

**NATO/CCMS PILOT STUDY MEETING ON  
TRANSBOUNDARY WATER MANAGEMENT ISSUES  
IN THE UNITED STATES & CENTRAL ASIA: PROBLEM  
DEFINITION, REGULATION AND MANAGEMENT**

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**Abstract:** This paper summarizes the main results of the NATO CCMS Pilot Study Meeting on Transboundary Water Management Issues in the United States & Central Asia (8–10 March 2005, Tallahassee, Florida). The structure of the meeting was focused on comparing how major transboundary water sharing conflicts in the United States (like the ACF conflict) have been managed toward the goal of equitable conflict resolution among the competing jurisdictions with similar conflicts in the Central Asian region.

**Keywords:** Transboundary water resources, Central Asia, water resources management, decision making process, risk assessment

## **1. Introduction**

The Pilot Study Meeting on Transboundary Water Management Issues in the United States & Central Asia was conducted in March 2005 in Tallahassee, Florida. This meeting focused on one of the most complicated and sensitive issues which has a significant and widespread influence on sustainable development of the Central Asian region: transboundary water resources management problems. The representatives

comprehensive overview on the transboundary water issues in their respective countries and adjoining areas. The speakers from the NATO countries shared their experience on the management of transboundary water basins. In particular, the case study on the management of the Apalachicola–Chattahoochee–Flint (ACF) river basin (Alabama, Georgia, and Florida) was presented and analyzed in detail. Also, the practice of integrated water management (IWM) in Belgium was presented in the context of the CCMS Pilot Study on IWM administered by the University of Antwerp.

This meeting concluded the series of meetings conducted within the framework of the NATO/CCMS Pilot Study on “Environmental Decision-Making for Sustainable Development in Central Asia”. The acronym CCMS stands for Committee on the Challenges of Modern Society which was established by NATO in 1969 in order to work on solutions related to social and environmental problems. This NATO Committee does not engage in research activities; rather its work is carried out on a decentralized basis with other organizations, through pilot studies. Subjects for pilot studies cover a wide spectrum, dealing with many aspects of environmental protection and the quality of life, including defense-related environmental problems. The list of publications available can be obtained from the CCMS Secretariat. Additional information on the NATO/CCMS Program can be found at <http://www.nato.int/ccms/>.

The Pilot Study on “Environmental Decision-Making for Sustainable Development in Central Asia (CA) was initiated in March of 2001. Since March 2001, the Central Asian NATO/CCMS Pilot Study organized the following five meetings<sup>1-7</sup>:

1. “Planning Meeting”, 26 February–1 March 2001, Silivri, Istanbul, Turkey
2. Working Group Meeting, 16–20 March 2002, The Belgian Nuclear Research Centre Headquarters (SCK-CEN), Brussels, Belgium
3. Working Group Meeting on “Landscape Sciences”, 22–24 September, 2002, Almaty, Kazakhstan
4. Working Group Meeting “Landscape Science and Public Health Issues for Environmental Decision-Making in Central Asia”, 17–18 March, 2003, Brussels, Belgium

5. Working Group Meeting on “Water and Health Issues in Rural Areas of Central Asia”, 4–5 November 2003, Almaty, Kazakhstan
6. Working Group Meeting “Transboundary Water Management Issues in the United States & Central Asia: Problem Definition, Regulation and Management”, 8–10 March 2005, Tallahassee, Wakulla Springs, Florida

In conjunction with this Pilot Study, a NATO Advanced Research Workshop on Risk Assessment as a Tool for Water Resources Decision-Making in Central Asia was also conducted on 23–25 September 2002 in Almaty, Kazakhstan.<sup>8</sup>

The main objectives of this Pilot Study were:

- To learn and analyze the approaches and processes used in the Central Asian Countries for environmental decision-making
- To provide up-to-date information to the Central Asian participants in selected areas, e.g., water resources management, and use of environmental impact analysis, through the NATO/CCMS experts.

This NATO/CCMS pilot study was administered by the Institute for International Cooperative Environmental Research of the Florida State University (Tallahassee, Florida).

## **2. Transboundary Water Resources**

Environmental problems can have a significant impact upon human health, the economic and political stability of countries and regions around the world. Shared watersheds and river systems and atmospheric systems may place the environmental goals of an individual country in conflict with regional goals. Environmental degradation also may generate conflict and instability. This Central Asian pilot study was focused on the environmental decision-making process, i.e., on the decision-making process that could protect and/or preserve the environment, and this way, help to facilitate sustainable social and economic development of the Central Asian region.

