

**CONFLICT OVER TRANS-BOUNDARY
WATER RESOURCES IN CENTRAL ASIA:
A CASE STUDY OF AMU DARYA BASIN**

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PRADEEP KUMAR SUTHAR



**CENTRE FOR INNER ASIAN STUDIES PROGRAMME
SCHOOL OF INTERNATIONAL STUDIES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067**

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CENTRE FOR INNER ASIAN STUDIES
SCHOOL OF INTERNATIONAL STUDIES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067, INDIA

Tel.: 011-26704350

Date: 05 January 2018

DECLARATION

I declare that the Thesis entitled "CONFLICT OVER TRANS-BOUNDARY WATER RESOURCES IN CENTRAL ASIA: A CASE STUDY OF AMU DARYA BASIN" submitted by me for the award of the degree of DOCTOR OF PHILOSOPHY of Jawaharlal Nehru University is my own work. This Thesis has not been previously submitted for any other degree of this University or any other University.

PRADEEP KUMAR SUTHAR

CERTIFICATE

We recommend that this Thesis be placed before the examiners for the evaluation.

PROF. SHARAD K. SONI
(Chairperson, CIAS)

Chairperson
Centre for Inner Asian Studies
School of International Studies
Jawaharlal Nehru University
New Delhi - 110067

PROF. MONDIRA DUTTA
(Supervisor)

Centre for Inner Asian Studies
School of International Studies
Jawaharlal Nehru University
New Delhi - 110067

PROF. SHARAD K. SONI
(Co-Supervisor)

Centre for Inner Asian Studies
School of International Studies
Jawaharlal Nehru University
New Delhi - 110067

DEDICATED

TO

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LIST OF ABBREVIATIONS

ADB	-	Asian Development Bank
ASBP	-	Aral Sea Basin Program
ASDB	-	Aral Sea Drainage Basin
BWO	-	Basin Water Organization
CA	-	Central Asia
CAEC	-	Council of the Central Asian Economic Community
CAR	-	Central Asian Republic
CAREC	-	Regional Environmental Centre for Central Asia
CAS	-	Central Asian States
CASA	-	Central Asia-South Asia Electricity Trade Project
CIA	-	Central Intelligence Agency
COS	-	Country Operational Strategy de
EC	-	European Commission
EUCAM	-	Europe-Central Asia Monitoring
FAO	-	Food and agriculture organisation of UN
GDP	-	Gross Domestic Product
GEF	-	Global Environment Facility
ha	-	Hectares
HDI	-	Human Development Index
HPP	-	Hydropower Plant
ICAS	-	Interstate Council on the Aral Sea Basin
ICCPR	-	International Covenant on Civil and Political Rights
ICESCR	-	International Covenant on Economic, Social and Cultural Rights
ICSD`	-	Interstate Commission on Sustainable Development
ICWC	-	Interstate Coordination Water Commission
IFAD	-	International Fund for Agricultural Development
IFAS	-	International Fund for saving the Aral Sea
IUD	-	Intrauterine Device
IWRM	-	Integrated Water Resources Management
KG	-	Kyrgyzstan
KWh	-	Kilowatt hour

KZ	-	Kazakhstan
MW	-	Million watt
OECD	-	Organisation for Economic Co-operation
OSCE	-	Organization for Security and Co-operation in Europe
RF	-	The Russian Federation
RWSS	-	Rural Water Supply and Sanitation
SANIIRI	-	Scientific and Research Institute of Irrigation
SCO	-	Shanghai Cooperation Organization
SIC	-	Scientific-Information Centre
SPECA	-	Special Programme for the Economies of Central Asia
TJ	-	Tajikistan
TM	-	Turkmenistan
UN	-	United Nations
UNDP	-	United Nations Development Programme
UNECE	-	United Nations Economic Commission for Europe
UNESCAP	-	United Nations Economic and Social Commission
UNSCO	-	United Nations Special Coordinator in the Occupied
UNWC	-	UN Convention on the Law of the Non-Navigational
USAID	-	United States Agency for International Development
		Uses of International Water courses
USSR	-	Union of Soviet Socialist Republics
UWSS	-	Urban Water Supply and Sewage
WB	-	World Bank
WES	-	Water and Energy Consortium
WWAP	-	United Nations World Water Assessment Programme

CHAPTER I
INTRODUCTION

I.1 Background

Two resources of nature water and air devoid of them it is not possible the survival of humankind. There was no need of any conflict over these resources till were abundant. But as the population grew, water started to grow scarce. Water crisis is much severe in some regions, cities, areas, countries and continents. The problem has having a very long history as in the beginning there was a problem with how to deliver water where it was much required. The aspects of water relations in past was directly linked to the history of irrigation because it was the main centre of this issue. There is also increasing ecological problem with the use of water as it affects environment adversely. In the beginning there was only problem of the contamination of water in big basins and seas. Later on the drastic changes appeared like the danger of complete evaporation of some rivers and lakes. It was the perhaps first time when it was international tensions for environmental concern raised the water issue into the subject of international relations. Development of this kind of environmental hazards such as Aral Sea problem in the Central Asian region became the symbol of these burning issues (Valentini et al., 2004).

Globally water is becoming a source of conflicts among the various states day by day. The issues of water sharing between more than two nations with consequences of their sovereignty became more complex. “The problem becomes more complicated when the internationalisation of a basin through political change happened overnight” (Valery, 2003). The severity of the conflict over water resources around the world has been growing over the recent years (Wolf, 2001).

Water Resources are the key forces that govern both the geo-economy and geo-politics of a region. Early history of civilization confronted the grave war over resources like arable land, gold, oil, gas and now water in the most recent times (Valentini and Orolbaev, 2004). Degradation of environmental resources and pollution has made these resources strategically valuable leading to conflicts and competition to thrive upon (Wolf, 2001). States having poor economy, lack of democratic norms and politically unstable are at greater risk and likely to be trapped in disputes of water conflicts (Siegfried, 2012). The issue becomes more complex in the backdrop of a weak international water management institution.

Politically Water is the most sensitive resource that can inflame armed conflict or even war like situation. It is no wonder therefore that such possibility has been widely discussed and in spite of the rising literature on water and conflict, there is very few work has been done to give point of view for the common principle that warned about the growing conflict over water emerges ahead. Jordan and Nile basins are marked as globally very sensitive for the emergence of conflict. Conversely, water has a very long history for historic evidence of co-operation on this resource among various riparian countries and it is also said that there was only one battle fought for water between Lagash and Umma two state of Mesopotamia 4500 years back. The definition and theories show that the concept of water and conflict where terms such as conflict, dispute, tensions, and war are regularly used interchangeably. At the end of the 20th century the nature of the water problem has changed radically (Valery, 2003).

All through several centuries in the gigantic land call Touran, Turkestan and the present Central Asia, “where invisible borders became wider or narrower depending on the degree of influence of a contemporary conqueror” (Valentini et al., 2004). But the one significant thing has constantly remained the same that the conflict over water can results in war like situation in international arena. Emergence of newly CIS states in 1991 were more vulnerable for such water issues and situation became worse in December 1991 as a result of the Alma-Ata Declaration that brought the USSR to an end and legally established the post-communist states (Votrin, 2003). Water competition is increasing in Central Asia which is not already a stable region and this is adding more enigmas for conflict. The economy of the region is mainly based on the agriculture. Crops like wheat, cotton and rice need intensive water for irrigation in the conflict prone thirsty region. Since 1991, after the independence of central Asian states the use of water increased very rapidly (Nanni, 1996). Then the duration of a long period of severe drought and without having proper access to the water for irrigational fields makes demands of needy countries in a very soar way (Bedford, 1998).

The major causes behind the problem is the matter of growing demand for water sources and reduce supplies adding more pressure due to lack of cooperation among the nations in the region’s nation to work together (ICG Report No. 34, 2002). The states of Central Asia were initially shaped by the policy of Stalin that gives largely illogical marking of the borders.

Such territories to titular nationalities, which is why state boundaries and ethnic composition in Central Asia lack correspondence. States of central Asia have adopted for domineering economic policies and authoritarian government. All states are late developers and have the traditional preference for their all policies. Clans, religious, ethnic and regional affinities here have not been displaced by centralizing, high-capacity states; and thus these states lack any experience with democratic multi-party systems (Valery, 2003).

Under the USSR era there were only administrative borders for the all countries that were free bartered their resources across the region (Shahrinav.blogspot, 2004). The reign of USSR provided the funds and management to build and maintain infrastructure (Ezeli, 2010). Completion among the five central Asian states has become bitter with the rising emotions of the nationalism and thus they were unable to adopt a regional innovative plan to put back the soviet structure of water resources management (Blagov, 2006). The water and energy related issues that can be also a cause of tension when these issues can link to Islamic extremism what is that happening as a cause of worry in current years.

The Aral Sea basin is a trans-boundary river basin in the centre of the Eurasian continent. It is also in the middle of Central Asia having total area of 1.76 million km. And geographically

it is spreading in a wide range of areas that covers (99 percent) of Tajikistan, Turkmenistan (95 percent) and Uzbekistan (95 percent) and other like Osh, Djalal-Abad and Naryn provinces of Kyrgyzstan cover (59 percent), Kyzylorda and South Kazakhstan provinces of Kazakhstan cover (13 percent). It also includes the northern part of Afghanistan where it covers 38 percent of area and in a very tiny division of the Islamic Republic of Iran in the Tedzhen/Murghab basin. There are two major zone of territory of the Aral Sea basin. First is the Turan plain and other is the mountain zone. The basin is composed of various types of alluvial and inter-mountain valleys, arid and semi-arid steppe and in all the regions the different forms of relief have created specific conditions that are reflected in the interrelation between water, land and people (FAO Water Report No. 39, 2012).

The major drainage area in Aral Sea Basin includes the two major rivers, Amu Darya and Syr Darya. The rivers descend from the slopes of the Tien Shan Mountains and the Pamirs and they run through Afghanistan, Tajikistan, Kyrgyzstan, Turkmenistan, Uzbekistan and Kazakhstan (International Fund for saving the Aral Sea Report, 2010). Conflicts over water sources of Central Asia center on these major two rivers.

Amu Darya River is flowing from Tajikistan through Uzbekistan and Turkmenistan and Syr Darya is flowing from Kyrgyzstan through Uzbekistan and Kazakhstan and both river are finally goes toward the Aral Sea basin. The border between the countries of central Asia is made by the Amu Darya with its tributaries naturally.

As far as the development of conflict on an annual level of cycle is concerned it is raising between three lowland countries Kazakhstan, Turkmenistan and Uzbekistan, these all three are highly depend on water use for cotton (Apasov, 2001). On the other hand the upstream nations – Kyrgyzstan and Tajikistan seeks for energy demands. Thus the downstream countries need more water for their growing agricultural sectors and increasing populations. “With a weak economy; the upstream countries are in dire need to win control over their resources and utilize or even exploit more water for electricity generation and farming to lighten their development burdens” (Wegerich, 2001). When one tries to identify the major issues or problems evolving in Central Asia for the water the most important subject of this issue shifts towards aspects of ownership of water sources, national interest and many more. The other issues including “the desiccation of the Aral Sea has been an important factor in the worsening socio-economic conditions of the area, fuelling nationalist ideas among the population of Karakalpakstan, the Uzbek autonomous republic located adjacent to the disaster zone” (Votrin, 2003).

The infuriating situations of water in the Central Asia with these vulnerable characteristics have a severe consequence leading to climate change and global warming. There is a lack of awareness about climate change among the Inner Asian states. Many factors responsible among them are weak institutions and the politicization of water resources makes Central Asia particularly vulnerable. There is considerable agreement that regional water management will become more difficult. The FAO warns of “increasing concern about climate change especially because climate change affects the Central Asian region’s water and energy security” (FAO Water Report No. 39, 2012). This way leads to the unstable political atmosphere between the states due to lack of careful management and cooperation of their water resources.

As far as climatic condition of region is concern it is hot and dry due to domination of low-lying deserts and low and uneven precipitation. Sharp daily and seasonal

differences in temperature are typical, with long hot summers and cool moist winters (Votrin, 2003). The region has very unique climatic zone with diverse water demands for energy production and for irrigation.

Agricultural, industrial and personal needs can only be satisfied through diversion of water from the Syr Darya, Amu Darya and Zeravshan rivers and their tributaries (Valery, 2003). The desertification process has begun very earlier due to excessive water withdrawals from the river of Aral Sea and later on with a series of droughts hit the region. Thus the dramatic reduction in river discharge, with a total stoppage of inflow during driest years, the Amu Darya flow was almost nil and as a result, salt and dust storms became a major new environmental hazard for the area (Valery, 2003).

Central Asia is well known for the environmental disaster called the Aral Sea Crisis. The Aral Sea which was the fourth highest water bearing capacity in the world has shrunk by more than half during the last forty years. The water for irrigation in agricultural sector is the main reason responsible for it. The Soviet schemes for mass production of cotton, rice and other crops irrigation cultures burdened the that required enormous amounts of water. However, large irrigation canals designed to provide massive agricultural expansion were on arid lands badly suited to irrigation where the soil is often much permeable and seepage is great. The rivers areas are raised, but the water of river cannot go back readily to river channel where it taken. Because of “overexploitation of water the total annual inflow to the Aral Sea has dropped to 7 km³, the surface area of the sea was reduced to 33,000 km³, and the level had fallen by 37 m and the sea also became saline and devoid of fish” (Valery, 2003). Soviet age irrigational pattern resulted in extensive and speedy land squalor.

Water is the only scarce resource for the region which has no substitute. Apart from irrigational water crisis there is a huge difficulty with delivery of water where it is much needed for drinking and the problem increases further more when it is linked to ecological problems (Valentini and Orolbaev, 2004). There is also a problem with outdated water infrastructure in Central Asia. Data shows that there is still loss of water in large amount (up to 40 percent) due to old fashioned irrigation system particularly in Uzbekistan and Turkmenistan through the canals. The water structure in Turkmenistan is in very poor condition and most of water gets wasted received by country. “The country is hesitant to spend huge funds for the expensive rehabilitation

of crippling Turkmen canals and draws off more water from the Amu Darya instead” (Valery, 2003).

Water pollution of river water due to the agricultural, industrial and municipal waste and drainage contribute on a large scale. The water quality of Central Asian Rivers has declined severely due to the large-scale irrigation. During the return flow water of rivers get polluted due to enormous amounts of salt, fertiliser, herbicides and pesticides. These harmful chemicals from the industrial waste and the fields got their path to the river water and contaminated the quality of water.

Of 36-40 km³ of total annual return flow, about 50%, or 18-20 km³, bring to rivers about 115 million tons of salt and other harmful components, dramatically deteriorating water quality. Amu Darya Basin alone has a total of 84 million tons of salt is discharged into the river during their runway to irrigate the fields (Valery, 2003).

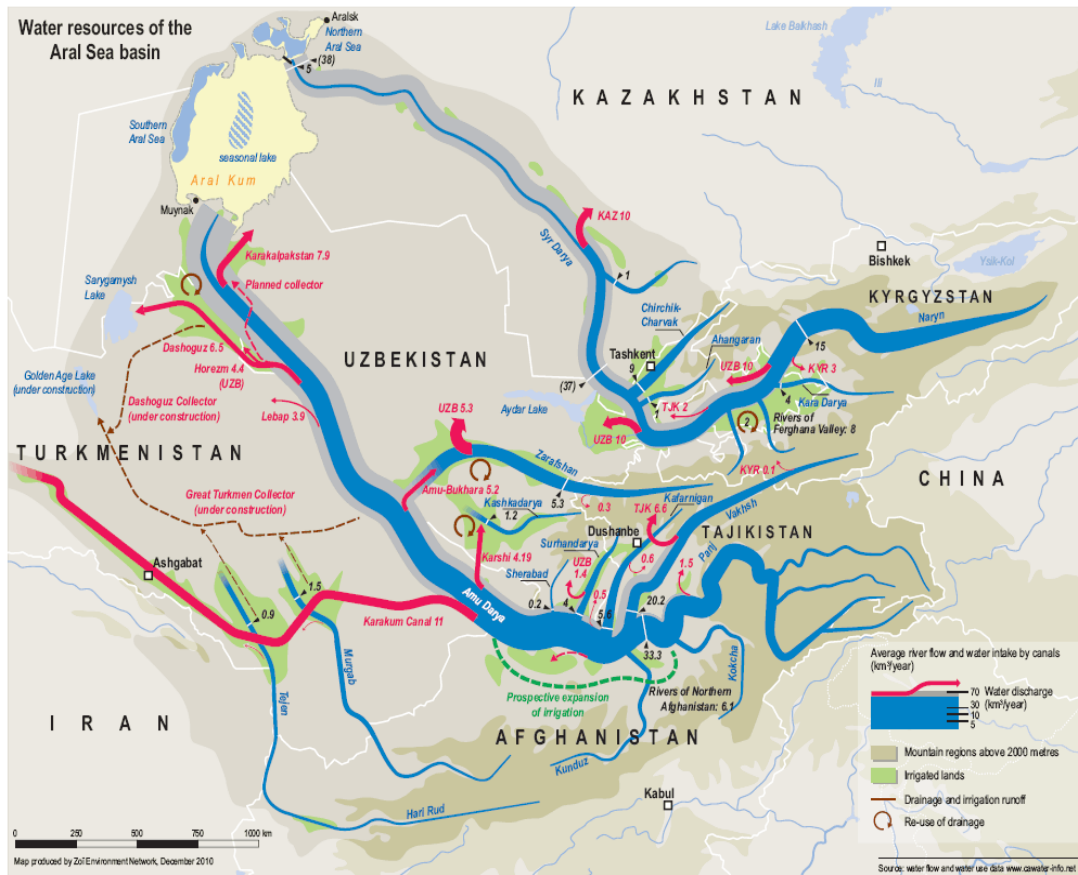
The chemical contamination of rivers and fields is common. Due to this hazardous contamination of fresh water reason for many cancer incidence, and considerable dioxin residues have been found in mothers’ milk, particularly in Karakalpakstan. The major industries like the case of Tajik Aluminium Company which resulted water pollution due to the fluorine. Increasing number of waterborne diseases has been found in the in full flow and downstream areas of the Amu Darya and Syr Darya.

The sample of water taken in Karakalpakstan proved chemical contamination of drinking water about 65%. These samples are not to correspond to standards of drinkable water. It is still found organo-chlorine pesticides (BHC, DDT) in the water of Major River like Amu Darya at the bottom level. Tissues of fish having highly polluted levels of pesticides dangerous for health found in the water of Amu Darya and Syr Darya. Crops like cane, rice, millet and wheat growing the basin water found to have dangerous levels of benzo-pyrene in their given samples alarm of health. Problem of waste like carcinogen produced by vehicle exhausts, oil, coal and asphalt that going to water of river. In USSR times, there was enough budget for water management infrastructure but at present the country like Uzbekistan spends only \$25 per acre or less than. Recovering from the civil war state like Tajikistan spends \$4 only (Glantz, 1999). “As a result of low budget for water management 55 m³ of total water to be used for irrigation, only 38-44 m³ of water can reach the fields and crops

get only 25-26 m³ due to the outdated irrigation technology” (Valery, 2003). The basin of Amu Darya water is highly silted content due to the lack of maintenance.

States around the bank of the Aral Sea records long history of international disputes over water allocation, ever since the disintegration of the Soviet Union. The ecological topography of Central Asia divides the region into two major riparian zones. The major rivers of the region categorize two zones the downstream nations and upstream nations on the basis of origin of these rivers. Population of the upstream countries find themselves in harder conditions and having fewer options of economic opportunities (Mosello, 2008). At the same time it's a zone where water resources originate from this land including the natural system of water creation, glaciers and water springs. However upstream states are not among the rich states, have scarce agricultural resources and lack expensive technology and communications. Thus they struggle for their existence rather than prosperity. These countries believe that they are mainly dependent on their water sources. The states of Central Asia share the basins of two major rivers: the Amu and the Syr Darya which form the Aral Sea basin.

Water Resources of Central Asia



Source: cawater.info.net

Map I.1

More than 60% of the region’s surface water is lying under the catchment of the Amu Darya basin the rest 30% makes by Syr Darya (Mcchesney, 1996). Pamir Mountains are starting point for the river and after that it shapes the Pyanj River at the border of Tajik-Afghan. Further the river is joined by the Surkhandarya near the Uzbek town Termez and finally appearance as the Amu Darya River. River has the length of 2540 km from its beginning point. It running further towards the west across Tajikistan, Uzbekistan and Turkmenistan and again enter into the Uzbek province Karakalpakstan and finally discharge into the Aral Sea (Valery, 2003). “The basin’s population of over 35 million occupies about 1.5 million square kilometres and population density varies from about 10 persons per square kilometre in the desert plains to over 300 in the valleys and foothills of the mountains” (Votrin, 2003). These two major rivers of Central Asia remained domestic until the USSR period but the

breakdown of USSR era in 1991 turned these rivers into international rivers overnight (Khamzayeva, 2009). The water disputes over Amu Darya have remained in the limelight for its complex nature of problems. Such conflicts show that existing regional and international water management institutions have failed miserably. Changing nature and run off of the rivers due to climate change in Central Asia has also interestingly entangled with ongoing interests of all states. On the other hand, there are serious tensions along the flow of the river not only between the upstream and downstream riparian like Tajikistan and Uzbekistan, but also between the middle and lower riparian, for example, Uzbekistan and Turkmenistan (Valery, 2003).

Formation of surface flow in the Aral Sea Basin

Countries	Amu-Darya River		Syr-Darya River		Total	
	Km.	%	Km.	%	Km.	%
Kazakhstan	0.00	0.00	4.50	12.12	4.50	3.89
Kyrgyzstan	1.90	2.42	27.40	73.77	29.30	25.35
Tajikistan	62.90	80.17	1.10	2.96	64.00	55.36
Turkmenistan	2.78	3.54	0.00	0.00	2.78	2.40
Uzbekistan	4.70	5.99	4.14	11.15	8.84	7.65
Afghanistan	6.18	7.88	0.00	0.00	6.18	5.35
Total	78.46	100.00	37.14	100.00	115.60	100.00

Source: Fundamentals of Water Strategy of the Aral Sea Basin, 1996.

Table I.1

The geographical positioning of Central Asian countries is adding more difficulties to forging a common but accepted solution to trans-boundary water dispute.

Old policies designed by soviet on water allocation do not convince all the Central Asian state with their respective interests in particular irrigation versus hydropower generation. Upper riparian states Kyrgyzstan and Tajikistan always seek for energy security within their own country. For this purpose they require to hydropower to meet their demands for all seasons. On the opposite side the lower countries Kazakhstan, Uzbekistan and Turkmenistan mainly depend on irrigation system. Thus they require more water to meet their demand for more agricultural production to boost up their economy (Avilash, 2013).

In 1991 with the internationalisation of intra Rivers of the Central Asia distorted the interests among all countries (ICWC report, 2008). “These new states were compelled with geographical limitations and uncertainties of unhindered energy production and

flow of water for irrigation as well as vivid example of a drying Aral Sea” (Avilash, 2013).

Amu Darya River Basin



Source: amudaryabasin.net

Map I.2

There were a series of bilateral agreement among CIS countries were signed for example the agreement between the Turkmen SSR and the Uzbek SSR on water quotas of Amu Darya River. However the regulation of water allocation with these plans and agreements are still working as the base for present water management structure in the region. It is also a very significant issue that Afghanistan is a contributor to Amu Darya rivers flow but interestingly country is excluded from the legal and institutional framework. In future it may be Afghanistan’s plan for the reconstruction of irrigation system. “It will raise worries across Central Asia as it is allowed to draw much more water from the Amu Darya and Panj rivers than it now

does” (Valery, 2003). During the post soviet period the Ministers of all five independent countries were negotiated immediately to avoid upcoming conflicts over water and its serious complications in water allocation, limitation and account in order to water resources management. October 10-12, 1991 in Tashkent the conference took place to discuss the problem of water and then many negotiations, meetings and discussions were held further for other ventures. The joint Statement was released based on historical community of Central Asian peoples, their equal rights and responsibility for ensuring rational water resources use in the region, and taking natural and economic conditions into account (EU-UNDP Project, 2008 - 2012). Later they got realise that joint effort for coordination and management will help to resolve the problem of water successfully particularly in the context of increasing ecological and social tension.

The Ministers of all five CIS States had signed Almaty agreement on February 18, 1992. Agreement on cooperation in joint management, use and protection of interstate water sources of Central Asia considering the prime focus. Later on this agreement has founded one more joint body called Interstate Coordination Water Commission (ICWC). Agreement of Almaty was pronouncement and approved for the joint actions on resolving the problems related to the Aral Sea by the all CIAS States Presidents, on March 26, 1993. The Agreement was deal with environmental protection and development of social-economic condition of its coastal zone in the basin. Thus the agreement among all five countries “On status of IFAS and its organizations” also took place in April 9, 1999 (EU-UNDP Project, 2008 - 2012).

The Interstate Commission for Water Coordination (ICWC) was a common platform for all CIS Countries to promoting the rationale use of equal water, equality and mutual harmony. Decision made by the all head of the CIS states on including ICWC about International Fund for saving the Aral Sea (IFAS) considering its status of as an international organization. Simultaneously on march 26, 1993 the water initiatives were primarily aimed to foster regional processes for peace building and others such as the venturing of European Union to approach for a new joint venture with Central Asia (Water Governance Facility Report, 2010). Germany is providing support for regional cooperation on water resource management. “A new model of regional co-operation other than that used in the Soviet times was needed to address specific environmental, socio-economic and political problems of the region” (Valery, 2003).

Presidential statement of the United Nations Security Council in its session on July 2011, warned that climate change can pose a threat to peace and security (UNSC Report, 2013). It is thus significant for all these states to find out the way forward to cooperate on water resources. The challenges of climate change environmental degradation are expected to pace up. In case of Central Asian states it even becomes mandatory for every state to make a contribution towards sustainable development, regional stability and security in the region.

As far as the geographical setting of the Amu Darya River is concern it is one of most complex one. Catchment area of Amu Darya basin is highest with its catchment area in the region. It is a trans-boundary river shared by Afghanistan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Most of the flow the Amu Darya is form on the territory of Tajikistan (72.8%), 14.6% in Afghanistan and 8.5% in Uzbekistan (amudaryabasin.net).

Kafirnigan, Sherabad, and Surhandarya are the three major tributaries those contribute to the river Amu. As far as the socio-economic status of Aral Sea is concern, Amu Darya is very significant for the livelihood of more than 43 million people of the region (Ohara, 2000). The region has agricultural based economy where the sector of agriculture became more significant with its major contributor to the GDP of all States. Even in case of “country like Afghanistan 80% of population depends on agriculture for their living and the sector contribute more than half of its GDP” (Martino, 2005). In Central Asian region’s economy agriculture sector alone “accounts for 20-30% of employment, and 20-35% contribution to GDP” (amudaryabasin.net). The irrigation sector consuming highest water form rivers. And even some state like Uzbekistan and Turkmenistan both getting more than 42% of whole run of water in the river (Dinar, 2007).

The ICWC is the main institution which decides monitoring, water allocation, water use, and other matters in the region.

It has which is including of higher water officials from every nation which is part of it and responsible for the plan. ICWC also includes its subordinate bodies like the Amu Darya’s Basin Water Organization and the Scientific Information Center (SIC). These are the executive bodies of the ICWC. BWO Amu Darya was founded in 1980s and responsible for implementation of decisions on water allocation and distribution (amudaryabasin.net).

These bodies are also accountable for procedure and protection of all main water structures. Scientific Information Centre (SIC) gives innovative and scientific information to support to the ICWC. IFAS is also one of the important regional level institutions which provide a stage to cooperation among all states on water related issues. The institution also guides its member countries to dialogue each other on well-organized use and management of water resources. It provide fund for improving socio-economic and environmental condition of all needy states in the Aral Sea basin.

I.2. Review of Literature

The literature review has been studied under three heads. These are

I.2.1. Inter State Conflicts in Central Asia

Central Asia's Amu Darya river basin and its tributaries has become a centre for growing rivalry among the riparian states. The basin is shared by all major countries including Afghanistan. Upstream states like Tajikistan, Kyrgyzstan and Afghanistan have direct control over it. While downstream states like Uzbekistan and Turkmenistan are largely depends on the upper riparian zone. Amu Darya marked border between Tajikistan, Uzbekistan. It also makes boundary between Turkmenistan and Uzbekistan and in the beginning between central Asia and Afghanistan (Valery, 2003). The 2,540 km. Length of the river that begins in the Pamirs at the convergence of the rivers called Vakhsh and Panj, further flows to toward the west to form Afghan's borders with Tajikistan, Uzbekistan, and Turkmenistan during much of the way and finally goes on to the Aral Sea (EWI News, 2016).

The dehydration of the Aral Sea basin has been impacted significantly because it deteriorates the socio-economic situation in the basin area. The disaster inflames nationalist feelings among the people of central Asia. Some province like Karakalpakstan the Uzbek autonomous region located to very near in the disaster area has very severe situation that infuriating already tense water relations in the region. The whole region of central Asia is ethnically very diverse. Ethnic factor is very important particularly in Kyrgyzstan and Uzbekistan because both are ethnically

diverse states. So the local conflicts here have been more grave often than bigger one. “Disputes over land and water resources provoking wider ethnic conflict have led to hundreds of victims in Kyrgyzstan in 1990 and further the poverty, rising costs and crumbling water infrastructure are adding to strains in local water system” (Valery, 2003).

The water crisis mainly hits the poor section of population where the large section of population is depending on these water resources for their income. For example in case of ethnically diverse Ferghana Valley which is shared by three states Tajikistan, Kyrgyzstan and Uzbekistan became more vulnerable for outbreak of any dispute over water. “Like it was in 1990, when bloody clashes between inhabitants of the Kyrgyz town of Osh claimed over 300 lives, or earlier, in 1989, when hundreds of the Meskhetian Turks, who had been deported to Central Asia by Stalin in the 1940s, were killed in the Uzbek town of Ferghana in what was called one of the most dramatic episodes of inter-ethnic relations in the Soviet Union” (Votrin, 2003).

Dispute over Amu Darya River is increasing day by day. The main focus of conflicts is between the governments of Turkmenistan and Uzbekistan. They turn out to be more aggressive towards each other. Their Completion for water can convert in full fledged war anytime.

The situation will be worse when Afghanistan will demand its share of water Form River. These tensions have so far been contained without conflict, but all parties have shown a willingness to put their interests first at any cost, including military intervention and particularly due to their reliance on agriculture, Uzbekistan and Turkmenistan view irrigation as a key security issue (Votrin, 2003).

In the late 1980s there were many small scale conflicts led to the warm atmosphere when the USSR was not in full control on Central Asia. The outbreak of conflict in the Kyrgyz town of Osh in 1990 on the border with Uzbekistan, claimed over 300 lives and it was provoked by fierce competition for water together with high population density, limited arable land and ethnic dimension largely population of Uzbeks living in the area (Valery, 2003). Tension between Kyrgyzstan and Uzbekistan arise in the summer of 1993 when Uzbek authorities blame Kyrgyzstan for releasing water from the Toktogul reservoir in a huge quantity. Uzbekistan sent 130,000 army troops on the border with Kyrgyz to lookout the reservoirs on both

sides of the two countries in 1997. In June 2001, “the Kyrgyz parliament adopted a law classifying water as a commodity, and the government followed up by announcing that the downstream countries would be charged for the water they use” (Votrin, 2003).

In return reply Uzbekistan blame Kyrgyzstan of deteriorating to obey with the barter agreement to give water to Uzbekistan’s water quota in return for oil and gas and country cut off its all deliveries to Kyrgyzstan. Even though “weaker in political and military terms Kyrgyzstan acknowledged this failure, Uzbekistan would be emboldened to behave in a more aggressive manner towards its neighbours” (Valery, 2003). Both states are vulnerable as the threshold of any major disputes in the region anytime. Tajikistan is the poorest country among its surrounding states with least development during the period of Soviet Union. The country has also faced a terrible civil war in the 1990s, which has taken the country further back. Unlike many of the oil rich neighbouring countries like Azerbaijan, Kazakhstan, and Turkmenistan, the lower riparian countries do not have adequate resources to utilize their development potential (Spoor et. al, 2004). Eventually based on the country’s underdevelopment, the leader of the country made a plan to pull Tajikistan out of poverty. They thought about a vision to build the world’s tallest dam. However, Tajikistan lacks in many natural resources and other advantages like its neighbouring states. But at the same time the country is a large reservoir of water. The country has thus indulged into utilizing the surplus water resources for generating hydro electricity and plan to build the dam on the Vakhsh River next to the small town of Rogun (Raiser, 2005). The idea would provide sufficient electricity for Tajikistan, the country that has been suffering from chronic energy deficit. It will also produce surplus electricity to export to other countries and generate revenues (Kamilov, 2005).

Uzbekistan intensified the tension more than once by acting in a unilateral manner and in July 1997, it cut off 70 percent of downstream flow, which caused a riot among the Kazakh farmers whose 100,000 hectares were threatened. The changing pattern of water flow by upper riparians states is no further peaceful because in summer 1999, Tajikistan free 700 million cubic meters of water from its Kairakum reservoir with no any warning information to its lower riparian neighbours. The consequence of this event led to the uneasy atmosphere. In opposite of it Kazakh cotton fields were in severe thirst because the southern part received very less water not as agreement so the crops get affected very badly. The situation was seriously aggravated by

Kyrgyzstan's concurrent move to reduce the flow to southern Kazakhstan in retaliation for Kazakhstan's failure to supply coal under the barter agreements (Valery, 2003).

However the issue was settled after a month of negotiations. Water quota agreement of 1992, in which Tajikistan was permitted to use 9 m³ of out of total 75 m³ of Amu Darya's annual flows, or equivalent to 12 percent. The country thinks it is very small quota for its need. Tajikistan wants to expand its agricultural production for its increasing population (Usupova, 2014). The Agricultural sector in Uzbekistan is not developed well since the Soviet times. The irrigation system of the country is decrepit and it require for urgent repairs. So "Tajikistan's only way out is to use more water either by increasing its water quota from the Amu Darya or by diverting the Zeravhsan River" (ICG Report, 2002). However it is easy for Tajikistan to get more water from the Amu Darya because country directly control over the water form it source of origin. Thus "in a principle, no one can prevent Tajikistan from consuming more water than was permitted by the water quota agreement because it is very tough to monitor Tajikistan's consumption in practical , as most equipment necessary for it been destroyed during the civil war in 1992-1997" (Valery, 2003). But at the same time country needs modern technology and advanced equipment to increase it water quota from river however it will impact downstream state in more hostile way (Elhance, 1997).

Similar kind of problem of water/energy complex has developed between Tajikistan and Uzbekistan. Central and southern parts of Tajikistan are well provided by electricity from the Nurek hydro plant; while northern part having no grid lines. The rest part of the country depends on Uzbekistan's irregular supplies of electricity and gas in winter (IWPR Report, 2006). With mutual exchange of energy and water resources Tajikistan gives power to south part of Uzbek region. But Uzbek authority has frequently complaining that Uzbekistan is cutting energy supply to northern part of tajiskitan to get more price for it. It became more severe when Tajikistan demanded for electricity rationed for its dark provinces. "The country desires to develop its hydropower resources to break dependence on Uzbekistan" (Valery, 2003). But it is presumed that increasing hydropower use would seriously have an effect on the downstream access to seasonal water supplies and make more conflict along the course of Amu Darya (ICG Report No. 233, 2014).

Nevertheless, some of the projects are still under construction. For example, “the huge Rogun Dam located upstream of the Nurek the current location of reservoirs, about 60% of the total storage capacity of Amu Darya” (Valery, 2003). Downstream countries Uzbekistan and Turkmenistan believed that they have very a small number of water storage facilities and are completely dependent relative for water on the upper riparian states (Khamidov et al, 1999). The shared water storage facilities, “like the Andijan reservoir that is located in the Uzbek part of the Ferghana Valley is supposed to re-channel some water back to Kyrgyzstan, also poses a serious inter-state problem” (Votrin, 2003). Many canals comprise: the North and Grand Ferghana Canals transporting water to the Ferghana Valley. “These are the Karshi Canal which provides water to 1.2 million hectares in Uzbekistan’s Karshi Steppe; the Amu-Bukhara Canal which irrigates the land in the Bukhara Region in Uzbekistan bearing water from the Amu Darya; and the South Hungry Steppe and Kirov Canals that irrigates the thirsty Steppe” (Nanni, 1996). It results in 2000, “out of the projected 7,641,600 m³ of water to be diverted from rivers, 6,866,200 m³, or 89.8%, was actually diverted, and 4, 88,660 m³, or 86.5%, of projected 5,648,800 m³ was used for irrigation” (Valery, 2003). As a result, due to this water overexploitation there is always water shortage for downstream riparian states which is the major reason for water conflict in Central Asia. Because the lower riparian states Uzbekistan and Turkmenistan utilize their water sources not in proper manner and thus they experience water insufficiency even at a time of water abundance (Wegerich, 2001).

Conflict between Uzbekistan and Turkmenistan over Amu Darya water resources is very complicated in nature as both are downstream states. “Both countries are equally depending on their cotton production and irrigation for agriculture and both claim that each of them exceed their water quotas” (Usupova, 2014). In 2002, the relations between both countries radically deteriorated when the Uzbek ambassador was killed in accusation of being persona non grata in Turkmenistan on charge of participating in the plot to oust and kill President Niyazov. “Uzbek-Turkmen relations over water can grow even worse, given Turkmenistan’s ambitious plan to complete a huge reservoir in the Karakum desert, called the Golden Century Lake with another point of contention is the Tyuyamuyun reservoir in the delta of the Amu Darya which is divided between Uzbekistan and Turkmenistan” (Valery, 2003). Equally the both countries discomfort by means of the inefficient of water use, and it lead to an

outburst of aggression over the diverting the drainage of results in cutting the pipes and irrigational canals in 1992 (Mosello, 2008). Even present day area called Tyuyamuyun leftovers most dubious areas in perpetually worsening the cross-border relations on water with Uzbekistan.

Uzbekistan's frequent disruption of electricity supply “causes serious discontent as Tajikistan is forced to have electricity rationed in many provinces due to poor state of Tajikistan’s grid lines” (Zonn, 2000). All through the independence period, rumours have circulated of a small-scale secret war between the two states over the river resources, Uzbekistan troops taking control of water installations on the Turkmen bank of the Amu Darya, and even of a massacre of a large number of Uzbekistan troops in Turkmenistan in 2001 (Votrin, 2003). However such incidents appear to be unproven, but they have symptomatic in nature of boiling anxiety between these two countries (Sievers, 2002). Thus it is significant to recognize the regions that may have turn out to be the possible points for intra- and interstate water conflicts in upcoming time.

It is argued that high population growth can be more damaging to the environment than high population density. Southern Uzbekistan’s provinces like Surkhandarya and Kashkadarya and several other areas in the Ferghana Valley experienced some of the highest population growth rates in the region between 1981 and 1991, are most likely to become a scene of a resource-related conflict (Valery, 2003).

The areas where high growth rate of population and having not native water sources to stores like Ferghana and Andijan in eastern part of Uzbekistan, in west part Karakalpakstanare region are the major key concern for discussion. In case of Turkmenistan’s Dashhovuz region and Uzbekistan’s Karakalpakstan region which share the water of the lower Amu Darya, “in future there may be possibilities for occurrence of water-induced conflicts in these regions” (ADB Reprot, 2004). Every area was grade in accordance with the essential features supposed to influence the water clash latent like population growth rate/density, per capita water availability from total and indigenous sources, share of water derived from external sources, minority population share of total population. Eight out of ten regions having the highest rankings for water-resource vulnerability are located in Uzbekistan and with top of four located in the Ferghana Valley (Dinar, 2007). Therefore, the region those

situated in the lower Amu Darya like Ferghana Valley has growing as susceptible to possible water-bring conflicts in the future.

I.2.2. Water Management Agreements

The water resources of central Asia were largely utilized on the base of water consumes schemes of the Soviet Union before 1991. Ministries of Land Reclamation and Water Management have prepared the plans and then sent to Moscow for approval of the Soviet Union. “These plans and schemes provided for annual water withdrawal limits with respect to each tributary, reservoir or canal and the limits were calculated against annual crop requirements” (Valery, 2003). After independence in 1991, Central Asian countries are yet to reach a decisive agreement on the consumption of collective water resources, which is make stressed and worse political relations with one another. Literature shows that there is still scope for optimism. Thus “the policy makers of the riparian countries can set up effective international water management system before the most severe climate change problems like changes in the seasonality of the runoff and geo-hazards hit the region” (UNEP, UNDP, ENVSEC, UNECE, OSCE, PEC and NATO Report 2011).

Only Regional cooperation is an innovative method of resolution for water trouble in region because “Water is a strategic resource across borders and its utilisation in past was an issue that compels the countries to negotiate effectively with one another in present time” (Water politics Report, 2012). So there is still the need and option for all CIS countries to enter into an agreement on common platform that properly defines water allocation in the region. The Almaty Agreement that established in 1992 includes the IWMC with consent to manage logical use of the trans-boundary water resources. IWMC’s decisions regarding intake limits and rational utilisation of water are obligatory for all users (Votrin, 2003). The commission was leading two inter-states Bodies for Basin Water Management: BVO Amu Darya and BVO Syr Darya. Therefore, the all five CIS States favoured to persist with the management system of BVO that was come in existence during the USSR time (ICG Report No.34, 2002). Such agreement that was signed in Almaty on 18 February 1992, “did not go far from water quotas set up under the Soviet Union regime” (Valery, 2003). As in the past, the water allotment schemes were biased towards the lower riparian countries as they received larger quotas and on the other hand upstream nations were allotted much

lesser quotas, bearing in mind their smaller population and low production of cotton designed by USSR.

Under the USSR scheme of water allocation, downstream countries were favoured by Moscow and water quotas were imposed by at the cost of the upstream riparian. In this plan water-rich States “Kyrgyzstan and Tajikistan were believed to give water for irrigated agriculture economies of Uzbekistan and Turkmenistan in spring and in summer when water available for thirsty cotton fields” (Smith, 1995). However in autumn and winter, Kyrgyzstan and Tajikistan experienced peaks in electricity demand, but “they were not supplied properly with Turkmen and Uzbek gas and Kazakh coal for their energy consumption”. Maintenance and operating costs of dams and reservoirs were covered by Moscow. They received electricity from downstream countries during winter to be compensated for the hydropower produced in summer (Valery, 2003).

Water Allocations under the 1992 Almaty Agreement

Country	Syr Darya allocation, %	Amu Darya allocation, %
Kazakhstan	38.1	0
Kyrgyzstan	1.0	0.4
Tajikistan	9.2	13.6
Turkmenistan	0	43.0
Uzbekistan	51.7	43.0
Total	100.0	100.0

Source: Bedford D.P., 1998 “International Water Management in the Aral Sea Basin,” Water International 21, no. 2 (1996), 64.

Table I.2

According to water allocation of Amu Darya under the Almaty Agreement, Kazakhstan’s proportion was 0%, Kyrgyzstan’s 0.4%, Tajikistan’s 13.6%, Turkmenistan’s 43%, and Uzbekistan’s 43% (Bedford, 1998). “The river basin organization also had the authority to increase or reduce allocations to each soviet republic by up to 10% depending on anticipated climatic conditions, reservoir, levels and other factors” (Gleditsch, 2012). In the beginning “IWMC was accountable for lots of subjects including water development and allotment plan, water quality control, water preservation, environmental protection, preparing yearly water distribution plans, defining limits of water consumed by each riparian country” (Valery, 2003). Between 1993 and 1995 there were establishment of other intergovernmental institutions like the International Fund for the Aral Sea and

Interstate Council on the Aral Sea Basin. However they have same functions as of the IWMC so they became somewhat duplicated and these intergovernmental bodies remained unclear about its relationship with other (IGC report, 2002).

The Agreement signed in Almaty was established on as per old norms maximum consumption while the global notion of equitable use and best possible use of water resources was kept at distant. There was also a drawback with the Agreement for the provision about dispute settlement (Mckinney, 2003). The agreement defines the responsibility of the Ministers of Water Resources of the all five nations for water disputes settlement. However, it does not have provision in case when Ministers are not capable to resolution the disputes. Thus in lack of any inter-state disagreement resolution body, it cannot work flawlessly.

In addition, the problem is also about the actual functioning of water management bodies, BVOs, which lack funding and legal powers and according to the Almaty Agreement, they have to submit a budget to the ICWC for approval. Once a budget has been approved, the five members' states are supposed to contribute a proportion of their budget based on the percentage of river water allocated so in practice, member states are unwilling to contribute funds to an external agency and the BVOs are chronically underfunded. Mostly these managements are tackling by national water management bodies not by BVOs so they also lack legal standing. However the two BVOs had sufficient power as mentioned above if they regulate properly. None of CIS country joined the party to the 1997 Convention. However, Kazakhstan gave it consent to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Valery, 2003).

