

EXPLORING *Central Asia's Lifeline*

For more than 30 years, Australian explorer and expedition cyclist Dr Kate Leeming has undertaken pioneering journeys through some of the world's most remote regions. She tells us about her latest expedition across Central Asia, following the great rivers of the Aral Sea Basin to uncover the true source of the Oxus River and solve a 3,000-year-old geographical mystery

When I show people the route map of my 9,001km Breaking the Cycle Central Asia expedition, they often look puzzled. 'How did you dream up this route?' they ask. 'What story are you trying to tell?'

The answer lies in a collection of interests that have accompanied me for decades. Growing up on a wheat and sheep farm in Western Australia, I developed a keen interest in geography, land management, and the relationship between people and the environment. As a child, I remember studying a world map on our kitchen wall and being intrigued by the Aral Sea, then marked as the world's fourth-largest lake. At the same time, stories of the Silk Roads and its most famous travelling merchant, Marco Polo, fired my imagination.

For years I wanted to explore Central Asia, but struggled to find a theme that would unite my interests in exploration, history, geography and environmental issues. But then, a light bulb moment: just as I cycle to connect closely with the people and the land, the waters that flow along Central Asia's mighty glacier-fed rivers, the Syr Darya and Amu Darya, connect every aspect of life.

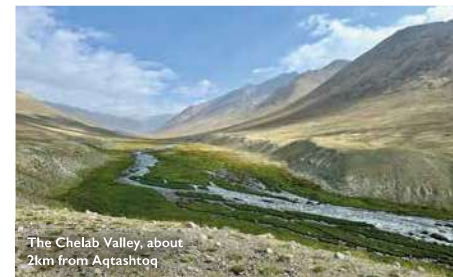
This idea became the foundation of Breaking the Cycle Central Asia. Over five months, my aim was to explore the importance of water in the Aral Sea Basin, by following the Syr Darya (Jaxartes River) from its source in the Tien Shan, Kyrgyzstan, to the Aral Sea; from there, to trace the course of the Amu Darya (Oxus River); and as the finale, search for its unverified true source in the Wakhan Corridor, Afghanistan. In essence, it was to be a journey from source to sea to source.



The team: Rupert McCowan, Malang Darya, Kate Leeming and Adrian Dmoch in the Little Pamir



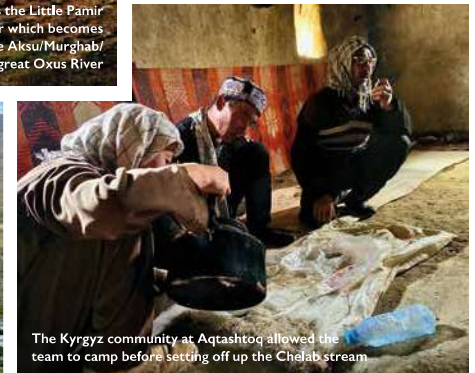
Last light on the Little Pamir near Lake Chaqmaqтин. The Chelab stream (foreground) has a unique feature: it bifurcates as it reaches the Little Pamir watershed. The West branch flows into the Little Pamir River which becomes the Wakhan River, and East into Lake Chaqmaqтин, then the Aksu/Murghab/Bartang system – to meet again downstream to form the great Oxus River



The Chelab Valley, about 2km from Aqtashtog



Kate, Rupert and Malang set off from Aqtashtog near the bifurcation of the Chelab



The Kyrgyz community at Aqtashtog allowed the team to camp before setting off up the Chelab stream

Water is the thread that binds Central Asia together. For thousands of years, the Syr Darya and Amu Darya sustained the great Silk Road cities such as Samarkand, Bukhara and Khiva. In a largely arid landscape, these rivers made settlement, agriculture and trade possible, helping to create one of the world's great crossroads of civilisation. For centuries, this hub of the Silk Roads was the economic capital of the world.

Today, those same rivers continue to sustain millions of people across six countries. Yet they also tell a cautionary tale. Water availability is not keeping pace with the rising demand from increasing population pressure and agricultural needs. Nowhere is this more evident than in the Aral Sea region.

The Aral Sea has become synonymous with environmental catastrophe. Soviet and post-Soviet regimes have diverted vast quantities of water from the Syr Darya, Amu Darya and their tributaries to irrigate cotton and rice fields in the desert. The consequences have been devastating. Water from the Amu Darya no longer even reaches the Aral. Since the late 1950s, the coast of Aral Sea South has retreated by more than 100km and less than 10% of the sea's original volume defies evaporation.

