Supplementary Document 14:

Arghandab River Basin Integrated Water Resources Management Study

April 2019

AFG: Arghandab Integrated Water Resources Development Project

CURRENCY EQUIVALENTS

(as of 31 January 2019)

Currency unit	–	Afghanistan Afghani (AF)
		United States Dollars ($)
$1.00	=	AF75.286
AF1.00	=	$0.01316

ABBREVIATIONS

AIS	-	Arghandab Irrigation System
ASBA	-	Arghandab Sub-basin Agency
AUWSSC	-	Afghanistan Urban Water Supply and Sewerage Corporation
CDC	-	Community Development Council
HAVA	-	Helmand Arghandab Valley Association
HRBA	-	Helmand River Basin Agency
FCAS	-	Fragile and conflict affected situations
IA	-	Irrigation association
IWRM	-	Integrated water resources management
MAIL	-	Ministry of Agriculture Irrigation and Livestock
MEW	-	Ministry of Energy and Water
Mm^3	-	Million cubic meters
MRRD	-	Ministry of Rural Rehabilitation and Development
MSWA	-	Multi-stakeholder water allocation
NEPA	-	National Environmental Protection Agency
PIM	-	Participatory irrigation management
RBA	-	River Basin Agency
RBC	-	River Basin Council
SBA	-	Sub-basin Agency
SBC	-	Sub-basin Council
TA	-	Technical assistance
WUA	-	Water user association
WSS	-	Water supply and sanitation

C O N T E N T S

EXECUTIVE SUMMARY

Integrated water resource management (IWRM) is a process which promotes the coordinated development and management of water, land and related resources. It is intended to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

IWRM has been increasingly promoted world-wide since the early 1990s, due to the realization that the world's water resources are limited and increasingly under threat of over-use or pollution. Addressing such problems requires an integrated approach, increasingly needed under a changing climate. Afghanistan's water resources are significantly underutilized and there is an increasing need to manage the country's water resources and ensure that allocation to different uses is effective.

The adoption of IWRM principles was strongly promoted in the 2009 Afghan Water Law, which stated that "IWRM and development for the purpose of sustaining supply and conserving water resources and protecting the environment will be carried out using a river basin approach" (Ministry of Justice 2009). Since that time, the Ministry of Energy and Water (MEW) has moved strongly towards river basin management, establishing river basin agencies (RBAs) and sub-basin agencies (SBAs) in Afghanistan's five river basins and their important sub-basins. The Helmand RBA (HRBA) and Arghandab SBA (ASBA) are of critical importance in relation to the present project, the Arghandab Integrated Water Resources Development Project. The law also recommended the formation of river basin and sub-basin councils (RBCs and SBCs), but none have yet been formed. Their establishment is seen as essential for effective IWRM. The revised Water Law, currently being finalized, addresses climate-resilient IWRM.

In addition to MEW, several agencies are responsible for managing the water resources of the Helmand basin. The principle agencies involved include the Ministry of Agriculture, Irrigation and Livestock (MAIL), Ministry of Rural Rehabilitation and Development (MRRD), Ministry of Urban Development Affairs (MUDA), responsible for urban water supply, and the National Environmental Protection Agency (NEPA).While these agencies acknowledge the law and the benefits of hydrologic boundary management, they have mostly not yet reflected this in their organizational set-ups.

The Helmand river and its major tributary, the Arghandab, were dammed in the early 1950s, with dams at Kajaki and Dahla. The Helmand Arghandab Valley Association (HAVA), with its head-quarters in Lashkargah was established in about 1952, the year Dahla Dam was built, as the first IWRM institution in Afghanistan. It was replaced in 2009 by the HRBA, ASBA, and five other SBAs. Despite the early start of IWRM in the Helmand basin, little progress has been made since then. Details of the Helmand basin and its rivers are provided in Appendix 1.

Under AIWRDIP, five main uses for water from Dahla Dam are planned. In approximate order of priority, these are:

(i) Water supply to Kandahar city and villages along the Arghandab River,must be classed as the top priority use for Dahla water, since once connected, supply will need to be provided year-round.
(ii) Irrigation water provision to theArghandab Irrigation System (AIS) and community schemes, is essential to the communities downstream of Dahla and is the primary reason why the dam raise is needed.
(iii) Environmental supply to the river environment, is also a high priority, for the river channel, adjacent communities, river-based ecosystems and downstream wetlands.

(iv) Flood control, a minor benefit of raising Dahla dam.
(v) Hydropower generation, most important economically, but a byproduct of releases for other purposes.

Balancing these five uses is recommended to be undertaken by a technical dam management group, supported by a full-time technical adviser from ASBA, which has overall responsibility for dam management. The adviser will collect the data needed to drive the river basin management model and recommend allocations. The technical group will comprise representatives of the major institutional stakeholders and the three-water user association (WUAs). As the number of WUAs expands, the basis for WUA representation will need to change to ensure that farmers from the major irrigation areas are involved, with membership of the group by WUA federations, if these are formed.

In common with many areas of Afghanistan, the Helmand basin is severely affected by conflict, with many project areas classed as insecure. The project is thus being assisted by a parallel technical assistance project – termed FCAS (fragile and conflict affected situations), aspects of which are outlined in Appendix 2.

A number of recommendations are made in this report to support IWRM nationally and in the Arghandab and Helmand River basins, several of which could be supported by AIWRDIP.

National recommendations

(i) Revise the Water Law to provide additional support to IWRM
(ii) Cross-sectoral linkage and IWRM – creation of a Water Resources Commission
(iii) Publish the Helmand River Basin Master Plan
(iv) Implement the Afghan/Iran transboundary agreement
(v) Develop a system of water entitlements and allocation

Recommendations for Helmand/Arghandab river basins

(i) Strengthen water governance systems and structures
(ii) Create functioning RBCs and SBCs
(iii) Develop overall participatory irrigation management (PIM)
(iv) Intra-year planning of water allocations from Dahla
(v) Establish groundwater measurement and regulation
(vi) Develop financing mechanisms for IWRM
(vii) Improve the availability of information
(viii) Undertake the monitoring and evaluation of IWRM
(ix) Assess long-term IWRM needs and required investments

I. INTRODUCTION

A. Afghanistan's Water Resources

1. Afghanistan receives an average annual precipitation volume of around 164 km^3. Evaporation/evapotranspiration, surface water run-off and groundwater recharge are estimated at 53%, 37% and 10% respectively. These assumptions generate an average volume of potentially available resources of 77 km^3 per year.

2. The National Water Master Plan (NWMP – MEW 2014) estimates that for the year 2010 available annual resources per capita amounted to 3080 m^3 for Afghanistan varying from 1390 m^3 for the Kabul basin to 5373 m^3 for Helmand basin. By 2040 Afghanistan's population will have increased to perhaps 46 million (according to NWMP estimates) meaning that available annual resources per person will have decreased to 1651 m^3 for Afghanistan, 745 m^3 for the Kabul basin and 2880 m^3 for Helmand.[1]

3. The present annual per capita water availability compares favorably with other countries of the region, for example, with Iran (1400 m^3 per capita per year) and Pakistan (1200 m^3 per capita per year). Afghanistan's water resources are still largely underused within the country.

B. Integrated Water Resource Management

4. Integrated water resource management (IWRM) is a concept developed from on-the-ground experience of practitioners. Although parts of the concept have been around for several decades –notably since the first global water conference in Mar del Plata in Argentina in 1977 - it was not until after Agenda 21 and the World Summit on Sustainable Development in 1992 in Rio that the concept became the subject of extensive discussions on what it means in practice. The Global Water Partnership's definition of IWRM is now widely accepted.[2]

Definition of IWRM
IWRM is 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.
GWP, 2000

5. As quoted by Delft Hydraulics[3] with minor variation: "the concept of IWRM has been developing since the early1990s. IWRM is the response to the growing pressure on our water resources systems as a result of increasing population and socio-economic developments. Water shortages and deteriorating water quality have forced many countries, developed and developing alike, to reconsider their options with respect to the management of their water resources. As a result, water resources management has undergone a drastic change world-wide, moving from a mainly supply-oriented, engineering approach towards a demand-oriented, multi-sectoral approach, known as IWRM. In the international meetings, opinions are converging to a consensus about the implications of IWRM.

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1 According to the Falkenmark Water Stress Indicator, an area experiences water stress when annual water supply drops below 1700 m^3 per person. Below 1000 m^3 per person, the population faces water scarcity, and below 500 m^3 "absolute scarcity".

2 Hassing J et al, "Integrated Water Resources Management in Action". WWAP, DHI Water Policy, UNEP-DHI Centre for Water and Environment (2009)

3 Delft Hydraulics, "Integrated Water Resources Management for the Sistan Closed Inland Delta, Iran" (2006)

6. This is best reflected in the Dublin Principles of 1992. Not all countries endorse all these principles; in particular the fourth principle on economic valuing is much debated. Although nearly all countries agree with the economic value of water, given its important social function, many developing countries do not recognize water as an economic good that can be left to the economic market of demand and supply. Notwith-standing this difference in perception, the concept of IWRM has let us move away from "water master planning", which focuses on water availability and development, towards "comprehensive water policy planning" which addresses the interaction between different sub-sectors, seeks to establish priorities, considers institutional requirements, and deals with the building of capacity.

Dublin principles

1. Water is a finite, vulnerable and essential resource, essential to sustain life, development and the environment.
2. Water resources development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels.
3. Women play a central role in the provision, management and safeguarding of water.
4. Water has an economic value in all its competing uses and should be recognized as an economic (and social) good.

7. A key-aspect of IWRM is that the management and development of water resources should take place in interaction with the users (the socio-economic system), the environment and the institutions involved. IWRM applied in this way considers the use of the resources in relation to social and economic activities and functions. These also determine the need for laws and regulations for the sustainable use of the water resources infrastructure, in relation to regulatory measures and mechanisms, which will allow for effective use of the resource, taking due account of the environmental carrying capacity.

