ARAL

Untold Stories from Before, During and After the Sea

ARAL CULTURE SUMMIT

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Advisor to the President of the Republic of Uzbekistan

"How wonderful it is, brother, the heart of humankind! How deeply one person can love another." These words by Karakalpak poet Ibrahim Yusupov resonate profoundly in the Aral Sea region, where an extraordinary sense of interconnectedness binds people across distances and generations. Once graced by the vast waters of the Aral Sea, this land has faced formidable challenges, yet its communities have demonstrated remarkable resilience, drawing strength from unity and culture.
In introducing the Aral Sea region through this lens of shared human experience, we set the stage for the story of a people whose hearts remain open and strong.

Where others see only a cautionary tale — a stark image of ships stranded amidst dusty plains — local communities see home, family, and the living memory of fishing villages, harvests, and celebrations, the voices, research, and reflections gathered here reinforce the notion that even when waters recede, hope rises in new and unexpected places: in the innovative research taking place at local universities, in the entrepreneurs reimagining desert farming, in the craftspeople weaving ancient symbols into modern textiles, in the museum workers preserving heritage for future generations, and in the unwavering belief that this region has much to teach the world.

The Aral Culture Summit was conceived with precisely this perspective in mind. While we must acknowledge the environmental damage inflicted here — how climate change and ecological mismanagement have put the region under tremendous stress — the summit also seeks to highlight the abundance of emerging solutions and the decisive role of culture in driving them into the spotlight. New soils can be regenerated, salt-tolerant plants can be seeded, and new ideas can be cultivated through collaboration between environmental engineers and creative minds.

Many of the articles in this book are sobering, charting the Aral's decline and dissecting the challenges of the region's evolving climate and economy. Yet they also offer a chorus of optimism, revealing how culture, when embraced as a force for change, can restore meaning to landscapes that might otherwise be left desolate. The intangible heritage of storytelling, rituals, and community bonds provides local people with a steadfast sense of place.

I invite every reader to view this collection of essays as the heartfelt story of a region, told by those who cherish their homeland and its people. Above all, may it affirm a simple truth: a culture that endures persists in seeking solutions.

GAYANE UMEROVA

Chairperson of the Uzbekistan
Art and Culture Development Foundation

Chairperson of the National Commission
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This book offers a vivid introduction to the traditions, cultures, and forward-looking visions that have emerged in response to the Aral Sea and the landscapes that border it. While headlines may cast the Aral solely as a symbol of environmental calamity, anyone who has travelled through Karakalpakstan and Khorezm quickly discovers an ancient and complex world of vast oases, desert citadels, and imposing castles—many dating back millennia. Sites such as Topraq-Kala and Khazarasp, now vying for UNESCO World Heritage status. These imposing fortresses reflect how ancient Khorezm thrived as an irrigation civilisation, its communities always orienting themselves around the Amu Darya's changing flow.

Indeed, recent archaeological excavations at the now-exposed Aral seabed have revealed medieval settlements, underscoring that the presence and absence of water has long defined life here. Far from being fixed or static, the region's landscape has been shaped, adapted to, and reimagined through centuries of environmental flux.

The Aral Culture Summit, initiated by the Uzbekistan Art and Culture Development Foundation (ACDF), arose from the conviction that heritage and innovation need not be at odds, but can instead propel each other. While the drying of the Aral Sea from the 1960s to the 2000s remains a profound loss for the entire planet, our hope — and our belief—is that science, history, culture, and creative practice can intersect to form a new model of regeneration. Such an approach has the potential not only to reinvigorate local communities but also to serve as a blueprint for other regions facing the challenges of climate change.

Uzbekistan has named 2025 the Year of Environmental Production and Green Economy — apt for a place whose cultural identity has always been deeply tied to nature. Once cultural and natural heritage are truly seen and valued, they become impossible to disregard. This holds true for objects and landscapes, but it equally applies to the intangible expertise of human societies — such as traditional jewellery or the age-old techniques of yurt construction. Just as the ACDF has proposed these and other skills for UNESCO recognition, our vision with this project in Karakalpakstan is to craft what one might call "artefacts of the future": creative interventions co-created by local experts, international specialists, and communities determined to find solutions that no single group would conceive alone.

