

Over-allocation now a global phenomenon

A special report about river management worldwide

The Nile, the Colorado River, the Ganges and the Yellow River – some of the largest rivers in the world are also the most susceptible to mismanagement and over allocation.

Irrigation is a historical practice - the Chinese have been irrigating since the third century BC and ancient Roman aqueducts that dot the European landscape are still used today.

However, rapid population growth and the need for greater food stocks at a global level has seen some of the world's largest and most important river systems depleted to shadows of their former selves.

Some facts:

- In 1900 the US had 7.8 million acres of irrigated farm land, by 2000 it had 55.3 million acres.ⁱ
- The Colorado River in south-western USA runs through seven states and provides drinking water to 25 million people and irrigation water to California's Imperial Valley, among other areas.
- Egypt and the Sudan use 94% of available Nile water.ⁱⁱ
- More than 130 million people rely on the Nile for their survival – 10 countries lie in the Nile Basin.
- The Nile currently does not reach the sea in dry periods because of high irrigation withdrawals.ⁱⁱⁱ
- The lower reaches of the Yellow River in China are now dry each spring, due to low rainfall and high irrigation demands.^{iv}
- 60% of the Ganges river flow is diverted for irrigation by barrages.
- When the world's largest barrage was built in the 1990s it reduced the average monthly flow of the Ganges from India to Bangladesh from 2 megalitres a second to 0.3 megalitres a second.^v
- In 2007 the World Wildlife Fund identified the Murray-Darling as one of the world's top 10 rivers at risk.^{vi}

Mistakes repeated

So, what can we learn from such a universal problem as over-allocation, mismanagement and lack of foresight?

Firstly, governments around the world continue to make mistakes when it comes to over allocation and short term management of river systems.

Egypt is a prime example. If current growth rates are not curtailed the population of Egypt could double by 2050^{vii}. The Egyptian Government has announced several

measures to try and slow population growth, as well as instigating plans to encourage people to move away from its overcrowded cities and towns.

One of these projects is the reclamation desert for massive irrigation projects. These projects are expected to provide work and food for millions of people but they will also rely on extracting water from a river that already fails to reach the ocean during dry periods.

In China, the lower reaches of the Yellow River are now dry each spring, due to low rainfall and high irrigation demands. However, in an effort to reduce poverty local governments continue to create new irrigation areas with farmers paying about US\$300 for a megalitre of water. The Yellow River Management Committee is supposed to have jurisdiction over allocation of the river's resources but new irrigation projects continue to be approved by provincial bureaux.^{viii}

A boat with no water

It was once the fourth largest inland sea in the world and thousands of people relied on it for their livelihoods. Now the Aral Sea in central Asia is a stark reminder of how devastating river mismanagement and over-allocation can be.

In the 1930s the then Soviet Union tapped into the Aral sea's two major inflow rivers, the Syr Darya and Amu Darya, to build vast cotton fields in the desert. Large scale diversion canals removed water from the rivers to irrigate the thirsty crops and the Soviet became one of the world's largest exporters of cotton.^{ix}

However, 80 years later the project has completely decimated the landscape around the Aral Sea. The shoreline has rapidly shrunk and the towns built on the edges of the inland sea are now located up to 100kms from the shoreline. Ninety per cent of the sea's source water and two thirds of its surface area are gone.^x

The human impact has been devastating. In parts of the Aral, salinity has reached almost three times the average levels found in seawater. Neighbouring residents are suffering from throat cancer, anaemia, tuberculosis and lung disease. Infant mortality is 30 times higher than it was before the lake became polluted with salt, fertilisers and pesticides from the cotton farms.^{xi}

Changes are being made – in 2000 the BBC reported that effective irrigation practices were slowing the sea's shrinking rate but conceded it would take years and extensive changes to irrigation before the Aral Sea could begin to grow.

Land of the free

The Colorado River has been described as the most regulated river in the world and provides water for 25 million people and 2 million acres of irrigated land. In 1922 the Colorado River Compact partitioned the rights of water between the lower and upper basins. Each basin was allowed the consumptive use of 9250Gl annually from the river.

It was then left to the basin states to work out between them how to distribute that amount. Additionally, in 1944 Mexico was guaranteed an annual allocation of 1850Gl.^{xii}

However, it is now clear that river levels were at unusually high levels at the time of the Compact - the average annual flow is 17,270Gl – some 3080Gl over allocation.

It is only because the states are not using their total allocation that the river continues to flow. It has been recognised that a prolonged drought would strain the entire system yet debate continues over which states have priority water rights from a drought-stricken Colorado River.^{xiii} Calls are being made for water to be diverted from agricultural irrigation and used for cities.

The Colorado River begins at the Rocky Mountains and meanders south west, carving out its niche at the bottom of the Grand Canyon, before crossing into Mexico and running its course into the Gulf of California – on a good year.

How much longer will there be enough water?