8. IWRM practices depend on the context of the specific application. This means that IWRM as applied in the Arghandab River valley will have to take account of the particular situation of the area with respect to the geographic and hydro-meteorological conditions as well as the social and cultural values of the country. IWRM should not be seen as a "model" that has to be enforced upon a country or certain region. IWRM is much more a process as indicated in the definition in the text box on the previous page."

9. In summary, the IWRM approach helps to manage and develop water resources in a sustainable and balanced way, taking account of social, economic and environmental interests. It recognizes the many different and competing interest groups, the sectors that use and abuse water, and the needs of the environment. The integrated approach coordinates water resources management across sectors and interest groups, and at different scales, from local to international. It emphasizes involvement in national policy and law-making processes, establishing good governance and creating effective institutional and regulatory arrangements as routes to more equitable and sustainable decisions. A range of tools, such as social and environmental assessments, economic instruments, and information and monitoring systems, support this process.[4]

10. Application of IWRM in Afghanistan should be supported by ADB's Fragile and Conflict Affected Situations (FCAS) approach which sets out guidelines for the integration of conflict sensitivity into project processing (see Appendix 2 for more information).

[4] GWP/INBO, "A Handbook for Integrated Water Resources Management in Basins". Global Water Partnership/International Network of Basin Organizations. (2009)

C. Legal Framework

1. Afghanistan's Water Law and IWRM

11. IWRM has been strongly promoted in Afghanistan through a number of policies since the end of the Taliban regime. Article 2 of the 2009 Water Law on the ownership and management of water states that "water belongs to the public and the government is responsible for its protection and management". Article 4 required that "integrated water resource management and development for the purpose of sustaining supply and conserving water resources and protecting the environment will be carried out using a river basin approach" (Ministry of Justice 2009) thus underwriting IWRM nationally.

12. Article 6 of the Water Law states that: "water resources may be used according to the provisions of this law with due consideration for the praiseworthy customs and traditions of the people to meet the needs for drinking water, livelihood, agriculture, industry, public services, energy production, transportation, navigation, fisheries and the environment. Priority for use of water resources shall be given to drinking water and livelihood."

13. Irrigators in principle should therefore leave sufficient flow to meet downstream demands by communities for drinking water and livelihoods. There is also a need to consider environmental flows in some of Afghanistan's rivers, particularly those that are perennial. Demands from down-stream neighboring countries also need to be taken into account in water resources planning, and where possible, agreement obtained prior to the construction of major water infrastructure. These factors, plus the likely increasing rate of industrialization and urbanization and the development of major water-demanding mining and processing activities suggest that the law's focus on IWRM is well placed and should be given strong emphasis in planning sectoral development.

2. Water Management Institutions

14. Several agencies are responsible for managing the water resources of the Helmand basin, and all river basins in the country. The principle agencies involved include the Ministry of Energy and Water (MEW), the National Environmental Protection Agency (NEPA), Ministry of Agriculture, Irrigation and Livestock (MAIL), Ministry of Rural Rehabilitation and Development (MRRD) and the Ministry of Urban Development Affairs (MUDA), responsible for urban water supply. The Ministry of Mines and Petroleum was previously responsible for groundwater development and management, but its Hydrogeology Department was transferred to MEW in 2013.

15. MEW has moved strongly towards IWRM by adopting river basin rather than provincial water management, establishing river basin agencies (RBAs) and sub-basin agencies (SBAs). However, there is a need to resource them adequately to be able to meet their mandates. In particular, the design and construction supervision capacity at the RBAs and some SBAs needs to increase. While other ministries also accept the need for hydrological boundary management, their systems have been slow to adopt the approach.

16. RBAs and SBAs play critical roles in managing local disputes and conflicts over water and water-related land issues in Afghanistan. Capacity development to support this role should be provided, as this will assist them to be more effective.

17. The formation of river basin councils (RBCs) and sub-basin councils (SBCs) specified by the Water Law will move stakeholders towards IWRM and integrate the interests of all water users.

However, despite the passage of the law a decade ago, no river basin or sub-basin council has yet been formed.

18. Water allocation on traditional systems is mainly through mirabs (elected water masters) responsible for main and secondary canal sections. Under the Water Law, an attempt has been made to introduce “more modern” irrigation management systems, with water user associations (WUAs) managing main canals supported by MEW, and irrigation associations (IAs) secondary and lower canals, supported by MAIL. However, the mirabs remain key to water management in most areas of Kandahar province. WUAs, IAs and mirabs all play a critical role in addressing water-related conflicts. The revision to the Water Law, currently underway, is expected to allocate the management of all levels of irrigation canal to MAIL. Multipurpose canals will be managed by MEW. MRRD support is expected to be expanded for small irrigation systems and dams up to 500,000 m^3.

19. The administrative complexity summarized above highlights the difficulties of applying IWRM principles in Afghanistan and in the Arghandab River basin. While the various provincial departments are in principle under the control of the provincial government, in practice, their primary responsibility is to the national ministry in Kabul. This complicates the coordinated development and management of water resources.

20. The only wastewater collection and treatment in Kandahar city at present is the private sewage treatment plant in the suburb of Aino Mina with a reported 4000 connections. Its effluent is partly used to irrigate parks. With the development of a city-wide water reticulation network under the Arghandab Integrated Water Resources Development Project, it is expected that the project will plan wastewater collection and treatment to be implemented under a subsequent project. Decisions will be required on how to use wastewater. Provided the plant is well managed and produces effluent at secondary quality (ie, better than about 20/20 (mg/l) biochemical oxygen demand/phosphorus) it would be usable for park watering, return to the river and also probably for groundwater recharge directly or indirectly. It may be noted that Thames water is said to be reused several times before it reaches the sea, while effluent from Kabul’s sewage treatment plant is returned to the Kabul river, downstream of Kabul city.

3. Dispute and Conflict Resolution

21. Given the importance of water to Afghan agriculture and increasing competition for available supplies, disputes involving water are reported to be quite common. While the traditional management systems involving the mirabs can resolve many issues, other mechanisms are also often required. These were analyzed in some detail in a study prepared by UNAMA (2016) which highlights the issues and the steps needed to resolve them. Primary among the recommended solutions is the full implementation of the administrative structure and permitting scheme required under the water law.

22. Many aspects of IWRM in the Helmand basin face issues related to conflict – between tribes, upstream/downstream, power structures, internally displaced persons, returnees from Pakistan and Iran, and lack of security in many areas. Because of their potential impact on project implementation and outcomes, ADB commissioned a technical assistance project to examine fragile and conflict affected situations (FCAS) in projects proposed for funding, commencing with AIWRDIP. While it has not yet commenced full operation, information relating to its proposed approach is summarized in Appendix 2.

D. IWRM and the Future

23. GWP/INBO (2009) provides a useful summary of the need for change, quoted below:

> "The increasing importance of effective IWRM is increasingly recognized. In many regions, managing water has always been a major problem because of the natural variability and uncertainty in weather patterns. With climate change this problem is likely to get worse. In some basins, changes in climate will mean less rainfall and lower river flows, while in other basins climate change will mean more floods. These changes will be exacerbated because of other variations such as population and economic growth, urbanization and rising demands for food, which increase the demand for water, and degrade water courses and aquifers in basins where water is already scarce.
>
> As water scarcity increases and hydrological variability becomes larger, dealing with the changes brought about by development presents a major challenge. The basin manager now faces huge pressures, risks and conflicts in balancing economic development with maintaining healthy water resources. But, in order to progress, many regions of the world need to develop water infrastructure. The challenge for governments and basin managers is to balance development with sustainability. This means finding smarter ways to develop and manage water resources and finding responses appropriate to the circumstances in each particular basin.
>
> Basin managers also have to address pollution. As towns and cities spread along riverbanks and lakeshores, water pollution from domestic and industrial waste increases. Advances in agriculture mean that farmers use more fertilizers and pesticides, which also increase pollution. The consequences of biological and chemical pollution, and the alteration of river and lake flows and diminution of groundwater tables, can be dire. Rivers become over-rich in nutrients and aquatic weeds may proliferate."

II. IWRM IN AFGHANISTAN

A. Progress in River Basin Management

24. Afghanistan first introduced river basin management systems under the Kajaki Multipurpose Project in 1952 by forming the Helmand Arghandab Valley Association (HAVA), with its headquarters in Lashkargah, the capital of Helmand province. It was created to manage the economic development of the Helmand and Arghandab valleys, primarily through irrigation and agricultural land development along the Helmand and Arghandab Rivers. Its activities included land development, administration of the settlement procedures and land ownership registration, and the operation and maintenance of the newly developed infrastructure. When the Helmand River Basin Authority (HRBA) was established under the Water Law of 2009, HAVA was dissolved. HRBA inherited the former HAVA offices and its extensive archives, including infrastructure design reports and drawings from the 1950s and 1960s. HRBA oversees the Arghandab Sub-Basin Agency (ASBA), which manages Dahla Dam and the Arghandab irrigation system (AIS).

25. Despite the early start of Afghan IWRM in Helmand and Kandahar provinces, little progress has been made since. A recent study (Atal Ahmadzai et al 2017) assessed the impacts of water reforms on agricultural productivity. In-depth interviews and focus group discussions were used as data collection methods. It was designed to be conducted in all five Afghan river

basins; however, the Helmand basin was excluded as no reforms were believed to have been implemented there.

26. The study concluded that ministerial linkages in the water sector were weak, lacking coordination and integration in relation to decision-making, project/program design, implementation and data sharing.

