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CACnews

IWMI CELEBRATES ITS TENTH ANNIVERSARY OF WORK IN THE CAC REGION

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• Arrange monitoring of the measures developed on adaptation of agricultural producers to global climate change.

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Sustainable groundwater management in Fergana Valley

Growing population, demand for food and energy, and competition between different water users are all increasing pressure on water resources Central Asia. In addition, water resources management is complicated by climate change and regional environmental issues. The Syrdarya River Basin is a key example where all of these problems come together and are steadily increasing. The establishment of new independent states at the beginning of the 1990s changed water allocations existing in the basin and increased competition between the upstream hydropower production and the downstream agriculture. The shift toward hydropower generation at the upstream Toktogul reservoir caused summer water shortages and excessive winter flows in the lower reaches of Uzbekistan and Kazakhstan, with water losses to the saline Arnasai depression.

A happy farmer who obtained yields for the first time in many years. Demo plot at Madaminov farm, Ferghana province

IWMI studies on groundwater management in Fergana Valley were initiated in 2005 to assess potential of banking the winter hydropower releases from the Toktogul reservoir in the aquifers of Fergana Valley. It is widely recognized that the shift of operation of Toktogul reservoir in 1992-93 from irrigation to hydropower generation caused increasing detrimental water losses in Syrdarya River basin. The midstream reservoirs, the Kairakum and the Chardara are full to the beginning of winter and have no extra capacity to accumulate the excessive hydropower releases from the upstream Toktogul reservoir. Moreover, the water in the downstream river channel has ice cover in winter. This created induced winter flow discharges of 2-3 km^3 annually into saline depression Arnasai, which at present has a surface area of over 3000 km^2 and a volume over 40 km^3. The main findings of this study contributing to solving the problem are given below.

Potental of groundwater development in Fergana Valley

Zones are specified in Fergana Valley with the potential for ground water use for irrigation (Figure 1a) and groundwater recharge (Figure 1b). Intensive groundwater abstraction at proposed locations can create additional free capacities for storing Naryn River winter flow in seasonal tenure or in the long term.

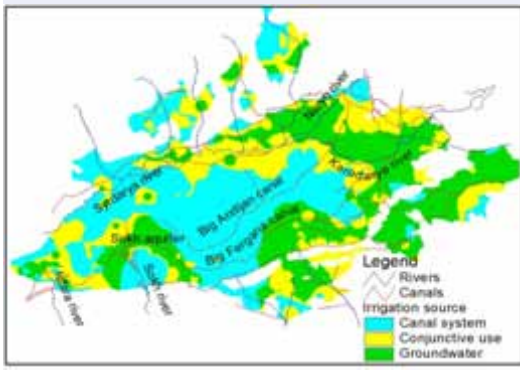

Figure 1a
Zones of groundwater use for irrigation (a) and water banking (b) in the Fergana Valley

The area of irrigated land with the potential to shift from surface to groundwater was found to be 290,000 ha (32% of the total), and that for conjunctive use to be at 243,000 ha (27%). This strategy will allow a significant reduction in the water intakes from the Naryn River for summer irrigation in Fergana Valley. The favorable areas for winter flow water banking (Figure 1b) include those with free capacities and the areas where these capacities could be artificially created by intensive groundwater abstraction. The free capacities exceed 3 km^3; while intensive groundwater extraction will create over 100 Mm^3 of additional free storage per meter of water table drawdown. The studies suggested that Sokh, Osh-Aravan, Chimion-Aval, Andijan-Shahrihan, Naryn, Altyaryk-Beshalysh, Almaz-Varzyk and Isfara aquifers have high potential for groundwater artificial recharge.

Enhancing natural recharge from river floodplains

Groundwater quality degradation is observed in many small river basins of Fergana Valley as affected by downward saline fluxes from the irrigated soils. The leakage from the small river floodplains can be intensified to sustain the groundwater quality. Adoption of water saving technologies allows the reduction of use of river flow irrigation and the use of saved flow to increase the groundwater recharge.