The countries of Central Asia declared their independence in the 1990s, and many of them are still in transition from the former Soviet Union “command” style economic system to more free-market economic systems. However, these countries inherited from the Soviet system the administrative/regulatory approach to environmental

decision-making. This decision-making method is not effective in the rapidly changing socioeconomic and political environment. The CA countries, facing economic declines, are generally not able to provide sufficient funding to support the administrative/regulatory decision making systems that are needed in these countries. In addition, the “command” style decision-making process often prevents excludes the public and stakeholders from the decision-making process which creates significant problems and barriers for future effective resource allocation.

The concluding Pilot Study meeting on transboundary water resources issues was conducted at Wakulla Springs (near Tallahassee), Florida. The structure of the meeting was aimed at comparing how major transboundary water sharing conflicts in the United States (like the ACF conflict) have been managed toward the goal of equitable conflict resolution among the competing jurisdictions with similar conflicts in the Central Asian region. The two case studies that were used principally to orient discussions were the Tri-State Water Conflict in the Southeastern United States (Alabama–Georgia–Florida or Apalachicola–Chattahoochee–Flint Rivers Conflict). This situation is also referred to as the ACF Conflict. The primary Central Asian transboundary water conflict example that was used to juxtapose against the ACF experience was the Aral Sea issue involving the countries of principally Kazakhstan and Uzbekistan.

The meeting was conducted at the Wakulla Springs Lodge; a facility that is situated at the mouth of the Wakulla River in Northern Florida. The groundwater that feeds into the spring originates from many primary sources via deep groundwater flow patterns. Wakulla Springs is one of the world’s largest freshwater springs generating approximately four billion liters of freshwater per day. The spring is contained within the Florida State Park System and is considered to be a pristine and natural ecological site in Florida. The remoteness and ecological beauty of the spring made for an appropriate and productive venue for the meeting.

The importance of Florida’s estuaries, including the Apalachicola Bay can be summarized with a few economic statistics. One of Florida’s primary economic sectors is tourism, which is largely dependent on its beaches and other coastal areas (i.e., in 2004, approximately \$53 billion in GDP and 700,000 jobs were attributable to coastal tourism in Florida). Recreational and commercial fishing

generate over \$5 billion per year; recreational boating contributes more than \$10 billion per year, and over 75% of both gross retail sales and taxable retail sales occur in coastal areas of Florida. The long-term vitality (i.e., sustainability) of these economic/ecological resources is highly dependent on the quality and quantity (i.e., flow) of waters entering coastal areas through Florida's River Systems. Rivers that flow southward from Georgia and Alabama to the Apalachicola Bay (i.e., river systems involved in the ACF Conflict) can have significant adverse impacts on both the ecological health of the Bay system and the Florida economy, if not managed properly and managed from a water basin wide perspective. The following two sections provide summaries of ACF Conflict in the United States and the Aral Sea Demise in Central Asia.

## 2.1. ACF CONFLICT SUMMARY

The states of Alabama, Georgia, and Florida attempted to negotiate an interstate Water Allocation Formula for the Apalachicola–Chattahoochee–Flint (ACF) Basin during the period from 1997 to 2003. This summary focuses on the lessons learned from the failure of this interstate negotiation process in the United States.

The Apalachicola River is formed by the confluence of the Flint and Chattahoochee rivers. The Flint and Chattahoochee are very different in nature and usage. The Chattahoochee's source of flow is primarily surface water and there are multiple storage reservoirs that allow the basin's water supply to be managed. The Flint River, on the other hand, has a large groundwater flow component and has almost no reservoir storage capacity. Therefore, in the Chattahoochee basin flows can be managed both through supply and demand management, whereas flows in the Flint can only be managed through demand management. The Chattahoochee River typically provides slightly more water to the Apalachicola's flow than the Flint, but at times the spring-fed Flint can make a greater contribution.

