River basins and Watersheds of Afghanistan

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Watersheds

There are forty-one watersheds delineated within five river basins in Afghanistan (Map 1). There are five non-drainage areas within these forty-one watersheds. The size of the watersheds was limited in order to retain 'meso-units' suitable for hydrological and agricultural/agro-meteorological monitoring and analysis and watershed management activities.

Map 1 Watershed map of Afghanistan

Statistics on population, settlements, irrigated and rainfed farming land, rangeland, lakes and wetlands, snow cover and forest areas are presented in the "Watershed Atlas" prepared by AIMS/FAO (Favre and Kamal, 2004). These statistics were calculated based on the FAO 1990/93 landcover maps (Shapefiles), using Arc-View 3.2 software. Table 1 present statistics for each watershed and river basin. These statistics have been prepared with data available at the AIMS office in Kabul. These data allow comparisons and classifications based on major characteristics between watersheds and river basins.

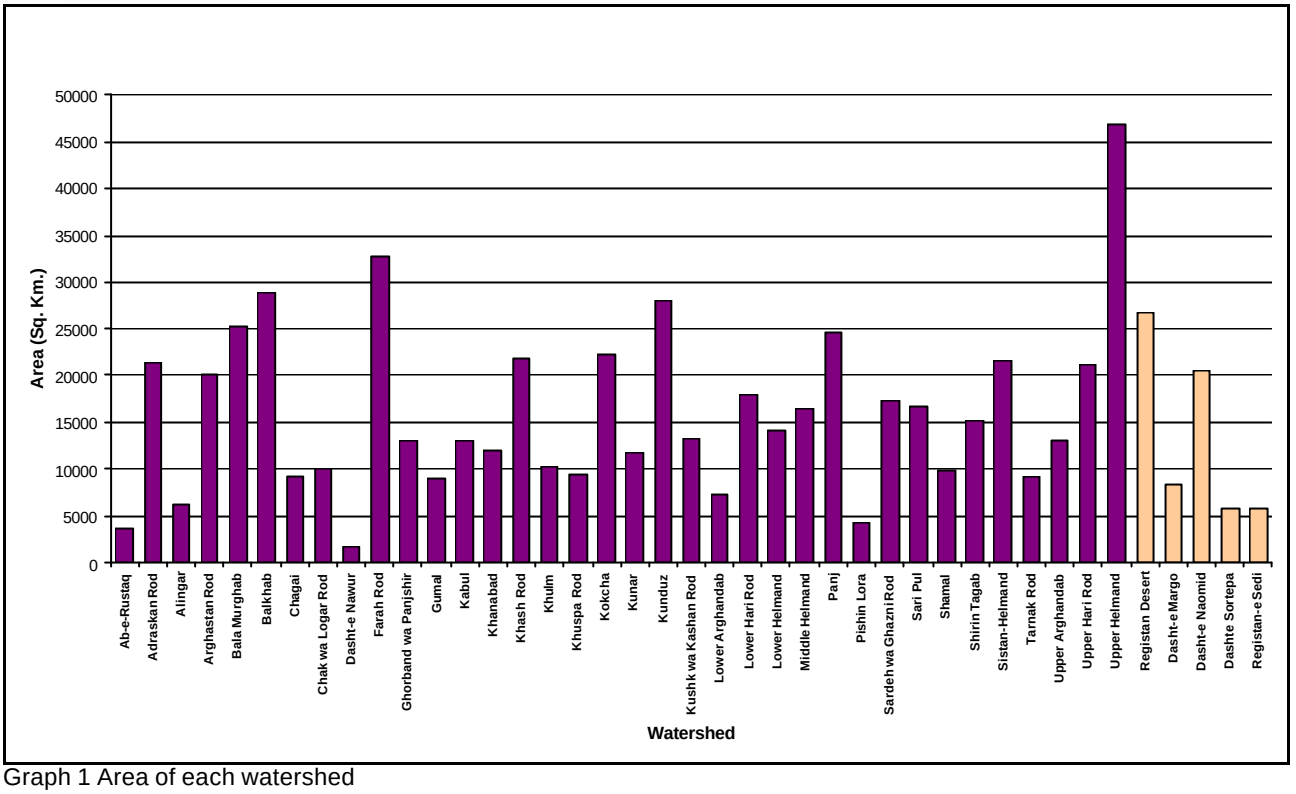
Table 1 Area, settlements and population by watershed