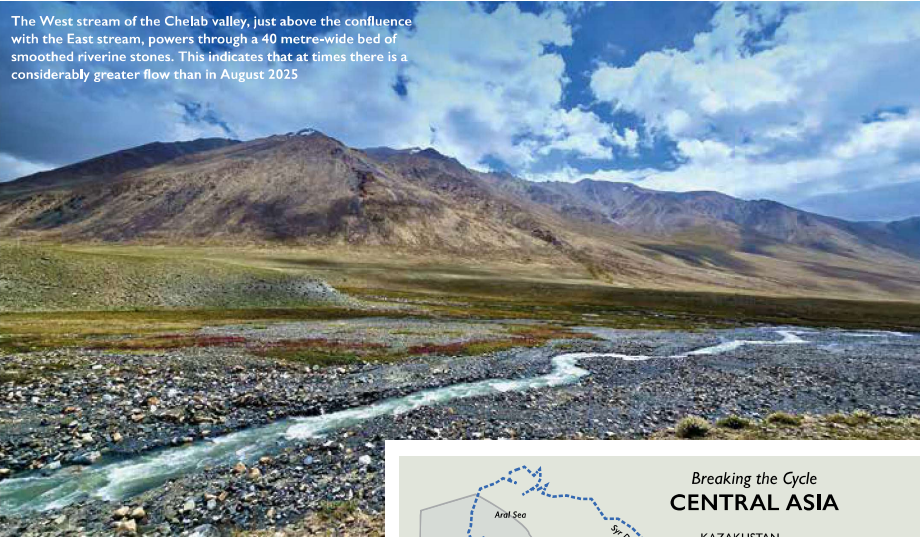
From passing vehicles I often received discreet waves, smiles and nods of encouragement that created a quiet sense of connection

The consequences have been profound. Fisheries collapsed, ecosystems disappeared and entire communities were left stranded far from the water that once sustained them. Toxic dust from the exposed seabed – laden with salt, pesticides and industrial pollutants – is carried airborne across continents. Scientists have detected traces of the pollutants as far away as Greenland and Antarctica.

Cycling across the former seabed was one of the most confronting experiences of the expedition. The ground was speckled with billions of tiny cockle shells, reminders of a vanished sea. I saw dust devils funnel toxic sediments high into the atmosphere. Local people spoke wistfully of the days when fishing fleets filled the harbours of Aralsk and Moynaq.

Many communities continue to experience serious health and economic challenges as a result of the disaster.

Yet I was determined not to focus solely on loss. One of the most encouraging aspects of the journey was seeing examples of adaptation and restoration. In Kazakhstan, I was given permission to visit the Kokaral Dam, built by the Kazakh Government and the World Bank in 2005 to save the smaller Aral Sea North. ☉



The West stream of the Chelab valley, just above the confluence with the East stream, powers through a 40 metre-wide bed of smoothed riverine stones. This indicates that at times there is a considerably greater flow than in August 2025



From its dry river mouth at the southern shoreline of the former Aral Sea (now the Aralkum Desert), I followed the Amu Darya upstream through the autonomous state of Karakalpakstan, Khorezm, into secretive Turkmenistan, 1,000km along the Zerafshan-Karakum Corridor, back into Uzbekistan and through Tajikistan's Pamirs, following the great river and its tributaries towards its source.

Few rivers have played such an important role in human history. Civilisations have depended upon the Oxus for at least 9,000 years. It appears in Greek, Persian and Chinese records, and served as both a conduit and a barrier between empires. Alexander the Great crossed it during his campaigns, while in the 19th century it became a focal point of the 'Great Game' between Britain and Russia.

Crossing into Afghanistan was essential if I was to solve one of geography's enduring mysteries: the location of the true source of the Amu Darya, or Oxus River. The first challenge was logistical. Reaching the remote Wakhan Corridor required months of planning, permits and local support. Entering via the Shir Khan border – the only crossing from Tajikistan open to foreign travellers –

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Rupert, Malang and Kate deciding which stream to follow at the confluence of the West and East streams that make the Chelab

The dam raised water levels by 12 metres, reducing salinity and enabling fish populations to recover sufficiently to support a tightly controlled fishing industry.

Throughout the expedition, I met farmers, teachers, students, herders and community leaders. Their stories reinforced how closely water is linked to food security, livelihoods, public health and social stability.

