

# Executive summary

The Aral Sea Basin (GIWA region 24) is located in Central Asia and entirely or partially, covers Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan, Turkmenistan, Afghanistan and Iran. The transboundary waters of the region are the Syrdarya and Amudarya rivers, which have a major hydrological impact on the Aral Sea Basin.

The GIWA Assessment evaluates the current status and the historical trends of each of the five predefined GIWA concerns i.e. freshwater shortage, pollution, habitat and community modification, unsustainable exploitation of fish and other living resources, global change, and their constituent issues. The assessment determined that freshwater shortage exerted the greatest impacts on the Aral Sea Basin. The effect of climate change on freshwater shortage has also been considered in this report.

Freshwater shortage is a fundamental problem for the countries of Central Asia which has led to the destruction of ecosystems in the Aral Sea and the degradation of terrestrial and aquatic ecosystems in Priaralye. As a result of freshwater shortages, the reuse of return waters in irrigated farming is becoming more frequent, resulting in heavy soil salinisation and the pollution of surface and underground waters. Consequently, poor quality drinking water is having severe health impacts on the population, particularly in Priaralye.

In the 1960s when the total population in five countries in the region (excluding Afghanistan and Iran) was approximately 15 million, more than 50% of the annual water yield of the Syrdarya and Amudarya rivers was used for economic purposes. Since the beginning of the 1980s the renewable water resources of the Syrdarya and Amudarya basins are fully exploited and the regional economy is developing under conditions of increasingly severe water shortages.

In view of this situation the concern of freshwater shortage, and more specifically the issue of stream flow modification, was prioritised for Causal chain analysis (CCA) and Policy options analysis (POA). The GIWA Task Team identified the following as immediate causes of modification of stream flow:

- Increased diversion;
- Decreased ice resources;
- Inter-annual climatic variability.

The main root causes of increased diversion stem from the regulation of rivers by reservoirs, which store huge volumes of water for irrigation and power generation. The collapse of the USSR triggered further problems for the region. The previously integrated economic system fragmented, and social and economic turmoil followed, e.g. civil war in Tajikistan (1992-1997). The quotas from the Soviet era have been maintained and they regulate water use to some degree. However, in recent years Kyrgyzstan and Tajikistan have persistently disputed the current system of quotas and demand that they be revised. There is insufficient coordination between upstream and downstream states regarding the allocation of water resources and a lack of mechanisms aimed at regulating the diversion of rivers. Conflicts between the various water users, particularly hydropower engineering and irrigation, remain unresolved.

The following were identified as root causes of freshwater shortage in the region:

*Demographic:* Increases in population have led to greater pressure on the water resources of the Aral Sea Basin.

*Economic:* The collapse of the economic system formed under Soviet rule, has led to a recession in the region and social upheavals. Consequently, investment in the agricultural sector reduced, which led

to a decline in the productivity and the water efficiency of irrigation systems. Water users are not given economic incentives to conserve water resources and there is no common approach to economically evaluating water.

*Legal:* There is weak legislation regulating water management. A mutually acceptable legislative framework for interstate sharing of transboundary water resources is absent. The current water legislation was formulated during the Soviet period and is not appropriate under present-day conditions.

*Governance:* The transboundary nature of the major watershed basins in the region makes it impossible to solve the freshwater shortage concern without inter-state agreements. Many of the agreements made to date have not been implemented or adhered to by the countries of the region. For example, despite the governments signing agreements aimed at resolving the water management issues, all of the countries in the region intend to increase their irrigated areas. The transboundary water management system is inadequate as it is based on the principles of centralised regulation formed in the Soviet period. There is a lack of clearly formulated national water strategies and each country's is significantly different, adopting various approaches to addressing the problems of interstate use of water resources of transboundary basins management. The national strategies are not integrated at the regional level, for example, through a regional water strategy.

*Knowledge:* The lack of knowledge regarding the contemporary characteristics of the region's water resources and future climatically induced changes in freshwater availability, is severely hindering policy makers in making informed decisions in order to resolve water management issues.