River basins	Watersheds Name	Area (sq.km)	Settlements (number)	Settled population*
Amu Darya	Ab-i-Rustaq	3670	231	358749
Amu Darya	Khanabad	11994	622	668938
Amu Darya	Kokcha	22368	1344	715236
Amu Darya	Kunduz	28024	1240	1090639
Amu Darya	Panj	24637	715	134560
Amu Darya		**90693**	**4152**	**2968122**
Harirod-Murghab	Bala Murghab	25353	735	301380
Harirod-Murghab	Kushk wa Kashan Rod	13191	501	287829

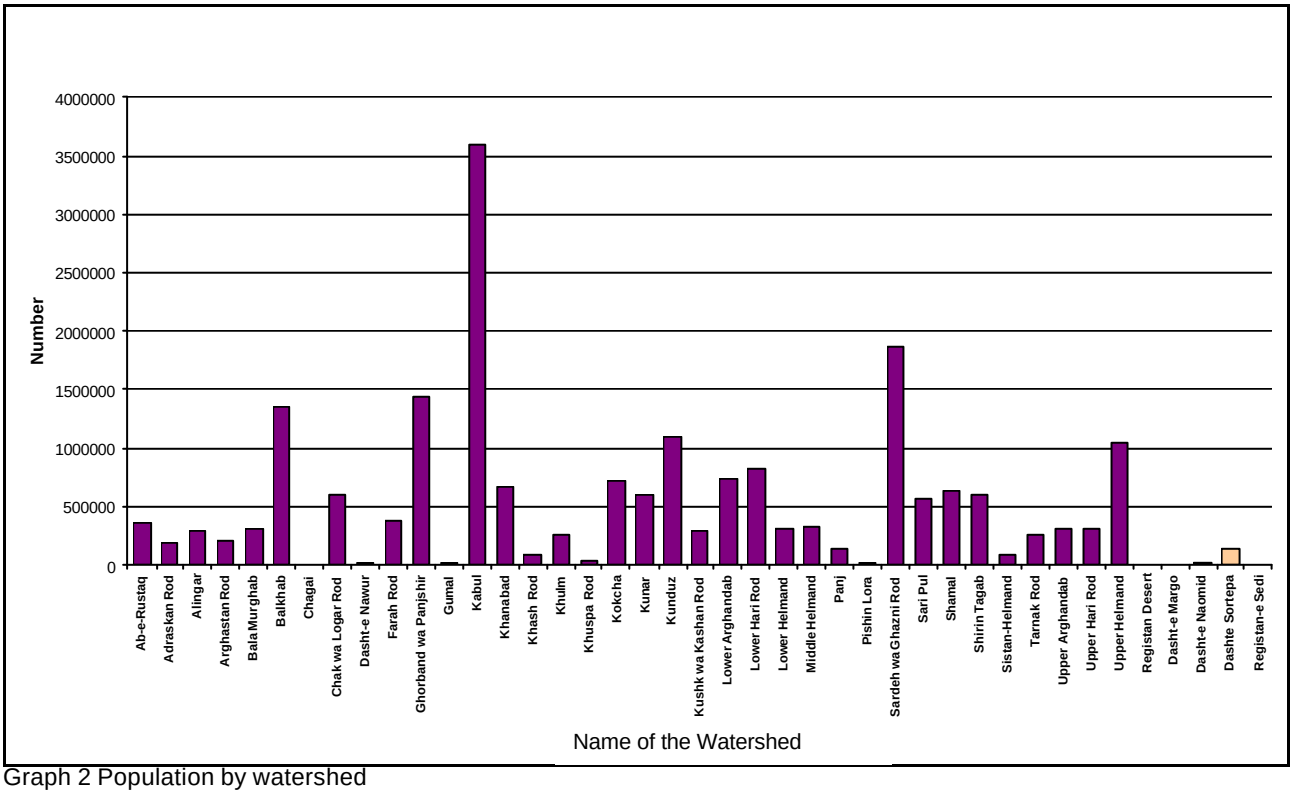
Harirod-Murghab	Lower Hari Rod	17936	639	824456
Harirod-Murghab	Upper Hari Rod	21124	1084	308610
Harirod-Murghab		**77604**	**2959**	**1722275**
Hilmand	Adraskan Rod	21266	462	186446
Hilmand	Arghistan Rod	20219	1470	208932
Hilmand	Chagay	9319	1	642
Hilmand	Dasht-i Nawur	1618	68	10987
Hilmand	Farah Rod	32809	1029	381281
Hilmand	Khash Rod	21840	339	92379
Hilmand	Khuspa Rod	9428	105	38987
Hilmand	Lower Arghandab	7300	631	732056
Hilmand	Lower Hilmand	14147	246	317275
Hilmand	Middle Hilmand	16441	810	326897
Hilmand	Sardih wa Ghazni Rod	17252	1922	1868342
Hilmand	Sistan-Hilmand	21575	173	91968
Hilmand	Tarnak Rod	9076	837	261602
Hilmand	Upper Arghandab	13170	1361	316790
Hilmand	Upper Hilmand	46882	4587	1046990
Hilmand		**262342**	**14041**	**5881571**
Kabul	Alingar	6239	465	287089
Kabul	Chak wa Logar Rod	9968	1212	607283
Kabul	Ghorband wa Panjshir	12964	1651	1440757
Kabul	Gomal	9014	190	16316
Kabul	Kabul	12997	1628	3591820
Kabul	Kunar	11664	712	600237
Kabul	Pishin Lora	4206	43	11320
Kabul	Shamal	9856	1138	630152
Kabul		**76908**	**7039**	**7184974**
Northern	Balkhab	28835	1662	1344202
Northern	Khulm	10230	274	259410
Northern	Sari Pul	16743	529	573449
Northern	Shirin Tagab	15092	504	605972
Northern		**70900**	**2969**	**2783033**
Non-drainage area	Dasht-i Margo	8414	0	0
Non-drainage area	Dasht-i Naumed	20561	23	17441
Non-drainage area	Dasht-i Shortepa	5880	46	134187
Non-drainage area	Registan	26672	0	0
Non-drainage area	Registan-i Sedi	5829	0	0
Non-drainage		**67356**	**69**	**151628.66**
Grand total		**645803**	**31229**	**20691604**

