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after Academic Hasan Aliyev (NASA)

**GLOBAL AND REGIONAL
HYDROPOLITICAL
PROBLEMS IN THE CONTEXT
OF INTERNATIONAL
COOPERATION AND SECURITY**

**International Conference
Baku, November 25, 2014**

Collection of speeches and articles

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Global and regional hydropolitical problems in the context of international cooperation and security

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Editors:

A. Gurbanov

F. Imanov

A. Garibov

L. Novruzova

Translator:

J. Yusifli

Design:

I. Mahammadli

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Global and regional hydro-political problems in the context of international cooperation and security

According to the reports of the international organizations, the global problem of shortage of fresh water from 2025 will become the political and social-economic means of pressure for a number of countries of the world. Presently, 700 million persons suffer from lack of water all over the world. In case we fail to step in settlement of this problem, their number will reach 3 billion persons. So, 40% of the world population depends on transboundary water resources controlled by two or more countries. As per the UN statistics, only within the last 50 years, 500 political confrontations and 37 armed clashes were taken place for taking control over the fresh water resources. Presently, we observe amongst the world states a new type of polarization, i.e. the efforts made by these states possessing rich water reserves and those suffering from lack of these resources to establish coalitions. Despite, UN, the European Economic Commission and other international organizations have adopted about 20 documents regarding effective use the transboundary water resources, the majority of these conventions were not carried into effect up to present.

Approximately 70% of the world water reserves are formed on the account of the transboundary water courses. Despite the Republic of Azerbaijan has already joined these conventions, the other states of the region objecting to sign some of these international documents carry out an independent policy as to using the transboundary water courses. Due to the fact that the international legal norms pertaining to the water reserves in the region are approved unanimously, pollution of the transboundary Araz, Kura and Alazan Rivers with industrial and domestic wastes is extending and the construction of hydraulic facilities serving to increase or decrease the water volume in rivers is planned. The fact that

Armenia has changed the course direction of the transboundary Rivers flowing to Azerbaijan and using the Sarsang water reservoir located in the occupied territory as hydro-diversion means against the civilians and the ecology of the region prove that the aforementioned matter is of political nature.

On November 25, 2014, an international conference was held on “Global and regional hydro-political problems in the context of international cooperation and security” in Baku organized jointly by the Center for Strategic Researches under the President of Azerbaijan Republic and the Institute of Geography named after academician Hasan Aliyev of National Academy of Sciences of Azerbaijan. This event was devoted to the matters to avoid using the transboundary waters and a lack of water as political-economic means of pressure, the conflicts taken place and predicted on the basis of fresh water all over the world, intensification of international law and drawing up of the related recommendations in this direction. In addition to the Azerbaijani scholars, the conference was joined by the experts and specialists from Turkey, Serbia, Egypt, Georgia, USA, Kazakhstan, Jordan, Nederland and Bosnia. Their speeches were heard and effective exchange of idea was made.

The reporters highlighted the necessity of the efforts aimed at effective use and protection of the water reserves in Central and Middle East, Northern Africa, Central Asia and Southern Caucasus and estimated them as an important factor for international peace and mutually convenient cooperation. They declared that monopolization of water sources and wastefulness observed in the course of use these reserves, the climate changes, demographic growth, geopolitical and geo-economic interests, politicization of the water reserves resulted in the fact that they have been turned into political means of pressure. In the modern period, this tendency manifests itself more acutely in the global and regional scale. As to the

shaped situation, it is a severe danger not only for separate states, but also peace and security all over the world, including ecological security. At the same time, using of water reserves by one state against another as a means of pressure was strongly condemned and utilization of hydraulic facilities in the territory under occupation and the transboundary water resources by Armenia against Azerbaijan Republic as hydro-political means of pressure was considered in the international law context.

In the conference it was accentuated that the world's water reserves are universal blessing and its monopolization, pollution and utilization as hydro-political and hydro-diversion means is prohibited. The participants of the event have expressed their anxiety as regards the struggle intensified day by day for monopolization of the water reserves and control over them, new political and economic polarization taken place as a result hereof, including confrontations, zones of conflict and military-political unions. It was recommended that the related international organizations have to speed up their activity in this direction, combine the efforts of the world countries in preventing of the conflicts arisen for the control over fresh water resources, at the same time these states have to do their utmost to cause the recognition of international principles and norms related to utilization of transboundary water courses and their protection by all states of the world and joining the international convention concerning transboundary water resources by all states.

At the end of the event, the Baku Declaration addressed to the UN, its qualified institutions and the World Water Counsel was adopted unanimously.

Declaration

of the participants of the International Conference on “Global and regional hydro-politics in the context of international cooperation and security” to UN, its institutions and the International Water Association

Baku city

November 25, 2014

Currently awareness of trans-border water basins, and the distribution, preservation and exploitation of surface and underground water resources are gradually shifting from inter-state economic-social relations to a more geopolitical and geo-economic dimension. The participants of the International Baku Conference have discussed global and regional hydro-political problems, the hydrological situation in conflict regions, the effective exploitation of water resources based on equal rights in Middle East, North Africa, and the Southern Caucasus, as well as the sustainable protection of these resources.

It was highlighted that global challenges including accelerated development of agriculture and industry, monopolization and wasteful exploitation of water resources, climate change, human population growth, increased pollution sources to the water bodies (untreated municipal sewage, industrial wastewater, agriculture drainage water), economic expansion interests have led to the increased politicization of access and risk transforming water resources into a tool of pressure. Currently we observe this trend rising in global and regional affairs. This situation poses new threats to individual nations and also to peace and security in the world.

Thus, problems in exploitation and unsustainable use of water resources have evolved into a larger scale and acute form. This situation requires more proactive and effective dialogs for the

solution of this problem on regional and global levels, as well as increased involvement of international law and organizations in this process. We acknowledge that the provision of sufficient water supplies to populations is an environmental, political, economic and social matter and critically a matter of basic human rights.

After informative speeches and discussions the participants of the Conference have identified the following conclusions:

- 1. The participants uphold the 28 July 2010, Resolution 64/292 of the United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realization of all human rights. Further in November 2002, the Committee on Economic, Social and Cultural Rights adopted General Comment No. 15 on the right to water. Article I.1 states that “The human right to water is indispensable for leading a life in human dignity. It is a prerequisite for the realization of other human rights”. Comment No. 15 also defined the right to water as the right of everyone to sufficient, safe, acceptable and physically accessible and affordable water for personal and domestic uses.**
- 2. Working with the national governments international organizations should continue to increase their efforts to involve more countries in international conventions on development of resources of trans-border water basins and their preservation as well as other international treaties and programmes on trans-border water resources. International organizations are key to identifying mechanisms for effective implementation of principles and norms of international law in this field, and may serve as a vital source of exchange of knowledge and experiences, and confidence building between riparian countries.**
- 3. The Baku Conference participants applauded the increased efforts of countries at the national level to coordinate water**

- management approaches among and between all sectors.
4. The Conference presentations highlighted cases of significant challenges in trans border water management in some basins, where uncoordinated development resulted in environmental, economic and social harm to countries sharing common resources. The participants of the Conference have expressed their concerns regarding the trend of growing rivalry over the control of trans border water resources globally that increases political strains over trans border water resources. It is regrettable that in some cases this has led to political and economic polarization, confrontations, conflicts and military-political alliances, largely due to mismanagement of shared trans border water resources.
 5. The abovementioned cases and precedents stress the importance of striving to reach agreements among neighboring countries prior to the construction of hydro engineering facilities in line with international environmental conventions, including the Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992), The Treaty on European Union and Treaty Establishing the European Community (2002/C 325/01, Article 174) and international best practices such as the EU Water Framework Directive (№ 2000/60/ EC)
 6. In the event that disputes arise between countries, international legal precedents should be observed, and resolved through bilateral and multilateral interactions, consensus-building and international law in order to avoid confrontation and losses.
 7. The participants of the Conference have expressed their concerns regarding growing rivalry over the control of transboundary water resources, attempts of some countries to monopolize the sources of trans border water resources and consequent political and economic

- polarization, confrontations, conflict areas and military-political alliances.
8. The participants of the Conference also highlighted the importance of international and regional cooperation on development and preservation of trans border water resources, and its potential contribution to international peace and security. Participants agree that monopolization of water resources as a tool of pressure increases tensions and call upon the national and international communities to strengthen their activities to reduce these trends.
 9. The Conference focused on the importance of the guiding principles of international water law – equitable and mutually agreed development of water resources, building effective cooperation in this field, trans- border exchanges of information and consultations. This includes avoiding harm to other parties, and consultation and agreement prior to construction of hydro engineering facilities that may cause environmental harm and impact neighboring countries. During development of water dependent sectors, including the construction of hydro engineering facilities, the all involved national and international bodies should abstain from activities that might harm the natural environment as well as the population of neighboring countries and territories until a mutually beneficial trans border management regime is agreed, and in case this harm takes place a member of international community should carry appropriate legal responsibility.
 10. The Conference participants call upon all citizens, governments, and international organizations to recognize the inherent need for shared water resources management between countries and condemn the attempts of some states and international terrorist organizations to utilize trans border water resources including hydro engineering facilities as tool of terror and ecological diversion in conflict

areas that may lead to environmental and humanitarian crises.

- 11. In conclusion the participants of the Conference also call upon the international community to support all efforts to avoid these potential human and environmental losses while building cooperative trans border water management regimes in line with international legal instruments and the precedents.**

The participants of the Conference have also stated confidently that global and regional cooperation based on the principle of mutual benefit and effective and equal development of trans border water resources, and resolving conflicts through dialog on the basis of international law will significantly contribute to sustainable socioeconomic development, peace, security and stability in the world for current and future generations.

**The declaration was approved unanimously
by the participants of the Conference**

Speeches and articles



Ramiz Mammadov,
*Azerbaijan National Academy of Sciences,
Institute of Geography, Direktor, academician,
co-chairman of the conference*

Current ecological condition of river waters of Azerbaijan

Azerbaijan is the most arid and less provided with water resources republic of the Southern Caucasus. So, the values of river waters are extremely high for the economy of Azerbaijan. The river network of Azerbaijan includes more than 8350 rivers [2] of different sizes. These rivers could be divided into 5 groups: the smallest – with length of less than 25 km, small rivers - 26-50 km, middle - 51-100 km, big rivers - 101-500 km and biggest – more than 500 km. Distribution of rivers by dedicated basins depends on their length as it is specified in Table 1:

Table 1.
Distribution of rivers based on their length

River graduation	Kura basin	Araz basin	Directly flowing into Caspian Sea	Total
Smallest – < 25 km	3884	1133	3171	8188
Small - 26-50 km	45	32	30	107
Middle 51-100 km	23	7	10	40
Big 101-500 km	11	4	7	22
Biggest >500 km	1	1	-	2
Total	3964	1177	3218	8359

The vast majority of rivers (8295) are the smallest and small. But, despite their apparent low importance, they play a significant role in the life of the republic. In recent decades, attention to the processes in the water catchment areas is largely increased due to the poor ecological state of water basins. It became obvious that it depends not only on the discharge of sewage, but also on a variety of economic activities at the river basins that affects runoff changes. The high level of economic and amelioration appropriation of the territories of Azerbaijan violates the terms of river flow and deteriorates water quality. It is occurred flush of polluted substances from farmlands, much of which comes down with the rivers to the Caspian Sea.

The water often does not meet standards of its suitability for drinking and household assignment, and to use for fishing. Poor condition of the territory of water catchment areas due to intensive human activities negatively affects the quality of water that was confirmed during provided chemical analyzes of the river waters.

Inobservance of environmental laws, rules and principles also lead to negative impact on the rivers. The negative impact on the river is resulted in failure of environmental laws, regulations and guidelines. Unfortunately, ecological regularity identified by the scientists is often violated. One of the major environmental laws is the law of internal dynamic equilibrium, according to which all data of ecosystem, in this case the rivers, should be functionally consistent to each other. Any change in one of the indicators leads to functional-structural quantitative and qualitative changes. Failure to comply with this law leads to the disruption of the ecological balance and when it reaches a certain limit, disruption can occur. For example, the increase of sewage may not lead to catastrophic consequences to a certain limit and then a slight increase may cause irremediable fallout.

For instance, the river Okhchuchay (Dead River), turned into open gutter since the 1980s of twentieth century. Large-scale construction of water systems and their operation began after the mid 60s of twentieth century. This has led to the expansion of irrigated areas by almost 2.5 times. Since the 60s of the twentieth century, it is observed degradation of rivers in Azerbaijan, beds of which have started often to use as collectors. Moreover, it is observed excessive levels of maximum permissible concentrations on a number of indicators of drainage water that is discharged into the sea, leading to destroy of their ecosystem. As a result, there have been big changes in the water chemistry of surface waters in quantitative and qualitative terms. Over time relations of concentration of ions with water charges are also changing. Since the tightness of relations $C = f(Q)$ is weakening in current period, but the types of functions that best approximate the dependence of $C = f(Q)$, is transformed from the power and hyperbolic function to inverse square and linear. Transformations of the function by period are presented in **Table. 2.**

Table 2.
Relations of concentrations of main ions (mg/l) and minerals – C (mg/l)
with water charges Q (m³/s) on the example of Velveli river at Tengialty
village from 1950 to 2010

Main ions and salinity	Relations 1950-1965 years	r	Relation 1966-2010 years	r
Ca ²⁺	Ca ²⁺ =169Q ^{-0,286}	0,91	Ca ²⁺ =27+2540/Q	0,83
Mg ²⁺	Mg ²⁺ =60,2Q ^{-0,382}	0,88	Mg ²⁺ =5,8+792/Q	0,87
Na ⁺ +K ⁺	Na ⁺ +K ⁺ =1,5+278/Q	0,47	Na ⁺ +K ⁺ =9,2Q ^{-0,188}	0,43
HCO ₃ ⁻	HCO ₃ ⁻ =878Q ^{-0,352}	0,83	HCO ₃ ⁻ =62,8+1540/Q	0,92
SO ₄ ²⁻	SO ₄ ²⁻ =6,7+79,8/Q	0,88	SO ₄ ²⁻ =8,7+5,9x10 ⁻⁴ /Q	0,78
Cl ⁻	Cl=19,3Q ^{-0,537}	0,52	Cl=1,4+296/Q	0,51
C	C=973Q ^{-0,354}	0,96	C=122+17390/Q	0,94

***Note:** The table lists the two functions with the highest correlation ratios (correlation coefficient).*

It is observed close inverse relations of concentrations of hydrogen ion, calcium, magnesium and the amount of ions and water flow for the most rivers. The character and tightness of the $C = f(Q)$ for the sulfate ion, chloride ion, and the amount of sodium and potassium are differ by highly variable; usually the concentration of these ions have a tendency to a slight decrease with increasing charges. The most tightness relations closest $C = f(Q)$, which is the most approximated by a power equations and hyperbolic functions are observed in the rivers of northeastern and southern slopes of the Greater Caucasus and in the rivers of the Lesser Caucasus.

Rivers of Lankaran natural area, Nakhchivan AR and Shirvan are characterized by less tight relations of different types (**Diagram 1**)

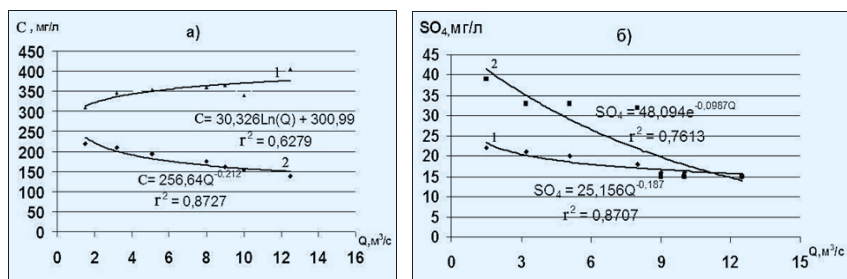


Figure 1. Change of type and tightness of relations $C=f(Q)$ (a) and $SO_4=f(Q)$ (b) on the example of Balakan river at the city of Balakan; 1-1950-1965 years., 2-1966-2010 years.

Our previous work [1] showed that for rivers of Greater and Lesser Caucasus, the maximum removal of ions observed in April (more than 15% of the annual runoff) and May (20%), and the minimum - in August and September (5%). As to the rivers of Lankaran natural area, the maximum flow of the main ions observed in November-December (over 30%) and the minimum flow is observed in June and July (5.5%). Analysis of relatively long-term changes in concentrations of major ions for the rivers of Azerbaijan shows that they can reach very high values for the rivers with long series of observations.

Thus, the relative long-term changes for the series of annual mean concentrations of chlorides, sulfates, sodium and potassium in waters of 20 rivers, observations of the chemical composition of which lasted at least 30 years are usually higher than 100-150 mg / l, reaching in some cases 400-500 mg / l. Increase in concentrations observed for all other ions: magnesium - from 30 to 78 mg / l of calcium - from 27 to 57 mg / L and bicarbonate ions from 15 to 70 mg / l. Water salinity of observed group in the rivers increases by 45-165 mg / L, and water flow for most rivers tend to descending. Increasing concentrations of major ions are also observed in other rivers.

For rivers with series of observations from 17 to 28 years, usually has a tendency to increase in the concentration of sum of sodium and potassium, chloride and sulfate ions and to decrease in the

concentrations of sodium ion, calcium, magnesium, and the sum of ions. For the studied rivers, there are many similarities in the nature of long-term changes in the concentration of the same ions. Along with this, the nature of long-term changes of the concentration of the chloride ion is substantially different from that of the sulfate ion. So, for the chloride ion concentrations slight increase begins in the mid-60s and continues until mid-70s, and then in 4-6 years it is observed a sharp (2-4 times) increase in concentration. Since the early 80s the increase stops and a fairly significant decrease in the concentration of chloride is observed. As for the sulfates, the increase in their concentration in the water of the rivers of Azerbaijan began in the mid-late 60's and continued with the same range until the mid 80s, and then a stabilization of the concentration or an insignificant increase is observed (diagram 2).

Assessment of changes in water salinity of rivers of Azerbaijan carried out using the linear method. Analysis of long-term series of salinity of rivers of Azerbaijan showed that the trends of its changes are very complex and ambiguous.

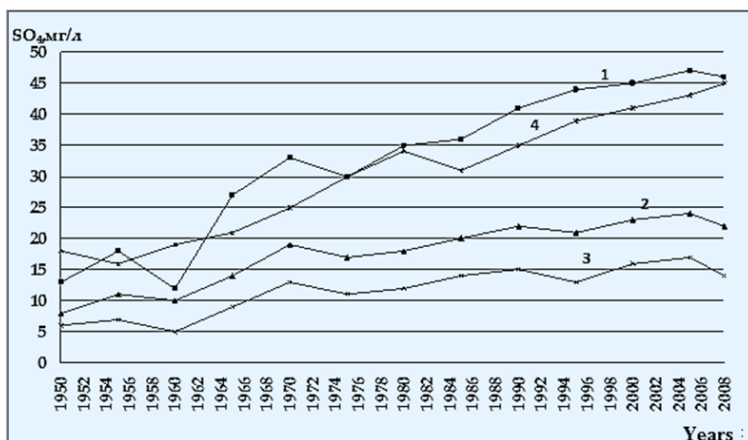


Figure 2. Long-term changes in sulphate concentrations in the water of the rivers of Azerbaijan 1-Ganca river, Zurnabad village; 2-Gusarchay river, Kuzun village; 3-Talachay river, Zagatala city; 4-Lenkaran river, Lenkaran city

In the rivers of Lesser Caucasus it is observed equally directed changes of hydrochemistry regime. Positive trends are observed on the Agstafachay, Tavuzchay, Shemkirchay, Gencechay, Goshgarchay, Gondelenchay and Karkarchay rivers (diagram 3).

From the period of 1975-2010, the level of salinity in Agstafachay river near the Gazakh city have increased by 1,8 times increasing from 474 mg/l to 842 mg/l. In the river of Tovuzchay the level of annual salinity is 13.6 mg/l. Small negative trend is observed in Kurekchay, Terterchay, Axoxchay and Akerchay rivers (diagram 4):

According to results of analysis from the period of 1950-2010 salinity in this rivers have been increased by 200 mg/l which makes 60% of average long-term value.

In the rivers at the Lenrakan natural areas it is also observed long-term variations in salinity. According to the results salinity in the Vileshchay river has been increased from source (0,68 mg/l) to mouth (6.53 mg/l) of the river. In Lenkaranchay river salinity has increased from 0.83 to 2.47 mg/l, and in Tangerudchay river it was 1,95 mg/l on average.

It is observed positive trends on the rivers of Nakchivan AR. Nakchivan river is the most affected with hydrochemistry regime among the rivers of Nakchivan AR.

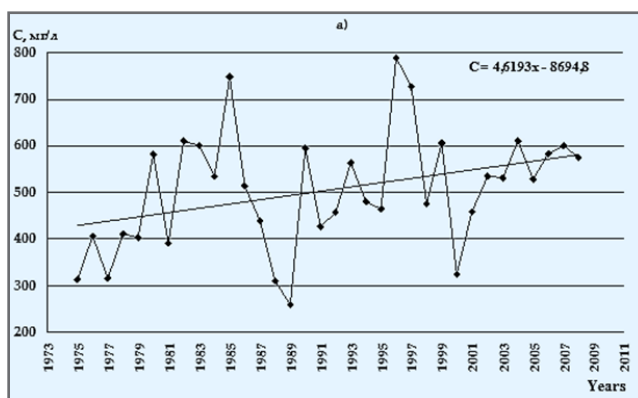


Figure 3. Changes in salinity from the period of 1975-2000 at Gorshqarchay river, Dashkesen city(a)

GLOBAL AND REGIONAL HYDROPOLITICAL PROBLEMS IN THE CONTEXT OF INTERNATIONAL COOPERATION AND SECURITY

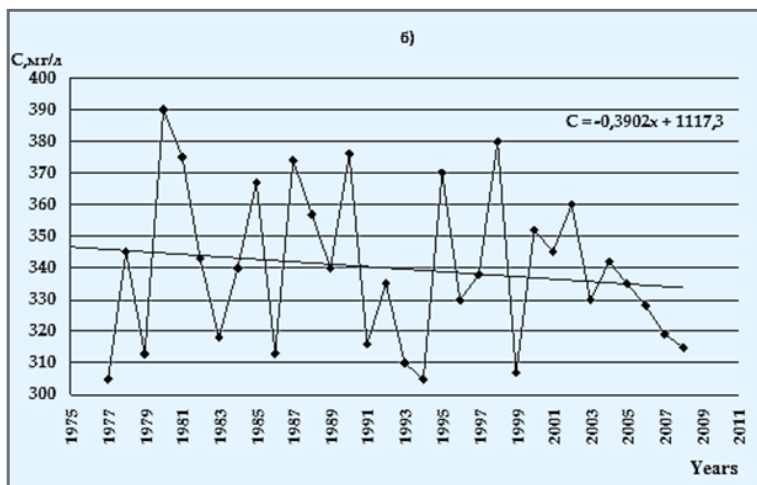


Figure 4. *Change in salinity from 1975-2000, Axoxchay river, Xanaga village (b)*

Thus, it can be noted that on the example of the rivers of Azerbaijan it is observed negative consequences of non-compliance of the fulfillment of the basic ecological rules. Therefore, environmental issues should take one of the first places of importance during the exploitation of natural resources of water catchments of river basin.

This study was conducted by support of the Department of Hydrometeorology / Ministry of Ecology and Natural Resource which supply data material. We thanks to this departement for supporting this study.



Hasan Sarikaya (Bosnia),
professor of the International University of Sarajevo,
an expert on hydro-political issues at World Water Council

How to Reduce the Water Shortage Problem in the Context of the Global Water Analysis

It is now a fact that many countries are already facing or will face severe water shortage problems in the near future. Water shortage or scarcity may be defined either in terms of the existing and potential water resources, or in terms of the present and future water demands, or both.

Considering the supply-side approach as presented in their pioneering study, Falkenmark, Lundqvist and Windstrand (1989) rank the countries based on the per capita amount of “Annual Water Resources (AWR)”. 1,700 m³ per capita per year was defined as the level of water supply above which shortage will be local and rare. Water supply adversely affects health, economic development and human well-being if the water supply is less than 1000 m³ per capita per year. Water availability becomes a primary constraint to life if water supply is less than 500 m³ per capita per year. This way of definition of water scarcity is named the “standard” indicator by Seckler, D et al. (1998).

Another study (Raskin et al., 1997) defined water scarcity in terms of the “total amount of annual withdrawals as a percent of AWR”. This was referred to as “UN indicator”. According to this criteria, if total withdrawals are more than 40% of the AWR, a country is considered to be water-scarce (Seckler et al. 1998). Since the supply-side approach does not consider the annual water resources versus water demand, the assessment based only on the supply side may be misleading.

The Global Water Balance

Since it is difficult to create or to destroy water under most natural conditions, the total quantity of water on earth is the same as the quantity of water which was on earth millions of years ago.

Total annual precipitation on Earth’s surface is estimated to be 108.000 km³. Around 60 percent (61.000 km³) evaporates directly back into atmosphere and the remaining 47.000 km³ flows toward the sea (Seckler D. et al, 1998). If this amount was evenly distributed and utilized without any loss, it would be approximately 9.000 m³ per person per year. Since much of the flow occurs in seasonal floods, only 9.000 km³ to 14.000 km³ may ultimately be controlled and utilized. Seckler D. et al. (1998) reported that only 3% of the total precipitation and 24 to 38% of the utilizable water is withdrawn for use.

When we examine the water resources of Turkey, the estimated total average precipitation is 501 km³ per year. Potential utilizable water amounts to 112 km³ per year. Currently only 44 km³ of water is used, which is 39% of the usable water potential.

Causes of water shortage and the means to solve it

It is obvious from the above mentioned global water balance analysis that, we are withdrawing and using only a small fraction of the precipitation on Earth. Then, the question is why we are

suffering from water scarcity. The answer is that yes there is enough precipitation but, that occurs during wrong time on the wrong place. In other words, water is not on the place we need and on the time that we demand.

In order to address the problem of the spatial distribution of supply and demand, water is transported by water transmission lines from water-rich basins to the water-poor basins. For instance to meet the water demand of the city of Istanbul, water is transported from Melen River which is about 200 km away from Istanbul.

In order to solve the imbalance of the supply and demand between the wet and the dry periods water storage facilities are built. In addition to the above measures, reuse of water and desalination of the sea water may be considered to increase the supply of water.

Water conservation as demand side management can be quite effective to correct the imbalance of supply and demand. There are three pillars for an effective water conservation and saving. These are: i) education of the water users, ii) development and access to the proper water saving technology, iii) rational water pricing. Failure in one of these points means failure in an effective water saving or in demand side management.

Transboundary waters

Good management of the transboundary waters is essential to control the global water scarcity due to the following reasons:

- 1. There are 261 transboundary waters,***
- 2. Transboundary water basins form 45.3% of the Earth's land surface,***
- 3. About 40% of the world's population live on the transboundary water basin,***
- 4. 60 percent of the river flows is of the transboundary nature,***
- 5. There are 145 countries on the transboundary water basins,***
- 6. 19 transboundary basins have 5 or more riparian countries.***

It is essential that the water resources (supply side) and the water demands are very well managed before discussing the controversial issue of the sharing of the flows.

Joint studies to harmonize the data and to generate the data which are reliable and comparable will help to build the trust among the riparian countries. In fact, if the events among the riparian countries are assessed, it can be seen that most of the events are in the form of cooperation rather than conflict - 1228 events of cooperation versus 507 events of conflict.

Most of the events are focused on the quantity of the water. Only 5 percent is on the water quality.

Turkey's transboundary water policy

Turkey's policy regarding the use of transboundary rivers is based on the following principles:

- 1. Water is a basic human need,***
- 2. Each riparian state of a transboundary river system has the sovereign right to make use of the water in its territory,***
- 3. Riparian states must make sure that their utilization of such waters does not give "significant harm" to others,***
- 4. Transboundary waters should be used in an equitable, reasonable and optimum manner,***
- 5. Equitable use does not mean the equal distribution of waters of a transboundary river among riparian states,***
- 6. The principle of sharing the benefits at basin level should be pursued,***
- 7. Turkey views water as a catalyst for cooperation rather than a source of conflict.***

Conclusions

Global water analyses demonstrate that the total water on Earth is sufficient to meet the total demand. The main reason of the water shortage is the uneven spatial and seasonal distribution of

the precipitation. Water transmission lines and the water storage reservoirs are built to address them. Reuse of water and the desalination of the sea water may also be applied to increase the supply of water. Water conservation as demand side management can be quite effective to eliminate the imbalance of supply and demand.