*Technology:* Water resources are not being utilised efficiently due to irrigated agriculture employing outmoded technology. Economic constraints and the lack of economic incentives for farmers to save water, is preventing the adoption of water saving technologies.

*Climatic variability:* Freshwater shortage may become even more acute over the next few decades if as predicted, water resources in the region's major river basins reduce by 20-40%. However, some predictions show anthropogenic induced climate change to play a less significant role than was previously thought as there is evidence of a compensating mechanism in the formation of run-off which is maintaining the total volume of renewable water resources.

The current use of transboundary water resources in Central Asia is complex due to a range of demographic, socio-economic and ecological trends. In the post-Soviet period essential differences have been revealed concerning the approaches used by the countries within the region to the mutual use of regional water resources, especially regarding the principles and criteria of interstate water sharing and the legal and economic mechanisms of water use. In addition to the economic problems encountered during the transitional period from Soviet rule, coordination between the countries in the sharing of transboundary water resources and nature protection has also proved problematic. Despite efforts by the region's governments and the international community, the situation of water supply in Central Asian states remains critical. One of the main reasons for the lack of progress is the tendency of governments to take unilateral decisions and actions, which often exacerbate problems in other countries due to the transboundary nature of water resources.

A significant reduction in the volume of water resources used in human activities is unlikely in the region, at least in the immediate future. However, water management in the forthcoming decades can be based upon the modern volume of available water resources, as there is not believed to be significant reductions in freshwater availability as a result of climate changes. Despite the considerable reduction in glacial resources, the flow rates of the main rivers have remained relatively unaltered in recent decades, suggesting the existence of a compensating mechanism. It is believed that an inflow of freshwater from the melt-water of underground ice accumulates in the perennial permafrost. The area of perennial permafrost is many times greater than the area of present-day glaciers, and therefore even slight melting of the permafrost could compensate for the reduction in freshwater supply caused by the decline in the area of the glaciers. This has yet to be adequately researched by the scientific community, despite its importance when considering the influence of climate changes on freshwater resources.

Increased water abstraction may lead to an ecological disaster by the year 2010. The situation is so critical that this scenario may transpire if only one of the countries increases abstraction of surface waters. The success of interstate agreements on the sharing of water resources may be jeopardised by the current level of water use, the continued deterioration of water infrastructure and degradation of the environment. A prerequisite to resolving the freshwater shortage problem is a comprehensive knowledge of the hydrodynamics of the region.

The report highlights policy options which governments could implement and incorporate into strategic policies. The main recommendations are:

- The development and enactment of national water strategies that comply with international water law and take into account the interests of all the countries in the region. They should aim to increase the efficiency of water use, primarily in irrigated farming, and promote the conversion of water intensive crops, such as rice and cotton, to less water intensive crops.
- To broaden the understanding of socio-economic and environmental characteristics and their relationship with the water resources of the region.
- To initiate and support scientific research on water and the environmental and socio-economic problems of the region.

At the regional level, it is recommended that: i) the existing system of water resources management be reorganised; ii) a new multi-lateral water sharing agreement be created; and iii) water pricing systems be introduced.

The tasks deserving special attention by the region's governments and the international community are:

- The creation of an interstate body empowered to implement effective and conflict-free regional water resources management.
- The development of a system of mutually acceptable political and legislative decisions and measures in order to facilitate the equitable and sustainable use of the region's water resources.

Financial, technical and organisational support is required from international organisations in the:

- reconstruction and updating of irrigation systems to increase water efficiency;
- development of legislative principles and mechanisms for water use at all levels, and in the implementation of integrated water resources management principles, and,
- monitoring of the environment, particularly regarding climatically driven glaciocosphere dynamics in the zone of run-off formation, where approximately 75% of the region's renewable water resources originate.

These policy options are intended to be considered by the international scientific community, local, regional and international decision-makers, funding bodies, and the general public, although at present, the latter is not sufficiently organised or powerful to act as a key stakeholder.

In conclusion, the water resources of transboundary basins in Central Asia are not optimally utilised, thus the freshwater shortage situation remains unresolved and continues to deteriorate. Progress in this area can be achieved through political rather than technical measures and firstly requires the development of legal agreements at the national, regional and international level.