The major water diversions on the Chattahoochee River are for municipal supply while the major diversions on the Flint are for agricultural irrigation. The reservoirs in the Chattahoochee Basin are managed for municipal and industrial water supply, electricity generation, water-borne transportation, flood control, and recreation. Relative to flows entering the Apalachicola River, the storage capacity

of the reservoirs is very limited. About 65% of the storage volume is in the uppermost reservoir, Lake Lanier. Lake Lanier, however, should be managed conservatively due to its location in the headwaters of the basin and because the reservoir also supports the water supply for the Metro Atlanta area. There is also political resistance to lowering water levels in the reservoir from homeowners and recreational users. The fact that Lake Lanier should be managed more conservatively than the other reservoirs contributed to a perception by other stakeholders in Georgia that the State had a bias toward protecting the interests of upstream stakeholders.

This conflict was seen more as a divergence between upstream and downstream interests in the basin than between the three states per se. From the start there was a disparity between how the negotiation process was designed (i.e., by state borders) and how the interests of the stakeholders involved in the negotiation were divided. This discrepancy was most pronounced in Georgia where most of the basin lies. Many interest groups in Georgia were more aligned with the interests of downstream states while the negotiating positions of Georgia tended to be dominated by the interests of the metropolitan Atlanta area (a major population center in NC Georgia).

## 2.2. ARAL SEA DEMISE SUMMARY

The environmental problem of the Aral Sea Basin demise is among the worst in the world. Water diversions, agricultural practices, and industrial waste have resulted in a disappearing sea, salinization, and organic and inorganic pollution. The problems of the Aral Sea, which previously had been an internal issue of the former Soviet Union, became internationalized after the collapse of the USSR in 1991. The five new major riparian republics—Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan—have been struggling since that time to help stabilize, and eventually to rehabilitate, the watershed.

The Aral Sea was, until recently, the fourth largest inland body of water in the world. Its basin covers 1.8 million km<sup>2</sup>, primarily in what used to be the Soviet Union, and what is now the independent Republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Small portions of the basin headwaters are also located in Afghanistan, Iran, and China. The major sources of the Sea, the Amu Darya and the Syr Darya rivers, are fed from glacial meltwater from

the high mountain ranges of the Pamir and Tien Shan in Tajikistan and Kyrgyzstan.

Irrigation in the fertile lands between the Amu Darya and the Syr Darya rivers dates back thousands of years, although the Sea itself remained in relative ecological equilibrium until the early 1960s. At that time, the central planning authority of the Soviet Union devised the “Aral Sea Plan” to transform the region into “the cotton belt” of the USSR. Vast irrigation projects were undertaken in subsequent years, with irrigated areas expanding by over one-third from 1965 to 1988.

Such intensive cotton monoculture has resulted in extreme environmental degradation. Pesticide use and salinization, along with the region’s industrial pollution, have decreased water quality, resulting in high rates of disease and infant mortality. Water diversions, sometimes totaling more than the natural flow of the rivers, have reduced the Amu Darya and the Syr Darya to relative trickles – the Sea itself has lost 75% of its volume, half its surface area, and salinity has tripled, all since 1960. The exposed sea beds are thick with salts and agricultural chemical residue, which are carried aloft by the winds as far as the Atlantic and Pacific oceans.

While there are other transboundary water problems in Central Asia, the Aral Sea demise is viewed as the most recognizable problem of this type in the region, if not throughout the world.

### **3. Conclusions and Recommendations**

During the meeting, the representatives of the CA region presented a comprehensive overview on transboundary water issues in the region. From the other hand, the speakers from the NATO countries shared their experience of management of transboundary water basins. In particular, the case study on the management of the Apalachicola–Chattahoochee–Flint (ACF) Basin (Alabama, Georgia, and Florida, USA) was analyzed in detail. Also, the practice of integrated water management in Belgium was presented as a general.

There is strong interdependence among the CA countries related to using shared water resources. The principal uses of non-potable water in the region are irrigated agriculture and hydropower generation. While the “upstream” countries, Kyrgyzstan and Tajikistan, generally use the rivers for hydroelectric power generation, the

downstream countries, Kazakhstan, Turkmenistan, and Uzbekistan, use water mainly for agricultural purposes. These uses are distinctly different in their temporal and spatial requirements, which in turn create disputes and tensions between the upstream and downstream countries. Also, there are many current issues related not only to water quantity, but to diminished water quality which is transferred by shared rivers Central Asia.

