After the group discussion, we'll hold MFGD with the same participants. During this session, we will create a map that shows: forested and non-forested areas; areas used for seasonal grazing and herding practices; locations of unique ecosystems; forest management structures and key

stakeholders involved in forest management. This mapping exercise will address research questions for SO 1, 4 and 6 of our study.

Activity 5: Social Affairs Specialists

Who: Specialist at District Social Affairs department with knowledge of employment practices and vulnerability.

What: Information on labour trends, employment, and reliance of families on remittances. This will include numbers of households employed in different sectors, levels of unemployment, and sectoral trends, such as remittances and labour migration. In addition, information on vulnerable individuals, such as single-female headed households and disables individuals, as well as household dependency ratios, will be explored.

Why: Need to understand the industrial needs for water (in case of other industries), as well as understanding agriculture and pasture managements' overall roles in the local economy, to understand the likely impacts of Acted's planned agrarian interventions. In addition, to provide a cross-cutting dimension for vulnerable individuals.

This FGD with representatives from each district social development department will provide valuable information on the current economic conditions, employment opportunities, and prevailing trends and vulnerabilities faced by communities within the Isfana watershed. The discussion also explores the challenges faced by vulnerable populations, such as people with disabilities and older adults, and examines how existing local policies aim to support them. By collecting this data, we aim to answer the research questions of SO 1, 6.

Activity 6: Women's Committees

Who: Women's Committee representatives at LSG level

What: Information on women's roles in natural resource management, farming practices, and herding practices, and stakeholder roles within management structures, particularly around participation and inclusion.

Why: Understand gender dimensions and complexities around natural resource management that may not be identified by the primarily male local government staff interviewed in other activities, to ensure that Acted programmes are sensitised to the needs of female beneficiaries.

This interview would be conducted with district and LSG-level women's committees. This will briefly cover women's roles in natural resource management of land and water resources within the watershed, and fill critical information on gender related norms and practices in the assessed communities. This would help to highlight gender disparities that programmes need to account for, including women's roles in farming, local water management, land ownership, and participation within aforementioned resource management structures. The research questions will guide the data collection for the SO 1 and 6.

Activity 7: Ministry of Emergency Services

Who: Representatives from District and City Hall offices of Ministry of Emergency Services (CoES/MoES).

What: Information on main disaster risks, disaster risk mitigation efforts and infrastructure, and disaster response infrastructure and locations. Includes rally points, villages at risk of key hazards, prepositioned resources, and disaster mitigation infrastructure. Also, will include stakeholder mapping and understanding of disaster response management structures.

Why: This will help understand dimensions of disaster risk in the area, to understand preparation and mitigation measures. Mapping will be done to support the risk analysis to understand coping strategies and measures that the local stakeholders have taken, as well as understanding how local stakeholders prepare for and respond to natural hazards in the watershed.

This interview would be conducted with key staff from the Ministry of Emergency Services. This FGD/MFGD exercises aim to address disaster risk reduction (DRR) as a cross-cutting issue across all sectors. This is especially important because climate change is making disasters more severe and climate-induced disasters can significantly affect irrigation water accessibility and disrupt established land use practices crucial for agricultural and pastoral activities.

The FGD is about the specific threats in the area, like landslides, mudflows and how these threats can be exacerbated by climate change. Additionally, we'll discuss how climate change increases disaster likelihood and affects water availability and land use; the importance of proactive disaster management initiatives in minimizing the adverse effects of natural hazards on communities and societies. Throughout this interview, we will delve into various topics, including understanding the fundamental components of emergency preparedness and response management in the watershed. Furthermore, the MFGD exercise identifies locations of disaster management in areas prone to floods, earthquakes, landslides, and mudflows, where communities' livelihoods are at risk. It considers water availability and land usage to mitigate the impact on these communities. In addition, local disaster management practices will be explored, and key gaps identified that are in need of support, as well as emergency response policies and key stakeholders and their structures for disaster management. Data will be collected to answer the research questions of the SO 4, 5 and 6.

Activity 8: Village Leaders

Who: Village leadership, sectoral specialists, and local activists.

What: Key basic information on demographics, vulnerability, service access, and local agriculture, water, and pastoral practices. This is designed to provide the vulnerability information for the GIS risk assessment to provide quantitative data at village level to compare alongside the hazard exposure from the GIS analysis. Also to provide information to cross-check the data collected from key stakeholders within government management structures.

Why: This data will be needed to conduct the risk analysis, which is an added dimension currently missing from the local analysis of climate change and disaster exposure. This will also provide key data across all sectors at a granular level, to provide a check on the qualitative data that will largely be collected from local authorities.

Finally, a KIIs with village leadership and key experts will be conducted in each village of the watershed. Enumerators will visit each of the 2 towns, 12 villages in Kyrgyzstan and 18 villages in Tajikistan, and ask a set list of questions at village level to these key leaders, including farming and water specialist, the village leadership, and other local experts, resources users. They will be asked a series of cross-cutting information, including on demographics, the location and functionality of infrastructure

services, farming practices, employment information, and the number of vulnerable individuals. This will help to provided necessary granular quantitative data at village level, which is often lacking from national record systems in Kyrgyzstan and Tajikistan. This data will help to allow for a highly granular analysis of risk within each watershed, a dimension often left out of key analysis. In this study, additional data to above mentioned Activities will be collected to investigate the questions outlined in the sections SO from 1 to 6.

Annex 3: GIS Analysis

OID	Hazard Indicators	Indicators	Driving Force	Exposure	Vulnerability
1	Pasture Degradation	NDVI, EVI; SAVI, MSAVI, NDMI, NBR, NBR2, VCI, VHI	Deforestation, wildfires, degradation including due to drought) , human activity	Population Density	Pasture capacity
				Pasture Land area	pasture user association efficiency
					% of Population engaged in Agriculture
2	Drought	Drought Severity	Climate change – seasonal temperature, precipitation change (higher temperature in winter, faster snow melting)	Population Density	Pasture capacity
					% of agricultural land that is rainfed
					% of HHs living under poverty line
					Distance from main water source
3	Flood	HECRAS Modeling DEM	Climate change – seasonal temperature, precipitation	Population Density	Distance to hospital + emergency services
				% of agriculture land	% of population with disability
					% of HHs living under poverty line
					% of HHs with family members working abroad (remittances)
					% of Population engaged in Agriculture
4	Earthquake	Modified Mercalli Index Estimations	Seismogenic affects	Population Density	distance to hospital
					building network density
					% of population with disability

5	Landslides	LHASA Landslide Indicators	Seismogenic affects	Population Density	distance to hospital
			Heavy rainfall	At Risk Roads (MOES)	% of population with disability
6	Temperature Change	WordClim Bioclimatic Variables	Climate Change	N/A	N/A
7	Precipitation Change				
8	Water Discharge	Water Discharge			
9	Water Yields	Temperature (ave, min, max)			
10	Sedimentation/mudflows	Precipitation			
11	Field Erosion	Solar Radiation			
12	Precipitation	Wind Speed			
		Wind Direction DEM, Soil Types			