The studies carried out at upstream of the Sokh River estimated the leakage from the Sokh River floodplain to vary from 98 mm^3 per year in low water years to 137

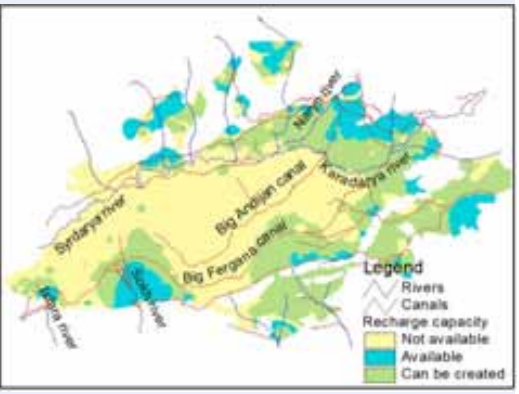

Figure 1b.

Zones of groundwater use for irrigation and water banking in the Fergana Valley.

Besharik Rayvodkhoz representatives (A.Kayumov and T. Nasreddinov) are selecting a site for experiment on groundwater recharge (Isfara aquifer)

In the fields of A.Barayev Scientific-Production Center on Grain Farming, North Kazakhstan, 10 August 2010

Mm^3 per year in high water years. This groundwater recharge can be doubled by adoption of water saving technologies and by reducing irrigation withdrawals in the river upstream by 25%. Adoption of these measures will sustain groundwater quality at levels acceptable for drinking water supply upstream and for irrigation downstream.

Banking the winter flow of the Naryn River in the Isfara aquifer

The Isfara aquifer is one of the aquifers of Fergana Valley with high potential for 'banking' the winter flow of the Naryn River, as shown by the field recharge and modeling studies. The field pilot studies demonstrated that groundwater recharge, using simple structures such as trenches and canal and stream channels, is highly efficient. The modeling results suggested that changing the canal and water lift irrigation in the Isfara River upstream by groundwater irrigation will create extra storage for banking winter flow of the Naryn River. The studies found that increasing groundwater abstractions from 1.7 to 5.7 m^3/s can increase free subsurface storage of the Isfara aquifer from 37 to 110 Mm^3/year, which would be available for banking the winter flow of the Naryn River.

Groundwater recovery using shallow wells and boreholes

The research carried out by IWMI found at least two relatively low cost technologies of groundwater recovery which could be adopted by the smallholder farmers of Central Asia. These are boreholes equipped with low yielding pumps at 2-3 l/s and shallow wells of 20-40 m deep. Field demonstration studies at the pilot orchard farm in the Sokh River upstream showed that the farmers were not affected by water shortages thanks to access to groundwater through the borehole equipped with the low yielding pump. The cost of the indicated technologies is 10-20 times less compared to 60-100 m deep wells widely used in the region. This technology is the practical solution for small farms of Fergana Valley needing to irrigate orchards, vineyards and vegetables which currently face irrigation water shortages.

We express our gratitude to IWMI staff members of the GIDROINGEO Institute, as well as to staff of Uzgidromet, AVRDC and other water organizations who were actively involved in the studies.

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WORKSHOPS/TRAININGS

Traveling seminar on breeding, plant genetic resources and biotechnology in Kazakhstan

In 2010, the National Center for Biotechnology of the Republic of Kazakhstan, JSC "KazAgroInnovation" of the Ministry of Agriculture, together with Food and Agriculture Organization of the United Nations (FAO) and International Maize and Wheat Improvement Center (CIMMYT) jointly launched the scientific and technological project on "Strengthening the plant biotechnology capacity for sustainable utilization of plant genetic resources for food and agriculture in Kazakhstan", which was endorsed by the Government of the Republic of Kazakhstan.

The project's main goal is to improve the breeding process of Kazakhstan's most important crops through application of biotechnology methods and effective use of plant genetic resources (PGR), and identification of priorities and actions for the further development of these applications in research institutions of Kazakhstan.

Within the framework of this project, CIMMYT organized a traveling seminar on breeding, plant genetic resources (PGR) and biotechnology. The seminar was held from 8 to 16 August 2010 and was attended by 20 leading national scientists and specialists in the field of breeding, PGR and plant biotechnology. The main objective of the seminar was to evaluate the status and prospects of the development of breeding, biotechnology and PGR in the region, as well as to promote innovative technologies. The itinerary of the traveling seminar included Astana - Karaganda - Astana - Shortandy - Zerenda - Kostanay - Karabalyk - Kostanay - Astana. The traveling group visited main ARIs, Centers, organizations and experimental breeding stations in Kazakhstan.