* Based on CSO 2003-04 figures. Nomadic population not included.

Upper Hilmand is the largest watershed in Afghanistan, covering 46,882 sq. km, while the smallest watershed is Dasht-i Nawur, which covers 1,618 sq. km. Graphs 1 illustrate the area by each watershed in Afghanistan. However, Graph 2 shows that the largest number of people are found in the Kabul, Sardih wa Ghazni, Ghorband wa Panjshir (Shomali plain) and Balkhab watersheds.



Graph 1 Area of each watershed



Graph 2 Population by watershed

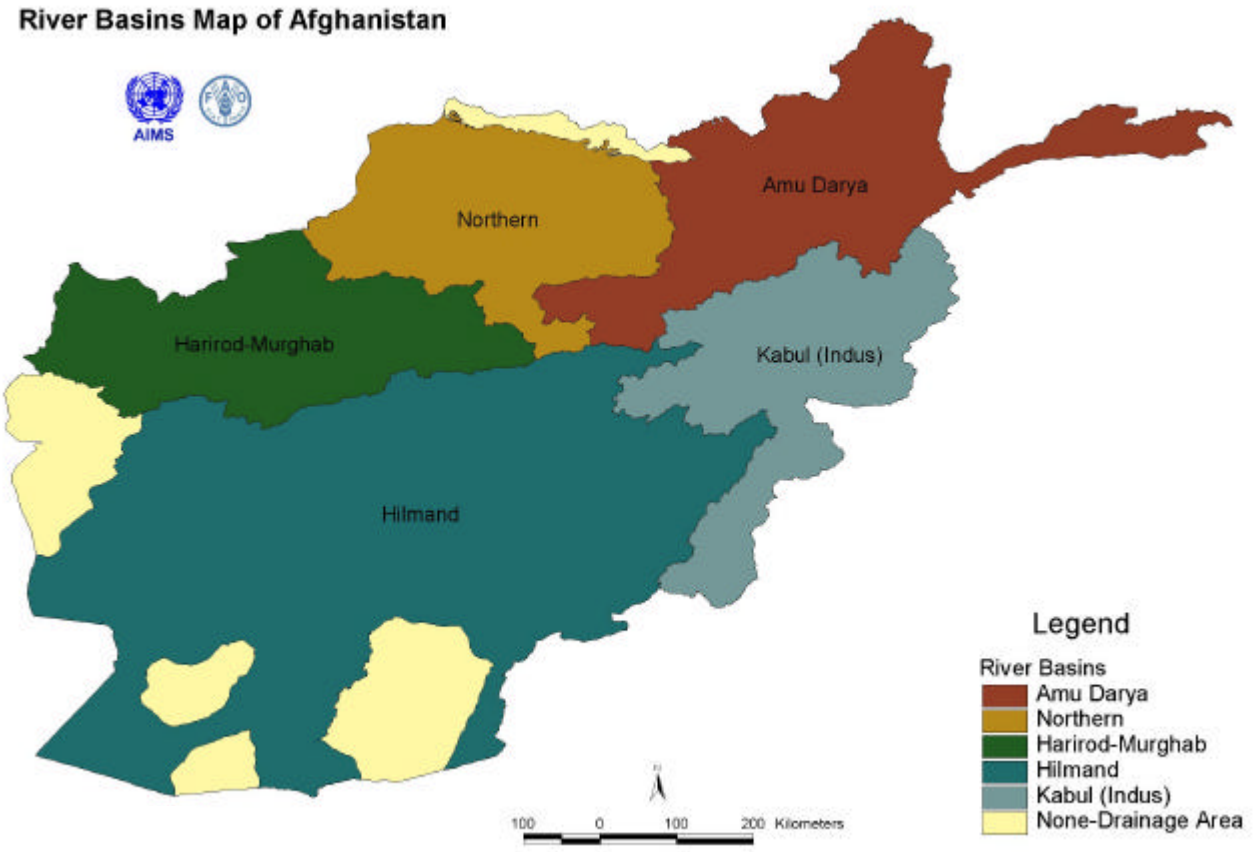
River Basins

River basin is defined as the area which contributes hydrologically (including both surface- and groundwater) to a first-order stream, which, in turn, is defined by its outlet to the ocean or to a terminal (closed) lake or inland sea. There are five rivers basins defined in Afghanistan (Map 2).

1. The Amu Darya river basin

2. The Northern river basin
3. The Harirod-Murghab river basin
4. The Hilmand river basin
5. The Kabul (Indus) river basin

The five river basins together cover 90 percent of the land area of Afghanistan (Map 2). The Hilmand river basin is the largest of these five basins, covering 43 percent of the national territory. The other four basins have similar sizes and cover 10-14 percent of the country. In additions to these river basins, there are four non-drainage areas: Namaksar, Registan-i Sedi, Registan and Dasth-i Shortepa.