In many ways, this short book provides a snapshot of the exchanges the Aral Culture Summit seeks to spark. We encounter a renowned archaeologist shedding light on Ancient Khorezm and Kerder ruins, large swaths of which remain unexplored. We meet a historian decoding the region's cultural history, with Zoroastrian, Buddhist, and Islamic elements interwoven over centuries. Readers will also find insights from an up-and-coming eco-activist on the power of community-building on social media, young creatives from Nukus, ethnographers, museum workers, and a pioneering microbiologist — voices that together reveal the region's multifaceted cultural and environmental landscape.

Nearly one hundred thousand cultural artefacts survive today thanks to the vision of Igor Savitsky, whose extraordinary collection in the museum in Nukus spans four thousand years of artistic and material culture of the region. Yet climate change now places this legacy at risk — threatening not just objects and archaeological sites, but also the intangible customs woven into daily life around the Aral Sea. Skills like net-weaving, boat-building, and managing the tuğai (riverine forests) are in jeopardy of being lost forever.

Part of ACDF's mission involves illuminating our culture internationally, even as we fortify preservation efforts at home. In 2022, we engaged the world through *Unbuild Together*, a project for the 18th Venice Architecture Biennale that was an exploration in earth-based architecture reflective of the vernacular structures that endure in Khorezm and Karakalpakstan. Later, in 2024, our *Avant-Garde in the Desert* exhibition — developed in Venice and Florence — journeyed back to Nukus, where renovation works have digitised archives and installed climate-controlled systems to safeguard fragile collections.

With the Aral Culture Summit, we aim to preserve and revitalise those customs, practices, and traditions that have persisted—and continue to evolve—in the Amu Darya delta. While science might help us measure and predict future pathways, it is art and culture that illuminate the ways we inhabit a place and create new narratives within it. Around the world — and especially in regions shaped by profound environmental shifts — culture has a unique capacity to spark transformation, fostering collaboration and inventiveness. The conversations and encounters captured in these pages reflect precisely that spirit.

We hope these essays, discussions, and stories will encourage readers to reimagine what the Aral Sea region once was and what it can become. Despite the many challenges, the region's story is still to be written by the communities who stand at the forefront of adaptive design, scientific inquiry, and cultural reinvention. The ACDF is proud to support these vital voices, echoing a belief that the future of Karakalpakstan — and of similarly vulnerable regions worldwide — hinges on a blend of daring innovation, respect for heritage, and unwavering collective endeavour.

EDITOR'S NOTE

The following essays were written in a variety of languages. Some in Karakalpak, some in Russian and others in English. Some were spoken aloud to me in Nukus and Tashkent before being translated into English, edited and translated back into Russian, Uzbek and Karakalpak. If anything indispensable has been lost in this process I hope the spirit and haste with which enterprise was undertaken encourages forgiveness.

—PM

Fishermen of the Aral by Ural Tansykbayev. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

A Civilisation at the Crossroads

Oktyabr Dospanov

An introductory tour of Karakalpakstan, and the culture, territory and history of the southern Aral Sea region by Dr Oktyabr Dospanov, Head of the Archaeology Department at the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky.

I was born and raised on the shores of Moynaq, a former Aral Sea island. Over the course of my lifetime I have witnessed how the loss of the great sea's waters has produced a social and cultural crisis across the broader region.

It is well known that the disappearance of the Aral Sea has had negative impacts on the entire planet. These range from air pollution and dust storms, to climate change and the deterioration of human health — including the progression of numerous diseases such as cancers, tuberculosis, anemia, cardiovascular diseases and many others. The most severe effects are felt in the lands surrounding the former sea, where the crisis has negatively affected pastoral agriculture and cultivation. To a large extent, this has been due to the lack of water for farming, but also the lack of safe water for consumption. All these factors, in turn, have hindered human potential as a whole. The loss of employment opportunities and the decline of traditional cultural practices characteristic of the peoples in the Aral Sea region continues to this day.