> "Cooperation among newly established grassroots organizations, including irrigation associations (IAs), water user associations (WUAs), river basin agencies (RBAs), and others, was found to be much stronger at the horizontal levels than the vertical. Strong cooperation and contact existed between IAs and WUAs, while vertical cooperation between IAs, WUAs, RBAs and other higher organizations was weak. The horizontal cooperation was both inter- and cross-organizational. The implemented agenda was found effective in neutralizing inter- and intra-community water-based conflicts between the water users. IAs and WUAs were highly effective platforms for farmers and water users to resolve their conflicts. Accessibility of conflict resolution platforms and instruments at grassroots levels, monitoring and supervision roles of the IAs and having decision enforcement mechanisms were the three main reasons for the effectiveness of the reform agenda regarding conflict resolution.
>
> The implemented reforms improved community-level agricultural productivity and were highly appreciated by the water users, including farmers. The improved agricultural productivity was facilitated either by the improved infrastructure, including lining canals and installing gated offtakes, or by the resolution or prevention of conflicts. Improved infra-structure enhanced the flow of irrigation water in the canals by reducing the waste of water, minimizing water stealing, and cultivating efficient water sharing. However, increased agricultural productivity did not augment farmers' income due to lack of market access.
>
> Panj Amu River basin was the pilot project for the implementation and testing of IWRM in Afghanistan. In 2004, the practical work, including the construction of infrastructure, was initiated. Organizational development (establishing of WUAs and IAs) was undertaken in 2006 and the first-ever IWRM-related WUAs were established in Kunduz, Takhar, and Baghlan provinces under the Panj Amu River Basin Program (PARBP). Subsequently, other WUAs were established in Badakhshan, Takhar, Bamyan and Baghlan provinces. From 2007 to 2014, more than 91 WUAs were established in the basin. However, since 2014, with the worsening security situation in the area, mainly in Kunduz province, the IWRM-related activities in the area not only halted, but the established organizations become almost dysfunctional. (It was) found that current members and representatives of the established WUAs conceal their identity due to the ongoing terrorism by the Taliban. It was even difficult to find and contact potential respondents for this research. WUA members are highly disappointed and without hope. In addition, most of the WUAs lost their equipment to looting and plunder during the capture of Kunduz in 2015. It seems that the established WUAs will disappear and all the achievements will vanish if the government does not take the required steps."[5]

27. Governance issues of this nature represent a key constraint in addressing water-based conflicts, as problem-solving and conflict management are often not conducted in a systematic

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5 Atal Ahmadzai et al "The Impacts of Water Sector Reforms on Agricultural Productivity in Afghanistan". Afghanistan Research and Evaluation Unit supported by GIZ (2017)

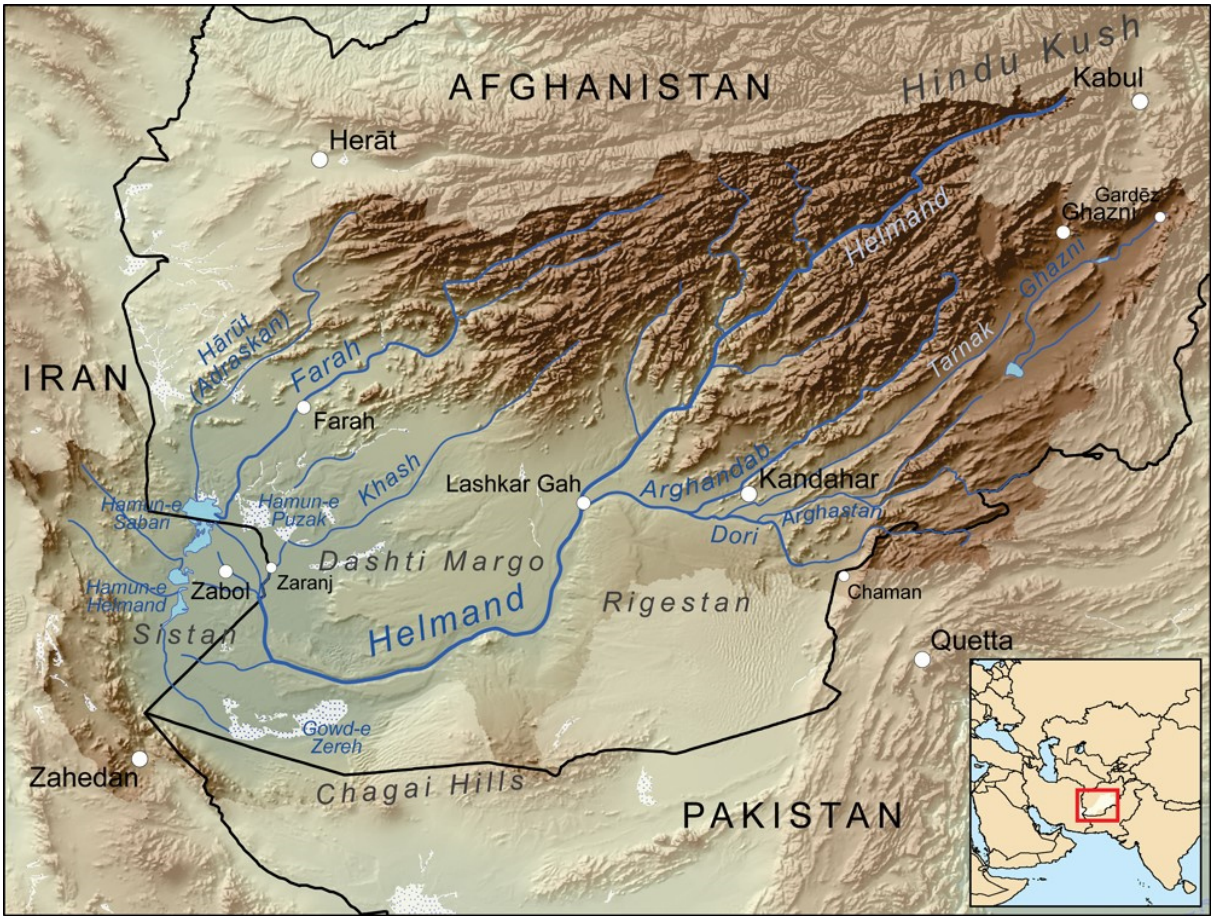
and effective manner throughout the system. Strengthening of water governance systems will be crucial to address this.

28. The problems experienced in the Panj Amu basin in the north highlight the problems of participatory management in a situation of conflict. Unless the parties to the conflict can reach an understanding of the need for and benefit from IWRM and subscribe to the principles of participatory management, its future is unlikely to be bright in the Helmand basin – at least until the end of the conflict.

B. Helmand River Basin

29. The Helmand River Basin (HRB) has a total area of approximately 402,000 km^2, including areas in Iran (15%) and Pakistan (3.6%). The basin plus three non-drainage areas in the south extends to over half the total area of Afghanistan. However, its surface water resources are limited, with only around 9 km^3 annual flow, or 16% of the national total (of 57 km^3). The Helmand basin (together with the Hari Rud) was the first area developed for extensive surface and karez irrigation, and also through HAVA, the first developed for "modern" irrigation. Elevations in the basin range from 490 meters in the southwest in the area of the Sistan depression, to over 4400 meters in the northeast. The main topographic features of the basin are shown in Figure 1.

Figure 1. Helmand River Basin



Note: the large pale areas in the south of the basin are non-drainage areas
Source: https://commons.wikimedia.org/w/index.php?curid=10323588

30. Helmand is a closed river basin. Runoff is generated largely from snowmelt in the upper basin. It is utilized for irrigation in the valley floors of the upper basin, and more extensively in larger scale formal irrigation areas in the middle basin, before entering the Sistan depression and a series of terminal lakes. Part of the Sistan depression has been declared an ecologically valuable wetland under the Ramsar Convention[6]. The water level and area of lakes (*hamouns*) in the Sistan depression vary in response to inflows and evaporation. Mean annual precipitation varies from about 50 mm in the southwest to almost 300 mm in the northeast. Precipitation occurs mostly in the winter months, and in the upper basin falls mostly as snow. Spring snowmelt provides the major part of the water resource in the basin. Peak runoff occurs with snowmelt, normally in March and April. Patterns are similar in all catchment areas.

31. The Helmand basin has experienced relatively little development in the last 40 years, in part due to the adverse security environment. It now has a marked need for further development to support its population and general economic development. The security environment remains a major negative factor in much of the basin. Under the Helmand River Basin Masterplan,[7]over 400 potential water development and water management projects were identified for the basin including many in the Arghandab sub-basin.

32. MEW's General Directorate of Water Affairs (Kabul) oversees all river basin agencies in the country. All dams and irrigation main systems for which MEW is responsible are managed by its basin or sub-basin agencies. The HRBA based in Lashkargah is the primary agency responsible for managing the water resources of the basin, taking over from HAVA after passage of the 2009 Water Law. The Arghandab Sub-basin Agency (ASBA), with its office in Kandahar City, is one of six sub-basin authorities under HRBA. An overview of the Helmand sub-basins in Afghanistan and transboundary areas taken from the Masterplan is in Appendix 1.

C. Arghandab River Sub-basin

33. The Arghandab is the major tributary of the Helmand River. Its headwaters are in the mountains of the Hindu Kush west of Ghazni, and around 150 km SW of Kabul. Much of the river's flow originates in the rain and snow falling on these mountains at elevations of about 3000 to 4000 meters. From the headwaters, it flows SW for almost 300 km, before reaching Dahla Dam at a current spill altitude of 1135 meters. flows 14 km SW to the weir which diverts the water required by the Arghandab Irrigation System (AIS) into the Arghandab south main canal. AIS was developed in the 1950s and rehabilitated in 2012 with assistance from Canada. The south main canal capacity should be 42.5 m^3/s, but is now reduced to 35 m^3/s by sedimentation.

34. Under a decision taken in discussion with the mirabs three years ago, the diversion to the AIS canal should be 40% of the irrigation flow in the Arghandab river, leaving 60% for the community irrigation systems further south. The main community irrigation systems extend as far as Dehqobad, 60 km SW of the weir, where the Arghastan river, including flows from the Dori[8] and Tarnak rivers enters the Arghandab. From there, the combined rivers flow east for about 88 km, before joining the Helmand rivernear Qala-i-Bust south of Lashkargah.Historically, the Arghandab and its tributaries have contributed an average of 880mm^3 per year to the Helmand or around 16% of their combined flow.