Map 2 River basins in Afghanistan

About 57 percent of the total river flow in Afghanistan originates from the Amu Darya river basin. The Kabul and Hilmand river basins contribute, respectively, to 26 percent and 11 percent of the total water flow. The Harirod-Murghab and Northern river basins have small contributions of, respectively, two percent and four percent.

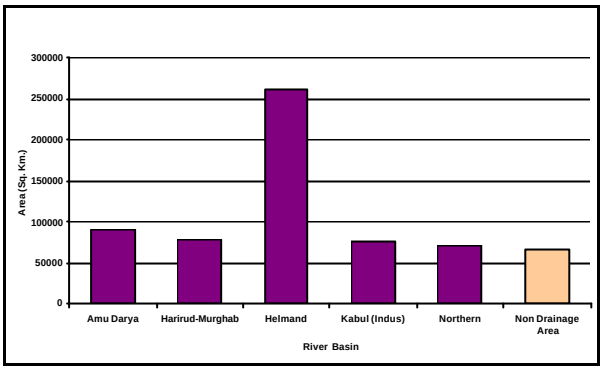
Table 2 Area and population by river basin

River basins	Area (ha)	Area (sq. km)	%	Number of settlements	%	Settled population*	%	Population density/sq.km
Amu Darya	9069189	90692	14.04	4152	13.30	2968122	14.34	33
Harirod-Murghab	7760366	77604	12.02	2959	9.48	1722275	8.32	22
Hilmand	26234136	262341	40.62	14041	44.96	5881571	28.42	22
Kabul	7690829	76908	11.91	7039	22.54	7184974	34.72	93
Northern	7090127	70901	10.98	2969	9.51	2783033	13.45	39
Non-drainage	6735636	67356	10.43	69	0.22	151629	0.73	2
Total	**64580283**	**645803**	**100.00**	**31229**	**100.00**	**20691604**	**100.00**	

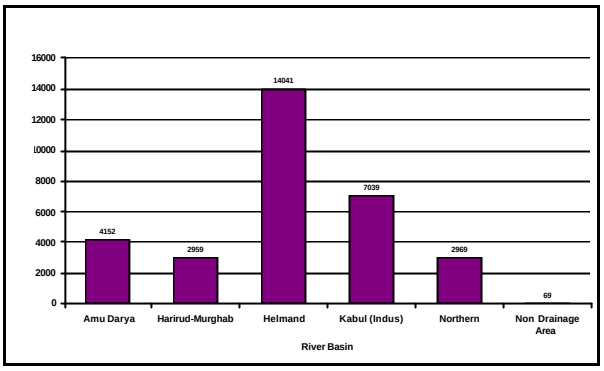
* Based on CSO 2003-04 Figures. Nomadic population not included.