Contemporary trans-boundary watercourse laws are mainly stand with the United Nations Convention, 1997 on the "Law of Non-Navigational Uses of International Watercourses". It advocates riparians not only to create legal agreements to manage their shared resources, but also to find joint management mechanism and to cede sufficient sovereignty to them to make them effective. The convention of 1997 on the "Non-Navigational Uses of International Watercourses Commission", took a long period of 27 years to build up and highlight the complexity of introducing the legal and hydrologic framework. On the other side of the scene some long-negotiated device of global water law like the 1997s UN's Convention on the Non-Navigational Uses of International Watercourses. It contributed little since "it provides for equally contradictory concepts of equitable use and no significant harm principles while the

former is favoured by upstream countries, downstream riparians insist on emphasising the latter because it protects their own rights” (Weinthal, 2006). However it is so hard to put into effect the principle in the lack of any global enforcing equipment. “The Law of the Non-Navigational Uses of International Watercourses is almost dysfunctional due to the adamant nature of upper riparian countries” (Avilash, 2013).

During the winter month’s upper riparian countries were forced in their economic development and capacity to accomplish their heating requirements because downstream countries were already introduced world prices for gas and coal. Country like Kyrgyzstan was not able to afford the prices of these costly projects so country started to increase electricity production at Toktogul reservoir. As a result there was sharp decrease in the water supply to lower states like Uzbekistan and Kazakhstan for irrigation in cotton season (ICG Report No. 93, 2005). The all nations have come forward to a structure relate to exchange agreement in 1998 just after grave conflicts in 1997, under this, “Uzbekistan and Kazakhstan were assigned to provide gas and coal to Kyrgyzstan during winter and in return country will provide water for irrigation during spring and summer”(Usupova, 2014).

Legal structure for existing management of water resources in Central Asia is concern, distant from the major structure of agreements over water resources for instance the 1992 Almaty Agreement, a numeral of other water organization/allotment agreements have been came into since 1992 (Valery, 2003). Under the list of some of them:

- In Orenburg, 1992 the Agreement between the governments of Russia and Kazakhstan on the joint use and protection of transboundary water resources,
- Agreement on the creation of the International Fund for the Aral Sea, 1993
- Programme on the joint actions on the improvement of environmental situation in the Aral Sea Basin, 1994
- Declaration on the problems of sustainable development in the Aral Sea Basin, Nukus, 1995
- Statement of leaders of Kazakhstan, Kyrgyzstan and Uzbekistan about the energy/water use, Bishkek, 1996
- Declaration on the creation of the Interstate Commission on Sustainable Development and the need of preparation of a Convention on Sustainable Development, Almaty, 1997

- Framework Agreement between the governments of Kazakhstan, Kyrgyzstan and Uzbekistan on joint use of the Syr Darya River Basin water/energy resources, Bishkek, 1998
- Agreement between Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan on co-operation in the field of environmental protection and Agreement on biodiversity conservation, Bishkek, 1998
- Agreement between Kazakhstan and Kyrgyzstan on the interstate use of hydrological facilities at the Chu and Talas rivers, 2000
- Annual intergovernmental water/energy agreements (Valery, 2003).

However, these barter agreements were violated regularly because there are many causes including: “first states are prepared generally in spring when Uzbek and Kazakh fields are thirsty of water; and second the both side parties have lack of trust and they do not keep their promises; and lastly there is a lack of regulatory mechanisms” (IWPR Report, 2006). In case of country like Kyrgyzstan where many years of harsh dry years has severely impact on the situation. It reduced the water for irrigation system in the summer season and causing overflow during winter in Uzbekistan. So the quota systems are failed to attempts for these reflect so far. Particularly the downstream states also have revealed very small perceptive of upstream states demand to enlarge their water quota and consumption of water (ICG Report No. 33, 2002).

The Central Asian water initiatives (in Berlin process) were launched in 2008 for their joint intention to continue and develop their cooperation (Berlin Process report, 2008). In 2009, the joint declaration of Almaty, all Central Asian states reaffirmed their desire to develop water supervision mechanisms which might be suitable to every state with their interest in the region (Water politics Report, 2012). Resolution of the UN general assembly in July 2010 (UN Report, 2014), on the human right to access for fresh drinking water reveals the current state of the problem in CIS Region and the need for analyzing possible solutions (UN general assembly Resolution report, 2010). “Tajikistan was first country who placed the issue of trans-boundary water allocation into UN's precedence agenda at the UN, as a result year 2003 was declared the International Year of water, and 2005-2015 was the Decade of Water for Life and 2013 was the Water Cooperation year” (Avilash, 2013). However Tajikistan's effort to highlight the grave water situation at the UN were considerable

but making every effort by country in forging for Regional Cooperation has very negligible impact.

Central Asian countries have signed an agreement on Cooperation in Joint Management, Use and Protection of Trans Boundary Water Resources in line with Panchsheel.

ICWC - Interstate Commission for Water Coordination was not able to give satisfactory regulations on the issues to deal with the difficulty of water and energy sources as a regional organization on Trans - Boundary Rivers. Thus these international treaties, frameworks and declarations on trans-boundary water have had only negligible impact on Central Asian countries due to its unique regional, geographical and economic complexities. There is a lack of powerful regional mechanism for disagreement resolution. To defend their interests CIS states enter into bilateral agreements respectively. Lower riparian countries like Uzbekistan and Kazakhstan signed a strategic agreement in June 2013 in Tashkent which highlights the progress of a fair system of water management with building of hydropower formation. This was a consequence of rising Russian hold for the creation of hydropower in higher riparian countries. Tajikistan and Kyrgyzstan have been jointly managing transboundary Isfara and Khodzha-Bakirgan River through inter-ministerial working group since 2007 (Avilash, 2013).

“The roots of any future ethnic strife in Central Asia lie in the unresolved social and economic problems, competition for scarce water and grazing resources and contentions over discriminatory land allocations” (Valery, 2003). There is a huge gap between the water-rich republics of Kyrgyzstan and Tajikistan, and on the other side states like Uzbekistan and Turkmenistan not having control on the sources of water. “The vulnerability indices not only express different access and pollution control opportunities, but also often suggests contradictory modes of water utilisation like hydropower versus Agriculture”(Klotzli, 1997).

I.2.3. International, Regional and State Actors

Water conflicts also contribute to the complex of problems in the CIS region, where border disputes, Islamic extremism, high population growth, ethnic tensions, clan competition, human rights and political instability can grow anytime (Valery, 2003). Authoritarian states like Turkmenistan and Uzbekistan have lack of public participation in policy making (Hegre et al., 2007). Moreover attempts by these

governments to seek military decisions that make situation already difficult and particularly the upstream states make the whole situation worse (Turusbekov, 2013). From the early days of sovereignty of CIS states, two-sided donors, global agencies and other personal organisations have funded so many projects to resolution the water problem in region. Major water initiatives in Central Asia were primarily aimed to foster regional processes for peace building and venture specially by European Union policy for a recent joint venture in Central Asia (Water Governance Facility Report, 2010). This implied technical solutions to political and economic ones. Particularly active were the World Bank, United Nations Development Programme (UNDP), the EU Programme of Technical Assistance to the CIS (TACIS), and the United States Agency of International Development (USAID) which spent millions of dollars to help resolve the Aral Sea crisis (Votrin, 2003). “The river basin organization also had the authority to increase or reduce allocations to each soviet republic by up to 10% depending on anticipated climatic conditions, reservoir, levels and other factors” (Gleditsch, 2012).

Central Asian states have a lack of enthusiasm to co-operate on many water issues that “has buried great many initiatives of joint cooperation for example an attempt was made by the Organisation of Security and Co-operation in Europe (OSCE) to persuade the five to discuss the region’s water problems at the water conference held in London” (Valery, 2003). Turkmenistan’s president reacted in a global conference held in London that it was not the correct location to talk about the water issues of Central Asia. On the other hand the president of Uzbekistan responded “that his country had a thousand years of experience in managing water problems and so he favoured only bilateral discussions to a multilateral conference” (ICG Report 33, 2002).

The complex water issue of Central Asia strained the authority of the all CIS countries to think about the substitute of schemes and policies for development of water communications to improved control over these water resources. Numerous huge schemes are now being taken into account for finding out the right path.

With little exception, all of them date back to the Soviet planning system, and several projects have been frozen and they immediately raised considerable anxieties among neighbouring countries. Some of projects like the Rogun reservoir can provide Tajikistan full control over the Amu Darya. The project

of the Golden Century Lake project in the Karakum desert of Turkmenistan will divert Siberian River of Ob and Irtysh to facilitate refill the basin of Aral Sea. This huge project which is economically not viable and environmentally doubtful in nature aims to Siberian water diversion has already contributed to the difficult water situation in Central Asia (Votrin, 2003).

World Bank warned that in order to successfully restore modest flow to the Amu Darya, agricultural runoff should be entirely restored (Wu et al., 2006). Thus, “huge lakes that developed over decades of water negligence from the excess water of the Toktogul reservoir and now support local agriculture, fisheries, recreation areas and biodiversity habitats would thus be bound to disappear” (Valery, 2003). And the main success of UNDP’s project on rehabilitation of the Aral Sea shore provides 16,000 residents of Karakalpakstan with safe drinking water and planting thousands of trees that withered immediately because they were unsuited for local climate (Finn, 2007). The major part of the problem of Central Asian nations is the failure to help the donor projects in a significant manner. States are neither support administratively or financially. So majority of the donors seems to show their work on paper reports only not in field actually (Sievers, 2000).

However, “actual regional co-operation over water resources apart from going for various agreements is glaringly absent” (Votrin, 2003). Despite of all the joint dialogue, speeches and reports on papers there is no real economic co-operation, and most of water regulation also has been failed and thus the countries facing sharp water shortage. So they have making a tendency to make plan for nationwide uses of water that would be quite logical for them. However not any of country has developed these one although Kazakhstan, Kyrgyzstan and Tajikistan have underway to work on it. The main problem is implementation of existing agreements that appears to be another big flaw. Many of accords are merely signed than implemented because the national interests always are more important than joint action. “None of water treaties specifies a goal of reducing water use or making agriculture less water-intensive due to the sceptical attitude of downstream countries to multilateral co-operation deters them from any environmental and financial commitments” (Valery, 2003).

The problem extends from non-availability of clean drinking water, pollution of big water basin and seas to complete disappearance of rivers and lakes (Wu et al., 2006). It was for the first time during the 20th century that the environmental problem

directly linked with the water issues got highlighted and conflict prediction was on the foremost agenda of the country's interest manifesto worldwide. Gradually it became an international issue straining the international relations (Valentini and Orolbaev, 2004). The countries of Amu Darya Basin are still trying to make equilibrium for the water management and energy resources through interstate organizations. “The major characteristics of the Amu Darya River include its trans-boundary nature, its division between hydropower use and irrigation use, and most importantly, the extent to which these two uses can be regulated to maintain a balanced supply for upstream and downstream users” (Amudaryabasin.net).

Similarly all these problems that resulted in an abridged storage capacity of basin have been discussed mostly. The study will explore the differences related to major trends and challenges for the balance use of water. It will outline differences stuck between agriculture production and energy need in the upstream and downstream of the Amu Darya Basin. These will also addresses issue of the insufficient water-governance strategy in the basin and the main challenge of attaining fair use of water in the Basin. However these issues “requires a mandate from a high government level before efforts can be undertaken to mitigate the effects of water pollution and environment policies” (FAO Water Regional Report, 2012). The other most important problems are information exchange and data availability in the region.

Past experience in Central Asia has made the governments and donor agencies wary of the creation of regional water management databases, due to efforts to limit access to or use of these databases. What is essential is a new-fangled notion, where the unprocessed data stays in the initiating country and reports are sent periodically to the other countries. The five national hydro-meteorological services have been working on the development of regional cooperation and data sharing in their area for the past year or so, and the lessons learned from their efforts could be applied on a broader scale (McKinney, 2003).

Major issue like national economies and Agricultural policy that affect on water use and environmental effects those have also impacts on the Central Asian states have not been studied yet. “Water allocation has been identified by several of the Central Asian countries as an important issue because Uzbekistan and Turkmenistan are reluctant to discuss this issue for fear of disrupting existing patterns of water use in their agricultural sectors and this issue required high level governmental cooperation

to tackle” (Burghart and Theresa, 2004). The future management regime adopted for both the Syr Darya and the Amu Darya should be based on a comprehensive evaluation of options including new physical infrastructure, upgrading of existing physical infrastructure and improved water management by user groups throughout the Basin (McKinney, 2003). Such analysis, “which must including Afghanistan for the Amu Darya, should amply demonstrate the benefits to be derived from regional cooperation as compared to unilateral or even bilateral decision making and actions” (Burghart and Theresa, 2004).

A comprehensive study with a holistic approach needs to be explored incorporating a broad range of physical, social, economic and environmental factors of water conflicts that identify the root causes. The “technical issues of water use and management in Central Asia are well developed and sufficient studies have been carried out that provide a sound technical base for future work on water saving, efficiency increases, information and decision system support, and capacity building for regional institutions” (McKinney, 2003). The present study will attempt to overcome the issues that are not deal with in the many studies either on regional level or global level. On the regional level the issues related to water cooperation and issue of deteriorating water quality as well as pollution from point and nonpoint sources particularly due to the trans-boundary effects are also must take in to account.

I.3. Definition, Scope and Rationale

The study focuses on a broad range of social, political, economic, demographic and environmental issues that cover Amu Darya basin. The problem of Amu Darya in Central Asia is unique in many manners because the setting of the region is debatably less hegemonic and therefore potentially the region is more unstable. The leading economic and military powers Kazakhstan and Uzbekistan also face the problem of water crisis and have future water security risks. Both these states are located in the lower riparian zone and in opposite of it the upstream states are in approximately complete physical control of the catchment runoff.

The region of Central Asia is exposed and more vulnerable with severe consequences that have occurred due to climatic changes. Theoretical and experiential studies have revealed that these kind of “upstream-downstream conflicts such as the one in the

Amu Darya river basin” are very hard to resolve. The region has a long history of mismanagement of water and its issues of funding and inappropriate allocations schemes, unequal political power by special interest, no protection concerns for environment, and lack of well managed water resources and decision-making stand out prominently.

The main cause of poor relations is because of low levels of trust and confidence among the CARs. Normally it leads to more bitter distribution bargain that worsen time inconsistency problems in implementations of agreements. The problem hindered because there is no such precise legislative framework for water ownership. However the installation of sufficient compensation mechanism that can solve the upstream-downstream conflicts principally. Besides there is a lack of understanding of the fact that water is going to be a more strategic resource in the future. So the international community need to recognise and take into account this principle. But the problem lies in the slow mechanism of recognition as it will decrease the interests of the water consuming states.

International and regional organizations like “International Fund for saving Aral Sea (IFAS) and interstate commission for water coordination (ICWC)” are the two chief institutes accountable for trans-boundary water resources management in the Amu Darya basin. But dealing with water related problems has been moving forward with a positive approach and they need for a practical solution to these controversies. The development of the monitoring system in hilly areas of the region with the formation of an integrated body to water resources management in river basin and to supplement existing institutional frameworks with information-sharing which will help trust building towards cooperation. It is need of relevant institution building for the space in political consultation in the region will be extremely useful for mutual benefit. Technique of compensation can be relevant in all cases where the question of internationally shared water is arising. It may also contribute to the progress towards successful resolution of a dispute where the problem is unsolved or the progress is slow or the results of positive feedback are unachievable.

I.4. Research Questions

The study focuses on following research questions:

1. How has the Soviet era dynamics influenced the current conflicts?
2. What is the nature of political dynamics among the states in the Amu Darya basin?
3. What are the major inter-state conflicts in relation to water resources of the Amu Darya river basin?
4. What are the major Interstate Water Management Agreements /Commission /MoU?
5. What are the policies of Central Asian States in reducing conflicts among the regions of Amu Darya River Basin?
6. How have the 'international, regional and state actors contributed towards conflict resolution over Amu Darya basin?

1.5. Hypotheses

- Despite geographical proximity, similar social-cultural makeup, conditions of existence, closely connected histories, the basin states have failed to cooperate on the issue of shared water resources.
- Problems of sustainability and optimal allocation of water distribution and utilization in the region have been aggravated as Water management has not been fully included into Regional Cooperation.

I.6. Research Methods

The study seeks to identify potential indicators of water conflict and analyse some of these within the regional cooperation framework. The database on water conflict itself shows that only seven minor conflicts has visibly been seen in this century and no war has been fought over water resources so far. More interestingly, more than 145 water-related treaties have been signed during the same period. A review of all these documents and treaties will be undertaken for a thorough study. The data base collected will be collated and tabulated for a proper understanding. Relevant notes of mutual negotiation of participatory states will be assessed for identifying the patterns of conflict and their resolution. The Study about the formulation of shared ideas will

then be put together to combine highlighting different positions of countries and areas of common interest.

The study will assess a trend analysis and explore the utilization of water resources in the Amu Darya basin. The study will attempt to identify and develop potential indicators based on secondary sources of information on water conflict in Central Asia and analyse the progress at a regional level from the global perspective. Measuring the scale of intensity of conflicts among the countries around the bank of Amu Darya Basin will further determine the overall relations and identify the potential points of future conflicts. The Amu Darya basin's biophysical attributes like runoff, population, dams etc., can be useful for the multi-dimensional analysis and the socio-economic and political attributes including GDP per capita, overall relations, ethnic minorities, etc. The variables may be quantifiable and qualitative in nature. The domain of political arena which deals with the internationalisation of a basin, future water infrastructure and water treaties in depth for a better understanding of the issues related to the topic of research.

It is significant to learn about the geo-politics of the region to understand the nature of the problem. Taking Central Asia as a unit of research, the planned study will explore the relationship on water resources their social, political, economic and environmental impact factors in the region. The study will also aims at finding combinations of variables that provide an indication of potential water conflict in Central Asia. An attempt will be made to visit the upper riparian states for a primary survey and undertaking a field visit to access the actual conditions prevailing in the area for analysis the water related conflict. The field visit will also look into the social, economic and political aspects evolving around the water issues in the region of Central Asia.

1.7. Chapters

The study is divided into six chapters

Chapter I: Introduction

The chapter provides the basic background and context of the problem posed. It will deal with a detailed literature review and highlight the region under discussion. The

chapter will discuss the historical and geographical perspective of Amu Darya River Basin.

Chapter II: Trans-boundary Water Resources of Amu Darya Basin

The second chapter deals with the distribution of Amu Darya water resources among the various concerned states in Central Asia. The utilization of the river basin's water resources will be detailed out in terms of livelihood option, industrialisation, irrigation and agriculture and impact of climate change and pollution on Amu Darya.

Chapter III: Conflicts in Amu Darya River Basin

This chapter highlights the major water conflicts in Amu Darya river basin. It will present an overview of regional water conflict trends between the upper and lower riparian states and also the conflict within a particular state.

Chapter IV: Regional Cooperation and Water Management

This chapter examines the Regional Cooperation Programme on Amu Darya River Basin and the inter-state Water Management Commissions and the bi-lateral, tri-lateral and multi lateral agreements that have been under implementation from time to time in the Amu Darya River Basin.

Chapter V: Role of International, Regional and State Actors

The fifth chapter will focus on the role of international organizations and the state government policies and programmes that manage the water politics of the region.

Chapter VI: Conclusion

The conclusion presents the main findings of the study.

CHAPTER II
TRANSBOUNDARY WATER
RESOURCES OF AMU
DARYA BASIN

Amu Darya is situated in the southern part of the Aral Sea basin. “River has a mean annual flow of about 70-80 km./year and the river is 2,540 km long, with a basin area of more than 300,000 km.” (FAO Water Report No. 39, 2012). The basin is share by five countries- Afghanistan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. “Most of the Amu Darya flow (74%) is formed on the territory of Tajikistan, 13.9% in Afghanistan and 8.5% in Uzbekistan and the delta of the Amu Darya is located in the north-western part of Uzbekistan” (FAO Water Report No. 39, 2012). Central Asia with Afghanistan has plentiful of natural resources with land, water and energy. Water resources of Amu Darya Basin is shared by Tajikistan, Kyrgyzstan Uzbekistan, Turkmenistan and Afghanistan but there is a issue with the imbalanced use of water for the different mode of need for economic and livelihoods requirements among all basin states. Currently, “8 percent of the Amu Darya’s Basin’s hydropower potential is used, while almost 90 percent of its water is used for agriculture while Afghanistan is a main contributor to the Amu Darya (about 21.5%) and country uses only 7 to 8 percent of its water resources of the basin” (amudaryabasin.net). The absence of the comprehensive management of water at the basin level, and the jointly agreement on regulation system of the Basin has resulted in tense relations between the riparian countries. The future consequences can lead to food and energy security in the region.

Mean annual runoff in the Aral Sea basin (km. /year)

Country	River basin		Total Aral sea basin	
	Syr Darya	Amu Darya	Km.	%
Kazakhstan	3.30		3.30	2.8
Kyrgyzstan	27.42	1.93	29.35	24.8
Tajikistan	1.01	*59.45	60.46	51.0
Turkmenistan		0.68	0.68	0.8
Uzbekistan	4.84	4.70	9.54	8.1
Afghanistan		11.70	11.70	12.5
Aral sea basin	36.57	78.46	115.00	100

Source: CAWaterInfo. 2011. The Aral Sea Basin.

Table II.1

All CIS countries are currently facing the challenges of water resources management. In the centre of these disputes the main problem of the absence of transparent sharing of hydrological data of the region. The problem became worse when the interruption in data sharing with limited resources that results in to inadequate measurement and planning level of the basin. Mismanagement is due to the “poor operation and

maintenance of an aged infrastructure in absence of financial assets for rehabilitation results in loss of agricultural land and inefficient water use whereby around 50-60 percent of water is lost during transportation” (amudaryabasin.net).

The existence of contradictory nationalized policies of every state that confined the role of the Regional actors in the region. Organisations are accountable for the better management of water sources and energy resources but problem with has very limited power to implementation of water laws. Imbalanced utilize of reservoirs for both purposes irrigation and hydropower production mainly due to the not have the jointly arranged organized guideline of river reservoirs that avoids balance use of the water.

Agriculture remains a major economic activity in the region, and this sector contributes significantly to the GDP of all basin countries (12 percent of the gross domestic product in Turkmenistan, 20 percent in Uzbekistan, 22 percent in Tajikistan, 29 percent in the Kyrgyz Republic, and 33 percent in Afghanistan. The role of hydropower to general energy use is highest in Tajikistan (about 98 percent), Kyrgyzstan (about 75 percent), and lowest in Turkmenistan (about 1 percent) (amudaryabasin.net).

Estimated reserves of Central Asian countries (excluded Afghanistan) are 31 km., in which 14.7 km. Area is cover by the Amu Darya basin (FAO Water Report No. 39, 2012). Meanwhile the over exploitation of water resources may impact flows of surface water, so it is needful to carefully carried out the identification of the portion of the reserves quantification and resources must be used without significantly diminishing surface runoff.

The reserves confirmed for extraction are an estimated 13.1 km. per year and the average annual groundwater recharge in Afghanistan is an estimated 2.97 km. in the Amu Darya basin, 0.64 km. in the Tedzhen basin and 2.14 km. in the Murghab and northern basins. In Kyrgyzstan groundwater recharge is an estimated 0.23 km. in the Amu Darya basin and 5.25 km. in the Syr Darya basin. Average annual groundwater recharge in Uzbekistan, which is entirely located in the Aral Sea basin, is an estimated 8.8 km., while in Tajikistan it is 6 km. Kazakhstan and Turkmenistan have no proper detailed figures about the basin database. Hence it has been observed that the surfacial and groundwater resources cannot be supplementary to get sum of renewable water resources due to “the overlap between surface water and groundwater because of seepage from rivers into aquifers and groundwater drainage into rivers (FAO Water Report No. 39, 2012).

Location of Aral Sea



Source: *CA Water info (cawater.info.net), amudaryabasin.net*

Map II.1

Being dominated by desert and only partially mountainous, Uzbekistan contributes a modest amount of the flow to the Aral Sea Basin, 10.9 bcm, and the interstate allocation of water to Uzbekistan is 53.6 bcm (McKinney, 2003). In year of 2000, “1.86 million ha land was irrigated in the Uzbek portion of the Aral Sea Basin with requirements of 18.1 bcm of water” (Burghart and Theresa, 2004). Uzbekistan land needed plenty of water to sustain the agricultural sector of its economy so the country negotiates with its upstream neighbors continuously. There are often interstate disputes over the delivery of natural gas from Uzbekistan in return for delivered irrigation water (McKinney, 2003). However the relations are still good between all Central Asian countries in the Amu Darya Basin.

Turkmenistan covers an area of 488,100 square km, but 80% of this area is desert land. In the south of the country the wasteland is bordered by a chain of oases watered by the Amu River located in the north of it (the Murgap, Tejen, and Atrek). The river is downward from the Kopetdag, Gershi and other peaks

in the region. However the western and central areas have no major natural waterways. The Kara Kum Canal (more than 1300 km in length) brings water from the Amu Darya west into the Mary Oasis and onward past Ashgabat and more or less 25% of Turkmenistan's GDP is derived from agriculture sector and 44% of the country's population is working in this sector. The amount of river flow generated within Turkmenistan is extremely small, 1.5 bcm, whereas the interstate allocation of water to Turkmenistan is 22 bcm and the country administration expects irrigated lands to reach 2.2 million ha by 2010. The Kara Kum inland waterway is the significant water resource in Turkmenistan that providing water to its agricultural lands more than 1 million ha of its irrigate lands. An average of 11.5 bcm is diverted into the canal each year from the Amu Darya and more than half of country's total farming products are grown in this zone of Canal (McKinney, 2003).

The total mean annual flow of all rivers in the Aral Sea basin is an approximate 115 km. (FAO Water Report No. 39, 2012). In "accordance with flow probabilities of 5 percent (wet years) and 95 percent (dry years), the annual flow ranges from 108 to 47 km. for the Amu Darya river and 54 to 21 km. for the Syr Darya river respectively" (FAO Water Report No. 39, 2012). However there are no major changes in the upstream zone of flow pattern and water creation but after the creation of large dams on the border area of these states, the pattern of downstream runoff management is changing. The flow getting to the Aral Sea is inadequate to a small percentage of these annual flows since the significant losses in the desert areas and due to major agricultural water withdrawal. And "the delta reveals in the driest years this corresponds to less than 10 percent for Amu Darya and less than 5 percent for the Syr Darya" (FAO Water Report No. 39, 2012).

As far as the socio-economic concern of the Amu Darya River is concern the river is very crucial for the livelihoods of about 43 million people of central Asia living in the Basin. The major water consumer sectors are agriculture, hydropower generation, industrial, domestic, and for the drinking purposes. "Agriculture is an important sector for the economies of riparian countries and in country like Afghanistan, almost 80% of population is depends on agriculture for their livelihoods, and contribution of agricultural sector is around almost half of the GDP" (Horsman, 2008). In other Central Asian countries, "agriculture accounts for 20-30% of employment, and 20-35% contribution to GDP" (amudaryabasin.net). Farming sector is also the main water consumer in central Asian states. Turkmenistan and Uzbekistan each country is

highest in water taking form the basin about 42% of total water flow for their agricultural production.

Amu Darya basin has recently attracted the attention of international community since the Aral Sea crisis, and its big projects of hydropower, irrigation and water engineering. However the disastrous consequences were noticed and warned by the expert missions even under the Soviet Union because of the policy of rapid, massive development of cotton monoculture in Central Asian region.

The shrinking of the Aral Sea basin and the increasingly poor environmental conditions in the surrounding region brought it home to policy makers that urgent action was needed to mitigate the sea's disappearance and the resulting socio-economic disaster. In the recent many years a range of global convention and missions by many international experts have portrayed the declining socio-economic and environmental situation in the basin of Amu Darya region particularly over the years. The future of these all issues when the particular state of commune's viewpoint raises for awareness and for better resolution the future raises concerns among the general public, national authorities, international organizations and experts (UNEP, UNDP, ENVSEC, UNECE, OSCE, PEC and NATO Report, 2011).

Thus in the recent many years a range of global conferences and assignments by national and international professionals raise the awareness about the challenges of environmental degradation and security perspective are growing in the region.

II.1 Area of Study

The river is given name Amu Darya from the point where the Panj River connects the Vakhsh River in the Pamir Mountains. "The basin of river is divided into two uneven parts: the smaller upstream to the southeast, characterized by the high mountain ranges of Central Pamir and Tien Shan with an altitude of 5000 - 6000 m., and the larger area downstream to the northwest, where plains dominate the landscape and elevations are no higher than 200 m." (FAO Water Report No. 39, 2012). Even though the very dry states of the region, the elevated peak ranges make possible the pattern of significant water-courses that act as a vast nourishing reservoir for the rivers.

The Amu Darya, Syr Darya, Tedzhen (also recognized as Hari Rod in Afghanistan) and Murghab rivers forms the Aral Sea basin that also includes, the Kara Kum canal

connecting with the Amu Darya (Micklin et al., 2014). “Rivers like Murghab and Tedzhen and some other trivial rivers flowing from Kopet Dag and western Tien Shan areas make the runoff between these rivers and around the Aral Sea basin” (Micklin et al., 2014). “The streams from the Torgai, Sarysu, Chu and Talas rivers are vanished in the desert and then they are directed to natural depressions in Kazakhstan”. However generally these rivers are not believed to be part of the Aral Sea basin. As we know that the 90 percent of Tajikistan and Kyrgyzstan is hilly area and more than half of the total annual runoff in the Aral Sea basin is generated in Tajikistan and almost one-quarter in Kyrgyzstan (FAO Water Report No. 39, 2012). The important characteristic of the region is the numeral oases like Fergana valley, Khorezm, Tashaus, Mary, Zeravshan, and Tashkent – Chimkent. “These oases wrap a little fraction of the whole area while very old times these oases have been at the hub of human movement as of their good livelihood circumstances like water, precipitation, the best soil (AquaStat Survey, 2012). “More than 50 percent of Kazakhstan, Turkmenistan and Uzbekistan are covered by desert, less than 10 percent is mountainous and over 10 percent of the mean annual runoff in the Aral Sea basin is generated in these three countries” (FAO Water Report No. 39, 2012).

The Amu Darya River Basin is divided into two distinct geographical regions; the south eastern, or upstream region which is largely a hilly area.

These regions have the Pamir and Tian Shan Mountain ranges in Tajikistan and Afghanistan, which are 5,000 – 6,000 meters above sea level. Nevertheless these arid south-eastern mountains mainly supply the water for the Amu Darya River. Winter precipitation is stored in these hilly zone that in the form of snow and ice and then discharged as runoff in the spring and summer. On the other hand this south-eastern region has very little-to-no natural gas deposits or oil reserves. Water is the most important and main resource in Tajikistan, and in northern Afghanistan also (amudaryabasin.net).

Downstream region or north-western of the ADRB is made of steppe lands and desert. “The region is very low-lying with maximum elevation about 200 meters above sea level” (amudaryabasin.net). The ADRB receives considerably very less rainfall in this downstream zone. This region has also arid condition like the upstream region but this northwest region is well known for its large oil and natural gas reserves. “Near town of Termez in Uzbekistan the Pyandj is joined by the Surkhandarya to form the Amu

Darya and the Pyandj is augmented by a number of major tributaries including the Vaksh and Kafirnigan” (Valery, 2003).

“The Amu Darya catchment basin constitutes 62% of the region’s surface water resources and the Syr Darya forms the remaining 30%” (Valery, 2003). “Most of the Amu Darya flow is formed on the territory of Tajikistan (72.8%), 14.6% in Afghanistan and 8.5% in Uzbekistan” (amudaryabasin.net). Three main tributaries Kafirnigan, Sherabad, and Surhandarya contribute to the river. “The Amu Darya basin unfolds westward from the mountains of the Kyrgyz Republic and Tajikistan, descending and contracting into the Karakum Desert of Turkmenistan and Uzbekistan as the river arcs gradually clockwise to the southern end of the Aral Sea” (ADB Report, 2010). The river divides into a delta with several arms as it move towards the Aral Sea. Near the river’s entry into Turkmenistan, the Karakum Canal built in the the Soviets time has “the longest such structure in the world that takes a third of the Amu Darya’s water and sends it to the parched south western parts of Turkmenistan to irrigate expanding cotton-growing areas” (ADB Report, 2010). There are some other trans-boundary rivers run into the Amu Darya basin like the Pamir, Kafirnigan, Surkhan Darya, and (formerly) Zarafshan rivers. Thus to some extent all these rivers influence the water system in the basin.

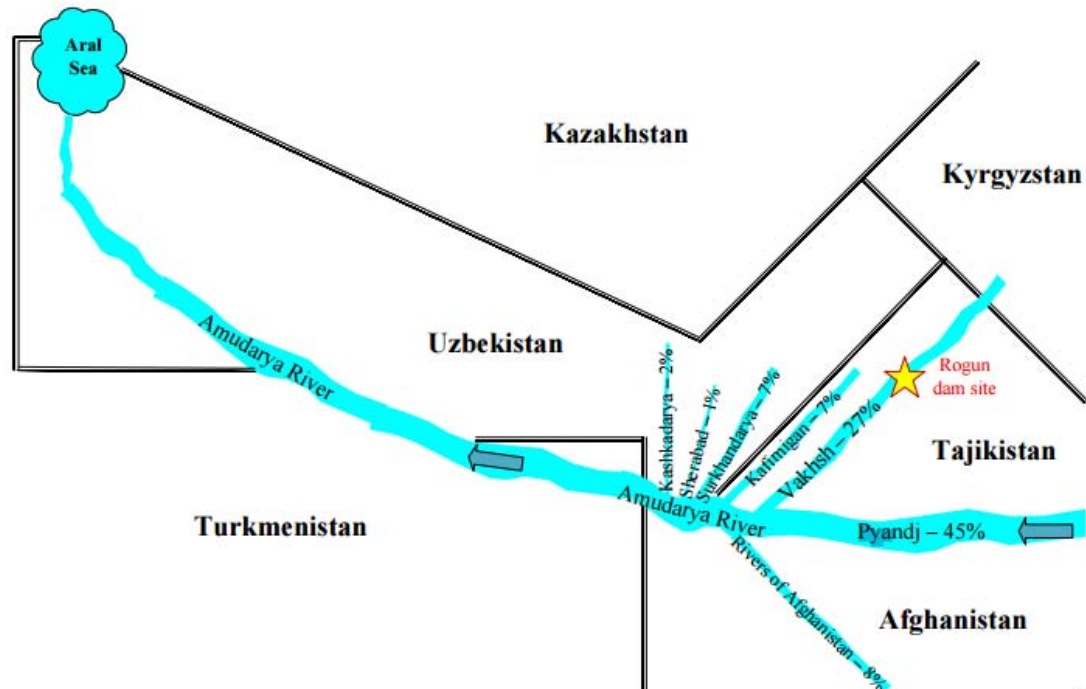
Amu Darya river runs through Turkmenistan and then Uzbekistan, it receives returned water from irrigation and groundwater, which add pollutants from agriculture (pesticides and fertilizer), industry (toxic chemicals), and domestic sources. Health problems from drinking the water are common. Soil erosion from upstream countries causes sediments to build up downstream along the river and Karakum Canal, and almost complete silting up of the Kalif lakes. But there are other issues: like parts of the canal have not been maintained and huge losses from seepage and leakage occur; also the flood approach to irrigation results in Stalinization of the soil and returned water to the canal (ADB Report, 2010).

Central Asia has a lot of natural lakes in the narrow valleys of hilly areas. The majority of the big lakes that occupy basins are by product of the tectonic activity like in case of Issyk-Kul, Song-Kel, Chetir-Kel, Karakul, and Sarichelek. There are also some lakes resultants from landslides, caused by earthquakes. “These are the Sarez and Yashinkul in the Pamir mountains. Numerous lakes are of glacial origin; one of

the largest is the Zorkul, located at 4125 m. in the Eastern Pamir” (FAO Water Report No. 39, 2012).

Lakes are generally having freshwater or slightly saline in the hilly region depending on the quality of inflowing water. Many shallow artificial lakes have been created, largest of these lakes in the region are Sarykamish, in the lower reaches of the Amu Darya and Aydarkul, in the middle reach of the Syr Darya (FAO Water Report No. 39, 2012). Lying on the boundary between Uzbekistan and Kazakhstan great amounts of water is released into Aydarkul Lake throughout the elevated water years from the Chardarya reservoir. In the “last few years, this has been common practice in winter to create energy from the Naryn-Syr Darya hydropower cascade and the volume of water resources found in artificial lakes is an estimated 40 km.” (FAO Water Report No. 39, 2012).

Formation of Amu Darya



Source - (Jalilov, 2010, p. 10)

Fig. II.1

The Amu Darya is mainly feed by water from thaw out snow and the utmost discharge is experiential in the month of summer and minimum in January-February. During the dry summer accessibility of the flow special treatment the use of the river water for irrigation.

The Amu Darya loses most of its flow to evaporation while crossing the plain, from Kerki in Turkmenistan to Nuqus in Uzbekistan. Other major reasons are infiltration and irrigation withdrawal of river water. The basin's total long-term average annual runoff is 78.46 km³ and this long-term average annual flow is 1.93 km³ or about 2 percent of the total flow in the Amu Darya basin from Kyrgyzstan to Tajikistan – through the Kyzyl Suu River. The “main flow of the Amu Darya originates in Tajikistan: about 59.45 km³, including 3.09 km³ of the Zeravshan River or 76 percent of the total flow. The Amu Darya River makes border between Afghanistan and Uzbekistan and after that flows across Turkmenistan and then returns back to Uzbekistan where it discharges into the Aral Sea. About 11.7 km³ (not including 1.9 km³ of the northern basin, which mainly evaporates before reaching the Amu Darya) or 15 percent of Amu Darya water is formed in Afghanistan. Turkmenistan's internal contribution to the river is 0.68 km³ or 1 percent and the internal contribution of Uzbekistan to the river is 4.7 km³ or 6 percent (FAO Water Report No. 39, 2012).

The Vakhsh River is named the Kyzyl Suu where it rises in Kyrgyzstan. This is the longest river in Tajikistan, crossing from the northeast to the southwest, its catchment area lies at over 3500 km². Makes the highest part of Tajikistan (FAO Water Report No. 39, 2012). Origin from the confluence of the Surkhob and Obikhingob rivers the Vakhsh River gets its name. The largest tributary of the Amu Darya, the Panj River originates in the Pamir mountain ranges and outlines the border between Tajikistan and Afghanistan (AquaStat Survey, 2012). “It is flowing from east to west for almost its entire length. After the confluence of the Panj and Vakhsh rivers, it becomes the Amu Darya and about 100 km. further downstream it leaves Tajikistan to become the border between Afghanistan and Uzbekistan” (FAO Water Report No. 39, 2012).

The Kofarnihon River rises in Tajikistan and flows into the Amu Darya about 36 km. downstream of the confluence of the Panj and Vakhsh rivers (FAO Water Report No. 39, 2013). The Kofarnihon River makes the boundary between Uzbekistan and Tajikistan over a small distance ahead of flowing into the Amu Darya. It flows mainly in Tajikistan. Two other large right tributaries, the Surkhandarya and Sherabad rivers, and two left tributaries, the Kunduz and Kokcha rivers, flow into the Amu

Darya in the middle reach (FAO Water Report No. 39, 2013). The Amu Darya has no tributaries further towards downstream the Aral Sea. Two rivers are similar to the Amu Darya, “the Zeravshan and Kashkadarya Rivers for their water catchment features however it does no longer discharge into the Amu Darya” (Aquistat Survey, 2012). The Zeravshan River rises in Tajikistan is the biggest branch of the Amu Darya prior to it began to be tapped mainly by Uzbekistan for irrigation.

Now the Zeravshan evaporates in the Kyzylkum desert near the city of Bukhara. In Afghanistan, slopes of the Hindu Kush and flow northwards towards the Amu Darya River however most of these rivers die out on the Turkistan plains before reaching the Amu Darya (FAO Water Report No. 39, 2012).

The Amu Darya River is regionally very vital river. The River is a vital starting place of water for all the riparians countries Agriculture is the main consumer of water resources and agriculture is key financial sector in all of the states. Uzbekistan has the largest area under irrigation, followed by Turkmenistan and Afghanistan and all of the Amu Darya states have plans to increase the amount of land under irrigation (Rahaman and Varis, 2008). Cotton is the main crop in Tajikistan, Turkmenistan and Uzbekistan.

Dependency on cotton crop has profound political, economic and social consequences with mutually reinforcing links to the lack of political openness, failure to reform economies, large-scale poverty and social deprivation. Usually the majority of the strategy and academic attention on the river has focused on the Central Asian riparians and this is however understandable that collectively these states are the majority of the riparians and the largest water users. In this context though the significance of Afghanistan cannot be unnoticed because country has usually been unnoticed though there have been distinguished exceptions. Afghanistan is the second largest contributor to the Amu Darya River after Tajikistan. Country is contributing nearly a quarter of the river’s 79 km. flow. Northern Afghanistan accounts for 15% of Amu Darya basin area and 17 % of its population (Rahaman and Varis, 2008).

Some other ASB Rivers also originates in Afghanistan. Its source country for the three rivers Atrek, Murghab and Tedjen which terminate in Turkmenistan, although the Tedjen also runs across Iran.

The meeting of the two trans- boundary rivers, the Pyanj and the Vakhsh is considered as the creation of the Amu Darya. Of these two, only the Vakhsh is

regulated therefore, floods often occur between the rivers' confluence and the Tyuyamuyunsk reservoir on the Amu Darya (UNECE Report, 2007). However the Amu Darya is fully regulated in downstream of this reservoir. Similar to other rivers in Central Asia, "the Amu Darya is also known for strong hydraulic processes like deformation of the river bed, meandering, bank erosion"(UNECE Report, 2007). Besides the the Pyanj and the Vakhsh, there are a number of other transboundary water sources are located in the Amu Darya basin, counting the Pamir, Kafirnigan, Surkhan Darya and Zeravshan rivers (UNECE Project report, 2009-2011). The Kafirnigan River is also a trans-boundary tributary to the Amu Darya. "The natural flow of the river is heavily disturbed by water management activities in the catchment area whereas some 120 m./s are estimated to originate in the mountain" (UNECE Report, 2007). Kafirnigan River made the common border between Tajikistan and Uzbekistan and some 30 km. and most of the Kafirnigan's catchment area of 11,590 km. belongs to Tajikistan (UNECE Report, 2007). The consequence of heavy rainfall, mudflow has adversely affected the safe operation for technical installations in river water it also impact the ecological regime.

"Afghanistan and Tajikistan share the catchment area of the Pyanj River, located in the Amu Darya River basin with its total catchment area, 107,000 km. are in the mountains and the rest (6,500 km.) in the lowland part of the catchment area" (UNECE Report, 2007). In the Sub-basin area of the Pyanj River Afghanistan Country's share is 47,670 km. or 42% and Tajikistan Country's share is 65,830 km or 58% (McKinney, 2003).

The Pyanj and Pamir rivers form the border between Afghanistan and Tajikistan and usually the confluence of the rivers Vakhsh Darya (Afghanistan) and Pamir (forming the border between Afghanistan and Tajikistan) is considered as the beginning of the River Pyanj. However, the water experts believe that the starting place of the Vakhsh Darya in Afghanistan as the commencement of the River Pyanj. The total length of the Vakhsh Darya/Pyanj is 1,137 km; from the confluence of the Vakhsh Darya and Pamir, the river is 921 km long. In Tajikistan, water use for irrigational agriculture in the Pyanj catchment area is relatively small and mostly limited to the Kyzylsu catchment area and according to the 1946 agreement between the Soviet Union and Afghanistan, Afghanistan is entitled to use up to 9 km. a year from the River Pyanj. Afghanistan presently "uses about 2 km. yearly and the full use of Afghanistan's quota for water use from the Pyanj (9 km./a),

fixed by the 1946 agreement, could radically change the water flow along the Pyanj and would have a significant impact on the downstream flow regime of the Amu Darya (UNECE Report, 2007).

Tajikistan (downstream country) and Kyrgyzstan (upstream country) “share the catchment area of the Vakhsh River, which is called the Kyzyl Suu in Kyrgyzstan of the total area of 39,100 km., 34,010 km is located in the mountainous part” (UNECE Report, 2007). Area of Country’s share of Sub-basin of the Vakhsh River for Kyrgyzstan is 7,900 km. or 20.2% and for Tajikistan is 31,200 km. or 79.8% (Kayumov, 2004). Since the Nurek reservoir became operational, the natural flow rate of the river has been measured upstream at the station Darband (former Komsomoladad), which was opened in 1976 and this value is also taken as the inflow value for the reservoir (UNECE Project, 2009-2011).

The intended expansion of the mining and aluminum processing plant in Tursunzade (Tajikistan) may source of significant trans-boundary crash. “The Government of Tajikistan is also planning to resume the construction of a big reservoir at Rogun (total volume 12,400 million km., exploitable volume 8,700 million km)” (UNECE Report, 2007). The reservoir will exercise to gratify the high energy demand of future hydro-energy production in the mining and aluminium processing plant in Tursunzade.