There are 261 transboundary waters on Earth which forms the 60 percent of the river flows. The transboundary water policy of Turkey states that water is a basic human need and the transboundary waters should be used in an equitable, reasonable and optimum manner. The principle of sharing the benefits at basin level should be pursued. Turkey views water as a catalyst for cooperation rather than a source of conflict.

The water shortage at global level can only be addressed through an integrated approach and with technical and financial support by the developed countries, regional and international organizations and financial institutions.



Jovan Despotovic (Serbia),
*Deputy Chairman of the Serbian National
Commission for UNESCO, Deputy Chairman
of the Bureau of UNESCO Intergovernmental Committee*

The Integrated Water Resources Management at the River Basins

An establishment of the water resources management should be integrated at the river basins, together with neighboring countries, upstream and downstream. It should also include industry, municipalities, cities and infrastructure systems, small communities, rural and distant settlements. In addition, flood and drought management at the basins' level should be based at institutional strengthening and capacity building of all levels in a state, from governmental to local authorities aiming at the food provision, environment, employment and energy, particularly renewable sources. Those are among major aspects of a modern water resources strategy.

The basis for establishment and development is education at all levels, including elementary, grammar school, higher education, specialization, master and doctoral studies, but also information

to wider audience and people at inland distant streams and water resources.

As wider information and education is the better will be integration of the water resources management from the general river basin plan developed with neighbours and international support, all the way to small settlements and agriculture fields. In order to accept such a strategy of water resources and environmental protection approach „millions of people if not each and everybody“ have to be informed and thousands of people have to be educated. Many of the educated people could be employed in inland waters, not only in big cities and Capital.

Network of universities and faculties with professional associations and Governmental agencies and stakeholders is the right (or the only) concept that can conquer increasing demands for water challenging transboundary problems. It is reliable bases for a state development, rather than developing of each entity at the state level, aiming at reasonable quenching the world thirst.

Applied research, planning, design projects in local conditions, accounting for tradition, culture of living, public health for people and animals including global and climate change is the other side of an international cooperation via commissions / committees.

Finally, engineering is final step that encompass water strategy implementation from spatial planning, design and construction, beside major infrastructure, housing, highways, also small settlements, farms, and water supply and waste water plants aiming at increase public health, culture and living conditions. In addition, global and climate change are also regarded.

Integrated water resources management is a complex, demanding time, wise and professional human resources. It is demanding at several levels of governing, including international, regional and within the state. Moreover, a numerous requirements are posed from settlement, small or big cities where the complexity is increasing to a very difficult and time consuming solution.

Concerning large river basins that are shared among many countries it is not easy to define a list of priorities of significant

GLOBAL AND REGIONAL HYDROPOLITICAL PROBLEMS IN THE CONTEXT OF INTERNATIONAL COOPERATION AND SECURITY

water management issues instead of tedious and long run discussions, negotiations and information of the interested parties – stakeholders (EU, 2000). Among the best practice as an example of a management at the large river basins could be used the experience of the IHP UNESCO Danube countries informal association that hold meetings, conferences and project performance for more than 50 years. Also are established several protocols on flood protection, navigation, water quality and else, including the Danube river basin management plan. This plan is the basic one for establishment the plans at the river sub-catchment, such as Tisza, Sava etc. In Figure 1. is schematically presented an integrated water resources management, discussed many times at the Danube river conferences but also at the meetings at other sub catchments.

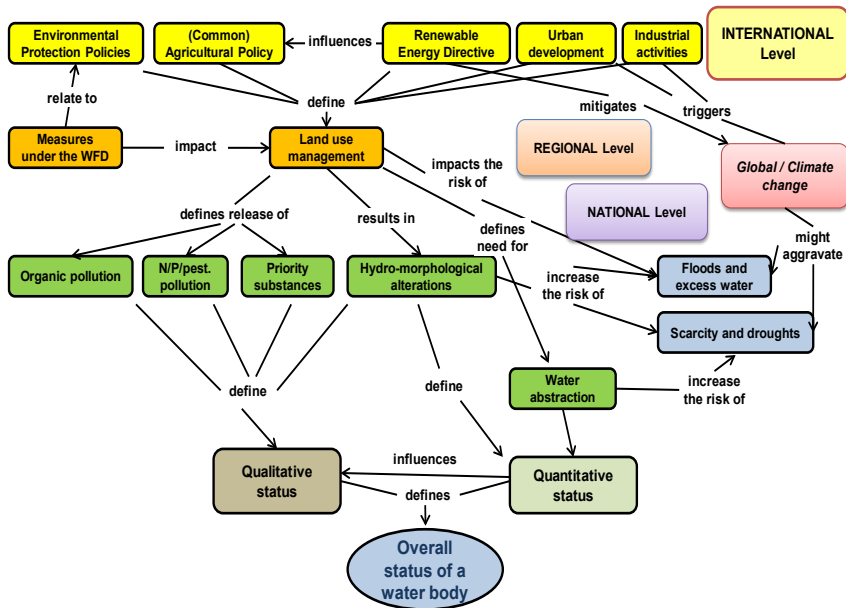


Figure 1. A schematically is presented an integrated water resources management as discussed at the Danube river basin management planning sessions

International level / basins

The Azerbaijan state share numerous waters, such as rivers and Caspian Sea with the countries, such as Armenia, Georgia, Islamic Republic of Iran, Turkey, Russian Federation, Kazakhstan and Turkmenistan, directly or indirectly. Azerbaijan is positioned downstream and of the rivers Kura and Aras, so that all of the impacts and consequences of water extraction at first place, including decreasing of low flows, and water pollution along the two rivers is collected, deposited and infiltrated at the soil and water of Azerbaijan. The Caspian Sea is shared among users of oil and gas from the sea and banks along it, so the pollution and impacts are shared between the neighbors.

An example of a good practice was establishment of an International Sava River Basin Commission of the ex Yugoslav republics, after war times so that aspects of navigation, water quality, flood protection and development at the whole watershed is planned and implementation commenced. In this order, in many regions of the World numerous water conflicts could be prevented or decreased if discussions, conferences, negotiations could be organized. It is to advice experience of the IHP UNESCO National Committees at the Danube countries as promising ground bases for cooperation.

Most important is also the assessment of the international rivers natural flow potentials: after decades of traditional management of resources, for agriculture irrigation or hydro energy production could lead to poor estimation of future projects or development, e.g. an example is high pollution of water at the international Kura/Aras system. Also, poor conditions of the Aral Sea system, incl. rivers Syrdarya and Amurdary. Improving of management of water demands in compliance to contemporary World experience, including quality aspects, is a challenging task for an International commission of a National IHP UNESCO Committees in the Caucasus region; **Figure 2.**

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Figure 2. *The State of Azerbaijan and the neighboring countries at the west part of Caucasus sea sharing the basins of the rivers Aras and Kura and also the Caucasus water district*

Regional level

General aspects, conclusions, visions and measures for improvement of the water body status from the river basin management plans should be conveyed and adapted at the regional and/or national levels. The major conditions and terms for water quantity and the aspects of water quality should be cross - checked at the border monitoring profiles, by joint work of the institutions from the two countries, e.g. Iran/Azerbaijan, or Azerbaijan/RF or others. There is a strong need for establishment of International Commission for the each and every water basin, such as Aras / Kura, the Caspian Sea. The river Ural water is affected by decrease of the water quality, no matter if they are positioned upstream or downstream. Health of entire world of rivers, riparian surfaces and even wider areas are endangered in case of water abstractions, for human or industry purposes, are increasing at the river basins are. In addition, numerous sources of point and/or non-point pollution

sources also decrease the quality of a whole life cycle of a river basin, to a higher or lesser degree.

At regional level lots of issues of a “lesser” importance should be shared and solved, such as water resources for drinking and irrigation purposes. Lots of farmers and people in agriculture are interested for those waters, as well as people and utility companies. Such demands and justification of problems could be solved if only they were settled within the water resources assessment.

National level

Support to implementation of the National Water Strategy should be secured via spatial plans, projects and activities which has an aim to improve water quality and environment at the river basin. Among the major aspects is a sustainable management of renewable water resources. , e.g. like at the basins of the rivers Pirsaat, Quozlicay and Chiclicay, given in **Figure 3**.

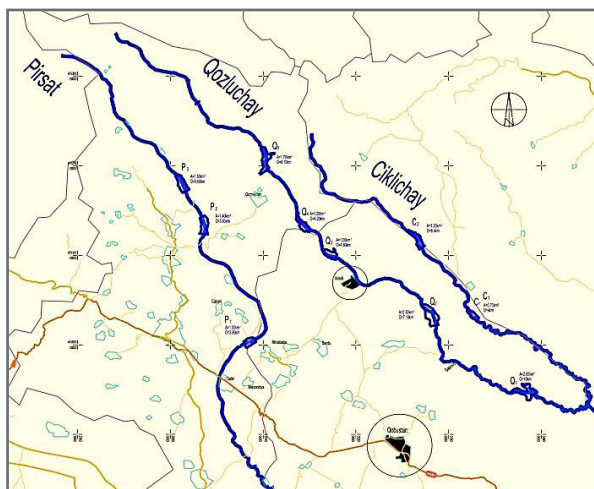


Figure 3. The basins of the rivers Pirsaat, Quozluchay and Chiclicay, including possible reservoirs along those rivers, major settlements Xilmili, Gobustan and villages, the roads - existing and future and pipelines for irrigation and water supply in the vicinity and the Region

GLOBAL AND REGIONAL HYDROPOLITICAL PROBLEMS IN THE CONTEXT OF INTERNATIONAL COOPERATION AND SECURITY

There are lots of potentials of sustainable usage of renewable water resources, measures of resilience accounting for floods and droughts, irrigation and supply. In addition, sanitation and waste water treatment, recycling and reuse, coupled with rainfall runoff treatment and harvesting are modern responses to global and climate challenges that were already documented

The strategy of water resources management has to be integrated, from both sides: at the international level together with neighboring countries at the entire basin level, and at the national level concerning public, state, private, and local authorities. The best way of integrative management is encompassing all human and economic activities and fields, particularly emphasizing renewable sources of water and energy within the national water strategy, for longer time spans, e.g. for 30 to 50 years.

In order for visions and plans that have high requirement to come true, as well as modern ideas, , the engineering domain must be strengthened and improved, taking modern approaches, methods, design and construction experience as a must, and by that, make the measures of improvement that can be beneficial to a wider ground.



Rovshan Rzayev,
*Deputy Chairman of the committee
of law policy and statehood of Milli Mejlis
Of Azerbaijan Republic*

The occupied Sarsang water reservoir as a means of hydro-diversion and hydro-terror by Armenia against Azerbaijan

It is known that Armenia occupied the region of Nagorno-Karabakh of Azerbaijan and adjacent 7 regions and behaves up to present in the territory of Azerbaijan as an invader. In these territories, our cultural and historical monuments, religious centers, natural resources and finally the ecology at whole are exposed to immense damage. As a result of the occupation, many melioration facilities and water reservoirs were passed into the hands of the enemy. The largest of these objects is Sarsang water reservoir.

Sarsang water reservoir was erected in 1976 on Tartar River in the territory of the former region Agdara. Its water capacity was 560 million m³ water. In the past, approximately 100 thousand ha of agricultural area was irrigated by means of this reservoir (*Tartar, Barda, Yevlakh, Agjabadi, Agdam and Goranboy districts*). Sarsang

water reservoir is located about 700 meters above the sea level. Height of a dam is 125 meters, the highest water dam in Azerbaijan.

Besides Sarsang water reservoir being an important melioration unit is a potential man-made threat for enemy. Namely for this reason, it was exposed to the threats and intimidation by the Armenian illegal armed unions. From the first days of Nagorno-Karabakh conflict, there was created a danger of explosion of Sarsang water reservoir and flooding of the surrounding regions. The destruction of the dam may cause facing of approximately 400.000 persons with the danger and humanitarian and ecological tragedy in the region. These ecological threats made against Azerbaijan are integral parts and one of directions of the Armenia's aggressive policy.

Before the occupation of the Azerbaijani territories, our experts have always conducted preventive works, environmental monitoring and other important measures in Sarsang water reservoir. After occupation of our territory, there was not taken any prophylactic measures in Sarsang water reservoir. Certainly, this fact of desolation resulted in technological obsolescence of the water reservoir being exploited within 40 years and neglected during the last 20 years and it was arisen a danger of destruction. Because of lack of necessary facilities, the Armenian occupying forces are not able to secure the water reservoir's safe engineering state.

Presently, the problem of securing Sarsang water reservoir's safe working regime is not resolved. The Armenian party tries to share the responsibility for Sarsang water reservoir with Azerbaijan government and the related problem statement is made on behalf of the occupying regime. In any case, namely Armenia is responsible for the technogenetics tragedy. The reason is that Armenia is an aggressive country and its armed forces occupied the territory of Azerbaijan.

The Azerbaijani party strives for providing the international community with information related to the problem of Sarsang water reservoir and other hydro-engineering units and mainly, the Armenian separatists are not able to resolve all these problems.

To estimate the technical state of Sarsang water reservoir and

other hydraulic facilities in the occupied territories, Azerbaijan makes all efforts to establish International Group of Experts with the participation of the related authorities of Azerbaijan Republic;

The Azerbaijani party has to summon Armenia to observe the international obligations and principles in the field of ecology with the help of international organizations. Especially, to the end of observing the “responsibility for damages caused to the nature of the other country” noted in Stockholm Convention of United Nations of 1972 “on protection of environment” and “protection of environment while military confrontations” underlined in UN 1992 Rio de Janeiro Declaration “on protection of environment”, Azerbaijan make efforts to increase international pressure on Armenia.

Presently there was taken a decisive step:

The matter related to the problem of Sarsang was raised in parliament Assembly of the Council of Europe and in EuroNest Parliament Assembly. I would like to put a special emphasis on the activity of Elkhana Suleymanov, our compatriot, the deputy of Milli Mejlis in this field. On his initiative, there were presented numerous draft resolutions in the Parliament Assembly of the Council of Europe in connection with the situation in Sarsang water reservoir, which were supported by the deputies of the different countries. Despite the Armenian party did its most to oppose this matter, finally in May of the current year there was appointed a reporter in the committee of social matters, health and sustainable development based on the draft resolution “concerning the deliberate deprivation of the civilians in bordering regions of Azerbaijan from water”.

Milisa Markovich, deputy from Bosnia and Herzegovina was assigned to prepare this report, who has submitted the first information on the matter in the fall session of the Parliament Assembly of the Council of Europe.

At the end, we would like to inform that the problem of Sarsang water reservoir is a matter causing military-political and environmental danger for the region and the international community has not remain indifferent as to this problem.



Mary M. Matthews (USA),
*International Coordinator of the Kura
United Nations Development Programme*

Presentation Title: Building transboundary cooperation in the Kura River basin through shared water resources management

The Kura River is a critical resource for the social and economic development of Azerbaijan. As a transboundary river system, there is a high level of need for coordination between neighbors to ensure that the water resources are shared and protected to safeguard sustainable development for current and future generations. Transboundary cooperation between Azerbaijan and Georgia is now leading the way as a model of how countries can work together for integrated water resource management (IWRM). This transboundary IWRM has been built on common and shared water management priorities in the Kura Basin. This supports the water resource needs of the countries and the different sectors, including agriculture, energy, municipal water development and the environment at the local, national and transboundary levels. Both Azerbaijan and Georgia have cooperated strongly as harmonized water resources use by all sectors in both countries is

a critical link further strengthening cooperation between countries. This presentation will outline what has been accomplished to date, and what future opportunities are ahead towards increasing international cooperation and security in the region.

Today, Azerbaijan is at the forefront of water governance for national and transboundary water security. The Kura River is a critical resource for the social and economic development of Azerbaijan. The people of Azerbaijan have relied on the Kura River for many centuries to sustain social and economic development. In the past century, agricultural development expanded drastically with irrigation fed by the Kura River, new energy sources have emerged, and flooding controls have been implemented. In the Soviet era, water resources were developed on a sector-by-sector manner, but based on the assumption that all water management would be centralized. Once the Soviet Union collapsed each country of the Southern Caucasus independently began to address water resources management to meet their own needs. Azerbaijan, as the most down stream country, and as the largest, and only growing population of the three South Caucasus countries, faces certain challenges in terms of water supplies. Despite these challenges Azerbaijan has tremendous potential to become a regional and international leader in water resource management. Azerbaijan now has the political will and financial resources to employ state-of-the-art technologies and build national level capacities to equal that of any country in the world. The insightful Presidential Decree in January 2013 prioritizing water management in Azerbaijan moved Azerbaijan to the forefront of regional and international water management.

As a transboundary river system, there is a high level of need for coordination between neighbors to ensure that the water resources are shared and protected to safeguard sustainable development for current and future generations. The Kura River system developed long before political boundaries, and yet management of these shared resources is now a political challenge in all countries. To protect the water resources we must also protect the environment that

sustains them, through coordination and cooperation. Azerbaijan, as the most down stream country recognizes this, since activities upstream, whether the construction of extensive hydropower reservoirs, or failure to treat municipal water discharge impacts the water quantity and quality for Azerbaijan.

Recognizing these challenges and working closely with the UN and World Bank through the Global Environment Facility (GEF), Azerbaijan is positioned to take a leading role in water management in the Kura Basin. Azerbaijan has lead the way towards inter-sectoral and inter ministerial commitment to addressing water management. The strong relations between Ministry of Ecology and Natural Resources, Ministry of Emergency Situations, Azer-Su, Azer-Amelioration, and Ministry of Health Care, and Ministry of Foreign Affairs, as well as the Parliament of Azerbaijan, has been key in working towards development of Integrated Water Resources Management at the National Level and in cooperation with upstream countries. Specifically the coordination between Azerbaijan and Georgia has been exemplary.

The transboundary cooperation between Azerbaijan and Georgia is now leading the way as a model of how countries can work together for integrated water resource management (IWRM). The Global Environment Facility has applauded these two countries for their commitment to cooperation and working together, through formal channels in line with UNECE Helsinki Convention, and through at development of a shared Ministerially endorsed Strategic Action Plan for the Kura Basin under the UNDP-GEF Kura Project.

This transboundary IWRM-based Strategic Action Plan has been built on common and shared water management priorities in the Kura Basin. Azerbaijan has played a leading role in this and continues to be at the forefront advancing cooperation and coordination in the wider Kura Basin through ratification of international environmental agreements, prioritizing modernized integrated water resource management, and sharing of experience and expertise internationally.

The approach agreed by Azerbaijan and Georgia supports the water resource needs of the countries and coordination among the different sectors, including agriculture, energy, municipal water development and the environment at the local, national and transboundary levels. This is the “water nexus“. The water-nexus is on the lips of every international organization from the EU, the UN, the World Bank, FAO, WHO, and ADB. The application of this “water nexus” involves integrating uses of water so that there is enough water - water for growing food, water for energy and industrials production, water for municipal and domestic uses and water to sustain a healthy environment, including the sources of the water itself. It also means balancing these uses in the face of climate change and adapting to shifting weather patterns.

The water nexus emphasizes water security for all water uses within a river basin. Where necessary trade-offs can be managed, and where possible positive sum solutions can be found based on the water nexus approach. Application of this water nexus is very ambitious, and very promising with the uncertainties of our future due to climate change in the transboundary context. The UNDP and Global Environment Facility welcomes Azerbaijan’s commitment to enhancing food-energy-water and environmental security through application of the water nexus, and will help support Azerbaijan and Georgia to implement this together.

The application of transboundary “water nexus” approach on the Kura River will put Azerbaijan and Georgia at the very front of international water management to sustain food-energy-water and environmental security. Right now, Azerbaijan is at the point of making such significant advances in integrated water resources management, in line with the internationally acclaimed “Water Nexus”, that neighbors and governments near and far are watching Azerbaijan’s development.

It is agreed that it would be ideal to have all countries in the Kura basin coordinating on this effort. However, at this time, the strong commitment from Azerbaijan, with Georgia, to improve national level water management for all sectors while protecting

the environment is the hallmark for leading the way to do this.

Azerbaijan is eager to move ahead and be the example of how water management for security can be achieved in an arid country with a growing population. This will not be easy. This will require financial resources for building capacity at the national level and the local levels. This will require improving local water quality in Azerbaijan. This will require long term financial commitments to sustainable environmental protection. This will require investment and commitment to improved water use efficiency and rational water use in all sectors. This will require commitment of funds for sustainable growth, and taking advantage of the God given natural blessings of this country, including the dedication and generosity of the Azeri people. This will also require a willingness to share experience and expertise with others, and to work in a cooperative spirit towards a sustainable future, to optimize these efforts.

Other countries in the basin will not be able to ignore or discredit the advances made by Azerbaijan as these developments occur over the next years and decades. Azerbaijan is poised to become the leader throughout the basin and internationally in sustainable natural resource security to support human development and advancement. Continued commitment, coordination, and willingness to share the lessons learned with neighbors and with the international community will be a key legacy of Azerbaijan in the future.

It has been said that: If the wars of the 20th century were fought over oil, the wars of this century will be fought over water -- unless we change our approach to managing this precious and vital resource.

Azerbaijan, already too familiar with the tragedies of war and conflicts, is positioned to show the world a new and promising approach to water management and peaceful security, first through close cooperation with Georgia and then onward, God willing.



Ahmed Abouelseoud (Egypt) ,
*Secretary General Egyptian Environmental
Affairs Agency (EEAA)*

Water Resources Management in Egypt “Challenges and proposed arrangements”

Water is a finite and vulnerable resource that is essential to all forms of life on earth. Worldwide water is becoming an increasingly scarce resource. In past times, at least in non-desert areas, water availability was not questioned. Water was easily available from surface and groundwater sources and ready to be applied in multiple uses (Attia, 1997). With the increasing population on one hand and the environmental degradation on the other, pressure has been intensified on the available water resources (Attia, 2001). Tsakiris and Todorovic (1997) reported that the scarcity of water resources, the unfavorable distribution of water resources in time and space, the increasing demands for water, the pollution of water resources, the variability and instability of climate, and the change of socio-economic activities had necessitated the search for rational ways of effective planning and management of water resources. Water institutions, formal as well as informal, water laws, water policy, and water administration are under going remarkable changes worldwide (Saleth and Dinar, 1999).

The Government of Egypt, represented by the Ministry of Water Resources and Irrigation (MWRI), is working towards the promotion of comprehensive water resources management measures to secure water for all sectors. MWRI is the main authority in charge of water resources development, allocation and distribution. Newly developed water resources management strategies has become more integrated in the sense of looking at the water scarcity from all its different sides. Current policies of water resources management look at the whole set of technical, institutional, managerial, legal, and operational activities required to plan, develop, operate, and manage the water resources system on both the national and local scales while considering all sectors of economy which depend on water. Not to forget, sustainability is a major objective of these policies in the sense that the utilization of resources by future generations should not be limited by the use of current generations in any way. Suggested projects and programs do not necessarily have to serve only one sector. Conversely, by better understanding the system and better cooperation between all stakeholders, projects can be multi-purpose; it can serve reclaiming new lands, build new communities and industries, and generating hydropower for these activities while conserving the ecological system for both humans and habitats.

National Water Resources Plan of Egypt till year 2017

An integrated management approach requires much closer coordination among concerned government institutions and the active participation of water users in planning, management and operation of water collection and distribution systems. It also necessitates the establishment/enhancement of the legal basis for water allocation, conservation and protection as well as user participation in water management. Training and capacity building of the MWRI and other stakeholders is also essential to face these challenges, and to be able to manage the ongoing, as well as the anticipated, reform activities of the water policies. To cope with

these challenges, the MWRI has developed a national policy with three major pillars of: 1) increasing water use efficiency; 2) water quality protection; and 3) pollution control and water supply augmentation.

The possibilities to develop additional resources are limited. Deep groundwater withdrawal in the Western Desert can be increased to 3.5 BCM/year, but, being fossil water, this is not a sustainable solution and should be carefully monitored. Small amounts of additional resources can be developed by rainfall and flash flood harvesting and the use of brackish groundwater. Co-operation with the riparian countries of the Nile Basin may eventually lead to additional inflow into Lake Nasser.

Measures to make better use of existing resources aim at improving the efficiency of the water resources system. They include a careful evaluation of planned horizontal expansion projects and a scheduled implementation of the projects in relation to the availability of water. The water use efficiency in agriculture can be improved by many measures, in particular by continuing the Irrigation Improvement Project (IIP) and Drainage Improvement (EP ADP) activities and by reviewing the present drainage water reuse policy, e.g. by applying intermediate reuse and by allowing the use of water with higher salinity content. Moreover, a different water allocation and distribution system that will be based on equity will decrease the losses in the system. To implement such a system and to improve operation and maintenance (O&M) it will be required to have a good institutional structure with strong Water Boards and Water Users Associations. The municipal and industrial water use efficiency can be improved by a mix of infrastructural and financial incentives or measures. Various research topics are formulated to identify further options to increase the efficiency of the system.

The strategy on protecting public health and environment includes several packages in which infrastructural, financial and institutional measures are combined. Priority is given to measures that prevent pollution. This includes reduction of pollution by

stimulating clean products and relocation of certain industries. Agriculture will be encouraged to use more environmentally friendly methods and products. If pollution can not be prevented, treatment is the next option. The plan includes a considerable increase in treatment of municipal sewage and wastewater. Domestic sanitation in rural areas requires a specific approach. In both cases cost recovery is needed to maintain the services. The last resort will be to control the pollution by protecting the people and important ecological areas from direct contact with this pollution. Additional attention is required to protect sensitive areas, e.g. around groundwater wells and intakes of public water supply.

The strategy also includes a number of general institutional measures. The initiated process of decentralization (to Water Boards) and privatization will be strengthened, including a restructuring of the role of MWRI, e.g. by establishing integrated Inspectorates at local level. Cost-sharing and cost-recovery mechanisms will be implemented to make the changes sustainable, in particular with respect to operation and maintenance. Finally, the role of the real stakeholders in water resources management, i.e. farmers and citizens, should be enhanced by involving them better in the various water management tasks but also by strengthening their 'ownership' feelings towards public property.

This paper will highlight the Government of Egypt's (GoE) efforts to achieve water security for all uses. It presents the new policies and programs that were implemented in the water resources management sector.



Farda Imanov(*Azerbaijan*),
Baku State University

Necessity of cooperation in using and protection of Southern Caucasus transboundary water resources

As in many other countries, the main strategy to use the water reserves in Azerbaijan, along with meeting the needs of the different sectors has to be directed towards increasing the efficiency of the use the water resources, amelioration of waters' quality and protection of the environment. Presently in Azerbaijan, we look for ways of application of the technologies enabling to use efficiently the water and increasing the volume of usable water resources aimed at securing the economic and social development in terms of population growth (Imanov, Alakbarov, 2013).

The river water reserves of the Republic of Azerbaijan are 30,9 km³ and approximately 70% of which (20,3 km³) are formed in the territory of the in the neighboring countries. It should be noted that these river waters join our territory in a polluted state.

The Republic of Azerbaijan is considered as a whole a country with restricted water resources. The per capita amount of river waters is 3219 m³ / year. If we take into account only the local water reserves, this figure will be equal to 1104 m³/year.

Presently, no change is observed in the annual course of Kura River in Turkey. The decrease of the course of this river in the territory of Georgia (8-12%) is taken place below Tbilisi between the frontiers with Azerbaijan. Here, water is taken from Kura by Gardaban ($40\text{ m}^3/\text{sec.}$) and Tashiskari ($12\text{ m}^3/\text{sec}$) canals. In Georgia, waters are taken from Gabirri (Iori) river through Upper Samgor ($30\text{ m}^3/\text{s}$) and Lower Samgor ($30\text{ m}^3/\text{sec.}$) canals, from Ganikh (Alazani) River together with Main Trunk and other canals in the amount of $42.3\text{ m}^3/\text{s}$ (Rustamov, Kashkay, 1989).

Decreasing of the river water course in Kura River because of anthropogenic influences extends in the territory of Azerbaijan. The strong influence of anthropogenic factors on the river course regime was started within 1950-1953 by putting into operation of Varvara and Mingachevir water reservoirs. Then, there were built other water reservoirs on Kura River (Shamkir, 1982), Yenikend (2000) and Sarsang water reservoir on Tartar River (1976); other water reservoirs were built on other branches of Kura that was resulted in collection of water reserves in the water reservoir in the amount of 20.6 km^3 (Ahmadzade, 2003).