6 Afghanistan is not currently a signatory to Ramsar, though accession has been considered and is possible.
7 Mott MacDonald, "Helmand River Basin Master Plan: Technical Report 5" (2013).
8 After joining of the Dori and Arghastan, the river is sometimes referred to as the Dori and sometimes (including by MEW) the Arghastan.

1. According to Delft Hydraulics (2006) the following tributaries contribute to the Arghandab south of Dahla:

   (i) Two intermittent streams, the Koshhk-e-Nakhud and the Garm Ab west of Kandahar, feed into the Arghandab from thenorth.
   (ii) The Arghastan River, about 280 km long. draining19,300 km^2, flows east of and parallel to the Arghandab. Joined, by the Lora no. 1 and Kushk-e-Rud, the Arghastan meets the Dori River southeast of Kandahar, and the Dori then flows on to join the Arghandab at Doab 25 km west of Panjwai.
   (iii) The Dori, about 320 km long, is called the Lora near its source in Pakistan. Its name changes to Kadanai as it enters Afghanistan, and the name Dori applies east of Spin Boldak. Irrigation uses most of the Dori and Arghastan flows before they join.
   (iv) The Tarnak, about 320 km long with a drainage area of 9060 km^2 is sandwiched between the Arghandab and Arghastan Rivers and drains the Kalat-e-Ghilzai region. Most of the Tarnak is diverted for irrigation before it joins theDori.
   (v) The Ghazni Rud, about 240 km long, mainly waters the Ghazni area, and its principal tributary, the Jilga, flows out of Paktya. A brackish lake, Ab-e-Istadeh, (27 by 8 km), receives the runoff from the Ghazni Rud. The Ab-e-Istada, the source of Lora no. 1, freezes inwinter.

35. From Lashkargah, the Helmand travels SSW then W then NW for around 400 km, before the bifurcation at Shila-i-Chark. The left-hand fork passes into Iran, where a canal takes water to four water storages constructed between 1981 and 2008 west of Shila-i-Chark, reportedly mainly to supply the town of Zabol, but which also can be used for irrigation. The righthand fork continues north, reaching and ending in the Sistan wetland.

D. IWRM Institutions

36. ASBA has two roles: firstly protecting/managing the water resources in the Arghandab sub-basin and secondly as operator of Dahla Dam and the irrigation infrastructure for diverting water into the Arghandab Valley's 120 community irrigation systems, downstream of Dahla Dam. Of these systems, 66 have their own intakes while the 54 systems of the AIS share the intake on the river at Arghandab weir. ASBA manages the AIS. Fieldwork under the TA indicated that ASBA provides a service that is generally appreciated by its principal customers, the irrigation communities in the Arghandab basin.

37. MAIL, through its provincial department in Kandahar (DAIL) is responsible for guiding the agricultural sector and managing the secondary and lower canals in irrigation systems such as AIS and supporting community irrigation systems. MRRD often through its provincial departments (DRRD) or under different projects and programs, supports small-scale irrigation rehabilitation or development and the development of village water supply systems. It mainly works through the community development councils (CDCs).

38. River basin and sub-basin agencies have been established in all basins, but not yet the River Basin Councils (RBCs), representing the stakeholders. A number of suggestions have been made, of which one is to convert the district-level committees of *mirabs* into sub-basin councils. Also, for most basins and sub-basins, the RBAs have not yet prepared draft river basin (management and development) plans for presentation to and review by stakeholders. This is important to resolve as not only would such plans support water governance and transparency, but they could also include specific FCAS considerations in a more systematic way.

39. Community-based organizations, such as WUAs (supported by MEW) and irrigation associations (by MAIL) have been formed, but numbers are well below target. Roles and responsibilities are not yet understood by all in the same way. For example, regarding groundwater use, some farmers understand that it is the responsibility of MEW's irrigation directorate and/or of the Ministry of Mines, while others believe that MAIL is responsible for groundwater management. The IWRM understanding is that management of groundwater is part of the remit of the RBAs and SBAs.[9]

E. IWRM and AIWRDIP

40. Much of AIWRDIP's focus relates to IWRM. It is the first major water sector program in Afghanistan that is attempting the integration of key sectoral activities and at the same time supporting environmental management. This was the primary reason for preparing the multi-stakeholder water allocation (MSWA)options study – the parallel study to this review of IWRM.

41. ASBA relates to water users through the WUAs it assisted in establishing. *Mirabs* are the key WUA members. In 2018 they received certificates issued by MEW. Three associations were established in 2016, each covering one or more community systems:

(i) Arghandab River WUA includes 29 community systems, serving 40,000 ha of farmland. The board consists of the leaders from the districts of Arghandab, Zheeri, Panjwayi and Maiwand.
(ii) Doab WUA is in Panjwayi District covering one community system between the Arghandab and Dori/Arghastan rivers.
(iii) Southern Arghandab WUA covers the 44 AIS community systems in Dand, Daman and Panjwayi districts. It includes leaders from the three districts.

42. ASBA understands that, based on the water law, it can only establish WUAs on canals that take water from the Arghandab River. ASBA plans to establish 28 more WUAs in the next five years. However, it receives no budget for this activity, for example for transport or training. It is noted that the responsibility of MEW for managing primary and secondary canals is likely to pass to MAIL in the near future under a national government decision. This should provide the potential to integrate the WUA and IA systems, and to consolidate participatory irrigation management (PIM).

43. The MSWA study undertaken under AIWRDIP was largely focused on IWRM of the water stored in Dahla reservoir. Reference may be made to the MSWA Options study for detailed information. However, in summary, the indicative priorities for the use of Dahla water were assessed as follows:

(i) Water supply to Kandahar city and the villages along the Arghandab River,
(ii) Irrigation water provision to the AIS and community schemes,
(iii) Environmental supply to the river environment and downstream wetlands,
(iv) Flood control, a minor benefit of raising Dahla Dam, and
(v) Hydropower generation, important economically, but a byproduct of releases for other purposes.

[9] Paragraph 36 Feasibility Study, Component 2: Climate-Resilient Productive Use of Water in Agriculture

44. **Potable Water:** Once the urban and village water supplies are established, they will become the highest priority use of Dahla water.[10] Although they require a relatively low proportion of annual inflow, the provision of domestic water will require that under no circumstances can the dam be allowed to fully empty. For Kandahar to run out of water would be catastrophic, since no ready means would be available to maintain even basic water supply to a city that will soon reach one million and may reach two million before 2050. While in the early years, households may be able to obtain water from pre-existing tubewells, over time they are expected to become fully reliant on treated water from Dahla.

45. Irrigation: is clearly the second highest priority use for Dahla water and is the primary reason why the dam raise is needed – to increase the storage of water in spring for release later in the year, and to reduce spillage. The increased storage volume will increase irrigation supplies in all years apart from the driest 30% and will allow expansion of the irrigated area and more reliable crop production. It is clear that during dry years, preference must be given to tree crops and other perennial crops such as vineyards. They represent a substantial investment of time and money and cannot be allowed to die. Annual crops are relatively equal in precedence – vegetable crops can generate high returns, while wheat is a critical crop for home and livestock consumption (the latter of straw).

46. Farmers and their families rely on irrigation to survive, and a failure of the river and irrigation system to provide adequate water (as in 2018) presents a major problem for many farm families and for the whole region. Dahla was originally constructed as an irrigation dam. In the future, accurate irrigation allocation predictions should allow farmers each season to plan cropping programs with available irrigation water supplies. If this doesn't happen, crops will fail, or excess extraction of groundwater will continue, leading to extreme long-term problems for the region.

47. It is noted that karez were once a major source of irrigation water in Kandahar province. However, by 2013 around 95% had dried up mainly because of declining water tables due to use of boreholes for irrigation, but also reportedly due to a number of low rainfall seasons.[11]

48. Environmental flow is important for several reasons: (i) to assist in conserving wildlife along the course of the river, (ii) to provide water to village communities west of Dehqobad. (iii) to contribute to groundwater recharge in aquifers linked to the river, and (iv) to provide water to the Helmand river flowing to Iran. Environmental allocations from Dahla should flow down the Arghandab, and be supplemented by seasonal flows from the Arghastan, Tarnak and Dori Rivers which join the Arghandab at Doad. In wet years, when flows are expected to exceed the capacity of the dam over the early spring period, environmental releases can commence in mid-winter. However, in drier years, when irrigation water is limited, it is unlikely that communities will allow the water to pass their offtakes, if their crops are thirsty. Also flows classed as environmental in the Arghandab may be abstracted by farmers downstream on the Helmand river. However, the HRBA indicates that Helmand river communities do allow environmental flows to pass their diversions. Further analysis is needed to define optimal environmental release from Dahla, but at present an average environmental flow of around 17% of inflow is assumed plus spills during high inflow periods.

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[10] Article 6 of the 2009 Water Law states "Priority for use of water resources shall be given to drinking water and livelihood." It is expected that the new water law under preparation since 2014 will have the same priority.

[11] Mott MacDonald, "Helmand River Basin Master Plan: Technical Report 5" (2013).

49. Few data are available to allow environmental allocation to be defined accurately. Consequently, an environmental study is planned under the project, which should allow environmental releases to be defined in more detail, together with study of the groundwater environment and limited assessment of the upland Arghandab catchment. The last of these will depend on the security situation, with such an assessment being at least partly dependent on a peace agreement.

50. Flood control: With its enlarged capacity, the dam will have potential for improved flood control and should be able to reduce flood damage even in the wettest years, and eliminate it in average years. The current maximum storage volume of Dahla is 278 Mm^3 increasing to 561 Mm^3 for an 9.1 meter raise of the spill level and 782 Mm^3 for 13.6 meters. Thus, up to an additional 280 to 500 Mm^3 of potential flood water could be entrapped by Dahla compared to the current spillway level. However, flood management requires control of water levels in the reservoir pre-flood, with early release of water if a severe flood is expected. While there is potential for downstream damage from a severe flood (maybe once in one hundred years) most floods cause damage between the riverbanks (for example to irrigation diversions), but are reported not to have caused widespread damage to agriculture or structures. Flood control, though sometimes important, is not classed as a central feature of dam management.