Despite some stabilization and economic growth, there are inter-country disagreements concerning methodological approaches, the monitoring of the environment, quality standards of the environment, the use of appropriate norms and regulations guiding usage of natural resources and the management of shared river systems. The data presently available on water quality and quantity are generally not sufficient for effective decision-making. Resulting ecosystem deterioration has also led to a noticeable reduction of biodiversity in the river basins, as well as indirect hazards posed by adverse impacts on water bodies such as the Aral Sea (e.g., airborne particulates with associated toxic components as a result of desertification). There is an urgent need to prioritize and better manage the activities in these river basins leading to preservation of ecological systems in the Central Asia region.

The case study discussion conducted during this Pilot Study meeting was focused on the legal, technical/modeling, public participation, and regulatory aspects of transboundary water issues. The comparison and contrast of the ACF situation with similar situations in Central Asia, including the Aral Sea demise and the Bishkek Agreement between the Governments of the Republic of Kazakhstan, the Kyrgyz Republic and the Republic of Uzbekistan on joint and complex use of water and energy resources of the Naryn Syr Darya Cascade Reservoirs) demonstrated surprising similarities among transboundary water problems throughout the world.

Another interesting conclusion of these discussions involved the implications of the absence of a higher authority for the Central Asian republics to help them in resolving multi-jurisdictional disputes in the region. In the United States, conflicts among neighboring states can be resolved by the Supreme Court or at the federal level of government. In Central Asia, particularly, after the demise of the USSR, there is no clear higher authority that has jurisdiction over multi-jurisdictional disputes. However, given the fundamental differences between the

situations in the USA and Central Asia over opportunities to resolve these problems at a higher level, there has been a similar lack of success in both instances in resolving these problems. So, regardless of the need to independently mediate among affected parties (as in the Bishkek Agreement) or to seek legal relief through a higher authority (like for the ACF Conflict with the US Supreme Court), there appears to be problems with both avenues of conflict resolution.

After the case study session, the pilot study participants were escorted on a half-day technical field trip of the Apalachicola River and Estuarine (i.e., Bay) by the Florida Department of Environmental Protection. The purpose of the field trip was to explain first hand the significance and fragility of the Apalachicola Bay Ecosystem to the meeting participants, and to illustrate the potential impacts of water quantity/quality degradation on the productivity of the ecosystem.

During the pilot study meeting, it was recommended:

1. To utilize an ecosystem approach for water distribution and integrated water management based on the natural needs of the environmental systems in order to facilitate long-term sustainability.
2. To develop market-based mechanisms and legal bases for effective management of transboundary water basins providing for sustainable development of the Central Asia.
3. To implement mutually agreed upon systems and principles for compensation and economic losses resulting from use of water resources (e.g., to create an insurance fund).
4. To create a consortium for developing rational and effective methods for the management of water resources and for effective solutions for transboundary problems.
5. To create an informational center that collects, analyzes and provides “informational exchange” among the Central Asian countries to facilitate the prevention of regional conflicts within transboundary river basins.
6. To continue the studies on transboundary water issues related to water pollution including the transport of radioactive contaminants.

7. To develop and implement a unified approach and methodologies for analysis of water quality, in compliance with the water standards of the Water Framework Directive (WFD) adopted by the European Commission and in conjunction with the ISO (International Organization for Standardization) criteria.
8. To develop monitoring systems, especially, bio-monitoring systems that can be used to understand the technical aspects of transboundary water use among affected countries.
9. To develop educational programs and training incorporating adopted curricula on issues pertaining to integrated water management systems, including model case studies.
10. To improve the overall sustainability of the ecosystems in mid- and lower streams of the Syrdarya River by improvement of effective use of the ecosystems in the area of Aydar–Arnasayak Lake basin.
11. To study and implement Central Asia model solutions for the Central Asia region based on positive practices for the solving of transboundary issues in the Apalachicola–Chattahoochee–Flint (ACF) water basin (USA.) and in Belgium. This should include: a general methodology for the establishment of river basin management plans; a conceptual approach for decision making; and defining and implementing integrated decision support.

One of the recommendations from this meeting was to organize a NATO Advanced Research Workshop (ARW) or NATO Advanced Study Institute (ASI) to discuss in-depth transboundary water problems worldwide and solutions for problems in the Central Asia region. The present NATO ARW workshop and its proceedings may be viewed as our further step in building up sustainable ecological future in the Central Asian region.