Due the sheer impossibility of determining the size of the catchment area, many hydrologists simply give a figure of 12,200 km. for the mountain part of the catchment area (UNECE Project, 2009-2011). The Karakul Oasis in the most upstream weir of the irrigation system is considered the mouth of the Zeravshan River which was formerly a tributary to the Amu Darya but lost this function with the development of irrigation in the lowland parts of the catchment area (UNECE Report, 2016).

Some hydrologists therefore consider the independent river; others still attribute it to the Amu Darya basin. Presently some 96% of the Zeravshan’s water resources are used for irrigation mainly in Uzbekistan based on information supplied by Uzbekistan, Tajikistan planning to construct a reservoir and hydropower station in the upper reaches of the Zeravshan River which might have an adverse impact on the quantity of water in the downstream part of the river. Uzbekistan has spoken the call for for an agreement on the joint use of the Zeravshan River with given the planned construction of a reservoir in Tajikistan. Country advocated responding to the

various forms of water use: hydropower generation in Tajikistan and irrigation in Uzbekistan (UNECE Report, 2007).

Mountains and glaciers play a significant role in water storage in central Asia. “They can store precipitation as snow and ice in winter and deliver it as snow melt to rivers and associated alluvial aquifers during the dry summer season (July and August)” (FAO Water Report No. 39, 2012). Nevertheless the major number of the tributaries are not running whole year. Many seasonal Rivers are drying up before reaching the major rivers.

The main rivers originate in mountainous regions – the Pamir and Tien Shan ranges – where there is surplus moisture (precipitation of 800–1 600 mm and potential evapotranspiration of 100–500 mm), resulting in permanent snowfields and glaciers. The total mean annual flow of all rivers in the Aral Sea basin is an approximate 115.43 km. and in accordance with flow probabilities of 5 percent (wet years) and 95 percent (dry years), the annual flow ranges from 108 to 47 km. for the Amu Darya river and from 54 to 21 km. for the Syr Darya river (FAO Water Report No. 39, 2012).

The KaraKum canal is the biggest and most significant artificial waterway in Turkmenistan. This canal was constructed in the 1950 and is the longest canal in the world with 1300 km. The estimated “Canal capacity is about 630 m./s. The canal’s bay on the Amu Darya is just after the river enters Turkmenistan from Uzbekistan (FAO Water Report No. 39, 2012). “The KaraKum canal pools the Amu Darya, Murghab and Tedzhen rivers into an integrated water management system and it supplies water to the densely populated south of the country and irrigates more than 1.2 million ha.” (FAO Water Report No. 39, 2012). The canal carries its run to Ashgabat and then to the oases in the south region. The Amu Darya is a similarly significant and positive feature for Afghanistan. The half of its length the River flows either inside Afghanistan or along its border.

Table II.2**Country areas in the Amu Darya basin**

Basin	Area (km.)	Country incorporated	Area of country in basin (km.)	total area of the basin in %	total area of the basin in %
Amu Darya	1023610	Afghanistan	166000*	16.2	25.4
		Kyrgyzstan	7800	0.8	3.9
		Tajikistan	125450**	12.3	88.0
		Turkmenistan	359730	35.1	73.7
		Uzbekistan	364630**	35.6	81.5

*stands for 75,000 ha of northern basin, **stands for the Zeravshan basin,

Source: Regional Water Intelligence Report of Central Asia, 2010.

More than 25% of its population and area between 13-40% of Afghanistan's are within the periphery of river basin and having 1.16 million ha of irrigated fields in the country with the most agriculturally productive. The total groundwater taking out in the Aral Sea basin is around 10 km.

Afghanistan has usually relied upon surface water and groundwater springs and karezes (constructed underground channels) for irrigated agriculture and the share of groundwater irrigation of the cultivated area is around 18 percent. During current famine years in the Aral Sea basin, the use of deeper groundwater, abstracted from dug wells and boreholes increased rapidly. Private farmers drilled many new wells and boreholes and, in some areas, groundwater abstraction rates are already exceeding, or will soon exceed, sustainable groundwater resources (FAO Water Report No. 39, 2012).

It is importance of looking at this point that there are substantial variations in the hydro-data on Afghanistan. "Caution must be exercised when using these statistics and the conclusions based on them as in case of contemporary information on Afghanistan's water flows and withdrawals does not exist" (Rahaman and Varis, 2008). War has reason for people movement and a fall down the superseding period that results in agriculture obliteration and lack of maintenance of its irrigation systems.

Basin area of Amu Darya River

Land Cover and Use	Area % basin area
Forest	0.1
Grassland, savanna, and shrubland	57.3
Wetlands	0.0
Cropland	22.4
Irrigated cropland	7.5
Dryland	77.8
Urban and Industrial	3.7
Loss of original forest cover	98.6

Source: "Aral Sea", cawater-info.net, www.cawater-info.net/aral/water

Table II.3

The attainment of hydrological data has also been consequence reductively in Afghanistan. The Naryn, Karadarya, Sokh, and Chatkal rivers (Syr Darya Basin) and the Kyzyl Suu River (Amu Darya Basin) are the main watercourses of the Kyrgyz part of Aral Sea Basin.

The flow formation within Kyrgyzstan's portion of the Aral Sea Basin is 29.2 bcm and the interstate allocation of water to Kazakhstan from the Syr Darya is 4.27 bcm. The population of Kyrgyzstan in the Aral Sea Basin is about 2.2 million and approximately 39% of Kyrgyzstan's GDP is derived from a severely disorganized and undercapitalized agricultural sector where about 55% of the population works. In 2000, "415,000 ha land was irrigated in the Kyrgyz portion of the Aral Sea Basin that requiring minimum 3.3 bcm of water (McKinney, 2003).

Scarcity of water causes resistance between the countries, provinces and tribes in central Asia. The significance of large-scale development of desert areas during the Soviet period, such as Golodnaya steppe, Karshi steppe, areas along the Kara Kum canal, Asht and Lylak systems, was they allowed the resettlement of hundreds of thousands of people from more populated areas (FAO Water Report No. 39, 2012). Such huge activities are no longer a feasible choice for these post-soviets, independent and economically weak states. So it is believed that the "decision should be based only on the development of available resources and not on advancement of the major new developments" (FAO Water Report No. 39, 2012).

The major characteristics of the Amu Darya River include its trans-boundary nature, its division between hydropower use and irrigation use, and most

importantly, the extent to which these two uses can be regulated to maintain a balanced supply for upstream and downstream users. These issues resulted in a reduced storage capacity. It is very significant to deal with different trends and challenges related to the balance of water use—between energy production and agriculture in the upstream and downstream of the Amu Darya Basin and also addresses the inadequate water-governance policies in the basin (Amudaryabasin.net).

Flow and withdrawals from the Amu Darya

Country	AVERAGE ANNUAL FLOW (KM3)	WITHDRAWALS (KM3)
Afghanistan	17.0	5 est.
Iran	< 3	NA
Kyrgyz Republic	1.6 0	15
Tajikistan	49.6	7.9
Turkmenistan	1.5	22
Uzbekistan	5.1	22
Aral Sea	-	9.3
Total	79	66.35

Sources: Glantz, 2005; Micklin, 2000, "Aral Sea", *cawater-info.net*, 25 August 2016, <http://www.cawater-info.net/aral/water>

Table II.4

Although Central Asian states have developed regional structures such as the Interstate Commission for Water Coordination (ICWC) and the respective Basin Water Organizations (BWOs), as well as corresponding national institutions but the inadequate provision and circulation of information has been an obstacle for making appropriate short and long term decisions regarding trans-boundary water resource management and implementing relevant policies (Amudaryabasin.net).

In order to deal with this inadequacy, "the implementation of the Central Asia Regional Water Information Base (CAREWIB) project has been initiated by the United Nations Economic Commission for Europe (UNECE) Special Program for the Economies of Central Asia" (amudaryabasin.net). These measures will increase the water utilization and decrease the level of pressure on shared water resources. These plans will provide platform for better management of agriculture and energy production and multipurpose infrastructure.

II.2 Demographic Structure

The Aral Sea basin is a diverse region with approximately 46 million people in 2006 while in 1960 and 1980 the population was 15 million and 27 million people respectively (FAO Water Report No. 39, 2012). The rural population in the Aral Sea basin is mostly working in agriculture. “Out of total 60 million ha that are considered cultivable only about 10 million ha are actually used” (FAO Water Report No. 39, 2012).

The population of the Amu Darya River Basin

Country	Population	Ethnic Makeup
Tajikistan	7 million	80% Tajik, 15% Uzbek, 5% Other
Turkmenistan	5 million	85% Turkmen, 5% Uzbek, 4% Russian, 6% Other
Uzbekistan	28 million	80% Uzbek, 5.5% Russian, 5% Tajik, 9.5% Other
Northern Afghanistan	Est. 15-30 million	Tajik, Uzbek, Turkmen, Pashtun (exact numbers unknown)

Source: Akmurdiv, et al., 2011 and CIA Fact Book, 2010

Table II.5

Half of the in fact cultivated land is situated on the fertile soils of the oases, which are drained naturally.

The other half needs complicated and expensive reclamation measures before it can be used, including drainage and land levelling and improvement of the soil structure. Land availability varies greatly between the countries. Kazakhstan and Turkmenistan have good land availability, while land is scarce in Tajikistan and Kyrgyzstan and in some areas of Uzbekistan, such as Khorezm, the Fergana valley and Samarkand provinces (FAO Water Report No. 39, 2012).

In 2010, the population of the Amu Darya River Basin was recorded as 50 million and the most densely populated are southwest Uzbekistan, southern Tajikistan, and Northern Afghanistan (amudaryabasin.net). Whereas there is lack of exact data for Northern Afghanistan but it is approximation “that the population could have grown

by about 15 million and making the basin region in Afghanistan populated by a total of roughly 30 million people” (amudaryabasin.net).

Amu Darya River Basin Facts

Basin area (square kilometers)	534,739
Average population density (people per square kilometer)	39
Cities (100,000 or more people)	9 (Bukhara, Chadzhev, Dushanbe, Kashi, Mazar-E Sharif, Navoi, Nuku, Samarkand, Urgench)
Economy	Agriculture: cotton, wheat, rice, silkworm breeding, cattle breeding. Industry: hydropower, mining and aluminum processing, chemical industry, light industry.
Environmental Issues	Heavy disturbance by water management activities in Surkhan Darya tributary. Sarez Lake is a potential threat to population living near the middle and lower Amu Darya. Mineralization as a result of discharge of collectordrainage waters. Soil salinity, decreased soil fertility. Drought.

Sources: International Union for Conservation of Nature (IUCN), the International Water Management Institute (IWMI), the Ramsar Convention Bureau, and the World Resources Institute (WRI). 2003. Watersheds of the World, 2007.

Table II.6

The ethnic makeup of the Amu Darya River Basin is quite predictable because Tajikistan, Turkmenistan, and Uzbekistan are majority Tajik, Turkmen, and Uzbek and Northern Afghanistan contains significant Tajik, Uzbek, and Turkmen populations, as well as some ethnic Pashtuns (amudaryabasin.net).

II.3 Water Utilization

All countries of Central Asia are depending on the rivers of the Aral Sea Basin for irrigation, hydroelectric power and drinking water. Kyrgyzstan and Tajikistan the upstream countries of the Basin used rivers for hydroelectric power, especially during winter months, while downstream states Turkmenistan, Kazakhstan, and Uzbekistan used for agricultural purposes in the summertime (Fabian et al., 2010). “The post-

independence upstream shift in water use away from irrigation has created disputes between the upstream and downstream countries over how the region's transboundary waters should be managed" (Burghart and Theresa, 2004). "Tajikistan and Kyrgyzstan together produce about 77% of the water in the Aral Sea Basin and Afghanistan contributes about 10% of the inflow to the Basin, but it has not been a party to the recent Aral Sea Basin management because of its political instability" (McKinney, 2003). Demand for water in agriculture sector in Central Asia has been subjugated by the needs of accounting for more than 90% of the total use and the downstream countries use about 85% of the Aral Sea Basin waters while the upstream countries use the rest (McKinney, 2003).

The barter system of the Soviet-era was not able to provide adequate structure to the recently independent states. "These states required to reduce their reliance on their neighbors for water and energy resources and this approach led to the realization that neglecting the transboundary nature of common resources would not achieve the desired results" (Amudaryabasin.net). Inside a year of their sovereignty, the all post-Soviet nations decided to keep stick on to the partition of the trans-boundary water resources as managed by Moscow. They also established an "Interstate Commission for Water Coordination (ICWC)" in 1992.

It was a body responsible for the definition of seasonal water allocations in line with the annual agreements and additionally it was agreed that the Basin Water Organizations Syr Darya and BWO Amu Darya would be included into the ICWC structure as implementation agencies. At present The ICWC sets the limits on the quantity of water to be allocated to the major areas of each country for both the irrigation and non-irrigation seasons and the policies are based on river flow estimations provided by the hydrological and meteorological services of the basin countries (Amudaryabasin.net).

The BWO Amu Darya is first and foremost accountable for supervision of the water allocation as decided perimeters put by ICWC for water consumers in the region. It is regulates the operation of the interstate reservoir and discharges in the Aral Sea basin. Other tasks include measuring water levels, assessing river flows, operating canals, head gates and control facilities at interstate structures and also designing and engineering new water management equipment (Amudaryabasin.net). During the Soviet era the water resources of the region were exploited solely in the cotton production also called white gold of Central Asian agriculture. There was

coordination on water intakes limits and return flows for all states. Dams were also synchronized the run of water, in sequence to irrigate cotton fields. Generating hydroelectricity remained a secondary priority since a “bartering system was already established as the downstream Republics provided energy resources to upstream Republics which would in turn store water primarily for downstream neighbors irrigation needs” (Amudaryabasin.net).

Irrigation in the Aral Sea basin

Country	Area equipped for irrigation (AAI) (million ha.)	As % of Total	Area actually irrigated (AAI) (million ha.)	AAI as % of AEI
Afghanistan	1.30	13	0.77	59
Kazakhstan	1.30	13	0.83	64
Kyrgyzstan	0.42	4	0.42	100
Tajikistan	0.74	8	0.67	91
Turkmenistan	1.80	19	1.80	100
Uzbekistan	4.20	43	3.70	88
Aral Sea basin	9.76	100	8.19	84

Source: Sokolov, 2009; horsman, 2008; rout, 2008.

Table II.7

Cooperation over water management between all riparian nations has changed since the USSR time but “at present countries in the region are uncertain regarding which flows of water will be available due to the multipurpose usage of water and the difficulties of calculating the impact of climate change” (Amudaryabasin.net). Furthermore, it is believed that “the independent, uncoordinated development planning by the basin countries may impact the amount of water available throughout the region”.

Irrigation plays a major role in the economies of Central Asia. “While some areas have been irrigated for centuries, central planning created many irrigation and drainage schemes in the 1950s–1980s”. In the 1960s, “Soviet policy assigned Central Asia the role of supplier of raw material, notably cotton and irrigation was necessary because of the mainly arid climate in the lower reaches of the Amu and Syr Darya basins and the development of irrigation in the Soviet area of the Aral Sea basin was spectacular: from about 4.5 million ha in 1960 to almost 7 million ha in 1980” (FAO

Water Report No. 39, 2012). Enormous plans were created to water desert or steppes and millions of people migrated to the regions to work in farming. “From 1970 to 1989 the irrigated area expanded by 150 percent in the Amu Darya basin and 130 percent in the Syr Darya basin” (FAO Water Report No. 39, 2012). Two main tributaries of the Amu Darya - the Vaksh and Pyanj Rivers rise in the mountains of Tajikistan and Afghanistan.

The flow formation within Tajikistan’s portion of the Aral Sea Basin is 60.9 bcm and the interstate allocation of water to Tajikistan is only 11.5 bcm. In 2000, 718,000 ha were irrigated in the Tajik portion of the Aral Sea Basin requiring the diversion of 12.5 bcm of water to irrigation systems and irrigated agriculture, using about 85% of the water, is the largest water consumer in the country (McKinney, 2003).

Under the Soviet Union’s regime, the Central Asian Republics (CARs) were ruled as one entity and resources were centralized however, extensive resource and economic development did not occur until 1953, when Nikita Krushchev implemented the virgin land policy, leading to a huge expansion of agriculture (amudaryabasin.net). The Ministry of Land Reclamation and Water Resources of Soviet Union handled the Republics’ water systems. Beneath this federal direction, the upstream and downstream states were separated in conditions of development.

The upstream region was awarded control of the water flow and developed for hydropower while the downstream region was irrigated in order to grow more cotton and mined for gas and oil. The Ministry set up a system of mutual interdependence, whereby the water provided to downstream crops was reciprocated by the provision of oil and gas to upstream villages in the winter (amudaryabasin.net).

The water usage for hydropower production is increasing since independence of CIS countries but still “the agricultural sector remains the most important water consumer in the region and approximately 93.4 percent of the water demand in the Amu Darya Basin is used for irrigation” (ADB Report, 2010). “Agriculture is a significant component of the riparian countries’ GDPs: 12 percent of gross domestic product in Turkmenistan, 20 percent in Uzbekistan, 22 percent in Tajikistan, 29 percent in the Kyrgyz Republic and 33 percent in Afghanistan” (Amudaryabasin.net). Any further development of hydropower is contingent on ambitious cross-border cooperation.

The role of hydropower to general energy consumption is greatest in Tajikistan (approximately 98 percent) and Kyrgyzstan (about 75 percent), and

lowest in Turkmenistan (about one percent). The integration of the riparian countries into a regional energy market could feasibly allow them to meet more than 71 percent of the region’s energy requirements through hydropower production, amounting to an output of approximately 150 GWh (Amudaryabasin.net).

Upstream Tajikistan and downstream Uzbekistan are riparian countries to the Zeravshan River. Currently, the most upstream weir of the irrigation system for the Karakul Oasis is considered the mouth of the Zeravshan River (UNECE Project, 2009-2011). The Zeravshan River was previously a branch to the Amu Darya but misplaced its way with the expansion of irrigation in the plain parts of the catchment area.

Currently some 96% of the water resources are used for irrigation, mainly in Uzbekistan. Based on Uzbekistan’s information, Tajikistan is setting up to construct a reservoir and hydropower station in the upper reaches of the Zeravshan River which may have an unfavorable impact on the quantity of water in the downstream part of the river (UNECE Report 2007).

It is considered that the Some 32.6 million ha is suitable for irrigation in the Aral Sea basin. Currently, “the total area equipped for irrigation is around 9.76 million ha and the area equipped for irrigation in the Amu Darya basin is an estimated 6 million ha of which 1.3 million ha in northern Afghanistan, 0.1 million ha in Kyrgyzstan, 0.5 million ha in Tajikistan, 1.8 million ha in Turkmenistan and 2.3 million ha in Uzbekistan” (FAO Water Report No. 39, 2012). Thus the Agriculture is the largest water user in the central Asia and sector also gives region’s largest workforce and major employer for producing a big percentage of each country’s total gross domestic product (GDP).

Average water generation and use in Amu Darya basin

Country	Contribution of Amu darya km/year	Percent of total	Irrigated land (Million ha.)	Water allocation	Percent of total used
Afghanistan	24	30%	1.2	-	-
Tajikistan	49.0	61%	0.5	9.5	15.4
Uzbekistan	4.8	6%	2.3	29.6	48.2
Turkmenistan	0.82	1%	1.7	22	35.8
Kyrgyzstan	1.6	2%	0.1	0.4	0.6
Total	80.22	100%	5.8	61.5	100

Source: Horsman, S. 2008, Khurshedi, N. 2011, Gleason, G, 2001

Table II.8

Diversions of Water for irrigation have resulted in harsh problems linked with lack of water in the downstream areas of the Syr Darya and Amu Darya Basins near the Aral Sea (McKinney, 2003). There is urgent need for increasing water quantity and improving water quality to meet basic human needs in these environmentally damaged and economically depressed areas (UNECE Report, 2007). However, “providing this water through reduced agricultural water use may impose great economic damage on the basin countries” (McKinney, 2003). More than 90 percent of the Aral Sea basin’s crops are produced on irrigated land. However, it is an important goal to increasing the productivity of non-irrigated land. “Some crops (e.g. cereals), which are grown increasingly in irrigated areas, could be moved to non-irrigated areas thus substantially reducing the volume of irrigation water withdrawn in the basin” (FAO Water Regional Report No. 39, 2013).

Irrigated Land in the Amu Darya Basin

Country	IRRIGATED LAND IN AMU DARYA BASIN (MILLION HA)
Northern Afghanistan	1.16
Iran	-
Kyrgyz Republic	0.1
Tajikistan	0.5
Turkmenistan	1.7
Uzbekistan	2.3
Total	5.76

Source: USAID, 2002, Ahmad & Wasiq, 2004.

Table II.9

The Amu Darya flow share allocated to Turkmenistan and Uzbekistan is 50 percent and this share is based on an agreement between Uzbekistan and Turkmenistan signed in January 1996, which supplemented the 1992 Agreement signed by the five Central Asian countries (FAO Water Report No. 39, 2012). The share allocation of the Amu Darya to Turkmen and Uzbek is 42.27 percent of surface water resources.

The agreements are calculated based on about 67 percent of the total flow produced in the Amu Darya basin, which is an average 78.46 km³/year. This calculation is adding the long-term average annual internal renewable surface water resources (IRSWR) of the basin in the different countries viz. Kyrgyzstan 1.93 km., Tajikistan 59.45 km., Uzbekistan 4.70 km., Afghanistan

11.70 km. and Turkmenistan 0.68 km. The irrigated land area has not altered since independence in Central Asian countries, with the exemption of Turkmenistan where the area of irrigated land during 1995–1996 increased by 400 000 ha (FAO Water Report No. 39, 2012).

However, the cropping patterns have been major changes. Even though irrigated agriculture land has decreased from 45 to 25 percent between 1990 and 1998. But still the share of Cotton is largest one in the region. In the same period, the area under cereals (wheat, rice, maize and others) increased from 12 to 77 percent (FAO Water Report No. 39, 2012). As dominant crop wheat in the region, that covers about 28 percent of total irrigated area. Other “food crops in 1998 occupied less than 20 percent of the total irrigated area, compared to 27 percent in 1990, which is highly adverse from the viewpoint of maintaining soil fertility and crop rotation” (FAO Water Report No. 39, 2012).

The actual surface water resources calculated every year before allocated to Turkmenistan and Uzbekistan depending on the actual flow. “On average, water resources allocated to Turkmenistan in the Amu Darya basin are about 22 km./year, including 0.68 km./year of IRSWR, and 22 km./year to Uzbekistan, which includes 3.09 km. of the Zeravshan river” (FAO Water Report No. 39, 2012). Although Afghanistan is not included in the agreement, allocations besides the five states of the Former Soviet Union. Therefore “between the five states comprises the flow of 11.7 km/year, which is calculated at Kerki station in Turkmenistan” (Aquastat Survey, 2012). Pumps and canals are the major sources of cultivation in the region, and mainly in Uzbekistan however this irrigation scheme the most complex in the world.

Since 1990, on-farm irrigation networks have worsened as a result of the poor financial condition of both state-owned and privatized farms, which are not able to rebuild on-farm networks or maintain them in an acceptable condition and the overall length of major and inter farm irrigation networks in the basin was 47750 km and on-farm irrigation networks was totalled 268500 km. by the end of 1998. The full amount of water withdrawal in the Aral Sea basin was an approximate 64.7 km. in 1960. In 2006, it was an approximate 107 km. of which irrigation withdrawal accounted for 96 km., or 90 percent of the total (FAO Water Report No. 39, 2012).

Most of the water from Amu Darya is withdrawn by Turkmenistan and Uzbekistan along the part of their common border and Uzbekistan account for just “about 56 km.

(50 km. in agriculture) and Tajikistan for 11 km. or 10 km. in agriculture”(Micklin et al., 2014) . “Extraction of water per irrigated hectare in the Aral Sea Basin is far above the ground, in the order of 11 000– 14 000 m. /ha or even more” (FAO Water Report No. 39, 2012). A way towards reasonable use of water in the Amu Darya Basin needs obligation from basin states with assistance from international community:

- 1) Recognize the network of the energy-agriculture-food of water resources and the emergency that can appear in food, energy and economic security in the lack of good governance of water resources.
- 2) Setting the efficiency of water and energy use on national-sector strategies and interstate organizations agendas having water conservation and energy loss as a common problem of water and energy competence can be a point of collaboration among riparian countries on awareness rising and rehabilitation of major infrastructure.
- 3) Promoting the partnerships of government-corporate-civil society, supported by a new generation of financial instrument.
- 4) Recovering interstate cooperation on incorporated water resources management that would necessitate the beginning of new cooperation patterns on developing legal, administrative and financial instruments.
- 5) Cooperation over just beginning small and medium hydropower projects in the region for shared benefit and a possible gain for the region.
- 6) Alternative ways of energy provision and enveloping more sustainable sources such as wind and solar energy development projects by identifying and promoting cost-effective energy efficiency improvements, expanding the use of renewable energy, facilitating the introduction of new clean energy technologies, and giving incentives for the public and private sectors to invest in these areas (amudaryabasin.net).

Thus the important active storage capacity of the region’s water reservoirs’ under the sedimentation and climate change threats in order to manage reservoir sedimentation and to discover new innovate approaches to deal with water-sharing negligence and partisanship (amudaryabasin.net).

II.4 Impact on Environment

The Amu Darya carries the highest sediment load of all the rivers in Central Asia and one of the highest levels in the world and “the sodium adsorption ratio (SAR) normally ranges from 0.5 7 mill equivalent (meq)/litre at most gauging stations in the Aral Sea basin” (FAO Water Report No. 39, 2012). These figures point out that, in

general, the water is still suitable for irrigation. Since independence from the Soviet Union implemented has been increasing awareness about ecological aspects by “strict limitation of water allocation between the countries is being paid to. This has led to some progress of water quality” (FAO Water Report No. 39, 2012). Return flow forms a high proportion of water resources in the basin and is a major source of pollution.

In recent years, the annual mean values of return flow comprised of drainage water from irrigation and wastewater from industry and municipalities have varied between 28 km. and 33 km. About 13–15.5 km. annually forms in the Syr Darya basin, and about 15–18 km. in the Amu Darya basin. The total amount makes up about 95 percent of drainage water and about 5 percent of untreated municipal and industrial wastewater and the high percentage of drainage water demonstrate that irrigation actually consumes only about 45–50 percent of total agricultural withdrawals (FAO Water Regional Report No. 39, 2013).

Karakalpakstan as an independent republic located in the basin of the Amu Darya within Uzbekistan, go throughs more than any other region in Central Asia from the cumulative outcomes of the Aral Sea crisis. Due to decades of agricultural development that paid more attention to centrally planned quotas than “the state of the environment, nearly the whole of Karakalpakstan is either salinized or waterlogged” (McKinney, 2003). Key factors in this disaster are the discharge of highly mineralized, pesticide-rich return flows into rivers; the use of unlined irrigation canals leading to waste and seepage of salts into groundwater; waterlogged fields leading to salty groundwater and salt runoff; and the lack of drainage facilities to remove unwanted water and chemicals from the fields (McKinney, 2003). The reduced “quality limits the direct use of drainage water, especially for irrigation and only about 15 percent of total return flow is directly used and more than 55 percent returns to rivers” (FAO Water Report No. 39, 2012). About 30 percent of water ends up due to evaporation in natural depressions.

Water for the irrigation withdrawal from both the Syr Darya and the Amu Darya constantly reduces the quantity of the remaining runoff in the rivers and inflow into the Aral Sea. During the summer months, when require for irrigation is at its highest but small amount of water reaches the Sea. “Diversion for irrigation, and relatively large amounts of water used for leaching and to upstream reservoirs to produce electricity, have reduced important winter flows to the sea” (FAO Water Report No.

39, 2012). According to FAO Water Report 2012, there are many environmental consequences because of large scale of irrigation development in the basin and these are are:

- The overexploitation of many tributaries has on such an extent that they no longer be the part directly to the flow of the Amu Darya and Syr Darya. These are the Zeravshan and Kashkadarya in the Amu Darya basin, and the Arys and Akhangaran in the Syr Darya basin.
- Agriculture in the Aral Sea basin has been practised with a high level of inputs, particularly fertilizers and pesticides, and this has resulted in the deterioration of surface water and groundwater quality. There is also pollution from municipal and industrial waste especially from urban areas.
- The traditional ecosystem of the two deltas of the Amu Darya and Syr Darya has perished. The marshes and wetlands, which covered some 550 000 ha and were a reservoir of biodiversity until the 1960s, have almost disappeared (only 20 000 ha were left in 1990) giving way to sandy deserts and More than 50 lakes, covering 60000 ha in the deltas, have dried up.
- The Aral Sea is drying up. Before 1960, the level of the Aral Sea was more or less stable. Its surface area was about 66000 km. and its volume was about 1060 km. The combined average discharge of the Amu Darya and Syr Darya to the sea was about 47–50 km./year, to which could be added 5–6 km./year of groundwater inflow and 5.5–6.5 km./year of precipitation over the sea and this total volume of 57.5–62.5 km./year compensated for the evaporation over the lake, estimated at about 60 km./year” .
- Salinization is even threatening the cultural heritage of Central Asia: high groundwater levels and salinity are affecting historic monuments in the famous towns of Bukhara and Khiva. The environmental crisis of the Aral Sea basin is a major disaster that has affected the territories of all five riparian Central Asian countries and has resulted in economic losses amounting to US\$115 million and social losses of about US\$28.8 million annually.
- The reduced size of the Aral Sea, its climate modifying function has been lost. The climate around the sea has changed; becoming more continental with shorter, hotter, rainless summers and longer, colder, snowless winters

and the growing season has been reduced to an average of 170 days/year causing many farmers to switch from cotton to rice, demanding even more diverted water.

- Communities face appalling health conditions. In Karakalpakstan, drinking water supply is too saline and polluted. The high content of metals such as strontium, zinc and manganese cause diseases and prevent iron absorption, causing anaemia. Between 1985 and 2000, kidney and liver diseases, especially cancer, increased at least 30-fold, arthritic diseases 60-fold and chronic bronchitis 30-fold. The infant mortality rate of the region is one of the highest in the world.
- The stabilization of the Aral Sea at its 1990 level (38 m asl) would require a total inflow of about 35 km./year, including the demand for the basin area. However, this would not end the environmental degradation and desertification in the exposed seabed.
- The restoration of wetlands in the Amu Darya delta and the conservation of the Western Sea would require an inflow of 11–25 km./year, with at least 5–11 km. of freshwater. Project has been implemented in Uzbekistan that aims to bring more water to the delta through the collector-drainage network since 1989. This water, combined with freshwater, is used to replenish shallow lakes. It has allowed the redevelopment of flora and wildlife in the abandoned areas and stopped the eolian (wind) erosion of the former exposed seabed (FAO Water Report No. 39, 2012).

Large amount of water is lost in transport about fifty to sixty percent of irrigation water. Water infrastructure is based on old norms in Water delivery of the region. The need for new norms of system oriented around demand, which takes consideration of cropping patterns, field topography, soil and subsoil conditions, and rainfall levels. The problem of evaporation of water which returns from the river or desert depressions the used water is then detained by collector drainage networks along the Amu Darya. This exercise is not environment friendly but it is an option to disposing used water in the watercourse, which would add to the mineralization of the river water. The inner use of drainage water raises water use effectiveness by dropping the disposal of pollutants in the river water. “It is approximate that drainage water uses

can be greater than before up to 25 percent of the annual drainage flow in the Aral Sea Basin, compared to the current 11 percent” (Amudaryabasin.net).

Agricultural losses due to poor management of irrigation systems in Amu Darya Basin

Estimates of total agricultural losses due to poor management of irrigation systems (millions of \$/year)				
Country	Syr Darya Basin	Amu Darya Basin	Aral Sea Basin	
Kazakhstan	206	0	206	0,7%
Kyrgyzstan	81	0	81	4,3%
Tajikistan	58	112	170	10,6%
Turkmenistan	0	378	378	6,1%
Uzbekistan	390	529	919	9,3%
Total	735	1019	1754	3,6%

Note: Annual agricultural losses are due to inadequacy in water availability, salinity; poor weed control, cultivation practices, soil compaction, leaching water, drainage problems and land abandonment.

Source: *International Fund for Saving the Aral Sea 2003 and World Bank 2005*

Table II.10

Due to agricultural runoff there is a main problem of trans-boundary pollution that adversely affect the health of population and dropping productivity in agriculture in Turkmenistan and causing many other problems in the downstream zone. “Turkmenistan gets transboundary flows at several locations including source water from the Amu Darya and return water from the Khorezm region of Uzbekistan and there is great concern about the quality of these waters especially the return water since it is a large volume and heavily polluted” (Lisa et al., 2010). Presently, Turkmenistan takes for granted the responsibility for the discarding of the return water, which worsen the pollution problems by contaminating of drinking water of groundwater sources (Lisa et al., 2010). In the current time, there is lack of the active agreements on quality of transboundary water resources of Central Asia. However “Turkmenistan has planned the development of a Transboundary Water Quality Agreement for the Amu Darya Basin with the purpose of prevent increased environmental damage from transboundary irrigation drainage water” (McKinney, 2003).

So the states around the Amu Darya Basin are still trying to stabilise the management of water and energy resources all the way through interstate organizations (amudaryabasin.net). The transboundary characteristic of the Amu Darya River makes

the river more significant. “The specific differences between hydropower and irrigation use and most significantly the extent to which these two uses can be synchronized to maintain a fair supply for upstream and downstream users” (amudaryabasin.net). The balance of water use between energy production and agriculture is the major issues that are developing around the different tendencies and challenges related to the upstream and downstream conflicts of the Amu Darya Basin. There is also a major problem to resolve the insufficient governance water policies in the basin. The major challenges for attaining the balanced use of water resources of Amu Darya are as follows:

- There is absence of a commonly suitable authoritarian regime on the river. The major regulations on river are defined to control the flow of river through artificial structures that allowing to use and release of a designated amount of water at present, the regulation capacity of multiyear plan of the Amu Darya raises at about 76 percent of river flow. Though the River is muddiest rivers in the world, with deposits of heavy mud in its reservoirs. As far as reservoir volume loss is concern average is estimated at 0.5 percent annually in Uzbekistan with augmented dead volume ability and sedimentation the reservoir’s storage capacity is continuously declining. It is debatable issue of the effectiveness of this regulatory regime, particularly in the areas of irrigation and energy production and the current regulations would need to be implemented in a mutually agreed upon framework in order to fulfil the demand of the agricultural sector.
- An inter-sect oral imbalance is also a major issue, possibly the major challenge for balanced water use in the River Basin. Countries are managing the regional water resources in turn to balance competing demands for human consumption, irrigation, industrial use and electricity generation. The basin countries are determined to build up their hydropower potential. At present, about 77 percent of its water resources are being used for agriculture and about 8 percent of the hydropower potential of the region has been developed (Amudaryabasin.net).

Afghanistan has borders with three other Aral Sea Basin countries Tajikistan, Uzbekistan and Turkmenistan but country was not included in Soviet Central Asia. The river Amu Darya’s 8% flow is formed in Afghanistan. The Amu Darya’s Afghan portions “include the territory rimmed by the Panj Rivers on the north, by spurs of the Bandi- Torkestan and the Hindukush Ridges on the south, the Kowkchen River valley in the east, and the Shirintagao River valley on the west” (Burghart and Theresa, 2004). Agricultural terrains in this region go above 1.5 million hec. Agricultural sector

makes approximately two-thirds of Afghan's total GDP and due to the past instabilities and low level of development. The country used only a small portion despite having its large tracts of irrigable lands.

As a late developer in the region Afghanistan is the country who did not utilize its water resources because the plentiful of water "about 21.5 percent of the Amu Darya basin's water flow originates in country and the existing Afghan water and agricultural infrastructure is able to utilize only 7 to 10 percent of its water resources" (amudaryabasin.net). But recently the country plans to take on large scale irrigation and energy development projects. It is believed that the capacity of "Afghanistan's irrigated land can reach 1.5 million⁷ ha. Based on ability and investment potentials some regional forecasts guess that Afghanistan will boost its irrigated land capacity by 200-300 thousand ha, at a cost of \$8 to 12 billion" (Amudaryabasin.net). However it will requires sound political, economic and institutional choices with coordinating water and energy use includes water management. It is very important to put into practice the policies that will be satisfactory to all countries in the region.

The over dependency of the population on water for agriculture and livelihoods in the Amu Darya Basin that directly links to food security. So the region should go for water and energy resources management in their regional cooperation agenda to reduce dependence on water for agriculture.

About 20 to 30 million people of basin countries directly or indirectly depend on irrigated agriculture. Afghanistan's expansion tactics as a late developer nation will cause a new set of stress over the Amu Darya river flow because the ependency of afghan population on the Amu Darya for their livelihoods and other economic movement is about twenty-five percent. Major challenge like climate change due to the latent cost of low down pliability facade a new threat in the region. Availability of water in Amu Darya may decline up to 40 percent owing the results of climate change. Region's environment can experience global warming that resulting in major environmental, economic and social disturbances while they require for water go on to raise sooner than the usual supply. In other consequences there may be a bigger incidence of droughts and decline in the productivity of grain and energy making capacities could also be affected. Although the Basin of Amu Darya is not facing a scarcity of water resources. But not having the effective management frameworks results the tensions between the countries over the use of water resources (amudaryabasin.net).

So promoting the reasonable water governance is necessary for stopping conflicts in the region. There are discrepancies between mandates and current practices despite trying to transition towards a governance system based on IWRM principles and having a number of regional organizations that deal with the trans-boundary nature of the basin resources (Amudaryabasin.net). In fact, each of the riparian state should promote unilateral economic development plans that depend on different uses of water and different operation modes for the river reservoirs, particularly between hydropower production and agriculture.

CHAPTER III
CONFLICTS IN AMU DARYA
RIVER BASIN

The character of water relations have happening to change in the most drastic way during the preceding quarter of the 20th century. The key focus of these relations was the issue of ownership and ownership of natural resources became so vital (Valentini et al. 2004). In this regard the water resources are not only a reason for disputes but considered as source which will carry challengers to the arena in the next century. There is no other alternative for water resources so water will be continuously remain the cause of many global and nationwide conflicts. “The world’s 263 international watercourses, which cover almost half of the earth’s surface, are home to around 40% of the world’s population, and generate about 60% of global freshwater flow” (Lucy, 2013). Central Asia is one of the biggest region and its framework with natural peculiarities and geographic position that defines the complex nature for water issues in the region. It was not a coincidence that on this region, particularly Tajikistan as part of the “Global Year of Fresh Water” declared by the UN.

Central Asia has a unique characteristic like all states with an enormous density of rapidly growing population combined with decisive poverty levels and a frantic need for development of resources. All the way through history of many centuries of this vast territory called Touran, Turkestan and now Central Asia, where unseen borders became wider or narrower by getting influence of a current conqueror. One significant issue has constantly stayed the same that conflicts over joint water resources could at any time develop into the war. The common psyche of the majority of people in the region with common believes that a poor peace is better than a good fight (Valentini et al. 2004).

The controversies related to “water relations are not over yet, since water resources are unavoidably decreasing and the population of the region is forecast to raise by an estimated 40% by 2025”. Due to this explosion of population growth one cannot exclude a possible outbreak of emotions in spite of the need for friendly relations and peace between brotherly nations. Thus over the shortage of water in the region the situation can lead to unpredictable consequences anytime (Valentini et al. 2004). Literature states that “a recurring cycle, in which there are periods of strong conflict activity followed by time of dormancy, will begin and progress until eventually, a violent war will result” (Lucy, 2013). However the immediate conflict can be solved peacefully, but the sources of conflict persist to be there is fresh possibilities for new set off conflict can unavoidably occur in the preceding one’s place. The other basic core cause of issues always remained unaffected and chronic. It is very important to

note that, according to the violent conflict literature “the war explodes when a trigger conflict like allocation of shared resources is rooted in historical accusation and there is a leaning for conflict between the various actors” (Lucy, 2013). However there is no cookie cutter solution undoubtedly regarding the facet that whether water is a key in clash in Central Asia. Since there come into light many others instant and causal conflicts as well. As a result, in turn to stay away from a battle in Central Asia, “whether it is a water war, an ethnic war, or a war fought over territory active third parties must find out and address all causes of conflict, instead of just the water dispute” (Lucy, 2013).

Central Asia is in a spotlight of fear for a number of reasons:

- Soviet design of water model for regional water systems was intimately woven together in a way of management that creates often irritable all five countries with little willingness to cooperate.
- Economy of the region is highly dependent on irrigation sector for much of its economic dependency and Irrigated crops give the privileged with the money and manage of benefaction that keeps them in power.
- Due to the deprived water management with enormous exploitation of water has left the many areas susceptible to famines and other environmental disasters that we have previously seen in the region of the Aral Sea basin.
- Countries of Central Asia are more and more adopting zero-sum positions on resources and other issues while their lack of consumption methods at unsustainable rates.
- States of the downstream zone are militarily dominant and economically rich than the upper riparian states. This discrepancy of power with natural resources causes trigger for the most of water conflicts (Lucy, 2013).

The Amu river basin “forms the border in some stretches between Tajikistan, Uzbekistan and Afghanistan, and between Turkmenistan and Uzbekistan on the 2,540 km. Amu Darya” (Valery, 2003). It begins in the confluence of Pamirs and further the Vakhsh and Panj rivers flow to the west to form Afghanistan’s boundaries with Tajikistan, Uzbekistan, and Turkmenistan during much of the way and finally goes on to the Aral Sea (Valery, 2003). Amu Darya river basin as well as their tributaries has become a centre for rising rivalry among the riparian states. “Water competition is increasing in Central Asia at an alarming rate and it adding together worry to what is already a troubled region”. Farming is the basis of economy of the region and dry harvests like cotton and rice need rigorous water. Rapid increase in the water

utilisation from the time when the states of Central Asia became sovereign in 1991. Irrigational structures have rotten so rigorously that “half of all water never reaches to the crops”. Due to the several years of drought have cut the availability of water by a fifth yet as require continues to climb. Reconstruction and peace building efforts in Afghanistan will also put yet more twist on supplies of water in Amu Darya.

The desiccation of the Aral Sea has been the main factor to the worsening socio-economic setting in the area, stimulating nationalist ideas among the population of Karakalpakstan, the Uzbek autonomous republic nearby to the disaster zone, and infuriating water situation in the region. It is believed that the local conflicts have been more serious than wider ones because disputes over land and water resources provoking wider ethnic conflict have led to hundreds of victims in Kyrgyzstan in 1990 (Valery, 2003).

Adding to water problem there are poverty, increasing costs and fragmentation of water infrastructure are issues of tension in local water system. Poor people are among the most affected in water crisis by paying the large part of their income for the access of resource. The Ferghana Valley is more vulnerable to violent outbreak of stress over water due to its complex ethnic makeup. Valley is “shared by Tajikistan, Kyrgyzstan and Uzbekistan has already been victim of the violence outbreaks of tense, like it was in 1990”. The bloody “conflicts between inhabitants of the Kyrgyz town of Osh claimed over 300 lives, or earlier, in 1989, when hundreds of the Meskhetian Turks, who had been deported to Central Asia by soviet regime and many people were killed in the Uzbek town of Ferghana also called as one of the most dramatic episodes of inter-ethnic relations in the Soviet Union” (Valery, 2003).

Climate change has already begun intimidating the most precious and conflict-prone resource in Central Asia due to a decrease in the quantity of the region’s water resources, the downstream agricultural countries are experiencing falling crop yields, and as a result, suffering economies (Lucy, 2013).

The problem, according to a background report commissioned by the UNDP for the 2007/2008 Human Development Report, is that 46 of Central Asia’s glaciers are recoiling at the average rate of one percent per year. Glacier lessening, in combination with the rising number of droughts and heat waves in the region and the beginning of a continual reduction in water flow of the Amu Darya and Syr Darya Rivers will exacerbate the water scarcity problem in the region (Lucy, 2013).

The trouble of growing need and deteriorating supply has been complex by the fail of the states to work together. Resources were exchanged freely under the Soviet Union and “across what were only administrative borders, region was provided the funds and management to build and maintain infrastructure and Central Asia states have failed” (Ezeli, 2010) due to rising nationalism and competition among the five prevent them to come up with a viable regional approach to replace the Soviet system of management. Indeed, Islamic extremism as a source of tension can linked to water and energy issues have been worry in recent years. “The Amu Darya is speedily flattering a locus of disputes as the governments of Turkmenistan and Uzbekistan turn into more antagonistic towards each other rival for water while Afghanistan is about to require its share for river water” (Valery, 2003).

Uncontrolled population increase in Central Asia has added additional pressure on the region’s limited water resources. This may contribute afterwards to the vulnerability of the interstate water conflicts.

From 1960 to 2012, the population in the Aral Sea Basin has more than doubled to over 64 million. Approximately 22 million people depend on the irrigated agriculture in Tajikistan, Turkmenistan and Uzbekistan for survival thus Water is also important for energy production: in Kyrgyzstan and Tajikistan, hydropower covers more than 90 percent of the total electricity needs, and is also a growing source of export revenue. Water has become securitized in a region where population growth and water availability are inversely consequently the states observe any conflicts over water as zero-sum situations and in these atmosphere there are a beginning the game of winners and losers (Lucy, 2013).

