

SECTOR ASSESSMENT (SUMMARY): MULTISECTOR (SECTOR REHABILITATION NEEDS)

A. Irrigation

1. Irrigation is of critical importance to the agricultural economy of Afghanistan. While a few areas in mountainous regions have sufficient rainfall for nonirrigated cropping, yields are generally low and unreliable. Irrigation in Afghanistan falls into two distinct categories: irrigation schemes (formal systems) and traditional (village or informal) irrigation. Irrigation schemes are generally large, often of several thousand hectares (ha), with primary infrastructure (headworks and main canal) managed by the Ministry of Energy and Water (MEW) and secondary by the Ministry of Agriculture Irrigation and Livestock through irrigation and water user associations. Traditional irrigation is often characterized by small area, temporary or simple stone and/or soil diversions (known as *sarbands*), and management by *mirabs*.¹ It is found along most river valleys with level or near level ground. Irrigation water is also supplied by karez (underground canals), springs, and wells. Few villages in mountain areas could survive the permanent loss of their irrigated areas. No national survey has been undertaken for decades; the most recent data available are based on the 1993 Food and Agriculture Organization satellite survey (footnote 1). Current areas are expected to be similar.

Table 1: Irrigable Areas by River Basin
(‘000 ha)

Water Basin	Intensively Cultivated (2 crops/year)	Intensively Cultivated (1 crop/year)	Intermittently Cultivated	Total	Total (%)
Kabul	62	244	178	484	15
Helmand	95	381	900	1,376	43
Hari Rod-Murghab	35	138	128	301	9
Northern	40	198	387	625	19
Amu Darya	106	248	48	402	13
Nondrainage area	4	10	7	21	1
Total	342	1,218	1,649	3,208	100

ha = hectare.

Source: Food and Agriculture Organization Aquastat quoting B. Rout. 2008. Water Management, Livestock and the Opium Economy. How the Water Flows: A Typology of Irrigation Systems in Afghanistan. *Afghanistan Research and Evaluation Unit Issue Paper Series*.

2. The area used for private gardens, vineyards, and fruit trees is not included in Table 1, and could amount to over 90,000 ha and is likely to receive some form of irrigation (footnote 1). In 2002, the irrigable area remained unchanged; the area actually irrigated was 1.73 million ha or 54% of the area equipped for irrigation, this increased to about 1.90 million ha by 2011.

3. A 1967 survey estimated the total irrigated area to be 2.72 million ha with nearly 29,000 systems, of which 27% drew from surface water sources (rivers and streams), and the remainder from groundwater sources (springs, karez, and wells) (footnote 1). While surface water systems made up less than one-third of the total, they covered 86.5% of the irrigated area, confirming the importance of surface water as the main irrigation water source. Springs accounted for 6.9%, karezes for 6.2%, and shallow and deep wells for 0.4%.² In 2002 18% of the total area was estimated to be equipped for irrigation of 3.21 million ha; 16% of the actual irrigated area of 1.73 million ha was irrigated using groundwater.

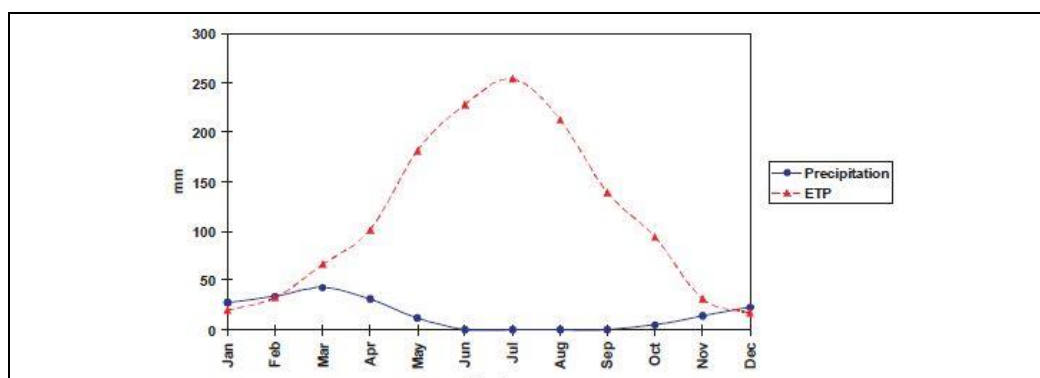
¹ B. Rout. 2008. Water Management, Livestock and the Opium Economy. How the Water Flows: A Typology of Irrigation Systems in Afghanistan. *Afghanistan Research and Evaluation Unit Issue Paper Series*.