The quantity of the course assigned to the tail-water of Mingachevir water reservoir depends on the operation regime of Mingachevir hydroelectric power station, the amount of water gathered through Upper Shirvan (water release capacity $78\text{ m}^3/\text{sec.}$) and Upper Garabagh canals (water release capacity $130\text{ m}^3/\text{sec.}$). At the end of 50s of the 20-th century, water was gathered from Kura River below the Mingachevir water reservoir through 151 pump stations ($128\text{ m}^3/\text{sec.}$). The average annual quantity of the evaporation from the surface of Mingachevir water reservoir is about 1000 mm or $20\text{ m}^3/\text{s}$.

This reduction is 44% from Mingachevir up to mouth of Araz River (Sugovushan). In the flange points of Kura River this course (in Salyan) is reduced $425\text{ m}^3/\text{s}$ or 49.8%. The reduction in the quantity of $325\text{ m}^3/\text{s}$ has been registered directly in the basin of Kura and $100\text{ m}^3/\text{s}$ – in the basin of Araz (Saatli).

Beginning from the frontiers with Turkey and Armenia

(Surmali), the anthropogenic reduction is observed in the river's annual course (18-23%). This reduction is 36-52% in the tail-water of Araz water reservoir.

It is known that Samur River located on the border with Russia is of great importance for the economy of Azerbaijan. We know that Samur-Davachi was channeled in 1940 from Samur river and at the end of 50s this canal was conducted up to Jeyranbatan lowlands, as a result of which in Absheron was formed a freshwater Jeyranbatan reservoir. This canal is a main water resource to irrigate the lands more than 100 thousand ha in Samur-Davachi lowland and Absheron peninsula. These waters are used in water supply of Sumgait and Baku city and in landscaping works in Absheron.

It was determined that within 1969-2006, both the average annual and the monthly course of Samur river was reduced. Decreasing of the annual course is equal to 21,8% (16,5 m³/s). The most significant decrease was taken place in July-September months (24,5-27,3%).

In Islamic Republic of Iran 2,6 million people reside in river basin of Araz. The arable lands consist of 636 000 ha. 270 000 ha lands are under crop. The irrigated lands are located in Mugan plain (90 000 ha) and in territories along the river Araz. Water is mainly used for irrigation. The volume of these waters is 3.270 km³ that 2.277 km³ of which falls into the share of underground waters. Only underground waters are used as fresh waters (UNDP/GEF, 2006).

Often using the water resources adversely affect the ecological state of the rivers, the main water reserves: the amount of the river water is decreased and the quality of water is deteriorated, as a result of which the matter and energy exchange process taken place in the river ecosystem is violated.

To resolve these problems, we have to conserve the water-ecological flow in the river at some degree. The definition of "ecological course" takes into account those quantity and quality indices of the river course that don't envisage any strong quality changes to be occurred in the river ecosystem and the river is

protected as a landscape element.

The overall classification developed to calculate the ecological course has been provided by R.E.Tharme (Tharme, 2003). But the summary provided by Tharme doesn't cover the methods developed in the former Soviet Union. The methods worked out in this territory have been researched widely by A.M.Vladimirov and F.A.Imanov (Vladimirov, Imanov, 1994).

The study of the ecological flow was not paid sufficient attention before 90s of the past century in Azerbaijan. So, while projecting of various water economy objects and drawing up of water economy balances, the recommendations effective in the former USSR were not referred basically. As it was noted by S.H.Rustamov and R.M.Gashgay, the depth of waters has to be at least 1,4-1,5 m to secure the normal working regime of vessels in Kura river (Rustamov, Gashgay, 1989). To provide these depths, the water consumption below the water reservoir Mingachevir has to be supplied in the amount of 175 m³/sec. that means and conforms to the flow capacity in a year in the quantity of 6km³.

The water reserves are considered in Azerbaijan as one of important factors of the sustainable development. Using and protection of water reserves has to be managed in an integrated manner and at the same time, the population's economic and social needs, including the factor of environment has to be taken into account.

The transboundary water policy of Azerbaijan is based on the effective international documents. This policy means first of all use of water resources together with neighboring countries and the fair distribution hereof.

The main reason hampering and even reducing the cooperation in use of the water reserves in the basin of Kura, the key transboundary river of the region and Azerbaijan, is the known position of the Republic of Armenia in connection with the Karabakh problem.

Presently, as it is impossible to conduct a dialogue with all basin countries and organize the exchange of the observation records as regards the river waters' quantity and quality indices, Azerbaijan

prefers the cooperation with the neighboring countries based on the bilateral contracts. And it creates all favorable conditions to resolve partially the existent problems.

Azerbaijan considers that the transboundary waters have to be distributed fairly and used purposefully and effectively. Fair distribution of waters doesn't mean that water reserves have to be distributed between the basin countries equally. The fair distribution stipulates for effective use of waters, including the factual and perspective needs of countries and application of the modern irrigation technologies.

The legal relations concerning the use and protection of water objects in the Republic of Azerbaijan are explained based on the "Code of Water", the law of Azerbaijan Republic. The Code contains at the same time, the rules, conditions and terms of giving of water objects into operation, rights and duties of water consumers, basis and rules justifying the liquidation of water use.

Despite the water code doesn't cover completely the principles of the integrated management of water reserves, its main preferences include first of all the development of management and protection of environment in the field of use and protection of water objects, as well as the coordination of the administrative-territorial principle with the basin principle.

Azerbaijan has joined 14 International Convention on the environment, including "the Convention on protection and use the transboundary water flows and international lakes" (March 18, 1992, Helsinki) and ratified it on March 14, 2000.

Presently Azerbaijan conducts a policy in the field of use and protection of transboundary water courses substantiated by the international water jurisdiction.



Hendrikus Bosch (Netherlands),
*EcoCoast Consultancy/European Centre for Nature
Conservation Land and Sea Group Associate*

Transboundary water management, willingness to cooperate between trust and technique

Water: A Common Good

Water is a common good which is balancing between local, national and international sovereign needs. Most water users see themselves as independent, sovereign users of the water resource. In fact water use is neither independent nor sovereign, but dependent on nature and other users. Water has a dynamic character requiring dynamic sharing of water. Water management is about dynamic balancing between water availability and water demand, nationally and internationally. Water starts to be recognized as the most important natural resource. In the Global Risks report 2014 fresh water ranks third, behind debt and unemployment, as one of the world's greatest economic risks.

Water Sharing

Sharing a river source is sharing a common good. Managing of common goods bring special challenges with them. Their

success is depending on common understanding and willingness to cooperate. Non communication on the background of proposals is a major source of conflicts. Technical water management is needed based on open communication and trust building

Water is a dynamic resource, changing from month to month, from year to year in quantity and quality. Fixed sharing per year does not fit seasonal water demand by agriculture or energy and the individual water quality needs of the users. Therefore fixed water sharing is impossible.

By the non-zero sum approach water needs are balanced based on the seasonal need and availability of water, given away one season and compensated in the next. The water sharing takes also the economic and social value of water into account. Value is depending on efficiency, market value, social and economic dependency and vulnerability. The sharing lies in the hand of water managers. The non-zero sum water sharing approach is building on recognized dependency of and trust in each other.

Mapping of Risks and opportunities

Maps are very informative and illustrative. They can be used as valuable instrument to identify risks and opportunities.

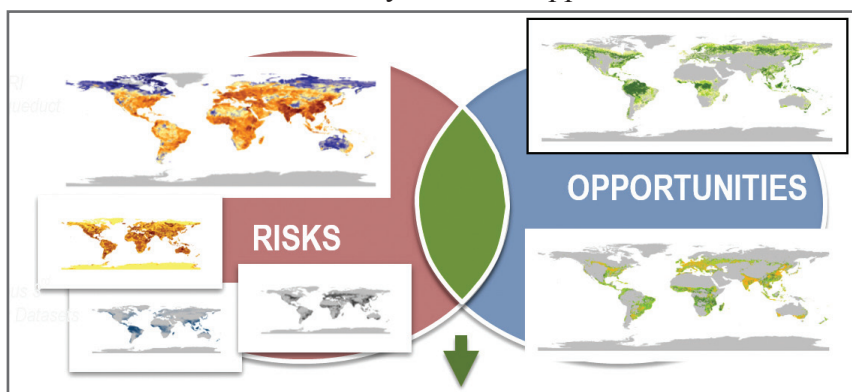


Figure 1. Risk and opportunity mapping

GLOBAL AND REGIONAL HYDROPOLITICAL PROBLEMS IN THE CONTEXT OF INTERNATIONAL COOPERATION AND SECURITY

For the Southern Caucasus maps of WRI–Aqueduct are illustrating the water management issues in the Kura Araks basin very well.

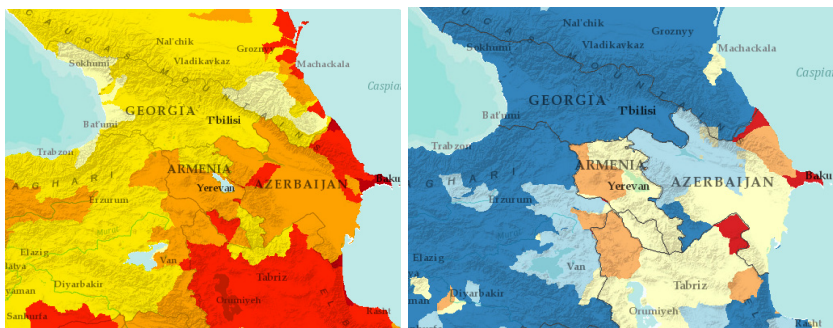
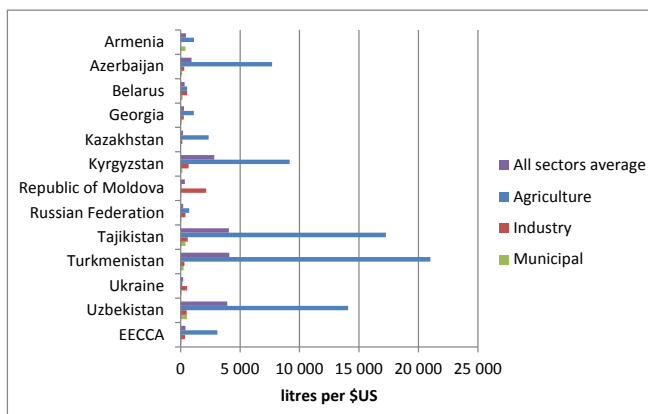


Figure 2. Water stress and climate change impact in the Southern Caucasus

Water efficiency

Water is relatively efficient used in the Southern Caucasus. Agriculture in Azerbaijan can be seen as an exception with a high water use per productive value. This cannot completely be declared from the climatic conditions in the country. In all Kura basin countries effort on efficiency would be useful.

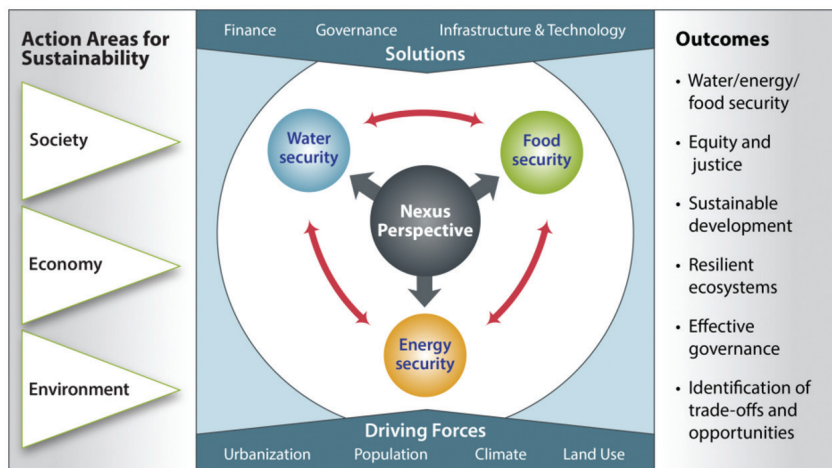
Figure 3 Water efficiency in the NIS



Water Nexus

Water is used for different aims varying from drinking water, food production, energy and environment. The sectors are competing in the use of the same water. The integrated approach of water management taking parallel all involved sectors into account is called the Water Nexus.

Figure 4. Water nexus perspective



In the Water Nexus in an integrated way driving forces, action areas, solutions and outcomes are logically and inter-sectoral brought together in one process



Figure 5 Water Nexus process

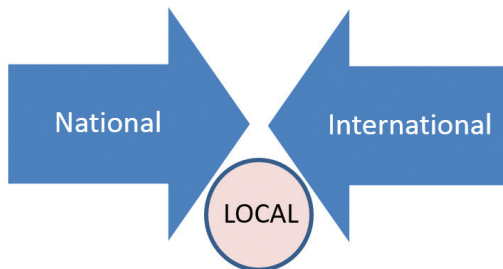
In the water nexus process Private Sector, Civil Society, Public Sector and Social Impact & Hybrids are brought together is searching for win-win situation. In the Water Nexus some factors are playing an important role:

1. *Scale of matters (national vs. local)*
2. *Science needs to be rightly involved*
3. *An external catalyst is often needed to spur action*
4. *Leadership is key in water nexus development*
5. *Education and Information is needed at all levels*
6. *Common Disaster preparedness and rebuilding infrastructure*
7. *Non-coercive incentives for participation*

Sovereignty

Sovereignty is severely influencing transboundary water management. It has a national and international dimension. National sovereign interests is playing a key role in transboundary water management, parallel to Economic, social, environmental policies, virtual water and Energy policy.

Global and international sovereign interest plays a role by transboundary waters (basin-wide) management, global and regional trade, environmental legal regimes and international law and international relations.



The Local dimension is often squeezed between the national and international dimension of sovereignty. But sometimes local dimension is a building block for them.

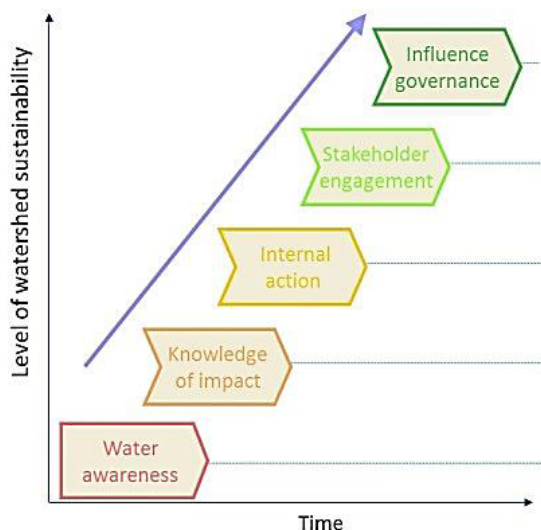
Figure 6 *Local, National and International dimension of water sovereignty*

Factors for success and failure of the Transboundary Water Nexus

Clear framework to prevent confusion and mistrust, working together, involvement of all stakeholders, open and transparent proceedings, local circumstances reflected, balancing the need for full participation and taking urgent actions when required, earmarking budgets and other resources and being flexible to allow collective learning, with continual adjustments based on priorities and needs. Those are the most important factors for success of the Water nexus approach.

Important factors causing failure are competing sectoral interests, each with its own agenda and professional blinkers, cultural differences and traditions, inaccurate, withheld or disputed data, ignorance or unconcern for other needs, structural, social or economic inequalities, clashes of interest on specific issues or procedures and most often personalities and power struggles.

The issues to start the NEXUS process with should be selected carefully, to reduce the chance on failure:



- ▶ Selection of the most important issues,
- ▶ Selection of the issues which can be solved quickest, easiest and cheapest,
- ▶ Selecting issues which, when solved, would create most common benefits.

Sometimes it is necessary to divide the issues in time and size smaller objectives to get result on shorter term, resulting in building trust between the stakeholders.

Ultimate goals per step for Water nexus stewardship are:

Water awareness: All basin stakeholders have a strong understanding of the water challenges, their dependence on freshwater and their exposure to water related risks.

Knowledge of impact: All basin stakeholders have a detailed understanding of the impact they and their suppliers have on river basins, including identification of high risk ‘hot spots’

Internal action: All stakeholders have taken action to optimize internal water governance, water efficiency and measuring, reporting and improving water quantity and quality

Stakeholder engagement: Companies, governments and NGO’s are engaged in multi-stakeholder platforms to address user responsibility and governance

Influence governance: Governments are motivated to manage water basins in a sustainable way and are investing in improvements of the basin

Feasibility

Water management should be Technical feasible, Economic feasible and Political feasible. Often it is a choice between National needs and Transboundary issues. The three key themes of Political feasibility are:

1. **Political acceptability to override international issues by national needs**

- 2. Willingness to cooperate**
- 3. Trust in partners**

Trust

Trust is not blind. It has to be earned. It is based on key conditions of building trust. In water management these are Water efficiency, Ability to manage, Timely information to enable influence on transboundary management and Techniques to control the information of the partners. By lack of these keys of trust, the transboundary water management will risk to fail.

Under Ability to manage is understood the complex of Water quantity and quality Monitoring, Control of pollution, Water quantity management, Risk management and the Capacity for Emergency response. When these are in place in an Nexus approach, with right can be said that the ability for water management exists. This ability in combination with information supply builds the trust that is worked on saving the quality and quantity of the natural resource for downstream users.

Techniques to control info contain Common monitoring, Early warning and increasingly Remote sensing. Common monitoring is a basic technique for information exchange. Increasingly remote sensing is taken over their role by global monitoring. New detailed, independent and open info sources are available for water management, for example in the framework the EU Copernicus programme.

It provides information and toolkits on:

- 1. Measurements of water quality and extension and allowing changes to be rapidly detected**
- 2. Consistent time series with high-end accuracy and reliability in support of freshwater forecasting systems**
- 3. For environmental and climate monitoring**
- 4. Measuring surface water height**

These data is free available, freely, timely and frequent, Verifiable and in common available for all users.



Adishirin Alakbarov,
*Deputy Director of “Sukanal” Scientific-Research
and Project Institute/ “Azersu” OJSC
Doctor of Geology and Mineralogy*

Transboundary water issues in the Southern Caucasus in the context of international law

The Caucasus is a region at the border of Europe and Asia, situated between the Black and the Caspian seas. There are transboundary water relations between Azerbaijan, Armenia, Georgia, Iran, Russia and Turkey in limited space. The Kura-Araz rivers basin catchment area is about 188 thousand km² which is a main water artery of Southern Caucasus. Whereas the Kura-Araz rivers basin is not very large at first glance, basin covers area of Armenia completely, most of its territory of Azerbaijan and Georgia, significant territories of Turkey and Iran. Amongst these countries Azerbaijan is located in the lower part of the Kura-Araz rivers basin. For this reason, throughout the basin, water flow starting from the area of Turkey, Iran, Georgia and Armenia, passing through the territory of Azerbaijan and discharged into the Caspian Sea.

There are transboundary problems between Georgia, Armenia and Azerbaijan in the region. There are no serious and critical

problems between countries in respect of the use of water resources. The main problem is pollution of transboundary water flows. In the territory of Georgia, every year around 330 billion cubic meters of contaminated water is discharged into the Kura river and its tributaries without any treatment. The Kura river's tributaries flowing through Armenia Akstafachay, Ijevan, Dilijan and others, contains chemical dye, oil products, phenols, ammonias and other other contaminants (over 1 billion m³/year) that are discharged into the river together with wastewater. The rivers Alazan and Iori (left tributaries of the Kura river) enter to Azerbaijan already polluted in the territory of Georgia.

Azerbaijan's second biggest river Araz has huge contamination concerns. Left tributaries such as Razdan, Arpachai, Okhchuchai etc. of the Araz River contain hazardous substances (nitrite nitrogen, ammonia nitrogen, heavy metals and other pollutants exceeding the sanitary norms dozens of times), which come from Armenia with water flow. Volume of annual wastewater disposal into the Araz River in the territory of Armenia is about 350 mln m³. Waste waters from Qajaran copper-molybdenum, Gafan copper-enrichment are flown to Okhchuchay without purification. During mass water flow "river water" which enters with Okhchuchay to the territory of Azerbaijan contains red-brown and almost black ooze flow. This liquid contains high concentration of aluminum, copper, zinc, manganese, titanium, bismuth and other component.

UN, UNESCO, UNECE, INBO, GWP and other international organizations aims consistent and durable for management of water resources on the principles of justice and mutual agreement, recognition and implementation of international principles and norms on use and protection of transboundary watercourses by all countries of the world, ensuring more countries to join international convention on transboundary water resources. In spite of international organizations accepted as of 20 significant documents on effective use of transboundary waters, most of these conventions haven't been applied.

It have been clearly identified that use of transboundary waters passing through its own territory according to the necessary

requirements, and take into account the rights of the other border states based on the principle “rational and equitable use of water resources” of the main document on transboundary waters UNECE “Convention on the Protection and Use of Transboundary Watercourses and International Lakes” Helsinki Convention.

While implementing measures for the prevention, control and reduction of water pollution, the parties shall be guided a) by the precautionary principle b) “the polluter-pays” c) water resources shall be managed so that the needs of the present generation-the main principles of humane governance, but in point of fact Helsinki Convention faces big challenges in the implementation and doesn’t operate effectively. In this regard, we consider it necessary to note 2 items: 1) many states ignores it and do not sign the convention; 2) There is also a need to put more acute problem in the Convention.

In the sentence “Water pollution prevention”, control and reduction which arrange the basis of the Convention the lined up words make the main essence weaker instead of strengthening. The phrase of “ Prevention, control and reduction of water pollution” in “Model Provisions on Transboundary Groundwaters” preparing by UNECE Helsinki Convention on the application of groundwater is maintained as well as before in convention. It will be more expedient putting issue concretly such as “prevention water pollution”. In this respect virtuality was imprinted more correctly in the European Water Framework Directive. The main objectives of Directive is the reduction of the concentrations up to the limits which can be found in the nature and achievement of the elimination at all.

The Parties shall eliminate hazardous substances in transboundary watercourses protecting the ecological mode, to ensure that transboundary waters are used with the aim of ecologically sound and rational water management, used in a reasonable and equitable way, shall take priority measures for environmental protection, maintaining and restoring ecosystem if necessary in accordance with 2nd article of the “Convention on the Protection and Use of Transboundary Watercourses and International Lakes”. As shown in obligations under the Convention it is necessary to

take precautions during these activities, shall be warned about the possible impact of hazardous substances carrying in transboundary waters, responsible party have to pay the cost of eliminating the damage, if discharged harmful substances into the waters.

Despite the clause shown in the Convention that the country located in the upper side of transboundary River shall not impact of surface water quantity and quality without consent of country located in the lower side of the river but the real situation is different in Southern Caucasus. The Republic of Azerbaijan which 70 % of water demand is developed into surface water of trans boundary Rivers has joint to 17 different international conventions on the protection of the environment, including ratification of Helsinki Convention for Use and Protection of Trans boundary Water Sources and International Lakes of United Nations.

Other countries of Southern Caucasus – Georgia and Armenia, have not joint to Helsinki Convention up to date and continue their illegal activities on trans boundary flows. Therefore, the legal resolution of the problem is limited.

In the result of non acceptance of international law on water sources by the all countries of Southern Caucasus pollution of trans boundary rivers with industrial and domestic wastes are continued. In the meantime operation of hydraulic facilities which affect the amount of water in the rivers in the neighboring countries agreed to operate hydraulic installations. A flow impact to the rivers coming through Armenia to Azerbaijan, use of Sarsang water reservoir which is under occupation as hydro diversion intentions and etc. against people and environment proves the dangerous nature of the problem.

Either in other regions of the world or in Southern Caucasus water pollution, monopoly of water resources as well as use of sources as hydro diversion intention is unacceptable. The development of further activities by the International Organizations in order to ensure recognizing and unconditional acceptance of international principles in the whole region on use of trans boundary water sources and their protection.



Ramiz Sevdimaliyev (Azerbaijan),
*Senior scientific employee of
The Institute of Philosophy and Law of Azerbaijan
National Academy of Sciences, Doctor in Political Sciences*

International political and legal aspects of the threats Related to the occupied Sarsang water reservoir for Azerbaijan

First of all, I would like to express my deep gratitude to the Center for Strategic Researches under the President of Azerbaijan Republic for organization of the international conference devoted to the international cooperation and security matters in the field of global and regional hydro-political problems. This conference dedicated to very actual and sensitive subject for the modern period was joined by leading specialists of 9 countries that demonstrates considerably the significance hereof. For the opportunity created to pronounce a speech in this international conference organized in cooperation with the Institute of Geography of Azerbaijan National Academy of Sciences I extend my gratitude both to the Center for Strategic Researches and the Institute of Geography. As it is known, the fight of the world states for energy resources, raw-

material, technologies, capital, transport corridors and sale markets is pertained to the main geopolitical problems of the modern international relations. At the same time, the competition for foodstuffs and water resources is exacerbated with the time having inclination to become the geopolitical problem of the international relations' system. Many experts forecast that the competition for the water resources will acquire the nature of open confrontation in the near future.

And the report submitted by the United Nations in 2013 as regards the condition of the water resources accentuates the necessity of radical changing of the method of management of water resources. The report stresses that the need in water in 4 sectors of the economy, as the agriculture, power engineering, industrial production and domestic use is growing rapidly. The report forecasts that the economic inequality amongst various countries and the economic differences between the separate regions inside the countries will intensify because of negative factors in connection with the state of the water resources that in its turn will increase the probability of passing the efforts concluded in acquiring access to the water resources to the open struggle context.

In the UN report devoted to the state of water resources, the Southern Caucasus and Central Asia are pertained to the regions where the struggle for water resources will be intensified in the near future. Therefore, the aforementioned problems acquire the special relevance for a region as the Southern Caucasus, which is geopolitically sensitive and where the water resources are distributed unequally.

Besides, one of the factors affecting the intensification of the struggle for the equal water resources in other spheres is to involve the Southern Caucasus countries to the armed confrontations. In the territory of Georgia, the separatist regimes of Southern Ossetia and Abkhazia were formed. And Azerbaijan is faced within the years when it has acquired its state independence with the aggression of Armenia. As a result of this aggression, 20% of the territory of Azerbaijan, including the region of Nagorno-Karabakh and the

adjacent 7 districts were occupied by the Armenian armed forces. Armenia keeps the aforementioned lands of Azerbaijan under occupation up to present and has formed an invader regime in this territory called “the Republic of Nagorno-Karabakh” (RBK).

Azerbaijan was exposed to the significant material and spiritual damages as a result of the armed aggression. In the occupied territory, numerous historical and cultural monuments, state owned enterprises and social objects were destructed and razed to the ground. The occupation of the Azerbaijani territory extends more than 22 years.

A number of objects of the great strategic importance were left in the occupied territories. Certainly, several water reservoirs include to these strategic objects. Therefore, this fact, i.e. occupation of the important part of Azerbaijani territory caused serious damages to the economy, as well as the agriculture of the regions near to the front line that are resulted in deliberate deprivation of the population residing in these regions and using the water resources against the population as a threat.

It is to be noted that the largest water reservoir being occupied within the war is Sarsang water reservoir. This water reservoir was put into service on Tartar River in 1976. The height of the dam is 125 m and its length – 500 m, the overall water capacity is 570 million m³, running water capacity 560 million m³. The system consists at the same time of the little regulating water reservoir 20 km below the main water reservoir and a dam (6 million m³).

Sarsang water reservoir was first of all envisaged with the purpose of electricity and irrigation. Therefore, there was mounted hydroelectric power stations in (HPS) the water reservoir consisting of 2 pieces of turbine, each having power of 50 MWth. The water turning capacity of each turbine being maximum 30 m³ / sec. there was envisaged to turn on water from the HPS in total 60 m³. At the same time, an irrigation canal was built in 6 districts of Azerbaijan (Tartar, Agdam, Gornaboy, Barda, Yevlakh and Agjabadi) to irrigate the fields under crop separated into two parts being the northern and southern directions and with the overall length of 240 km.

Besides, 6 valves have been installed in the water reservoir's dam aimed at discharging irrigation water to the river in the cases when HSP was not in working regime. There was envisaged to discharge water in maximum volume of 30 m³/sec through these valves to Tartar river, each 5 m³/sec.