A cycle of annual base conflicts has augmented between the three lower zone countries – Kazakhstan, Uzbekistan and Turkmenistan. These states are “heavy consumers of water for growing cotton so they require more water for their growing agricultural sectors and rising populations” (reliefweb blog). At the same time as “the economically weaker upstream countries are trying to win more control over their resources and want to use more water for electricity generation and farming” (waterwiki.net). “Tensions mainly focus on the main rivers of the region that flow to the Aral Sea the Amu Darya from Tajikistan through Uzbekistan and Turkmenistan”. Border between Afghanistan and the Central Asian states is by the river and its tributaries.

Management of water has carried “the legacy of old Soviet of top-down control” and general competitions between the states. Soon after independence, the five states decided to uphold the “Soviet-era quota system” but this system was impracticable due to its complex nature. Kyrgyzstan’s economy decay and the civil war in Tajikistan have supposed that water-monitoring facilities have fallen into poor condition. States at the present frequently lay blame on each other of exceeding quotas because control and enforcement mechanisms no longer function. “Turkmenistan is taking too much water to the loss of Uzbekistan, which in turn has been lay blame on Kazakhstan of taking more than its share and According to Kyrgyzstan and Tajikistan the three downstream countries are all consuming water more than quotas”. Even inside Uzbekistan the various provinces have charged one another of using too much water.

The major “key areas of stress among the Central Asia nations including the lack of rational water management, failure to stick to or acclimatize water quotas, non-implemented and premature payments and barter agreements and last one is hesitation over future infrastructure plans” (reliefweb blog). Some of the gravest tensions have centred on the issues of payments and barter agreements. The upstream states seeking to do business over water with Uzbekistan and Kazakhstan for return of energy in the form of gas, coal or power. From the time when energy deliveries have been untrustworthy, Kyrgyzstan has reacted by releasing more water in the course of its hydropower dam in winter and that has affects in downstream flooding and less water for summer irrigation (reliefweb blog). Kyrgyzstan’s efforts to claim of payment for water have been opposed by the downstream countries.

These tensions have so far been limited without conflict, but all parties have shown a readiness to put their interests first at any cost, even with military intervention and due to their dependence on agriculture, Uzbekistan and Turkmenistan see irrigation as a key security issue. This state of affairs has already led to many small-scale local conflicts, began in the late 1980s when the central authorities destabilized their grip on Central Asia. The eruption of conflict in In 1990 the Kyrgyz town of Osh, on the border with Uzbekistan, proclaimed over 300 lives and was aggravated by violent antagonism for water together with high population density, limited arable land and ethnic dimension (large population of Uzbeks living in the area) (Votrin, 2003).

Major Troubled Water Spots in Central Asia



Source: *CA Water info* (cawater.info.net) **Map III.1**

Because of zero-sum game every state has going ahead to analysis the trouble as a matter of ego increase the tendency to take moves to raise their control over water by loss of the others. There is also rising hesitation about preparations to construct recent reservoirs and dams in Central Asia to enlarge the irrigation. “There has been lack of healthy discussion over most of these projects, leading to deepen doubts between states”. Efforts to rebuild agriculture in Afghanistan since the fall of the Taliban in November 2001, there has been worry about the future impacts. “Afghanistan at present uses very little of the water from the Amu Darya but after the reconstruction of irrigation systems in the country will put extra weight on the water of river” (Valery, 2003).

Central Asia is one of the region in the world that fail in managing the trans-boundary waters, contributing to conflicts as well as finding it hard to build effective frameworks and initiatives to address ongoing water related issues (ICG report, 2002). In 1991, however the regional countries signed and ratified a set of bilateral and multilateral agreements and established River Basin Organizations to facilitate the trans-boundary waters governance and cooperation (Valentini and Orolbaev, 2004).

Two main theories have come out from the literature: the first is that shared trans-boundary river basin resources will in the end lead to war; and the second is that shared trans-boundary river basin resources will finally lead to cooperation. It will not be the precise water allotment variable only that will cause war or cooperation; instead it will be the supreme pose of conflict triggers upon historical root causes of conflict that will result in war. The hypothetical proposal of violent conflict that trigger incidents rooted in fundamental accusations often become escalatory turning points in a conflict and thus in these state of affairs war is more likely than cooperation and Central Asia is because of its geopolitics that make it the ideal site for a water war (Lucy, 2013).

Water Scholars agree that conflict over shared river basin resources is most likely when a downstream riparian is highly dependent on river water and is strong in comparison to upstream neighbours. Geopolitical location of the Central Asia in which upper riparians states Kyrgyzstan and Tajikistan are in control of the Syr Darya and Amu Darya rivers. These nations have plenty of water access to use resources. These states are not rich and lack of powerful military than their downstream neighbors. On the other hand “Uzbekistan, Turkmenistan and Kazakhstan are the

downstream riparians who be deficient in water resources and rely greatly on the two rivers for their agricultural economies” (Lucy, 2013). Thus Central Asia is because of its geopolitics that makes it the perfect site for a water war potential with its history of rivalry rather than cooperation between the leaders of the five republics (Lucy, 2013).

III.1 Emergence of Water related Issues

Analysis of a conflict is generally conducted before third party intervention or mediation in a conflict. The aim is to add an inclusive understanding of latent or ongoing violent conflicts. Analyzing the key conflict factors at the local, national, regional and international levels is very significant to study such issues (Lucy, 2013).

According to the United States Institute of Peace conflict analysis should respond the questions of strategy and USIP analysis framework there are four parts and each part with its own questions of strategy. First part is to recognize what is the conflict all about. Part two is to understand the main actors to the conflict and part third is to understand the broader context of the conflict (i.e. what type of institutions are already in place to manage conflict and last part is to understand the actors’ power and sources of influence (Lucy, 2013).

The methodology of conflict analysis has been verified by the UN, the World Bank, NGOs and Western nations and all other who have used their findings to create long-lasting peace building interventions policies to prevention of conflict for conflict management (Lucy, 2013). In this world the places where rivers originate are not very suitable for living. As a rule, rivers come out from mountains, or swamp if in lowlands. People living in highlands find themselves in harder situation and have less opportunities for economic prosperity.

Mountainous regions and countries are strained to pay a kind of natural rent, obviously making more efforts to get hold of the same quantity of resources for life than downstream nations. Clearly, this sort of inequality created by God or by History, but the nature has also provided with the chance and instructions to fix this injustice and this opportunity is the right of people to own their land where they live and everything originating from this land and also includes also the natural systems of water-creation: glaciers and water springs. Hilly states are not among the rich nations for well-understood reasons the scarce agricultural resources and expensive communications, countries in the mountains tend to badly struggle for their survival rather than prosper (Valentini et al. 2004).

The international community also recognizes and supports “the principle for any mountainous nation that water serves essentially as a natural historic source of and possibility for their development”. This recognition of principle unfortunately finds its approach very slowly. Partially it is because the costs the interests of the all water using states. It necessitates the compulsion to pay for the water “they have taken for granted for many centuries”. “They resist it so hard that they even use the authority of God as an argument for their position, Partly, the solution of the problem is delayed due to the absence of any previous practice or legislative framework for issues related to water ownership” (Valentini et al. 2004). One more very significant factor is the accepting that water is growing into a strategic resource of the not-so-distant future and those who own it are already towards the inside the circle of global power canters in this century (Valentini et al. 2004).

According to the UN-Water statistics, forty six percent of the earth surfaces are covered by trans-boundary river basins. The term trans-boundary Rivers often refers to trans-boundary waters and that is a source of freshwater shared among various user groups with diverse standards and different requirements, linked with use of water. In this way, water crosses boundaries and affects the interests for those of economic sectors, legal jurisdictions, or political one (UN-Water, 2003). “There are 276 trans-boundary river basins in the world: 64 in Africa, 60 in Asia, 68 in Europe, 46 in North America and 38 in South America” (Samli, 2017). Sixty percent of the world’s international river basins need a cooperative management.

“International Peace Research Institute of Oslo”, an institution whose research has made significant progress recently in establishing a direct correlation between scarcity and conflict, says that “the probability of military conflict increases when rivers cross borders rather than outline borders as this creates upstream-downstream dynamics” (Lucy, 2013). While individual nation’s right to use water resources can be pretentious by a different’s activities. The people involved in the process may start to perceive the dilemma as a zero sum situation and end of the day it is the downstream nation that loses (Lucy, 2013). This is because the upstream country can influence the volume or the quality of the downstream nation’s water by diverting it or polluting it, but the downstream riparian is not able to do the same.

In these situations the “downstream nation will start on to present the upstream nation as an rival, By creating an enemy, the emotions of the general public strengthen and they begin to group the main issue of water, with other historical grievances, like ethnic divisions” (Lucy, 2013). We can observe such situation all through the Middle East, between India and Pakistan, South Africa and Lesotho and Egypt and Ethiopia. The Central Asian region deeply depends on its agricultural sector and irrigation. The waters in the region have been used intensively for several decades now and have reached a serious stress point. Given the decreasing water availability, scholars argue that water contributes to the conflicts (Gleick, 1993) and moreover, the future wars will be fought over water resources (Brochman et al., 2009; Gleditsch, 2006).

For Central Asia, where a significant share of the water withdrawn from nature has been sent to the fields and the history of water relations is mostly represented by irrigation (Valentini et al. 2004).

Five to six thousand years ago, nomads developed their first settlement, seeded the first plots of land around it with millet or sesame and then dug out several canals to the fields the length of which was a bit over two kilometres. Thus the first irrigation system was born in the region. During the bronze age when the evolution of farming and then irrigation structure was spreading in the river valleys of Zerafshan, Surkhandarya, Fergana (now Uzbekistan), Vakhsh, Kafirnigan, Guissar, in the vicinity of a modern Hudjant (Tajikistan) and Murgab (Turkmenistan) and in the productive flatlands of the Amu Darya basin. There is proof that the irrigated areas of the ancient period downstream of the Amu Darya and the Syr Darya match up to similar display of the mid-twentieth century, The period of first to fourth centuries A.D was the maximum prosperity of irrigation (Valentini et al. 2004).

“The geographical and climatic particulars of the region made the rulers of the feudal epoch understand the usefulness of the statement that if you want to govern the country first learn to govern water” (Valentini et al. 2004). They did the same as the Khiva khan commanding up to forty thousand diggers at the same time for building or renovates of canals or stingy unruly tribes of Turkmen for right to use the water sources. Usually the belief of “the majority of the authors of historical studies lead to the end that the period of the 15th to19th centuries is characterized by the division of the centralized state into khanates and emirates, endless internecine wars in the fight for power and, as a result, deepest depression in all spheres of life” (Valentini et al. 2004).

Before 1970s, the river Amu Darya divides into numerous supplementary watercourses which go into the Aral Sea with a wide delta. It is said that “the growing water withdrawal from the Amu Darya for irrigation radically distorted the water balance of the whole Aral Sea basin” (UNEP Report, 2011). Water was consumed even earlier than it goes into the Aral Sea. Thus the Aral Sea started to disappear very rapidly. In 1980s the water release from the Amu Darya towards the Aral Sea was blocked for one to three months. Presently the Aral Sea consists of two main parts. “The smaller Aral or northern sea on the territory of Kazakhstan and the southern sea shared between Uzbekistan and Kazakhstan and its western segment is relatively deep, while the low eastern part is rapidly disappearing. In the east and south of what remains of the Aral Sea a new desert has appeared on the former seabed: the so-called Aral-kum” (UNEP, UNDP, ENVSEC, UNECE, OSCE, PEC and NATO Report 2011). “From the formal point of view, the modern constitutional values of all countries of Central Asia don’t offer a rationale for disagreements, as they announce national sovereignty over all natural resources and over water within their boundaries” (Valentini et al. 2004).

It is important to note that such an explanation is pretty dissimilar from the religious doctrine of medieval century’s believing that “water is the gift of Allah and no one but God can own it”. However, it does not agree with the rather vague Doctrine of Common Interests which is a hundred years old (Valentini et al. 2004). It is also necessary to note that Soviet Union water regime in Central Asia was focused on agricultural development and not on effective water governance and environmental concerns. “The waters in the arid Central Asian region were extensively used for high-levels of cotton cultivation, a particularly water intensive crop” (FAO Aqua stat Survey, 2012). “Even after the breakup of the Soviet system, countries continued using the water irrationally that already brought to the Aral Sea disaster, which in turn brought to local catastrophes in Karakalpakstan, autonomy under Uzbekistan, and the health hazards in these regions have come to high levels” (Micklin, 1988).

The sources of objection and disputes can be draw back to the age right away follow the “Bolshevik Revolution when Stalin and the Soviets determined to liberate this region from the old imperial structure by delimiting internal borders and this choice has in effect and shaped all-encompassing and long-drawn-out difficulties for the

post-Soviet republics of Central Asia” (Lucy, (2013). The interstate disputes over water are not only stubborn in character, but also have growing latent as they are basically deep-rooted in considerable past accusation. These have risen out of randomly forced, constantly redrawn, and carelessly imposed borders and have been exasperated by the institutions of closed society.

In turn, the boundary and enclave conflicts have taken on characteristics on ethnic conflict. Before creation of the concluding choice to separate Central Asia into republics, there was a discussion between Stalin and his Soviet planners about whether or not individual republics were the best way to organize the region. The substitute option they measured was creating a single Central Asian Federation without single republic entities. Though, the leaders were afraid that this would promote pan-Islamic and pan-Turkic activities, who could possibly arise in hostility in opposition to the Russian power. Due to their collective fear, the Soviets instituted the Policy of National Delimitation in 1924, which recognized administrative borders for the Soviet Socialist Republics of Central Asia (Lucy, (2013).

Very few attempts were made to implement the scheme of natural geographic divisions by the all republics. “Moscow did take thorough mind to make heterogeneous states by amalgamation populations from the five main ethnic divisions Turk, Tajik, Uzbek, Kyrgyz, and Kazakh” (Lucy, 2013). The main objective was to keep away from finish up with racially unite states that may stimulate nationalist or anti-Moscow emotions.

Their political aim was to left large portions of one titular ethnic group of one state in the territory of another but because of the federal nature of Soviet planning the borders were not concrete prison walls custody the ethnic populations ensnared inside. Thus the borders existed only on maps and people and goods were open to move nonstop across borders, as all economic and transportation links were designed to cross state lines without any limitations (Lucy, 2013).

The policy of 1924 was designed to serve the centre with its lots of impacts to function exclusively for Moscow’s needs only. Central Asia had never linked with territory before Stalin’s “great division with a specific ethnic or linguistic group”. It was as a multi-ethnic land that was home to a similar culture while Central Asia has been influenced by many diverse cultures all through its history (Lucy, 2013). However “across the vast steppes of the region, gradual shifts could be seen from one

dialect to another from blue ceramics to azure, from one musical mode to a variant mode in a slower tempo” (Lucy, 2013). In its place there were religious and cultural differences of ethnic or political divides between peoples. For example-

Muslim civilizations were more common around the Syr Darya River Basin and in the historic cities of Samarkand and Bukhara whereas the Persian influence was weaker in the Tien Shan Mountains because the Turkic-speaking tribes had not been open to the elements of Islamic culture until the 18th and 19th centuries. Most significantly, these differences of culture did not associate with barring or conflict. Actually in most important Soviet era of border delimitation, the region was split into three emirates Kokand, Bukhara and Khiva each one invented of a multi-ethnic population. But the competition for power came not from different ethnic groups but from the many heterogeneous dynasties, clans and tribes (Lucy, (2013).

Since tribal or dynasty fidelities were base of identities until 1924, ethnic pride or nationalism was non-existent when the individual republics were formed (Lucy, 2013). So the political divide of USSR had small influence on the “multi-ethnic peoples” of the region. In 1991 when the soviet era ended, the administrative borders arbitrarily created by the Soviets suddenly took on major significance. The entire transportation links of the trans-boundary economic relations were disrupted and “suddenly some states were stopped receiving subsidized energy supplies” as this was unfavourable for the upstream, fossil-fuel deprived countries like Kyrgyzstan and Tajikistan unlike other”. Centralized and communal resources like Water, land, natural gas, oil deposits now were individually managed and controlled. Hence “upon independence, certain states saw significant improvement in their strategic positions and increased asset capital, whereas others saw their economies and leverage in the region plummet” (Lucy, 2013).

Various ethnic groups were no longer cross the borders due to delimitation policy that had been spread across the region with no difficulty to visit. They had been split with strict border controls as many of the countries have imposed in visa regimes. These ethnic groups were isolated with these circumstances became frustrated and wanted someone to blame. The administration of these new independent nations utilized these frustrations to fabricate popular sentiments of unity and nationalism amongst these people to make stronger their own power. They began to susceptible to their neighboring states and depicting them as the enemy. Ultimately enmity developed

with these outbreaks of emotions, as “interaction between populations that once shared many aspects of a common culture and way of life” (International Crisis Group, 2002).

Thus “the nation building process was initiated, divisions and stereotypes were being formed in peoples’ minds, inevitably creating separations between certain groups” (Kipping, 2008). Today, “the combination of an incomplete nation building process and a geographic ‘ethnic kaleidoscope’ has already resulted in intrastate, communal violence (Note: In 1992 a five year civil war broke out in Tajikistan between the Moscow-backed government and the Islamic-led United Tajik Opposition; an estimated 50,000 people were killed)” (Lucy, 2013). However “with these cross national loyalties that eventually leads to interstate violence between the different ethnic factions”. “It is more likely to become a source of conflicts as governments compete for its water, and Afghanistan starts to take its share in future”. The Amu Darya makes boundary between Tajikistan and Afghanistan and then between Afghanistan and Uzbekistan. Further it continues runs into Turkmenistan, after that all along the border of Turkmen-Uzbek before cross into Uzbekistan and finally goes in the southern ending of the Aral Sea.

At present border conflict stemming from the legacy of Soviet era to redrawing the boundary lines between Uzbekistan and Turkmenistan. “It involves Turkmenistan’s historical claims to the Uzbek regions of Khiva and Khorezm and the argument of the Turkmen nationalists is support that Khiva was one of the most important Turkic Khanates during the 1800s and that the majority of the regions’ inhabitants are of Turkmen descent” (Lucy, 2013). On the other hand the Uzbek nationalists react that the regions of Tashauz and Turkmenabad in Turkmenistan are encompassed the majority of Uzbek populations so based on Turkmenistan’s rationale Uzbekistan has rightful claim to this territory (Lucy, 2013).

Tajikistan and Uzbekistan are also equally doubtful of one another as a result of historical claims to each other’s territory. Uzbek territory included Samarkand and Bukhara two of Central Asia’s most important and historic cities according borders were drawn in 1924.

As ethnic Tajiks constitute the majority of the respective populations (Note: While official estimates say 1.25 million ethnic Tajiks reside in Samarkand, Bukhara and surrounding areas, it is thought that as many as 7 million actually live there and that Soviet authorities registered Tajiks as Uzbeks when the internal borders were created), Tajikistan has long laid claim to these cities. Although Tajikistan is the poorest country among all the five states and so it is believe that it does not pose a military threat to the regional hegemony and the leaders of Uzbekistan do worry that determined Tajik terrorist cells might have the capabilities to inflict significant harm on its territory (Lucy, 2013).

There is a long history of disputes between Kyrgyzstan and Uzbekistan that is still there nowadays. So “Uzbekistan felt it had been unjustly underprivileged of its territory”. Since 1991, “the mostly ethnic Uzbek population of Osh has harbored anger towards Kyrgyz state for deprived them in proper representation in the process and its unconcealed attempt to Kyrgyzcise the country”. Outbreak of the ethnic war in 2010 (“as the number of battle-related deaths was over 1,000”) “between the minority and the majority group in that witnesses to the killings say that the attacks by the Kyrgyz population on the Uzbek minority in Osh and other southern Kyrgyzstan villages were attempted genocide and the official statements reporting 178 fatalities and 1,800 casualties are ‘woeful underestimate(s),’ whereas in reality, around 2,000 Uzbeks were massacred in the pogroms” (Lucy, 2013).

There have been grave water conflicts between Kyrgyzstan and Uzbekistan since summer 1993. Uzbekistan blamed Kyrgyzstan authorities for discharge too much water from the Toktogul reservoir. Due to this “the extra water did not reach the Aral Sea but was dumped instead into the Aydarkul depression the large sinus which has developed as a result of years of negligence”. Uzbekistan deployed “troops around 130,000 on the Kyrgyz border to guard the reservoirs straddling the two countries in 1999”. In June 2001, law adopted by the Kyrgyz parliament to categorizing “water as a commodity and the government followed up by announcing that the downstream countries would be charged for the water they use”. In reaction Uzbekistan cut off all deliveries of gas to Kyrgyzstan and blames Kyrgyz government of failing to honour the barter agreement to provide Uzbekistan with water in return for oil and gas. “Although weaker in political and military terms Kyrgyzstan acknowledged this failure, Uzbekistan would be emboldened to behave in a more aggressive manner

towards its neighbours and thus the two were on the verge of violent conflict for several times” (Valery, 2003).

Tajikistan was the poorest country among its surrounding states with least development during the period of Soviet Union. The country has also faced a terrible civil war in the 1990s, which has taken the country further back. Unlike many of the oil rich neighbouring countries like Azerbaijan, Kazakhstan, and Turkmenistan, the lower riparian countries do not have adequate resources to utilize their development potential (Spoor et al, 2004). Eventually based on the country’s underdevelopment, the leader of the country made a plan to pull Tajikistan out of poverty.

They thought about a vision to build the world’s tallest dam. However, Tajikistan lacks in many natural resources and other advantages like its neighbouring states. But at the same time the country is a large reservoir of water. The country has thus indulged into utilizing the surplus water resources for generating hydro electricity and plan to build the dam on the Vakhsh River next to the small town of Rogun (Raiser, 2005). The idea would provide sufficient electricity for Tajikistan, the country that has been suffering from chronic energy deficit. It will also produce surplus electricity to export to other countries and generate revenues (Kamilov, 2005).

Uzbekistan intensified the dispute many times by acting in a unilateral manner. In July 1997, “it cut off 70 percent of downstream flow, which caused a riot among the Kazakh farmers whose 100,000 hectares were threatened” (Valery, 2003). The situation of change in water flow pattern by upstream riparian’s was no more same.

In summer 1999, Tajikistan released 700 million cubic meters of water from its Kairakum reservoir without warning its downstream neighbours. Due to less water than was agreed, cotton crops in southern Kazakhstan were shattered. The condition was even more seriously provoked by Kyrgyzstan’s simultaneous move to reduce the flow to southern Kazakhstan in retaliation for Kazakhstan’s failure to supply coal under the barter agreements. However following months of negotiations, the issue was ultimately developed with haze. According to the agreement that signed in 1992 of water quota for Tajikistan was allowed 9 m³ of about 75 m³, 12 percent of annual flow of the Amu Darya. Tajikistan considered the quota very low as it demands to increase its production in the agricultural sector for the food security of growing population. Tajikistan’s agriculture is underdeveloped since the Soviet times, and the irrigation system is derelict and in need of urgent repairs

so Tajikistan's only way out is to use more water either by increasing its water quota from the Amu Darya or by diverting the Zeravhsan River (Valery, 2003).

Uzbekistan used 95 percent of the Zeravhsan River and that creates serious conflicts with Tajikistan's much powerful neighbor.

The ambitious project of "the Lake of the Golden Century" by Turkmenistan connected with creation of a vivid example which will certainly change the water balance in the region. Thus this project is completely taken displeasure by Uzbekistan and Kazakhstan. "Against this background the intentions of Tajikistan and Kyrgyzstan in a so-far insufficiently specified prospective to increase their volumes of national water consumption or the projects of Uzbekistan envisaging the construction of new reservoirs in the Fergana valley don't look that impressive" (Valentini et al 2004). Though, the all states are able to overcome the unbalanced relations over water sharing system in the central Asia. In adding to the boundary conflicts as revealed above, "the Kazaks also make claims to the Uzbek capital of Tashkent and Uzbekistan makes claims on territory not only within Turkmenistan, but also within Kazakhstan and Tajikistan" (Lucy, 2013).

Considering all issues as we know there are many disputes including border disputes among all five CA states. somewhat, "the actors remain in a perpetual stage of intractable conflict characterized by tension and suspicion amongst the leaders, inflammatory rhetoric depicting neighboring states as the enemy and isolated incidents of small-scale violence" (Lucy, 2013). The all states of Central Asia followed the authoritarian governmnet that have practiced the economic chaos and internal discord. In addition to this all simultaneous conflict that triggers mainly widespread seasonality of water release. The legacy of the 1924 National Delimitation Policy with historical grievances increased the probability of conflict growth.

Most of literature on prevention of conflict suggested that "early and robust intervention of third party can play key role in preventing violent conflict and if the trigger and historical conflicts those are not addressed soon, the positions of the parties will harden and the disputes will intensify, pushing the actors into the next stage of active War"(Lucy, 2013). First of all third parties must address present triggers of conflicts and in its early intervention effort find out the historical

grievances if they want long-lasting peace. The reason for this is that “if the current conflict triggers over water are resolved peaceably but the underlying historical grievances remain, then new trigger conflicts will continue to emerge, each one with escalatory potential, and ultimately Central Asia may become host to the first water war in history”(Lucy, 2013).

The delta of Amu Darya repeatedly suffers from water disputes and mismanagement. Poor quality of rivers waters that negatively impact livelihoods and biodiversity of Amu Darya basin. “A stable, sufficient water supply to the Amu Darya delta region, sustainable water management, socio-economic development and environmental protection along the Amu Darya basin is consequently one of the most urgent tasks for the basin states” (Hill, 2002). The delta of Amu Darya basin in the region suffers most from the adverse results of the Aral crisis.

International and national actors should focus their attention on water management of the basin. Forests areas were largely cleared along the Amu Darya to make space for agricultural field. Later these forests died out due to lack of sufficient water flow. “Poor water quality and shortages have had significant social, economic and health consequences for the areas in the epicentre of the Aral Sea crisis – the Republic of Karakalpakstan and Khorezm province in Uzbekistan and Dashkhovuz region of Turkmenistan” (UNEP, UNDP, ENVSEC, UNECE, OSCE, PEC and NATO Report 2011).

III.2 Understanding of the Conflicts

After the collapse of USSR era in 1991, rivers of central Asia like the Syr Darya and the Amu Darya were became trans-boundary Rivers and were no longer situated within one state. Major rivers of regions transacted the boundaries of all CIS states. In the discourse of hydro politics, this was perceived as a geographical misfit between water and state boundaries, raising the potential for water wars (Bichsel, 2011). Water is very crucial and scarce resource in Central Asia that may be competed for water by every state and certain identity groups. Since “it is vital role for physical survival and basic for most human activities” (Bichsel, 2011). Thus water acting a critical position in Central Asian region after USSR era. There is always need for the supply of additional water because the active arid typical weather in the region that restrictions

the option for rain-fed agriculture. “Neither the processes of domestic reform nor inter-state negotiations have been smooth or predictable as disputes over how to distribute shared water resources” (Bichsel, 2011).

The breakdown of the USSR placed huge pressure on the existing scheme of inter-republican compensation mechanism for water and energy. It is true that after independence many water user states have faced severe water crisis and they are still in greater uncertainties over its delivery.

Water scarcity and strained inter-ethnic relations could lead to violent conflict. The changing seasonal patterns of water distribution and the effects of the inefficient and dilapidated infrastructure have negatively affected the situation. Moreover, as the population continues to grow, there will be a further increase of pressure on water, land, and other natural resources (Bichsel, 2011).

The Amu Darya River runs towards “west through Uzbekistan, Turkmenistan, Kyrgyzstan, Tajikistan, and Afghanistan”. This river is shared by four states out of the five Central Asian countries. “There are two major conflicts over the Amu Darya’s water resources that exist today the first between Turkmenistan and Uzbekistan and second between Uzbekistan and Tajikistan” (Lucy, 2013). The problem of water quotas and wasteful water practices are two main source of anxiety between Turkmenistan and Uzbekistan.

Soviets regime enforced irregular agricultural economies on Turkmenistan and Uzbekistan as the economy of both countries depend forever at the mercy of adequate supplies of water. Nevertheless the 1992’s Almaty agreement signed by all Central Asian states and “every state was subject to water certain quotas that limit the quantity of water resources they can extract or consume. The agreement essentially reinstated the Soviet era water quotas so, as before, the downstream countries were given the largest allotments because of their agricultural needs and large populations (Lucy, 2013).

It was very necessary for all five newly independent states to become signatory of this accord. However Turkmenistan and Uzbekistan given large allocations in comparison to their “upstream neighbors both countries often take more than their allotment”. The major drawback as “there are no authentic and reliable measurement technologies or enforcement mechanisms that can ensure compliance with the allocation amounts of water” (Lucy, 2013). Due to ill-maintenance neglect attitude over the years, Turkmenistan’s Soviet-era water infrastructure has become inefficient and wasting

much of the precious commodity it was designed to hold (Lucy, 2013). As there is need of fixing the pipes and canals and “that would require an enormous amount of money so the state prefers to get what it loses in its hydrologic infrastructure by exceeding its quotas and more drawing from the Amu Darya”. This stolen water lost and wasted when the routed back through the faulty system.

Uzbekistan would not have such an accusation if only Turkmenistan was wasting its share. Instead, “these wasteful water practices caused an outbreak of violence between the two in 1992 when both attempted to redirect the drainage waters of the Tyuyamuyun reservoir, located in the delta of the Amu Darya, by cutting pipes and damaging irrigation canals” (Lucy, 2013). According to some scholars who write about plans to manage and direct a number of development projects in Central Asia throughout the 1990s observed that “the shared water resources mainly based on rumours about a small-scale secret war that took place between the two states (Ibid.). “The reports mention Uzbek troops using force to take control of water installations on the Turkmenistan side of the river; and even go so far as to reference a massacre that took place in Turkmenistan in 2001, in which large numbers of Uzbek troops were slaughtered” (Lucy, 2013). Turkmenistan and Uzbekistan have conflicts over quotas and wasteful practices. The disastrous conflicts between the two state that lurk on the prospect. In year 2000, Turkmenistan declared its preparation to construct a “Great Salt Lake in the Kara Kum Black Sand” desert by consolidating drainage resources from the country’s irrigated cotton fields.

Turkmenistan has a goal to grow an additional 500 thousand tons of cotton, 300 thousand tons of grain and several thousand tons of fruit annually. It is frequently ask a question about water conflict: will the drainage resources alone be enough to fill the vast lake, or will Turkmenistan eventually siphon water from the Amu Darya to support the lake? They fear the latter, which they say would likely start a war with Uzbekistan (Lucy, 2013).

In July 2009 at the unbolting ceremony of the “Golden Age Lake” the President of Turkmenistan Gurbanguli Berdimukhamedov said to the state-run newspaper that “we have brought new life to these once-lifeless sands and these our great deeds will be recalled with glory.”(NBC News, 2009). This project seems unlikely “one of the biggest and most ambitious in the world costly upwards of \$20 billion US dollars” (BBC News, 2009) will be remembered with glory. Seeing as for years “it has not

only has the potential to cause serious conflict with Uzbekistan but also the environmentalists have been forecasting its doomed fate as the next Dead Sea” (Lucy, 2013). The most of water will evaporate when it spread into the vast desert and also prone to be getting contaminated by lethal fertilizers and pesticides. President of Turkmenistan Berdymukhamedov asserted with his “logic-defying feat that might have appealed to Stalin,” (Luke Harding, 2009) possibly since it is a logic challenging accomplishment that might have plea to Stalin.

The second clash over water of the Amu Darya is between Uzbekistan and Tajikistan. Although Tajikistan was allotted a very small quota about 13.6% of the Amu Darya in the Almaty Agreement but the country wants to increase its quota for vast needs for ensuring the survival of its populace” (Lucy, 2013). Tajikistan is the poor amongst the all Central Asian states. Country wants to enlarge its farming production in line to give food to its increasing population. The country also desires to produce adequate electrical energy throughout the winter seasons to stay its nation to temperate. Awkwardly, equally both sphere need water.

The options available to Tajikistan are either to exceed the Almaty allocation amounts by drawing more from the two rivers, or to divert water from the Zeravhsan River basin. Bearing in mind that Uzbekistan used 95 percent of the Zeravhsan River resources, raising the quota of Amu Darya was the easier and less dangerous option, especially considering Tajikistan’s geographic advantage as the upstream riparian. Tajikistan came up with a plan to increase its quota that would not only fix the country’s immediate needs, but would also have long-term returns for its ailing economy (Lucy, 2013).

President of Tajikistan Emomali Rakhmon in May 2008 declared that the country would start again construction on the Rogun dam. Soviets started the dam during the 1970s and left unfinished. It is said that “Rogun dam can make available Tajikistan with a sustainable source of cheap energy which Tajikistan is in frantic need of” (Botting, 2013). Caused in part by Uzbek blockades, “an estimated 70 percent of the Tajik population has experienced extended blackout periods during past winters, resulting in loses of approximately 3 percent of GDP, according to a World Bank study released in November of 2012” (Lucy, 2013). Tajikistan remains the poorest in the region because of country’s “intermittent energy supplies” that made difficult to develop domestic industries. “Rogun would not only allow Tajikistan to become

energy self-sufficient, but it would also enable the country to develop a robust private sector.” (Botting, 2013).

The Rogun megaproject is not being accepted by Tajikistan’s neighbors however having dam’s capacity to determine Tajikistan’s most crucial trouble. Uzbekistan’s President Islam Karimov opposed the project due to fear that “it will alter the established power balance in the region, giving Tajikistan unfair control over water resources.”(The Economist, 2012). In his open disapproval of the project he said that “the project is strategically fails to mention how it would also obstruct Uzbekistan’s efforts to continue controlling Tajikistan and Kyrgyzstan using fossil fuel as leverage” (Lucy, 2013). In its place, Karimov said that “any project like Rogun or Kambarata-1, another mega-dam in Kyrgyzstan, required the downstream riparians’ approval before construction” (McKinney and Kenshimov, 2000). Possibly that note fell on deaf ears, because on September 2012 “Karimov upped his rhetoric by saying projects like Rogun and Kambarata- I could lead to not just serious confrontation but even wars”(The Economist, 2012).

While Kazakhstan’s President Nursultan Nazarbayev supports the opinion of his more hostile complement President Karim. In his speech of the leaders of Kyrgyzstan and Tajikistan said that “exhibited more restraint our neighbors and brothers who are ‘sitting’ on the upper reaches of these rivers, we send another ‘fraternal signal’ that we –Kazakhstan and Uzbekistan on the Amu-Darya and Turkmenistan, located downstream – most of all perceive the shortage of water; each person feels it, because this is their life; this is the life of millions of people.”(Lucy, 2013). Regional Water and Energy Consortium called by Kazakhstan in 2006 in the capital Astana was a major doorstep. This was not the first time that the leaders of all states joined hand in the anticipation of cooperative resolution of conflicts of the regional water issues. “But judging from their failed efforts to establish any framework for concrete cooperative action, the chances of regional collaboration on Rogun and Kambarata-1 are slim” (Ricklet, 2005).

Coincidentally with all these dramas the state like Tajikistan cannot build Rogun on its own bearing in mind that “the \$2.2 billion cost is almost half of the country’s GDP and Uzbekistan’s displeasure in coincidence with President Rakhmon’s obstinacy and megalomaniac behavior has left possible investors doubtful” (Lucy, 2013). Russian

President “Vladimir Putin originally promised to provide \$2 billion, but upon disagreement with Rakhmon over the dam’s height (335 meters, making it the tallest dam in the world), Putin withdrew his offer” (The Economist, 2012).

China and Iran have already spoken about the concern of the partnership that “it would only be beneficial for them if they could buy the hydropower produced at Rogun”. Both Tajikistan and Kyrgyzstan are looking into “ways to circumvent the Uzbek capital of Tashkent where the current electrical grid in the region is centered and run transmission lines north into Kazakhstan, Russia, China, Iran, Afghanistan and Pakistan” (Wegerich, 2008). At present, creation of Rogun is on seize while a chain of studies are conducted financed by the World Bank about the dam’s potential of ecological, environmental and socio-political impact on the region (Botting, 2013). The citation of an Economist in his article titled, “Water Wars in Central Asia: Dammed if they Do” – “if only President Rakhmon could settle for something less than the biggest, he would have a better chance of building his dam, and leading his people out of darkness too.” (The Economist, 2012).

The major causes of conflict at the present and in the past 22 years amongst the all Central Asian countries over the allocation of water resources of the Amu Darya and Syr Darya rivers is water quota sytem. All through the USSR era, “leaders in Moscow come to a decision to introduce cotton farming to the downstream riparian republics of Central Asia as the desert regions of Uzbekistan, Turkmenistan and Kazakhstan were obviously poor for cultivating cotton so the Soviets leader had to first implement complex water irrigation and distribution systems to transform the dry wasteland into arable grounds” (Lucy, 2013). Throughout the time all water resources of central Asia were managed with one centre from Moscow. In order to “supply plentiful resources for the downstream agricultural economies, Moscow utilized dams and canals to manage the Amu Darya and Syr Darya rivers situated in the hilly regions of Kyrgyzstan and Tajikistan” (Ibid.).

Following the building of these dams projects those who living in the water loaded nations like Tajikistan and Kyrgyzstan required using the water storage to produce the electricity. Since they were being short of access to oil and gas, “they were not capable to warmth their homes during the winter months”. “Although Soviet rule has decided to store the water until summer when it would be better utilized for crop

irrigation in the downstream regions, it did fashion an agreement that addressed the electricity needs of the upstream riparians” (Sirodjidin, 2002). The agreement of the downstream nations, “which needed more water for their agricultural requirements that would give Tajikistan and Kyrgyzstan with gas and coal in the winter in reply (Lucy, 2013)”.

Turkmenistan and Uzbekistan are two conflicting countries in the heart of modern Central Asia. The Amu Darya, one of the main rivers in the region, flows through Turkmenistan and neighboring Uzbekistan. Irrigation season comes, and with it do the encounters, ill engagements, and fights over the flow of the Amu Darya River at the local level, particularly among the farmers and people living in the border of the above-mentioned countries (Gulyamov, 1987). It starts right about the time when the upstream country, Uzbekistan, cuts the flow of the river, leaving the downstream country, Turkmenistan, without water to irrigate its’ lands. In particular, farmers of the two neighboring countries fight because of the water shortages as well as sharing the river during the irrigation season (Ovezova, 2015). As a result of the water shortages and growing demand during the irrigation season Central Asian countries experience emerging water related conflicts among upstream and downstream riparians, despite the bilateral and multilateral agreements signed during the first decade of their independence.

For the reason that “the forced prioritization for the downstream cotton-producing to profit making regions of Moscow’s projects not only shaped an upstream/downstream separation between the five newly-independent states but these plans also caused both the cotton-producing states to turn into remarkably reliant on water for all economic actions and the upstream nations to befall extremely reliant on the downstream nations for electricity”. After the USSR disintegrated in 1991, the earlier federal structure of water and energy allocation accords amid the post Soviet states either ruined or was abandoned. Lacking the information on how to properly deal with and mind for the resources like water resulted in “the deteriorate of the water quality in the region very rapidly and agricultural yields stagnated or fell taking along with the economies that they were so expertly attached” (Lucy, 2013). The newly all sovereign republics began candidly rival for the water resources of the region.

From the time of 1991, when the interstate aggression has lingered at quite low down the levels among the all nations and they have effectively stay away from any outright conflict or interstate war but “it is undeniable that there are two distinct sources of regional conflict: the Amu Darya River and the Syr Darya River and both have the potential to ignite an international war” (ICG, 2002). “The Amu-Darya is to a large extent less regulated than the Syr-Darya with smaller number of dams and hydro plants to source for potential of problems with downstream flow” (ICG, 2002). Hitherto it has not grounds for the similar conflicts either but “there is substantial dissatisfaction along the span of the river as every downstream county or province charges its upstream neighbor state of taking more than a right share of the water resources”(UNEP Report, 2011).

III.3 Upper to Lower Riparian Relationships

In the Amu Darya basin like in various “regions of the world topographic, hydrological and climatic features are intimately related to human factors”. “Hilly regions upstream with their abundant water supply are sparingly populated and water utilization is far lesser than the available supply” (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011). Simultaneously “the water-rich mountains of Central Asia have an idle latent for electricity making but depend on their neighboring states for the transportation and import of conservative (fossil fuel) energy”. “The presence of large water reserves in the mountains and available land in the plains was one of the main factors in favour of developing large-scale irrigated agriculture in the region” (Mosello, 2008). In equivalent with the creation of water storage conveniences and irrigation canals, the powers of Soviet was considered “these areas also suitable for hydropower production and started building a large number of reservoirs and associated hydropower facilities, which also served to regulate the water flow for irrigation needs” (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011).

Throughout the USSR period, the communications between energy and irrigation was constructed in Central Asia so that the all five states would be mutually dependent. The main concern was specified to “the wants of agriculture and water storage facilities as a result run in irrigation mode like water was released during the

vegetation period in spring and summer” (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011). In summer time the low-priced energy production in the irrigational season was utilized to regulate the several water-lifting pumps for the basin’s irrigation systems. In post-Soviet period, the upstream states started changing to “energy mode”(Young, 2013), “increasing water releases from their dams in winter to meet demand for electricity and reducing summer flow to ensure water accumulated for the water months” (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011).

“In contrast the arid plains downstream are heavily inhabited and the majority of the water is needed and utilized for agriculture while downstream countries are gifted with plentiful oil and gas deposits”. The Amu Darya River therefore lay downs the juncture for relationships among the all riparian countries. In contrast, increasing the quota of Amu Darya water appears to be quite easy, “since Tajikistan is among the upper riparian state and has an upper hand in distributing water resources of the Amu Darya” (John, 2012). Theoretically “none can stop Tajikistan from utilizing extra water than was permitted by the water allocation agreement however it is extremely tough to watch Tajikistan’s performance since nearly all equipment which required has been damaged during the civil war in 1992-1997” (Votrin, 2003). But even “Tajikistan was to increase its water quota moderately it would need modern equipments and also have an immediate impact downstream” (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011).

For the low riparian nations where this issue has become centre point as they are greatly reliant on irrigated farming for food safety and generating foreign exchange.

They must rely on trans-boundary water sources, since over 90 per cent of Turkmenistan’s and Uzbekistan’s water supply originate outside their borders. The three nations situated in the water creation spots of the main rivers, Tajikistan, Kyrgyzstan and Afghanistan have it in mind to expand their hydropower latent to cover up rising domestic energy need, export energy and reduce their energy reliance on hydrocarbon-rich neighbours countries and suppliers and such plans have prompted apprehension in downstream countries, concerned that these developments will affect their access to water for agriculture (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011).

The same water/energy complex situation of Uzbekistan versus Kyrgyzstan has taken place between Tajikistan and Uzbekistan. “Tajikistan’s inner and southern areas are well provided by electricity from the Nurek hydro plant while northern Tajikistan having no grid lines with the rest of the country relies on Uzbekistan’s intermittent supplies of electricity and gas in winter” (Votrin, 2003). In reply, Tajikistan gives energy to southern Uzbek regions. It has been frequently argumentative that “Uzbekistan switches off electricity to northern Tajikistan in line to maintain imports inside the agreed limit so as not to pay the high price and this is a cause of serious discontent as Tajikistan is forced to have electricity rationed in many provinces due to poor state of Tajikistan’s grid lines” (Mckinney, 2005). The state wants to build up its hydropower assets to rupture reliance on Uzbekistan. “But increasing hydropower consumption would seriously affect the downstream access to seasonal water supplies and create further discord along the course of Amu Darya” (ICG Report, 2002).

On the other hand, a number of the projects are still beneath construction, as such as, the huge Rogun Dam situated in upstream of the Nurek. In the present location of reservoirs, “it has about 60% of the total storage capacity of Amu Darya” (ICG Report No.34, 2002). Downstream riparian countries like Uzbekistan and Turkmenistan cover little water storage space amenities so completely needy for water on the upstream states (Khamidov et al, 1999). “The collective water storage space facilities, like the Andijan reservoir that is situated in the Uzbek region of the Ferghana Valley is believed to re-channel some water rear to Kyrgyzstan also poses a serious inter-state problem” (Valery, 2003).

New canals comprise: the North and Grand Ferghana Canals transport water to the Ferghana Valley; “the Karshi Canal provided water to 1.2 million hectares in Uzbekistan’s Karshi Steppe; the Amu-Bukhara Canal irrigating land in the Bukhara Region in Uzbekistan from the Amu Darya; and the South Hungry Steppe and Kirov Canals irrigating the hungry Steppe” (Nanni, 1996). Therefore, in 2000, farther than “the predictable 7,641,600 m³ of water to be sidetracked from rivers, 6,866,200 m³, or 89.8%, was actually diverted and 4, 88,660 m³, or 86.5%, of projected 5,648,800 m³ was used for irrigation” (Akhrorov, 2002). As a result, water overexploitation is the main cause for downstream riparian states water shortage. “Uzbekistan and

Turkmenistan make use of their water wastefully and therefore they occurrence water shortage even at a time of water's large quantity" (Valery, 2003).