² R. Favre and G. M. Kamal. 2004. *Watershed Atlas of Afghanistan I (I-IV)*.

4. Most land in double-cropped areas and a significant proportion of the single-cropped area are in formal schemes. About 80% of the single-cropped area and almost all the intermittently cultivated area are under traditional irrigation, often with traditional channel or brush-weir diversions. In Khulm district in Balkh province, one village drawing water from the Khulm river has around 40 ha of irrigated land in the village and 1,000 ha downstream. However, not enough water is available to fully irrigate this area, and irrigation is limited to about 300 ha, with the area irrigated rotating annually among the landowners. Spring wheat is the predominant crop in many irrigated areas, with secondary crops including barley, potatoes, and onions. Many areas comprise tree crops including almonds. Food crops account for more than two-thirds of the cultivated area, typically grown for subsistence and mixed with a variety of other crops such as perennial horticultural crops and vegetables.

5. Most rivers are ephemeral, that is, they flow for a few months each year, depending on rainfall and snowmelt from the previous winter, or in some cases glacier melt. Rainfall is highly seasonal with most falling over the winter and spring during November–May (Figure 1). Average annual rainfall in Mazar is 184 millimeters.

Figure 1: Average Precipitation and Evapotranspiration, Mazar-i-Sharif



ETP = evapotranspiration, mm = millimeters.

Source: R. Favre and G.M. Kamal. 2004. *Watershed Atlas of Afghanistan*. I (I-IV).

6. The negligible rainfall and high rate of evapotranspiration from June to October highlight the need for irrigation to finish spring crops or plant and grow summer crops.

7. Traditional irrigation is frequently located in the steep-sided and narrow valleys of the mountain ranges. The relatively small areas of irrigable land are watered from canals a few meters to a few kilometers in length from intakes. Village or secondary roads often follow the rivers, crossing the river when the terrain requires. Small traditional or modern concrete slab or steel bridges connect the two sides of the river and are essential in providing adequate road access to houses and irrigation areas on the other side of the river. Many of these bridges were washed out by the 2014 floods.

8. Formal irrigation systems are estimated to account for about 15% of the national irrigated area, with 85% comprising informal systems managed by villages and irrigators. In the formal systems, MEW manages headworks and primary canals, and the Ministry of Agriculture Irrigation and Livestock manages secondary and sometimes tertiary canals.

B. Rural Roads

9. Rural roads are a major factor supporting village life and livelihoods. They connect villages to government and social services, markets, and medical and educational facilities. Secondary and tertiary roads follow most of the significant valleys in northern Afghanistan and

provide a vital link to markets and suppliers of agricultural inputs (seeds, fertilizers, chemicals, and machinery). Within the village, rural roads connect to houses, gardens, and farming areas. In many cases, settlements and agricultural areas lie on the opposite bank of the river to the secondary or tertiary road. In these cases, many villages have constructed concrete slab or steel bridges often constructed under the National Solidarity Program implemented by Ministry of Rural Rehabilitation and Development (MRRD). The loss of these roads and particularly bridges in floods is highly disruptive of social and economic activity.

C. ADB Support for Traditional Irrigation

10. The Asian Development Bank (ADB) has been making substantial investments in Afghanistan's traditional irrigation sector since 2003 through the Community-Based Irrigation Rehabilitation and Development project (\$10 million grant),³ and the Rural Recovery through Community-Based Irrigation Rehabilitation Project (\$5 million).⁴

11. The Community-Based Irrigation Rehabilitation and Development project is undertaking community-based irrigation rehabilitation and development in four northern provinces.⁵ The project is upgrading about 120 small-scale irrigation systems. The implementing agency, MRRD, has agreed to allow project offices to assist with implementation of the proposed project. Figure 2 shows one of the structures that survived a 1:100-year flood providing an example of the "build-back-better" approach.