The water course is regulated with the help of two turbines of 50 MWth mounted on the water reservoir before the Armenian occupation and with the purpose of irrigation the areas under the crop in 6 regions of Azerbaijan near the front line, they were directed towards the irrigation canal. Through the main canals beginning from Sarsang water reservoir, sowing areas more than 100.000 ha were irrigated in the territory of aforementioned districts located in flat grounds of Azerbaijan. These districts were deprived of using it within a period exceeding 22 years because of occupation of Sarsang water reservoir.

It is to be noted that Sarsang water reservoir is pertaining to the category of one of the most complicated water reservoirs of the world by its geographical position and the structure of the territory it located. So, the territory of Sarsang water reservoir is too high from the hypsographical point of view and was built approximately at height of 726 meters that increases seriously the likelihood of results of an accident to be occurred.

It should be emphasized that water reservoirs, especially those built possessing very complicated hypsometrical parameters as Sarsang water reservoir have to be exposed regularly the technical inspection. But within the period of occupation exceeding 22 years, the hydro-facilities and equipment were not rendered any technical inspection. On the other hand, the water reservoir, as it was noted above was put into service in 1976, i.e. 38 years ago. Therefore, hydraulic devices and equipment in the water reservoir have exhausted their engineering resources. So, presently Sarsang water reservoir is in emergency state and it may meet at any time the accident.

These accidents may be occurred firstly because of expiration of service period of the equipment and hydraulic facilities mounted

on the water reservoir within the years of occupation, when they were not rendered any technical maintenance service.

Secondly, the intensity and scope of natural calamities, floods and earthquakes occurred within the last time in different places of the world are seriously increased. Even, the natural calamities not included to such category may be occurred regularly in the regions for which they were not typical.

Finally, thirdly, Sarsang water reservoir is under occupation of Armenia and the aggressive regime has repeatedly threatened Azerbaijan to blow up the water reservoir. Each time, the diplomatic pressures are intensified against Armenia within the framework of international organizations, the invader state deliberately exacerbates the situation in the front line, organizes armed diversions and threatening Azerbaijan using the factor of water, informs about its intention to blow up the water reservoir. On the other hand, the transboundary River Araz is polluted regularly in the territory of Armenia with domestic and industrial wastes, as a result of which the amount of heavy metals, toxic elements, including other materials harmful for the health, environment and agriculture exceed over and again the limit envisaged by the recognized norm. Through other small rivers joining the territory of Azerbaijan through Armenian lands, different explosives are discharged from this country to the territory of Azerbaijan. One of these cases was resulted a few years ago in a tragedy. An underage child of a family visiting their close parents in Tovuz district from Russia picked up a toy from the River water course, it was exploded in his hands and the child was killed. That's why, the probability of blasting Sarsang water reservoir by Armenian party is high and in such a case, the water may be turned into a mass destruction weapon.

It should be asked: what can we say about the negative results and a scope of an accident to be occurred in Sarsang water reservoir? In the case of accident to be occurred for any reason, water leaving the reservoir begins to move quickly thanks to great kinetic energy, as the water basin is located at the height. As per the calculation

made by the Ministry of Emergencies' experts, while an accident to be arisen for various reason the giant water masses, overcoming approximately a distance of 48 km within 60-70 minutes will reach the city of Barda and the height of water flooding the city will be about 40-50 cm. As a result, an area of 30 thousand ha will be under water masses within a very short time, which will destruct completely the infrastructures, flora and fauna in this territory and generally all wildlife.

Certainly, in such a case, the formation of a humanitarian crisis will be inevitable. So, because of the accident emerged suddenly, huge water masses will overcome approximately the distance of 48-50 km within a very short time (in total 1 hour) and will destruct all wildlife met in its way. Within this short time, it will be impossible to relocate the persons populated in this area. It should be noted that the population of 6 front line districts of Azerbaijan deprived to use the water supply as a result of occupation is about 400 thousand persons. It is clear that the life of populated settled in these districts are always under danger and in the case of an accident there will be inevitable to meet the humanitarian crisis in the region.

It should be emphasized that some part of internally displaced persons exposed to the forced relocation because of ethnic cleansing carried out forcibly by Armenia in the occupied territories of Azerbaijan have populated the front-line districts. These people have already exposed to the humanitarian crisis once, at the beginning of 1990s as a result of ethnic cleansing policy of the Armenian armed forces and 22 years later they are met with again the same analogical threat.

So, the Azerbaijani population settled in the level ground territories below the water reservoir fallen into the emergency conditions because of lack of technical maintenance within a long years are now under serious danger. Besides, the invader Armenia releases water from the water reservoir during the winter, as a result of which lands remain under water, roads are destructed. And in the summer season, when the population and the agricultural areas

are of great need in water, it blocks the entrance. As a result, the organic content in the upper surface of the land became broken, the agriculture was seriously damaged and the productivity has fallen sharply, vegetation in many territories were dried and destructed and began the process of desertification, due to these facts the ecological balance in the region was violated and the biodiversity was severely infringed.

The matters, such as, relation and the international legal responsibility became one of the most important issues while considering the emergency situation occurred in Sarsang water reservoir, the international legal and political aspects of the threats created by this water reservoir for the surrounding territory. As regards the matter of appurtenance it should be emphasized that Sarsang water reservoir was built in the territory of Azerbaijan and on account of its budget expenses. Sarsang water reservoir is located within the internationally recognized boundaries of Azerbaijan and is a property of Azerbaijan.

At the same time it should be emphasized that Sarsang water reservoir was occupied from 1992 by Armenia. According to the international legal norms, any activity carried out by the invader in the occupied objects is considered illegal. Besides, the aforementioned invader will be responsible for any catastrophe occurred or to be occurred as a result of activity or inactivity in the occupied objects in line with the internationally recognized legal norms. So, Armenia bears international legal responsibility for the humanitarian and ecological crisis to be occurred in the region as a result of an accident in Sarsang water reservoir for any reason.

It should be asked: what steps have to be undertaken to prevent the accident in Sarsang water reservoir and the humanitarian and ecological crisis to be occurred as a result of this accident?

It should be noted that the problem related to Sarsang water reservoir cannot be considered as a separate problem. It was occurred because of the conflict of Armenia-Azerbaijan, Nagorno-Karabakh, occupation of Azerbaijani territory by Armenia and extension of this conflict more than 22 years and has to be analyzed

namely in this context. On the other hand, without liberate the Azerbaijani lands from occupation we cannot reach the resolution of this problem for a long time. Therefore, Azerbaijani territories have to be liberated as soon as possible from occupation. To this end, the world community has to demonstrate respect and objective attitude towards international legal norms, to oblige Armenia to put an end to the occupation through available mechanisms both on universal and local level. Finally, after liberation of Sarsang water reservoir the experts have to organize the technical expertise hereof, we have start to various restoration and reconstruction works and the irrigation networks have to be reorganized in strict conformity with the modern requirements.



Arif Akhundov,
*Head of the Service of Statistical reporting
of the State Agency of Water Reserves,
the Ministry of Emergencies*

Water strategy of Azerbaijan Republic, providing its water security

In 21-th century, the water security is amongst the matters of the very strategic important for each country, as the energy, foodstuff and transport security. So, the shortage of water resources in the modern period is one of the global problems threatening the world and the population's reliable water supply is becoming a problem affecting the intergovernmental relations.

According to the last report of United Nations (2009), if we fail to take decisive steps as regards this problem, in 2030, 67% of the world population, i.e. 5 billion persons will be starved to death.

According to the calculations of the World Resources Institute of 2005, the name of Azerbaijan is appeared amongst 13 countries where per capita water reserve is fewest (97 m³ / year).

The country's geographical position is sensible to the climate changes' influences. Azerbaijan is by right appeared in the list of 39 countries that will expose to damages because of climate changes

as it was acknowledged by the report of US Central Intelligence Administration.

The potable waters in the territory of Azerbaijan, possessing restricted resources were distributed unequal. Presently, the surface water resources of the country are 27 m³ and in times of drought these resources are reduced up to 20-21 m³. 70-72% of the country's fresh water resources, i.e. 19-20,6 m³ are formed outside the country boundaries at the expense of the transboundary rivers' flows (21 rivers).

According to the opinion of the specialists, in the new millennium, the water can occupy the place of oil in the 20-th century. So, more and more countries prefer to use the water resources as a pressure and economic-political means.

As the President Ilham Aliyev has noted in one of his speeches, "presently the struggle is conducted all over the world for the oil and gas resources and as luck would have it Azerbaijan uses these resources for the welfare of the people and the development of the country. But the time will come when the fight for the water resources will become more strained. Now we feel the signs of the mentioned struggle. In this case, the water security has to be provided in Azerbaijan completely".

And to provide the water security, the President say that "effective use of water resources, implementation new projects, laying of new canals and constructing of water reservoirs is a matter of strategic importance".

We know a number of factors impeding the provision of the water security:

- 1. The water resources' integrated management system is not perfect, coordination of institutions carrying out their activity in the field of water is poor;**
- 2. The legislative base and statistical reports in the field of water don't meet completely the requirements of the international standards, the matters of passage to the basin principle as per the Water Framework Directive (WFD) and the integrated management were not resolved completely;**

3. Within the last 30 years, re-estimation of water resources was not carried out.

But the water security is threatened and these menaces are growing as a result of aggression of our country's territory by Armenia:

- 1. Limited water resources. The average annual water shortage is calculated in the amount of – 3,7 km³ and during the years of water shallow it is 4,75 km³. According to the Second National Information of the country concerning the UN Climate Changes Framework Convention, as a result of climate changes, 23% reduction of country's water resources is forecasted until 2050.**
- 2. Formation of 65-70% of the surface water reserves in the territory of neighboring countries and entering to the territory of the country in polluted state through transboundary rivers (21 rivers);**
- 3. Unequal distribution of the internal rivers in the country territory and not regulation of their courses;**
- 4. Regular repetition of floods and other similar events;**
- 5. Excess amount of water losses and so on.**

As per information provided by the Statistical Committee:

- 1. The amount of waters taken from natural sources is annually 12509 mln.m³ (for 2013) and per capita water – 1346 m³;**
- 2. The water consumption is in total – 8229 mln. m³ or 65,8% of the gathered water, from them: for domestic and drinking purpose – 311 mln. m³, 2,5%.**
- 3. For production needs – 2056 mln. m³, 16,4%, including portable water – 53 mln. m³.**
- 4. For irrigation and supply in the agriculture – 5746 mln. m³, 45,9%;**
- 5. Water lost while transportation – 4280 mln. m³, 34,2 % of the taken water or 52% of the consumed water.**

Besides the problems we have noted in connection with the water reserves, we have to emphasize the threats for the water security:

1. *Growth of the country population, widening of the irrigated areas aimed at the supply of the foodstuff security, climate changes and other similar factors lead to an increase in demand for water. To meet the growing demands on the account of water reserves formed inside the country and waters whose reserves are decreasing year by year is impossible;*
2. *62% of the total water reserves of the Southern Caucasus region are fallen to the share of Georgia, 28% - Armenia and only 10% to the share of Azerbaijan. The fact that the corresponding international documents concerning using and distribution of water reserves were not signed by all region states affords possibilities for revival or outbreak of unresolved conflicts.*
3. *The territories and the population located in the lower flow of Tartar River are always threatened by failure of administration of the water economy objects, including Sarsang water reservoir in the territories occupied by Armenia and failure of regulation of the water level in these units. At the same time, the plans drawn up regularly by the Armenian specialists to change the direction of flow of some rivers are a means of threat for all regions.*
4. *The fact that more than 70% of the water resources of Azerbaijan Republic are formed in the territories of the neighboring countries, which are exposed to the intensive pollution with chemical, radioactive and other harmful substances cause troubles in supply of the population with potable water and the arable lands with irrigation water. The dependency ratio of the region states on the transboundary waters is 76.6% for Azerbaijan, 11.7% for Armenia and 8.2 % for Georgia. As it seen, mainly Azerbaijan in the Southern Caucasus is a state faced with the problem of water shortage.*

The main local threat sources for Azerbaijan include: pollution of water reserves with wastewaters, intensity of floods, troubles

occurred in the potable water economy affected by the natural processes, drying up of springs, rising of groundwater level, abundance of water losses in connection with the climate changes and anthropogenic factors.

The ecological state of Araz, the second largest river of our country is more dangerous than Kura River. Araz river receives all domestic and industrial wastes of more than 10 Armenian industrial cities alongside the flow beginning from Gumru until the border area with Nakhchivan AR. The rivers Gederchay, Vorotan and Akhuran merging with Araz are extremely poisoned. Their waters contain no oxygen and acidity indicator is reduced to pH 2,4, the microflora is decreased in 180-200 times and the vegetation along the river bank is destructed. In waters of Araz, between Armenia and Nakhchivan AR, phenols exceed more than 220-1160 times than the allowable limit (harmless concentration), salts of heavy metals – 36-44 times (copper, molybdenum etc.), nitrogen-phosphorus slats – 26-34 times, chlorides- 28 times and oil-based hydrocarbons – in 73-113 times.

Razdan River's waters, the left branch of Araz rank one of the first places in Armenia for degree of pollution. The wastewaters of the industrial enterprises of Razdan, Charensavan, Abovyan and Iravan cities and the domestic wastes of other settlements located on the bank of river are thrown into waters of this river. In 1980s, the average annual amount of wastewaters released to Razdan river was 210 million m³. Even within the summer months, when the level of Araz waters is decreased amount of wastewaters of Razdan River is not reduced. As a result, Araz water reservoir is exposed to very dangerous state.

One of the rivers, contaminating Araz is Okhchuchay. The solid acidic waters, heavy metal salts and other wastes of Megri, Gajaran, Gafan and Destekert mining enterprises (ore dressing) in hundred thousand tons contaminate Okhurchay enormously. During separate times, the amount of copper in waters was more than 25-50 times in comparison with BHK, amount of phenols exceeded the allowable norm in about 6-15 times. Okhchuchay contains

the contaminating elements such as, aluminum, zinc, manganese, titanium and bismuth. Okhchucay exposed purposefully by Armenia to the extreme pollution is recognized as the “dead river”.

The current state causes fair concerns and troubles in Iran, besides Azerbaijan and presently this matter is a matter of discussion between Islamic Republic of Iran and Armenia.

The activity of Armenian nuclear power plant is closely related to Araz river, so, this river is contaminated within a day with wastes of 12-16 thousand m³ that would cause enormous troubles in future for Araz and its branches. Because of all aforementioned factors, the chemical content and quality of Araz River has been changes and filled with sulphate-sodium elements.

It is to be noted that the transboundary Kura River is exposed to intensive contamination in the territories of the neighboring countries.

The main reason of pollution of Agstafachay, the transboundary river and a branch of Kura include the wastewaters of industrial and agricultural nature thrown into the river from Ijevan settlement of Armenia. Armenia doesn't prefer to filter the wastewaters directed by the rivers flowing from the territory of this country towards Azerbaijan.

Kura River is exposed to the intensive pollution in the territory of Georgia too. So, wastewaters of Tbilisi and Rustavi cities are thrown directly into this river without passing any filtration process.

To regulate this matter, a draft agreement has been drawn up between Azerbaijan Republic and Georgia and the provisions hereof have been agreed in 90%. The implementation of this agreement lingers over because of the power crisis occurred in Georgia.

To prevent the aforementioned threats and secure the water security in full capacity, the party of Azerbaijan intends to take series of arrangements:

- 1. New water reservoirs are built aimed at increasing the water resources.**

- 2. The run-off Takhtakorpu water reservoir and Shamkirchay water reservoir were completely built, which significantly improved the water supply of Baku, Ganja cities and other settlements.**
- 3. Arrangements have been carried out to reduce the water losses. So, there was drawn up “the Program of development of melioration and water economy in the Republic of Azerbaijan during 2014-2020”, which stipulates for using water-efficient irrigation technology in the field of agriculture.**
- 4. We are looking for ways out to resolve the present problems in management of the water reserves. Arrangements are taken to improve the coordination amongst the organizations acting in the field of water in Azerbaijan.**

The Ministry of Ecology and Natural Reserves of Azerbaijan Republic (carries out the hydrological and meteorological monitoring and the works of monitoring of the waters ecological state, prepares the Registry of underground and surface waters in Azerbaijan), the Open Joint-Stock Society of Melioration and Water Economy (carries out the supply of sown areas with irrigation waters, organizes the consumption of the state owned melioration and irrigation systems, keeps the state records of waters on the sector of using waters), Open Joint-Stock Society “Azersu” (carries out the supply of population with potable water), Open Joint-Stock Society “Azerenegy” (carries out the hydropower production in the water reservoirs) are Water Users Unions (carries out the distribution and sale of waters taken from the irrigation systems’ administration).

The works related to the improvement of water resources are carried out in our country regularly. So, to improve the management of water reserves, in 2011, there was established the Water reserves State Agency under the Ministry of Emergencies, as a result of which, the water reservoirs in Shamkir, Yenikend, Mingachevir, Varvara and Jeyranbatan, where more than half of water resources are collected and their main hydraulic facilities,

as well as Gumyataq lake were given to balance of this Ministry.

The appropriate arrangements were carried out to organize the reliable protection of water reservoirs and corresponding infrastructures were provided.

Series of important arrangements were carried out after establishment of the Water Resources State Agency:

- 1. Dredging works have been carried out to increase the river's intake capacity aimed at preventing the floods;**
- 2. The UN program of "Integrating climate change risks into water and floods management by vulnerable mountainous communities in the Greater Caucasus Region" extends with success.**

The works of preparation and implementation of the arrangements are extending by the Ministry of Economy and Industry and the Ministry of Emergencies involving the foreign companies in the field of study of the state of lakes and water beds and improvement of their ecological state.

The project of re-estimation of the surface and underground water resources in the territory of the country with consultation and participation of the company Deltares of the Kingdom of the Netherlands has been started.

The engineering problem of the project of Baku Bay cleaning has been prepared.

It is planned to implement the estimation of water reserves technical security given to the balance of the agency, as well as their seismic security. The works on the project "Developing Water Resources Sector Strategy in Central and West Asia" financed by Asian Development Bank have been started.

The Water Strategy is a main document reflecting the sustainable management principles of water resources and:

- 1. Determines the main activity directions of water economy complex securing the sustainable use, protection of water**

and water objects and preventing the harmful influence of waters;

- 2. Recognizes the main activity directions on development of the water sector, the key principles of the water policy in the field of use and protection of water objects and stipulates for admission and implementation of the managerial decisions to protect the water ecosystems;**

Main duties of the water strategy:

- 1. Guaranteed provision of social (potable water supply, improvement of sanitary conditions) and industrial (agricultural, industrial, hydropower, fishing) areas with water;**
- 2. Preventing the harmful influence of waters (torrent, flood and inundation);**
- 3. Preventing the pollution of water facilities and improvement of their ecological conditions;**
- 4. Optimization of the water resources using structure, effective use of water and reducing of water losses;**
- 5. Providing the melioration works' development in the irrigated lands, improvement of ecological state in the lands where melioration works have been carried out.**
- 6. Improvement of management system of water resources;**
- 7. Improvement of the effective water legislation;**

The strategy developed to fulfill the aforementioned tasks with success, we stipulate to carry out the arrangements on the below specified main activity directions:

- 1. Improvement of institutional framework on water resources integrated management;**
- 2. Improvement of cross-border links;**
- 3. Determination of needs in water to estimate the water resources and preventing the water shortage;**
- 4. Restoration and improvement of the irrigation system;**
- 5. Restoration of collector-drainage networks and widening in**

strict conformity to the needs;

6. Management of water-based dangers (flood, torrent, inundation and aridity);
7. Development of agricultural goods and their marketing;

So, the “water strategy” has to be drawn up in such a manner to embrace the concrete proposals on the directions enabling maximum preventing the threats in the supply of water security. These directions have to include:

1. Re-estimation of water resources;
2. Estimation and providing of technical security of hydro-technical facilities;
3. Reducing of water losses by development and modernization of irrigation and melioration systems;
4. Widening the using wastewaters;
5. Diminution of harmful influences of floods, torrents and inundations and finally
6. Improvement of unique management, water legislation, and normative-legal acts related to the water, securing the passage to the integrated management principle.

The implementation of these arrangements will be important steps undertaken to secure the water security.



Tugba Evrim Maden (Turkey),
ORSAM's expert on water issues and hydro-politics

Water as a Tool of War (During Arab Spring)

Increasing human activities and climate change have created a great pressure on water resources in terms of both quality and quantity. It is an unequivocal fact that there is a water shortage in the world and the problem will affect lives of billions of people in the upcoming years. Water resources might serve as a driving force for both peace and war especially in the Middle East. Policies to be pursued by states could lead to a cooperation or a conflict. If there is no present agreement on basin, it is seen that use of water resources is directly proportional to power balances in the basin. Even though water is not a direct cause of war, it is observed that it has lost its technical feature and is directly affected by political balances. Water might serve as a cause of either cooperation or a conflict depending on the interests of states. This situation makes water resources a national priority issue in the regions especially such as the Middle East where water is a limited resource. Since water resources are likely to entail conflicts in the recent years, global water problems are considered in the status of “priority policy”.

While the use of water resources might lead to a conflict among states, communities and towns, water resources might also become

a primary target with the aim of weakening and seizing control of the area during wars and conflicts. Thus, they might be of great strategic importance during these periods. As seen in the past, especially dams and pipelines for water conveyance have been among primary targets during conflicts. We witnesses with of using water as a tool of war during the so-called Arab Spring / Arab Uprising and beyond.

Introduction

Scenarios have been generated claiming that water could lead to conflicts or war in water-scarce regions, and the Middle East was pointed out as the most probable example to those scenarios. The past experiences also show the possibility that water resources in the Middle East, where lots of conflicts take place, might lead to either collaboration or conflict between countries. Thus, political intentions of countries shape the state of water resources. On the other hand, water resources are also known as one of the primary targets to be seized or hit during conflicts and wars with the aim of weakening the opponent.

Libya example:

During the Arab Spring, it was observed that water structures in Libya were attacked. 1,300 wells were drilled for the Great Man Made River project, carried out in four stages and has been in operation for two decades. The entire Great Man Made River Project (GMMRP), the world's largest drinking water pipeline project, consists of a 3,500 km-long network of pipes and reservoirs constructed in five deserts. Weighing 6 tons and being composed of 4-meter diameter cylinder pipes, the pipeline conveys 6,5 million-m³ of water to northern Libya. Which is sufficient to supply 1,000 litres of water per person per day in Libya. That the pipeline conveying water to Tripoli was under the control of pro-Gaddafi groups and the pipeline was sabotaged through cutting off the water flow by the very same groups were in the news during those days (November 2011). The UN reports and experts suggest

that Gaddafi sabotaged his project, which he always showed as a major success, to prevent the people in Tripoli from accessing water. It was also claimed in the news that the pumps were broken and the pipeline was damaged. The UN officials and experts had taken steps in order to repair the pipeline and provide the people with water as soon as possible back then.

Syria example:

Also similar case was seen in Syria during the conflict process in September 2012. The main water pipeline in Aleppo was damaged and the people in the city couldn't access drinking water for a long time. In May 2014, Syrian government's artilleries hit the main pipeline supplying Aleppo with water. Being the largest city of Syria, Aleppo was flooded after direct hit on the water pipelines, leaving the city without water. Such attacks being carried out in Syria where the civil war still prevails will worsen the current humanitarian crisis across the country, which will lead to migration flows both within and out of the country.

Another important basin of Syria, in Orontes Basin, which is provided a quarter of the agriculture production and a third of industrial production. The distribution of population, agriculture and industrial activities are largely related to the availability and access to water resources. The centre of the Orontes basin was a stronghold of the Ba'ath party, became a protest hotspot. And Ba'ath forces have damaged 90% of water infrastructures of this Basin since March 2011.

ISIS example:

The Euphrates-Tigris basin is among the most important river basins in the Middle East. The average annual discharge of the Euphrates and Tigris rivers is 84 billion m³, which equals to the average annual flow of the Nile river. The Euphrates-Tigris basin is of great importance in terms of being the source of energy, food and drinking water for Turkey, Syria and Iraq, which are the main riparians to the basin. The riparians have been working

on developing the basin waters since the 1950s. The population growth, urbanization, agricultural and industrial activities, as well as periodic dry spells in the basin, put pressure on water resources in terms of both quality and quantity. Being located in a region with rather poor water resources, waters of the basin have been of great priority in political relations between the riparians and have led to cooperation or conflicts among the aforementioned states.

Recently, the climate change has appeared as another factor that affects the hydrology of the basin. It is estimated that climate change will create pressure on the Euphrates-Tigris rivers in the upcoming years. The studies on climate change show that the surface temperature of the Middle East will increase by 2.5 to 5.5 degrees Celsius in years to come, causing a 20-percent-decrease in rainfall in the region. Either individually or in cooperation with riparian countries, countries have been striving to come up with a solution in order to struggle against the climate change and adapt to new climate conditions. The most significant example to this effort is the protocols on water and environment within the Memorandum of Understanding (MoU) Turkey signed with both Syria and Iraq in 2009. The protocols also include observation of water resources, joint projects and protocols envisaging to struggle against the climate change. It is an undeniable fact that hydrological and meteorological changes have an impact on basin waters. However, the biggest obstacle to institutionalization and cooperation aiming to benefit from water resources in the basin is political instabilities and shifting power balances. The protocol signed between Turkey and Syria on the Orontes (Asi) river in 2009 sets a great example to this situation. The Protocol between Turkey and Syria envisages construction of a joint dam entitled 'Friendship Dam' on the Orontes river. The construction of the dam began on February 6, 2011. However, the uprising which broke out in Syria in March 2011 set back the project. Thus, the project being a successful example of cooperation in transboundary water basin in the Middle East was unfortunately postponed due to the instability in the Middle East.

The ongoing spread of ISIS across Iraq after Syria in the recent period has caused ISIS to seize control of water resources in both Syria and Iraq. While ISIS seizes control of Tabqa and Tishreen dams on the Euphrates river within Syrian borders.

In Iraq which is located in a semi-arid and arid climate zone, the amount of rainfall has declined; water use, especially in densely populated areas, has increased; and 50 percent of water has been wasted due to the mismanagement of water resources and leakages in pipelines over the last few years. (The UN, March 2013). Iraq is facing water shortage. Some 85 percent of water resources in Iraq has been used in agriculture to grow wheat. The fact that ISIS seizes control over dams and cuts off water flow negatively affects wheat production and livestock. Besides, drinking water and power generation is also provided through dams. In other words, the intervention has negative impacts on drinking water supply and power generation as well. Seizing control of the dams on the Euphrates-Tigris rivers, ISIS prevents people in the region from having access to water; causes them to turn towards alternative unsanitary water resources; leads to increase in water-borne diseases; and causes those people to migrate to other regions, through the water cuts.

The dams chronologically seized by ISIS within the Iraqi borders are as follows;

In April 2014; ISIS took control of Fallujah which is located on the Euphrates river, and opened the dam's gates in order to avoid the Iraqi military forces' approach to the city. As a result, 40,000 people were affected by the flood.

In June 2014; the Iraqi military forces defended the Haditha Dam, the second-largest generator of hydroelectricity in Iraq's power system and located on the Euphrates river, from Islamic State militants. Conflicts still continue around this dam which supplies 30 percent of Iraq's electric power.

Since last week when ISIS started to seize control of al-Anbar, it has been suggested that ISIS could take control of the Haditha Dam. The dam supplies 30 percent of Iraq's electric power, as well as irrigation and drinking water for Baghdad. Seizing control of

the aforesaid dam comes to mean that ISIS will be able to control Baghdad's water and energy security.

Between August 8-13, 2014; the Mosul Dam, the biggest dam in Iraq, was captured by ISIS. The dam, of which the construction was completed in 1984, is located about 50 km northwest of the city of Mosul. It was built to supply drinking water, hydroelectric power, for irrigation and flood prevention purposes. The dam with 750 MW-power generation capacity is located on the Tigris river. The power generated by the dam supplies power to 675,000 households in Iraq. The dam is constructed on a ground consisting of water-soluble gypsum, limestone, anhydrite, and marl. The bedrocks beneath the Mosul Dam are karstic structures which react with water. Which creates large sinkholes and caves in the area. The aforementioned problems of the dam was noticed when water was started to be kept in the dam and major sinkholes have appeared in body of dam and its reservoir. The dam is not in a stable condition and there are still leakages. Cement grouting is performed for rehabilitation of the dam. It was not repaired during the conflicts. It poses a great risk for both Mosul and Baghdad due to the possibility that it might collapse and the potential flood risk.