The most striking clash over Amu Darya water resources is between downstream nations of "Uzbekistan and Turkmenistan equally depend on their cotton production and irrigation for agriculture and both claim that each of them exceed their water quotas" (Votrin, 2003). The relationship between two states considerably worsen in the year of late 2002 while the ambassador of Uzbekistan was affirmed "persona non grata" in Turkmenistan on allegation of provoking the plot to exile and murder of President Niyazov (Ibid.).

In the earlier period the Amu Darya spotted the boundary between the USSR and Afghanistan. "Now the sovereign countries in the region have to deal with several rivers and canals which are now trans-boundary water courses, and conduct complex annual negotiations over water and energy in a context in which all states regard access to water and energy as issues of national security importance" (Bernauer & Kalbhenn, 2010). Moreover, the latest and probable cosequences of climate change, severe droughts and other natural calamities have stressed already delicate circumstances.

Anxieties over water and energy have added to a usually anxious political climate in Central Asia. "Not only do they tend to provoke hostile rhetoric but they have also prompted suggestions that the countries are willing to defend their interests by force if necessary" (The Reliefweb Blog, 2017). Uzbekistan has performed drills appear apprehensively like practice runs at confined the Toktogul Reservoir. "The gas shortages and winter flooding that Uzbekistan and Kyrgyzstan have inflicted on each other have a direct and widespread impact on the peoples of those countries and have the potential to inflame ethnic tensions in the Ferghana Valley (The Reliefweb Blog, 2017).

Rivalry for water can only augment anxiety and nervousness that will increase if better mechanisms are not put in place to handle the problems (Ibid.). Ineffective state institutional regulations and lack of cooperation on water resources governance between riparian countries lead to conflicts during the irrigation season. Owed to the lack of water resources and the not have of efficient implementation of the existing

water cooperation agreements, riparian countries by the side of the Amu Darya and Syr Darya rivers in the region are exposed to social and economic degradation (Siegfried et al. 2011). For example, farmers along the Amu Darya basin experience decrease in their harvest, loss of their livelihoods, and encounter disputes with the farmers of the neighboring country.

Even though the Central Asian countries understand that the management of water and incompetent irrigational structure that innate from the USSR era are not suitable in present.

They have maintained the status quo and have on the whole been slow to try and change the system's setup. The significant subject which require being deal with for better administration of the regional water resources and energy structure. All along the Amu Darya basin the volume and timing of water release, regional and export energy market development, payment for maintaining and operating infrastructure and watershed conditions benefiting several users in the basin. Main structure pooled by many states about the projects with impact of Trans –boundary issues. Over the years all these issues and developments have become critical from the security point of view in the Amu Darya River basin (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011).

Sharing water is a real problem for the five states in the Central Asian region, and, in fact, a potential for more sustained conflict unless the state leaders come to the table to address the issues and find solutions for cooperation. Turkmenistan and Uzbekistan share one river, Amu Darya, to meet all their water needs, which raises issues and disputes at the village levels. Water can be a catalyst for a conflict but effective water cooperation can also be a catalyst for peace (Valieva, 2013).

It is imperative for the Central Asian countries to address the water issues for the security and sustainable development in the region. There is sufficient water to fly around Central Asian region, and if there will “better management of water systems the conflicts over water distribution and allocation would diminish” (The Reliefweb Blog, 2017). “But massive and rising overuse and inter- and intra-state tensions over distribution will ensure that water remains a cause of competition rather than cooperation” (The Economist, 2012).

III.3.1 Uzbekistan-Tajikistan

According to the 1992's accord on water allocation quotas, Tajikistan was permitted utilize 12 percent, the figure that according to Dushanbe was far too low. The regular yearly run of the Amu Darya is about 75 cubic kilometres. Farming system was not well developed during the Soviet era, send-off the state susceptible to food deficiency. "It also has one of the highest population growth rates in the region at more than 3 percent and the country needs to provide for these people and says it intends to expand agricultural output" (Khudoikulov, 2004). Tajikistan's irrigation system is either totally dilapidated or in critical require of repairs because the nation has no funds to lift up irrigation effectiveness, the only manner to boost production is by means of more water. "Tajikista's tactics to achieve these goals, either by rising water quota from the Amu Darya or diverting the water of Zarafshan River for irrigation". Though "the second option would consent for irrigation of high-quality soil but it would be also very costly" (Boltov, 2002).

However "it could cause grave clash with Uzbekistan which uses 95 per cent of the river flow and if implemented the supply to the city of Samarkand in Uzbekistan would be seriously impaired" (McKinney, 2002). "It is dubious that Tajikistan could lift the required money as donors are not keen on the project" (The Reliefweb Blog, 2017). "Deputy Minister of Foreign Affairs Abdunabi Sattorzoda holds the view that this project will not be implemented without Uzbekistan's consent" (ICG Asia Report, 2002) which is not likely to be given. Tajikistan cannot meet the expense to overlook of Uzbekistan on issues related to water, as its financial system is reliant on its neighbour for many imports. "Trade has shrunk by half in recent years, and Tajikistan is desperate to reverse that trend" (Abdurakhim, 2002). Conversely, "raising the water abstracted from the Amu Darya is comparatively easy and needs only limited investment because the Amu Darya originate and starts its route in Tajikistan so its neighbours countries cannot do much to prevent Dushanbe from rising its water quota more than allocation" (The Reliefweb Blog, 2017).

The countries situated in downstream criticize that Tajikistan previously gets extra water than it is to be paid according the agreement of 1992. At the same time Tajikistan did not accept all these allegations. "Monitoring Tajikistan's water use is very difficult as much of the equipment was either destroyed or fell into disrepair

during the civil war” (Lillis, 2012). Moreover “the management staffs of Amu Darya lack the resources to perform recurrent and surprise inspections and they also have to apply for entry visas” (The Reliefweb Blog, 2017). Some long years of harsh famine has condensed the altitude of the Amu Darya. “Even if Tajikistan were to increase its share of the water only modestly, it would have an immediate impact on agriculture downstream” (Brochmann & Hensel, 2009).

Huge water resources of Tajikistan provide considerable hydropower potential for the country. Presently the country creates 15 billion kWh of electricity yearly (IFAS, 2002). “Some 80 per cent – twelve billion kWh – is produced by the Nurek hydropower station on the Vakhsh River however not enough to cover domestic demand and Tajikistan depends, therefore, on imports of electricity and gas from Uzbekistan in winter “(ICG Asia Report, 2002). Due to unreliable Uzbek gas supplies and “the troubles with the completion of the Uzbek-Tajik electricity exchange program have lead to power rationing in many parts of Tajikistan”. There is no power grid line links to Northern Tajikistan (Sughd Province) with the central and southern parts of the country where most of its electricity is produced by the Nurek hydro plant.

Uzbekistan gives Sughd Province with electricity and in reply Tajikistan offers power to Uzbekistan’s southern provinces but after all this electricity exchange is not adequate to provide consumers electricity 24 hours a day. If Tajikistan exceeds its limit, it pays a higher price therefore Tajikistan, repeatedly desires that Uzbekistan switch off electricity supplies to Sughd Province to make sure that imports are reserved within the agreed limit. The electricity grid in Tajikistan is not in a proper state, resultant in everyday mishap during winter. Electricity is rationed in nearly all districts and villages from six to eight a.m. and from six to nine p.m. According to the deputy director of Barqi Tojik the people understand why gas from Uzbekistan is sometimes cut but they much less understand about the shortage of electricity. This break down in power infrastructure not only encourages social dissatisfaction but also is a stern hindrance to the sort of economic development that Tajikistan has need of if it is to get better living standards as desired to endorse political and social stability in the country (The Reliefweb Blog, 2017).

In 2012, Uzbek President Karimov, cautioned neighboring country Kyrgyzstan and Tajikistan that “their attempts to construct hydroelectric power stations on the headwaters of the shared resources of Amu-Darya and Syr-Darya Rivers that could be

reason for a war between them”(Jenkins, 2013). It is said that “the dams would disrupt water supplies to downstream states and adversely impacting the economy and damaging the environment” (Jenkins, 2013). The leaders of Kyrgyzstan and Tajikistan disagree that they require harnessing hydropower in line to improve their fragile economies. Therefore Karimov would have the same opinion with Wolf that “manifold and contradictory demands on the use of water resources can lead to war”. Karimov said that “important international organizations like the United Nations only discuss the issue of countries sharing limited international water resources because they believe that it could become an escalatory problem that causes relations to deteriorate, and if aggravated enough, can spark not simply serious confrontation but even wars.” (Lillis, 2012).

Uzbekistan's frequent disruption of electricity supply reasons grave displeasure as Tajikistan is enforced to have electricity rationed in several areas owing the poor state of Tajikistan’s grid lines (Saiko and Zonn, 2000). Tajikistan is eager to build up “its hydropower resources to rupture reliance on Uzbekistan and to sell abroad electricity to neighbouring countries so that the personal energy requirements could without difficulty be met by augmented hydroelectric generation but this would not only need most important investment” (The Reliefweb Blog, 2017). “It would also have a harmful effect on downstream countries access to seasonal water supplies and thus make further possible conflict amongst the Amu-Darya states” (Saiko and Zonn, 2000).

III.3.2 Uzbekistan-Turkmenistan

During the freedom time of newly republicans’ states rumours have spread of a small-scale underground disputes between the two countries over the water resources. Military troops of Uzbekistan taking power over water installations agencies on the Turkmenistan’s side on bank of the Amu Darya (Votrin, 2003). News circulated even of a massacre of a huge figure by Uzbek troops in Turkmenistan in 2001. Although these reports appear to be unproven, “they are very indicative of simmering tensions between the two” (Valery, 2003). Approximately “eighteen millions populations in the Uzbekistan and Turkmenistan are relying on the water of the Amu Darya”. The both nations signed an agreement in 1996 to partition this uniformly. On the record

Uzbek and Turkmen legislative body say they are pleased with execution over water quota (Iskandar, K., 2002).

However, “Uzbek water experts and officials in Khorezm region and the autonomous republic of Karakalpakstan find fault that Turkmenistan is taking too much water and Uzbek experts maintain that it is unfair to divide the water of the Amu Darya equally since fourteen million people depend on it in their country compared to four million in Turkmenistan” (ICG Report, 2002). Moreover, “Uzbekistan has more territory to water and water has to be elated over longer distances” (Sirodjidin, C. 2002). According to their demographical observation, “the total area of irrigated land and water losses should also be considered when setting up water quotas” (The Reliefweb Blog, 2017).

Uzbekistan argues that the Turkmenistan is perpetually increasing its quota. “Turkmenistan and Uzbekistan are each entitled to use some 22 cubic kilometres of water” (Lysenko, 2002). As a matter of the fact, “Turkmenistan is thinking to use as much as 30 cubic kilometres” (IFAS, 2002). Its water utilization is very vague owing to very poor water administration. “The Karakum Canal – the main water flow from the Amu-Darya to irrigated Turkmen lands – carries twice as much water as in Soviet times” (Klötzli, 1994). It is pathetically maintained, steadily silting up and fetching more and more wasteful in sense of water loss and delivery. “This can only be undertaken in two ways by executing exclusive treatment work on the canal or by sketch off rising amounts from the Amu-Darya” (The Reliefweb Blog, 2017).

Hitherto, the second tactics has still existed. In combination with possible Afghan requires for more water from Amu-Darya and “Turkmenistan’s future reservoir plans, it seems likely that Uzbek-Turkmen relations over water can only worsen”. Relations between Uzbekistan and Turkmenistan over water share can rise even poorer because of ambitious plan of Turkmenistan to build a vast reservoir in the desert of Karakum, named the Golden Century Lake.

One more spot of conflict is the Tyuyamuyun reservoir in the delta of the Amu Darya which is separated between Turkmenistan and Uzbekistan. Both sides feel displeased with the wasteful use of water, and this led to an outbreak of violence in 1992 over the re-direction of drainage waters and raids by both sides to cut off pipes and irrigation canals” (Votrin, 2003).

These days, the Tyuyamuyun remnants as the most contentious and several doubtful issues in ongoing water clash with Uzbekistan.

III.3.3 Intra Uzbek Rivalries

It is important to recognize those regions that may turn out to be latent crucial arena for potential intra- and interstate clash in central Asia. It is declared that “high population growth can be more damaging to the environment than high population density like southern Uzbekistani provinces as Surkhandarya and Kashkadarya and several regions in the Ferghana Valley that experienced some of the highest population growth rates in the region” (Votrin, 2003).

Between 1981 and 1991 are most likely to become a scene of a resource-related conflict. The studies show that the regions combining high population increase and no native water supplies in Andijan and Ferghana in eastern Uzbekistan, Karakalpakstan in the west are of major unease. Since Dashhovu region of Turkmenistan and Karakalpakstan region in Uzbekistan’s share the water of the lower Amu Darya, future water-induced conflicts may occur in this region. Every province was ordered according to “the essential distinctiveness supposed to influence the water conflict potential like population growth rate/density, per capita water availability from total and indigenous sources, share of water derived from external sources and minority population share of total population. Eight of ten regions having the highest rankings for water-resource vulnerability are located in Uzbekistan and with top of the top four located in the Ferghana Valley (Valery, 2003).

Therefore the areas comprising the Ferghana Valley and those inhabiting in the lower part of Amu Darya basin become visible to be the most susceptible to possible water-provoked clashes.

Uzbekistan country is separated into smaller quotas for each region. The Amu Darya runs through three Uzbek provinces Surkhandarya, Bukhara and Khorezm and finally ends its route at the Aral Sea in the Autonomous Republic of Karakalpakstan. Water specialists, politicians and agronomists speak that Karakalpakstan and Khorezm regions advance upstream to Surkhandarya, Navoi and Bukhara obtain extra water than they are allowed to.

This is confirmed by official statistics which show that upstream provinces regularly received 50-60 per cent of their allotted quotas and in comparison to

Khorezm received only 6 to 8 per cent and Karakalpakstan no more than 7 per cent. Nine out of fifteen regions in Karakalpakstan have not obtained any water for the last two years. The consequences have been very serious as only 173,000 hectares of land were farmed in 2001 in Karakalpakstan compared to 395,000 hectares in 1999 and the drop of 44 per cent. The sowing of rice, conventionally one of the main crops of Karakalpakstan and which needs large water and it was abridged by almost 95 per cent from 86,000 hectares in 1999 to 4,800 in 2001 and the production of grain go down by almost 80 percent. A BWA Syr Darya official told ICG that Uzbekistan blame Turkmenistan not for the country's water shortages but poor planning and management which are the major culprits and to do away with the problem the provinces must coordinate planning in the water sector (The Reliefweb Blog, 2017).

A official from Karakalpakstan lay the responsibility on colleague officials from Uzbekistan that “some of our officials have care-less attitude and this is causing anarchy in water supplies one province receives 60 per cent of its quota whereas another province receives only 20 per cent”(Bekberian, 2002).

Some NGOs in Karakalpakstan in January 2002 sent an appeal to President Islam Karimov urging him to investigate the matter. They recommended that “either Turkmenistan was more than its quota or the southern areas were captivating more than their right” (ICG Report, 2010). The appeal recognized that Karakalpakstan explanations for a very little division of the Uzbekistan's population and that its financial worth is inadequate. As the NGOs had no means to influence the upstream provinces directly they appealed to the president to intervene on their behalf (ICG Report, 2010). The presidential direction approved the petition to IFAS and “the signatories afterward received an answer from the director of GEF-IFAS who did not take action straight to their points” (Ibid.). In its place he submitted report on Central Asian water issues prepared for the Global Water Forum in late February 2002 at a conference in Almaty.

IFAS and new organizations have tried to set up micro-credits to these regions. “Money for this purpose has been allocated by Tashkent, and local IFAS branches in Nukus and Chembai is responsible for implementing the scheme” (Sirodjidin, 2002). Particularly the be short of water, the deprived form of soil and lots of health problems caused by the Aral Sea tragedy, though, micro-credits are improbable to have much impact. More extensive actions are compulsory as many inhabitants stay alive only on humanitarian help. Those not capable to depart have sold their livestock

and by hook or by crook handle to acquire wages. “Several local people suggested that social tensions are likely to increase in 2002 as people have nothing more to sell and the money they receive from Tashkent is insufficient to cover their basic needs” (Ibid.).

III.3.4 Afghanistan

While Afghanistan is not play a part in the Environment and Security program in the region but “it does take part in a key role as an upstream state of the Amu Darya River basin and ought to have special consideration because the water resources in part of Afghanistan in the Amu darya basin had a significant impact on the energy and agriculture infrastructure in the armed conflict and instability” (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011). According to the UNEP Post- Conflict Assessment Deforestation and overgrazing of pastures are commonplace in Northern Afghanistan report revealed that valuable pistachio forests have been severely depleted (UNEP, 2003).

However Afghanistan is still excluded from the the regional structure body where it should be recognized in view of the fact that the ending of the Soviet era to deal with natural resources and particularly water. “Over the past decade Afghanistan has cautiously expressed its interest in becoming an observer or member of the existing natural resource management mechanisms in Central Asia and is increasingly engaging in bilateral environmental cooperation” (Wegerich, 2004). Because of the uncertainty in Afghanistan, the neighbouring central Asian countries uphold an armed attendance all along boundaries to stop attacks by carrying weapons groups and drug traffickers. “Access to border areas are still problematic and in some places dangerous making cross-border water monitoring and other environmentally-related activities difficult” (UNEP, UNDP, UNECE, OSCE, REC, NATO, 2011).

Water acting as a key purpose even is a cause in internal conflict. Experts on the subject argues that “the risk of violence becomes more intense the smaller the scale of the dispute, an idea supported in Central Asia where local conflicts have been more serious than wider ones” (The Reliefweb Blog, 2017). Water is contributory to a wide sense of agitation across the central Asian region. “Concerns over water are one strand of a complex web of tensions including drugs, Islamist extremism, ethnic

rivalries and border disputes” (ICG Asia Report, 2001). Not any of these subjects may have show the way to extreme war but troubles amongst the Central Asian states are hold back economic expansion, increasing radicalism and rarely resulting in violent behaviour.

Due to dilapidation of farming land and scarcity of water countless young men have hardly any economic opportunities, moving them further expected to link militia or terrorist groups. The interdependency and soaring dependence on water that runs crosswise borders also denotes, though, that states have a bunch to go down by struggle over supplies. Heading for conflict is a very costly means of controlling resources, and the majority administrations have preference agreements. “The tendency ... even where water conflicts have been deemed an imminent risk is to trade water for peace and structural changes in water use”, writes one expert. “The emerging consensus is well summarized as ‘water is a trigger for conflict but a reason to make peace’” (Ohlsson, 1999). In view to water variances today,

Neo-Malthusians stress that it is not the specific water scarcity variable that results in conflict instead it is the socio-economic consequences of water scarcity like declining agricultural output or on the whole financial decline that will consequence in clash. The Neo-Malthusian model holds the premise that it is the inherent economic worth of water resources to the region of Central Asia that creates each cause of conflict which are extremely stubborn (Jenkins, 2003).

Water is also significant for economic and social development and attached to the conflicts around the world. However, water’s role in the economic development depends on the effective and integrated water resources governance (Hoekstra and Hung, 2004). From the time when all of the Central Asian countries were greatly depend on irrigated agriculture and/or hydropower, water is supposed as being both vital for national continued existence and for the sustained economic growth of the nation. “Because of the potentially catastrophic combination of climate change, pollution and a lack of resource management, and population growth, the intrinsic economic value of water in Central Asia has soared, causing it to become a matter of national security” (Lucy, 2013). As a result all water-related conflicts are likely to have exceedingly inflexible in character. “Even though Kyrgyzstan and Tajikistan make up only 20 per cent of the land of the Aral Sea Basin and some 80 per cent of

the area's water resources are generated on their territory" (IFAS Regional Report, 2002). Tajikistan wants to build up giant reservoir at Rogun on the Vakhsh River. It is one of the major tributaries to the Amu Darya. "To oppose this raise in upstream control the downstream nations have delineated plans to construct their personal reservoirs, more complicating the progress of a rational regional system of management" (Khudokilov, 2004).

Disputes over Water and energy resources have already had a force on big figures of people, mainly in "susceptible region like the Ferghana Valley where Uzbeks have tolerated winter floods and summer droughts because of Kyrgyzstan's discharge of water from dam for electricity production" (Khudokilov, 2004). "The Kyrgyz consecutively have trembled during winters while Uzbekistan unsuccessful to send gas unpaid in exchange for irrigation water on a local point so water conflicts have been on the climb and have resulted in aggression" (The Reliefweb Blog, 2017). There has been recurrent anxiety flanked by Kyrgyz and Tajik inhabitants on the boundary over right to use the competition supplies of water. Disagreements over resources that "threat infuriating on wider ethnic clash as occurred when land conflicts led to inter-ethnic uprisings in Kyrgyzstan in 1990 that left hundreds dead" (Khudokilov, 2004).

Increasing prices, badly preserved water schemes and privatization of all major projects will only insert twist in local water systems. "Water affects the poorest sectors of societies which end up paying the largest proportion of their income for the resource and problems with irrigation, drinking water, floods and declining soil quality are additional burdens to people already coping with economic turmoil and rapid social change" (Khudokilov, 2004). Scholars and experts in the field of peace and conflict studies discuss the role of water in the conflicts, which can occur internally and at international level. A number of studies examine the role of legal frameworks as well as failures and successes in water cooperation and preventing water disputes.

Given the growing water conflicts in the region of Central Asia it is true that the problem is at the critical point where there is a need for third-party intervention to implement bilateral and multilateral environmental agreements.

Speedy increase of inhabitants has elevated demand for land, and the difficulty has been compounded by the fall down in industry that has enforced many people reverse to agricultural sector. Although Uzbekistan and other downstream countries have emphasized food self-sufficiency in agricultural programs but the pressure to grow cotton remains high as it is a key foreign currency earner also a particularly thirsty crop that requires heavy irrigation (The Reliefweb Blog, 2017).

Turkmenistan wants to increase cotton production triple time by 2010. Other states are also likely to increase cultivation however it will result massive increase in water use and wastage also (Egorov, 2001). “High prices have meant farmers have devoted even more land to the crop and have intensified use of water and fertilizers” (Ramankulov, 2002). The agricultural sectors of Uzbekistan and Turkmenistan more or less totally reliant on water from the Syr Darya and the Amu Darya as they are downstream nations. “These pressures have thus far been limited without conflict but all states have revealed an eagerness to put their benefit first even while this might have grave cost for their neighbours and by reason of their dependence on agriculture, country like Uzbekistan and Turkmenistan outlook irrigation as a key in security issue in national interest” (Votrin, 2003).

Relationships between Uzbekistan and Turkmenistan have all the time been anxious. “The hostility between their presidents there has been few substantive bilateral talks over water issues” (The Reliefweb Blog, 2017). Water matters were whispered to be at “the back a military confrontation at the border in 1995 and Uzbekistan looks likely to take a very sturdy streak against more unilateral decisions by Turkmenistan to raise its water seize from the Amu-Darya” (Khudokilov, 2004). By replacing or repairing old-fashioned irrigation systems could do much to decrease water utilizes and gets better crop yields but such solutions are costly. “About half of all water used for irrigation is lost en route or through filtration and evaporation” (Egorov, 2001). “Just 28 per cent of irrigation canals were wrinkled to prevent filtration in 1994 and from the time the situation of infrastructure has turn down” (Micklin, 2000).

International law does not manage water conflicts successfully like the discrepancy between the Central Asian states. Besides the international law

They offer no enforcement machinery to avoid water disputes from taking place. The Convention in 1997 on the Law of Non-Navigational Uses of International Watercourses a flexible and overarching global legal framework adopted by the United Nations provided hope for nations in dispute over water resources (Lucy, 2013).

This Convention creates “basic standards and rules for cooperation between watercourse states on the use, management, and protection of water resources that cross international boundaries” (Loures, 2009). Therefore, no worldwide accord has been place into result leading international water resources. “Some individual nations, like Pakistan and India, have implemented their own treaties that govern interstate cooperation on their specific basin; however these agreements often lack sufficient legal protection” (Lucy, 2013).

Wars over water are more possible than cooperation over water because most of shared trans-boundary river basin resources hard to manage peacefully. There is ever growing tendency of ‘Water Securitization’ all through water-scarce regions of the world. “When water is perceived as essential for national survival and for the continued economic growth of the country, it often becomes ‘securitized. Water has become securitized because international law treats water as property or a thing that territorially defined political units can appropriate and own.”(Blatter and Helen, 2001). Albeit water has long been commoditized and “consequently a number of have it while others don’t and every human being, and every nation needs it for survival”.

Central Asian states have also been likely to re-examine water resources for a many reasons. “Not only do the five major republics need to provide 65 million people with 20-50 liters of water a day to ensure their basic needs are met, but, they are also motivated by national concerns over economic development, the need to control ethnic tensions and social uprisings, and the need to manage environmental degradation and population growth.”(Mosello, 2008). This deep investigation, in line, “has dissipated the prospect of a hydro-political complex in the region, thus wasting the ‘cooperation-inducing’ potential of water resources.”(Lucy, 2013).

Over and over again times, as in the case of Central Asian region, the lower riparian states have more power, economically and/or militarily than the upper riparian states water resource-rich countries.

When the upstream riparians capture the water resources before they reach the downstream countries the downstream countries may use what power (i.e. force) they have on hand to them and this water securitization transforms what could be a cooperative non-zero sum situation into a zero-sum hydro-political conflict. This securitization of water-related matters would therefore emerge to raise the risk of disputes. Whereas the literature provides a comprehensive investigation into water's conflict inducing and cooperation-inducing characteristics, it seems to ignore the fact that water conflicts are often interconnected with an array of other socio-political conflicts, making it difficult to isolate the water allocation variable as the main contributor to violent conflict and/or cooperation (Lucy, 2013).

So water subjects traditionally interconnect with deep-rooted concerns such as identity or border conflicts all of the literature saying that “trans-boundary river basin resources alone will either cause cooperation or war seems overly simplified and limited” (Lucy, 2013). The writings also not succeed to include the theory on the eruption of aggressive clash. “The literature on water wars does not appear to need a historical tendency of conflict between actors for the outburst of a war instead it seems an immediate conflict trigger like construction of a mega dam of the headwaters of a shared river, has the potential to spark a war between otherwise harmonious actors” (Jenkins, 2003). However “the theory of violent conflict says that while the potential for conflict exists wherever opposing interests, values or needs clash”(Ho-Won, 2008).

Conflicts over a general and “non-inflammatory issue like water-sharing or oil prices, is not likely to turn violent unless there is also a long-term rivalry between the parties over fundamental issues like religion or other value-based beliefs; the reason being that these causes often evolve into threats to individual or collective identity” (Lucy, 2013). But they give reason for using violence because they are in needs or value that water as crucial to their center identity and continued existence. Thus they are not only more resistant to resolution and/or elimination, as a defense mechanism. In these conditions, at the start unimportant issues can activate conflict that may become an escalatory turning point where the issues begin to broaden, and victimized groups begin to link the triggering incident to more fundamental grievances (Lucy, 2013).

CHAPTER IV
REGIONAL COOPERATION AND
WATER MANAGEMENT

IV.1 Importance of Regional Cooperation in Water Management

It is no surprise that throughout the past of human race, management of water and water allocation fueled tensions between various states with particular role played by trans-boundary river resources. “Although history shows that full-scale wars over water, proving to be neither strategically rational nor hydrographically effective, have never been fought” (Votrin, 2003). But water persists to be a cause of severe conflicts across the world. The problem grows harder when it comes to the relationships between two or more countries over river water as a result of the internationalization of a basin through political change. “The number of international basins has grown from 214 in 1978 to 263 today and these international basins cover 45.3% of total land surface, affect about 40% of the world’s population, and account for about 60% of global river flow” (Wolf et al., 2003).

The interconnectedness of border-crossing fresh water systems inevitably results in the interdependence of all its users and stakeholders who share river. Water related activities in one state are likely to impact the water situation in another one and water related problems such as “pollution can often only be solved through trans-boundary cooperation therefore the need to cooperate on water issues beyond the borders of states have been broadly accepted for many years (UNW-DPC Report, 2010)”. Since 1814 “more than 300 bilateral and multilateral agreements on the cooperative use and development of trans-boundary waters have been concluded” (Wu, et al., 2006). Approximately 200 such agreements on the non-navigational uses of trans-boundary waters made within the last 50 years.

Cooperation, however is not necessarily based on formal agreements, it can manifest itself in a variety of ‘cooperative institutional arrangements’ which means that states formally or informally agree to a common set of rules that govern their interactions. A recent study by the University of Arizona has attempted to map cooperative institutional arrangements on water which according to this late set exist in 41% of all trans-boundary river basins in the world (Gerlak, 2007).

This in turn means that ‘158 of the world’s 263 international river basins, plus trans-boundary aquifer systems, lack any type of cooperative management framework (UNW-DPC Report, 2010). In the first world water development report (WWDR) progress made in areas of water governance and management was emphasized as

development of particular note. Since then the focus on governance and the need for governance reform has taken hold in debate on freshwater issues globally and criteria for effective water governance have been developed (WWAP, 2009).

It was representing the most desirable but at the same time most idealized situation with building and strengthening institutionalized water cooperation between states must be seen as one aspect of this. Given the enormous tasks such cooperative institutions face it is indispensable to ensure that they possess the capabilities to act accordingly and institutionalized cooperation in trans-boundary water resources results in benefits for the states involved, as it provides them with information and reduces uncertainty as well as transactions costs (Gerlak, 2007).

Modern trans-boundary watercourse law largely based on the 1997 UN Convention on the “Law of Non-Navigational Uses of International Watercourses urges riparians not only to create legal agreements to manage their shared resources, but also to find joint management mechanism and to cede sufficient sovereignty to them to make them effective” (Kalbhenn and Bernauer, 2011). Nevertheless it is observed that cooperation on water management between states is a lengthy and complicated process which requires substantial resources, capacities and support in order for it to materialize and be sustained. In present time trans-boundary cooperation has moved forward most successfully where “immediate need is combined with an abundance of appropriate human financial and techniques capacity” (Swastuk and Wirkus, 2009).

Eventually modern international water law focused on the sustainable balance of sovereign rights of each state to use water resources in their national interests and their responsibility for attendant actions infringing on the interests of neighboring countries. “Thus having overcome the stage of confusion and discord, humankind has returned to the folk wisdom and try to live better yourself and don’t prevent others” (Dombrowsky, 2007). In this situation, such long-negotiated instrument of international water law as the 1997 UN Convention on the Non-Navigational Uses of International Watercourses is of little help as it provides for equally contradictory ‘equitable use’ and ‘no significant harm’ principles: while the former is favoured by upstream countries, downstream riparians insist on emphasising the latter because it protects their own right (UN Report, 1997). It is also hard to put into effect the Convention “in the absence of any international enforcing mechanisms because the

Convention hardly weighs out a variety of political, social, economic, demographic and environmental factors that encompass each shared river basin” (Votrin, 2003).

Negotiators whose task is to provide timely diplomatic intervention or apply means of the so-called preventive diplomacy in order to avoid the escalation of a dispute into open conflict need to be aware which basin is prone to water conflict well in advance. To do that, they need to identify potential indicators of conflict that incorporate a wide range of physical, social, economic and environmental variables, including those which can be analyzed within a Geographic Information System (GIS) and to develop a comprehensive model to explore specific linkages between them. In particular, “this method can be applicable in those cases of internationally shared rivers where progress towards successful resolution of a dispute was slow or unachievable” (UN Water Report, 2008). Considering all factors having influence on the river basin regime is becoming crucial to elaborate meaningful and workable framework to provide resolution to the growing water conflict (Votrin, 2003).

Since the collapse of the Soviet Union Central Asia has become a tangle of unresolved trans-boundary water disputes and water is the most critical resource in Central Asia and it has more often been the source of competition rather than the focus of conservation. The absence of mechanisms to handle the water problems has already resulted in various accusations of improper water use and onsequently the whole region becomes the site of potential conflict that requires a framework which should incorporate a great many variables to identify the proneness to water conflict and to allow for the possibility of preventive diplomacy. Such technique which has never been exercised towards the specific problem of Central Asian water disputes that can provide solutions based on a more holistic approach to natural resources while recognizing the historical, geopolitical and natural characteristics of the region (Votrin, 2003).

The mid 1970s long earlier than the breakdown of the Soviet era, “the need for the creation of inter-republican entities of water resource management had become obvious on the territory of Central Asia as well” (Valentini et al., 2004). By that time the Ministry of Water Resources of the USSR had started experiencing difficulties in the division of water resources in the situation of a long deficit in the flows of the rivers Amu Darya and Syr Darya because “the traditional procedure of consultation of the Soviet Unions’ ministry with the management of the five Republics was becoming less and less effective so multiple teams of officials from Moscow and other

Republics had to settle water conflicts in the field” (Valentini et al., 2004). When similar voyages to “remote areas” became systematic and extremely long, in 1986 “the decision was made to create two Basin Water Management Organizations BWO Amu Darya and Syr Darya with the headquarters located in Urgench and Tashkent (Uzbekistan) respectively” (Wegerich, 2004).

According to a special Decree of the Government of the USSR all large reservoirs and head water intake facilities with a carrying capacity of over 10 cubic meters per second in the flows of both of the rivers and their tributaries were supposed to be transferred to the BWO’s management. They were also endowed with the right to change the water consumption quotas of each Republic up to 10% depending on the operational situation; however they did not have the possibility of interfering in the water use processes inside the Republics and did not control water quality (Michael, 2002).

After the ending of the USSR era, the established network of information exchange in Central Asia on water economy and environment related issues also collapsed and considerable knowledge was lost and the transfer of hydrological and meteorological data between countries was uneven. Although Central Asian states have developed regional structures such as the Interstate Commission for Water Coordination (ICWC) and the respective Basin Water Organizations (BWOs), “as well as corresponding national institutions, the inadequate provision and circulation of information has been an obstacle for making appropriate short and long term decisions regarding trans-boundary water resource management and implementing relevant policies” (McKinney, 2003). In 1994 the five leaders of the countries of the region agreed in Nukus (Uzbekistan) on a joint decision to prepare a common strategy of water distribution, efficient water use and protection of water resources and also to prepare draft international legal and regulatory acts regulating the issues of the joint use and protection of water against contamination, given the socio-economic development of the region (Gregory, 2001).

If one compares those responsibilities with everyday reality one has to face an obvious contradiction and the constitutional and legal acts of Central Asian countries unambiguously declare adherence to international law standards. Frequently the priority of international conventions and agreements with regard to domestic legislation at the same time an uninterrupted range of one-sided actions in the water management field over the previous ten years, even caused by objective reasons, “can

hardly testify to the unconditional belonging of the region to the international legal field” (Khamzayeva, 2009). Regular violations of agreed conditions of inter-republican water division and the lack of desire of to comply with the traditional irrigation regime of water discharges and the renewed failure of agreed supplies of energy resources from its opponents can be included in those actions.

Since this intention has failed to be implemented, “the essence of the problem was not only the question of who is the nominal owner of water resources, but also who actually manages them now and who should manage them in the future at the national and regional levels” (Kipping, 2008). This idea automatically draws attention to the next problem an institutional one. After efforts of so many years to return these chaotic processes “an agreed flow with the help of political declarations at the highest level or framework agreements has not yielded great successes” (Valentini et al., 2004). They require for a creation of innovative agreements together with both a list of specific responsibilities of stakeholders and the detailed procedures of their implementation is required.

However, “actual regional co-operation over water resources other than entering into numerous agreements is glaringly absent” (Sievers, 2002). Neither economic co-operation, nor water regulation has been a success, despite all the joint negotiations and speeches. For the states experiencing sharp water scarcity change of shift to developing a national water strategy would be quite logical yet none of Central Asian states has developed one though Kazakhstan, Kyrgyzstan and Tajikistan have started working on it (Mosello, 2008). “Far more accords are signed than implemented and national interests always outweigh joint action and none of water treaties specifies a goal of reducing water use or making agriculture less water intensive with the skeptical attitude of downstream countries to multilateral co-operation deters them from any environmental and financial commitments” (Klötzli, 1997).

In Central Asia management, operation and maintenance responsibilities were transferred to water users which resulted in the creation of Water Users Associations (WUAs) who took on these responsibilities. However these “WUAs still do not adhere to established hydrographic principles because its members often lack the necessary knowledge, skills and experience to register or manage the organization or the infrastructure, while the objectives of WUA development are yet to be realized”

(Micklin, 2000). After independence the Central Asian states as successor states to the USSR inherited the rights and responsibilities of the previous but extant agreements on water resources (ADB Report, 2004).

Thus they became signatories to the 1873, 1946, 1958 and 1961 agreements and all of which remain in force (Rahaman and Varis, 2008). Central Asian states established a series of regional institutions and agreements with the expressed intention of allocating the Aral Sea Basin's waters and protecting the Aral Sea. They began with the 1992 Almaty Agreement. "With this the five states accepted that the only through unification and joint coordination of action on water resources could be the region's solution to managed water crisis effectively" (Abdullayev, 2000). Under the agreement, "they retained Protocol 566's allocation quotas, refrained from projects infringing on other states rights and promised an open exchange of information" (Khudokilov, 2004).

In the subsequent number of years the organizations were established. These were the Interstate Coordinating Water Commission (ICWC), the subordinate Amu Darya and Syr Darya Basin Management Authorities (BVOs), the Interstate Council on Problems of the Aral Sea Basin (ICAS) and the International Fund for the Aral Sea (Rahaman and Varis, 2008).

All these institutional reforms resulted in the ICWC being subsumed into the ICAS and it subsequently integrated into the IFAS as it was hoped that the merger in 1997 would simplify administrative procedures and reduce duplication of effort and bureaucratic inertia. That was an unusual indication of the states' awareness of the serious nature of the Aral Sea Basin crisis and the need to coordinate their response more effectively. The Central Asian states also agreed to adhere to international water law and in doing so they accepted a normative body that supports equitable, reasonable and mutually advantageous water resource use (Rahaman and Varis, 2008).

Although Central Asian states have developed regional structures such as the Interstate Commission for Water Coordination (ICWC) and the respective Basin Water Organizations (BWOs), as well as corresponding national institutions, the inadequate provision and circulation of information has been an obstacle for making appropriate short and long term decisions regarding trans-boundary water resource management and implementing relevant policies. "One reason for this lack of

progress may be a pervasive non-cooperative tendency in the region” (Wegerich, 2004).

Not all stakeholders in the Central Asian region share the same values or interests in promoting regional cooperation. Antipathy toward multilateral organizations and cooperation is particularly acute in Ashgabat and Tashkent and IFAS member states have expended little political or financial effort on the body (Gleason, 2001).

In order to address these shortcomings, the implementation of the Central Asia Regional Water Information Base (CAREWIB) project has been initiated by the United Nations Economic Commission for Europe (UNECE) Special Program for water use efficiency in Central Asia (UNECE Report, 2007). “Increasing water use efficiency will reduce the level of stress on shared water resources and allow for better management of multipurpose infrastructure in agriculture and energy production and according to some experts there have been major improvements in reducing water withdrawals in the basin from 114 bcm in 1990 to 109 bcm in 2010” (El Oifi et. al, 2012). The drops in water extractions result from economic recessions, the physical fatigue of water infrastructures and the loss of agricultural lands. Water management cooperation between riparian states has fluctuated since the Soviet period but “in present countries in the region are uncertain regarding which flows of water will be available due to the multipurpose usage of water and the difficulties of calculating the impact of climate change” (Bedford, 1998).

Furthermore, there are alarms that “the independent, uncoordinated development planning by the basin countries may impact the amount of water available throughout the region” (Khudokilov, 2004). The Soviet-era bartering system was unable to serve the newly independent Republics and these states sought to reduce their dependence on their neighbors for water and energy resources (Howell et al., 1994). Nonetheless, this move led to the understanding that “neglecting the trans-boundary nature of common resources would not achieve the desired results and within a year of their independence the five post-Soviet states in the Aral Sea basin agreed to maintain and adhere to the division of the trans-boundary water resources as dictated by Moscow” (Elhance, 1997).

The history of water conflict and water cooperation, especially over the past 100 years, demonstrates that in the absence of viable institutions shifts in water use and water availability can create tensions. Water governance in the Amu Darya Basin is complicated by “the absence of effective mechanisms for water management and bilateral/regional cooperation over shared water resources” (Froeblich et al., 2006). The political, social, economic and administrative systems of CIS Countries directly or indirectly affect the use development and management of water resources. The presence of institutions to facilitate effective trans-boundary water management and engage in preventive hydro-diplomacy to mediate disputes between countries is crucial.

The year of 1991 following the collapse of the USSR saw the establishment of five new independent states. Afghanistan was not party to the process. “The transition did not herald a period of greater inter-state cooperation and was not entirely positive for water management” (Horsman, 2008). They also founded an Interstate Commission for Water Coordination (ICWC) in 1992 and selected it as the body responsible for the definition of seasonal water allocations in line with the annual agreements. Furthermore, “it was agreed that the Basin Water Organizations (BWO) Sir Darya and BWO Amu Darya would be incorporated into the ICWC structure as implementation agencies” (Jalalov, 2003).

There are two core bodies accountable for trans-boundary water management in the Amu Darya basin at the interstate level. “The Interstate Commission for Water Coordination (ICWC) which is comprised of senior water officials from each riparian country is responsible for water allocation, monitoring, and water use, and other issues in the region” (Michael, 2002). The ICWC was established as a result of the Agreement signed by the Central Asian countries in 1992 on joint management of interstate water resources. The Basin water organization Amu Darya, the Scientific Information Center (SIC), and the ICWC Secretariat are the executing bodies of the ICWC (Khudaiberganov, 2002).

Water Management in Central Asia



Source: *Water management in Central Asia: state and impact*. (2005). UNEP/GRID Arendal Maps and Graphics Library.

http://maps.grida.no/go/graphic/water_management_in_central_asia_state_and_impact

Map IV.1

The ICWC currently sets the limits on the quantity of water to be allocated to the major areas of each country for both the irrigation and non-irrigation seasons; “these policies are based on river flow estimates provided by the hydrological and meteorological services of the basin countries” (USAID, 2002). The BWO Amu Darya based in Urgench in Uzbekistan is primarily responsible for overseeing the allocation of water according to the agreed limits set by ICWC for users in the basin. “It also controls the discharges to the Aral Sea and the operations of the interstate

reservoir with other tasks include measuring water levels, assessing river flows, operating canals, head gates and control facilities at interstate structures and also designing and engineering new water management equipment” (Weinthal, 2006). The “Basin Water Organization Amu Darya”, established in 1980s, is responsible for implementation of decisions on water allocation and distribution. The BWO is also responsible for operation and maintenance of all major water structures. The SIC provides scientific and information support to the ICWC (SIC ICWC Report 2007). “At regional level, the International Fund for Saving Aral Sea (IFAS) is an important institute serving as a platform for dialogue to improve cooperation between the countries on the efficient use and management of water resources, and improving socio-economic and environmental situation in the Aral Sea basin” (Peachey, 2004).

Experts have emphasized that the benefits of regional cooperation over shared water resources because the necessity for improved and coordinated planning regarding water resources in the Amu Darya Basin has become increasingly evident. “The growing reliance on water for energy and agriculture needs is fuelled by a growing population and climate change, which causes the melting of the region’s glaciers that feed its rivers” (Rakhmatullaev, 2009). This policy brief will offer major recommendations for effective planning related to water resources, in order to balance the usage of water infrastructure, particularly in agriculture and energy (Horsman, 2008). “Coordinating water and energy use includes water management requires sound political, economic and institutional choices and it is imperative to implement policies that will be acceptable to all countries in the region” (Khudokilov, 2004). Instead they have pursued unilateral approaches to water resources issues because the laws have defined water as a national asset rather than common good (Kayumov, 2004).

Turkmenistan’s Golden Century Lake and Turkmen Lake projects are striking examples of this unilateral approach (Khamidov, 2002). “Given that these artificial lakes will probably require additional withdrawals from the Amu Darya it may be an infringement of Articles 7 and 16 of the 1958 Treaty” (Glantz, 2005). Uzbekistan has complained about the impact of the lakes on the lower Amu Darya so it is easily visible that the Regional attitudes towards Cooperation of central Asian countries are biased and vague. “There is a dire need of political, social, economic and

administrative systems of water governance that directly or indirectly affect the use, development and management of water resources” (Khudokilov, 2004).

IV.2. Water management during the Soviet Period

During the Soviet era, inter-republican water resources were managed on the basis of water use plans and these plans were developed by local Ministries of Land Reclamation and Water Management and then sent to Moscow to the Ministry of Land Reclamation and Water Management of the Soviet Union for approval (Votrin, 2003).

