Kazakhstan, Item 9

Remote sensing for sustainable water resource management

Water, food and energy systems in Central Asia are intricately connected, but water is the most precious resource connecting the countries in this region. However, in recent years water deficit in Central Asia has been increasing at an alarming rate due to climate change and man-made interventions. Today, policy makers in the region are trying to balance the needs of energy production and fresh water supply with the needs of agriculture – the mainstay of Central Asian economies.

Increasing deficit of water resource coupled with the population growth poses new challenges to upstream as well as downstream countries in Central Asia. Droughts among other things add to the vulnerability of already fragile balance of water availability. Now, more than ever, the need for coordinated and transparent approach to management and monitoring of water resource utilization is painfully apparent.

Kazakh Space Agency in association with its partners has been actively researching and developing solutions that can help address existing challenges. Currently, remote sensing technologies offer multiple possibilities of monitoring and assessing water consumption and distribution at a very large scale simultaneously. One of the approaches, researched and tested by our agency allows to monitor water resources utilization and productivity not only at country scale, but also at hyper-granular, field scale. We have tested this approach at regional level, monitoring Turkestan region of Kazakhstan for two years. The goal of the project was to develop a scalable remote sensing-based monitoring system for water resources with minimal reliance on official reporting data.

Kazakhstan spends approximately 65 percent of its surface water on agriculture. Of this number, close to 98 percent is used for irrigation. However, how that water is spent is very much a “Black Box” – some of it is used productively, some not. Large amounts are lost to evaporation, operational spills, weeds etc. A combination of satellite remote sensing data and ground truthing, allows to estimate most of these parameters without relying on local authorities. Resulting water productivity analysis helps with emphasis on specific or dominant crops grown in the given area, helps local authorities make informed, data-driven decisions and develop policy based not only on water consumption levels, but also economic value of crops grown, cultural preferences or other social factors.

Remote sensing technologies such as this also help examine the effects of climate change and human activity on water availability and the impact on the livelihoods of the farming communities in the observed areas. Satellite based water resource monitoring also provides granular, field-level insight into water productivity, that can help link larger environmental issues to the plight of farmers on the ground. The results of our research and all the data is currently integrated into a decision support system that helps local authorities visualize and examine water resource use at various scales – from field to district, and to region.

In conclusion, it's worth repeating, that satellite remote sensing allows water resource use and productivity to be monitored at scale – an important feature for cross-border water policy decisions. Satellites provide an opportunity to establish an independent, verifiable basis for water accounting. This can help drive policy decisions regarding irrigation systems design, infrastructure projects, subsidies, and a host of other factors across the entire region of Central Asia and help ensure stability, sustainability and peace for years to come.

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