12. The Rural Recovery through Community-Based Irrigation Rehabilitation Project operated in Jowzjan, Faryab, and Sar-e-Pul provinces, three of the provinces experiencing flood damage in 2014. Under the project, 74 subprojects were completed. The project closed in June 2010. The project experienced a slow start, caused by several factors including slow consultant recruitment and the termination of a consultant contract due to security issues. The project is rated successful. It provided a useful base for the effective implementation of the ongoing Japan Fund for Poverty Reduction project and demonstrated that MRRD and its project implementation units, using community contracting as a key modality, could manage and implement a project effectively.

D. ADB Support for Formal Irrigation

13. ADB is supporting selected government water resource, agriculture, and rural development priorities through medium-scale investments and targeted technical assistance to develop capacity, improve sector governance, and enhance sector coordination. It has been a key development partner in Afghanistan's agriculture and natural resources sector and has financed a number of irrigation rehabilitation and water resource projects. ADB technical assistance has supported sector institutional and capacity development.

14. Since 2003, ADB has provided support to formal irrigation systems rehabilitation mainly based on the larger rivers, in some cases with water storage dams. Three projects were completed with a total value of \$115,000,000.⁶ Two projects are under implementation, with a

³ ADB. 2012. *Report and Recommendation of the President to the Board of Directors: Proposed Grant Assistance to the Islamic Republic of Afghanistan for Community-Based Irrigation Rehabilitation and Development*. Manila.

⁴ ADB. 2003. *Report and Recommendation of the President to the Board of Directors: Proposed Grant Assistance to Afghanistan for the Rural Recovery Through Community-Based Irrigation Rehabilitation Project*. Manila.

⁵ Baghlan, Balkh, Ghor, and Samangan.

⁶ ADB. 2003. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the Transitional Islamic State of Afghanistan for the Emergency Infrastructure Rehabilitation and Reconstruction Project*. Manila; ADB. 2004. *Report and Recommendation of the President to the Board of Directors: Proposed Grant Assistance to the Islamic Republic of Afghanistan for the Balkh Basin Integrated Water Resources Management Project*. Manila; ADB. 2005. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Asian Development Fund Grant to the Islamic Republic of Afghanistan for the Western Basins Project*. Manila.

total value of \$369 million.⁷ Both projects are on track.⁸ MEW has been the lead implementing agency.

Figure 2: Weir+ Intake Built by Communities Contracted by MRRD under the Community-Based Irrigation Rehabilitation and Development Project



Source: Photo taken by Asian Development Bank missions during fact-finding in July 2014.

E. The 2014 Floods

15. **Traditional irrigation systems and rural roads.** The mountain valleys experience frequent flash floods with associated damage to houses, and irrigation and road infrastructure. Residents expect many rivers and streams, for example in the Khulm and Balkh river catchments, to flood every year. One village on the Khulm river reported 15 flood events in 2014; one was extreme resulting in great damage to irrigation weirs, canals, farmland, and road bridges as well as the destruction of many houses. In this valley, every bridge in about 10 villages was destroyed. The 9 villages visited during fact finding have lost all 29 of their concrete slab and steel bridges.

16. Many villages have undertaken temporary basic repairs to maintain some irrigation. They have paid excavator operators to bring their machines from rural centers and have patched canals and intakes. In one case, the supply to seven villages in the Sarbagh valley was partially restored with a temporary pipe using welded oil drums to replace a collapsed canal (Figure 3 shows the severely damaged weir in the background). The water supply irrigates around 800 ha, and drives 7 flour mills and a micro-hydropower plant. It is thus integral to the

⁷ ADB. 2005. *Report and Recommendation of the President to the Board of Directors: Proposed Grant Assistance to the Islamic Republic of Afghanistan for Water Resources Investment Development Project*. Manila; and ADB. 2005. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Grant Assistance to the Islamic Republic of Afghanistan for Western Basins Water Resources Management Project*. Manila.

⁸ Disaster Risk Management Overview (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

life of the villages and needs urgent reconstruction of the weir and canal. The water level was high above the canal wall during the flood, and scoured the riverbed and undercut the retaining wall. This type of damage is widespread, and typical of the type of repairs needed. More than 800 small to medium-sized irrigation and rural road assets are identified as requiring repair.⁹

Figure 3: Destroyed Canal, Temporarily Repaired on Sarbagh River



17. **Formal irrigation systems.** The major impact of the 2014 floods on formal irrigation schemes, mainly maintained by MEW, was on the Nahr-i-Shahi scheme in Balkh and Jowzjan provinces, with lesser damage reported from Samangan and Kunduz. For example, the main canal for the Nahr-i-Shahi scheme in Balkh was unable to cope with the volume of runoff water and overflowed in several locations, damaging canal walls and adjacent roads. In some places the flood completely washed away the canal bank protection, mainly gabion walls and intakes. Severe damage was caused in Keshinda Bala and Pa'en as the Qashlaq Kohana, Qara Teri, and Aacha Meli intakes were completely washed away. More than 950 families who had benefited from these intakes now have limited access to potable water and irrigation for about 660 ha. Several watermills also stopped functioning.