These plans and schemes provided for annual water withdrawal limits with respect to each tributary, reservoir or canal and the limits were calculated against annual crop requirements. Several bilateral agreements were marked among the states to make accurate water allocation, such as the an agreement between the Turkmen SSR and the Uzbek SSR on water quotas from the Amu Darya, between the Kyrgyz SSR and the Uzbek SSR on the use of waters of the Sokh river. Neither of these agreements contained any provisions with respect to the quality of return flows like the drainage water disposed of into the rivers however these plans and agreements still constitute the basis of current water management in the Central Asian region. Under the Soviet system of water allocation or water quotas imposed by Moscow favoured downstream countries at the expense of the upstream riparians as water-abundant Kyrgyzstan and Tajikistan were supposed to supply irrigated agriculture economies of Uzbekistan and Turkmenistan with water in spring and summer when water should be available for cotton fields (Votrin, 2003).

In autumn and winter, when Kyrgyzstan and Tajikistan experienced peaks in electricity demand, they were supplied with Turkmen and Uzbek gas and Kazakh coal to satisfy energy consumption and they also received electricity from downstream countries during winter to be compensated for the hydropower produced in summer (Michael, 2002). “Under the Soviet Union’s Protocol No. 413 of 1984 in a normal year, 75% of the annual discharge from the reservoir was to be made in summer and discharges in winter could not exceed the remaining 25% Kyrgyzstan and Tajikistan supplied surplus electricity from their hydropower plants through the Central Asian Power System to the three downstream countries in the summer” (Eurasian Development Bank, 2008). In exchange, since the Kyrgyz and Tajik region lacked any significant resources of fossil fuels, “electricity was transferred from this power system to enable Kyrgyzstan and Tajikistan to meet their winter demand for

electricity and heat” (The World Bank, 2004). As a result of this system, “the countries have become closely interdependent in their water utilization and the uneven distribution of water resources has raised trans-boundary reservoir management issues over water allocation among the countries of the region” (Izquierdo et al., 2010).

During the Soviet era, “the Aral Sea Basin River systems were used exclusively in the production of cotton, the white gold of Central Asian agriculture” (Dinar, 2007). Water intakes and return flows were coordinated and limits were established for all major off takes and dams regulated the flow of water, in order to irrigate cotton fields. Generating hydroelectricity remained a secondary priority, “since a bartering system was already established: downstream Republics provided energy resources to upstream Republics; which would in turn store water primarily for downstream neighbors’ irrigation needs” (Kranz et al., 2005). The USSR-era system of bartering was not capable to provide right allocation mechanism to the recently self-governing nations.

These states sought to reduce their dependence on their neighbours for water and energy resources. However, “this approach led to the realization that neglecting the trans-boundary nature of common resources would not achieve the desired results” (Froebrich et al., 2006). Inside a year of independence, “the five post-Soviet states in the Aral Sea basin agreed to maintain and adhere to the division of the trans-boundary water resources as dictated by Moscow”. They also established an Interstate Commission for Water Coordination (ICWC) in 1992 and “designated it as the body responsible for the definition of seasonal water allocations in line with the annual agreements” (Khamzayeva, 2009). Furthermore, it was agreed that the Basin Water Organizations (BWO) Syr Darya and BWO Amu Darya would be incorporated into the ICWC structure as implementation agencies (Khudaiberganov, 2002).

The Central Asian countries have some of the largest irrigation schemes in the world, and “some 22 million people in these countries depend directly or indirectly upon irrigated agriculture for their livelihoods” (World Bank, 2004). Whole communities came into being exclusively for the reason that “irrigation development and settlement schemes during the Soviet era.

Today twenty to forty percent of the GDP of these countries is derived from agriculture, almost all of which are irrigated and with no irrigation; a great deal of the land would relapse to desert cleanse. Irrigation benefited from massive investment during the Soviet era, but water was not well managed so water application rates were extremely high, which reduced the quality of farmland through the rising water table and salinization and the irrigation systems were in poor condition even before the Central Asian countries became independent in 1991. From the time when the disintegration of the USSR regime took place the site has deteriorated very much. Both government budgets and farm incomes have fallen dramatically, water management institutions have weakened and institutional structures are generally not strong enough to ensure efficient water management Thus, much of the infrastructure is fast approaching collapse (Bucknall et al., 2003).

Canals are silted up or damaged, gates broken down or non-existent and pumps held together by improvised repairs and parts taken from other machinery and “the problem is exacerbated by the shrinking of the Aral Sea and winter floods caused by excessive reservoir drainage” (Eurasian Development Bank, 2008). The United Nations Development Program (UNDP) reports that “the Central Asian region loses \$1.7 billion a year, which constitutes three percent of the region’s GDP from the poor water management that lowers agricultural yields” (UNDP Report, 2005).

IV.3. Water Management Post-independence in Central Asia

The nations of Central Asia have “inherited an interconnected and complex hydraulic infrastructure system from the Soviet era and this system was set up to be based upon the construction of large dams and water reservoirs in the mountainous areas of the upstream countries Tajikistan and Kyrgyzstan” (Izquierdo et al., 2010). This was because of the area’s attractiveness of natural conditions and higher water accumulations per unit area in comparison to the conditions of the lowland within the downstream countries, Uzbekistan, Kazakhstan and Turkmenistan. On the other hand, “the lowlands were suitable for practicing irrigated agriculture and for growing water intensive agricultural crops, such as cotton, rice and wheat” (Rakhmatullaev et al., 2010).

Since the independence of the Central Asian states and the subsequent conflict in Afghanistan, the basin countries’ management capacities have been eroded and have yet to return to previous levels. In these Republics much of the

capital accumulated by the former Soviet system has been either consumed or dissipated as a result important infrastructure, such as irrigation, drainage systems and roadways have been neglected (amudaryabasin.net).

After the collapse of the Soviet Union, the newly independent Central Asian states agreed to largely continue the Soviet era water sharing agreements, without Soviet era funds and created the Inter-state Coordination of Water Resources Commission which maintained water quotas (Hodgson, 2010). The existing water sharing inside the region is earlier back from the 1992 Almaty Agreement in which the five states agreed to adhere to an established pattern and principles of allocation basically codifying existing practices (Izquierdo et al., 2010).

The Agreement was signed in haste and only a few weeks after the Central Asian states became independent from the Soviet Union and little thought was given to its long-term consequences. By signing this Agreement the Central Asian states chose to keep Soviet allocations unchanged that the bulk of the region's water resources is still allocated to the downstream countries leaving the upstream countries with little access to the water generated on their territory (Izquierdo et al., 2010).

Furthermore, the Almaty Agreement made no provision for Afghanistan despite the fact that approximately 6 percent of the flows within the Aral Sea Basin are generated on its territory (Izquierdo et al., 2010). Soon after the Agreement was signed, the upstream countries realized that their water allocation was not sufficient for planned expansions in agriculture. Kyrgyzstan has argued that not only are they denied fair access to water that rises on their territory, they are also expected to pay for the upkeep and maintenance of the dams and reservoirs that control the flow of the Syr Darya, "while the downstream countries, especially Uzbekistan, reap the benefits" (O'Hara, 2004). All through the basin states, "most irrigation systems are in a state of disrepair". Furthermore, the basin governments, "each advancing its own national interests within a regional context, have been forced to manage the operations of systems within their own borders, while large areas of formerly irrigated land have been lost due to the breakdown of the water system" (McKinney, 2003).

Following the independence, the need for all riparians to enter into an agreement regulating water allocation in the Basin has become apparent and such agreement signed on 18 February 1992 in Almaty did not go far from water quotas set up under

the Soviet Union (Votrin, 2003). Earlier under the Soviets rule “in the water allocation schemes the downstream nations received the largest quotas and the upstream countries were given much smaller quotas considering their smaller populations and low cotton production” (Ibid.). The “Interstate Water Management Coordination Commission (IWMC)” was established with a mandate to control rational utilization of the trans-boundary water resources and “IWMC’s decisions regarding intake limits and rational utilization of water are obligatory for all users and it is responsible for governing the two inter-republican Basin Water Management Bodies: BVO Amu Darya and BVO Syr Darya” (SIC ICWC Report, 2005).

The five preferred to continue with the BVO management system put in place during the Soviets. Initially, IWMC was responsible for great many issues including water development and allocation planning, water quality control and conservation, environmental protection, preparing annual water allocation plans, defining limits of water use by each riparian. With the establishment of other intergovernmental institutions between 1993 and 1995 such as the Interstate Council on the Aral Sea Basin and the International Fund for the Aral Sea the functions of the IWMC became somewhat duplicated and its relationship with other intergovernmental bodies remain unclear (Votrin, 2003).

In spite of all these other international and regional attempts to improve the water disaster, the only joint agreement signed by all five leaders is the Almaty Agreement from 1992 and in recent years there have been a number of discussions on its current status and the need to review, revise, and/or replace it but one of the key issues surrounding it is how the upstream states, where Central Asia’s water originates, are not given their fair share of resources (Izquierdo et al., 2010).

Now they are increasing their domestic water usage and decreasing the amount sent to the downstream states because this is a major need to update it especially as this will have potential to ensure that regional stability is maintained. One more issue of climate change in which the region’s main glaciers are shrinking. Therefore it resulted in decreasing the overall water supplies for the region. This highlights the need to acknowledge current water levels so all is ensured they get the amount of water they need (Izquierdo et al., 2010).

One ultimate topic is about Afghanistan which was excluded from the agreement and this state is of special importance since once it becomes more stable it will most likely

ask for its fair share of water resources. The Almaty Agreement attempted to secure the existing situation where water was allocated to allow maximum utilization whereas the international concept of equitable and optimum utilization was kept aloof so the Agreement lacked the provision about dispute settlement (Votrin, 2003). According to it, “water disputes are to be settled by the Ministers of Water Resources of the five states however it does not provide for the situations in which the Ministers are unable to resolve the disputes due to absence of any inter-republican dispute settlement body and this seems to be serious flaw” (Ibid.).

Moreover, the problem is also actual functioning of the water management bodies BVOs, who lack funding and legal powers (Votrin, 2003). According to the Almaty Agreement, “they have to submit a budget to the ICWC for approval Once a budget has been approved the five members states are supposed to contribute a proportion of their budget based on the percentage of river water allocated and in practice member states are unwilling to contribute funds to an external agency and the BVOs are chronically underfunded” (Ibid.). They are also short of lawful standing as “most water management seems to be handled by national water management bodies, not BVOs” (Dinar, 2007). Hence, upstream countries were further restricted in their economic development and ability to satisfy heating needs during winter months as downstream countries introduced world prices for gas and coal (Hegre, et al., 2000). Powerless to afford them,

Kyrgyzstan increased electricity production at Toktogul reservoir that caused sharp reduction in water to downstream Uzbekistan and Kazakhstan for irrigation during cotton season. After serious tensions in 1997, the countries have come to enter a framework barter agreement in 1998 under this Uzbekistan and Kazakhstan would provide Kyrgyzstan with gas and coal during winter in return for irrigation water during spring and summer (Votrin, 2003).

However, “barter agreements are in constant breach due to a number of reasons as they are ready usually in spring when Uzbek and Kazakh fields are in dire need of water, the parties lack trust and do not keep their commitments, and there is lack of control mechanisms” (Votrin, 2003). On the other hand several years of severe drought have affected the situation dramatically causing Kyrgyzstan to reduce water for irrigation in summer and triggering floods in Uzbekistan during winter (Ibid.).

Efforts to regulate the quota system reflect that this have until now unsuccessful. “Downstream states have exposed very slight sympathetic of demands of the upstream riparians to increase their water use” (Gleason, 2001). Each of the riparian countries promotes unilateral economic development tracks that depend on different uses of water which puts more stress on shared resources.

Downstream states are still dependence on upstream states for irrigational water and other purposes. But “the upstream countries lack of cooperation when it comes to water management is an energy concern” (Izquierdo et al., 2010). Tajikistan and Kyrgyzstan on the other hand are struggling to meet their energy needs for electricity, especially in the cold winter months when they have tried to cope by arranging barter deals with their western neighbors, trading summer water releases and hydropower for coal and gas for fall and winter use. However, as downstream nations began to charge for oil and natural gas imports, the two countries began to alter their hydroelectric facilities' water flows, increasingly hoarding it in the growing months for winter release to generate electricity rather than pay ever rising energy import bills, raising political tensions with their downstream neighbours (Daly, 2010). “Drought and low levels of reservoir storage have created shocks and setbacks for the basin economies” (Mosello, 2008).

Water demand is perpetually growing to meet national, economic growth and planned water usage for energy exports to new regional markets (Mosello, 2008). So the basin countries must engage in open dialogue on the need for reform that acknowledges the energy-food-environment nexus of water resources. “The Amu Darya Basin is not suffering from a shortage of water resources, yet the lack of effective national and regional management frameworks stokes tensions between the countries over the usage of water resources” (Khurshedi, 2011). Water usage for economic growth remains the core interest for each of the Central Asian Republics, as well as Afghanistan.

In modern years, Kyrgyzstan has been cut short in not having enough power for the winter and Barter arrangements with neighboring countries have also broken down. The in charge intergovernmental bodies for water management is the Ministry of Energy and the Ministry of Natural Resources and the government has embarked on reforms to improve management and transparency in the water and energy sector that gives hope that workable

solutions may be feasible. In 1998, Kyrgyzstan and Uzbekistan signed an agreement to manage the Syr Darya water basin and this agreement governed the Toktogol complex, which permitted Kyrgyzstan to generate electricity to prevent damaging water releases, a number of barter agreements were created to ship natural gas and coal to Kyrgyzstan in the winter (Izquierdo et al., 2010).

But these barter agreements were not followed and Kyrgyzstan sought to charge the downstream nations the full use of the water which caused protests from the downstream countries. The barter agreements could never tackle the core question of water allocation and how to pay for the aging Soviet era dam and irrigation system. There remains a fundamental disagreement over the pricing of water versus other natural resources, which were sold in the region for full market value. “Leaders of different countries were also suspicious of each other and did not trust the water agreements, which were promoted by international agencies like the World Bank” (Allouche, 2007).

Aside from the core structure of agreements over water resources for example the 1992 Almaty Agreement, there are numbers of other water management/allocation agreements have been entered into since 1992. A few of them have been listed below:

- Agreement between the governments of Russia and Kazakhstan on the joint use and protection of trans-boundary water resources, Orenburg, 1992
- Agreement on the creation of the International Fund for the Aral Sea, 1993
- Programme on the joint actions on the improvement of environmental situation in the Aral Sea Basin, 1994
- Declaration on the problems of sustainable development in the Aral Sea Basin, Nukus, 1995
- Statement of leaders of Kazakhstan, Kyrgyzstan and Uzbekistan about the energy/water use, Bishkek, 1996
- Declaration on the creation of the Interstate Commission on Sustainable Development and the need of preparation of a Convention on Sustainable Development, Almaty, 1997
- Framework Agreement between the governments of Kazakhstan, Kyrgyzstan and Uzbekistan on joint use of the Syr Darya River Basin water/energy resources, Bishkek, 1998

- Agreement between Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan on cooperation in the field of environmental protection and Agreement on biodiversity conservation, Bishkek, 1998
- Agreement between Kazakhstan and Kyrgyzstan on the interstate use of hydrological facilities at the Chu and Talas rivers, 2000
- Annual intergovernmental water/energy agreements (Giordano et al., 2002).

After the 20th century the Central Asian management, operation and maintenance responsibilities were transferred to water users which resulted in the creation of Water Users Associations (WUAs) who took on these responsibilities. However, “many of these WUAs still do not adhere to established hydrographic principles; its members often lack the necessary knowledge, skills and experience to register or manage the organization or the infrastructure, while the objectives of WUA development are yet to be realized” (UNESCO and FAO Report, 2005). Kyrgyzstan’s parliament in 2001 passed a law on water pricing to the downstream countries, maintaining that water was property of the Kyrgyz state (International Crisis Group, 2002). The regulation also predetermined that the downstream countries should pay for the maintenance of the dam and canal system (Izquierdo et al., 2010).

Both Kazakhstan and Uzbekistan contrasting the issue that violated international law and Kyrgyzstan eventually backed down from insisting that downstream countries pay for the full price of the river water. Kazakhstan, Tajikistan and Kyrgyzstan signed a new set of barter agreements on supplies of water, oil and coal but the influence of the agreement was limited since Uzbekistan opted out to complicate matters, Uzbekistan and Kazakhstan pulled out of the regional electrical grid in 2009 (Izquierdo et al., 2010).

In 2007, Kyrgyzstan resumed construction of the Kambarata-2 project; abandoned in the 1990s the project was able to draw on a \$300 million loan from Russia to help revive the country's economy and infrastructure (Hodgson, 2010). “The first unit of the Kambarata-2 hydroelectric project will allow Kyrgyzstan to produce an additional 500 million to 700 million kilowatt hours per year of electricity” (Ibid.). The country currently generates about 14 billion kilowatt-hours annually, and the increase in power production is destined for export to Russia and China. “Kyrgyzstan's ambitions to control the flow of its rivers in order to generate more hydroelectric power are of particular concern to Uzbekistan its immediate neighbor to the west and the most populous post-Soviet republic in Central Asia”. Uzbekistan relies on rivers that

originate or pass through Kyrgyzstan and its other mountainous neighbor, Tajikistan, to irrigate its arid cotton fields and farmland (Radio Free, Radio Liberty, 2010).

The Kambarata project is only the first of several projects planned along the Naryn River, which rises in the Tien Shan Mountains and is dammed at Toktogul, the largest reservoir in Kyrgyzstan, before running on to merging with another river to become the Syr Darya. “The power plant has received critique from people inside Kyrgyzstan, especially energy experts who argue that the Kambarata dams are too expensive. Instead, Kyrgyzstan must look into developing its coal industry”. Equally Kyrgyzstan and Tajikistan, though, lack public debate over how water resources must be managed, as leaders make these decisions without the interference of public opinion.

Modern trans-boundary watercourse law largely based on the 1997 UN Convention on the Law of Non-Navigational Uses of International Watercourses “urges riparians not only to create legal agreements to manage their shared resources, but also to find joint management mechanism and to cede sufficient sovereignty to them to make them effective” (UNECE Report, 2007). None of Central Asian states have become a party to the 1997 Convention, although Kazakhstan did accede to the Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes. “Around 400,000- 500,000 ha of saline land is located primarily in Turkmenistan, Khorezm and Karakalpakistan regions of Uzbekistan” (Abdullaev, 2000). Often, “the water runs out or develops a high concentration of saline as a result of mismanagement and a lack of finances for rehabilitation as a result, water logging and salination problems are common, mostly in newly captured areas that required highly complex drainage methods” (Saiko and Zonn, 2000). Tajikistan is also suffering from chronic mismanagement of water resources. This is especially evident during the winter months, when the country faces electricity shortages and severe cold and darkness.

In Tajikistan, the Ministry of Melioration and Water Resource as well as the Ministry of Energy and Industry are the responsible intergovernmental bodies for water management (Izquierdo et al., 2010).

The government and the Tajik Central Bank have come under international scrutiny after the International Monetary Fund (IMF) scandal and the IMF demanded that Tajikistan repay nearly \$48 million after it accused the Tajik

Central Bank of not providing accurate information about the country's financial state. This led to investors being more cautious about investing in hydroelectric projects and these projects have been a source of tension with Uzbekistan because it claims water supplies will be severely reduced. One of the more controversial dam projects is the building of the Rogun Dam and construction of this project began in 1976 but was frozen after the collapse of the Soviet Union. In February 2007 Tajikistan, with support from Russia announced the plan to complete the dam this would allow the Tajik Republic to overcome its energy crisis through increasing electricity production as well as decrease its dependence on energy imports from Uzbekistan and it is also seen as contributing to the stabilization of Afghanistan through electricity exports. However, "Uzbekistan is sternly against any new construction arguing that it will devastate their water intensive economy further they warn against potential environmental damage particularly to the Aral Sea (Izquierdo et al., 2010).

Tajikistan sees this opposition to reflect fears that the project will decrease Uzbekistan's leverage over Tajikistan. "Energy security is important to both parties, on the one side Uzbekistan wants to retain its leverage and on the other side Tajikistan is seeking greater energy independence" (Marat, 2009). As a biggest user of water resources Uzbekistan in central Asia, mainly used water for agriculture. Uzbek farmers have been using the water flows from Amu Darya and Syr Darya to irrigate their water-intensive cotton fields since ancient times. Recently there has been an inconsistent supply of water. "The year of 2000 and 2001 marked the most severe water-shortage in Uzbekistan recorded over the last two decades devastating their economy".

The Main Water Management Department (MWMD) under the Ministry of Agriculture and Water Resources is responsible for the development and management of irrigation and drainage infrastructure. However, these efforts have not been completely successful. There is ten Basin Irrigation System Authorities (BISAs) responsible for the management of inter-farm irrigation and drainage systems backed from the state funds (Izquierdo et al., 2010). However, "the sector is facing financial crisis and is unable to make the necessary investments in the deteriorating sector" (Swiss Agency for Development and Cooperation, 2008). In 2000, Uzbekistan gave Water Users Association (WUAs) a management role over irrigation systems to address the hierarchical management of the sector (Izquierdo et al., 2010). The most recent institutional reforms in 2003 about "changing from an administrative

territorial-water management to hydrologic basin water management and these WUAs have internal problems stemming from favoritism and their role in resolving conflicts and imposing sanctions” (Ibid.). Turkmenistan countenances lots of the similar problems as “its downstream neighbor Uzbekistan stemming from a high dependency on water intensive cotton production”. The water sector in Turkmenistan is represented by a complex governance system comprising a number of ministries and institutions (Muller, 2002).

The key specialized governmental ministries responsible for water resource management and protection are the Ministry of Water Resources and the Ministry of Nature Protection, but very often authorities share joint responsibilities and functions. In addition to the complicated management structure, there is a lack of interaction and coordination among the ministries and institutions of the water sector (Volovik and Yegov, 2010).

As the functions of water resource management are divided between a number of government agencies, priorities and objectives of these authorities are sometimes different makes coordination between them quite complicated due to mismanagement of scarce water resources has severe consequences for the agricultural sector (Muller, 2002). “Agriculture sector in Turkmenistan is almost totally dependent on irrigation, proper management of the region’s water resources is essential for this industry” (O’Hara et al., 1999). One of the major challenges for the management of water in Turkmenistan is that increasing food production is one of the major goals of Turkmenistan’s national agricultural policy means that irrigation development and agricultural intensification have to be achieved in a general context of limited water resources, “creating a need for a more efficient water management system” (Muller, 2002).

On the other hand, Kazakhstan is also very dependent on irrigation for its agricultural sector which consumes over 70 percent of total supply in the country (Izquierdo et al., 2010).

A major difficulty of a large amount of the water is lost through inefficient use and leakage due to old infrastructure and pollution and these problems for the most part do not stem from supply shortages but from poor water management. Almost in the entire country, almost half the pumps and public taps are turned off permanently because they are worn out or sub-standard. The intergovernmental bodies responsible for water resources management are

like the other downstream countries fragmented under-funded and poorly governed and budget and staffing cuts has had a dramatic effect on the ability of the authorities to manage water (Izquierdo et al., 2010).

The Kazakh Government has get on a water resources management project “aimed at strengthening the water management organizations within the country by instituting the practice of Integrated Water Resource Management (IWRM) and this is the first document in the country since independence that proposes significant reforms in the water sector” (waterwiki.net, 2009). In the nonexistence of most important reforms, unrelenting infrastructure problems include:

- Physical problems such as poor design or state of the infrastructure;
- Institutional problems such as staff lacking the skills to operate complex systems;
- Financial problems, i.e. the lack of adequate financial resources for rehabilitation and the limited ability to recover maintenance costs (waterwiki.net, 2009).

Yet none of Central Asian states has developed one though Kazakhstan, Kyrgyzstan and Tajikistan have started working on it but implementing existing agreements appears to be another problem (Votrin, 2003). “For the states experiencing sharp water scarcity the developing a national water strategy would be quite logical” (Ibid.). Outlying further agreements are marked than put into practice and national interests constantly prevail over joint action. “The sceptical attitude of downstream countries to multilateral co-operation deters them from any environmental and financial commitments” (Kipping, 2008). None of water treaties specifies a goal of reducing water use or making agriculture less water intensive (UNW-DPC Report 2010).

IV.4. Water Management of Amu Darya

Water management in the Amu Darya basin such as in its ‘sister’ basin the Syr Darya and the encompassing watershed of the Aral Sea basin is heavily influenced by the trans-boundary course of the river. Moreover, “water management is closely intertwined with the agricultural and energy sectors in the region which remains in a state of transition towards new political stability and statehood after the collapse of

the Soviet Union in the early nineties” (amudaryabasin.net). As a consequence of the existing “cotton monoculture, water bodies in this region are in a dire environmental state” (Ibid.). These issues related to the water quality, “but above all water use rights allocation among the riparian states creates a constant potential for conflict in the region”. In the Amu Darya basin, “the upstream countries only use a little share of the surface water economically but the downstream countries Uzbekistan and Turkmenistan use over 80 % for their production needs, mostly for irrigation of cotton monoculture.

Still, water constitutes a major energy source for upstream countries and the expansion of the generation of hydropower is conflicting with irrigation needs. The conflict also has a strong seasonal component, since upstream countries (in case of the Amu Darya: Tajikistan) “mostly use the water for hydroelectricity generation in wintertime, making water available to downstream users at a time when it is not needed for agriculture”. In summertime, when the water would be needed for irrigation, upstream countries close the dams to collect water for winter. “The inter-linkages between water and energy management are only insufficiently taken care of In the wake of the collapse of the Soviet Union existing procedures to achieve integration of these sectors have been discontinued” (Glantz, 2003).

The Aral Sea cannot be excluded from the analysis of trans-boundary issues in the Amu Darya basin because the water management policies in the river basin have direct repercussions on the lake with problems culminating here in many instances. Water is the vital natural resource in Central Asia. The region is highly dependent on agriculture and most of the cultivations need irrigation. The semi-arid to arid conditions of the region create a high potential for water scarcity and sustainable water management is a major challenge in the socio-economic development in the Amu Darya Basin (Glantz, 2003).

Three essential matters for (trans-boundary) water management can be recognized: first is Water allocation schemes in the basin, with high potential for conflict among the newly independent, riparian states, second is Gradual drying-up of the Aral Sea, with huge adverse socio-economic and environmental effects throughout the entire region, last and third one is Environmental degradation, with the increase in land and water salinisation (Glantz, 2003).

In particular two decisions in Soviet water management should be highlighted with regard to trans-boundary water management. “In the wake of several water crises in the mid-Seventies and the early-Eighties in Central Asia, there was an increasing awareness about the need of concerted action across the region.” The former USSR Ministry of Land Reclamation and Water Management (USSR Minvodkhoz) arranged for the establishment of river basin organisations, the BVOs, to manage the resources in accordance with regulations and schedules agreed by the Ministry. The BVOs for the Syr Darya and the Amu Darya were “installed in 1986 and still exist until today while having been integrated into new organisational structures” (UNECE, 2004).

The water allocation among the all Central Asian states was base on the water development master plan for the basin drafted by the central authorities in Moscow. “The four Central Asian states approved the master plan by way of Resolution 566 of the Science and Technological Council of USSR Minvodkhoz in 1987, the agreed allocation foresees a share of 0.6 % for Kyrgyzstan, 15.4 % for Tajikistan, 35.8 % for Turkmenistan and 48.2 % for Uzbekistan”. Afghanistan was not an official signatory to the resolution, while previous agreements had failed to clearly specify the share of the Amu Darya’s water available to Afghanistan. “Since the allocation specified through the Resolution hold valid until new have had been specified Afghanistan’s share of water as well as its integration into the system remain uncertain” (Wegerich, 2005). An additional quota principle was entered for the sharing of water between Turkmenistan and Uzbekistan, “which foresees an equal share of the adjusted run-off at Kerki hydrological post, which is valid until the present day” (Raadgever and Mostert, 2005).

At the global stage, the basin of Amu Darya is very much determined by the agreements reached by the riparian states following the fall down of the Soviet era in 1991. “Efforts of the Central Asian Republics to reach a common approach concerning trans-boundary water resources culminated in the 1992 ‘Agreement on co-operation in the management, utilisation and protection of interstate water resources’ (1992 Agreement), with Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan as signatories” (Vinogradov and Langford, 2001). With this accord, the five Central Asian states “committed themselves to refrain from any activities within their respective territories which, entailing a deviation from the agreed water shares or

bringing about water pollution, are likely to affect the interests of, and cause damage to the co-basin states (Article 3)”. “Article 1 defines the water resources of the region as common and integral. According to article 4 of the agreement, the Central Asian states agree to jointly undertake activities for the solution to the problems related to the drying up of the Aral Sea and to determine yearly sanitary water withdrawals based on the availability of water resources” (Ibid.).

The agreement leads to the establishment of the so-called “Interstate Water Management Coordinating Commission (IWMCC – later referred to as the interstate Commission for Water Coordination or ICWC)”, which is collected of the all ministers of water management of the riparian states and has the mandate to control and ensure rational utilization and protection of the interstate water resources. “Until recent changes, the ICWC not only oversaw utilization but also aimed to provide incentives for adhering to regional water allocation regimes” (Vinogradov and Langford, 2001). Together with the so-called regional Basin Water Management Organisations, BVO Amu Darya and Syr Darya as the operative branches, the ICWC also held responsibility “for the short and long-term water development and allocation planning, water quality control, conservation and environmental protection. A number of other intergovernmental organisations were created between 1993 and 1995. This rather “rapid emergence of new international organisations for the management of shared water resources can be explained by an interest in ensuring regional co-operation in the transitional period after the collapse of the Soviet Union” (Weinthal, 2002).

The agreement of 1996, on the structure of international basin organisation established the inter-linkages of the various organisations and aiming to streamline their areas of responsibility (Raadgever and Mostert, 2005). “IFAS, its Executive Committee, ICWC and its executive bodies, the Scientific Information Centre of ICWC and the Basin Organisations (BVO Syr Darya and Amu Darya) emerged as the main organisations in managing trans-boundary regimes” (Ibid.). ICAS was merged with the former IFAS, the executive functions for the ASBP. “These agreements and organisational structures on the international level are more or less related to the organisational framework and policies at the national level and also the bilateral

agreements existing in this region will be briefly outlined in the following section”. It should be mentioned that information was not available for all riparian states.

The current set-up of the IFAS reflects the merger of the initial IFAS with the ICAS, IFAS consists of the Executive Committee with two representatives of each riparian country, responsible for the implementation of the decisions adopted by the IFAS Board, consisting of the Deputy Prime Ministers of the five states. The work of the IFAS is related to the management and co-ordination of the financial support for projects and programmes in the Aral Sea basin. This activity involves liaising with the national branches of the IFAS as well as international organisations and donors, the implementation of projects and the accumulation and allocation of funds. In this function, the ICWC also supports the activities of the IFAS. “The ICWC fulfils a number of functions, the key responsibility of which is the development and co-ordination of annual consumption quotas for the riparian countries and the management of these allocations based on water availability” (Raadgever and Mostert, 2005).

The ICWC furthermore operates and maintains the water abstraction facilities controlled by the BVOs. On a more strategic level, ICWC oversees the development of the regional water management policy taking into account public as well as economic concerns in order to increase water availability in the region. In this function “ICWC also advises regional governments on pricing policies for water abstraction and the legal base for water use, is in charge of large infrastructure construction and the introduction of water conservation technologies” (amudaryabasin.net). ICWC is the key institution in the area of environmental monitoring and co-ordinates research in development in the water management field. ICWC furthermore comprises the “BVOs for the Amu Darya and the Syr Darya the ICWC Scientific Information Centre (SIC) and the ICWC Secretariat as executive bodies” (Ibid.).

The BVO Amu Darya based in Urgench Uzbekistan is “mainly responsible for overseeing the allocation of water according to the agreed quotas to users in the basin” (amudaryabasin.net). it also controls the discharges to the Aral Sea and the operations of inter-State reservoir Other tasks include the measurement of water levels, river flow assessment, the operation of canals, head gates and control facilities

at inter-State structures and also the design and engineering service of new water management equipment” (UNECE, 2004). While the structure of the institutions has been somewhat clarified through the more recent agreements, the practical activities of these international structures are not used to their fullest potential.

In general these institutions have very restricted ability and task according to some clashing beliefs. “The water sectors operates largely independent and without coordination with the energy sector Another issue is related to the geographic location of these institutions: most of them are based in Uzbekistan and managed by Uzbeks without following a rotation principle Particularly, the effectiveness of the IFAS has been very much hampered by this situation and kept it from successfully developing regional water management strategies or negotiating regional water and energy sharing agreements” (McKinney, 2003).

Unlike in the Syr Darya basin, where Uzbekistan, Kazakhstan and Kyrgyzstan have entered into an international agreement on water and energy sharing, such an agreement does not exist in the Amu Darya basin (Shering et al., 2004). Still, “there are considerable shortcomings due to, among other factors, the inefficient and inadequate exchange of information among the riparian states, lacking transparency and involvement of relevant stakeholders of policies at the national and international level as well as the dominance of old structures, networks and mindsets” (Ibid.). The quotas allocated to Afghanistan are equally subject to a constant debate. Afghanistan is controlling one of the tributaries to the Amu Darya and thus can basically use as much water as possible but Technical constraints have prevented that all the Kunduz water is abstracted by Afghanistan (Ibid).

The leverage of the BVOs in mitigating these shortcomings is also limited, as many of the major water abstraction facilities and hydropower plants are controlled by national authorities and not the inter-State basin organisations. The sections of the Amu Darya within a country’s national borders are under the jurisdiction of the national authorities limiting the BVOs in the fulfilment of their tasks and furthermore the BVOs have only limited capacities to monitor the amount of groundwater abstraction, flow discharges or water quality. “In performing this task they are not collaborating with national hydro-meteorological services, which often lead to contradicting data bases and misleading information” (UNECE, 2004). This is mostly related to the

limited technical capacities of the BVOs to transmit and process data effectively. “While there is a general agreement of all states involved to increase the leverage and efficiency of this international institutional structure through strengthening their financial, legal and organizational capacities” (Burghart and Theresa, 2004).

IV.5. Water Management and international law

With the arrival of independence, Central Asian states have quickly become the parties and in some cases ratified the international environmental agreements and conventions such as the Convention on Biological Diversity, the Convention to Combat Desertification, and the United Nations Framework Convention on Climate Change (Votrin, 2003).

No international convention related in either event to water has been acceded to even to the Convention on Wetlands of International Importance especially as Waterfowl Habitat, not to mention the Convention on the Law of the Non-Navigational Uses of International Watercourses. Only Kazakhstan was a party to the Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes (Votrin, 2003).

Some regional water treaties (like the Syr Darya Framework Agreement 1998) “do address the particularly sensitive issue of the water utilization in the region and proceed from the interest in joint use of water resources to seeking common definitions and to acknowledging international legal principles relevant to the use of trans-boundary water resources” (Vinogradov and Langford, 2001). Such stipulation referring to “the joint management clause based on the basin principle which provides for the equality of the parties’ rights to use and responsibility to ensure rational utilization and protection of the common and integral water resources of the region” (Votrin, 2003). Despite the fact that these provisions are undoubtedly a better development over previous actions stand on “the concepts of water apportionment and maximum utilization and the principle of equitable and reasonable utilization and participation in accordance with Article 5 of the UN Convention on the Law of the Non-Navigational Uses of International Watercourses should be recognized” (Giordano and Wolf, 2002).

This belief takes into accounts such factors as geography, hydrographic, hydrological, climatic, and ecological factors of a natural character, social and economic needs of a

watercourse, the population dependent on the water resources, existing and potential uses, conservation, protection, development and economy of water resources use and the availability of alternatives to a planned or existing use (Votrin, 2003).

Meticulous significance for Central Asia's water resources are "the principles of the 1997 UN Convention which include the obligation not to cause significant harm to other watercourse states. The general obligation to cooperate through joint mechanisms or commissions (art. 8) to exchange information on a regular basis (art. 9) and to provide timely notification of planned measures and emergency situations which may have a significant adverse effect upon other watercourse states. Where significant harm nevertheless is caused to another state the party responsible for causing such harm is obliged in consultation with the affected state to eliminate or mitigate such harm and where appropriate to discuss the question of compensation (Votrin, 2003).

Nonetheless, not any of Central Asian state has ever complied to the UN Convention of 1997.

IV.6. Afghanistan factor in the Region's Water Management Structure

Twenty-five percent of the Afghan population depends on the Amu Darya for their livelihoods and economic activity (amudaryabasin.net). According to Afghanistan National Development Strategy the future Afghan reconstruction and development goals will be mainly based on the nation's water resources. Around 21 percent (between 13 and 19 bcm) of the Amu Darya's flow is generated in Afghan territory (Ibid.).

Afghanistan currently diverts only about 2 bcm (about 3 percent) of the Amu Darya and its tributaries to feed irrigation networks in its part of the basin. It is conceivable that the country could divert as much as 10 bcm in the future if development plans are realized. So it is needful that efficient water-use technologies and sound-water management practices are introduced in Afghanistan, along with improvements in information and data exchange on water flows originating in the country (amudaryabasin.net).

Agreements concluded by Afghanistan, Russia, the USSR and Central Asian states before more than a century over the water resources. Soviet Union and Afghanistan made many relevant agreements even before 1991 and some of which are still in

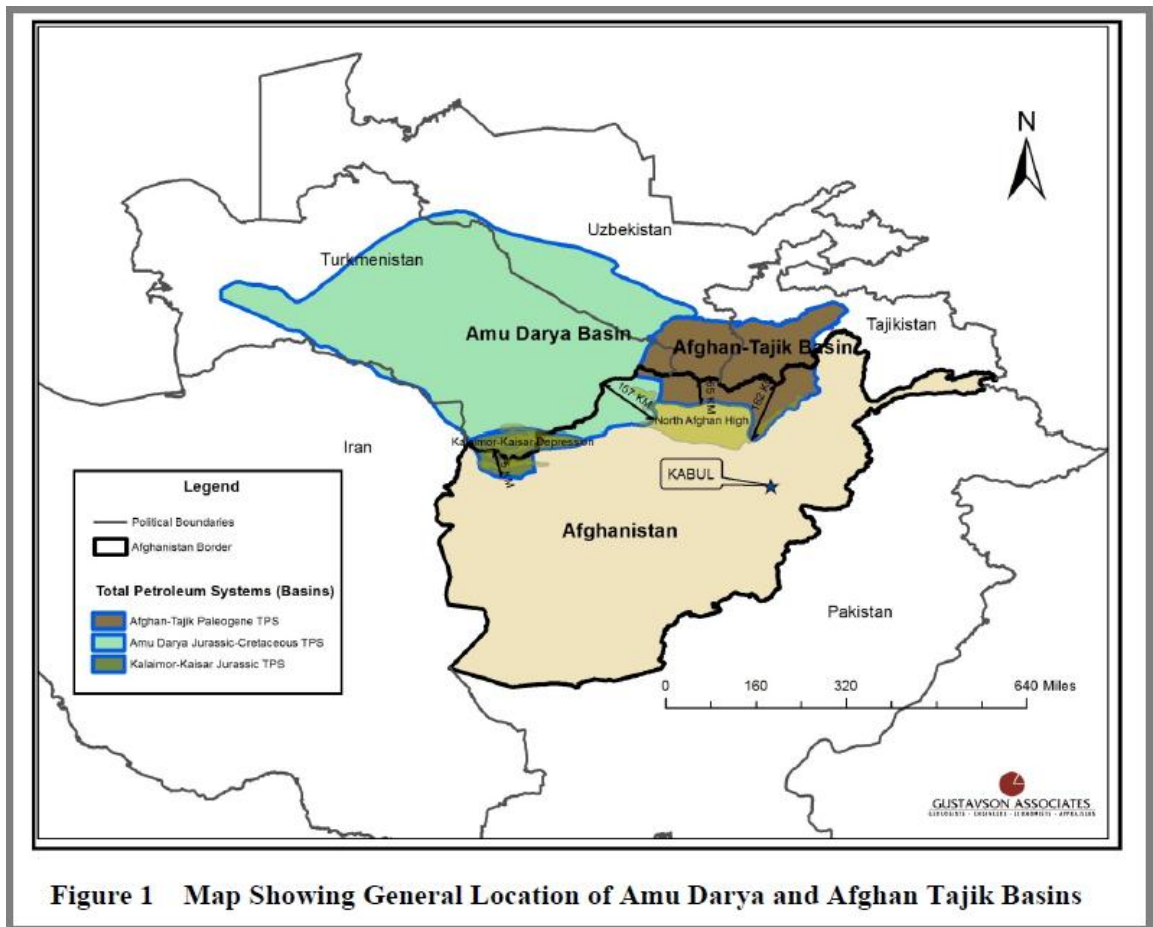
force. There were also a number of decrees imposed by USSR regime of Afghanistan over water resources.

Afghanistan's right to an equitable allocation of water from the river has not been fully recognized by any of these powers. Since then the five post-Soviet states have established new institutions but the recognition of Afghanistan's legitimate water rights and responsibilities by its fellow riparians has not improved since 1987 and possibly not since 1958. Neither the Central Asian states' independence nor the establishment of the Karzai government in Kabul was seized as an opportunity to recast regional water structures (Rahaman and Varis, 2008).

Afghanistan contributes about ten percent of the inflow to the Aral Sea Basin, but it has not been a party to the recent Aral Sea Basin management because of its political instability (Burghart and Theresa, 2004). "The downstream countries use about 85% of the Aral Sea Basin waters, while the upstream countries use the rest" (Ibid.). Given the subsequent failure to include Afghanistan in post-1991 management structures it is worth noting the Amu Darya featured significantly in Russian/Soviet agreements with Afghanistan (Rahaman and Varis, 2008). "The key agreements were the frontier Agreement between Afghanistan and Russia, 1873, Frontier Agreement between Afghanistan and the Union of Soviet Socialist Republics, 1946, and Treaty between the government of the Unions of the Soviet Socialist Republics and the Royal Government of Afghanistan concerning the regime of the Soviet-Afghan state frontier, 1958" (Ibid.).

Most of all these agreements were based on the global border created by the rivers. They were also handled the issues of navigation, quality of water and water use in irrigation. "Water quotas were not directly addressed and it has been suggested that this was because Afghanistan's water withdrawals were so small that they were not considered an inter-state issue" (Rahaman and Varis, 2008). With the lack of dedication for regional cooperation there is compulsion for Afghanistan to accept the norms that considered unfair for the country.

Location of Amu Darya in Afghanistan



Source: *cawater.info.net*

Map IV.2

Ultimately Afghanistan is an upstream state with direct and uninterrupted access to the waters it depends upon. It does not need to ask any other state for permission to utilize this resource. It appears that Afghanistan follow the principles of cooperative water management framework. Country sees it as a means of defending and promoting its own national interests and protecting a shared natural resource. Afghanistan's Foreign Minister, Abdullah Abdullah, first stated the importance of regional cooperation in the country's foreign policy in 2003. Kabul's support for trans-boundary water cooperation was emphasized in the 2007 Ministry of Energy and Water's draft, Trans-boundary Water Policy document and the 2008 Water Security Strategy draft (Rahaman and Varis, 2008).

Draft of 2007 observed that neighbouring riparians states had taken benefit of Afghanistan's weak and instabile circumstances since many years. Thus the country not able to consult or compensate even for their increased quotas from shared rivers

since three decades of occupation, civil unrest and post conflict reconstruction (Rahaman and Varis, 2008). Throughout the similar time, “as the draft was follow, Afghanistan was not able to put into practice projects or protect its interests in the ongoing course of water resources sharing” (Ibid.). According to the draft being party to international agreements would encourage regional cooperation and understanding and protect Afghanistan’s water rights, encourage economic development and international donor investment lead to fair and sustainable water allocation and prevent possible water conflicts (Ibid.).

However these agreements are significant for the current discuss because mainly they point out the USSR regime. There is a requirement in these negotiations over the Amu Darya with Afghanistan over the issues of common resource as well as a joint border. The 1958 Treaty was conceivably the most important and subsequent in 1961 agreement banned any constructions on the Panj and Amu Darya without consultation with the other party (Rahaman and Varis, 2008). There were numer of agreements established in 1980s over water quota resolution for the Central Asian SSRs. The major agreement on Amu Darya was Protocol 566 of September 1987. “This authorized 61.5 km³ of water to be extracted by the four Soviet SSRs and it included the assumption that Afghanistan extracted 2.1 km³ from the river” (Rahaman and Varis, 2008). Prior to the invasion of Soviet, Afghanistan had sent a delegation to Tashkent to prepare a water sharing agreement however no agreement was reached (Ibid.).

In present day Afghanistan want to organies it’s all plans. Country wants to develope its basic infrastructure and increases the water storeroom facility to maximum uses of its water resources and counterbalance climate changes. It will be benefiery of country after new dams those will improve its energy security. “Afghanistan has identified at least thirty one major infrastructure projects including the construction of 15 storage dams at an estimated total of almost \$10 billion” (amudaryabasin.net). These projects would serve multiple purposes “leading to the use water for domestic needs, irrigation, power, flood control, industry, recreation, groundwater recharge and environmental rehabilitation” (Ibid.). On the other hand, in most cases these new infrastructure always demands for proper agreements with neighboring states and assistance of the donor community to resolve the best possible ways to handle joint water resources.