The current water crisis, which began to affect Karakalpakstan, Uzbekistan and neighbouring countries beginning in the mid-1960s, is usually ascribed to the policies of the former leadership in the Soviet Union. It is always easy to condemn past decisions with the benefit of hindsight — especially when the state responsible for them no longer exists. History, however, does not accept the subjunctive mood. Rather than seeking to explore the causes of the ecological crisis, this book is interested in solutions. Instead of fixating on the past, it will reflect on the history, culture, and everyday life in this unique corner of the planet — once an industrially developed part of what we might call the greater Aral Sea region — through the memories and hopes of our contemporaries.

Karakalpakstan is a region with a unique geographic and cultural heritage, where majestic landscapes, ancient civilisations and historic monuments intersect. Located in the lower reaches of the Amu Darya river — our lifeline, which cascades down from the

Pamir and Tian Shan Mountains to form extensive deltas that create the conditions for diverse cultures to thrive — its landscapes also include the arid Kyzylkum Desert, the grassy Ustyurt Plateau and the remnants of what was once the abundant Aral Sea. Despite the ongoing crisis, Karakalpakstan's ecological diversity — which includes desert, mountain, and steppe biomes — remains impressive.

The ancient Khwarazmian civilisation, and the Kerder culture of the southern Aral Sea region, hold an important place in history. Both peoples have left distinct traces in modern Karakalpakstan. Ancient Khwarazm, which was established as a satrapy of the Achaemenid Empire around 550-330 BCE and persisted through the Islamic conquest of the 8th century CE until Mongols invaded in 1220 — was a highly developed centre of irrigated agriculture and trade that included citadels such as the palace city Toprak-Kala and the fortress Gyaur-Kala. This civilisation was known for its architecture, religious complexes and complex social structure. The Kerder culture, which in turn rose in the late 6th-7th century, was characterised by elements of both nomadic and sedentary ways of life. Archaeological findings — ceramics, metal artifacts and burial sites — indicate a singular approach to economy, religion and art.

The ancient inhabitants of Toprak-Kala and Gyaur-Kala would have been largely Zoroastrian, and elements of Zoroastrian ritual are preserved in the ethnographic culture of modern Karakalpaks. This includes the celebration of Nowruz, which symbolises the renewal of nature and the beginning of a new year, as well as traditions of ancestor and fire worship. The Kerder culture also demonstrated a close connection with the natural environment. The intricate ornamentation of carpets and various household items in modern homes can be interpreted as echoes of ancient symbols associated with the cult of the sun and earth.

Though they differed in their degree of urbanisation, and in the development of craft, trade, and the complexity of social organisation, both cultures greatly influenced the traditional culture of the Karakalpak people. From the ancient Khwarazmian civilisation, the Karakalpaks inherited aspects of agricultural practice such

as irrigation systems and a firm reverence for water. The Kerder culture can be seen in the preservation of nomadic traditions, adaptability to harsh natural conditions, and desire for harmonious coexistence with the surrounding environment. Epic poems such as “Kyrk Kyz” (“Forty Girls”), folk music and an oral tradition of storytelling preserves the memory of life in this ancient landscape. Folk artisans continue to create magnificent carpets adorned with intricate ornaments, while musicians perform compositions inspired by nature and the history of their homeland.

There is much evidence about the peoples who lived in this territory that were neither exclusively Kerder or Khwarazmian. Living for centuries in the space between two seas — the Caspian and the Aral — they led a largely nomadic lifestyle. They had no written language and no formal religion until the arrival of Islam. Their way of life, tested by both time and climate, generated new and unique customs, beliefs, traditions and kinship ties between tribes and families connected by blood. Nature itself inspired those who lived face to face with it — in all its beauty and destructive power. Among the Karakalpaks, one group among those desert people, decorative and applied arts such as embroidery, carpet weaving, metalwork and wood carving emerged. Names like ram’s horn, camel’s foot and fish eye were used to connect decorative elements with plants, animals, and natural forces along with symbolism liberally incorporated from religions including Christianity and Buddhism.