51. Hydropower: is seen as a by-product of releases for other purposes. Thus, a primary aim of Dahla Dam management will be to ensure that the dam is as full as possible at the end of the high volume run-off period. Power generation will occur during periods of regulated water release to meet the demand for water supply, irrigation and the environment. Aside from "by-product" power generation, hydro-power will be produced through release to the turbines when water is about to spill over the spillway, so as to extract energy from the water, rather than have it spill for no energy gain.

52. Groundwater: has been widely used in the irrigated areas of the Arghandab basin to support surface water irrigation. While in principle, tubewells need to be approved and registered, this appears not to have happened in the Arghandab river basin, or in fact in much of Afghanistan. This is leading to rapid decline of the water table in many areas, and if not controlled will ultimately lead to the loss of aquifers and the inability of groundwater to support irrigation. Increasing the availability and planning of surface water release under AIWRDIP should have a major goal of limiting the need for groundwater usage, and thus reversing or at least stabilizing the falling water tables. This must be supported through adequate links with the community (see AIWRDIP's FCAS Community Engagement Strategy).

F. Afghan-Iranian Helmand Treaty

53. The Helmand is currently the only basin in Afghanistan currently governed by an international treaty – the Afghan-Iranian Helmand River Water Treaty of 1973. Article 3 of the treaty allocates an average flow of 26 m^3/s[12] to downstream Iran in a "normal year". For this purpose, a normal year is defined as one where flow for the 12 months ending 30 September is at least 5.662 km^3 at the gauging station above Kajaki dam. When the amount of flow is less than that of a normal year, the required deliveries in future months are reduced pro rata (Article IV).

[12] The treaty included an average flow of 22 m^3/s based on the Helmand River Delta Commission recommendation plus 4 m^3/s granted to Iran by Afghanistan "as an expression of goodwill and brotherly relations" (Article 2). Article 3 defines the normal year flow at three defined locations with monthly averages ranging from 2.3 m^3/s in September to 78 m^3/s in February. The additional 4 m^3/s was intended to result in a number of concessions from Iran, including railway development, connection to the sea (presumably at Chabahar port), and financial support. These benefits were not acted on due to political turmoil.

However, the gauging station has been in an insecure area for several years, and therefore cannot be read even if still operable.

54. Due to the 1973 Afghan coup, the 1978–79 revolution in Iran, the 1979 Soviet invasion of Afghanistan, and the rise and fall of the Taliban, the treaty was never fully implemented. Improved Kabul-Tehran relations following the ending of the Taliban regime have not yet yielded a solution, though discussions are ongoing.

55. Constructive moves to solve outstanding disagreements have taken place in recent years. Afghanistan and Iran have assigned a common Helmand River Commissioners Delegation in accordance with Protocol 1 of the Helmand River Treaty. The Afghan and Iranian Helmand River commissioners currently meet on a quarterly basis to promote bilateral cooperation and the formation of subcommittees on dredging and flood control in the Helmand. The Afghan Helmand Transboundary Commission is now headed by deputy ministers in both countries, thus emphasizing its status.

G. IWRM in Practice

56. For IWRM to work effectively, systems must be put in place to allow discussion and agreement between key stakeholders. While IWRM relates to the whole of the Arghandab basin and its link to the Helmand basin, under AIWRDIP it will be most critical in relation to the management and operation of Dahla Dam, following the planned dam raise.

1. Overall IWRM

57. The best approach to managing IWRM in the Arghandab sub-basin, will be through the proposed SBC. This should bring all stakeholders together to understand the issues relating to water resources management and make recommendations to government agencies. Involvement in the SBC should be sought from WUAs, IAs and mirabs, also from the CDCs. All relevant government agencies should be represented on the SBC, preferably by staff of reasonably high standing and experience. Once the SBC has been established, mechanisms to support this level of participation would need to be defined. At a minimum, it is suggested that groups are formed at the community or tertiary canal level, to discuss issues and nominate representatives to attend SBC meetings in Kandahar or elsewhere in the sub-basin.

58. Given that IWRM is a technical governance program in a sector that can experience high levels of dispute and conflict in Afghanistan, the AIWRDIP IWRM model utilized should be closely informed by the FCAS approach. Technical aspects will take primary consideration, but in order to operate effectively in a conflict affected area, an understanding of the non-technical issues affecting water resources management will be critical for them to succeed.

59. The project's FCAS approach provides the necessary analysis of conflict, socioeconomic, and political issues that may impact on water resources management in Arghandab. It includes guidance on working within this context through action plans and community engagement strategies. This can help inform and guide technical decision-making when conflict issues are evident.

2. Arghandab Irrigated Areas

60. In a parallel study to this, multi-stakeholder water allocation options were assessed, and a model developed to allow stakeholders to plan and manage water distribution from Dahla. The following paragraphs are taken from the MSWA report prepared under the TA.

61. In order to decide on optimal use of Dahla water, it is recommended that a technical group is established, representing all key stakeholders. Subject to government approval, it is suggested that the group should comprise of technical representatives from: ASBA (chair), DAIL, DRRD, AUWSSC, NEPA, DABS and the 3 WUAs.

62. It is suggested that the group should initially meet twice per month on the nearest weekday to the 1st and 15th of the month. During its first few months' operation, it will review whether two meetings per month represent the best option, or whether more frequent meetings would be valuable, at least for the six or seven months from 1 Hut (21 February).

63. Using the Excel model developed under the multi-sector water allocation options study, the group will review the data available on inflows and outflows and decide on a firm release program for the next three months and an indicative program for the subsequent two or three months. To the extent possible, the group should reach agreement on the release program, which will be expressed as average cubic meters per second, which can be varied during the month to respond to demand, provided that the volume released during the month meets target.

64. ASBA will need to appoint a skilled water resources management specialist to operate the model. He/she will be responsible for collecting the data required to update the model before each group meeting. Initially at least, it is recommended that the technician should work full time to ensure that all data collection activities are working well, to follow up the rain stations and flow gauges, send information to the American National Oceanic and Atmospheric Administration (NOAA), and process it in-house, based on the training to be provided by eWater[13]. Interaction will be required with the various agencies and individuals that collect necessary data, such as DABS for the turbine gauge readings. AUWSSC will provide the data from the water networks on a fortnightly basis, so that it can be reviewed and entered into the model at the end of each month.

65. The WUA, DAIL and DRRD representatives will play a key role in working with the mirabs to define irrigation water demand. In practice, the mirabs in each region may form committees to meet with the WUAs every fortnight to discuss experiences during the previous period and future water demand. This information would be a valuable input to the fortnightly group meeting. As the mirab groups gain confidence in the system, they should be able to allocate water on demand to different users or groups of users. They should be provided training to assist them in this effort.

66. While it is hoped that the technical group would usually, or at least often agree on the allocation decisions, there may be times when there is disagreement. In this case, some mechanism for reaching agreement will be required. Some relevant aspects include (i) the reservoir can never be allowed to run dry or even go below its minimum volume, tentatively set initially at 50 million m^3, comprising 25 million m^3 below the penstock offtake and 25 million m^3 to provide for urban and village water supply in an extreme low inflow year, (ii) in difficult years, where crops are dying or even thirsty, environmental flows should be allocated to agricultural use over the period July to December; the reasons for such problems should be assessed and attempts made to avoid them in future, (iii) the delivery of water to Kandahar and the Arghandab villages can never be interrupted; however in the event of a significant crisis, Kandahar and the villages may be requested to enter a period of water use restriction – it would be hoped that this would not happen more often than about once every ten years.

[13] A technical assistance project funded by ADB will start in early 2019 to assess river flows in the main Afghan rivers, commencing with the Arghandab. Training will be provided in satellite image interpretation and the links between catchment precipitation and river flow.

67. The forward estimates of water allocation by the technical group would need to be widely publicized through the WUAs/IAs, in the broadcast media, in the press and on a website. Publication would also be the responsibility of the proposed full-time ASBA employee.

III. RECOMMENDATIONS

68. A number of recommendations can be made to support IWRM in the Arghandab and Helmand river basins. The first five recommendations are national in nature and will need to be reviewed by national institutions such as SCoLW and MEW. The remainder relate to the Arghandab and Helmand basins with potential for support by AIWRDIP.

A. National Recommendations

1. Revise Water Law to Provide Additional Support to IWRM

69. The 2009 Water Law provides a useful framework for the management and direction of the sector. Its move to hydraulic boundary management underpins the development of the sector, though some agencies are finding difficulty adjusting to it. Amendment to the law will be useful in the short-term to add to its relevance, combined with the required preparation of supporting regulations. The law is already under review, and the suggestions in this section are raised for consideration by the review committee.

70. Among other important modifications, particular attention is required to aspects of participatory irrigation management, and the funding of irrigation operation and maintenance. The major need is considered to be the development of a participatory irrigation management law – perhaps termed a Water User Association law, to underpin and give direction to the development of PIM in Afghanistan's irrigation sector. If this proves impossible, a bylaw or regulation maybe a short to medium term solution.

71. A review of the law was undertaken five years ago supported by the World Bank[14] which highlighted areas where the law needed to be strengthened or supported by subsidiary of parallel policies or regulations. Some of the key issues raised in the review include:

(i) The law embraces several ministries and agencies. The "usual" basic rule in Afghanistan is: one law, one ministry. (However, since IWRM is multi-sectoral, covering several ministries is not considered to be negative).
(ii) There is some lack of clarity between the roles of RBAs and RBCs.
(iii) Perhaps the key problem with the law as it stands is the lack of clarity between WUAs and IAs, and the need for subordinate legislation to establish them fully.
(iv) More information is required on the issue of water rights.
(v) Access to data is covered in the law to some degree but more detail would be desirable in relation to public access.
(vi) The law lacks provision for protected areas and wetlands.
(vii) The law makes little provision for the payment of irrigation service fees by farmers.