In September 2014: Located on the Tigris river and the north of Baghdad, the Khalis/Sudur Dam which was seized by the ISIS, supplies the Balad Ruz (southeast of Diyala where Shiites are densely populated) with water. ISIS took control of the the Sudur dam and cut off the water flow to the region.

The majority of the Euphrates-Tigris river waters, being as important a resource as oil, are seized by ISIS in Syria and Iraq, which gives a strategic advantage to ISIS. On the other hand, it also directly affects the water needs of Syria and southern Iraq. Lack of water will have a negative impact on agricultural production and energy generation in the regions. In addition to this, water scarcity might lead to migration from the region, unrest and conflicts. As an alternative solution, Iraq and Syria have recently turned towards unconventional water resources in the event that the inhabitants in the region suffer from water scarcity.

Being aware of the vital importance of water and acting accordingly in the region, ISIS uses water resources with the purpose of obtaining strategic power as they do with other fossil sources in the region. Seizing control of water resources is as important as managing energy transmission lines and oil wells in the region. It is worried that the control of water resources in the region could threaten water security.

Turkey's transboundary water policy

Turkey's policy regarding the use of transboundary rivers is based on the following principles:

- 1. Water is a basic human need,**
- 2. Each riparian state of a transboundary river system has the sovereign right to make use of the water in its territory,**
- 3. Riparian states must make sure that their utilization of such waters does not give "significant harm" to others,**
- 4. Transboundary waters should be used in an equitable, reasonable and optimum manner,**
- 5. Equitable use does not mean the equal distribution of waters of a transboundary river among riparian states,**
- 6. The principle of sharing the benefits at basin level should be pursued,**
- 7. Turkey views water as a catalyst for cooperation rather than a source of conflict.**

Conclusions

Global water analyses demonstrate that the total water on Earth is sufficient to meet the total demand. The main reasons of the water shortage is the uneven spatial and seasonal distribution of the precipitation. Water transmission lines and the water storage reservoirs are built to address them. Reuse of water and the desalination of the sea water may also be applied to increase the supply of water. Water conservation as demand side management

can be quite effective to eliminate the imbalance of supply and demand.

There are 261 transboundary waters on Earth which forms the 60 percent of the river flows. The transboundary water policy of Turkey states that water is a basic human need and the transboundary waters should be used in an equitable, reasonable and optimum manner. The principle of sharing the benefits at basin level should be pursued. Turkey views water as a catalyst for cooperation rather than a source of conflict.

The water shortage at global level can only be addressed through an integrated approach and with technical and financial support by the developed countries, regional and international organizations and financial institutions.

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Araz Qurbanov ((Azerbaijan),
Research Fellow, SAM

Hydro problems of Azerbaijan Republic: threats and ways out

The fact that a rapid politicization of the underground and surface fresh water resources and directing them towards securing the geopolitical and geo-economic interests of the separate states in the CIS countries will affect the interests of Azerbaijan too. The possibility of incurring the country with new type's hydro-pressure efforts in near future is real. According to the reports developed by the world resources institute, amongst 13 countries suffering from fresh water shortage all over the world, the names of CIS countries, namely: Turkmenistan (annually 296 m³ per capita), Moldova (236 m³), Uzbekistan (625 m³) and Azerbaijan (972 m³) are put special emphasis. By per square kilometer and per capita water reserve, Azerbaijan Republic, located in arid zone falls behind considerably other states of the Southern Caucasus. So, 62% of the Southern Caucasus's total water reserves fall into the share of Georgia, 28% - Armenia and only 10% - Azerbaijan. According to the official information provided by the Ministry of Ecology and Natural Reserves of Azerbaijan Republic, the country's total water

resources are equal to 35 km³. Approximately 5 km³ of which are underground waters. 19-20,6 km³ of these waters fall into the share of transboundary rivers (Kura, Araz, Alazan, Samur, Agstafachay and so on), 9,5 – 10 km³ to the share of internal rivers. Approximately 80% of the Azerbaijani population consumes the waters of Kura and Araz rivers polluted with agricultural and domestic wastes. Each year, the transboundary surface water reserves receive wastes in the quantity of 350 million m³ and 330 million m³ wastes from the territory of Armenia and Georgia. These waters containing petroleum products, phenols and heavy metals affect seriously the health condition of population and ecology of the basin.

As a result of appropriation of the transboundary water flows' potential through hydro-technical facilities in the territories of Turkey, Iran, Armenia and Georgia, the water reserves in Kura and Araz rivers entering to the territory of Azerbaijan were reduced to 20%, which caused problems in the water supply. According to the analysis of the initial information provided by the State Statistical Committee of Azerbaijan Republic, serious and considerable decreasing is observed in the volume and using of water reserves. For example, the capacity of waters taken from natural resources in 1990 was 176 million m³, and in 2011, these figures were decreased to 11 billion 779 million m³. In comparison with 1991, we observe reduction in the volume of waters lost while transportation (4 billion 449 million m³ – 3 billion 767 million m³). In total, in comparison with other states of the region, the distinctive characteristics of the water resources in Azerbaijan Republic are as follows:

- 1. Restricted volume of surface and underground waters and decreasing tendency;*
- 2. Uneven distribution of water reserves in the territory of the country.*
- 3. Forming of 70% of water resources in the territory of foreign countries;*
- 4. 80% of total water resources consist of transboundary water courses – waters of Kura River.*
- 5. Seasonal character of some part of internal water courses;*

6. *Transboundary water courses are polluted and reached the ecological and social crisis limit in the territory of Azerbaijan.*

So, if the hydro-political relations of the region countries are not regulated based on interstate agreements and international legal norms, as well as in the framework of mutual interests, the political tension will be intensified over the next ten years because of pollution of the available water reserves, changing of rivers courses' direction and unequal sharing. However, despite Azerbaijan is ranked amongst the problematic states from the standpoint of the volume of fresh waters reserves and their exploitation, the situation is not hopeless and the obligations proceeding from state's economic and political potential necessitate the performance of preventive measures aimed at estimation and prevention of the problems related to the water resources.

The problem arisen in connection with availability of disputable frontier territories between Russia and Azerbaijan, i.e. non-determination of the common using norms the water resources of Samur River within a long term (*however this quota was effective since the Soviet Period*) was noted in the chapter 4 of the Water Strategy of RF, effective from 2009 as "reconsideration of the agreements for use and protection of Samur river's waters in direction of development of the transboundary cooperation" and in a year – in 2010, it was resolved partially in an undesirable form for Azerbaijan owing to the diplomatic efforts of the official Baku and Moscow. Only 38 km of Samur River flows along the border of Russia and Azerbaijan. According to the Protocol of USSR Water Economy Ministry of November 7, 1967, the annual using limit of Samur River waters were determined accordingly 800 million m³ and 300 million m³ for Dagestan region of RSFSR and Azerbaijan SSR. This distribution norm proceeded from the real necessity, i.e. the demand for water of the large agricultural units in the northern regions of Azerbaijan SSR and lack of corn fields in the Southern Dagestan (*this situation was not still changed*). However, the ethnic separatist institutions carrying out their activity at the instigation

of Armenia and some political groups of Russia declared that the above specified distribution norm didn't meet "the Russian national interests and the economic-political interests of Lezghin people" with the intension to use Samur River's water resources against Azerbaijan and proposed repeatedly to consider the mentioned distribution limit.

On September 2, 2010, the agreement "on the state frontier between the Republic of Azerbaijan and Russian Federation and"the cooperation treaty on effective use and protection of Samur River water reserves between the governments of the Republic of Azerbaijan and Russian Federation" concluded due to diplomatic efforts by the both countries on September 03, 2010 put an end to all political speculations on this theme. As to using the water resources, excluding the water releasing limit in the amount of 30,5% for ecological needs, there was decided to distribute the water volume entered to the frontier area of Samur between Azerbaijan and Russia in equal share. Despite the proportional distribution system doesn't satisfy the needs of the northern regions of Azerbaijan, this treaty caused artificial protests in Russia and the protesters (*separatist ethnic groups*) urged Valdimir Putin to liquidate the aforementioned document in unilateral manner. According to their claims, if the River Samur takes its source from the territory of Russia, possessing its water reserves is the exclusive right of Russian Federation and at the best case "water of Dagestan" has to be sold to Azerbaijan. It is to be noted that Dagestan (Russia) side appeared with its own version in distribution of water reserves of Samur. According to this proposal, the river's reserves have to be distributed in parity rate of 476 million m³ for the both parties during the initial periods and in five years the annual using limit will be determined in correlation with the length of Samur river pertaining to the state frontiers, in consequence of which the Republic of Dagestan and Azerbaijan were correspondingly allotted a quota in the quantity of 905 million m³ (6%) and 47 million m³ (4%). And it would be resulted in using Samur river drinking waters as a political factor

not only for provision of the northern regions of Azerbaijan with drinking water, but also occurring the artificial drinking water in Baku city and surrounding settlements decreasing the level of water in Samur-Absheron canal.

It is to be noted that the possibilities of using the transboundary water reserves of the Republic of Armenia against Azerbaijan is only leverage of the enemy against the official Baku. The aggressive and ethnic cleansing policy pursued by the official Yerevan has also affected its water strategy. As a result, the hydro-policy pursued by the Republic of Armenia aimed at reaching the shortage of the fresh water resources to the environmental disaster level and using the transboundary rivers' water resources as political pressing means. The artificial ecological crisis to be created by Armenia in Azerbaijan has to be estimated unambiguously as the "environmental disaster", an activity aimed by one state at creating of ecological disaster zones in the territory of other state.

The distribution of transboundary Araz and Kura rivers' water resources amongst five states (Turkey, Azerbaijan, Iran, Georgia and Armenia) is not regulated legally up to present. The official Yerevan, ignoring the international conventions regarding the management, use and protection of transboundary water reserves, as well as determination of water quota slows down the conclusion of hydro-agreements with the states of the region. So, offering such a pretext that its country is a legal heir of Armenia SSR, the official Armenia extends to rest upon the provisions of treaties passed by USSR in 1924 with Turkey, in 1957 with Iran about the water distribution regime. Despite the South Caucasus states have obtained their independence, the aforementioned distribution system is carried out according with the principles shaped amongst USSR, Turkey and Iran and bilateral agreements being null and avoid. So, the aforementioned documents (Convention on the right of using the transboundary rivers and springs – USSR-Turkey, January 8, 1927, "Treaty on construction of dam and water reservoir on Akhuryan transboundary river – USSR-Turkey, October 26, 1973", "Agreement on regulation of frontier conflicts

– USSR-IRAN, May 14, 1957”, “Treaty on drawing up of initial projects on equitable use of Araz and Atrek rivers with the purpose of irrigation and production of electric power, USSR-Iran, August 11, 1957”) don’t envisage any water limit distribution separately for Azerbaijan SSR, Georgia SSR and Armenia SSR. In such a case, the fact that Turkey, Iran, especially Armenia, driving benefit from the created legal gaps have increased the water consumption of Araz river unilaterally, construction of new dam, hydroelectric power stations on the river contradict the international law and has to be estimated as hydro-political threats, pressure on the state’s political will and an activity directed towards creating of ecological crisis.

The deliberate contamination of the natural water basins, such as, Boyuk Alagol, Kichik Alagol, Zalkhagol, Janligol, Garagol, Alagol and Ishigli Garagol in the territories under occupation caused additional environmental problems for Azerbaijan. Levon-Melik Shahnazaryan, the Armenian expert in politics elucidates the essence of the hydro-policy driven by the official Armenia as follows: “the Armenian state has to restrict the delivery of water to Azerbaijan by any means. Today, the activity of Armenia has to be directed against the food security of Azerbaijan and creating acute water shortage has to reach the all over the country social-political tension, mass protests and national confrontations. The acute reducing of watercourses of the rivers flowing through the territory of Armenia will be crushing blow to the Azerbaijani agriculture. At the same time, population residing in the regions bordering Armenia and Nagorno-Karabakh will leave these territories after deprivation of irrigated lands and pastures”.

The hydro-policy pursued by Armenia against Azerbaijan is more large-scope than military operations and firstly directed against the civilians, especially those residing outside the conflict zone. We know that there is not any water cleaning devices on the rivers flowing from Armenia towards Azerbaijan. The amount of copper, molybdenum and other heavy metals, including slops discharged into the river of Araz from the Gafan and Gajaran’s

mining, copper-molybdenum plants and residing settlements and Metsamor nuclear-power station classified as “contaminated water” for its quality indices exceeds much more the critical limit. The said object was built deliberately apart, 280th km from the bed, near Araz river not to mount the required water cleaning installations for gold refining enterprise Soyudly (Zod), 70% of natural resources of industrial importance of which is pertaining to Azerbaijan. Besides, Armenia discharges the wastewaters and slops of residing settlements and industrial enterprises located into Araz River from Surevan village having the border with Sadarak settlement of Nakhchivan Autonomous Republic through pipelines. And the main reason of contamination of Agstafachay, the right branch of Kura, the other transboundary watercourses is a discharge of wastewaters into this river each year in the amount of one million m³ from residential settlements of Ijevan and Dilijan of Armenia, including from the industrial enterprises. As a result, the amount of phenols in the river has exceeded in 34-45 times in comparison with the norm. As to the water reservoir built hereon, it is serious source of threat for the population of Azerbaijani North-western region. The water sources of Tartar, Tovuz and Khavhin Rivers located in the territory of Azerbaijan are now in the regions occupied by the armed forces of Armenia. The official Yerevan, catching an excuse that the both countries have “different ecological criterion”, declares that the pollution of transboundary waters didn’t reach yet the dangerous limit as per the Armenian standards and Azerbaijan side is conducting unreasonable campaign of propaganda. But Azerbaijan refers in its protests not to aforementioned “national normative”, but to the recognized international sanitary norms.

One of the threats of the hydro-diversion nature is a possibility of using the reserves of the Sarsang water reservoir (*Agdara district*) with total water capacity of 560 million m³, located in the territory of Nagorno-Karabakh against Azerbaijan by Armenia both as political-economic pressing means and hydrological and ecological arm. Presently, the artificial floods and droughts

organized regularly by Armenians through Sarsang water reservoir cause ecological tension in the Azerbaijani low-lying areas and serious difficulties in meeting of needs of the population and sowing areas in fresh water. Besides, the catastrophic state of the dam located at 125 km height casts threat for the life of 400 thousand people residing in the surrounding regions. The water reserves of Kalbajar and Lachin districts occupied by Armenian invaders are of great strategic importance in the hydro-policy of the Republic of Armenia and Nagorno-Karabakh's separatist regime. 81% of water resources of the rivers of Nagorno-Karabakh are formed in the territory of Kalbajar district. It may be no accident that the liberation of Kalbajar and Lachin districts from Armenian occupation is estimated in Yerevan as an inevitable collapse of the false regime and taking the lead by Azerbaijani side in the hydro-policy.

The Islamic Republic of Iran having common interests and tactics with Armenia in respect of attitude towards the Republic of Azerbaijan is demonstrating the similar strategy regarding the transboundary water courses. The efforts made by IRI to take control over common water reserves turned it into one of the regional states pretentious to the "water geopolitics". So, the hydro-policy driven by the both states implies the implementation of the joint projects aimed at using Araz River's water resources against the Republic of Azerbaijan as political and economical means of pressure and intentionally reducing the water level in the part of Araz River belonging to Azerbaijan.

The unequal distribution of water reserves in Azerbaijan Republic, shortage of fresh water, regional fight for taking control over underground and surface water resources and other similar factors have to be estimated during the next ten years as serious basis for creating of new problems. The fact that Azerbaijan has no means to exert influence on Armenia and Georgia, not joining Helsinki Water Convention deliberately and extending ineffective use the transboundary waters and their own pollution strategy exacerbates the mentioned problem. Despite the official

Baku prefers to resolve the regional water problems within the frameworks of recognized international norms, Yerevan and Tbilisi appear first of all from their interests substantiated on their legislations and individual hydro-political points of view. On the other hand, Russia, Turkey and Iran have intensified their activity to take control over transboundary water reserves. As to the official Moscow, it doesn't hide its intention to take control over water reserves in the Southern Caucasus and hydropower facilities within the framework of CIS countries and to establish the unique hydropower system as in the Central Asia. All these facts prove that water problems in the region are closely related to the geopolitical interests.

In the modern International Law, the resolution of the interstate disputes related to the transboundary fresh waters via consensus is recognized the only peaceful means. Despite the international water law consists of using water resources and their distribution rate agreed between the parties, including establishment of mutually beneficial cooperation in this field and intolerance of any serious social-economic and environmental measures to impact on the opposite party, these obligations, as well as the principle "the party causing damage has to indemnify it" are only recommendations as other provisions of the UNO regarding other necessary and vital matters. Despite 15 years passed since the UN European Commission Convention "on protection and use the transboundary water courses and international lakes", the quorum to be secured by the joining states (35 countries) was not obtained yet that is the main obstacle in the way of application of this document. The countries possessing rich water reserves (*In the CIS space: Armenia, Georgia, Kyrgyzstan and Tajikistan*) while objecting to the ratification of the Convention offer excuse that it is directed against the states' right to use their own national riches and the fair principle of distribution is not determined yet in the international law. Though, the "criterion of fair distribution of transboundary water resources" is not the same for all basins and is determined in strict conformity with each state's water resources, demands of

the user-states, environmental requirements and other parameters. The second reason of the refusal is that the Convention “didn’t contain any principle of not causing considerable damages”. The fact that Armenia and Georgia didn’t join this document in the Southern Caucasus proceeds not only from tendencies of intensification of control over transboundary rivers, but also from the fact of violation of the mentioned principle by the states, their deviation from the procedure of determination of the using quota of transboundary waters and pollution of water courses entered to the territory of Azerbaijan with the harmful wastes. In this case, Georgia shares the same position with Armenia. In other documents (i.e. the UN Convention on “Environmental Impact Assessment in a Transboundary Context.” (ESPO, 1991), the Protocol on Strategic and Environmental Assessment proceeding from requirements hereof (2001) and the Appendix hereto (No:1), there were specified assessment rules for the partner states aimed at estimation of the damages caused to the environment and objects and kinds of activity exerting harmful effect were determined. It has to be noted that despite the USSR government joined this Convention on June 6, 1991, the Russian federation, its legal heir and Armenia (the outpost of Kremlin in the Southern Caucasus) detain the ratification process.

The demand in fresh water in the region exceeds the supply in sustainable manner. At the same time, the anthropogenic influences on the water resources accelerate their pollution and acute character of the ecological problems. The promise and effectiveness of the policy driven by Azerbaijan presently are determined namely by the extent of conformity of its national interests to the global calls, social, political, economic and ecological requirements, including to the internationally recognized legal norms. As it seen from the analysis of the risks of political, social-economic and environmental problems related to the water shortage and the hydro-policy of Azerbaijan Republic, if the Armenian-Azerbaijan and Nagorno-Karabakh conflict is not resolved before reaching the global and regional water shortage the real danger

against the peace and security, it wouldn't be excluded to use the transboundary watercourses and water resources of the occupied regions by Armenia against Azerbaijan as only means of pressure. The official Yerevan understands that the return of Kalbajar and Lachin districts and loss of fresh water resources in this region will be mean the loss of Nagorno-Karabakh for Armenia once and for all.

Based on the analyses, the water problems of the Republic of Azerbaijan related to the political, economic and legal aspects are connected mainly to the below specified factors:

1. *Non mandatory nature of international legal norms on use and protection of transboundary waters, absence of bilateral and multilateral agreements based whereon, carrying out of individual hydro-policy by the region's states, non joining of Armenia and Georgia to the related international agreement, indetermination of quotes as regards using the transboundary waters for Azerbaijan, Turkey, Iran, Armenia and Georgia, unavailability of regional structures regarding common administration of water reserves;*
2. *Construction of hydro-technical plants on the transboundary watercourses and laying of additional branches by the states of region in an uncoordinated manner by Armenia, Georgia and Turkey;*
3. *Pollution of Araz and Kura Rivers, the main fresh water resources of Azerbaijan with industrial, agricultural and domestic wastes by Armenia and Georgia and sustainable nature of this activity. Location of mining and chemical industry enterprises of Armenia near the watercourses in the territory of Azerbaijan, as well as the settlement points populated by ethnic Azerbaijanis in Georgia.*
4. *Intentions of some political circles of Russian Federation and separatist organizations in Dagestan to use water resources of Samur River against Azerbaijan as means of pressure from 2015.*
5. *Location of some part of Azerbaijani surface and ground*

- water resources in the territories occupied by Armenia and using them against Azerbaijan as means of environmental and hydrological pressure;*
6. *Not carrying out of management of Azerbaijani water resources and its protection, as well control on the consumption in a centralized manner;*
 7. *excess of demand over supply in the water economy, failure of application of effective sanctions against pollution of water resources;*
 8. *unavailability of water cleaning plants in production enterprises and population points in necessary amount; unavailability of reuse system of water, pollution of internal watercourses and lakes with agricultural and domestic garbage;*
 9. *inconformity of water to the known standards in hydro-technical units and failure of population to use clean and drinking water;*
 10. *not application of innovative irrigation methods in the agriculture enabling to use water economically and erosion of available hydro-plants.*

The hydro-strategy of Azerbaijan has to be determined based on agile and modern political-economic and environmental tendencies. From this standpoint, taking into account the national security interests of the country, its environmental challenges, international obligations undertaken by Azerbaijan in connection with using and protection of transboundary watercourses, forecasts and threats, experience of foreign states in this field and other factors, the below specified measures are considered purposeful for shaping of national hydro-policy and national water strategy.

1. Recognition and protection of the surface and underground water resources in the legal context as “state’s strategic reserves”. Using the fresh water reserves economically and with full benefits and protection of these resources include important political, social and economic duties of the state. The water

economy, the legislative framework have to be improved within the modern requirements and forecasts, new norms and rates have to be determined in connection with using water, preventing of use the water resources by separate legal entities and individuals and application of sanctions determined by the legislation to prevent the violations related to use and protection of water reserves, intentional water losses, corruption and cases of wastefulness.

2. Debt-for-nature swaps. This principle enables the states possessing lesser budget profits to resolve their difficult environmental problems involving additional capital. 40 states of the world – Argentina, Bangladesh, Brazil, Bulgaria, Egypt, Vietnam, Syria, Peru, Honduras, Tanzania, Tunis, Jordan, Mexico, Poland, Columbia etc. referring to the principle of debt-for-nature swaps have got rid of dependence on external finance and on the other hand they prevented their main ecological problems. One of the main reasons of the same principle, which is actual as regards the ecological problems of Georgia is that the country's debts have already reached the state budget amount. The application of the debt-for-nature swaps principle under the supervision of the related international organizations will enable the Republic of Georgia to reduce its debts and to resolve the severe ecological problems.

3. Study of Israeli experience of using the water reserves and its application in Azerbaijan. The problem of water shortage faced today by Israel is a projection of the fresh water problem expected in Azerbaijan in ten years. The number of population in the both countries located on the sea coast is approximately the same and the problem of transboundary water courses is actual for Israel and Azerbaijan. From this point of view, the acceptable option for the hydro-policy of the Republic of Azerbaijan is the study and application of Israeli water economy's management and protection. Presently this country applies new hydro-policy. For example, the demand of agrarian sector in water is met only at the account of wastewaters cleaned partially from garbage and the application of the modern agricultural methods, especially the drop irrigation method. The rainwater collected in numerous artificial

basins is directed towards irrigation of corn fields and orchards in times of drought.

4. Development of alternative water resources. Presently, the experience shaped in the field of desalination of sea water is used extensively. According to the effective norms, the amount of a salt in a liter of water should not exceed a gram. The greatest water cleaning facility of the world is near Ashqelon city of Israel. By means of device 108 million m³ fresh water is received annually. But the experts declared that this method is not very favorable from the ecological, economic and the health standpoint. So, as a result of its extensive application, the salt's percentage rate is increased in the sea water that leads to the infringement of ecosystem and the amount of minerals necessary for the human kind organism is reduced to the minimum.

5. Wide range application of drop irrigation method in the agriculture. The method of drop irrigation, actual for Azerbaijan in the conditions of global water shortage is an approach enabling the reaching of water and fertilizers directly up to roots of plants and reduction of expenses in 2-5 times in comparison with the traditional methods (*water, energy, mineral and organic fertilizers*). One of the main preferences of the modern drop irrigation method is that it contains the fertirrigation (means a delivery of the liquid mineral substances to the plants' roots together with water) measures too. Presently, the farmlands with the total surface of 3 million ha in USA, France, Israel, Australia, Italy, Spain, Austria, Germany, Ukraine, Egypt, Mexico, Brazil and New Zealand are irrigated by means of the aforementioned method.

7. The problem of fresh water of Azerbaijan in the context of international law. The opportunities of international law have to be determined in settlement of matters to use transboundary watercourses by the region states commonly and other legal and environmental issues and we have to conclude long-term treaties with transboundary states as regards using the region's water reserves supported by UN specialized institutions and Islamic Organization for Cooperation. To the end of preventing

intergovernmental legal contradictions in using the transboundary water resources, national water strategies have to be coordinated and on which basis **Southern Caucasus Water Strategy and regional Water Concept have to be established.**

8. Giving preference to the water resources and ecological security factor in all state agreements passed with the Republic of Georgia and having economic-political importance for the country. Paying attention to the fact of inadmissibility of a discharge of harmful garbage to the transboundary rivers, as well as the water basins in the territory of compact residing of ethnic Azerbaijanis in Georgia, water discrimination applied as regards Azerbaijanis, intentional restriction of using the water by their economic objects and obliging them to the forced migration through artificial water shortage.



Azad Garibov,
Research Fellow, SAM

Geopolitics of Transboundary Waters in Central Asia

Transboundary waters flows, which link countries together in a shared system of hydrological interdependence, often lead to friction among the states involved. Currently Central Asia is one of the regions of the world where water conflicts are considered highly promising. Two upstream states of this land locked region– Kyrgyzstan and Tajikistan – have a surplus of water; the other three downstream countries – Uzbekistan, Kazakhstan and Turkmenistan say they do not get their share from the region’s great rivers, the Syr Darya and Amu Darya, which flow across it from the Tien Shan, Pamir Mountains, and the Hindu Kush to the remnants of the Aral Sea. Upstream countries want to treat water resources as a national asset for energy production and export like that of a oil, natural gas and coal of downstream countries, however downstream countries needs transboundary waters for mainly irrigation and demand equal sharing of them. In fact water and energy resources are not limited in Central Asia, contrary to recent suggestions by some commentators both from within and outside the region. However, conflicting approaches by the upstream and

downstream countries to the sharing of water resources prevents region-wide cooperation with regard to management of these resources and results in conflict-prone situation. Failing and highly ineffective irrigation infrastructure takes further toll, while climate change is likely to have long-term negative consequences in terms of reducing the amount available fresh water in the region. Existing border disputes and regional tensions complicate the search for a mutually acceptable solution to the region's water needs. Pressures are mounting, exacerbating intra-regional relations, especially in Kyrgyzstan, Tajikistan and Uzbekistan.

Transboundary water flows of Central Asia

Most of Central Asia is embedded in the Aral Sea basin, stretching from what is left of the Aral Sea in the West to the melting glacial “water towers” in the east. The two main rivers of the region, which flow from east to west, are the Syr Darya to the north and the Amu Darya to the south. Both of them are mostly fed by snow- and glacier-melt from the Pamir, Hindu Kush and Tien Shan mountain range. The former originates in the Tien Shan, flows through Kyrgyzstan as the Naryn River and combines with the Kara Darya to become the Syr Darya. 2200 km river traverses the Uzbek portion of the Ferghana Valley on its way to Khujand in Tajikistan and eventually flows into the Aral Sea in the territory of Kazakhstan.¹ The latter, the 2,540 km Amu Darya begins in the Pamirs at the confluence of the Vakhsh and Panj Rivers and flows west, forming Afghanistan's borders with Tajikistan, Uzbekistan, and Turkmenistan much of the way, and then on to the Aral Sea.² These two major rivers of the region account for 90% of Central Asia's river water and 75% of the water needed for its irrigated agriculture.³

1 R.D. McChesney, *Central Asia: Foundations of Change* (Princeton, 1996), pp. 35-36. In International Crises Group, *Water Pressures in Central Asia*, Europe and Central Asia Report N°233, 11 September 2014

2 *ibid*

3 Daene McKinney, Dan Burghart and Theresa Sabonis-Helf (eds.), *In the Tracks of Tamerlane: Central Asia's Path to the 21st Century*, Honolulu, 2005



4 In International Crises Group, *Water Pressures in Central Asia, Europe and Central Asia*
Report N°233, 11 September 2014

dam on the Vakhsh, a major Amu Darya tributary. Another major dam, Nurek, about 75 km from Rogun, has operated since 1980, and is currently providing about 80% of electricity produced in Tajikistan.⁵ Availability of large water flows make Kyrgyzstan and Tajikistan, Central Asia's poorest republics, potential world leaders in renewable energy, however, particularly during winter, both countries suffer from harsh electricity shortages.