Yet, perhaps my strongest memories are not of stunning landscapes or environmental challenges, but of people. Again and again I was welcomed into homes, offered tea and meals, and provided with places to sleep. These unplanned encounters provided insights into cultures and communities that no guidebook or internet search could ever reveal.

Kate and Malang at the true source



Quest for the Source of the Oxus

19th century

During the Great Game, Britain and Russia sought to define the Oxus source as the demarcation point between their empires in the region that was to become the Wakhan Corridor. Yet despite numerous expeditions, nobody could agree where the great river truly began

1838

Lt John Wood identified Lake Zorkul as the source of the Oxus

1893

Lord Curzon championed an ice cave at the head of the Wakhjir River as the river's true source. Others proposed the Little Pamir River or Lake Chaqmaqin

20th century

Curzon's Wakhjir ice cave is widely accepted as the source

2007

British explorer Bill Colegrave demonstrates that the Chelab Stream, on the Afghanistan–Tajikistan border, is the Oxus's true parent stream

2025

Dr Kate Leeming and team discover the true source of the Oxus, a glacial lake that they name Lake Malang after their guide

Lake Malang

Lake Malang covers approximately two hectares and lies 14km beyond the Chelab bifurcation. It is more than 2,500km from the dry mouth of the Amu Darya at the Aral Sea. Importantly, it also satisfies a key geographical requirement of a river source: permanence. Unlike a glacier or seasonal snowfield, Lake Malang is a stable geographical feature. Scientific modelling suggests the glacier feeding it may survive for only another 30 to 40 years, yet the lake itself is expected to remain long after the ice disappears. Held in situ by impermeable glacial moraine, it should continue as a stream-fed lake for thousands of years.



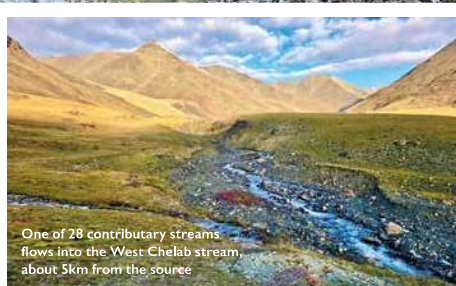
I was met by my host and guide, Azim, and prepared to cycle into a country very different from any in which I had previously ridden.

As a woman travelling by bicycle through a conservative Islamic region only four years after the end of two decades of war, I was uncertain how I would be received. Taliban officials occasionally questioned my clothing and movements, and one suggested that no bare skin should be visible on my legs – I wore three-quarter length cycling baggies and long sleeves, covering up even in the extreme heat. Yet, despite my apprehensions, the reception I received was overwhelmingly positive.

Wherever I stopped, crowds of curious men and boys gathered around my bicycle, fascinated by every detail of my journey. Drivers often followed for kilometres to ask questions or take photographs. Although the attention could sometimes feel intense, it was almost always friendly curiosity rather than hostility. Women were less visible in public life, but from passing vehicles I often received discreet waves, smiles and nods of encouragement that created a quiet sense of connection.

To maintain the line of my source-to-sea-to-source journey, I rode the 470km from the border through Kunduz and Faizabad to Ishkashim, gateway to the Wakhan Corridor. This narrow, 350km finger of north-eastern Afghanistan, created during the 19th century 'Great Game' as a buffer between the British and Russian empires, lies at the heart of the 'Pamir Knot', where the Hindu Kush, Pamir, Tien Shan and Karakoram mountain ranges converge.

The cycling itself was extraordinarily demanding. Rough tracks, steep climbs, loose rock, sand, flooded sections and washed-out roads made progress painfully slow. It took three days to cover the almost 200km to Sarhad-e-Broghil and another day and a half to reach the Little Pamir on a newly constructed mountain road.



One of 28 contributory streams flows into the West Chelab stream, about 5km from the source

After 149 days on the road, tracing the rivers of the Aral Sea Basin from the source of the Syr Darya in Kyrgyzstan to Afghanistan, I finally arrived at Lake Chaqmaqin, one of the recognised sources of the Oxus. Surrounded by glacier-capped peaks marking the borders of Tajikistan, Pakistan and China, I stood at Lake Chaqmaqin's shoreline, more than 4,000 metres above sea level. In celebration, I lifted my bicycle above my head. I felt on top of the world in a region commonly referred to as the Roof of the World – and was now within reach of solving a 3,000-year-old geographical mystery.