Surrounded by ornamental signs that were highly symbolic, a belief system emerged in close synthesis with nature. People began to believe in supernatural forces in which they felt divinity, and tried not only to live in this nature but also to preserve the biodiversity around them. The disappearance of the Aral Sea has degraded this ancient culture. Speaking yet more pragmatically, the disappearance of water, and with it nature itself, has led to high unemployment and low incomes. People have left to seek work or education, and abandoned once inhabited places where

rich pastures and forests once thrived. Once a haven of biocultural diversity, the land has become desertified and static. Today the decorative arts and forms of nomadic or semi-nomadic dwellings can only be found among museum collections — divorced from their traditional form.

Another feature has left a lasting impact on the monuments, as well as the material and spiritual culture of both the people of the Aral Sea region and lands much farther afield: the presence of the great Silk Road. This trade route — a vast girdle that connected Chang’an (Xi’an) in China to Constantinople in Europe while passing through Central Asia, Persia, the Middle East and South Asia — not only facilitated the exchange of goods but served as a channel for the dissemination of ideas, technologies, and artistic traditions between East and West. Systematic archaeological research and detailed analysis of material culture data confirm the existence of close contact between the peoples of the Aral Sea region and the rest of the world.

One of the most significant archaeological sites from this period is Janpyk-Kala, a settlement that once thrived on the banks of the Amu Darya. This port city had a well-developed urban infrastructure with inner streets, a caravanserai, mosque and artisans quarters, making it a significant centre for medieval trade. The citadel’s outer walls are adorned with elegant and colourful arches in the form of semi-columns, the sort of architectural character typical of Iranian culture. Excavations of medieval quarters dating from the 9th to 14th centuries uncovered exquisitely decorated ceramic vessels of the minai and luster types, brought from Iran. These were found along with rice grain vessels of Chinese origin. Other finds included silver jewelry for women — bracelets, earrings and rings — as well as ceramic fragments with inscriptions of Indian origin. Cultural finds also include spherical glass irons characteristic of Egyptian culture, which were manufactured and distributed along caravan routes.

At Janpyk-Kala it becomes clear that the Silk Road not only facilitated economic prosperity but also served as a major conduit for cultural exchange and the formation of a heterogenous regional identity. These same trade ties would have extended to residential oases that supported the estates at Kavat-Kala, Berkut-Kala, Yakke Parsan, and Burly-Kala, as well as many others on both the right and left banks of the Amu Darya.

Today Karakalpakstan is actively developing its tourism industry. Many thousands of tourists already visit the republic each year, showing great interest in the rich cultural heritage and archaeological monuments of this unique land. However, despite the growing interest in historical sites, once-majestic architectural and cultural monuments are in decline and are being destroyed at an alarming rate. One of the most vulnerable sites is Koy Krylgan-Kala, which, according to research, was a centre of astronomy for the ancient Khwarazmian civilisation. This monument is gradually eroding due to adverse natural factors such as saline soils, high groundwater levels and the constant swing between baking heat and freezing cold, exacerbated by climate change and the loss of the temperature-stabilising sea. At the same time, another outstanding ancient monument, Toprak-Kala, once the residence of the Khwarazmian royal dynasty and adorned with numerous wall paintings, frescoes, and sculptures, is also under threat of complete destruction.

The early culture of the southern Aral Sea region and the Amu Darya delta was vibrant and diverse, a reflection of the richness and variety of its human and nonhuman resources. But with the desiccation of the Aral Sea — a result of both natural and anthropogenic forces working in tandem — the loss of the delta's many once-prosperous oases was inevitable. The reduction of water changed the broader ecosystem, which in turn made life virtually impossible for the flora and fauna of forests and steppes that were once full of life and diversity. These same changes transformed the

way of life of the local population, which depended on agriculture and fishing, crowding into cities in the hope of opportunity.

Nevertheless, optimism about the future continues to inspire local communities. Efforts are underway to restore ecosystems, to improve and maintain canals, breed resilient crops and create nature reserves. Local communities continue to hope — informed by past experience — that natural resources can be recovered and the revival of cultural traditions might lead to a new phase of prosperity. There is hope that modern initiatives for environmental protection and sustainable development, aimed at restoring ecosystems and preserving cultural heritage, could form the foundation for future well-being. An aspiration for revival and prosperity remains an important aspect of the region's identity and cultural uniqueness.