Downstream countries, Uzbekistan, Kazakhstan and Turkmenistan use water mainly for irrigation purposes. Extraction of water from both rivers drastically increased in 1960s when central planning of the Soviet Union created a "cotton belt" in the lowlands of the mentioned three countries, irrigated through a complex system of dams, pumps, and channels using water coming from mountains in Kyrgyzstan and Tajikistan.⁶ The amount of water taken from the Amu Darya and Syr Darya doubled between 1960 and 2000, allowing cotton production to nearly double in the same period. By the 1980s, nearly 90% of water use in Central Asia was directed toward agriculture, primarily cotton production, with the Amu Darya and the Syr Darya supplying nearly 75 percent of the water flow.⁷ Uzbekistan who is largest consumer of irrigation water in the Aral Sea basin, overall consumes more than 50% of the two rivers' flow for its cotton production. Amu Darya's waters in Turkmenistan and Syr Darya's waters in Kazakhstan are also used mostly for agriculture purposes. Furthermore, over-use of waters of the two major rivers of Central Asia brought about a serious environmental catastrophe for the whole region – heavy pollution, evaporation and shrinking of Aral Sea and emergence of a chemical-salt mixed desert in its place. From 1960 to 1998, the sea's surface area shrank by about 60% and its volume by 80%.⁸ Waters of Amu Darya stopped to reach the Sea, continued shrinkage split it into two separate bodies of water.

5 Таджикистан намерен достроить Рогунскую ГЭС ["Tajikistan intends to finish constructing the Rogun hydropower plant"], *Vremya Vostoka*, 16 August 2013.

6 David Muckenhuber, *Breaking the Dam: Water Politics in Central Asia*, Global Observatory, 14 February 2013, <http://theglobalobservatory.org/2013/02/breaking-the-dam-water-politics-in-central-asia/>

7 Ibid

8 Aral Sea, CAWATER, http://www.cawater-info.net/bk/water_land_resources_use/english/docs/aral_sea.html

Surface of Aral Sea in 1989 and 2008



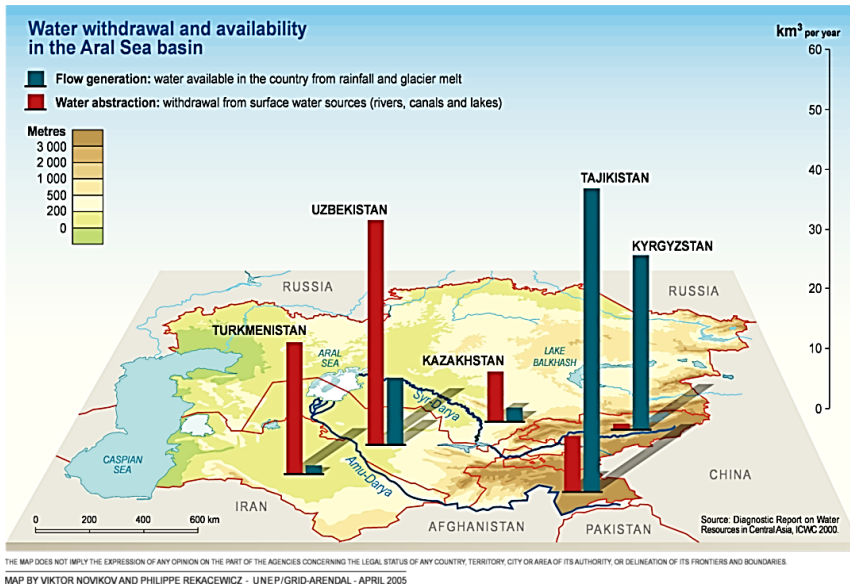
Source: <http://review-planet.ru/2012/02/aralskoe-more-foto/>

Decrease of area of glaciers and consequently water flows of rivers of Central Asia at the results of climate changing, as well as, waste of significant portion of withdrawn water at the result degradation of old Soviet irrigation infrastructure caused by under-investment, further reduces the amount of available water. This happens while there is serious upsurge in population of the region which increases demand for fresh water. In 2000, an estimated 55.9 million people lived in Central Asia. Currently combined population of the Central Asian countries is 65.7 million. A further twenty million are expected by 2040, placing enormous demands on water and infrastructure and possible severing the struggle for shared water resources.⁹

⁹ In International Crises Group, Water Pressures in Central Asia, Europe and Central Asia Report N°233, 11 September 2014

GLOBAL AND REGIONAL HYDROPOLITICAL PROBLEMS IN THE CONTEXT OF INTERNATIONAL COOPERATION AND SECURITY

Comparison between the availability of locally generated water resources and water withdrawal from surface waters



Source: <http://expeditieaarde.blogspot.com/2012/10/the-disappearance-of-aral-sea.html>

Failure of intra-regional cooperation efforts

The root of the problem is the collapse of the resource and income-sharing system the Soviet Union established on the region until its demise in 1991. Under the Soviets, water and energy resources were exchanged freely across what were only administrative borders, and Moscow provided the funds and management to build and maintain infrastructure.¹⁰ While creating a cotton belt and utilizing water flows originated in the upstream countries mainly for irrigation in the downstream countries, Soviets also created electricity-water nexus in Central Asia, whereby the generation

¹⁰ International Crises Group, Central Asia: Water and Conflict, Asia Report N°34, 30 May 2002, <http://www.crisisgroup.org/en/regions/asia/central-asia/034-central-asia-water-and-conflict.aspx>

of electricity from hydropower in upstream countries was linked to the water needs of those downstream. This system operated in the context of a common management system and shared energy arrangements through regional energy grids and networks.¹¹ Thus, Kyrgyzstan and Tajikistan provided water to Kazakhstan, Turkmenistan and Uzbekistan in summer for irrigation needs. In return they received Kazakh, Turkmen and Uzbek coal, gas and electricity in winter. However, this system ceased to exist with the collapse of the Soviet Union and the overnight emergence of international borders, and a plethora of bilateral and regional agreements and resolutions concluded in that decade failed to fix it.¹² Now downstream countries still demand to use more water in summer, but upstream countries - Tajikistan and Kyrgyzstan, being deprived of coal, gas and electricity supply, insist on accumulating water in summer to use them for electricity production in cold periods of winter. Water was increasingly seen as a national asset rather than a common resource by the upstream countries, since paying for the supply of hydrocarbons to them (formerly delivered freely as compensation for irrigation water) constitutes significant burden on their economies.

The problems of increasing demand and declining supplies have been compounded by the failure of the region's nations to work together. Rising nationalism and competition among the five Central Asia states has meant they have failed to come up with a viable regional approach to replace the Soviet system of management. Water management has suffered from the Soviet legacy of top-down control and general rivalries between the states.¹³ The Interstate Coordinating Water Commission (ICWC) that was set up in 1992 has failed to take into account changing political and economic relations.

¹¹ David Muckenhuber, *Breaking the Dam: Water Politics in Central Asia*, Global Observatory, 14 February 2013, <http://theglobalobservatory.org/2013/02/breaking-the-dam-water-politics-in-central-asia/>

¹² In International Crises Group, *Water Pressures in Central Asia*, Europe and Central Asia Report N°233, 11 September 2014

¹³ Richard Kyle Paisle, *The Challenge of International Watercourse Negotiations in the Aral Sea Basin*, NEGOTIATE Toolkit: Case Studies, IUCN Water Programme, <http://cmsdata.iucn.org/downloads/centralasia.pdf>

The annual cycle of competition for water is exacerbated not only by management and infrastructure problems, but also by issues of border delimitation and demarcation. Kyrgyzstan, Tajikistan and Uzbekistan share 3,681 km of borders, of which 961 km are disputed. Many of the disputed sectors are in the Ferghana Valley. In 2012-2013, there were 38 security incidents on the Kyrgyz-Uzbek border and 37 on the Kyrgyz-Tajik border, with four deaths resulting from the former.¹⁴

In 2012, a dispute over water resources risked provoking military conflict among the former Soviet republics, due to plans by Kyrgyzstan and Tajikistan to dam rivers for hydropower projects. Uzbekistan, Central Asia's most populous country, is also one of the World's most dependent countries on transboundary to irrigate farmland and it has long opposed the plans to revive Soviet-era projects to build dams on upstream Amu Darya and Syr Darya. In 7 February 2012, during his visit to Astana president Karimov even stated that current disputes over distributing water resources in the region "could deteriorate to the point where not just serious confrontation, but even wars could be the result." Situation continues to remain tense now, with border skirmishes that sometimes kill soldiers. Regional leaders seem disinclined to cooperate on any of their main problems. Suspicion is growing between the most directly affected countries, Kyrgyzstan, Tajikistan and Uzbekistan.

Rogun dam project and Uzbek opposition to its construction

The reason for the major dispute between Uzbekistan and Tajikistan – the most risky situation in terms of water conflict, is the Tajik government's plans to build the Rogun dam on the Vakhsh River. Although the initial construction began in 1982, the break-up of the Soviet Union did not allow the country to complete the project. In 2007, Russia partnered with Tajikistan to complete the dam, but the two parties soon fell out. The Tajik government announced in early 2010 that it would try to raise by itself the \$1.4 billion needed to finish the dam and the construction was

¹⁴ International Crises Group, "Water Pressures in Central Asia" Europe and Central Asia Report N°233, 11 September 2014

re-launched. The 334-meter-high dam of Rogun, if it is ever completed, will be the world's tallest dams and allow Tajikistan to produce about 13 billion kilowatt-hours of electricity annually.¹⁵ However, Vakhsh is the major tributary to the Amudarya River – a vital water source for downstream Uzbekistan, and therefore Tashkent seems highly concerned about the possible negative impacts of the project on Uzbekistan.

Trying to recover from the devastating impact of the civil war of the 1990s, the Tajik government wants to utilize its natural resources to facilitate the development of the extremely poor country. Tajikistan's primary resource is its enormous potential for hydropower production, which is planned to be used for transforming the country into a prosperous state. The Rogun dam project holds a notable position in this plan. Tajik officials have long been promoting the project as a shortcut to energy independence and economic growth, saying that it will enable the country to not only become self-satisfactory in electricity supply but also export it to neighboring Afghanistan and Pakistan. Thus, the Rogun dam project became the cornerstone of the Tajik government's ambitious economic development program.

Construction of Rogun dam



Source: <http://news.bbc.co.uk/2/hi/asia-pacific/8580171.stm>

15 Azad Garibov, An 'Undeclared Cold War' in Central Asia? The Journal of Turkish Weekly, <http://www.turkishweekly.net/op-ed/2977/an-%E2%80%98undeclared-cold-war%E2%80%99-in-central-asia.html>

From Uzbekistan's point of view, the picture is quite different and they have their own legitimate reasons for opposing the project. Uzbekistan claims that the dam will decrease the flow of water in the Amudarya River, which is the main feeding source for irrigation canals in Uzbekistan. The majority of the Uzbek population lives in rural areas and is employed in the agricultural sector, particularly in cotton production. Any decrease in the water level in the river will inflict immense damage to Uzbekistan's agriculture, where the water shortage is already felt even without a dam upstream on the Vakhsh.

The gigantic dam project carries with it environmental risks as well. Water shortage could completely dry out the Aral Sea, which has already lost 90% of its original size due to the low level of water reaching the sea. Its location in the seismically-active region is another serious concern, and the dam is claimed to be vulnerable to earthquakes that could destroy it and consequently cause massive flooding in the downstream areas of Uzbekistan.¹⁶

Finally, being able to regulate the flow of water in Amudarya, Tajikistan could be used as a means of political pressure and make water supply to Uzbekistan dependent on Dushanbe's good will. Dushanbe could also use water as a trade commodity and relate the supply of water to Tashkent's delivery of gas. Therefore, at a more fundamental level, Uzbekistan fears that an ability to control the flow of the Amudarya River will provide Tajikistan important geopolitical leverage in a region where the Uzbekistan has long sought to be a leader.

Tashkent has undertaken a number of measures in order to block the construction of the dam. Uzbekistan has resorted to diplomatic and economic pressure on Tajikistan, and has successfully persuaded possible foreign investors, notably Russia and China, from participating in the project. Since the end of 2011, Uzbekistan has imposed a transport blockade on Tajikistan, which is connected with outside world mainly through the transport network passing through Uzbek territory. Starting from April 1, 2012, Uzbekistan also shut down the gas supply to

¹⁶ Azad Garibov, An 'Undeclared Cold War' in Central Asia? The Journal of Turkish Weekly, <http://www.turkishweekly.net/op-ed/2977/an-%E2%80%98undeclared-cold-war%E2%80%99-in-central-asia.html>

Tajikistan. This threatens to stop the operation of an aluminum plant at Kurgan-Tyube, near the border with Uzbekistan, which is one of the few competitive enterprises of Tajikistan and responsible for 70% of the country's industrial export.¹⁷ Another significant plant for the country, Tajiksement, can also be forced to shut down its production because of the lack of the gas. Bearing in mind that the closure of these big plants will result in the closure of the dozens of other relatively smaller enterprises which are connected to those, this would be a serious blow to the economy of Tajikistan.

Politicization of the dispute as a crucial impediment to compromise and reconciliation. Another very important factor standing in the way of a possible compromise is the significant political capital that the leaders and the governments in both Tajikistan and Uzbekistan have invested in promoting and opposing the project. In Tajikistan President Rahmon has repeatedly claimed on TV that Tajikistan will complete the project at "any expense." He referred to the construction of the dam as a "battlefield for national pride and honor."¹⁸

Long awaited results of the independent assessment of technical feasibility and environmental and social impact of the Rogun dam project conducted by World Bank were disclosed in summer of 2014. Overall, the study concluded that the project could be realized, confirming the safety of building and operating a large dam at the Rogun site, however with strict international safety norms.¹⁹ Situation still remains tense after the release of the report, however resent news about the possibility of a new rapprochement between Uzbekistan and Tajikistan give some hopes of negotiated settlement of the confrontation.²⁰

Tensions over water and energy have contributed to a generally uneasy political climate in Central Asia. They do not only provoke hostile

17 Ibid

18 Azad Garibov, An 'Undeclared Cold War' in Central Asia? The Journal of Turkish Weekly, <http://www.turkishweekly.net/op-ed/2977/an-%E2%80%98undeclared-cold-war%E2%80%99-in-central-asia.html>

19 World Bank Draft for Discussion, Key Issues for Consideration on the Proposed Rogun Hydropower Project, World Bank, June 2014

20 Paolo Sorbello, A Timid Uzbek-Tajik Rapprochement, The Diplomat, 24 January, 2015, <http://thediplomat.com/2015/01/a-timid-uzbek-tajik-rapprochement/>

GLOBAL AND REGIONAL HYDROPOLITICAL PROBLEMS IN THE CONTEXT OF INTERNATIONAL COOPERATION AND SECURITY

rhetoric, but also prompted suggestions that the countries are willing to defend their interests by hard power if needed. Competition for water can only increase, and tensions will rise unless better mechanisms are put in place to manage the problems.

A multifaceted approach is needed that addresses energy, agriculture and demographic aspects of water use. There is need for more regional and more inclusive approach to discussion water problems that touch the interests of the all regional states. Water should be treated as a regional asset, not the national one, water disputes should not be considered as a “zero-sum game” and they should de-politicized and de0-securitized. Aging irrigation infrastructure should be improved in order to achieve more efficient usage of water resources and decrease water withdrawal from the transboundary rivers. It will contribute to both easing tensions over water distribution as well as addressing environmental crises underway in the Aral Sea basin. Finally, there should be more international commitment to facilitate dialogue in the region for negotiated solution of water disputes as well as for improving region irrigation infrastructure.



Dursun Yildiz (Turkey).,
Hydropolitics Expert
Head of Hydropolitics Academy

A new International Hydro diplomacy: from water cooperation to comprehensive collaboration

Past experiences showed that there was a strong need to ***comprehensive collaboration*** in the transboundary river basins co-riparian beyond the present weak cooperation level. Why can't oil and gas reserves be used as a key interdependency factor to develop stronger collaboration between riparian countries lying on the same transboundary rivers basins?

There are many countries which have rich oil and gas resources and at the same time they receive water from rivers which comes from energy poor neighboring countries.

There are several examples for such geographies and geopolitical situations;

For instance:

- a) ***Gas and oil rich of Uzbekistan meets its water need from rivers which flow from Kyrgyzstan and Tajikistan (Amu Darya).***

Although Uzbekistan receives the water gratis, it shows no intention applying any beneficial terms as exporting its oil and gas to its two neighboring countries.

- b) The same goes for Iraq and Turkey but on another modality (Tigris and Euphrates Basin)***
- c) Sudan-Egypt and Ethiopia, Kenya, Uganda (Nile Basin)***
- d) Nigeria and Niger-Mali (Senegal River Basin)***
- e) Republic of South Africa and Namibia (Orange River Basin)***

Present situation

There were about 50 independent countries at the beginning of the 20th Century. But the number of countries has grown rapidly since the last 25 years. It reached as many 195 countries when entering this Millennium. This brought some new transboundary river basins and hydro political interactions like in Southern Caucasus, Central Asia, Balkans and Eastern Europe.

Beyond growing number of independent countries, new fossil energy resources (natural gas, shale gas), new energy geopolitics, new hydrocarbon rich areas (including Arctic) have inadvertently affected Hydro-geopolitics of the new world.

Almost half of the world population lives in transboundary watersheds. However, the ambiguities related to water and the things to be done have not yet been sufficiently addressed in commercial or political agreements.

As Conca (2013) indicated in his paper that “*current efforts to support international cooperation on transboundary waters are characterized by a relative underinvestment in the diplomatic pillar as compared with the techno-managerial pillar of cooperation*”.

Present situation is more complex than that in the last century. Because the Water, Energy and Food Security nexus shows how various ways water is being used affect each other, and also highlights the need for a coherent policy. Climate change has repeatedly been described as a ‘threat multiplier’ for unstable regions around the globe. The impact of climate change is likely

to be felt primarily through the water cycle reinforcing many worrying trends regarding water scarcity, salinisation, alteration of seasonal flow patterns and flood risks.

- 1. 158 of the world's 263 international river basins, plus transboundary aquifer systems lack any type of cooperative management framework.**
- 2. Most water is shared across nations and people. A total of 145 nations hold territory within, and 21 countries lie entirely within international basins. (Water for Life" 2005-2015).**
- 3. Of the world's 263 international basins, 158 lack any cooperative management framework according to the UNDP Transboundary Waters Programme.**
- 4. Over the last 60 years, governments have signed more than 300 international water agreements, while there have only been 37 cases of reported conflict between states over water. (Water for Life, 2005-2015).**
- 5. The existing agreements are mostly bilateral, at times not sufficiently effective to promote integrated water resources management.**
- 6. Only 116 out of 276 transboundary basins have ever had a river basin organization.**
- 7. Most of the existing agreements do not include all riparians. Only 5 agreements are three lateral ones.**
- 8. Issues of shared aquifers are growing increasingly important. There are about 260 transboundary groundwater basins and no agreement framework and agreement so far.**

Nevertheless, in a report for the US State Department, the US Director of National Intelligence noted that during the next decade water problems will contribute to instability in states important to US national security interests.

Based on an analysis of past water disputes which contributed to tensions among rivals including nuclear-armed India and

Pakistan, Israel and the Palestine, and Syria and Iraq.(ICA2012).it concludes that after 2020, risks of geopolitical water conflict will likely increase. (Clapper, James R. 2013)

Traditional “Water Conflict or Cooperation” Approach!

Conventional term “*Hydro-politics*” now should encompass consideration of variety of scale, new actors, increased interdependency nexus water, energy, food, new geopolitics and new technology.

The use of transboundary water management and beneficial energy supply approach together rather than arguing only water sharing or allocation of water itself, provides by far the best scope for identifying mutually constructive collaborative actions.

The Oxford English Dictionary defines the word ‘cooperation’ as “working or acting together to the same end” for a common purpose or benefit, (Claudine Brelet 2013).Unfortunately, this process does not always take into account a “*shared vision*” to reach an ultimate goal. Real collaboration requires mutual dependent relationship and trust.

In the water sector, the cooperative approach is still too often based only on hydrological and climatological data, on modeling and engineering, all relying on the application of scientific and mathematical principles to practical ends, (Claudine Brelet 2013).

Concerns over transboundary water «cooperation» have to shift away from absolute water quantity to applicable benefit sharing collaboration on water and energy supply. If collaboration is essential in sustainable transboundary water management, oil and natural gas supplement in a mutually beneficial way can help built this collaboration in appropriate transboundary river basins.

Conceptualizing conflict and cooperation in a linear fashion is not a solution oriented approach. It is very hard to achieve transboundary water cooperation with normative assumptions starting from conflicted water issues. Therefore it needs a new conceptual approach .It may be productive to focus on the

analyses of rapid changing which brought new areas to collaborate between basin states rather than taking discrete events related to transboundary water interactions.

Growing Energy Demand and Transboundary Water's Energy

Water is a main or very important energy source in some hydrocarbon poor countries. This put water resources to main energy source like gas and oil. All energy resources except for water are barely to give any direct disturbance to neighboring or riparian states in normal energy generation process. But water is the only energy source that downstream states can directly be affected in the absence of any agreement. Therefore, even if water is an energy source, upstream riparian state is not as free as oil and gas owner states are in using water to generate energy. These circumstances, well, force a mutually beneficial energy supply agreement between energy rich downstream riparian and water rich upstream riparian countries.

Therefore in some transboundary river basins a new comprehensive collaboration paradigm should include a realistic positive interdependency on both water and energy resources to build confidence, and applicable and sustainable transboundary water management

The persistence of water conflicts in many arid regions is not simply a matter of water shortages but rather the lack of equitable agreements and confidence. In order to achieve sustainable water security, peace and hydro stability, higher level of interdependency plays very important role to confidence building. Therefore, international collaboration in the areas of Water and Energy issues, in relationship with transboundary hydro-politics is a necessity henceforth.

New energy geopolitics, new food geopolitics, new fossil energy resources, climate change, new natural threats, bring out the need for a new approach to International Hydro Diplomacy

Climate Change Pressure on Hydro Diplomacy

Although there are several reasons for a new hydro diplomacy approach, the most basic reason forcing us to such a new approach is the climate irregularities that have already been faced in several part of the world. Climate change will contribute to dramatic alterations in the physical parameters of the water regime prevailing in many rivers. Considering the possible impacts of climate irregularities, it may be said that transboundary water management is going to face serious risks within the scope of climate irregularities.

The irregularities and uncertainty that climate change entail for many basins is a new threat for transboundary water management. If climate change were to result in conflict, it would thus probably be over water²¹. The political risks resulting from extreme weather conditions have become apparent, for example, in the way fundamentalist forces were able to politically exploit government failures in Pakistan in aftermath of the massive floods in 2010.

In certain regions climatic variations will result in an excess of water during particular periods of the year contrasted by a deficit during others, (Jägerskog, 2013).

Unfortunately, few transboundary agreements (where and if they even exist) have been designed to compensate for increased variations as they are often restricted by a rigid definition of water allocation expressed by terms of volumes of water, not by percentages of flow which would otherwise allow for greater flexibility. Thus greater climatic variations will result in an increased pressure on, in many instances, rather weak agreements, (Falkenmark M., and Jägerskog, A., 2010).

Therefore “*immediate collaborative approach necessity*” and what to be done for this change should be taken into account such international congress, symposium and forums.

21 Benjamin Pohl 2014 The rise of hydro-diplomacy Strengthening foreign policy for transboundary waters. www.climate-diplomacy.org. www.adelphi.de

A New International Hydro-diplomacy Approach

Transboundary waters are a pivotal but underappreciated issue in the global politics. Water management in many transboundary basins is highly politicized and has a considerable impact on conflict prevention, regional stability, and environmental peace-making and international governance. Therefore, transboundary water governance is a domain that should elicit greater attention in the foreign policy community.

There is little historical precedent for major ‘water wars’. On the contrary, shared waters have in some instances been ‘islands of cooperation’ in otherwise conflictive relationships. The 1960 Indus Waters Treaty has thus survived three wars between India and Pakistan, cooperation on the Mekong persisted throughout the Indochinese wars, and water has served a crucial means for strengthening cooperation in Southern Africa. As a consequence, the use and allocation of water in transboundary basins is both a source of tension and an opportunity to promote cooperative practices and build collaborative institutions.

From classical cooperation to comprehensive collaboration (CC to CC)

In some regions, the economic, political, and security dynamics of the region are sometimes closely tied to its hydropolitics. Therefore oil and gas production and their transportation security may be also related to hydro policy and hydro stability in the oil and gas rich regions.

As Therese Sjömander Magnusson indicated in her article, *“We need greater understanding of how various regional forms of cooperation work outside of the water sector. We need a way of cooperation that strengthens regional integration affecting water management between countries,”* (Therese Sjömander Magnusson 2014).

In the cases where basin states are water rich-energy poor or/and energy (oil and gas)rich-water poor co-riparian, this can/should bring comprehensive collaboration and regional integration. A New International Hydro-diplomacy based on this collaborative approach may foster regional integration by supporting the *spill-over effect* of cooperative practices into other sectors.

Since energy security has both political and economic dimensions, it is difficult to confine energy security issues to any of the existing sectors of security, because often energy security threats have spill-over effects to the other sectors and in many cases other way around. Therefore as mentioned above, energy is more likely to be a super sector or cross-sect oral or inter-sect oral, because energy is a necessary precondition for other sectors, (Mikko Palonkorpi2007).

Water security complex

Water security complex or in a far reaching term the hydro-political security complex, defined as “a group of states whose primary hydro-political concerns are linked together so sufficiently closely that their national hydro-politics cannot be realistically considered separate from one another”.

The development of the idea of a hydro-political security complex is derived from the work of Barry Buza who explains the security complex as being a“set of units”.

In these cases where basin relationships are unstable, hydro-diplomacy may be able to build on technical collaboration to facilitate stability and peace. Such collaboration can and should simultaneously be used to foster regional integration by supporting the spill-over effect of cooperative practices into other sectors, such that water may become the nucleus of more formal integration via legal rules and shared institutions, (Pohl 2014).

In regions that are ‘securitized’

The challenges to effective transboundary water management emerge in different forms in diverse parts of the world. In regions that are ‘securitized’ (where there is a strong focus on security issues such as military conflicts, for example the Middle East region), cooperation and advancement of cooperation beyond the water sector is arguably less likely than in regions where there are less pressing security issues (Phillips, D.J.H., M. Daoudy, J. Öjendal, S. McCaffrey and A.R. Turton. 2006). In geographical spots where a securitization is materialized due to a set of perceived and real risks and treats, possibilities to interact in a two or multi way direction with other areas such as social welfare, water related issues, civil rights etc. dramatically are reduced and can only be revitalized until one or more of the other areas other than the said “securitized” one offer useful contributions to securitization leading a way to promote its ends. So, components of hydro-political security complex can thus serve as an instrument to break off a fate that securitization poses hindering cooperation let alone collaboration. Keeping in mind that securitization of any particular area explicitly refers to ego-centralization of resources which could otherwise be an instrument of a friendship, main drivers of which cannot be easily removed considered the complexities of current globally prevalent security environment.

By the same token, it has been suggested that regional cooperation over water as a shared resource can be a recipe for wider cooperation. While this may be the case, it is clear that such an assertion shouldn’t be overextended, (Jägerskog, 2003).

Phillips and others point out that the level of securitization in a river basin is an impediment to a functionalist (cooperation leading to cooperation) approach since the preoccupation of the states will be on national security, thereby clearly limiting the room for regional perspectives, (Phillips, D.J.H., M. Daoudy, J. Öjendal, S. McCaffrey and A.R. Turton. 2006). This is clearly evident in regions with a strong security focus. This does not mean

that cooperation cannot happen, but the assertion that this would almost automatically lead to wider cooperation is far-fetched.

Power Asymmetry

Basin politics are often compounded by power asymmetries, begging the question of how to deal with riparian hegemons. Hydro-hegemons frequently refuse to be drawn into cooperative multilateral basin for a, preferring to deal with weaker partners individually on a bilateral basis, (Pohl 2014).