Discovering the true source of the Oxus

The team – British geographer Rupert McCowan, Afghan guide and mountaineer Malang Darya, Polish filmmaker Adrian Dmoch and I – set up camp at Aqtashtog, a remote Kyrgyz winter settlement just 4km from Lake Chaqmaqin, and adjacent to the point where the Chelab Stream bifurcates.

At first light, we set off into the unknown. Behind us stretched sweeping vistas of Lake Chaqmaqin, the Little Pamir and the jagged peaks of the Hindu Kush. Ahead stretched the beautiful Chelab Valley,



Glacier and mounds of glacial moraine, 2.5km from the source

a landscape of streams, grasslands and glacier-covered mountains.

After trekking 6.5km across trackless, stony terrain, we reached the confluence of the two principal tributaries that form the Chelab. Here we faced an important decision: which stream should we follow?

Before the expedition, I had studied satellite imagery and an old Soviet map, and measured both tributaries. They appeared similar in length and elevation, although the western branch was slightly longer. Standing at the confluence, however, the answer was obvious.

The West stream (as we called it) flowed through a broad bed of smoothed riverine stones about 40 metres wide, with numerous smaller channels flowing through the rocks. The landscape clearly showed evidence of substantial flow over a very long period. By contrast, the East stream spread into several much smaller channels, flowing across grass-covered ground, indicating significantly lower water volumes.

The evidence convinced us that the West tributary was the principal stream.

We followed it upstream and established camp beside the river. The setting was idyllic, but our attention was focused on what might lie beyond.

The next morning, we set off before dawn. From my research, I knew we had approximately 6.5km to cover before reaching the glacial headwaters, but in remote mountain terrain distances can be deceptive.

In all, we crossed 28 tributaries originating from glaciers and springs. Gradually the valley became narrower and the steep-walled, glacier-topped mountains, higher.

Approaching the glacier at the head of the Chelab, we reached a formidable barrier: a kilometre-long mound of glacial moraine. At its base, around 20 springs emerged through the porous rock, gradually combining to form the headwaters of the Chelab Stream. It took nearly an hour to scramble across unstable boulders and finally up the bank of the glacier lake.

I stood quietly, absorbing the moment. The scene – the lake, the glacier and the surrounding wall of mountains – was mesmerising

All of a sudden, we were there. Wow!

I stood quietly, absorbing the moment. The scene – the lake, the glacier and the surrounding wall of mountains – was mesmerising.

The glacial lake nestled beneath the towering Chelab Glacier at an altitude of 4,951 metres. Its murky green appearance was due to the existence of glacial flour, once-frozen dust particles that had become suspended in the lake's freshly thawed waters. Small icebergs drifted silently across its surface. The stillness was punctuated only by the cracking of ice and the sound of meltwater cascading from the glacier.

It felt particularly fitting that we made the discovery during the United Nations' International Year of Glaciers' Preservation.

We concluded that the lake represented the ultimate source of the Chelab Stream and therefore the true source of the Oxus River. In honour of our guide and friend, we named it Lake Malang, recognising Malang Darya's achievement as the first Afghani to climb Afghanistan's highest mountain, Mount Noshag.

The discovery brought together the central themes of my Breaking the Cycle Central Asia expedition. Standing beside Lake Malang, at the beginning of Central Asia's greatest river, I was reminded that the future of these fragile headwaters – and the millions of people who depend upon them – rests not only with the communities who live here, but with all of us. Whether local actions create global consequences, as with the Aral Sea, or global actions create local impacts, as with the glaciers of the Pamirs, the lesson is the same.

We are all connected.

DR KATE LEEMING OAM

Dr Kate Leeming OAM is an Australian explorer and endurance cyclist who has so far cycled 106,000km on her expeditions – two and a half times the Earth's circumference. In 2010, she became the first person in history to cycle an unbroken line from Africa's most westerly to its most easterly points: from Pointe des Almadies, Senegal to Cape Hafun, Puntland, Somalia. She's also an educator, presenter, author and documentary filmmaker. In 2016, Kate was awarded an Honorary Doctorate of Education by the University of Western Australia and in 2023, a Medal of the Order of Australia. She is currently setting up the Breaking the Cycle Foundation to help alleviate poverty, support the environment, contribute towards equality, and provide leadership education.

www.breakingthecycle.education