18. Bank protection walls were damaged along the length of Balkh river in Chemtal, Balkh, and Charbolak districts. In Jowzjan province, the Hacha Qala and Qulbandi intakes suffered the most destruction. Hacha Qala in Said Abad is a flood control structure with a spillway that was washed away.

F. Rehabilitation Required

19. **Traditional irrigation and rural road and bridge infrastructure.** The provincial authorities and disaster management agencies visited most of the severely affected villages and

⁹ Project Administration Manual, Appendix 1 (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

estimated the costs to repair or replace damaged infrastructure. A summary of the damage need assessment and subprojects is outlined in Table 2 (and footnote 8).

20. **Formal irrigation systems.** Damage needs assessments identified approximately 22 structures in formal irrigation schemes in Balkh, Jowzjan, and Samangan provinces that require rehabilitation to bring them to operating condition (footnote 8).

Table 2: Traditional Irrigation and Rural Roads and Bridges Subprojects (MRRD)

Irrigation								
No	Province	Families Affected	Dams	Canals	Intakes	Retaining Walls	Total (\$'000)	Management
1	Ghor	8,008	225	776	2,680		3,681	PIU
2	Balkh	1,640			700	834	1,534	PIU
3	Baghlan	14,239	22	206	2,791		3,018	PIU
4	Samangan	1,065	35	425	4,200		4,661	PIU
5	Jowzjan	5,300		175	3		178	From Balkh
6	Bamyan	11,373		147	3,553		3,700	PIU
7	Daykundi	772	70	11			81	From Ghor
8	Laghman	11,779			84	10	93	From Kabul
9	Panjshir	3,770	11	33	7		51	From Kabul
10	Sarepul	6,846		66	211		276	From Balkh
11	Faryab	1,882		9	116		125	From Ghor
12	Badakhshan	23,350	139	182	51	80	452	PIU
13	Takhar	1,582	351	51	135	74	611	From Badakshan
14	Kunar	1,320				750	750	From Kabul
15	Nuristan	3,640	4	104			108	From Kabul
	Total	96,566	856	2,185	14,529	1,748	19,318	
	%		4%	11%	75%	9%	100%	

Roads and Bridges							
No	Province	Families Affected	Bridges	Culverts	Roads	Total (\$'000)	Total MRRD (\$'000)
1	Ghor	11,239	9	38	283	330	4,011
2	Balkh	1,425	202	105	712	1,019	2,553
3	Baghlan	800	63	70	105	239	3,257
4	Samangan	803	1,030	3740	50	5,290	9,950
5	Jowzjan	5,300	312	312	250	625	803
6	Bamyan						3,700
7	Daykundi	2,184			20	38	118
8	Laghman						93
9	Panjshir	2,850	18	18		59	110
10	Sarepul	11,355	12	12		992	1,268
11	Faryab	12,778	5	5	78	1,176	1,301
12	Badakhshan	28,250	14	14		1,091	1,543
13	Takhar	45			7	119	730
14	Kunar		40	40		40	790
15	Nuristan	9,685	83	83	6	878	986
	Total	87,694	1,788	4,498	623	11,895	31,213
	%		15%	38%	5%	100%	

MRRD = Ministry of Rural Rehabilitation and Development, PIU = project implementation unit.

^a The decision on whether to locate the PIU in Takhar or Badakhshan has not yet been finalized.

Source: MRRD.

G. Lessons

21. Sector issues include weak technical, institutional and financial capacity of government water institutions and ministries. Ministry absorption capacity is constrained by the capacity of skilled professionals. In some locations, the decline in security is affecting contractor interest. ADB provides consultancy support to strengthen project management by the ministries. Training programs for selected ministry staff continue to be provided through the projects and ongoing technical assistance projects, which include training sessions inside and outside of the country.