IV.8. Addressing the Governance Issues

The opening of new cooperation trends needs systematic effort in the initial legal, administrative and financial systems. Under these conditions while not yet undertaking far-reaching reforms of the existing systems, experts advise that countries begin coordinating activities of all relevant institutions and improve their operations (amudaryabasin.net). Therefore, it is compulsory to start steadily growing a regional cooperation mechanism in the management realms of water resource. “In this regard the effective coordination of SPECA, IFAS and other initiatives should be pursued and all countries of the regions should be engaged in active cooperation” (amudaryabasin.net). However the need to maintain and broaden cooperation remains paramount concern despite the conflicts over its forms and methods.

In order to deal with this water related issues the implementation of the Central Asia Regional Water Information Base (CAREWIB) project has been initiated by the United Nations Economic Commission for Europe (UNECE) Special Program for the Economies of Central Asia (amudaryabasin.net). Same time “none of Central Asian states have become a party to the 1997 Convention although Kazakhstan did accede to the Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes” (Votrin, 2003).

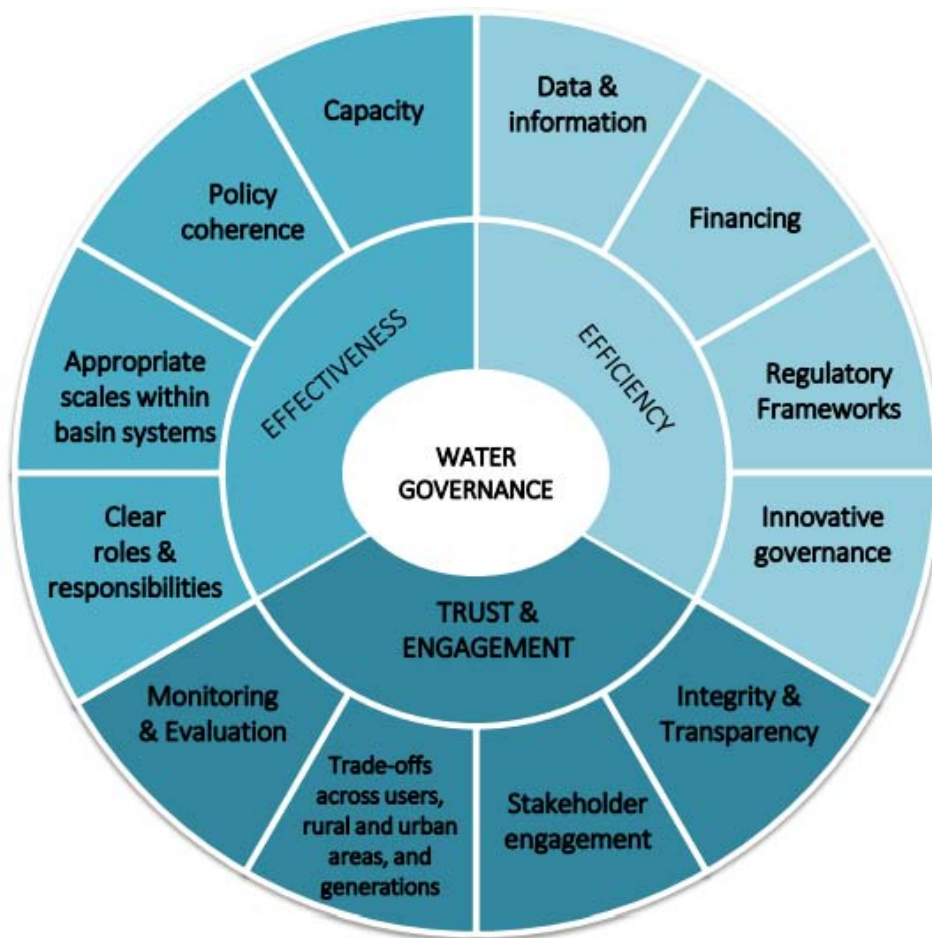
Water delivery in the region is based on old norms rather than on a system oriented around demand which takes into account cropping patterns, field topography, soil and subsoil conditions, and rainfall levels (amudaryabasin.net).

Fifty to sixty percent of irrigation water is lost in transport. The water of the Amu Darya mostly evaporates during the return of the river towards depressions of desert alongside. Often the water runs out or develops a high concentration of saline as a result of mismanagement and a lack of finances for rehabilitation. As a result, water logging and salination problems are common, mostly in newly captured areas that required highly complex drainage methods (amudaryabasin.net).

Experts point out that the structural rehabilitation of irrigation and drainage networks would promote sustainable irrigated agricultural production, increase employment and generate farm income by introducing participatory irrigation management. Meanwhile the basin countries can play a vital role in trying to rehabilitate the irrigation and drainage systems with the support of donors such as the United Nations Food and

Agriculture Organization, the World Bank, the United Nations Development Programme, the Asian Development Bank, the Aga Khan Foundation, the European Bank for Reconstruction and Development, the Islamic Development Bank, the European Union and others, collaborating with regional and national authorities (amudaryabasin.net). These developments would reinstate the capacities of major dams with pump stations. It would also increase water use efficiency in main-canal, intern-farm and on-farm areas as well as introduce the Integrated Water Resources Management principles (Ibid.).

OECD Principles on Water Governance



Source- OECD, 2015, p. 4.

Fig. IV.1

Thus most of these projects purpose to increase the water utilisation. Major research findings reveal that existing water-sharing management and partisanships are not compatible. And there is need for more innovative methods and plans should be explored. For example, “instead of the current compensation of direct water releases

with hydrocarbon energy equivalents upstream countries could be compensated for winter-water savings and summer releases in a mixed incentive scheme” (amudaryabasin.net). On the other hand the compensation levels could be tied to expect future climate variability with water savings in the non-vegetation period preceding an expected below-average hydrological year as determined by probabilistic forecasts carrying a higher value for compensation than water-savings in normal or above-normal periods (Ibid.).

Proper measurement is the key for successful management of any resource. In the basin areas, “the measurement systems of water energy resources are insufficient and in data sharing structure notably hydrological and meteorological data used to forecast water availability and develop the respective water allocation and cropping plans among riparian countries which still remains very limited” (amudaryabasin.net). The main problems comprise:

(i) be short of of stability - The move of hydrological and meteorological statistics flanked by nations is not smooth. Sharing precise information would allow every party to observe other party’s notions. (ii) Limited resources providing accurate forecast data requires sophisticated modern equipment in hydrological and meteorological agencies. This is also contains a way of capturing satellite pictures and technological and scientific tools to analyze them. It’s very hard to measuring the levels of snowfields and facilitating works in the field including remote locations. These difficulties are compounded by mediocre communication just after the dissolution of the Soviet Union and the established network of information exchange in Central Asia on water, economy and environment related issues also collapsed and considerable knowledge was lost (amudaryabasin.net).

There is an ample bit of well-documented account is existing on the issue and troubles of regional water management in Central Asia. Research has shown that instability related to environmental degradation is more likely to occur in marginal vulnerable areas typically arid plains, mountain areas where high and low-land interact and transnational river basins (UNEP, UNDP, UNECE, OSCE, REC, NATO Report, 2011). With these characteristics Amu Darya delta became as an environment and security hotspot. Over the years the challenges for the region from an environmental and security perspective have increased and “the outlook for the future raises concerns among the general public, national authorities, international organizations and experts” (Ibid.).

Every riparian state encourages the development of unilateral economic track that based on diverse utilisations of water resources, which place extra pressure on shared resources. Drought and low levels of reservoir storage have created shocks and setbacks for the basin economies (amudaryabasin.net). Claims over water is increasing and this rising need meet up national, economic development plans and utilisation of wtare resources in planned way for energy generation and further exports to new regional markets. “Basin countries must engage in open dialogue on the need for reform that acknowledges the energy-food-environment nexus of water resources” (Ibid.). Water utilisation for economic growth is prime concern in the region.

The Amu Darya Basin is not having shortage of water resources but due to the lack of effective national and regional management frameworks stokes tensions between the countries over the usage of water resources. Regardless of water systems that offer sufficient management structures, “the basin countries still lack financial resources, qualified skills and modern equipment that would allow for their implementation” (amudaryabasin.net). There is a serious challenge in the transparency and monitoring of the water-resources. Weak rules of law and corruption burden the effectiveness of projects undertaken by governmental institutions or initiatives funded by international aid and development agencies due to limited inter-institutional coordination of decision making and monitoring of water resources management the subject remains unresolved.

CHAPTER V
**ROLE OF INTERNATIONAL,
REGIONAL AND STATE ACTORS**

From the initial days of sovereignty, bilateral donors, international agencies and private foundations have supported dozens of projects consecutively for the resolution of tricky water condition in Central Asia. In these actions, “technical solutions were preferred to political and economic ones especially active were the World Bank, United Nations Development Programme (UNDP), the EU Programme of Technical Assistance to the CIS (TACIS), and the United States Agency of International Development (USAID) who spent millions of dollars to help resolve the Aral Sea crisis” (Votrin, 2003). Known deprived situation of water structure these plans have given some way towards reasonable outcomes particularly with various projects. “Effort to tackle water from political perspective however has resulted in problems” (Ibid.).

Central Asian states have lacking will to co-operate over resources that has suppressed immense plans, like, such as, an attempt by the Organization of Security and Cooperation in Europe (OSCE) to persuade the five to discuss the region’s water problems at a water conference to be held in London (Votrin, 2003). Many initiatives have come to nil with response of Turkmenistan’s president that international conference in London was not the precise place to converse Central Asia’s water. In his turn, Uzbekistan’s president said that “his country had a thousand years of experience in managing water problems and he preferred bilateral discussions to a multilateral conference” (Ibid.).

In seek for the resolution to the aridness of the Aral Sea, Aral GEF a project funded by the Global Environmental Facility (GEF) and designed to create small but viable wetlands and fisheries on the place of the Aral Sea through restoration of a modest flow to the old seabed and the UNDP Aral Seashore Rehabilitation and Capacity Development Project are so far most prominent (Votrin, 2003). According to the World Bank, “in order to successfully restore modest flow to the Amu Darya agricultural runoff should be entirely restored” (Votrin, 2003). Therefore, vast lakes that evolved over the decades of water laxity from the excess water of the Toktogul reservoir and that now support local agriculture, fisheries, recreation areas and biodiversity habitats would thus be bound to vanish (Ibid.). And the main success of UNDP’s project on “rehabilitation of the Aral Seashore consisted in providing 16,000

residents of Karakalpakstan with safe drinking water and planting thousands of trees that withered immediately because they were unsuited for local climate” (Ibid.).

Part of the problem is “the failure of Central Asian states to support the donor projects in a meaningful way either administratively or financially” (Votrin, 2003). Neither donor looks to call for something more than paper reports. The World Bank has supported financially National Environmental Action with UNDP and TACIS are based on the ineffaceable design. The one and only well-known water structure that plan and actions are much required to keep the condition. This approach endorsed by donor staffs inherently contradicts the overarching goal to help Central Asian states to move away from a planned economy and to embrace the market economy and decentralization (Ibid.).

V.1. Regional Efforts of Central Asian States

The 1992 Almaty Agreement as Cooperative agreements between the five post-Soviet states worked insofar as downstream countries provided the upstream countries with gas and coal in the winter to allow them to generate heat and power without releasing water (Izquierdo et al., 2010). Similarly, Kyrgyzstan would release the reservoirs the length of the Syr Darya for summer irrigation. The explanation here is that all decisions regarding trans-boundary water management in the Central Asian countries were made top-down by the “Ministry of Land Reclamation and Water Management” in Moscow in coordination with the Ministry of Energy, without regard to the Soviet republics’ own interests (Ibid.). There is a common idea that “Soviet planners deliberately divided resources and unified investment among them so none would be self-sufficient” (Ibid.). The reliability of the accords was for all time a feeble point, as upstream states required to more enlarge their hydro-power services, “whereas downstream countries were skeptical of these claims warning about possible consequences” (Izquierdo et al., 2010).

Many endeavours to encourage cooperation and water management in Central Asia affected adversely due to increasing conflicts over the use of water with clash of political interests of all nations. After independence, “three out of the five Central Asian leaders came out of the Communist Party and continued the top-down governance used during the Soviet era” (Izquierdo et al., 2010). Central Asia is

broadly authoritarian system in the region, the Kyrgyzstan constitution created a parliamentary democracy which balances power between the executive and Parliament (Ibid.). Though, this is not clear yet that how efficient these actions will be in the upcoming time. Central Asia states are affected by the internal politics within the countries themselves and stability of the region. Foreign Policy and the “Fund for Peace’s Failed State Index (FSI)” is a yearly score based on 12 social, economic, and political indicators of risk (The Fund for Peace).

According to the 2010 Index, three of the Central Asian countries were performing similarly based on these indicators Uzbekistan (#36), Tajikistan (#38) and Kyrgyzstan (#45). Moreover, the index considered Turkmenistan, Kyrgyzstan, and Uzbekistan to be in danger based on their Failed State indicators (Izquierdo et al., 2010).

Corruption is out of control in Central Asia and political leaders of the region have been engaged in the robbery of national resources as while they were at their only removal. The lack of political will of the Central Asian leaders irrespective of the prevailing public sentiment thwart efforts to cooperate (Izquierdo et al., 2010).

All countries have turned out to be economic competitors because they are no longer part of the same economic union and can make use of their natural resources to produce export income. This has been more strengthening throughout the regions shift in the direction of a market economy and the deviate the uses of water agricultural growth vs. augmented hydroelectric power production. Diverging national interests have led to low political will to prioritize regional interests and this lack of a shared vision for a mutually beneficial agreement has prevented effective cooperation (Izquierdo et al., 2010).

Contradictory approaches to regional water management have also let down successful cooperation over water resources. The downstream countries favor maintaining old Soviet Union quotas whereas the Kyrgyz Republic and Tajikistan are in favor of receiving payment for water supplied to the downstream states (Izquierdo et al., 2010). The Kazakhstan, Kyrgyz Republic, and Uzbekistan all have charters which declare that water is a property of particular country. This debate over water allocation extends once again to water being used for agriculture versus hydroelectric generation when downstream countries have claimed that “international rivers should be a common good shared by all countries” (Ibid.). This shows the difficulty of water

resources treat as a public good or a commodity. One more part to this dispute is about the use of domestic or international water law in sequence to discover a solution to the clash. Various water agreements have been broken due to the reasons mentioned above as “these countries pursue often conflicting sovereign interests, the incentive to uphold any agreement will be weak” (Izquierdo et al., 2010). Moreover, the short of financial support and enforcement instruments inside the agreements more deteriorate their efficiency.

Two organizations for water cooperation, Interstate Coordination of Water Resources Commission (ICWC) and International Fund for saving the Aral Sea (IFAS) have been limited in their effectiveness partly because of rivalry and conflict over staffing patterns and questions over bias (Izquierdo et al., 2010). In the earlier period there have been doubts that the officials from Uzbekistan were profoundly represented and these institutes favored its interests. Conversation is therefore delayed due to distrust and rivalry. Furthermore “the problems of cooperation have been exacerbated by retaliatory actions such as when Kyrgyzstan suddenly stopped water supplies to Kazakhstan from the Kirov reservoir in April 2010” (Ibid.). Additionally, Uzbekistan also reduced the flow of water in 2010 from Kyrgyzstan to Kazakhstan in the cross-border Dostyk channel (Ibid.).

All five states move towards the creation of the “International Fund for saving the Aral Sea (IFAS)” in 1993. The all five heads of central asian states declared “an organization designed to facilitate regional cooperation in order to address this crisis and IFAS was also created to attract funds from the five states needed to carry out projects and inform the international community about the crisis and gain its support in addressing it” (Izquierdo et al., 2010). Ever since its beginning, IFAS has played a part in a number of projects, such as the 1993-1997 Aral Sea Basin Programme. Four main objectives of this project focused on “stabilizing and rehabilitating the surrounding area, developing better water management strategies and increasing the ability for regional and national organizations to advance their projects” (Ibid.). Another key initiative was the 1998 and 2002 Water and Environment Management Project. IFAS, in collaboration with the World Bank, “attempted to create both a regional and individual strategy with the help of a group of neutral experts but the

first two attempts of initiatives were unsuccessful as there have been discussions on reviving it in order to achieve the goals it set out to do” (Ibid.).

Kazakhstan has been attempting since 1992 to save the Little Aral Sea by construction of a dam in turn to protect it and bring it rear to its previous levels.

For many years the dam’s poor planning and the usage of sand for building material caused it to breach a number of times but international support from the World Bank helped fund for the building of the Kokaralsk Dam which was completed in 2005. In just a few years the sea level has risen but the salinity has been reduced, and fish species have flourished which has revived the area’s fishing industry (Izquierdo et al., 2010).

While some efforts were successful in tackling the Aral Sea crisis but not all have met the similar outcome, particularly those by the international community. Some authors have criticized the international community for as “they responding to the Aral Sea as either a water crisis (World Bank, UNDP, and UNEP) or as a water/energy crisis (USAID) but not as a crisis of agriculture” (Izquierdo et al., 2010). The all states of the region and international community have discarded any striking restructuring to the agricultural sector in the downstream nations. “This move alone could have had the most impact on this crisis, but the political power of the cotton producers is too entrenched to allow this necessary change to finally occur” (Izquierdo et al., 2010). The need to modify these agricultural practices due to its effects on the Aral Sea is even more evident now that Uzbekistan’s Big Aral Sea is splitting into the Big Aral East and Big Aral West (Ibid.). It is obvious an absolute service of the agricultural sector cannot take place with how many these states economically depend on it. But these states along with the international community need to find a balance between economic needs and the environment before it leads to more problems.

The Aral Sea if not the greatest case of the outcome that not having cooperation in the region and the take no notice of the Soviet planners who had for the environment while organizing their grand scheme and it is interesting to note that once the Aral Sea problem was first realized, the Soviet Union’s plan to address it included diverting water from Siberia into the Aral Sea instead of the Arctic (Izquierdo et al., 2010). However “this would have led to yet one more problem and sustained the series of mistreating nature for human gains (Izquierdo et al., 2010). Even though various attempts have been made by the Central Asian states and the international community

to save and revive it again because “the Aral Sea will never return to its former state and will forever be a constant reminder to the region of its Soviet Union legacy” (Ibid.).

V.1.1. Initiative for Land Management in Central Asian

This initiative of central Asian countries is a shared ten year project assisted by the Asian Development Bank (ADB) to fight against land degradation (ADB Report, 2010). “Desertification and declining agricultural yields that impact over 20 million people in the region” (Izquierdo et al., 2010). In year 2006 the governments of all central Asian states signed a structure agreement with ADB and other global partners like Global Environment Facility. “CACILM has received commitments on country level and on the international level to raise \$1.4 billion for the initiative” (Izquierdo et al., 2010). This comprises assistance from United Nations agencies, World Bank and other international development agencies from Canada, Germany and Switzerland.

CACILM has recognized eight national plans in the all countries of the region and two joint schemes that centre on land degradation, eco-system stabilization, sustainable agriculture, pastoral management and sustainable forestry. In the midst of the probable global environmental reimbursement of this proposal is an important decrease in the thrashing of soils from sand storms, the lessening of soil and pesticide overflow into rivers that run downstream and into trans-boundary

By 2020, the initiative aims to increase private investment and make major improvements in degraded farmland, develop an integrated approach toward land-use planning and train more government workers and citizens in sustainable land management practices. Rivers as well as improvements in water availability, which should moderate the harsh climate, related to desertification and other environmental benefits include a reduction in the loss of carbon sinks in soils and forests and a reduction in greenhouse gases created by unsustainable agricultural practices (Izquierdo et al., 2010).

Since the CACILM is a recent programme and it is also too early to assess its achievement or breakdown, but up to now there are excellent sign of broad contribution of all central Asian countries in deal with the long inherited problems of poor irrigation practices resultant in water logging and salinization which has damage farming lands.

V.2. Role of Neighboring States

Neighboring states can play a key role in regional politics system that is link to Central Asia's major problem of water crisis. The Brookings Institute has suggested that "these countries and others should use available diplomatic mechanisms to ensure that possible inter-state tensions over the management of scarce water and energy resources in the region are managed effectively with no disputes" (Izquierdo et al., 2010). The prominent countries which affecting the regional structure most prominently are neighboring countries like Russia, China, and Afghanistan.

V.2.1. Russia

Russia has a unique and vibrant relationship with Central Asia since the recorded history. It remains the region's largest trading partner with revenues totaling more than \$21 billion in 2007" (Izquierdo et al., 2010). However its economic influence has decreased just after the recession began. On the other hand "Russia has also been a destination country for many Central Asian migrant workers who unable to find employment" (Izquierdo et al., 2010).

Russia's intent in further maintaining its influence in the region occurred when it established its own anti-terrorism rapid action force in Kant, Kyrgyzstan. The country set up the Collective Security Treaty Organization (CSTO), an organization determined on economic and military regional coordination and members include Armenia, Belarus, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. According to the Foreign Policy, this organization is seen as a counter to Chinese and American influence in the region and as an opportunity for Russia to re-establish hegemony in the region (Izquierdo et al., 2010).

At the same time in matter of water disputes in the region, Russia is hesitant to get involved. The evaluation of the role of Russia in water management matters revealed that the nation had to hit a subtle equilibrium among comforting region's most important power like Uzbekistan, and upholding its own hydroelectric investments in Kyrgyzstan and Tajikistan. Russia had formerly favoured the construction of upstream countries' hydroelectric projects and generally switched to a more neutral role. The country stated that "construction should only proceed after the interests of all states have been adequately addressed" (Izquierdo et al., 2010). Thus the Russian

policy for the central Asia is sideways and it is blurred view whether the region would view any Russian arbitration as neutral or credible (Ibid.).

V.2.2. China

China has been described as being part of a new great game alongside Russia and the United States for influence in Central Asia. China had a major role of large investor in the region and the important part of investor by provided that financial support for many projects like oil, the creation of dams, roads, and power broadcast lines. According to a Foreign Affairs article,

China's strategy to secure natural resources has been to court the region with the construction of two major pipelines, one through Kazakhstan and the other from Turkmenistan across Uzbekistan and Kazakhstan. By this approach, China has tried to foster good relationships with the Central Asian states for new markets for its huge investments through diplomatic means and by settling many border disputes in the region in order to create more hospitable relations (Izquierdo et al., 2010).

Thus in future china can paly a vital role in Central Asia since the country is investing huge range of products in the newly established markets of the region.

V.2.3. Afghanistan

Afghanistan has agricultural based economy mostly been affected by internal social and political turmoil in the country. However country has potential for the future development of hydropower. The Amu Darya, "an important water source in the region, runs through Afghanistan's northern border and feeds 40 percent of its irrigated lands but due to poor infrastructure that leads to water losses as high as 70 percent" (Izquierdo et al., 2010). Furthermore, "the estimated 75 percent of Afghanistan's 34 million people live in rural areas where agriculture is the principle means of livelihood" (Ibid.). Thus, Afghanistan's development in the agriculture sector in future will insert even additional require for its water resources in the region. Need for more water utilization will create the potential for future conflict in the region. Another potential challenge is how the country may pursue development of its own hydropower as "it has only 10 percent of its hydropower potential developed

along the Amu Darya” (Izquierdo et al., 2010). On the other hand, Afghan plans to develop its hydropower face opposition from Turkmenistan and Uzbekistan.

Finally the issue of equal distribution of water resources of the Amu Darya in region became puzzle in the region.

Although there are agreements relating to water use, the only one which dealt with water allocation was the Tashkent Agreement of 1987, which excluded Afghanistan. Recently, Tajikistan has led the approach for engagement and cooperation with Afghanistan. Memorandum of 2007 and two other protocols of 2010 about understanding relating to increased cooperation, water use, and capacity building were signed between the countries (Izquierdo et al., 2010).

Even though at present Afghanistan has an inadequate role but it has future possibilities for its extra role. The shift of country’s role will stabilize and demand more engagement with the Central Asian states.

V.2.4. United State of America

First time in 2001 when the entry of the United States with other international actors into Central Asia corresponding with the commencement of the armed movement in Afghanistan. This major shift has also distorted the internal dynamic of SCO’s (Hill, 2002). The member states have responded in their own manner to the war in Afghanistan. They recognized free roles in the U.S. alliance in Afghanistan rather than performing as a group with China.

Particularly “they have taken a back seat while the states of Central Asia have created vacuum ahead of Russia in looking for intensify their relations with the U.S. and candidly exclamation of the benefits of a potentially long-term American military presence in the region” (Hill, 2002). Even they were pleasing and hosting U.S. and other foreign groups on their soil. Screening more, the active role of SCO and other sub-regional groups have some drawbacks as they are not fully addressing the requirements and relations in Central Asia and the Caucasus region (Ibid.).

Even though the U.S. and Central Asian states had previously developed military ties in the 1990s, but the physical existence of U.S. and other global armed forces in central Asia has a vital representative outcome in highlight Central Asia’s contacts to the outer globe following a decade of darkness and feeble make contact with (Hill, 2002).

Thus the Central Asian region for the first time in 2002, start to cooperate at different stages with the worldwide with different community.

V.3. International Involvement

Right away following the Central Asian countries achieved their independence in 1991, a huge amount of international aid agencies hustled into the region with projects and funding (ICG Asia Report No. 34, 2002). The prime approach of early global engagement was to keep away from aggressive conflict among new states over water and for seeking more cooperative modes of engagement (Bichsel, 2011). A further concern was the shrinking of the Aral Sea and its adverse impact on the people and the environment.

With a growing emphasis on agriculture, an increased need for irrigation and a wasteful water distribution infrastructure caused the water levels in the Aral Sea to drop between thirteen and eighteen meters since 1960. Combined with salinity levels eight times higher than they were in 1960 and over 400,000 kilometers of land lost to heavy pollution, the Aral Sea garnered much attention. Efforts were geared toward mitigating the disaster as well as protecting the environment for the future. This meant repairing the draw of water for agriculture from the Amu Darya and Syr Darya Rivers by rehabilitating transportation and instituting water-saving irrigation practices. It also meant that finding more efficient means of using water including the institution of some sort of pricing mechanism (Bichsel, 2011).

Finally, international institutions criticized Soviet top-down approaches that had reduced farmers or farm workers, as it were to the status of passive implementers of decisions rather than entrusting them with responsibility for their own water use. In its place, international groups opted for decentralization in water management and supported the granting of a high degree of self-governance to water users (Bichsel, 2011). “Efforts to rectify the Aral Sea environmental disaster led directly to the formulation of inter-state initiatives for the improvement of water management in Central Asia as a whole” (Ibid.). The well-publicized disaster generated large funds and a multitude of projects from multilateral agencies, bilateral donors, and private foundations.

Spearheading these projects from the outset was the World Bank, the United Nations Development Programme the European Union and the United States Agency for

International Development. To different degrees, “each of these organizations conducted scientific assessments, produced management plans, initiated conservation schemes, and held inter-state negotiations to improve the water regulation and ecological condition of the Aral Sea” (Bichsel, 2011). Several agreements were reached on the management of water in the Syr Darya basin and the institutions established to implement them. However, “the actual allocations of water remain hostage to yearly barter agreements among the states (Ibid.). Moreover, while the ecological condition of the Aral Sea region has been improved, it remains unlikely that this body of water will ever be restored to its pre-1960s level. Among the many explanations for these outcomes, two warrant thorough consideration.

One is that nearly all the inter-state negotiations sponsored by international agencies focused on the nexus of water and energy, but devoted insufficient attention to agriculture. As a result, parties ignored environmental issues in the Syr Darya basin that were caused by water-intensive production and other critical agricultural policies. Second, many of the international funders and agencies were not organized enough to assure substantial outcomes, while the local actors with whom they interacted lacked commitment to the projects and offered only hollow promises (Bichsel, 2011).

Additionally, international involvement with water management in Central Asia has focused on promoting reform along the lines of Integrated Water Resource Management (IWRM), usually coupled with the rehabilitation of infrastructure. In the Ferghana Valley, for example, the Swiss Agency for Development and Cooperation has run an IWRM project in cooperation with the ICWC since 2001. “The aim of the project was to improve and reorganize the institutional arrangements for water management” (Bichsel, 2011). This incorporated the reformation of water management on the base of hydrological relatively than administrative boundaries, and rising farmers’ involvement in decision-making. The project was joined by an effort towards Canal Automation, which would automate the measurement of water flows and the transmission of data.

Generally, “international funders and organizations have been involved in decentralizing irrigation management along the lines of IWRM have established Water User Associations (Bichsel, 2011). Major donor organizations promoting the work include the World Bank and Asian Development Bank in Kyrgyzstan, USAID in Uzbekistan and Kazakhstan, and the World Bank in Tajikistan (Ibid.). Irrigation

reform based on IWRM principles altered the structure of water management in Central Asia. International donors have established a large number of WUAs and introduced water service fees in Central Asia.

Considerable progress has recently been made to actually collect water fees, a process which was initially under-enforced. Nonetheless, shortcomings remain.

WUAs usually enjoy little legitimacy in the irrigation communities in which they operate, exert limited influence on the actual distribution of water compared to informal authorities, and are frequently misunderstood as an arm of the state instead of representatives of local communities (Bichsel, 2011).

Yet it remains unclear who is to blame for these shortcomings. Dr. Jenniver Sehring, a policy associate at Ecologic Institute, has analyzed the irrigation reforms in Kyrgyzstan and Tajikistan, finding that “WUAs themselves must bear responsibility for their modest impact on the distribution of water (Bichsel, 2011). Thus, the WUAs’ failures stem from their faulty implementation. IWRM is a prescriptive concept predicated on the belief that democratic governance is good governance.

IWRM is based on a market economy and democratic governance inspired by neo-liberal thinking and assumes that the conditions for such governance are already in place (Bichsel, 2011). As a consequence, “IWRM is politically blind to the actual political economy and power relations which exist in the Ferghana Valley, especially in Tajikistan and Uzbekistan” (Ibid.). It is questionable whether the IWRM goals of economic decentralization, self-government, and empowerment of water users can ever be achieved within strongly centralized governance systems. At present, another major organization in Central Asian water relations is the bilateral donor. GIZ is commissioned by the German Federal Foreign Office to run the program Trans-boundary Water Management in Central Asia during the period of 2009-2011, targeting all five countries of the region (Bichsel, 2011).

The program aims to enhance the expertise and capacity of supra-state water management institutions and the International Fund for the Aral Sea. An additional focus is on the improvement of management by river basin organizations situated on selected cross-border rivers. “GIZ approaches these issues with the advisory support of experts, the training of personnel, and the creation and facilitation of forums to foster interdisciplinary and cross-regional exchange” (Bichsel, 2011). GIZ also

provides funds for technical equipment, refurbishment of irrigation infrastructure, demonstration facilities, and small hydroelectric plants.

V.4. Regional and International Efforts

Attempts for improved regional cooperation on Central Asia's water issues have been made between the states and with the help of the international community. The following will take a look at some of these key efforts, the extent to which they worked, and how some key aspects may be used for future efforts.

V.4.1. Chu-Talas Joint Rivers Commission

In 2000, Kyrgyzstan and Kazakhstan signed an agreement for joint management on the Chu River (Kyrgyzstan) and the Talas River (Kazakhstan) through the Chu-Talas Rivers Commission.

The commission became operational in 2006 and created a new level of cooperation between the two countries as part of the arrangement, Kazakhstan has agreed to pay for some of the costs of dams in Kyrgyzstan and results have so far shown that Kazakhstan has followed through on its promise. The commission has been praised for providing reliable water forecasts for irrigated agriculture (Izquierdo et al., 2010).

Kazakhstan now pays a reasonable cost for receiving water from the dams on the Chu River, and has thus moved away from Soviet era water quotas. The Chu-Talas Rivers Commission is regarded as a breakthrough agreement by the United Nations Economic Commission for Europe. "It is seen as a model for helping resolve larger upstream-downstream water conflicts" (Izquierdo et al., 2010).

V.4.2. International Fund for Saving the Aral Sea (IFAS)

One of the unique features of the International Fund for saving the Aral Sea (IFAS) is how the Chairmanship is chosen on a rotating basis (Izquierdo et al., 2010) and allows each of the five states to hold this position. During the Tajikistan's term as Chairman, President Rahmon's main focus was on the socio-economic and ecological issues of the crisis. "These aspects were dealt with during the Summit of Heads in 2002, where all five states signed onto the Dushanbe Declaration, organized the Aral Sea Basin Programme 2, and a UN Special Commissions was put in charge of coordinating the

international community's efforts IFAS also became a member of various international organizations, created partnerships with world financial institutions" (Izquierdo et al., 2010).

In continuing with the rotating of the Chairmanship Kazakhstan will now hold the position from 2009-2011 and relocate IFAS headquarters to Almaty. The UN declared 2003 as the International Year of Fresh Water and 2005-2015 the International Decade for Actions Water for Life. In 2008, IFAS received official observer status by the UN.

In May 2010 Kazakhstan held a Donors Coordination Meeting, which further solidified relations with international donors and continued the planning for Aral Sea Basin Programme. These declarations are of special importance, as the UN is committing itself to helping IFAS in finding a solution to the Aral Sea crisis and giving freshwater issues the international attention it needs (Izquierdo et al., 2010).

It will be difficult for IFAS to further its goals if many of the key problems, such as the crumbling infrastructure, climate change, and agricultural practices, are not dealt with as they are still creating barriers in allowing major changes to be made in saving the Aral Sea (Izquierdo et al., 2010). Also, instead of continuing to fund the same types of projects, "the international community could help fund projects on these key issues, especially in updating the infrastructure since the Central Asian states do not have the funds needed for that kind of project" (Ibid.). Although IFAS has had some high and low points, it has served as a platform in promoting regional cooperation between the five states in addressing a key issue that affects them all.

V.4.3. UNDP Integrated Water Resources Management (IWRM)

IWRM is a management system of surface, ground and return water that takes into account. The different economic sectors and hierarchical levels of water use, involves all stakeholders into decision-making, and promotes efficient use of water, land and other natural resources for the sake of sustainable satisfying water requirements of eco-systems and human society (Izquierdo et al., 2010). This initiative views regional coordination as critical in addressing increased demand for water, climate change, and conflicting interests for water usage. A large component of this approach is that "public participation is crucial and that countries need to take a legal, financial,

holistic and integrated approach to water management” (Ibid.). IWRM has been in practice for centuries, but was only officially recognized internationally in the Dublin Declaration in 1992. IWRM was implemented in Central Asia under the Soviet Union during which time Basin Water Organizations were established for Amu Darya and Syr Darya.

In 1996, the Central Asia IWRM Resource Center was founded in order to build capacity of the region on sustainable water use. UNDP’s 2005 report “Bringing down Barriers: Regional Cooperation for Human Development and Human Security” “recommended the need to establish a regional Water-Energy Consortium to manage the abundant regional water and energy resources for greater efficiency, human development and regional stability” (Izquierdo et al., 2010). The same year, the Central Asian countries attempted to set up a water and energy consortium (WES) to advance IWRM in the region.

Again in the late 2000s, the states attempted to form a Water-Energy Consortium (WEC) but this effort failed due to Uzbekistan withdrawing from negotiations, a move motivated by its isolationist policy (Izquierdo et al., 2010). So far these initiatives have been considered largely ineffective. Currently, “UNDP in collaboration with the European Commission has initiated Promoting IWRM and Fostering Trans-boundary Dialogue in Central Asia, a \$5.4 Million project based out of Almaty, Kazakhstan” (Ibid.).

This project is working in Kyrgyzstan and Tajikistan, to develop and implement IWRM Strategies at the national and basin levels. There is an increasing dialogue and cooperation between Kazakhstan and China on the Ili-Balkhash.

Regionally, the program is trying to build capacity and trans-regional coordination. This project is facing little resistance as countries welcome technical assistance. While the project is addressing critical issues of water usage and management, it is limited by its mandate to stay out of politics, a large cause of the lack of cooperation in the region (Izquierdo et al., 2010).

An additional challenge IWRM a face is that water managers become responsible for short and long term environmental and social impacts of their management decisions. This in turn necessitates legislation to address the socio-economic components of

water resources. The attempts to integrate IWRM in National Water Policies have overall been unsuccessful.

Central Asia as a whole ranked lowest on the indicator of monitoring, information management, and dissemination, and lower stakeholder participation- all strategies that could promote IWRM, compared to East and South East Asia. The Johannesburg Declaration called for Kazakhstan to be the first country in the region to prepare a National IWRM and Water Efficiency Plan (WE) and it completed its plan in December 2005 (Izquierdo et al., 2010).

As of 2008, only Kazakhstan has an IWRM national plan in place, whereas the other four countries in the region are still in the preparation phase with their plans. These IWRM and WE plans would address the inefficiency of water use, a contributing factor to the water crisis, and should be developed and implemented by the rest of the countries (Izquierdo et al., 2010).

V.4.4. World Bank

The World Bank (WB) has been heavily involved in Central Asia since each state joined following independence. One type of involvement has been the development of “Country Partnership Strategies (CPS)” with both Tajikistan and Kyrgyzstan. The CPS identifies key issues affecting the states, such as water and energy, and the best ways to address them by utilizing past experience and knowledge gained from similar projects (Izquierdo et al., 2010). Another type of assistance, relevant to this report, is environmental and techno-economical assessments done prior to the commencement of hydropower projects.

The World Bank has also collaborated with potential donors in collecting investments needed for the Central Asian states. One important regional donor is Russia, who recently signed onto two new agreements to expand this role. “The first asks for a \$30 million contribution towards improving the region’s financial management systems and the other puts \$9 billion towards the EURASEC Anti-Crisis Fund, which Tajikistan, Kyrgyzstan and Kazakhstan are part of venture” (Izquierdo et al., 2010). Another key regional donor is China, “who invested \$267.2 million and \$58 million towards two electricity lines in Tajikistan (Ibid.).

In recent years, the World Bank launched a new initiative with the five Central Asian governments and regional institutions, such as IFAS, called the Central Asia Energy-Water Development Framework.

This program aims to show each state how to utilize their resources in a socially sustainable and environmentally-friendly manner, with regards to each others' national priorities and regional stability greatly differed. This initiative has three specific aims: 1) balance energy options while addressing winter energy shortages; 2) strengthen investment in infrastructure to expand energy trade within and outside the region; and 3) work with regional organizations to encourage dialogue among the states and improve water usage for the energy and agricultural sectors (Izquierdo et al., 2010).

If successful, this program will help the states realize the changes they need to make with regards to these issues, for they are part of the overall problem and have not yet fully been addressed.

As a stakeholder, the World Bank has played a positive role in collecting investments and addressing country specific issues in Central Asia. "It is worth mentioning once again the Bank's involvement in building of the Kokaralsk Dam and the Aral Sea Basin Programme 1, as these are just a few of its attempts in addressing the Aral Sea crisis" (Izquierdo et al., 2010). The World Bank may also be able to put one other positive role in the region, depending on the outcome of feasibility study currently being done on the Rogun Dam. "The World Bank should be further utilized by the Central Asian states since it seems very interested in helping address the key issues that continue to plague them" (Ibid.).

V.4.5. European Union

The European Union (EU) has been engaged with the five countries in Central Asia since they gained their independence. The relationship that has developed significantly over the years and revealed shared economic and security interests. "Central Asia's energy resources are of particular interest, as the EU is dependent on external energy sources in order to increase energy security" (Izquierdo et al., 2010). As a result of this development, in June 2007, the EU adopted the EU and Central Asia: Strategy for a New Partnership that marked an upgrade in the relations between the EU and Central Asia (Ibid.).

As part of its Central Asia Strategy, the EU-Central Asia Environmental Dialogue has been established to foster environmental protection and better manage water resources. The EU has increasingly focused on working with the five Central Asian countries to improve the management of lands and forestry resources, and supporting the stabilization of the Aral Sea (Izquierdo et al., 2010). To promote and increase capacity building for renewable energy sources and improve energy efficiency, recent activities include trainings and seminars of government officials and financing feasibility studies regarding the installation of small sized hydropower stations and the use of renewable energy sources in the region (Izquierdo et al., 2010).

The EU is also trying to alleviate the problems arising from the conflicting needs for water access and use between upstream and downstream countries by actively promoting efficient and economic usage of this resource. Several initiatives have been launched to tackle these issues, for example, better use of resources, better management and rehabilitation of irrigation systems and energy transmission lines. The EU has stated that “reducing the demand for these resources is a fundamental component of a possible solution” (Izquierdo et al., 2010). The work undertaken under the EU Water Initiative, through its main operational instrument- National Water Policy Dialogues- is the centerpiece of EU efforts to achieve the water-related Millennium Development Goals and targets of the Integrated Water Resource Management (IWRM) network (Ibid.).

The overall objectives of National Policy Dialogues are to initiate country-specific activities regarding water supply and sanitation, financing strategies and IWRM to improve regulatory and administrative frameworks, help setting country priorities, identify projects and develop capacity in the region through a dialogue that involves public authorities and representatives of the civil society. National Water Policy Dialogues was launched in Kyrgyzstan in 2008 and Tajikistan and Turkmenistan in 2009 with help of EU.

The EU has in collaboration with UNDP addressed integrated water resource management (IWRM), where the idea is that by looking at national coordination a model for cooperation can be developed. However it has been pointed out that “Uzbekistan has marginalized itself from these multinational projects, making progress difficult, and moreover the EU projects have been largely focused on water

quality issues (Izquierdo et al., 2010). This does not contribute to resolving the main issue of sharing and allocation of water resources. Although dialogues have been held under the EU Water Initiative, they have mostly been on the national level. “In practice, the EU involvement, similarly to efforts by UNDP and the World Bank to some extent, has remained focused on providing technical assistance” (Ibid.).

V.4.6. UN Special Programme for the Economies of Central Asia (SPECA)

SPECA was established in 1998 by the presidents of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Azerbaijan joined in 2002 and Afghanistan in 2005. It is mutually maintained and executed by the UN Economic and Social Commission for Asia and the Pacific (UNESCAP) and UN Economic Commission for Europe (UNECE). What distinguished SPECA from other actors involved in the region, such as the EU and the UNDP is the direct involvement from political leaders and the focus on how important political efforts are in order to solve issues related to the mismanagement of water in the region (Izquierdo et al., 2010). At the same time, the program has the "neutral protection" from the UN, which can be beneficial in promoting cooperation.

Problems hindering regional cooperation in Central Asia are often political, and SPECA has been able to offer a neutral UN umbrella and a broad range of international legal instruments of which UNECE is the custodian to resolve bilateral and regional disputes. SPECA states that the objective of the Programme is to support the Central Asian states in developing their cooperation, creating incentives for economic development and integration into the economies of Europe and Asia (Izquierdo et al., 2010).

It is working to provide a framework for dialogue and cooperation as well as for broader cooperative initiatives. “Its activities include the development of Euro-Asian transport linkages, including the possible extension of railway and road networks into the region as well as the positive development of institutionalized cooperation between the Kazakh and Kyrgyz Governments in the management of water installations on the Chu-Talas Rivers” (Izquierdo et al., 2010).

V.4.7. Shanghai Cooperation Organization (SCO)

The Shanghai Cooperation Organization (SCO) is a stable intergovernmental international organization. It recognized on June 2001 in Shanghai by China, Russian,

Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. According to their Charter, “the main goals of the SCO are to strengthen relations among the member countries, promote effective cooperation in politics, trade and economy, science and technology, culture, education, energy, transportation, tourism, and environmental protection, make joint efforts to promote peace, security and stability in the region in accordance with the principles of non-alignment, non-targeting and openness” (Izquierdo et al., 2010).

The Heads of State Council (HSC) is the highest decision-making body in the SCO. It meets annually to make decisions and give instructions on important issues of SCO interest. The Heads of Government Council (HGC) meets once every year to discuss a strategy for multilateral cooperation and priority directions within the Organization’s framework to solve pressing issues of cooperation in economic and other areas (Izquierdo et al., 2010). “The SCO member states represent the voice of three fifths of the Eurasian continent, and with a population of 1.5 billion, make up a quarter of the planet’s population”(Ibid.). The SCO has an important role to play regarding the water crisis in Central Asia for various reasons:

- With the exception of Turkmenistan, all of the Central Asian countries joined the SCO in an effort to promote good neighboring relations and to strengthen regional cooperation mechanisms.
- All of the goals formulated in the SCO charter fall directly into place with the ongoing water crisis in Central Asia.
- The SCO strategic paradigms cannot be fully achieved as long as regional stability is fractured, particularly in the turbulent Xinjiang province in China and in the Central Asian region.
- Given the SCO political clout in the region, it is by far the institution that stands out with the potential to become a central body to foster broader regional cooperation regime (Izquierdo et al., 2010).

However, “the members’ increasingly diverging interests and the absence of Turkmenistan in the SCO continue to represent an obstacle in the achievement of the SCO goals” (Izquierdo et al., 2010). But since its inception, the SCO has made various efforts to promote cooperation among the Central Asian states.

V.4.8. International Crisis Group

Some international institutes, such as the International Crisis Group are recommending Tajikistan to abandon its Rogun plans because the country cannot afford it and the benefits simply do not outweigh the costs (Izquierdo et al., 2010). Additionally, downstream states are planning to build reservoirs to counter Tajikistan's control of the Amu Darya, which will only further complicate the relations between the states and future prospects for a more coherent regional management system. Tajikistan has many aspirations regarding the Rogun Dam, including a much needed source of income (electricity exports) and an increase in its regional status.