Input

- Average annual flow in the Colorado River since 1930: 17,270 Gl

Current output

- Loss by evaporation from reservoirs: 2467 Gl
- Upper basin states: 4687Gl
- Lower basin states (California, Arizona, Nevada and Mexico): 10,115 Gl

Current use

- Irrigation in lower basin (including Mexico) uses 85% of allocation
- Amount used by California: 6414Gl
- Imperial Valley alone uses (for irrigation): 3824 Gl
- Los Angeles and San Diego: 987Gl

Future

- Upper basin states do not fully use allocation (9250Gl) but by 2020 developing economies and population growth will push up use to 5550 Gl
- California been ordered to reduce consumption back to allocation of 5427 Gl
- By 2015, with growth of Las Vegas, Nevada is expected to exceed its allocation of 370Gl^{xiv}

Las Vegas water supply in doubt

On February 13 the New York Times reported that the Colorado River-fed reservoir that supplies water to the cities of Phoenix and Las Vegas has a 50 per cent chance of running dry by 2021. The researchers found that in times of high evaporation that demand for Colorado River water exceeds supply. As a result the Southern Nevada Water Authority now gives Las Vegas residents financial incentives to conserve

domestic water use. Residents who are water wise when landscaping their gardens receive US\$1.50 for every square foot of lawn removed. The authority also offers rebates to motorists who use a water smart car wash and to pool owners for covers. An ad campaign encouraging people to stop watering their lawns featured an old lady kicking a man in the crotch, followed by the tagline “Don’t make us ask you again. It’s a desert out there” (follow [this link](#) to watch the ad).

All of this illustrates that in Nevada water is now being treated as a precious commodity. The Mojave Desert makes up the majority of the State – which receives less than 4 inches of rain a year on average – and officials are now recognising the State cannot ignore that fact.

California declares drought

Nevada is currently on drought alert – the second highest drought classification – and the situation is similar in California.

On June 4, the Californian Governor, Arnold Schwarzenegger, declared California was officially in drought and that water restrictions to cities and regions would be enforced if conservation efforts did not improve.

In declaring the drought Schwarzenegger ordered water from less dry areas to be transferred to those that were dangerously dry. He also requested that the Federal Government provide aid to farmers and ordered that the department of water resources immediately undertake several measures, including technical assistance to improve irrigation inefficiencies.

Onus on residents

A New York Times article on June 5 stated that a bill requiring Californians to cut water use by 20 per cent by 2020 recently passed the Assembly. Importantly, the bill places the onus on residents to save that water, not the agricultural industry.^{xv}

The bill still requires Senate approval, but if passed it will provide a clear indication that the Californian Government gives more value to a viable agricultural industry than city residents’ lawns, parks and gardens.

In addition, the New York Times further reported on June 7 that Californian water authorities and government agencies have started denying and delaying housing developments that do not include provisions for a 20 year water supply^{xvi}.

“The water in our state is not sufficient to add more demand,” the director of California Department of Water Resources, Lester Snow, was quoted as saying. “And that now means that some large developments can’t go forward.”

The rain in Spain

In early April the Spanish city of Barcelona was placed on heavy water restrictions because of fears of drought. Residents were banned from watering gardens, filling

swimming pools and washing their cars. Those who flaunted the rules faces fines of up to AU\$5000. In April the showers on Barcelona's beaches were closed, city fountains were turned off and parks and gardens were barely watered. By May drinking water was being shipped in at a cost of AU\$36 million a month to ensure the city had enough supplies for the busy tourist season.^{xvii} Extensive rains at the end of May and start of June led to the water restrictions being dropped.

However, ecologists maintain that the country must rethink the development of huge resorts and golf courses, which they say are unsustainable, and that inefficient irrigation practices result in extensive water wastage.^{xviii}

Lessons to be learned

The extent of information available online about international water management and practices is overwhelming. Irrigation inefficiencies are a major source of water wastage worldwide, with many governments either too poor or too short-sighted to invest in upgrading infrastructure. The Murray-Darling Basin is by no means alone in terms of resource mismanagement and inaction – what is important now is whether the State and Federal Governments will learn from others' mistakes and victories.

An edited version of this report features in the South Australian Murray Irrigators July newsletter.

ⁱ http://ecohealth101.org/whats_left/eat4.html

ⁱⁱ <http://www.american.edu/TED/ice/bluenile.htm>

ⁱⁱⁱ http://www.1degree.com.au/files/AdvertiserPartworks_Part6_Page12.pdf

^{iv} <http://www.chinadevelopmentbrief.com/node/238>

^v http://www.1degree.com.au/files/AdvertiserPartworks_Part6_Page12.pdf

^{vi} <http://wwf.org.au/publications/worlds-top-ten-rivers-at-risk/>

^{vii} http://www.courant.com/news/opinion/op_ed/hc-smith0624.artjun24,0,3335711.story

^{viii} <http://www.chinadevelopmentbrief.com/node/238>

^{ix} <http://unimaps.com/aral-sea/index.html>

^x <http://www.worldlakes.org/lakedetails.asp?lakeid=9219>

^{xi} <http://news.bbc.co.uk/2/hi/asia-pacific/678898.stm>

^{xii} <http://www.ci.slc.ut.us/utilities/NewsEvents/news1999/news082799.htm>

^{xiii} <http://ag.arizona.edu/AZWATER/arroyo/101comm.html>

^{xiv} <http://www.think-energy.com/ThinkEnergy/16-18/case-studies/case-study-6.aspx>

^{xv} <http://www.nytimes.com/2008/06/05/us/05drought.html?scp=7&sq=Colorado+River&st=nyt>

^{xvi} http://www.nytimes.com/2008/06/07/us/07drought.html?pagewanted=1&_r=2&sq=Colorado%20River&st=nyt&scp=6

^{xvii} <http://www.thinkspain.com/news-spain>

^{xviii} <http://edition.cnn.com/2008/WORLD/europe/05/13/spain.water.ap/index.html>