Graphs 3, 4, 5 and 6 show that the largest number of settlements are located in the Hilmand river basin; however, the largest settled population density is found in the Kabul river basin, with 93 inhabitants/sq. km. The national average is 32 inhabitants/sq. km (nomadic population not included). Non-drainage areas have the lowest population density; with two-inhabitants/sq km.

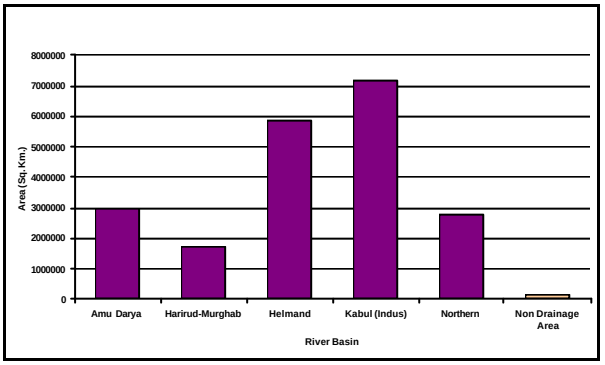
Graph 3 Area (sq. km) of each river basin



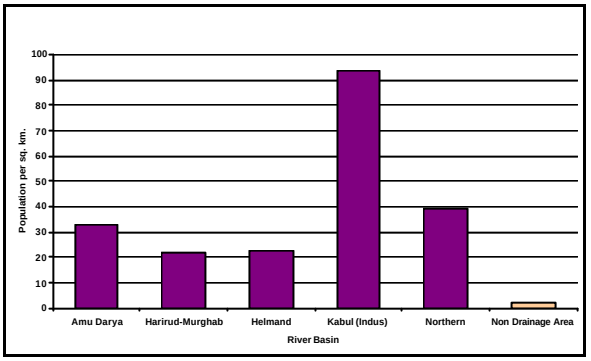
Graph 4 Number of settlements by river basin



Graph 5 Population by river basin



Graph 6 Population density by river basin



Amu Darya river basin

The Amu Darya basin has its headwater in the High Pamir Mountains of Afghanistan and Tajikistan. The northern branch of the Amu Darya, the Ab-i Pamir River, has its source in Zor Kul Lake, which is shared between Tajikistan and Afghanistan. The southern branch, the Wakhan River, flows out of Chaqmaqtin Lake. The Amu Darya River (the classical Oxus River) runs for 2,400 km and receives a large number of tributaries in Central Asia, but dries up in the Turan lowlands in Turkmenistan and Uzbekistan.

The main reason for this is the excessive use of the water by irrigation for cotton production. Less than 20 years ago, the river ran as far as the Aral Sea. Today's lack of inflow has been a major factor for the dramatic reduction in the surface area and volume of the Aral Sea. The Amu Darya basin covers 14 percent of the national territory, but alone it drains more than half (57 percent) of the total annual water flow of Afghanistan. Therefore, the basin has great hydropower potential that is largely unused.

The basin comprises five watersheds:

1. Panj watershed
2. Kokcha watershed
3. Ab-i Rustaq watershed
4. Khanabad watershed
5. Kunduz watershed

Northern river basin

The northern basin has the smallest annual flow contribution in Afghanistan, with only 2 percent of the total, but all of the water is used within the national boundaries of the country. The basin is composed of watersheds of short perimeters that take their sources in the high mountains of the central highlands. The rivers dry up in irrigation canals or desert sands long before reaching the Afghan border and the Amu Darya River. It should be noted that in the event of exceptional floods, the Balkhab River may at times drain water into the Turkmenistan lowlands just on the other side of the border. Historically, in the northern Turkistan plain, the river deltas were close to the Amu Darya, but with the development of traditional irrigation schemes centuries ago, these rivers no longer contribute to this river, drying up in

canals [1]. Therefore, a non-drainage area exists between the Northern river basin (Shirin Tagab, Sari Pul, Balkhab and Tashkurghan Rivers) and the Amu Darya River.