Hitherto, "the possible negative effects on its neighboring states need to be highlighted and considering the tense atmosphere regarding each state's use of water" (Izquierdo et al., 2010). This is an ongoing issue that may not be resolved until the conclusion of the World Bank's feasibility study, which will also determine the World Bank's success or failure as a third-party mediator. This will depend on the response from Tajikistan and Uzbekistan and if tensions ease between them. "The controversy surrounding the Rogun Dam further illustrates the states' interdependence and the need for increased regional cooperation, as neither can make a decision on their own without taking into account how the rest will be affected" (Izquierdo et al., 2010).

There have been numerous efforts by the international community to address Central Asia's problems. Some of these have achieved limited success, but have not addressed the full scope of the problem. In its place, "they have been case-specific and have overlapped with other initiatives and this is demonstrated in the case of the Aral Sea, where international efforts have been largely unsuccessful" (Izquierdo et al., 2010). On the other hand the regional organizations also frequently overlap in their goals and yet contain only a subset of regional states (Hill, 2002).

In Central Asia, there has been much focus on the Shanghai Cooperation Organization (SCO), which includes China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan but tensions among the Central Asian member states of the SCO, squabbles over budgetary issues, and a shortage of funds for group commitments, have constrained the development of the organization as a new multilateral mechanism for regional cooperation (Hill, 2002).

The entry of the United States and other international players into Central Asia in October 2001, coinciding with the beginning of the military campaign in Afghanistan, has also changed the SCO's internal dynamic. "Russia's continued economic, social, and political influence in the region and its interest in maintaining this influence puts it in a unique position to aid efforts in regional cooperation on water management" (Izquierdo et al., 2010). China has an interest in the region's natural resources, and has increased its influence through the Shanghai Cooperation Organization. Moreover, "the country has not only invested in the region but engaged diplomatically with Central Asian countries, and will continue to do so for the foreseeable future" (Ibid.).

Afghanistan, which has so far had a limited role in region due to instable internal political reasons, is likely to assume a more prominent player in the years ahead (Izquierdo et al., 2010).

The individual member countries have reacted in their own way to the war in Afghanistan and established independent roles in the U.S. coalition in Afghanistan rather than acting as a group. China, in particular, has taken a back seat, while the Central Asian states have forged ahead of Russia in seeking to deepen their relations with the U.S., openly speaking of the benefits of a potentially long-term American military presence in the region, and inviting and hosting U.S. and other foreign troops on their soil (Hill, 2002).

Looking ahead, the SCO and other existing sub-regional organizations only address some of requires and relationships in Central Asia and the Caucasus On a regional level, in Central Asia (Hill, 2002). Donors also agreed to coordinate on water resource management; trade and transportation; energy development; rural development in crucial areas such as the Ferghana Valley; tackling HIV/AIDS, tuberculosis and other public health issues; and combating drug trafficking (Ibid.). Although, the increasing attention to the unstable region in 2002 and has already brought additional resources for assistance and international aid to Central Asia.

There is no ratified global framework on trans-boundary water issues for settlement of complex water issues.

However there are water agreements from other regions which can provide models for cooperation in Central Asia Active engagement by the international community clearly makes a difference in advancing cooperation among

countries over international waters. It may take decades of engagement and active diplomacy, but the wide range of success in water cooperation has emerged in every corner of the globe (Izquierdo et al., 2010).

In a number of cases the World Bank and the Global Environment Facility have helped develop regional water sharing agreements, as have various UN agencies like the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). This is an encouraging sign in an age of climate change when water conflicts are likely to grow more combative, which in turn may increase the need for international mediation in water disputes worldwide.

CHAPTER VI
CONCLUSION

This thesis analysed the impact of the conflicts among Central Asian countries over the matter of water allocation from the transboundary river Basin of Amu Darya. Conflicts over trans-boundary water resources are one of the major risks factors for the security of the Central Asian region. Following the collapse of Soviet Union, the management of water resources has turned into a very complex subject of trans-boundary water sharing among all the five republics of Central Asia. Emergence of new nations in 1991 and their self-governing administrations determined to follow their own deviate national interests. Even though these states choosed to sign the Almaty Agreement in 1992 and uphold the Soviets system of water quota. But the Soviet water system was out dated and was inadequate in its efficacy. On the other hand the efforts of regional and international actors were unsuccessful to discover a long-term resolution of water issues mainly due to the distrust and little political will of the Central Asian leaders to work together.

Other factors were mainly like fragmentation of old Soviet infrastructure that results to economic crisis inside the new states, uneven allocation of natural resources like water and enery and environment disaster due to climate change. Internal dynamics of the Central Asia have disturbed by the competition over national interests and the lack of commanding actors on the regional level that adversely affected the progress of regional water cooperation in the region. Legacy of USSR's projects with consequences of the cotton-producing countries to befall extremely reliant on water for all economic deeds and the states of the upstream zone to develop into very needy on the downstream states for power production. After the USSR era the formerly federal energy structure and water sharing agreements were either broke down or were ignored. The quality of water in the region began to decline quickly just after independence because all states in the region were lacking the knowledge to properly manage the water resources and deal with the disputed concern over water.

Central Asian region have a variety of natural resources for example oil, gas, minerals and hydropower potential which may possibly make the Central Asia socially and economically developed. The downstream nations have blessed with more resources like oil and gas reserves that favor the countries Kazakhstan, Uzbekistan and Turkmenistan for more advancement. The upstream states Tajikistan and Kyrgyzstan have glaciers that fuels water for rivers mainly utlise for downstream irrigation and

for the production of hydro-electricity. The downstream nations have fully utilized their resources like oil, gas and other minerals. They export the surplus of agricultural products to advance their national incomes and growth in the rank. In this regard country like Kazakhstan has been the most flourishing its economy.

On the other hand upper riparian states like Tajikistan have hardly any alternatives for economic growth other than utilising water resources for more hydropower production. The upstream nations Tajikistan and Kyrgyzstan are the poorest states in the central Asia. Thus the uneven division of natural resources that has shaped the complex dynamics in the region called the haves against the have nots among the upper and lower riparian states. Thus the upstream states Kyrgyzstan and Tajikistan desire to make use of their water resources for hydropower potential by building HPPs, on the other hand downstream nations Uzbekistan and Kazakhstan have problems to such efforts since it will affect their water demand in the irrigation sector.

Central Asia's major rivers have turn into a focal point of rising rivalry and violent conflict amid all riparian countries of the region. Sovereignty from the USSR regime shaped asymmetries of national interests, capabilities and endowments of natural resource like water for all states in the region. Particularly, the states like Uzbekistan, Kyrgyzstan and Kazakhstan indulged in a sour clash over water resources in the Syr Darya basin. On the other hand, Turkmenistan, Uzbekistan and Tajikistan start to fight over the water resources in the basin of Amu Darya. The relations among all nations are also affected by the project like Rogun Dam. The project worsens the relations between Tajikistan and Uzbekistan. The relations between the upstream country Kyrgyzstan and the downstream countries Kazakhstan and Uzbekistan deteriorated due to the Kambarata Dam-1 project.

The upper riparian states have comparatively less influence than the downstream nations because they are not rich, smaller in size, less potent for utilise the resources to develop their nation. Following to the decline of USSR regime, the newly five independent states of Central Asia found themselves in a new era of globalisation with new world order of liberalized economic system. The major influence of these changes occurred with the increasing emotions of nationalism in the states those were growing stress over shared water resources. Since the independence, the issue of

trans-boundary water management has developed into one of the most complicated security problems among all states. Inequitable water allocation structure and the problem with existing policies over these resources reveal the severity of water issues and conflict in the region.

Taking the Central Asia as a unit of study, it offers a model of relations between water resources and the social, political, economic and environmental patterns of Central Asia. Water as an unconventional security threats became more important since post-Soviet era in Central Asian region. The ending of the Cold War era that changed the meaning of water and the management of water resources connected with security concerns. Thus the water securitization in the region that affected interests of all newly independent nations and Water became an additional concern with separatist movements, racial conflicts and religious conservatism, threatening the internal security of Central Asia.

The barter system of Soviet time was not capable to provide the proper channel in the contemporary time for the all newly independent states. These newly build nations wanted to decrease their reliance on their neighboring state for the need of water resources and energy demand. Though, this attitude show the way to understanding that ignoring the issue of trans-boundary character of joint resources would not attain the required outcomes. After one year of self-rule, in 1992, the all nations decided to uphold the allotment of the trans-boundary water resources as designed by old USSR regime. The record of conflict and cooperation over water resources show that the history more than the past 100 years reveals that the nonexistence of workable institutional bodies and the changes in water utilize and water accessibility can create anxiety among the states.

Even with a familiar legacy of USSR era, hitherto the all five states of Central Asia have unsuccessful to come across the common platform with the aim to resolve their water disagreement. The lack of concret decision making in the political dimension together with low political determination delay the possibility for most important change to take place. There has been very negligible role of the international community, regional actors and the Central Asian nations in dealing with these issues. The main obstruction is fight over the contradictory nationalized interests like agriculture versus production of hydro energy led to widespread distrust and outcome

of the zero-sum game. The central Asian republics began explicitly rival for the region's water resources. Water rivalry is rising in a region which is already not a stable region, adding more puzzles for future cooperation and conflicts.

Central Asian economy is largely based on the agriculture sector. The harvests like wheat, cotton and rice need thorough water for irrigation in the conflict prone dry region. Since 1991, after the independence of central Asian states the use of water resources increased very rapidly. After that the stage of a long period of stern drought and without having proper access to the water for irrigational fields makes demands of needy countries in a very soar way. The main difficulty lies in the subject of growing water demand and turn down the water supplies that have been combined through the walk out of the region's countries to effort jointly. The issue of water management in central Asia has been discussed separately in a chapter. Beginning from the very early history of water management in the Central Asia the chapter has discussed the contemporary issues related to it.

In history the all paradigms of water management has described in the chapter right from the breakdown of the Soviet period. The experiences of Central Asian countries has broadly analysed after 1991 with the major issue evolving around the water management. The central Asian countries started to pursue their own individual interests after breakdown of centralised water allocation controlled by USSR before 1991. As a result, in favor of their 'national interests' every state of the region move forward the unilateral agreements on the water problem in Central Asia. The ineffective regional conflict solution mechanism has allowed countries to enter bilateral agreements to protect their interests.

Interestingly, in June 2013, a strategic agreement that was signed in Tashkent, between Uzbekistan and Kazakhstan, which emphasized the development of proper arrangement of water management including construction of water-flow structures. This was a result of the growing Russian new support for the creation of hydroelectric power in the upper repairs countries. Since 2007, Kyrgyzstan and Tajikistan were jointly managing the transboundary Isfahra and Khoda-Bakkiran Rivers through the inter-ministerial task force. Several bilateral agreements were signed between the republics to improve the water allocation, such as agreement on water quota from Amu Darya between the Turkmen SSR and the Uzbek SSR, between the Kyrgyz SSR

and Uzbek SSR for water use of the Sokh River. However, these plans and agreements are still the basis of current water management in this area.

It is also a very important issue that Afghanistan is contributing to the flow of the Amu Dariya River, but the interesting thing is that there is no part of the legal and institutional framework. In the future, Afghanistan's plan to develop water infrastructure in the country, whose irrigation and agriculture plans have raised concerns in the Middle East for the renewal, because in future country may attract more water from the Amu Darya river.

On the other hand, these newly-independent states of Central Asia entered into other agreements to maintain the nexus of energy-water complex of the region. The Almaty Agreement signed in 1992 was one of them. Some other accords were also made like the Agreement of Kyzyl-Orda, the Bishkek accord, the Declaration of Ashgabat, and the Dushanbe Declaration. Apart from all these agreements, countries of Central Asia have established some foundations such as the ICWC, the IFAS, the CAREC, and the ICAS to deal with the issues over the water management. However the problem of water management is still on the table.

The Almaty Agreement signed in 1992 became non-operational when it has been unsuccessful in provide even-handed allotment of water resources in Central Asia. Since it has lost its effectiveness in amendment, the agreement has been a focus of conversation inside the region and outer of it. Provisions of barter agreements of Soviet age have not been doing well and even they augmented anxiety among the five nations. Nevertheless, the process of regional cooperation can be reached all the way through combined agreements that consider the all challenges and needs of every upstream- downstream state. For example the agreement of Chu-Talas between Kazakhstan and Kyrgyzstan is doing well and promising the permits for impartial water sharing and preservation of dam. One important question is whether water should be treated as public good or an object, which is to create a division between the two countries and deal with the water crisis.

Water scholars agree that the contrasts on shared river basin resources are most likely to occur when the countries are very much dependent on the water over river and they are stronger than the neighbors located above the river. Thus, Central Asia is due to

its geo-politics, which makes it an ideal place to compete with the history of rivalry rather than cooperation between the all the five republics.

One reason for this lack of progress can be a broad non-cooperative tendency in the field. All stakeholders in the Central Asian region are not part of equal value or interests in promoting regional cooperation. Loyalty and cooperation towards multilateral organizations, especially in Ashgabat and Tashkent and IFAS Member States, spend very little on political or financial efforts on these bodies.

Although the all countries of Central Asian region have signed an agreement on 'joint management, use and protection of trans-boundary water resources' in line with 'Panchsheel'. Inter-State Commission for Water Coordination (ICWC), which was established in 1992 as a regional structure to overcome the complexity of water and energy on Trans-Boundary rivers, was unable to provide satisfactory rules on issues.

Thus, due to these unique regional, geographical and economic complexities, these Asian international treaties, frameworks and transit water announcements have had only negative effects on Central Asian countries.

Although Central Asian states have developed regional structures such as water coordination (ICWC) and related Basin Water Organization (BWO) as well as related national institutions, but there is a barrier to inadequate provision of information and circulation, cross-border water Suitable short and long term decisions about resource management and implementation of relevant policies. To overcome these shortcomings, the Central Asian Regional Water Information Base (CAREWIB) project has been implemented by the special program for the United Nations Economic Commission (UNECE) and Central Asia's Economics.

Every nation in the region is in frantic require for growth in their prospects and most of the development need the water utilisation. The existing water system of Central Asia is very incompetent in terms of international principles. The irrigation structures like bridges and canals are in quick collapse due to deprived preservation of irrigation structures that is a main setback in the region. The major key parts of anxiety amongst the all nations are because of not haveing the rational management of water resources; fail to follow or acclimatize water shares; lack of execution and premature structure of barter agreements and mechanism of payments; and last one is hesitation over outlook

of infrastructure plans. The upstream states deal for their water resources with Uzbekistan and Kazakhstan for energy resources like gas and coal.

Since the energy supplies have been untrustworthy, Kyrgyzstan has countered by discharging additional water right all the way during its hydropower dam in wintry weather, which consequences flooding in lower riparian nations and lack of water in summer for irrigation. There will be the adverse impact of the dam like Rogun on the relations between Tajikistan and Uzbekistan. Rogun and the Kambarata Dam-1 project in Kyrgyzstan that creates problems in the region. The Rogun Dam and Kambarata projects were started during the Soviet era but still waited to be completed. Even though Rogun project did not strictly opposed by downstream countries of Kazakhstan and Uzbekistan as severely condemn the Kambarata projects since they think that Kyrgyzstan will manage all water run in the river when the project will be completed. Thus the efforts by Kyrgyzstan to claim expense for water have also been opposed by the lower stream states. Since under the USSR reign the water and energy resources were exchanged very liberally through the crossways in the region and boundaries were only governmental by nature. The control of USSR offers the financial support and administration to construct and preserve the all infrastructures.

After independence the rivalry amongst the all five central Asian states has become bitter with the increasing emotions of the nationalism. They were not able to rise with a practical regional approach to change the old system of soviet management. It can also be a reason for conflicts when these issues can link to Islamic extremism that is what happening as a cause of stress in recent years.

Central Asia may be the next Middle East because Islamic rebellion is growing especially in the region after the Arab Spring. If issues of major dispute are not immediately organized, then the stability of region will be lost and all countries can face severe war, if people lose their security and hope, then terrorism can dominate this area.

So the leaders of the Central Asian countries have to resolve these threats and take suitable steps to stop outbreak of emotions. For that reason, the first and foremost thing they must to think about to resolve the matter of water management issue that terrorizes the security and stability of the region. If the Central Asian states will not

go for a stable resolution to the water dilemma, this will not only have an effect on regional security, but it will also affect their economy.

Regionally the River Amu Darya is very significant. The River is a vital source of water for all the states in the region. Agriculture sector is the foremost user of water and it is also a key for economy in all states. Uzbekistan has the biggest region for irrigation, followed by Turkmenistan and Afghanistan. All states on the bank of Amu Darya have preparations to raise the quantity of terrain under irrigation. Cotton is still a main irrigated crop for Tajikistan, Turkmenistan and Uzbekistan, even though its GDP share is falling in all of these countries. Their dependence on cotton farming has deep political, economic and social costs due to a lack of political honesty, unsuccessful reforms of the economies, large-scale poverty and social backwardness.

Massive population growth in Central Asia has increased additional pressure on the limited water resources of the region, after which the imbalance in interstate water contributes to the conflicts. From 1960 to 2012, Aral Sea basin population is more than double. Approximately 22 million people depend on irrigated farming in Tajikistan, Turkmenistan and Uzbekistan. Water is also important for energy production: Hydropower in Kyrgyzstan and Tajikistan is more than 90 percent of the total electricity needs, and it is also an increasing source of export revenue. In areas where population growth and water availability are related to inversion, water has become scarcer. Therefore, states have to face any conflicts over water as zero-sum situations, in which there are winners and losers.

The Amu Darya is similarly a very vital and positive feature for Afghanistan. Approximately half of its length, the river runs either within the country or all along with its border. The basin area of the Amu Darya river is very productive for farming in Afghanistan and having millions of hectares of irrigated land. Afghanistan is a late-developing country since the current structure of water and agriculture in the country is not capable of utilizing its potential. Thus the country uses a very small amount of its water resources. So the country is going to get ready to take on a huge range of projects related to irrigation and energy development. In the future it is estimated that the capacity of land irrigation can increase up to 1.5 million ha in Afghanistan. The other regional predictions guess about the ability and investment potentials that the country will enlarge its irrigated land facilities.

Water authority in the Amu Darya Basin is complex in nature due to absence of efficient machinery for management of water resources. The process of regional cooperation over shared water resources is also very slow and vague. The political, socio-economic and administrative structure of all Central Asian states that directly or indirectly influence the utilization and development regarding the water resources management. The existence of such organizations is very vital to make possibly successful management of trans-boundary water resources and unite in a common anticipatory hydro-diplomacy to settle all water related conflicts between nations. Ineffective state run institutional regulations and lack of cooperative governance on water resources between riparian countries lead to conflicts during the irrigation season. Same time owing to lack of the water resources with ineffective implementation of the existing water cooperation agreements, riparian countries at the side of the Amu Darya and Syr Darya rivers in the region are exposed to social and economic degradation. For example, farmers along the Amu Darya basin experience decrease in their harvest, loss of their livelihoods, and encounter disputes with the farmers of the neighboring country.

The major obstruction is competition for water resources and national interests like farming versus production of hydroelectric thus the common distrust has produced a zero-sum fixture. However, several bilateral agreements that supplemented by the other multi-party agreement signed by all Central Asian republics. The most relevant approach was probably the 1996 bilateral agreement between Turkmenistan and Uzbekistan. This agreement reiterates the initial sharing agreement of 1987 for the water of the Amu Darya. These two countries furthermore maintain an agreement at the technical level on operating the trans-boundary drainage collectors, which derives in the Khorezm province in Uzbekistan and end in Turkmenistan. The aggravating water situations in the Central Asian region with vulnerable characteristics of climate change and global warming have leading to a severe consequence. There is a lack of awareness about climate change among all the Central Asian states. Numerous factors responsible including the weak institutions and the politicization of water resources issues makes Central Asia particularly vulnerable. There are considerable setbacks of agreements that make regional water management more difficult. The FAO warns of growing anxiety about climate change particularly since climate change influences the Central Asian region's water and energy protection. This way leads to political worry

among the states except they work together in careful management of their water resources.

Climate change is already dramatically affecting upstream and downstream countries and the Aral Sea. Growing temperature is rapidly melting glaciers, which are reducing the level of the two main rivers in the region, and crop up in the downstream countries, especially Uzbekistan, which are financially dependent on water intensive crops for their development. If these environment damages left unchecked, climate change can lead to more political instability in Central Asia. To adapt to climate change, national plans can give Central Asian County a new opportunity to see and give new information so that it helps to understand how many programs will be resolved to help further development in this area. In its current state, the existing irrigation system of Central Asia is an open invitation to the environmental disaster.

Glacier melting in Tajikistan and Kyrgyzstan and with temperatures rising in downstream countries, global warming is being felt in central Asia, which will have a real impact on agricultural practices. A World Bank report on climate change in Europe and Central Asia showed that the current struggle due to cross-flow of water boundaries in climate change would further increase. Climate change serves as a "risk factor" for the entire Central Asia's water crisis, making it more serious. In the mid-1970s, the temperature has increased twofold faster than the global level, in the mid-1970s. This report says that the summer of winter increase will be offset due to hot winds in summer, which will lead to increasing evaporation.

Central Asia has become the most dramatic environmental disaster in the world, notorious as the site of the Aral Sea crisis. Aral Sagar, which was the fourth largest lake in the world, has shrunk more than half in the last forty years. The main reason for this was the increase of water flow for irrigation. Grand Soviet schemes require lots of water for cotton, rice and other irrigation. However, large irrigation canals designed to provide large agricultural expansions were made suitable suitable for irrigation on dry land, where the soil is often very popular and moisture is very good. Water pollution from agriculture, industrial and municipal waste and drainage is also an issue. The history of irrigation has dramatically declined in the quality of water in major Central Asian rivers. Large amounts of salt, fertilizers, herbs and insecticides

have found their way to rivers, because industrial waste and flow of return from the region.

In the heart of the problem, due to the lack of cooperation and negotiation on regional water management, how these water resources are used and whether they have been seen well in the item or public form. The EU's action on water resources in Central Asia has found that downstream countries, Kazakhstan, Turkmenistan and Uzbekistan are dependent on irrigated agriculture, whereas upstream countries, Kyrgyz Republic and Tajikistan, focus on the expansion of reservoir capacity and hydroelectric power generation.

In order to co-ordinate the use of water and energy water management requires concrete political, economic and institutional alternatives. It is mandatory to implement these policies which would be acceptable to all countries of the region. Instead, they have adopted a one-sided approach to water resources issues. Kazakhstan has successfully progressed in implementing Integrated Water Resource Management Scheme to strengthen water management in the country. Thereby reducing the effect of water crisis in efficiency of water use and water policy. The role of the public can be increased in.

The geographical location of Central Asian countries is to add more difficulties to create a common but approved solution to dispute the waters crossing the border. The already agreed water allocation policy does not include all state holders in special irrigation versus hydroelectric generation. Kyrgyzstan and Tajikistan, the Upper Riparian Nations (Water Towers) seek hydroelectricity to meet the domestic energy demands of all seasons. In the form of Kazakhstan, Uzbekistan and Turkmenistan, the lower riparian countries are definitely dependent on irrigation. In 1991 when the Intra Rivers of the Central Asia become international rivers, it changed the interests of all CIS states drastically. These new states were forced to withstand the geographical boundaries and the uncertainty of uncertain power generation and the flow of water for irrigation, with a clear example of the drying the Aral sea basin. Water management has suffered from the general rivalry between Soviet heritage above-the-bottom control and the states.

Immediately after independence, five countries agreed to retain the Soviet era quota system, but it has become impossible, the civil war in Tajikistan and the decay of the economy of Kyrgyzstan mean that the facility of water monitoring has fallen into the accident. The control and enforcement mechanism no longer works, and in many countries often make the most allegations of a second quota. Turkmenistan is using too much water to harm Uzbekistan, in exchange for which Kazakhstan is charged with taking more than its share. Kyrgyzstan and Tajikistan say that three downstream countries are more than all quota, even within Uzbekistan, the provinces have accused each other for using too much water.

Even laws have left water in the form of a national asset rather than ordinary people. The Golden Sectury Lake and Turkal Lake projects in Turkmenistan are a notable example of this one-sided approach, considering that these artistic lakes will probably require extra clearance from the Amu Darya, it may be a violation of Article 7 and 16 of the 1958 Treaty. Uzbekistan has complained about the effect of the lakes on the lower Amu river. So it is easily visible that the Regional attitudes towards Cooperation of central Asian countries are biased and vague. There is a dire need of political, social, economic and administrative systems of water governance that directly or indirectly affect the use, development and management of water resources.

The water disputes over Amu Darya have remained in the limelight for its complex nature of problems. Such conflicts show that existing regional and international water management institutions have failed miserably. Changing nature and run off of the rivers due to climate change in Central Asia has also interestingly entangled with ongoing interests of all states. The river is much less synchronized and has smaller number of dams and reservoirs to cause the latent water problems. Though, there are grave stresses beside the stream of the river not only among the upstream and downstream riparian like Tajikistan and Uzbekistan, but also between Uzbekistan and Turkmenistan the middle and lower riparian.

Therefore, all parties involved in these conflicts try to make the most of their national interests on priorities albeit they damage the rights of others to get benefit from water. Consequently, due to these contrast of their interests there may be social tensions among the all nations of the region. Though the quantity of water in the region is secure but there is still need for effective solutions to prevent the emergence and

escalation of local conflicts in the region. However we can say that water does not have the latent to be reason of a war in the future but certainly it has to be likely the cause of tensions and the consequence of these conflicts cannot be predicted. Therefore, the conflicts over water-related issues can create threat to regional security and stability. And if these problems over the use of water issues can not be solved by the nations of central Asia there may remain the rivalry among the all nations and it even emerges in a war in future.

As far as the development of conflict on an annual level of cycle is concern it is developing between downstream states Kazakhstan, Uzbekistan and Turkmenistan, all are heavy users of water resources for cotton cultivation. These nations need more additional water for their growing agricultural sectors and growing populations. While having a weak economy the upstream countries are in dire need to win control over their resources and want to utilize or even exploit more water for electricity generation and farming to lighten their development burdens. When one tries to identify the major issues or problems evolving around the water resources in Central Asia, the main subject of this issue shifts towards aspects of ownership of water sources and the subject of the national interest. The other issues including the aridness of the Aral Sea have been a main reason in the deterioration socio-economic setting of the region. It increases separatist ideas amid the people of Karakalpakstan, the Uzbek autonomous region situated nearby the disaster zone.

In terms of water allocation four major interstate conflict spots can be identified-

- between Tajikistan, Uzbekistan and Turkmenistan at the Vakhsh river because of the Rogun Water Reservoir,
- between Turkmenistan and Uzbekistan because of the Karakum-Channel,
- between Turkmenistan and Uzbekistan at the lower Amu Darya because of the Tujamujun Water Reservoir,
- Between Turkmenistan and Uzbekistan because of the construction of the water reservoir.

These tensions have been covered so far without conflict, but all parties have expressed their desire to do their interests, including the first military invasion at any cost. Due to dependence on agriculture, Uzbekistan and Turkmenistan see irrigation

as an important security problem. Not surprisingly, this situation has already given birth to many small local conflicts, which began in the second half of the 1980s, when Central officials reduced their hold on Central Asia. In 1990, over 300 people claimed the outbreak of conflict in Kyrgyz town of Osh on the border of Uzbekistan and high population density, limited agricultural land and ethnic dimensions (in the land area of Ujjay's land area).

ICWC advises regional governments on pricing policies for water abstraction and the legal base for water use in Central Asia. It also recommends to control the construction of large infrastructure and the introduction of water conservation technologies. ICWC is the key institution in the area of environmental monitoring and co-ordinates for the research development in the water management field. ICWC furthermore comprises the BVOs for the Amu Darya and the Syr Darya, the ICWC Scientific Information Centre (SIC) and the ICWC Secretariat as executive bodies. Based in Uzbekistan, BVO Amu Dariya is primarily responsible for the maintenance of water allocation, according to the agreed quota for users in the basin. It controls the discharge of Aral Sea and interstate reservoir operations. Other functions include measurement of water level, river flow assessment, and operation of canals, main doors and control facilities on inter-state structures and design and engineering services of new water management equipment. The river basin organization also had the right to raise or reduce the allocation to each Soviet republic, up to 10% on the basis of estimated climatic conditions, reservoirs, levels and other factors.

There is a shortage of funds and legal powers in these water management bodies like BVOs. According to the Almaty agreement, they have to submit a budget to the ICWC for approval. Once the budget is approved, the five member states should contribute according to the percentage of the allocated river in proportion to their budget. In practice, member states are not prepared to contribute money to an external agency and the BVO is limited for a long time. They are legally standing because most water management is being handled by the National Water Management Bodies, BVOs. So each of the riparian countries have certain tendencies to promote unilateral economic development tracks that depend on different uses of water, which puts more stress on shared resources.

However the recent agreements and the practical activities of all regional and international structures are not fully used with their potential. In general these institutions have very limited capacity and function because of their contradictory principles. The water sector should operate largely independently and co-ordinate with the energy sector. Another issue is related to the geographic location of these institutions since most of them are based in Uzbekistan and managed by Uzbek officials without following a rotation principle. Particularly, the effectiveness of the IFAS has been very much hampered by this situation and kept it at bay from successfully developing regional water management strategies or negotiating regional water and energy sharing agreements.

Sharing of water resources is a real problem for all the five states in the Central Asian region, and, in fact, a potential for more sustained conflict unless the state leaders come to the table to address the issues and find solutions for cooperation. Turkmenistan and Uzbekistan share one river, Amu Darya, to meet all their water needs, which raises issues and disputes at even the village levels. Water can be a catalyst for a conflict but effective water cooperation can also be a catalyst for peace. It is imperative for the Central Asian countries to address the water issues for the security and sustainable development in the region. Despite geographical proximity, similar social-cultural makeup, conditions of existence, closely connected histories, the basin states have failed to cooperate on the issue of shared water resources.

International and regional organizations like International Fund for saving Aral Sea (IFAS) and interstate commission for water coordination (ICWC) are the two main institutions accountable for trans-boundary water resources management. It is significant to seek cooperation in the realm of water management especially when the challenges of climate change are expected to pace up. In case of Central Asian states it even becomes mandatory for every state to make a contribution towards sustainable development, regional stability and security in the region. But the problems of sustainability and optimal allocation of water distribution and utilization in the region have been aggravated as water management has not been fully included into Regional Cooperation.

Further dealing with water related problems the progress should have been moving forward with a positive approach and they need for a practical solution to these

controversies. The development of the monitoring system in hilly areas of the region with the formation of an integrated body to water resources management in river basin and to supplement existing institutional frameworks with information-sharing which will help trust building towards cooperation. It is need for building the relevant institution in the realm of political consultation in the region that will be extremely useful for mutual benefit. Technique of compensation can be relevant in all cases where the question of internationally shared water will arise. It may also contribute towards the successful resolution of a dispute where the problem is unsolved or the progress is slow and positive feedbacks are unachievable.

There are several schemes and methods which can be adopted by regional states to reduce conflicts or to find solutions to water problems. By establishing a solid legal framework with a holistic approach, the restoration of old agreements like the Bishkek Agreement of 1998, rehabilitation of old-time assets, changing the irrigation system, and renewal of existing infrastructure can help solve the problem. Therefore, while there are many ways to solve the difficulty of using water, all these solutions depend on the political will of the leaders. In other words, the important question is what kind of countries / leaders should solve, as if someone has correctly said that if there is a political desire for peace, then water is not a barrier, but if any. There are many opportunities in the water if you want to find a reason to fight. In other words, the stress related to water in Central Asia is not related to technical difficulties or feasibility issues. These tensions can be solved, the struggle can be reduced and if the leaders show strong political will, then sustainable development can be achieved.

Immediately after achieving independence of Central Asian countries in 1991, a large number of international aid agencies went into this area with projects and money. One of the major concerns of early international engagement was to avoid violent conflict on water between new states and instead seek more cooperative methods of engagement. Since the early days of independence, bilateral donors, international agencies and private foundations have funded many projects to solve the difficult water situation in Central Asia. The major water initiatives in Central Asia are primarily to promote regional processes for peace building, such as the EU strategy for a new partnership with Central Asia. These underlying technical solutions were carried out for political and economic reforms. Particularly active World Bank,

United Nations Development Program (UNDP), CIS (TAISIS) were the European Union Program of Technical Assistance and the United States Agency for International Development (USAID), which helped millions dollars to solve the Aral Sea difficulty.

Many efforts have been made by the international community to overcome the problems of Central Asia, some of them have achieved limited success, but have not addressed the full scope of the problem. Instead, they are case-specific and overlapping with other initiatives, it has been displayed in the case of Aral Sea, where international efforts have largely been unsuccessful. Russia's continuous economic, social and political impact in this area and its interest in maintaining this effect put it in a unique position to help efforts of regional cooperation on water management.

Afghanistan, which is still playing limited role in the field due to internal political reasons, is likely to get a more prominent player in the years ahead. China has an interest in natural resources in the area, and its effect has increased through the SCO. Apart from this, the country has not only invested in this area but has also acted diplomatically with Central Asian countries, and will continue to do so for the near future. There is no approved global framework on the issue of cross border water for the disposal of complex water issues; However, Central Asia can provide models for cooperation, which are water agreements from other areas.

International partnership with water management in Central Asia has focused on promoting improvement on the lines of Integrated Water Resources Management, which is usually associated with infrastructure rehabilitation. For example, in the Fargana Valley, the Swiss Agency for Development and Cooperation has launched IWRM projects with ICWC since 2001. The purpose of this project was to improve and restructure institutional arrangements for water management. In this, the reconstruction of water management involves an increase in the participation of farmers in decision-making and on the basis of hydro-science rather than administrative boundaries. This project was connected with an effort to automate canal automation, which will automate the flow of water flow and the transmission of data.

Generally, international funders and organizations have established the Water User Associations (WUA) in the area of decentralization of irrigation management on the lines of IWRM. Major donor organizations promoting this work include World Bank and Asian Development Bank in Kyrgyzstan, USAID in Tajikistan and Kazakhstan and World Bank in Tajikistan. Irrigation reforms based on IWRM principles changed the structure of water management in Central Asia. For example, international donors have set up a large number of WUAs and have introduced water service fees in Central Asia.

International institutions criticized the Soviet top-down approach, which reduced the farmers and evaluated the position of inactive implementers to make decisions instead of handing over the responsibility of using their own water. Instead, international groups opted for decentralization in water management and supported the permission of higher levels of self-government for water users. The well-publicized disaster has prepared a large project of big money and multilateral agencies, bilateral donors and private foundations.

Many agreements reached institutions established to manage and implement water. However, the actual allocation of water for the annual Barter agreements has remained mortgaged, while the ecological situation of the Aral Sea region has improved, but it is unlikely that this body of water will be restored at the earlier 1960s level. In many explanations for these results, consider two warrants completely. One is that nearly all state-state talks sponsored by international agencies were centred on a combination of water and energy, but gave insufficient attention to agriculture. As a result, the parties ignored environmental issues and important agricultural policies. Secondly, many international funders and agencies were not adequately organized to give adequate results, while with local actors they lacked commitment to projects and offered only hollow promises.

There is no approved global framework on the issue of cross border water for the disposal of complex water issues; However, Central Asia can provide models for cooperation, which are water agreements from other areas. The international community's obvious participation in the forward movement of cooperation between countries is clearly different. In many cases, the World Bank and the Global Environment Facility have helped in developing regional water sharing agreements, in

the form of various United Nations agencies like United Nations Development Program (UNDP) and United Nations Environment Program (UNEP). This is an encouraging sign in an era of climate change, when there is a possibility of a higher quarrel in the conflict of water, which, in turn, can increase the need for international arbitration in water disputes around the world.

In Central Asia, the roots of any racial ethnicity are in competition for unresolved social and economic problems, rare water and grazing resources and on the allocation of discriminatory land. There is a different distinction between the rich republics of water in Kirjistan and Tajikistan, and Republicans not controlling sources of water courses such as Uzbekistan and Turkmenistan. The vulnerability index not only expresses the different accessibility and pollution control opportunities, but often suggests the opposing way of using water (like hydroelectric versus agriculture). Due to the deviation of water for irrigation, the downstream areas of Sir Darya and the Amu Darya valleys near Aral Sagar have caused serious problems related to water scarcity. In order to meet the basic human needs in these environmentally damaged and economically disadvantaged areas, improving water quality and increasing the quantity of water is an essential requirement, however, to provide this water through less water the basin large economic losses may be imposed on countries.

For the sake of cooperation, the lack of will has buried many initiatives. The President of Turkmenistan responded that the International Conference in London was not the right place to discuss the waters of Central Asia. The President of Uzbekistan said that there is a thousand years of experience in the management of water problems in his country and that they will have a multilateral conference prefer than bilateral discussions. The situation of complex water in Central Asia forced governments of five states to consider alternative plans for the development of water infrastructure to get better control over water resources.

Many major projects are now being considered in an effort to get out. With a little exception, they all come back in the Soviet planning system, and many projects are frozen and they immediately raise enough concerns among the neighboring countries. Among those projects are: The germ reservoir is able to give Tajikistan complete control over the Golden Century Lake between the Amu Darya, the Karak desert of Turkmenistan, the project to help re-fill the Siberian rivers of Ob and Eritish in the

Aral Sea. Not financially viable and environmentally suspicious, the Siberian water-turning project has contributed to the difficult water situation in Central Asia.

The Amu Darya basin countries are still trying to balance the management of water and energy resources through interstate organizations. Major characteristics of the Amu Darya River include its cross-border nature, its division between hydropower and irrigation use, and most importantly, to the extent that these two uses should maintain balanced supply for upstream and downstream users. Can be regulated for similarly, due to the low storage capacity of the basin, all these issues have mostly been discussed.

Its impact on agricultural policy and national economies, water usage and environmental impacts are also a major issue and they have impact on Central Asian states which have not been studied. Water allocation has been identified in the Central Asian countries as a number of important issues, but Uzbekistan and Turkmenistan are denying this issue on the stand of rejecting existing obstacles in the water of existing pattern in their agricultural areas. High level of government cooperation is needed to deal with this issue. Both heads should be adopted for future management for both Darya and Amu Darya, in which new physical infrastructure should be based on a comprehensive evaluation of the option of upgrading existing physical infrastructure and the improvement of water management by the user groups in the basin. Such analysis, in which it is necessary to include Afghanistan for the study of Amu Darya, should clearly demonstrate the benefits received from regional cooperation in relation to unilateral or bilateral decisions and actions.

Prior to efforts to reduce the impact of water pollution, this issue requires mandate from higher government level. The second and most important problems of information and data exchange, the past experience in Central Asia has warned governments and donor agencies to build regional water management databases, due to efforts to reach or limit these databases. What is needed is a new concept, where raw data is residing in the starting country and reports are sent from time to time to other countries. Five national hydrological-related services have been working on the development of regional cooperation and data sharing in their area for the last one year, and the lessons learned from their efforts can be implemented on a wider scale.

The Amu Darya Basin is not suffering from the lack of water resources, but the lack of effective management framework, raises the tension between the countries in relation to the use of water resources. Therefore it is necessary to promote equitable water administration to stop conflicts. In fact, each of the Riparian countries promotes one-way economic development schemes, which depend on the various uses of water and various operation modes for the reservoirs, especially between hydropower generation and agriculture. Apart from this, there is a difference between mandates and existing practices, despite the changing of an administration system based on the principles of IWM and despite having many regional organizations dealing with cross-border nature of basin resources.

The population of Amu Daria basin is dependent on water for livelihood and food security for the impact of agriculture. Approximately 20 to 30 million people rely on irrigated agriculture directly or indirectly in basin countries. In this area, cooperation on water and energy resources is needed and to reduce water dependence on agriculture. Afghanistan's future development plans (a late developer) will demand a new set on the flow of Amu Dariya river. Twenty-five percent of the Afghan population depends on the indigenous people for livelihood and economic activity.

Finally, the potential for climate change, less flexibility and mitigation is a major challenge. Due to the effects of climate change water availability of Amu Darya can be reduced by 40 percent. There may be significant warming in the central Asian climate, leading to major environmental, economic and social barriers; particularly, because demand for water is increasing rapidly compared to natural supply. Also, there may be an increasing number of droughts, decrease in grain productivity and power generation capacity can be affected.

Sharing water is a real problem for the five states in the Central Asian region, and, in fact, a potential for more sustained conflict unless the state leaders come to the table to address the issues and find solutions for cooperation. Turkmenistan and Uzbekistan share one river, Amu Darya, to meet all their water needs, which raises issues and disputes at the village levels. Water can be a catalyst for a conflict but effective water cooperation can also be a catalyst for peace. It is imperative for the Central Asian countries to address the water issues for the security and sustainable development in the region.

There is enough water to go around in Central Asia, and with good management of the system, tension on distribution will be reduced, but the more susceptible and inter-state stress on delivery will ensure that the cause of competition rather than water cooperation Remains. Repairing or replacing the old irrigation system can do a lot to reduce water use and improve crop yield, but such solutions are expensive. Almost half the water used for irrigation has been lost in the route or through filtration and evaporator. In the year 1994, only 28 percent of irrigation canals stood to prevent fertilization, and since then the condition of infrastructure has decreased.

In relation to existing water-sharing mal-administration and bias attitude, more innovative approaches should be detected in the light of research findings. For example, instead of the current compensation of direct water with hydrocarbon energy equivalent, upstream countries can be compensated for the release of winter-water savings and heat in a mixed stimulus plan. The level of compensation can be linked to the relative climate variability of the future, before the average water science (defined according to realistic predictions), along with the saving of water in non-vegetation period, compared to the saving of water in general. High-value or above-normal period for compensation mechanism can be applied.

Indus Water Treaty shows that third-party mediation can be successful. The World Bank worked as a cordial arbitration and was able to negotiate an acceptable treaty due to the solution to provide financial compensation to Pakistan. India accepted the treaty because a large part of the financial compensation came from the international community. The study of the case of the Mekong Basin Treaty has been largely successful because it was implemented during the time of relative peace. It is highly relevant to Central Asia, because it highlights the importance of dealing with issues of water before opening the conflict, working as a model due to its focus on the economic and social needs of Southeast Asia. Thus, it can create a "win-win" situation for all those people who rely on this river.

There are two choices for Central Asian countries regarding trans-boundary waters either they continue fight against each other for water demand and supplies or agree to a collective approach and search for a solution or way out that will equally secure the interests of all involved parties. The only efficient way for addressing the Central Asian water dilemma is to approach regional water management not as a source of

competition or dispute, but rather as a need that compels countries in the region to cooperate by establishing regulating mechanisms. Such cooperation among Central Asian states would lead to a number of benefits on the national level as well as for the entire region.

The efforts of CIS States will shape a regional water system in the region. The role of internal and external dynamics of these institutions has very significant impact on regional cooperation over water resources within the context of a regional security complex. The major initiatives taken by all CIS states after their independence on trans-boundary Rivers as they agreed in 1992 to continue with the basic water-sharing principles but there is still need for new inclusive agreements had to be made. The role of Regional Cooperation Programme, the inter-state Water Management Commissions and the bi-lateral, tri-lateral and multi lateral agreements are very crucial. But there is a major problem of implementations of these accords from time to time in the region.

In short, the leaders of Central Asian countries have to end their damaging tendencies of their neighbor's interests. Instead, they should try to find solutions with which all parties get land. In other words, instead of harming each other, Central Asian countries should be part of a broader cooperation. The issue of cross-border water is not necessarily a cause of conflict; it can also be a forum of cooperation. This is the only way to develop and stabilize this area. Apart from this, if water-induced stress eventually leads to war, social, political and economic costs, then it will be a lot more. Even if the war was not the cause of war yet, then it could be a trigger factor in the future to start a war in Central Asia.

It should also be kept in mind that water is considered to be 21st century oil. In other words, water will be as valuable and important as oil was in the 20th century. Therefore, if in general Central Asian nations have not solved the problems of water usage in the world, then there can be no such problem of solving it in the future. In other words, today, Middle Asia is one of the few lucky areas in the world that has enough water, but due to climate change it can not be a case in the near future. Therefore, if the water management problem is not resolved in this area, then not only will the management but also the lack cause also cause competition and stress. As reported in a report on climate change in Central Asia, political tensions can emerge

as long as the Central Asian countries do not cooperate in the management of their water resources.

However, it should also be noted that if there is no effective cooperation in this area, then there can not be a complete war on the issue of water management between the interests of global powers such as America, China and Russia, in this area. Any area can not allow any conflict to create instability in this area in which they have many interests, hence the issue of water management should not only be resolved effectively, but as soon as possible before this problem will impossible to solve. The new leaders in central Asia, unlike the old leaders, put the concern at the center of the relations among all nations. It is a positive and different attitude. New officials have stressed on more friendly ties with neighboring countries and it can be a good sign in the case of finding long-term solutions to the problems of use of transboundary water in Central Asia.

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