72. Other issues include the statement in the law that water is free, which limits the potential for economically rational decision making in relation to water allocation. It also lacks definition of the roles of regulator and operator, lacks focus on the need to measure and regulate water and to allocate and protect water rights. Over the 10 years since the law was introduced, there has also been increasing understanding of the need for the environmental management of water. Due

[14] Hodgson 2014

to these and perhaps other issues, there is now a need to revise the law, particularly to bring it into line with current international thinking in relation to IWRM.

2. Cross-sectoral Linkages and IWRM – Creation of a Water Resources Commission

73. While the creation of RBCs and SBCs will be valuable, it is considered that they need support from Kabul. It is consequently recommended that a new Water Resources Commission is set up in Kabul, probably under the Supreme Council on Land and Water which will support the establishment and operation of the regional basin councils, and promote the development of projects supporting IWRM.

3. Publish the Helmand River Basin Master Plan

74. The major Helmand River Basin Master Plan was completed in 2013 with support from ADB and the United Kingdom (DFID). It has still not been approved by MEW or the Afghan government. The Master Plan contains much useful information. Three recommendations are consequently made (i) that the master plan should be published as soon as possible, with a section which indicates any specific concerns that the government has that have previously prevented publication, if necessary, (ii) that a short (perhaps 50 page) supplement is commissioned to update key aspects of the plan, perhaps undertaken by Mott MacDonald, the company responsible for the original report, and (iii)the supplement includes a section which addresses FCAS issues in the basin and sets out an FCAS approach that will support the master plan to achieve its technical ambitions, as well as identifying the potential for HRB investments to contribute to stability and peace in the areas.

4. Develop a System of Water Entitlements and Allocation

75. Systems for defining water allocations from Afghan rivers need to be developed and implemented. The work undertaken on the Arghandab to define multi-sector water allocations needs to be further developed and applied to other river basins. The capacity to develop and operate basin water resource models needs to be established in Kabul, in order to support such activities in all river basins. It is also noted that there is limited capacity in Afghanistan to assess freshwater ecology or ecohydrology – the interactions between water and ecosystems. Options for establishing such capacity should be reviewed.

5. Effectively Implement the Afghan/Iran Transboundary Agreement

76. The extent of dam construction and raising in the Helmand basin, means that the volumes agreed for delivery to Iran under the Afghanistan Iran 1973 treaty may be difficult to deliver, particularly under a climate change regime. However, it is noted that the 26 m^3/s average flow intended for Iran is only 15% of the historical average flow at Dehraud of 176 m^3/s. Iran's share of Helmand water between 2010 and 2017, though lower than historical volumes, appears to have averaged around 66 m^3/s based on the differential in flows between Kwabagh and Shila-i-Charkh. In addition, it is noted that Iran has invested in water transfer and storage in its border areas, which are drawing water from the Afghan part of the Sistan basin.

77. The inaccessibility of the Dehraud gauge currently makes monitoring of treaty flows impossible. If this situation does not improve, it may be necessary to define flows at an alternative location, though this is complicated by the plan to raise Kajaki dam. The current issues with implementation are discussed regularly at Commission meetings. If they cannot be resolved in

the next few years, review of the treaty and its conditions may be merited. Any review of the treaty should be linked to the government's approach to developing more productive regional relationships as a way to address fragility, resilience and transnational terrorism.

B. Recommendations to be Supported by AIWRDIP

78. The nine recommendations in this section relate to the Helmand and Arghandab basins and are considered suitable for support under AIWRDIP.

1. Strengthen Water Governance Systems and Structures

79. The strengthening of water institutions and the overall water governance structure is central to effective water resources management. It would address some of the gaps in the system identified and help integrate the AIWRDIP FCAS approach. Areas for intervention could include:

80. Develop ASBA management and development plans. Implementation of the IWRM approach would be enhanced if it is linked to and embedded in ASBA plans. These should clearly set out the governance structure and systems involved in water resources management in the Arghandab sub-basin. In particular this should include strategies for addressing capacity needs, community engagement strategies (including sensitising water users on the water governance structure) and a provincial institutional coordination strategy.

81. This could be an opportunity to strengthen the effectiveness of water governance, particularly vertically, to address some of the technical and non-technical issues faced in the sector. To make this sustainable, elements of organisational development and capacity development/ resourcing needs should be considered.

82. AIWRDIP would benefit from including this, as it will provide greater clarity of the Arghandab water governance structure, overcoming some of the complexity previously noted, and providing an opportunity to embed the FCAS approach into longer-term planning.

83. **Improve environmental knowledge and management in the Arghandab River basin.** NEPA is currently not strong in Kandahar, as in most other Afghan provinces. Some strengthening of NEPA will be useful, particularly to assist in the development of basin modelling tools supporting management understanding and decision making. A detailed environmental study is proposed in the MSWA report, to be undertaken under the AIWRDIP. In addition to covering river-related environmental impacts and management, it is recommended that the study includes assessment of the groundwater situation and its management. This could include such aspects as the need to licence tubewells and mechanisms to limit their use, so that aquifers can be protected for use in dry seasons.

84. Invest in personnel and organizational capacity development: In addition to support in technical capacity development, the water governance system would benefit from complementary capacity development that facilitates engagement in a conflict environment. For example:(i) conflict management capacity will enable ASBA and the WUAs to manage and resolve minor disputes before they become more significant; (ii) community engagement capacity will help in ensuring broader community consultation and participation that includes vulnerable populations, households and individuals; (iii) conflict, social and environmental impact assessment capacity will help the ASBA routinely monitor the impacts both in construction and post-construction and track unanticipated changes that are occurring; and (iv) in conjunction with

community engagement and problem-solving capacity, this will enable the water governance structure to develop effective mitigation strategies and address problems before they expand.

85. Link to FCAS Community Engagement Strategy: Effective community outreach will be critical in ensuring that: (i) roles and responsibilities of stakeholders in the water governance structure are clearly articulated to water users; (ii) technical decisions (e.g., water allocations, maintenance prioritization) are adequately disseminated to water users; (iii) transparency and accountability are enhanced; and (iv) potential disputes and conflict are appropriately managed.

86. The FCAS community engagement guidelines provides guidance for government officials and project implementers in planning and implementing community engagement in conflict areas. A specific FCAS community engagement strategy for the AIWRDIP has been developed and can be consulted as necessary.

2. Create functioning RBCs and SBCs:

87. In order to involve all stakeholders in Helmand/Arghandab River basin management, the creation of an RBC and sub-basin councils (SBCs) is essential. Article 12 of the 2009 Water Law states that “River Basin Agencies and Councils (should be) formed with the purpose of integrated water resources planning and participation of the users and other social and cultural institutions in the decision-making processes for management and development of water resources, protection of the environment, equitable distribution of water and other water related matters.” It is recommended that a Helmand RBC is formed as soon as possible, and may if required be supported under AIWRDIP.

88. The law also requires coordination with SBCs, and creation of the Arghandab SBC is recommended under the project. This SBC, if it performs well, may provide a model for other sub-basins in the Helmand basin, such as Farah Rod.

89. Formation of the RBCs should include terms of reference relating to the implementation of an FCAS conflict sensitivity approach as these institutions will be have significant community presence and will be influential in addressing any disputes that emerge.

3. Develop Overall Participatory Irrigation Management (PIM):

90. There was not seen to be any obvious or major benefit in separating the functions of WUAs and IAs. In the future it is suggested that consideration is given to amalgamating the two bodies. While at present, WUAs link to ASBA (MEW) and IAs to DAIL, there is not considered to be any reason in principle why all community irrigation groups cannot be called WUAs (or IAs). What is needed is a multi-layered system, suggested to be as follows:

(i) At the main canal or overall system level, a WUF (water user federation with members elected by the WUAs)
(ii) At the secondary canal or community irrigation system WUAs (water user associations}
(iii) At the tertiary or quaternary canal level, WUGs (water user groups)

91. The three key agencies that can support PIM – ASBA, DAIL and DRRD, should form a PIM group, which can integrate PIM activities and support between them, ensure consistent approaches and prevent duplication or conflict.

92. Mirabs will need to be fully integrated into the systems where the mirab structure remains effective. While this is a general recommendation, it is suggested that it should be attempted under and supported by the project in the Arghandab irrigation areas.

4. Intra-year Planning of Water Allocations from Dahla

93. It is intended that the water planning system recommended for introduction to the management of Dahla Dam will improve irrigation planning and performance. Thus, before Nowruz each year (about 15 Hut– early March) a reasonable estimate should be possible of likely inflows to the dam over coming months. As discussed in the MSWA study and summarized in Section II.G, it is proposed that a stakeholder technical group meets twice monthly to define irrigation releases for the next three months. It is hoped that this will permit farmers to plan their cropping patterns in the knowledge that they will receive timely water. This should have two main benefits: (i) it will allow them to plant areas of crops suited to water availability and to apply appropriate inputs, and (ii) it should eliminate or greatly reduce the need for groundwater irrigation. Both aspects are important, but it is noted that the present rapid decline in the water table will make groundwater irrigation infeasible in many areas in the next 10 or 20 years, if not reversed. Although it is hoped that the extent of such irrigation will reduce demand greatly, as a backstop for use in emergencies, groundwater will always have value and thus needs to be protected. Effective community engagement to increase accountability and transparency would be essential here (see FCAS Community Engagement Strategy).

5. Groundwater Regulation

94. It is recommended that, following the environmental study of groundwater in the irrigation areas of the basin proposed under AIWRDIP, an aquifer management plan is drawn up. This may lead to the licensing of tubewells and limitations on their use, which should as far as possible be limited to emergencies – e.g., when agreed water allocation targets cannot be met. Irrigators should be allocated groundwater licensing linked to surface water availability (conjunctive use extraction licensing). If less surface water is available for some reason, more can be extracted from the ground. Mechanisms for charging for groundwater use should be assessed and implemented, if feasible, for example through an annual license fee. A negative aspect of charging is that farmers will likely think that they are entitled to use their bores if they are paying more than a nominal amount. However, a small annual fee to cover the management and monitoring of groundwater by ASBA is considered to be warranted.