The benefits of collaborative management of transboundary waters therefore cannot only be counted in the direct economic gains, but also in the benefits of conflicts avoided.

The need for and prospective benefits of hydro-diplomacy are thus on the rise, (Pohl 2014). Although shared waters have spawned conflicts, they also present diplomatic opportunities. Here the question lies under which set of coercive or persuasive conditions could a country which possesses power asymmetry over others be led to a compromise and trade-off. To our assessment, a comprehensive mutually advantageous engagement of energy provision policy might reduce the limiting effects and consequences of securitization of transboundary water resources and increase prospective benefits of hydro-diplomacy in some appropriate regions.

Power Structures in the Region

Zeitoun and Mirumachi argue that it is imperative to make a thorough analysis of the power structures prior to any engagement in the support of transboundary waters management, Zeitoun, M, and N. Mirumachi (2008). It is obvious that a region cannot move towards a wider cooperation and integration without taking the power structure dynamic into account.

Main barrier before a constructive relation between the energy rich-water poor and water rich-energy poor parties which share

the same basin in the role of upstream and downstream countries is that the lack of inclusive and comprehensive energy provision policy which could guaranty the provision of energy in exchange for a water. Actually the responsibility lies with both sides to hold in that while energy rich-water poor party tends to abuse the notion which implies the provision of water is a matter of basic human rights ignoring other aspects of the question, the other party- energy rich-water poor- tends to exert power asymmetry it derives solely from possessing energy. Another question can be raised as to whether finding a trade-off or compromise point is reachable by the current governing/overarching structure, mechanisms and code of law for the management of transboundary waters. Attaining or at least endeavors towards a trade-off point would serve bring both sides on somehow equal terms to built confidence to achieve higher levels of far reaching collaborative water management ends.

Regional (Water - Energy) Security Complexes

Since the end of Cold War, the understanding of security and the security environment of international politics has been radically changed. It is generally accepted that regional security mechanisms/ ideas can create an impact on the identities and behaviors of actors. That is why regional security has turned to bean important subject for the international relations (IR).

After rapid increase in oil and natural gas dependency between co-riparian states in some transboundary river basins, these energy resources may also be used as a political weapon like water resources. This suggests that water and energy issues can involve interdependency relationships which include political aspects that can be argued as (water -energy) security threats, if not all, in some regions.

The regional water-energy security complexes may be formed by water-energy related interaction between two or more states in a limited geographical area, which includes a water-energy

dependency relationship between the states involved and perception of this dependency as a threat (securitization).

The energy interaction includes transactions such as production (export), purchasing (import) and transit of energy. Energy dependency is politicized or securitized more easily if it is linked to other controversies or conflicts (enmity) between states and these enmity perceptions can be regarded as factors which turn dependency into a negative energy dependency. Analogous to RSCT definitions by Buzan & Wæver, also the threats arising from energy dependencies are usually more intense between states (or regions) in close geographical proximity.

On the other hand, positive energy interdependency is likely to develop according to the rules of the energy market where the main threats are secure supply and stable price of energy as quoted above.

As Howard Chase has pointed out, in itself lack of self-sufficiency in energy is not a problem, because energy trade is the mechanism that should balance that out. But water trade mechanism wouldn't be a solution in the case of a neighboring water poor country. This difference between water and energy sources may put "a new hydro policy approach "to origin of regional security complex.

Transboundary Energy and Water Agreements: Finding a Trade-off point

When we consider water rich upstream and energy rich downstream countries lying on the same transboundary river basin, upstream riparian may use the transboundary waters for political pressure. On the other hand, if there is an agreement on oil or gas provision from downstream country to upstream one, the energy price may also be very effective instrument for political pressure of downstream country.

But this can also link the countries with a win to win situation.

If the energy price is subsidized by energy rich co-riparian state, this will be a very concrete first step to achieve trust. But this can

be only a first step and should be extended by other sectors as well as developing a mutually beneficial transboundary water agreement. Because the elites of the both receiving and supplying country know that the subsidized energy prices can be withdrawn at any point of time. This risk also requires more interdependency and mutually beneficial agreements between co-riparian states.

In fact it can be a win win situation when it is well organized.

On one hand, subsidized energy prices in turn contribute to the internal stability and dependent state is expected to take supplying country's interests into consideration in order to secure subsidized prices – and internal stability - in the future. On the other hand, revenues from energy exports are no less important for producer countries internal stability. Should these revenues suddenly disappear, producer country may face considerable stability challenges.

In summary, both subsidized energy prices and mutually beneficial transboundary water agreement can feed each other to built confidence in the basin. This approach will exactly contribute to the stability of the basin with win-win method. A new mutually beneficial effective transboundary water management system will be one of the most important result of this process.

As water quality deteriorates and demographic and socio-economic development increases in the world, the demand for freshwater resources also increases. This trend is further aggravated by climate change. Climate irregularities and environmental changes are likely to sharpen existing and may trigger new social and political conflicts over water, in particular in regions that lack robust institutions for cooperation for the least, and for collaboration at which we should aim.

In some certain parts of the world where there are water and energy disputes, New international hydro policy on transboundary water governance together with transboundary energy supply politics may present significant challenges and opportunities for foreign policy makers to prevent conflicts and harness opportunities for greater regional cooperation.

GLOBAL AND REGIONAL HYDROPOLITICAL PROBLEMS IN THE CONTEXT OF INTERNATIONAL COOPERATION AND SECURITY

Various conflicts over water and interstate tensions over water issues in the Nile basin, the Middle East, and South and Central Asia and South Africa need for a comprehensive collaboration that needs trust between countries. Oil and natural gas provision politics can play very important role to built confidence. This may also create collaborative approach to transboundary water management on the basis of greater regional cooperation.

Climate change progressively became a security issue for the countries, leading to a necessary change of water policies as well as their behavior to transboundary water management. It should therefore be a priority to promote deeper cooperation, comprehensive collaboration on transboundary water management in assessing climate change and its impacts on these strategical water resources.

In fact, classical cooperation approach between co-riparian states wouldn't be enough to manage the transboundary rivers and transboundary aquifers under the effects of climate change as well as new international relationships and new geopolitics. Besides the transboundary rivers, the proper governance of transboundary aquifers requires particularly high levels of international collaboration.

Taking into account the rapid increase in water and energy needs, energy resources rich neighbors can create amicable and closer relationships among co-riparian states on transboundary river basin. This can make necessary hydro politics more effective by applying it into broader transboundary cooperation and efforts at regional economic and political levels.

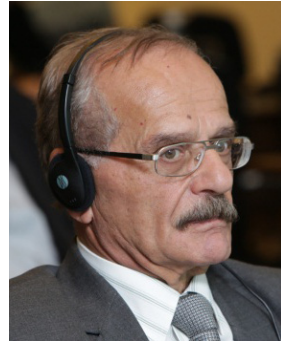
Greater vision and scope in cooperation may lead to greater potential benefits. Yet to achieve such synergies by water and energy resources require dedicated political interest.

Energy provision politics in a mutually beneficial way can be a useful tool to help alleviate the negative political consequences of transboundary water governance problems, and to foster greater cooperation where possible. A beneficial oil and gas supply agreements can built mutual trust and help reduce uncertainties

between co-riparian states. It may provide incentives for their realization, and help frame issues such that cooperation becomes politically more attractive than unilateral actions.

Sustainable transboundary water management need greater political and diplomatic engagement that can't be achieved only classical cooperative approach on water issues.

It requires shared vision, shared goal and unity of effort which means a real collaborative approach on the basis of new Hydro-diplomacy approach instead of tight classical cooperative one.



Elias Salameh,
*professor at the University of Jordan, Director
of the department of Agriculture and water
at Jordan's Supreme Council of Science and Technology*

Water Conflicts And Resolution

Social and economic development depends to a large extent on the availability of adequate water resources in quantity and quality.

Increasing population in the different countries, improving living standards, industrialization and generally socio-economic development have, during the last few decades, led to higher demand on water resources. Many countries especially those of the semiarid and arid climatic zones have become unable to satisfactorily provide the required water amounts to users with suitable quality.

In some water rich countries, environmentally irrelevant socio-economic development has, during the last few decades, rendered the quality of many water resources unsuitable for their pre-developmental uses, which has roughly impacted health and environment.

Water shortage and water quality problems culminate when water resources are shared among countries, because countries try

to unilaterally develop these resources without due consideration to other countries' fair shares in that water sources.

In addition, water resources, especially non-renewable groundwater stocks were exploited within countries irrespective of coming generations rights in such wealth.

In some water rich countries environmentally irrelevant socio-economic development has, during the last few decades rendered the water quality of many water sources unsuitable for their pre-developmental uses which has negatively impacted health and environment.

Situation of shared water resources

The situation of transboundary water resources has, therefore, turned to become a new area for disputes and conflicts among countries sharing the same water source or among the water use sectors within a country depending on a water source. Combined with the overexploitation of resources the whole water issue has become a big concern for individuals, societies, policy-makers and governments.

Developing water resources fulfills the socio-economic needs of societies for that water and once a water exploitation project is in place, it becomes extremely difficult to eliminate or to cancel because of that project economic and social services to societies. Therefore, elimination might lead to social discomfort, unrest and conflicts among use sectors or among countries sharing such resources.

Therefore, it has become a social, political, local and regional imperative to exploit water resources within one country and those shared with other countries in a logical fair way.

International law principally bases on:

“Develop in a way not to cause harm to others sharing the same source”, which means it is a moral principal than a law. In addition, such moral principals can only serve as a **“basis to share water”** and not to share water or to solve water conflicts.

The inadequacy of international laws and by-laws to solve conflicting interests in transboundary water resources forces to search for other mechanisms in fair sharing of water resources.

In addition, bilateral and multilateral sharing agreements become generally obsolete when changes in the water regime and its governing conditions take place. As an example on that one can think of climatic changes. “Which country and how will the sharing countries bear the consequences of such changes”?

Bilateral and multilateral water sharing agreements such as those on the Jordan, the Nile, the Euphrates, the Tigris Rivers and others proved to be inadequate to withstand development, changes in the water regime, climatic changes etc.

The inadequacy of River basin agreements has been recently demonstrated on the example of Ethiopia constructing the Nahda Dam on the Nile River. The Ethiopian Foreign Minister declared during the first week of November this year that Ethiopia does not recognize the 1929 and 1959 agreements on the Nile and will not abide to these agreements because Ethiopia was not a partner to these agreements and these agreements reflect only the interest of Egypt.

Hence, new mechanisms for sharing water have to be developed. The most appealing and promising mechanism seems now to be the joint management of hydrological basins by sharing countries or use sector.

How to reach at Joint management of hydrological basins?

1. *Scientific detailed studies of the natural water situation in a hydrological basin including precipitation, evaporation, surface runoff, groundwater formation, water quality etc. to be studied by independent high-caliber water experts. Such studies should only consider the natural system set-up in the basin.*
2. *Details on the recent and historic water uses of the shared*

- water resource in the different countries.*
3. *Studies on the water requirements for each use in the water basin parts of the different countries.*
 4. *Required water project to maximize benefitting from the water resources.*
 5. *Development of scenarios for water use per country and sector. The scenarios should only lead to win/win situations for all water users and use sectors.*
 6. *Scenarios should then be discussed by the high level administration of the different countries within each country and among the countries sharing a water source. This seems to be the most difficult task of the Joint Management Approaches, but also it seems to be the most relevant way to reach at fair and dynamic (year by year) sharing of a basin's water resources in a win-win situation for all partners or riparian countries.*



Erdem Denk - (Turkey),
*Expert on international law and hydro-political
issues at the University of Ankara*

A New Approach to the Law of International Watercourses?*

There are numerous valuable studies in the literature on the law of international watercourses. Although they deal with different aspects of the utilisation of international watercourses, it is difficult to say that a legal framework duly accepted, acknowledged and recognised by all relevant States is reached regardless of the fact that the 1997 UN Convention has recently entered into force. The conventional paradigm may be briefly criticised basically on two distinct grounds: because it fails to recognise that watercourse States owe obligations to non-watercourse States and the international community in general (in addition to other watercourse States), and because it sees the principles of equitable utilisation and no significant harm as being inevitably in conflict.

First, the utilisation of international watercourses may bring in numerous rules and principles of international law which are not necessarily limited to those specifically relevant to the utilisation of international watercourses. This is simply because the law

of international watercourses does not function in isolation. Watercourse States may well breach international obligations arising from other areas of international (environmental) law. The basic obligation not to cause significant transfrontier harm, for example, covers not only harmful effects caused to other watercourse States, but also those caused to “third” parties, however exceptional such effects might be. Furthermore, watercourse States also have obligations for the harmful effects of their utilisation activities that are not “transfrontier” in nature (in the strict sense of the word). The notion of the common concern of humankind provides the theoretical legal basis for such obligations. In this context, the obligations of watercourse States for “national” harmful effects caused, for example, to biodiversity, cultural heritage and human populations, and those for “global” effects (i.e., to the global climate) are relevant. Although it is true that the category of obligations arising from the notion of the common concern of humankind has nothing to do with the “international” character of international watercourses as such, it is clear that a study (or a global instrument) claiming to provide a comprehensive legal framework for the utilisation of international watercourses should cover, refer to or at least not to hinder the application of rights and obligations of the parties owed to non-watercourse States which are not conventionally embodied by the law of international watercourses. The conventional paradigm, on the other hand, is convinced that utilisation of international watercourses are to be (or, can only be) regulated by balancing the interests of upstream and downstream States. The (conventional) law of international watercourses is therefore confined to rules and principles basically concerning the mutual rights and obligations of watercourse States and as a result other rules -if adopted at all- are inevitably ignored/neglected (“balanced out”) in the final analysis.

Second, the principles of no-significant harm and equitable utilisation are complementary principles, rather than being in an inevitable conflict, contrary to the conventional wisdom. However, most of the studies in the literature can roughly be divided into two

groups: those that advocate the superiority of the principle of no-significant harm over that of equitable utilisation, and those assert the opposite. The 1997 UN Convention has also adopted such a formula and apparently backed the superiority of the principle of equitable utilisation. One of the basic premises of the present study is that these two basic schools are actually far from being substantively different, contrary to the common assumption in the literature. Moreover, it is indeed hard to accept that there is a “sharp” difference between these two main approaches, which are in fact no more than two sides of the same coin. Rather they are simply derived from, or based on, the same paradigm, i.e., the conventional paradigm. According to this basic assumption on which these two groups base their arguments, the principles of no-significant harm and equitable utilisation inevitably conflict. This ill-founded framework provided is open to subjective and even arbitrary interpretations as well, because if these two principles “inherently”, or “unavoidably”, conflict, the only thing to be done in order to settle this conflict would, in the final analysis, be to “prefer” one of these fundamental principles over the other. According to one’s point of view, in other words, it can (“legitimately”) be argued that the principle of no-significant harm prevails over that of equitable utilisation and the opposite is also equally possible. Such an approach cannot adequately govern non-navigational utilisation of international watercourses, simply because it does not put forward a legally acceptable objective framework but a fragile, delicate and unstable one solely in between watercourse States. Indeed, as is widely seen, this in practice means that while some watercourse States (usually upstream States) argue (or, “prefer”) that the principle of equitable utilisation prevails over the principle of no-significant harm, others (usually downstream States) argue (or, “prefer”) just the opposite. So, the solution found (or the preference made) would be bound to be subjective, and, most importantly, the development of “the law of international watercourses” would effectively be blocked, as we have been witnessing for a long time.

Hence, the conventional paradigm, which not only neglects many obligations owed to “third” parties, but also apparently sees substantive rules other than those based on, or derived from, the fundamental principles of no-significant harm and equitable utilisation as secondary rules, fails to comprehensively address the utilisation of international watercourses. Similarly, most procedural obligations of watercourse States are also formulated narrowly putting the mutual obligations of watercourse States at the centre. So, the conventional paradigm mainly, if not merely as is the case for many aspects of the issue, deals with, and addresses, mutual rights and obligations of watercourse States and other applicable rules and principles arising generally from international (environmental) law are “unavoidably” neglected/ignored. This is particularly true for the 1997 UN Convention, as it is charged, or claims, to cover “legal problems relating to the use of international watercourses”²², not only those relating to the mutual rights and interests of watercourse States.

In view of these criticisms of the conventional paradigm, it is hard to conclude that the 1997 UN Convention provides a meaningful and comprehensive legal framework. It is far from adequately covering (or even referring to) some substantive obligations of watercourse States, let alone the fact that it effectively obstructs application of various obligations of watercourse States arising from general principles of international environmental law. In other words, it is well far from progressively developing the law of international watercourses. This is a simple result of the fact that the paradigm it follows falls short of comprehensively addressing all relevant aspects of the utilisation of international watercourses, as the Convention puts all its emphasis rather on settling disputes between watercourse States.

The present study therefore endeavours to put briefly forward a meaningful framework within which “the law of international watercourses” can be addressed comprehensively and consistent

²² * This paper is largely based on the “Conclusion” section of the PhD thesis of the author submitted to, and endorsed, by Cardiff Law School in 2004. The exact title of the thesis supervised by Prof. Robin Churchill is: “Relative Sovereignty over International Watercourses: Rights and Obligations of Watercourse States”.

with (not in isolation from) other specific areas of international (environmental) law. The main pillars of this framework may be briefly outlined as follows.

1. **The theoretical legal basis of the right to utilise is the territorial sovereignty concept:** *It must be first and foremost stressed that the legal basis of the right to utilise international watercourses is in fact a simple geographic fact: These resources flow within the respective territories of watercourse States for a certain period of time. It is, in other words, the territorial sovereignty concept that constitutes the legal basis of the right to utilise in theory. However, this sovereignty (to be) enjoyed over international watercourses is a restricted and even a provisional one due to its nature. Watercourse States, accordingly, may exercise the right to utilise only as long as these resources flow within their territories (i.e., its provisional character), and, more importantly, within the ever narrowing limits of international environmental law in general and the law of international watercourse in particular (i.e., its restricted character). The sovereignty exercised over international watercourses will therefore be called here as “relative sovereignty” as opposed to the conventional “absolute” and “restricted” sovereignty doctrines.*
2. **The practical legal basis of the right to utilise is the principle of equitable utilisation:** *Although the right to utilise is thus established by the territorial sovereignty concept in theory, the exact scope of this “theoretical” right for each watercourse State is still subject to determination. This is a simple result of the fact that the waters of international watercourses flow as a whole and the exact amount of water that can be used by each watercourse State is to be determined. The principle of equitable utilisation, which is well settled in international law as has also been confirmed by Article 5 of the 1997 UN Convention, complements the territorial sovereignty concept and provides adequate means to determine the exact (quantitative) scope of each watercourse State’s share. In this*

sense, this principle clearly relates to the existence of the right to utilise, i.e., the actual use of the water.

3. **In determining the equitable shares of watercourse States, all relevant factors are to be taken into account equally, except “vital human needs” which enjoy an inherent priority:** *The equitable share of each party is to be determined by taking all “relevant factors” into account depending on the special circumstances of each particular case. All relevant factors are not limited with those that have been listed, or referred to, in official instruments, and they would be given equal weight. Nevertheless, it must be stressed at this juncture that “vital human needs”, which are an indispensable element of the human right to life, which may even have a jus cogens character, enjoy an inherent priority over other factors. Watercourse States, therefore, are required to give inherent priority to vital human needs whilst not only determining the equitable share of each watercourse State but also when utilising their respective equitable shares.*
4. **Application of the “relevant factors” clause does not, and in fact cannot, include considerations of “the effects of the use or uses of the watercourses in one watercourse state on other watercourse states”, contrary to what is provided in Article 6(1)(d) of the 1997 UN Convention as well as in the literature:** *The factors to be weighed in determining the equitable shares of an international watercourse should not include “the effects of the use or uses of the watercourses in one watercourse state on other watercourse states”, as this would not only be ill-founded, but also impracticable. It would be ill-founded because this “factor” relates to the “way” the right to utilise is exercised, whereas the principle of equitable utilisation, as stressed above, relates to the existence of the right to utilise and governs the quantitative extent of this right. Furthermore, while the right to utilise belongs merely to watercourse States, “the effects of the use or uses” of the watercourse may well directly affect non-watercourse States*

and third parties, as well as other watercourse States. So, taking such a factor into account in determining the equitable shares of watercourse States would be theoretically ill-founded. Second, such a factor would be impracticable as well. As is well known, lawfulness must be present at the time of activity at the latest. Since “effects” of utilisation activities cannot be present by the time the activity in question is executed, such a factor would clearly be impracticable and misleading in determining the equitable shares of the parties. Such a factor, otherwise, would give “unfair protection” to earlier activities, which would simply cause a development race between the parties on a “first come first use” basis.

5. **The minimum stream flow must be determined first and put aside before the equitable shares of watercourse States are determined individually or collectively:** *The minimum stream flow represents the amount of water required to keep the (ecology of) international watercourses alive. This doctrine is arguably now well-established thanks to the latest developments in international (environmental) law in general and the law of international watercourses in particular. The relevant amount of water, which is determined consistent with the special features of each particular watercourse, is to be put aside first before the equitable shares of watercourse States are determined, as it is not subject to (equitable) utilisation of watercourse States.*
6. **Any watercourse State that exceeds the limits of its equitable share is required to abandon the activity in question:** *Since the principle of equitable utilisation (together with the territorial sovereignty concept) governs the existence of the right to utilise, that is to say the actual use of water, the responsibility of any State exceeding its equitable share would also be towards the actual use itself. So, if any breach of this principle is in question, the watercourse State concerned would be required to abandon/mitigate that actual use of the water. So, since the existence of any right precedes any other principle*

or rule that govern the way this right (once established) is exercised, one should first and foremost determine whether this right is established. (Whether this right (once established) is exercised consistent with international law is to be tested in accordance with principles/concepts stated in point 7 below).

7. **Watercourse States are obliged to utilise their equitable shares consistent with all their relevant international obligations based on, and derived from, the principle of no-significant harm and the notion of the common concern of humankind:** *Once the equitable shares of watercourse States are established as a result of the territorial sovereignty concept and the principle of equitable utilisation, each and every watercourse State, as a general rule of international law, is required to utilise its respective equitable share within the limits of all relevant rules and principles of international (environmental) law in general and the law of international watercourse in particular. In this context, the principle of no-significant harm and the notion of the common concern of humankind provide the general theoretical framework of the responsibilities of watercourse States for prima facie lawful activities. Both of these principles relate to the way a(n already established) right is exercised. Watercourse States cannot therefore ignore any applicable obligation, contrary to what might appear to be implicitly suggested by the conventional paradigm which apparently assumes that only rights and obligations of watercourse States vis-à-vis other watercourse States are covered by the law of international watercourses. Since “the law of international watercourses” does not, and in fact cannot, operate in isolation, it is obvious that watercourse States are bound by all the relevant and applicable rules, principles, obligations and duties imposed by international environmental law in particular and international law in general. Watercourse States thus are responsible for all harmful effects caused by their utilisation activities, be they within their own territories, in the territories*

of other watercourse States or of non-watercourse States, or global commons. The fact that harmful effects on both non-watercourse States and watercourse States are included must be particularly underlined here, because the conventional paradigm on the law of international watercourse -except for some (rather ambiguous) parts of the 1997 UN Convention- deals mainly with obligations owed to other watercourse States. Besides, even foreseen obligations owed to non-watercourse States becomes effectively inapplicable in the final analysis, as the central “balance of interests” approach occupies a central and even a decisive role in the conventional paradigm. The prevailing understanding might even be perceived as suggesting that watercourse States would almost be (legally) free to utilise international watercourses as they pleased as long as they did not cause significant harm to other watercourse States. However, as is well known, watercourse States are bound by various specific environmental and related obligations derived from the principle of no-significant harm and the notion of the common concern of humankind. These include obligations concerning water pollution, marine pollution, conservation and protection of biodiversity, climate change, human populations (including the human right to water, the human right to health, and obligations concerning human settlements), conservation and protection of cultural heritage and other harmful conditions such as flooding, erosion and blocked sediment movement.

- 8. The substantive and procedural obligations of watercourse States are obligations of due diligence, which is meant to prevent harmful effects when and where they can be prevented:** *The principle of due diligence represents the basic understanding that harmful effects should not be caused intentionally or negligently. So, this concept cannot be interpreted/implemented in a way that leads to an excuse for causing harmful effects contrary to international law.*
- 9. Any watercourse State that exercises its utilisation right**

over its equitable share contrary to international law is required to abandon the wrongfulness, i.e., the harmful effects caused: *Since the principle of no-significant harm and the notion of the common concern of humankind, both of which relate to the way the already established right to utilise is exercised, govern the harmful effects of utilisation activities, the responsibility of any wrongdoing State is towards the harmful effect caused. Thus, a watercourse State which, whilst exercising its right to utilise its equitable share, breaches any of its obligations arising from the principle of no-significant harm and/or the notion of the common concern of humankind, is required to abandon (or mitigate where applicable) only the unlawfulness in question, that is to say the harmful effect caused, not necessarily the actual utilisation activity (cf. point 10 below). If the State of origin can abandon/mitigate the harmful effects caused without abandoning/mitigating the actual use in question, it will be able to proceed with the actual activity, which in itself is perfectly lawful. (Unlawful, that is to say inequitable, activities would not be subject to the rules and principles governing the way the right to utilise is exercised, anyway, because only established “rights”, i.e., lawful uses of the watercourse, can be tested in terms of whether they are exercised consistent with the applicable rules). It is obvious that abandoning or mitigating the harmful effect without abandoning the actual utilisation activity may not be possible in all cases. Emphasising this theoretical fact is still of paramount importance, because this will not only give watercourse States the chance (and in fact encourage them) to develop techniques which make it possible to mitigate/minimise the harmful effects of (beneficial) utilisation activities without altogether abandoning the activities in question, but it will also be of key importance in dispute settlement, as the parties may well agree on “political” solutions, i.e., by balancing their interests, by paying compensation, or other trade-offs, only by having full knowledge of the applicable law in this*

area. It is, in other words, vital that the legal framework be properly set out, as otherwise the situation, to say the least, will be legally misleading.

- 10. The principles of equitable utilisation and no-significant harm, both of which govern different aspects of the utilisation of international watercourses do not, and in fact cannot, conflict:** *Each of the principles of equitable utilisation and no-significant harm has distinct and separate meanings and functions. Indeed, while the former, as a complementary principle to the territorial sovereignty concept, relates to the existence of the right to utilise, the latter, together with the notion of the common concern of humankind, relates to the way this already established (prima facie lawful) right is exercised. In other words, while the principle of equitable utilisation governs the actual utilisation activities of watercourse States, that of no-significant harm governs the harmful effects caused by such activities. So, two principles do not and cannot conflict, contrary to what is argued by both schools of the conventional paradigm. Moreover, these two principles not only have different functions, but they function at different stages in a complementary way: In the case of a utilisation plan, first the question of whether the relevant watercourse State has the right to carry out that utilisation activity has to be determined by applying the principle of equitable utilisation (through evaluating the relevant factors). Second, once it is established that the watercourse State in question can carry out that utilisation activity (or, to put it another way, is entitled to utilise the relevant amount of water), the principle of no-significant harm (together with the notion of the common concern of humankind) becomes relevant according to which the watercourse State in question is required to utilise its equitable share without causing harmful effects prohibited by international law. In short, these two fundamental principles in fact complement each other, rather than being in conflict, as has been conventionally assumed and asserted.*

11. **The substantive obligations of watercourse States can only be adequately fulfilled if relevant procedural obligations are also complied with:** *This is simply a result of the fact that international watercourses are factually internationally shared resources (irrespective of whether this “status” has been officially recognised by international instruments). It is indeed virtually impossible for watercourse States to properly abide by all their specific substantive obligations without conforming to various procedural obligations generally imposed by international environmental law and the law of international watercourses alike. Indeed, any watercourse State which wishes to utilise its equitable share within the limits drawn by international law cannot reasonably do this without sharing data and information with others and without other forms of full cooperation conducted with goodwill. The key concept in this context is the principle of due diligence, according to which any watercourse State that does not act with due diligence would hardly find any excuse to explain any wrongdoing.*
12. **Procedural obligations of watercourse States constitute a comprehensive whole:** *The main suggestion of the present study with regard to the procedural obligations of watercourse States is the fact that all of these obligations constitute a comprehensive whole: Each and every procedural obligation becomes relevant and functions in relation to the previous one(s), that is to say complements it (them) both legally and practically, and paves the way for the following one(s), that is to say establishes both the legal and practical grounds for the proper fulfilment of it (them).*
13. **Joint mechanisms seem the best way of dealing with the utilisation of international watercourses comprehensively:** *Since the aim of the law of international watercourses is not only to settle watercourse disputes but also to govern the utilisation of international watercourses in a comprehensive way, all relevant aspects of the utilisation of international*

watercourses should be taken into account by any legal/political effort that aims to handle the issue meaningfully. Joint mechanisms (i.e., commissions and so on) seem the best way to do this, as they are not only more likely to regulate watercourse issues before a conflict arises, but they also cover all aspects of the issue and embrace all relevant parties/States, unlike classic dispute settlement mechanisms which usually address only a particular point/issue/dispute that has arisen between certain/limited parties.