The Northern river basin in the north is comprised of four watersheds:

1. Khulm watershed
2. Balkhab watershed
3. Sari Pul watershed
4. Shirin Tagab watershed

Harirod-Murghab river basin

The Harirod-Murghab river basin contributes to a tiny 4 percent of the total annual flow in Afghanistan. The main rivers are the Hari Rod, which takes its source from the western slope of the Koh-i Baba Mountains in the central highlands and the Murghab, which comes from the Tir Band-i Mountains in Turkistan. However, only part of the water from both rivers remains within the national boundaries of the country. Indeed, the Hari Rod and Murghab dry up in the irrigation canals of the Mary[2] and Tejen oases of the Garagum desert in Turkmenistan. A water channel, the Garagum channel, linking the oases to the Amu Darya River, was constructed across more than a thousand kilometres of desert in Turkmenistan to add water in the Mery and Tejen oases (from the Amu Darya River)[3].

The Harirod-Murghab Basin includes four main watersheds:

1. Bala Murghab watershed
2. Kushk wa Kashan Rod watershed
3. Upper Hari Rod watershed
4. Lower Hari Rod watershed

Hilmand river basin

The Hilmand basin is the largest in Afghanistan, covering almost half (43 percent) of the national territory. Despite its size, it drains a smaller proportion of the total annual flow, with an 11 percent contribution. The Hilmand basin covers the southern half of the country, draining water from the Sia Koh Mountains in Hirat province to the eastern mountains in Gardez province and the Parwan Mountains northwest of Kabul, and finally to the unique Sistan depression between Iran and Afghanistan. The Sistan depression is a large complex of shallow wetlands, lakes and lagoons that are divided into four separate sheets of water. They are locally known as Hamun-i Saberi, the deepest, to the north; Hamun-i Puzak to the northeast and in Afghan territory; Hamun-i Shapour to the south; and a central pool known as Hamun-i Hilmand. These separate sheets of Hamun water become one at flood times and can reach an area of about 3,200 sq. km when the level of the lake rises. The surplus water flows out at the southern end of the lake, through the channel of Shileh Shallaq into the depression of Gaod-i Zirreh inside Afghanistan.

The Sistan-Hilmand basin includes fifteen watersheds:

1. Adraskan Rod watershed
2. Farah Rod watershed
3. Khuspas Rod watershed
4. Khash Rod watershed
5. Upper Hilmand watershed (above the Kajaki dam)
6. Middle Hilmand watershed
7. Lower Hilmand watershed (intensively irrigated perimeters below the Kajaki dam)
8. Sistan-Hilmand watershed (below the intensively irrigated perimeter in the Sistan zone)
9. Chagay watershed
10. Upper Arghandab watershed (above the Dahla dam)
11. Lower Arghandab watershed (intensively irrigated perimeter below the Argandab dam)
12. Tarnak Rod watershed
13. Arghistan Rod watershed
14. Sardih wa Ghazni Rod watershed
15. Dasht-i Nawur watershed

Kabul (Indus) river basin

The Kabul river basin includes all Afghan rivers that join the Indus River in Pakistan. The Indus empties into the Arabian Sea of the Indian Ocean. The basin drains water from the Kotal-i Shibar Pass to the Kunar Valley in the north and the Paghman Mountains to the Spingar (or Koh-i Safid in Persian) in the south of Jalalabad. In the eastern mountains, rivers take their sources in high mountains covered by snow and glaciers that maintain water flow throughout the summer. The Kabul basin also includes the small Pishin Lora River in the southeastern corner of Afghanistan. The eastern part of the Kabul basin is under the influence of the monsoon rains reaching the valley systems that face the Indus Valley in the summer. The Kabul basin covers 12 percent of the national territory, but alone it drains one-fourth (26 percent) of the

[1] J. Humlum, *Ibid*., 1959.
[2] Historically called Merv.
[3] An estimated one million hectares of land are irrigated from the canal.

total annual water flow of Afghanistan. Therefore, the basin has major hydropower potential that is already partly developed:

The Kabul basin is divided into eight main watersheds:

1. Kabul watershed
2. Chak wa Logar Rod watershed
3. Ghorband wa Panjshir watershed
4. Alingar watershed
5. Kunar watershed
6. Shamal watershed
7. Gomal watershed
8. Pishin Lora watershed

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