6. Develop Financing Mechanisms for IWRM

95. Various mechanisms will be needed to finance effective IWRM in the Arghandab basin. The addition of hydropower and water supply to the outputs from Dahla means that revenue should be drawn from the responsible agencies and applied to dam and basin management. Thus, DABS and AUWSSC/MUDA should contribute both to dam management, and also to environmental management, insofar as this can assist in prolonging dam life. WUAs and IAs should charge their members for water deliveries and use the funds both to manage and maintain their own infrastructure, but also to pay for water delivery from ASBA. ASBA/HRBA/MEW should draw up financing plans and agree them with the other agencies involved in the water sector in the basin.

7. Improve the Availability of Information

96. Access to information is not a strong feature of Afghan government services at present. For example, data which in many countries are widely available, such as river flow and rainfall data, can often only be obtained in Afghanistan by a letter from the ministry to the data holder. It is recommended that all data relating to IWRM in the Arghandab and Helmand basins (and ultimately all river basins) should be made freely available through publication on the internet. Particular mechanisms will be required to provide information to residents of the basins and these need to be developed and defined. For example, the water allocation program discussed in the MSWA report is planned for distribution through the WUAs, IAs and CDCs, supported by internet, SMS, newspapers, radio and television.

97. In order to promote the development of IWRM in the Arghandab and Helmand river basins, it is recommended that a public awareness program is organized to inform local people about the concept and benefits of IWRM. It would be hoped that this will limit the extent of disagreement with project programs by the community, as well as providing a mechanism for ASBA and other government agencies to understand community concerns. It is recommended that a series of IWRM workshops are organised under the project. As part of this program, it is suggested that the project managers develop a list of stakeholders who can contribute to project implementation and management, together with their contact information and skills, so that they can be effectively integrated into the project.

8. Monitoring and Evaluation of IWRM

98. It is recommended that the progress of IWRM in the Arghandab and Helmand basins is closely monitored. An initial monitoring program can be undertaken by the technical group proposed for the operation of Dahla Dam. They should report to the provincial and national agencies, perhaps twice each year on the positive and negative aspectsof IWRM in the Arghandab basin and how to overcome problems. After around five years, it is recommended that an independent evaluation of the IWRM program is undertaken, perhaps supported by a bilateral or multilateral donor. This could perhaps take place as part of the project completion reporting process, through commissioning a specific study.

99. IWRM monitoring can support FCAS monitoring which is a critical element of the FCAS approach for AIWRDIP (see the FCAS M&E Framework). Independent evaluation of the IWRM program should also include a component of evaluation of the AIWRDIP FCAS approach.

9. Assess Long-term IWRM Needs and Required Investments

100. While it is hoped that environmental management of the Arghandab catchment area will limit erosion and sediment transfer to Dahla, the nature of the catchment will continue to generate substantial sediment. In this context, the long-term future of the Arghandab irrigation industry will require additional means of storing spring river flows for summer use. The optimal option at present appears to be construction of the Hasanzay Dam around 25 km upstream of Dahla in perhaps 40 or 50 years' time. It is recommended that the dam site and potential inundation areas are secured, with compensation paid to land-owners, and further construction of houses and other infrastructure limited, or if possible, prevented. This will be difficult to achieve until the security situation improves. In the light of this, and the government and ADB approaches to FCAS in Afghanistan, all future investments should expressly consider the conflict implications for operations and develop an effective FCAS approach.

Appendix 1. Overview of Sub-basins in Afghanistan and Transboundary Areas

Sub-basin	MEW office	Sub-sub basin	Area[1] [km²]	Area [%]	Key attributes (main water uses, assets and issues)
Upper Helmand	Daikondi		**38,529**	**9.6%**	Mountainous, feeding area for Kajaki Dam (~1134 million m³ storage which is ~33% of mean annual inflow). Some informal irrigation in floodplains.
Tarin Kowt	Tarin Kowt		**8,303**	**2.1%**	Mountainous, feeding area for Kajaki Dam. Significant informal irrigation in floodplains
Middle Helmand	Lashkar Gah		**38,178**	**9.5%**	-
		Musa Qala	7,992	2.0%	Tributary to main Helmand River downstream of Kajaki Dam, mountainous. Informal irrigation in floodplain and from *karez*
		Main Helmand	30,186	7.5%	Floodplains fed by Kajaki (Helmand) and Dahla (Arghandab) dams. Largest water user in basin: 4 large formal irrigation projects (Nahri Seraj, Boghra, Shamalan, Darweshan).
Lower Helmand	Zaranj		**38,460**	**9.5%**	Desert, plains with limited traditional irrigation in floodplain, Kamal Khan Flood Dam being developed. New (Nov 2011) irrigation system at Charhar Burjak. Nahri Laskari Canal (32 km) towards Zaranj Zaranj water supply problematic (saline groundwater) Minimal flow to lakes (*Hamouns*) that are (partly) ecological Ramsar sites. Flow to Iran via 'Helmand fork'.
Upper Jolga	Paktia		**3,616**	**0.9%**	Mountainous, possibility of some small dams. Large areas with traditional irrigation. Small annual river flows, much groundwater development. New small dam under construction, halted in early 2013 (Machalgho).
Stopped Water/ Ab-i-Istada	Ghazni		**15,404**	**3.8%**	Small river flows, little or no surface water outflow to Arghistan sub-sub basin. Three small dams for irrigation (Ab Estada & Band-e-Sarde, Sultan/Seraj). Two lakes (Ab Estada & Dash-e-Navar) that are (partly) national parks. Large areas with traditional irrigation. Much groundwater development
Tarnak	Qalat		**57,941**	**14.4%**	Small annual river flows (minimal contribution to Arghandab).
		Tarnak Rod	9,058	2.3%	Tributary to Arghandab (downstream of Dahla Dam), Significant traditional irrigation in upstream part
		Arghastan	19,317	4.8%	Hilly area, some traditional irrigation, by *karez* (especially near Pakistan)
		Rigestan	25,904	6.5%	Desert, no main rivers.

Sub-basin	MEW office	Sub-sub basin	Area[1] [km²]	Area [%]	Key attributes (main water uses, assets and issues)
		Pishin Lora	3,662	0.9%	Edge of mountains, small seasonal streams flowing into desert (not directly draining into main rivers)
Arghandab	Kandahar		**19,860**	**4.9%**	-
		Upper Arghandab	13,230	3.3%	Mountainous feeding area for Dahla Dam (~315 mln m³ storage which is ~24% of mean annual inflow). Some traditional irrigation from river and *karez*
		Lower Arghandab	6,629	1.7%	Dahla Dam feeding Arghandab formal irrigation project, Kandahar by far the largest population centre in the basin (~675,000) with domestic water requirements
Farah	Herat		**106,789**	**26.6%**	The four 'smaller' rivers draining into Sistan Depression
		Adraskan Rod	42,843	10.7%	Largely desert, drains into *Hamoun* Sabiri. Significant floodplain irrigation along upstream part of river, some *karez*
		Farah Rod	32,796	8.2%	Largest flow contribution to Sistan after Helmand River. Large traditional irrigation areas near Farah. Drains into *Hamoun* Sabiri much informal irrigation near Farah. Large Dam and irrigation scheme proposed.
		Khuspas Rod	9,378	2.3%	Some informal irrigation in flood plain along mid-stream part ofriver, some *karez*. Drains into *Hamoun* Puzak. No hydrological data.
		Khash Rod	21,772	5.4%	Some traditional irrigation in mid-steam section. Drains into *Hamoun* Puzak
Afghan part of Helmand Basin	Lashkar Gah		**326,797**	**81.4%**	-
Pakistani part of Basin	-		**14,372**	**3.6%**	Small upstream mountainous area, that does not contribute to the main rivers in the basin, and a desert area downstream.
Iranian part of Basin	(Zabol)		**60,316**	**15.0%**	Sistan depression with two Ramsar sites. Three reservoirs and large formal irrigation project. One main regional town (Zabol). Main surface water inflow from Afghanistan, 1973 Afghanistan-Iran Flow Treaty on Helmand River
Helmand Basin	-		**401,485**	**100%**	

Source: Mott MacDonald, "Helmand River Basin Master Plan: Technical Report 5" (2013)

Appendix 2.Fragile and Conflict-Affected Situations (FCAS)

A. Planned Technical Assistance

1. Issues relating to conflict effects have been mentioned in several places in this report. Reducing the likelihood and extent of conflict is being addressed under a technical assistance project addressing fragile and conflict-affected situation (FCAS) issues in Afghanistan. This entails the mainstreaming of conflict sensitivity throughout ADB-supported projects with the explicit aim of ensuring projects "do no harm" (that is, they do not exacerbate local conflict dynamics) and, where possible, contribute to local peacebuilding efforts and support the generation of a peace dividend. The FCAS approach will aim to bring projects and communities closer together, increasing ownership and strengthening government legitimacy. Overall, this should facilitate the opening up of operational space, meaning that project completion times are reduced. The tools are currently being piloted and will then be revised based on close consultation with government, supervision consultants and contractors.

2. The conflict sensitivity approach is based around eight interlinked tools/guidelines that work together throughout all stages of project processing and implementation. They require implementation by, or oversight from, staff trained in the conflict sensitivity approach and specific tools. These tools/guidelines include: the FCAS assessment guideline; the FCAS action plan guideline; the FCAS monitoring and evaluation guideline; the FCAS capacity tracking tool; the FCAS conflict sensitive procurement tool; the FCAS community engagement guideline; the FCAS project community agreement guideline; and, the FCAS community-driven development component guideline

3. AIWRDIP reports note the potential for upstream-downstream conflicts in the project context through the likely creation of winners and losers. Displacement and security issues are seen as major threats to the success of the project. However, in order to assess the project's potential vulnerability to these threats, and to reduce risks, further assessment and planning is necessary.