- 14. To sum up, the primary aim of the legal framework outlined here (as with the conventional paradigm) is not to address and settle watercourse disputes, but to comprehensively regulate the utilisation of international watercourses regardless of any dispute that arises between watercourse States:** *The present study aims at providing a legal framework that governs all relevant and applicable rules, principles, obligations and duties of watercourse States. First, this is assumed to legally encourage all watercourse States, be they upstream or downstream, to settle international watercourse disputes, as arguably the first stage of a successful dispute settlement procedure is to put forward (and/or clarify) the applicable legal framework accurately and fairly. More importantly it stands for comprehensively regulating the utilisation of an international watercourse before a conflict arises. In this context, all obligations of watercourse States owed to all potentially affected States (including non-watercourse States and the international community as a whole, as well as other watercourse States) in relation to all harmful effects they cause contrary to international law (including those caused within their own territories and to the global commons, as well as in the territories of other watercourse States) are duly taken into account, and no right or obligation of watercourse States are neither overestimated nor underestimated at the expense of any other. So, arguably, an all-inclusive and fair legal framework is suggested.*



Givi Gavardashvili,
*Institute of Water Economy of
Georgian Technical University*

Water resources of the transboundary river Kura And policy of using them

The matters, related to the necessity of the broadened complex researches covering the interconnection between water supply, ecology and economy of the Southern Caucasus require to conduct in-depth researches of mutual relations of all fields of transformation and using water resources, interconnection amongst them and with the environment at numerical estimation of available events.

Alongside herewith, it is necessary to widen information aimed at forming public opinion moving up in objective estimation of water relations between the republics of the Southern Caucasus.

At the present stage of the scientific-technical progress, we have always possibility to arrive at a solution and to take the required arrangements regarding the reasonable distribution of water resources of the Southern Caucasus and to stabilize the ecological conditions. While realization of this problem, the complex water economy units became effective facilities both in the technical-economic and social relations. In case if we use namely this type of

approach to the problem of using the water resources, we cannot be concerned about the water crisis. Presently, it should be necessary to arrange the tasks planned out for the future, so, there are no other ways in the affair of development of the water economy and protection of water resources of the region [1].

SOUTHERN CAUCASUS TRANSBOUNDARY WATERS

The river Kura is the largest river of the Southern Caucasus, the basin of which (198300 km²) embraces the territory of Turkey, Iran, Eastern Georgia, Armenia and Azerbaijan. The River Kura, passing a frontier of three adjoining states (Turkey, Georgia and Azerbaijan) is an example of transboundary waters course.

The river regime is characterized by a spring high water and steady summer and winter runoff low. The river's perennial average discharge is 443 m³/sec. The flood time is observed at the end of April – at the beginning of May and is finished at the beginning of July. The Kura river's characteristics of water resources are indicated in the schedule 1, picture 1.

Kura and its inflows' waters are widely used for needs of the national economy for power engineering, irrigation, water supply and other purposes. Low water content of rivers in all eastern Caucasus includes 130 billion m³. Presently, up to 30 large and middle water reservoirs of Hydro-Electric Power Stations with the capacity exceeding 10 million m³ are consumed herein. The largest one is Mingachevir water reservoir, wherein up to 65% of all rivers' flow is accumulated.

While analyzing the perspective of development of water-engineering system of irrigation assignment you have to pay special attention to the fact that in the Southern Caucasus states (Georgia, Azerbaijan and Armenia) there are used averagely up to 60% of the territory envisaged for agriculture. The undeveloped lands are not so productive in their natural conditions and may be effectively used only on the assumption of taking corresponding land reclamation arrangements. We know that in the modern

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level of water consumption, the seasonal regulation is not able to secure the needs of national economy in water that is observed in streamflows of Iroi, Khram and other rivers.

Schedule 1

Average long-term indicators of water resources in the basin of the Kura River

№	Sources and cross-sections	Total stock (mln. m³)	Including those formed in the territory				
			Azerbaijan	Armenia	Georgia	Iran	Turkey
1	2	3	4	5	6	7	8
I. Surface runoff							
1	Kura-state frontier	975	-	-	-	-	975
2	Kura frontier of Azerbaijan	7250	-	-	6275	-	975
3	Alazani-mouth	4000	1595	-	2405	-	-
4	Khram-mouth	1920	-	1073	847	-	-
5	Iori-Ujarma	670	-	-	670	-	-
6	Inflows of Kirovabad-Gazakh zone	1590	999	591	-	-	-
7	Kura-Mingachevir	15430	2594	1664	10197	-	975
8	Inflows of Karabakh and Shirvan zones	1920	1920	-	-	-	-
9	Kura-замык. створ	17350	4514	1664	10197	-	975
10	Araz – state frontier	2854	-	330	-	-	2524
11	Araz-Khudafarin	8340	923	4257	-	535	2625
12	Araz-hydro electric power station “Araz”	5940	270	2913	-	132	2625
13	Araz-Bahranmtapa	9100	1218	4257	-	1000	2625
14	Kura - mouth	26450	5732	5921	10197	1000	3600
15	Inflow in Sevan lake	827	-	827	-	-	-
16	Total of surface runoff	27277	5732	6748	10197	1000	3600
			22677				
II. Underground waters							
17	Natural resources	4241	1899	1206	1135	-	-
18	Statistic reserves	250078	198009	13039	39030	-	-
19	Exploitation reserves	4940	2665	1120	1150	-	-
20	Taking into account damages of surface runoff	3248	2220	502	526	-	-
21	Total water resources of basin of Kura River	30525	7952	1250	10723	1000	3600

The irrigation, having regard to the climate peculiarities of the Southern Caucasus, mainly is developed in the eastern part of the region on the basis of Kura and its influents. In this case, the hydrologic characteristics determine the necessity of creating the regulating water reservoirs even in the little irrigation systems. Presently, more than 100 water reservoirs are consumed in the region of Southern Caucasus (capacity of which is more than 1 billion m³).

Extensive development of irrigated agriculture, agricultural development of areas of higher zones of vertical zoning will require in the future a complete regulation of the Kura River reservoirs with a total capacity of up to a 3.0 km³. Given the already exploited reservoirs, the total volume of irrigation reservoirs reaches 7.0 km³.

OVERALL PROCEDURES FOR REGULATION OF WATER COURSES OF TRANSBOUNDARY RIVERS

The whole history of mankind shows that water is one of the most precious resources, determining the existence of terrestrial civilization. Reaching significant progress in the field of scientific and technical progress, the human kind could not reduce his dependence on water and moreover in recent decades there is arisen a clear trend of growth of water scarcity. The growing water deficit is caused not only by increasing water consumption, but also ineffective approach to its use and mismanagement of water economy complex of rivers' basins.

It is known that water resources are reserves of surface and groundwater used in the fields of the national economy or having the potential to use them. It should be noted that namely a set of measures on the use and protection of surface and groundwater, as well as to combat damage caused by the waters of the country's economy is an object of water conservancy facilities, the highly efficient management of which is the most important task not only of a particular country, but in general for all the countries of transboundary river basin.

The complex using the water resources, coordination of interests of water consumers and water users with the interstate distribution of the water runoff is fundamentally necessary both on large and small rivers. Thus, the objective contradictions are arisen in the interests of water users and water consumers both domestically and regionally. In this regard, the management of water economy should be aimed at optimizing the efficiency of use of waters of the basin while maintaining its environmentally stable condition [4,5].

The mankind, at different stages of its development is constantly faced with the problem of lack of water resources. It should be noted that the 145 countries of the world use so-called “transboundary water basins” together with their neighbors. It also should be noted that the territory of 21 states is fully included to the international basins [3]. Despite restriction of water resources, the need for their joint exploitation often leads to worsening of bilateral relations.

The problem of shared use the transboundary rivers is widely manifested in the 20-th century, when the creation of reservoirs, as well as the construction of diversion canals and other hydraulic structures have gained global nature. The considerable part of this infrastructure is created on 300 major rivers of the world, flowing through the territories of two or more countries. As a result of this type of construction, the concern of states located in the lower part of the flow of rivers has been increased, as the construction of hydraulic structures lead to a reduction in the amount of water reaching the territory of low reach countries, as well as affect the ecosystems along the river bed.

For a long time the countries are trying to solve the problems related to water by diplomatic means. The legal regime of transboundary waters is regulated by international conventions and treaties, the legal effect of which are applied to the signatory states and the countries joined them. In this regard, there are two major global documents: Convention on environmental impact assessment in a transboundary context (1991) and the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992) [6]. They have a great international

political importance, but are of a general recommendation nature, touching upon first of all the environmental problems and only marginally related to water resources management problems of rivers. The mechanism of settling international disputes is practically absent [7,8].

The main effective transnational agreements on transboundary waters include the “Rules of using the waters of international importance”, adopted in 1966 in Helsinki by the International Law Association. It provides a set of rules, both of general and special character and most importantly, introduces the concept of “international river basin”. The latter means “the geographical areas embracing two or more states and defined by the boundaries of the spread of water systems, including surface and underground waters, flowing into a common body of water” [2].

The legal regime established by the Helsinki Convention was further developed as a result of the approval of two additional protocols: the London Protocol on Water and Health problems (1999) and the Kiev Protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters (2003). The provisions of both protocols are directly related to transboundary water resources.

Along with these facts, there are two environmental documents of UN European Economic Commission (UNECE) that must be considered when dealing with issues related to the protection of Transboundary Watercourses: the Convention on the Transboundary Effects of Industrial Accidents (1992, Helsinki) and the Convention on Access to Information, Public Participation Guidelines (1998, Ohrus).

As noted above, the integrated use of water resources involves the implementation of hydraulic engineering for interests of various sectors of the economy. In such a case, we have to keep in mind that water for hydropower is of interest only as a carrier of energy and for the water transport is most important the availability of necessary depth within the period of navigation; the fishery ponds need not only for reproduction and nursery grounds, but in many

cases a certain river flow. The main feature of irrigation is a large amount of both general and specific water consumption, and only a small portion of water collected from the sources of irrigation is returned to the pond. The water supply, unlike the irrigation demonstrates increased demands on water quality at relatively low volumes of water consumption. Together with the facts specified above, it should be noted that a significant increase in the population of the world, increasing its material well-being, improvement of sanitary conditions require increasing the amount of water used in irrigation and water supply, and electricity generation.

It should be noted that in circumstances where a river basin belongs only to a state, the water management is reduced to redistribution of them among the branches of the national economy. In the case when the matters of using of water resources of transboundary rivers that cross the territory of two or more states are considered, the right to use water resources will belong to all states of transboundary rivers and therefore there is arisen a problem of fair distribution between the states.

One of the most effective approaches to the allocation of transboundary water resources is to find compromise solutions that are beneficial for all parties of the transboundary basin.

This approach involves the refusal from distribution of water as a commodity and the transition to an equitable distribution of not water, but the benefits derived from its use.

Examples include the agreements on shared use of water basins of the Nile, the Danube, the Mekong, the Rio Grande, the Limpopo and the North American Great Lakes.

However these agreements are characterized by specific features of their pools and therefore the attempt for versatility runs into serious difficulties. Meanwhile, the need to develop common approaches to the allocation of transboundary water resources is continuously increasing. The reason, among others is that in the modern society the process of formation of new sovereign states, which can no longer be content with the old order of water allocation is extending adopted in the conditions of existence of

a single state and are forced to adjust their water relations with the new realities. Indeed, as of 1978, in the world there were 214 river basins that cross the boundaries of two or more countries. Currently, their number increased in 261, which cover 45.3% of the Earth's surface, contains 80% of global river flow and are home to 40% of the world population.

The problem of substantiated water distribution has demonstrated it keenly in relations between sovereign states that emerged in the former Soviet Union. Until recently, the South Caucasus republics have exploited a system of their own water resources under single distribution schemes of the Kura River basin.

However, presently the political and economic situation in the region has changed dramatically. After declaration of independence, each of the sovereign states tends to maximize the use of available water resources, especially in their own national interests.

In order to eliminate possible conflicts of interests of sovereign states of the basin of the river Kura, consistent decision-making in the management of water resources need to be developed as a methodological approach and theoretical bases for the construction of software management solutions.

In the most general form, the distribution of water resources of transboundary rivers between the two countries can be carried out in proportion to the area of the catchment basin, located within the boundaries of individual countries.

The formula account might look like as:

$$V_i = \frac{k \cdot V}{\sum_{i=1}^n S_i} \cdot S_i, \quad \text{million m}^3 \quad (1)$$

where V - volume of water resources in the basin, mln. m^3 ; S_i - the catchment area in i – of that state's pool thousand km^2 ; V_i - volume of water resources used in i – in that state's pool, mln. m^3 ;

k - correction factor ($k < 1$), taking into account the health gaps, contractual and other conditions.

Optimizing the distribution of water resources requires solving the following problems: to develop a mathematical model of approval of compromise decisions in the management of transboundary water resources in the interests of states; to develop mathematical models of management modes of transboundary basin reservoirs based on a balance of interests of various countries in the use of water resources for irrigation and hydropower; to develop specific modules for economic evaluation of water resources in the basin; to build an information system for transboundary rivers basin.

Optimizing the distribution of water resources between countries of transboundary basin will largely clarify contradictions in the field of water and water use, secure the inability to provide depletion and pollution of waters and will be a catalyst of good neighborly relations between the two countries, will exclude the prospect of a military solution to the issues of water distribution.

CONCLUSIONS

To develop the concept of redistribution of transboundary waters between adjacent states - Georgia, Armenia, Azerbaijan, Turkey and Iran, you need to create a bank of the latest data on all components of the use of water resources (rivers, reservoirs, lakes, wetlands, groundwater and glaciers). To do this, you must enter into an agreement (contract) for participation in work on drafting a "Handbook of Water Resources of the South Caucasus", to develop a common methodology to collect information, and then, in accordance with international law, to coordinate research on the preparation of the concept of distribution of transboundary waters in a comprehensive solutions of environmental problems. The developed method of distribution of water resources of neighboring countries may be the basis of an intergovernmental agreement for the above specified five countries.

The next step will be a development of a document that regulates water use policy of waters by the Border States. The

drawn up document will be a legal basis for management of surface and underground waters. The document has to be directed towards drawing up of arrangements securing the impossibility of degradation of water bodies, reducing their pollution, promote sustainable water use, measures to reduce the damage caused by natural disasters, including floods and droughts. To solve these problems, it is first necessary to conduct a study on identification of transboundary rivers' basins, economic and environmental analysis of water use and registration of cross-border territories. In addition, the cross-border states shall ensure the removal and use of water, taking into account a requirement - the "polluter will pay for its action".



Asset Ordabayev (*Kazakhstan*),
*Expert of Institute of World Economy and
Politics at First President Foundation*

Transboundary Rivers: role in regional cooperation

In modern world demand for fresh water is increasing day by day. One of the key conclusions of the report of “Water resources of Kazakhstan in the new millennium” developed under the auspices of UNO acknowledges that the water supply deficit in central Asia will be on the rise, especially taking into account the climate changes that will put at risk the sustainable development of the region as a whole²³.

In Central Asia there are states with great density of population, developing economy and predominance of agrarian sector. This and other factors explain the highest difficulty of water relations in the region, which are complicated by uneven distribution of water resources.

Against the backdrop of these problems, the situation may be redoubled even more. According to the forecasts provided by UNO, the water consumption in the region will be grown with the time.

²³ The General Assembly (UN 1970), “recommends that the International Law Commission should, as a first step, take up the study of the law of non-navigational uses of international watercourses with a view to its progressive development and codification”.

At this point, about 90% of water resources, which are consumed mainly in agrarian sector, have been included to the stream of commerce. Tailored to the growth of the population, demand in water by 2018 may be increased in 20% in comparison with the first half of this millennium. In other words, water resources of Central Asia will be reduced in invariable indices in the near future and maintenance of the modern level of the annual consumption of water in the amount of 5-6 thousand liters per capita will be changed into impossible task²⁴.

The problem of transboundary Rivers has a centuries-old history. The tribal people and then the states located in the territories of the modern Central Asia were faced with a challenge because of distribution of water, which long since was not only a source of life, but also instrument in the political posturing. And presently, the problem of shared use the water resources in central Asia, is on the front burner.

Having got independent in 1991, the Central Asian states were faced with the problem of transboundary Rivers and irregularity of distribution of water resources. That's why, the region shared on rich water resources of the countries, such as, Tajikistan and Kyrgyzstan, the "upper countries" and the "lower countries", such as, Uzbekistan, Turkmenistan and Kazakhstan, contingent on water intake. When this happens, Tajikistan and Kyrgyzstan use waters to develop the country's energy complex and Uzbekistan, Kazakhstan and Turkmenistan use them mainly in the agriculture.

The most complicated situation in management of transboundary waters resources were arisen in basins of Amudarya and Sirdarya, the largest rivers of central Asia. The river flow of Sirdarya is formed mainly in the territory of Kyrgyzstan (75,2%), the length of the river is 3019 m, the watershed area – 219 thousand km².²⁵ The length of Amudarya is 2540 km and the watershed area – 309

24 http://www.undp.kz/library_of_publications/files/2496-16076.pdf - Summary of the "Water resources of Kazakhstan in the new Millennium".

25 <http://www.ia-centr.ru/publications/3257/>

thousand km². The main river flow of Amudarya (74%) is formed in the territory of Tajikistan²⁶.

So, in basin of aforementioned rivers, the water requirement for hydropower engineering and the agriculture is out-of-seasons (mistime) that became one of the contradictions related to the use of waters of Sirdarya and Amudarya, and namely, divergence of interests relative to its wastewaters within the different time of a year.

In summer season, the lower reach countries are in demand for collection of greater amount of waters for purpose of development of agriculture, whereas the upper-reach countries are interested in catchment of waters during this period in artificial reserves in their territory for later use in energy yield during winter period. The water discharge increase in winter period by the upper-reach countries threatens the inhabited localities located down by the riverside with subsoil flooding, as well as flooding the agricultural lands.

In the Soviet times, the regulation of the flow pattern of Amudarya and Sirdarya rivers was maximally adapted to the farming demands in the lower-reach countries. In autumn-winter period, was realized the centralization of delivery of energy resources from other regions of USSR to the republics, located in upper-reach of these rivers. In this season, the water outlet for electricity output was reduced and waters were collected in reservoirs for the next irrigation works. There was also existed a system of transmission of extra electricity to the other regions of the country through the united energy system. The collapse of the USSR resulted in destruction of the system of using the Transboundary Rivers in the central Asia regions.

The sovereign states of the region have taken a shot at changing the former centralized system of administration of water economy and power economy of the region for the joint administration form in the sphere of unified management, using the protective water resources of interstate sources²⁷.

²⁶ Information-analytic bulletin <http://www.imperi-eurasia.ru/baner/blt14.pdf>.

²⁷ Ibid.

However the signed agreements didn't stipulate for any cooperation in the matters of power engineering that was culminated in the tension because of objective desire of Tajikistan and Kyrgyzstan to develop their energetic potential of hydro-resources that caused problems in the field of water use in the lower reach countries. So, the water ambition of Tajikistan is backed by forcing the development of hydraulic power industry. The official Dushanbe is expecting for 2015 to get rid of volatility and proceed to the export of electric power to Iran, Pakistan and India (approximately in the amount of 8-10 billion KWT in a year)²⁸. The plans of the Ministry of Energy of Tajikistan are related to the construction in river Pyandj, the main feeder airliner of Amudarya, 14 hydro-electric power stations' power – 4000 MBt, annual electricity output – 15,6 billion KWT/hour and the capacity of water reservoir of 17,6 km³ (that is a capacity of a half of all water reservoirs in Amudarya)²⁹.

With the purpose of preserving balance in the field of electricity and water supply in all region, there has been taken a shot at creating mechanism of compensation for the upper-reach countries, especially for Kyrgyzstan, in support for the loss of electric power ("Agreement on using water-energy resources of the basin of the river Sirdarya"³⁰ (1998).

However, the main task implying to secure the sustainable administration of the working regime in Narin-Sirdarya's hydroelectric power chain for the benefit for all participant countries³¹ was not reached. Kyrgyzstan and Tajikistan are extending to incur expenses on a unilateral basis to support the hydroengineering structure, consuming thereat lesser than 10% of all amount of waters for its own needs that explains and

28 Policy of the USA and water resources of Central Asia. <http://ceasia.ru/forum/politika-ssha-i-vodnie-resursi-tsentralnoyazii.html>.

29 Great water armistice. <http://www.kursiv.kz/freshkursiv/details/tendencii-weekly/bolshoe-perimirie/>

30 Mironenkov A.P. Sarsembekov T.T. "road map of creating"

31 Ibid.

substantiates their demand to the neighbors regarding the financial compensations.

The sharpest debate was provoked by a matter of construction of Rogun hydro-electric power station. This problem exerts serious influence on the relations between Uzbekistan and Tajikistan. The official Tashkent considers that the construction of hydro-electric power station will result in imminent ecological consequences, whereas in contrast the official Dushanbe makes reference to the positive expertise of the World Bank. The tension in the bilateral relations has been resulted in so-called “railway war” when Uzbekistan blocked freights with construction materials for Rogun hydro-electric power station³². This episode is only a little stroke in the overall picture of disagreements regarding the matter of construction of Rogun hydro-electric power station.

The another point of tension arisen amongst states includes irrational consumption of the water resources by the lower-reach countries, the loss of which is equal to 1,7 billion USD or 3% of gross domestic product as per the estimation of the UNO³³. The whys of it was the old system of farming, with respect to which the water consumption per article exceeds by a factor of several times the world indices.

These and other problems are related by the experts first of all to the absence of the unique and agreed agricultural policy in a matter of water consumption. Each country attempts to increase the space of its area under crop and appropriate the “unconfined volume” of water.

So, the uneven distribution of water resources, ineffective use thereof and absence of water and energy balance give birth to the knot of contradictions amongst the regional states and increase the conflict potential. The president of Uzbekistan Islam Kerimov noted that “water-energy problems can lead to the war”³⁴.

32 Ibid.

33 Uzbekistan blocked freights, transported from Iran to Tajikistan <http://www.rosbalt.ru/exussr/2013/06/06/1137927.html>

34 <http://www.regnum.ru/news/polit/1569140.html>.

Currently, there are two ways to resolve the problem of Transboundary Rivers and taken all round water consumption; bilateral agreement and regional cooperation. The covenant based on the bilateral agreements, first of all stipulates for regulation of water courses of the transboundary rivers and is not of a long term nature. The regional cooperation, according to the experts' opinion is a preferable way, enabling to create a mechanism of regulation of the water problem.

The perception of necessity to solve a problem regarding the Transboundary Rivers on a regional level has been lead to signing the "agreement of cooperation to manage transboundary water resources" (Alma-Ata. 1992), in a framework of which there was established the "interstates coordinating water economy commission" of the Central Asia (MKBK) and the executive organs of MKBK – the Basin water economy Union (BVO) "Sirdarya" and BVO "Amudarya"³⁵. This structure should resolve the matters related to the joint use the transboundary water resources. Despite the sweeping attack on the activity of the commission, it copied with involvement of more than 300 million USD of donor subsidies to settle various ecological problems related to the Transboundary Rivers³⁶.

The activity of the International Foundation of Rescue of Aral (IFRA) (1993) is considered hardly effective³⁷. One of the main reasons, which are paid special attention by many researchers, consists of the targeted multidirectionality of the projects implemented in Kazakhstan and Uzbekistan. So, at rehabilitation of the northern and southern segments of Aral, the official Tashkent stakes mainly on the localization of catastrophes, protection of survivor genetic pool of Aral Sea region, just as actions of Kazakhstan are directed towards intensive inundation of the large areas of surface and rehabilitation of the water table in the southern part of the sea separated by special protective bulkhead.

35 [http:// www.regum.ru/news/polit/156940.html](http://www.regum.ru/news/polit/156940.html)

36 Official site of MKBK [http:// www.icwe-aral.uz/index_ru.htm](http://www.icwe-aral.uz/index_ru.htm)

37 Ibid.

Thus, the catastrophe of Aral Sea was not a combining factor enabling to resolve the problems of Transboundary Rivers by the Central Asian countries.

The efforts undertaken in 1994 (“Program of Central Asiatic countries and RF as per the concrete actions aimed at improvement of ecological circumstance in the basin of Aral sea in the next 3-5 years taking into account the social and economic development of the region”) (PBAM-1)³⁸ and in 1995. (Declaration on the cooperation regarding the hydropower problems of Central Asia³⁹ on regional level based on the mutual respect, good neighbourliness and resolution); these and other documents set a goal to create the strategy of water apportioning and management of water resources in the matters of energy, but because of various reasons were not able to cope with the mentioned task.

In 2000s, there was approved a wide range documents (“Main directions of the Program of concrete actions regarding improvement of ecological and social conditions in the basin of Aral Sea during the period of 2003 through 2019” (PBAM-2, 2003)⁴⁰. The third program of the basin of Aral sea within 2011-2015 (PBAM-3)⁴¹, directed towards resolution of the water problems. More importantly, the matters related to the “sustainable consumption of waters” have been discussed in the framework of SOC during the period from 2003 to 2010.

Due to these agreements, the state copied with settlement of number of important questions: to evade a problem related to the ecological catastrophe of Aral, to avert a crisis in Balkhash Lake, maintain the hydropower facilities of the region in in service state and improve the water and energy supply of the population.

Whenever, the question about establishment of real mechanisms regarding management of the transboundary water resources is

38 K.P. Borishpolets. Water-energy problems of the Central Asia and the comparative possibilities of Eurasian Economic Union and Shanghais Union of Cooperation to resolve these problems

39 <http://www.ecoportcalca.kz/pbam>

40 <http://www.uznature.uz/rus/nukusdeklaraciya.html>

41 <http://www.ecoportcalca.kz/pbam>

not finally resolved. The reasons hereof have to be classified as follows:

Firstly, the disagreements between the countries of lower and the upper reach regarding the questions related to the water intake.

Secondly, the different tasks in using water resources – the lower-reach countries are in need of waters for the agriculture and the upper-reach countries for energy security.

Thirdly, Tajikistan and Kyrgyzstan invite to consider waters as resources and remind that they use lesser than 10% of the total quantity of waters for their own needs⁴², in this case they incur unilateral costs on maintenance of hydropower infrastructure. Therefore they require compensations from the neighbors, just as, Uzbekistan, Kazakhstan and Turkmenistan defend the notion that waters cannot be anybody's resources and are for common use, as they exert influence on the region's ecological conditions.

In order to avoid serious consequences, we have to resolve the below specified tasks:

Firstly, we have to create a mechanism of using the transboundary water resources. Despite the fact that all countries are conscious of the common needs in the questions of water conservation there are not any interstate agreements for now, on which there would be formulated and enumerated regional interests for all five countries.

Secondly, coordination of matters of joint development of energy potential of water resources of the region within the framework of which the matter of water pour out will be regulated.

Thirdly, the lower-reach countries should implement modernization of irrigation systems to reduce the water loss while watering and consequently to resolve the problem of effective use waters.

Fourthly, to line up a single policy to rescue Aral Sea, capable to increase the channelout of the rivers Amudarya and Sirdarya hereto.

Ultimately, the onward joint development of the region's water-energy potential is of great integration potential, enabling to help

42 <http://www.ecoportcalca.kz/pbam>

settlement of a matter of the joint use the energy potential and effective use of water resources in the agriculture.

The contradictions existing in water relations are not resolved finally. Therefore, even in case of common aspiration for friendship and mutual neighbourly co-operation between the central Asian states, emotional outburst because of water deficit is not ruled out.

NOTE

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**GLOBAL AND REGIONAL
HYDROPOLITICAL
PROBLEMS IN THE CONTEXT
OF INTERNATIONAL
COOPERATION AND SECURITY**

**International Conference
Baku, November 25, 2014**

Collection of speeches and articles