4. The primary objective of the FCAS assignment is to pilot the tools that incorporate the FCAS conflict sensitivity approach and provide feedback on their relevance, application and effectiveness, as well as areas for improvement. In order to achieve this, the following sub-objectives are to:

(i) Conduct a full FCAS assessment to determine major conflict threats and local capacities for peace, provide the basis for the development of the FCAS Action Plan, and to support the generation of an FCAS baseline;
(ii) Prepare the project's FCAS action plan based on findings from the FCAS Assessment and integrating conflict-related findings from safeguards assessments and the initial poverty and social assessment (IPSA);
(iii) Generate an FCAS monitoring and evaluation framework that includes an FCAS baseline and appropriate project-context interaction indicators, as well as guidance on conflict sensitive monitoring;
(iv) Create an FCAS capacity plan that outlines specific FCAS resource requirements and capacity development tracking processes;
(v) Develop an FCAS procurement plan detailing procurement strategies to ensure conflict sensitivity is built into project contracts and accounted for in conflict management guidance;

(vi) Produce a project FCAS community engagement strategy that provides guidance for the supervision consultant and contractor, as well as government counterparts, for community engagement on all project-related matters to ensure this is conducted in a conflict sensitive manner. The FCAS community engagement strategy should incorporate guidance on and planning for the FCAS community-driven development component (CDDC)

5. Detailed terms of reference have been drawn up for each of these activities. When implemented prior to and during project implementation, it is expected that they will have the potential to limit conflict issues and improve project outcomes.

B. Rapid FCAS Assessment

6. The FCAS approach for the AIWRDIP includes an annex which discusses some of the conflict linked parameters. Several of these are reproduced in the following sections.

1. Tribe, Politics and Power Dynamics:

7. The Pashtun comprise the majority of population in Kandahar province, where about 98% of the population are Pashto-speakers along with Dari and Balochi that are also spoken by some residents. The major tribes of Pashtuns in Kandahar province include the Popalzai, Alkozai, Barakzai, Alezai and Noorzai. The tribal structure is deeply rooted and complex, where most often political appointments are made based on tribal and ethnic factors. Therefore, tribes and ethnicity play an important role in the socio-economic and political life among the people of Kandahar province.

8. The majority of the influential people in Kandahar province refer to themselves as tribal leaders because their source of influence originates from their tribe, with only a few deriving their influence from their positions. These influential people often organize their networks, militias and cartels along tribal lines to protect their influence over others and to ensure they are active partners in the local politics and power dynamics (ibid). Kinship and patronage networks play a key role in accessing jobs as well as the services delivered by the state and local government institutions. Some of these tribes consider themselves neglected by the central government. For example, the Alokozai tribe of Arghandab district, based on their historical prominence and population size expect a greater role in local affairs and politics. However, their weak linkage with the central government caused their exclusion from the provincial government, and this contributes to center-periphery conflict (Jackson 2015).

9. The power structure in Kandahar province is divided among various entities and tribes and requires deeper power analysis to ascertain potential impact on, and by, the AIWRDIP. The Karzai and Sherzai families), and other political and tribal elders can positively or negatively influence the project depending on how they are engaged.[15] The existence of various patronage networks along ethnic lines may be an issue of concern. The existence of various power holders and their competition for resources and power can result in severe impacts on the project. These power holders can impose significant pressure to involve them or their groups under the project via project related procurement or hiring their companies and firms to provide services. In order to better understand the needs, interests and positions of various tribal elders and warlords, a

[15] Forsberg, C, Politics and Power in Kandahar. (2010). Available at: http://www.understandingwar.org/sites/default/files/Politics_and_Power_in_Kandahar.pdf Accessed 10 Jun. 2018

comprehensive FCAS assessment is needed during the processing stage, and separately for each project component.

10. Working with the local communities in Kandahar province requires a comprehensive understanding of these tribal divisions and structures, especially their representation in relation to any project related activities and in development work. Community engagement processes, and the Community-Driven Development Component of the project must be informed by the FCAS assessment to ensure these issues are accounted for, including the identification of ethnic and tribal minorities in the region.

11. Some of the key potential areas relating to tribe, politics and power that could affect or be affected by the project, and should therefore be assessed in greater depth include:

(i) The potential risk that one tribe benefits more from the project which can increase chances for grievance.
(ii) The potential that political/tribal entities in power may put pressure on the contractor and supervision consultants regarding their engagement in the project which can create local tensions, drive social exclusion and decrease transparency and accountability.
(iii) The project might only involve and benefit the directly affected communities, thus ignoring neighboring communities, which could increase the distance between them. Options for engagement of neighboring communities should be considered.
(iv) The rehabilitation and extension of the irrigation system should increase the efficiency of water management systems. This could decrease water related conflicts, leading to greater social cohesion.
(v) There is a potential geopolitical aspect of the project due to the Arghandab river being the main tributary to the Helmand river which passes into Iran. This issue requires further assessment to ascertain the potential for cross-border dispute, at both the political and local level.
(vi) There is risk that armed non-state actors operating in the project area could extort financial benefit from project, reducing state legitimacy and increasing public anger.
(vii) The project preparation consultants could raise public expectations regarding the project, as well as create anger from communities who perceive themselves as losing from the project.

2. IDPs, Refugees and other Vulnerable Groups:

12. Ongoing violent conflict across the country is resulting in population movements (of internally displaced persons or IDPs). When coupled with increased numbers of returnees (refugees returning from Pakistan and Iran) and urbanization, this is increasing pressure within Kandahar province, which accommodates about 260,000 IDPs and returnees.[16]Kandahar city provides shelter not only for rural Kandaharis, but also accommodates tens of thousands IDPs from neighboring provinces. In addition to this influx of IDPs and refugees, the alarming rate of rural migration into urban areas places further pressure on available resources. According to some

[16]Reliefweb. "Afghanistan Baseline Mobility Assessment-Summary Results" (2017). Available at: https://reliefweb.int/sites/reliefweb.int/files/resources/Afghanistan-Baseline-Mobility-Assessment. Summary-Results-December-2017-Kandahar-English.pdf. Accessed 10 Jun. 2018.

credible estimates the city's population has more than doubled in the last five years to around 800,000 people.[17]

(i) There is a potential for the project to involve IDPs and returnees as wage labor and under community-based procurement which would help to reduce vulnerability and poverty in the region and enhance government legitimacy.
(ii) The involving of IDPs and returnees would require careful thought as it could limit chances of employment for the local communities, potentially resulting in dissatisfaction and division.
(iii) There are chances of joint work for IDPs, returnees and the communities which further can strengthen social cohesion and help IDPs in reintegration (e.g. through the Community-Driven Development Component).

3. Water Scarcity:

13. The scarcity of irrigation and clean drinking water is one of the most prevalent issues facing the residents of Kandahar province, where competition for these depleted resources is steadily increasing. In southern Kandahar province, farmers in several districts are facing shortage of irrigation water which takes a heavy toll on their crops and orchards, causing severe economic loses. The water storage capacity in Dahla Dam reservoir is down to 60% of its initial capacity. This can cause farmers at the tail end of irrigation systems to receive little or no water.[18]

14. This shortage of water in the same districts further increases competition among farmer communities and increases the chances of water related conflicts, especially between up- and downstream communities. Given the recognized impacts of the project upstream and downstream, and the potential for water-based conflicts, an in-depth assessment of the issue is required to identify how the existing water management capacities could be promoted and what strategies are needed to empower local capacities in water distribution management and conflict resolution. Detailed analysis will be required to define the upstream and downstream communities, requiring high resolution data and sophisticated mapping and modelling processes.

(i) The project has the potential to raise expectation of the farm communities for receiving supplementary water for irrigation and electricity from the project, which needs to be managed through an effective community engagement and consultation process.
(ii) The project has the potential to create opportunities for collaboration between farmers of different communities and even among districts to come together and better manage the water distribution system. This opportunity could be used for peacebuilding and government legitimacy.
(iii) The urban and village water distribution scheme has the potential to provide safe drinking water for the urban dwellers and poor families, reduce women's efforts to fetch water, increasing social inclusion and government legitimacy in the eyes of people.

[17] Forsberg, C, "Politics and Power in Kandahar" (2010). Available at: http://www.understandingwar.org/sites/default/files/Politics_and_Power_in_Kandahar.pdf. Accessed 10 Jun. 2018.

[18] Basher, N, "80% Kandaharis facing acute water shortage". (2014) Pajhwok.com. Available at: https://www.pajhwok.com/en/2014/01/24/80-kandahar-population-facing-acute-water-shortage Accessed 10 Jun. 2018.

4. Potential Project Impact on Communities:

15. Those losing land and houses are not the same communities as those likely to benefit from the project – a major concern from a conflict sensitivity perspective which can easily trigger division and conflict if not properly treated and managed.

16. It is also possible that people who are losing their land and properties belong to one tribe and those who benefit from the project belong to other tribes, which can create further tribal divisions and grievances in the area. Geographic information system techniques will be used to identify the impact of the reservoir and which communities are most likely to be affected.

Combining this information with previous conflict data as well as tribal mapping will allow an understanding of whether the loses are felt more heavily by one faction or another. This, in conjunction with mapping extended irrigation facilities, will augment the development of resettlement and compensation planning to target those most affected and support receiving communities during the resettlement process. The FCAS assessment needs to consider how these kinds of potential negative impacts could be addressed and how different options could be adopted such as application of FCAS Community Engagement guideline or the utilization of Community-Driven Development Component to reduce the most turbulent impacts of the project.

5. Lack of socio-economic data about the province and the districts:

17. Publicly available and government owned data is often limited, outdated and sometimes inaccurate, which further impedes an informed decision making and planning process. The collection of primary data regarding different aspects of the province and specifically about the vicinity of the Arghandab Dam project is therefore critical. Geographic information system information can augment data collected during the FCAS assessment and support in the development of appropriate design and planning.