In the 21st century, in an era of advanced technologies and developed civilisation, it is especially relevant to create all necessary conditions for preserving ancient culture and architectural monuments. It is my wish that the Aral Culture Summit can contribute to this momentous task. We require a comprehensive approach, including both scientific research and practical measures, initiated domestically and welcomed from overseas, for the conservation of biodiversity and ecological stability, and the restoration of cultural heritage sites. This is just the beginning. From now it will be important not only to draw attention to preservation issues but also to develop programs aimed at sustainable cultural resource management. In this way we help humanity recognise the need to protect the Aral Sea through culture, art, education, and science ensuring the wellbeing of future generations.

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Along the Amudarya by Faim Madgazin (1974). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Anatomy of a Delta

Fred Pearce

Environmental journalist Fred Pearce investigates the shifting watercourses of Amu Darya and Syr Darya rivers, a millennia-long chronicle of loss and restoration.

In the 1960s, Moynaq was one of the great seaside resorts of the Soviet Union: Uzbekistan's jewel on the shores of the Aral Sea. Then the tide went out, ecologically as well as politically. Today, visitors are rare, even with the introduction of regular flights from the Karakalpak capital Nukus. Standing on the promenade, you no longer see crashing waves, or fishing boats sailing into harbour with catches destined for sale from Riga to Vladivostok. What confronts you instead is a dry seabed stretching to the horizon.

The new desert, the Aralkum, extends across 68,000 square kilometres that the Aral Sea once occupied, an area the size of Ireland. It is plagued by dust storms, whipping up salt and toxic pesticides that were washed into the sea in times past by drainage from irrigated fields. But there is hope.

Among the sand dunes, work teams are busy planting trees they hope will resuscitate the land. Scientists have been busy too, unravelling the sea's complex hydrological history. What they found is that the Aral Sea has receded many times before – and that human activities, as much as nature and climate, have determined how and where water flows on these lands for more than a thousand years. The death of the Aral Sea is not new. And it has been rejuvenated before.

During the first half of the 20th century, the Aral Sea was the world's fourth largest inland sea. But it largely disappeared in the final years of the Soviet Union, as ever more water from the two rivers that once kept it filled were diverted to irrigate crops. What remains today is a salty sump that starts more than one hundred kilometres north of the Moynaq promenade. In between, the world's newest desert is perhaps the last large area of land on the planet that remains substantially unexplored except through the eyes of passing satellites.

The decline of the Sea has been described as among the greatest environmental tragedies of the 20th century, comparable in the global imagination to the Chernobyl nuclear disaster or the de-

struction of the Amazon rainforest. True enough. But the history of the Aral Sea basin shows that it is a surprisingly ephemeral body of water. One of the world's youngest and most variable inland seas, it has repeatedly waxed and waned.

Archaeologists exploring the sea bed and surrounding areas have found layers of sand and sediment containing fossils of aquatic organisms from the sea's past. They have also found the remains of peat from when it was a soggy swamp, as well as irrigation canals and the foundations of ancient monuments dating from the late Middle Ages. This chequered history reveals that the 20th century was not the first time human activities have emptied the Aral Sea – but also that the sea has recovered before. And so could again.

Most of the world's rivers flow out of mountains and into the ocean. But some flow into enclosed depressions in continental interiors, known as endorheic basins, where their waters collect in lakes and inland seas. Many of these water bodies are drying out as river flows are diverted by dams, among them the Dead Sea in the Jordan Valley and Lake Chad in the African Sahel. That is the case too in Central Asia, where two giant rivers flow out of the Pamir and Tian Shan Mountains of Tajikistan and Kyrgyzstan, towards the region's arid heart. They are the Amu Darya, which has a natural flow greater than the Nile, and the slightly smaller Syr Darya. Their changing destinations have been central to the region's human history for millennia — but it is increasingly clear that human history has also shaped the destination of the rivers.

Once, it was wetter. Five thousand years ago, at the height of the Holocene era, most of the water coming down the two rivers ended up in an Aral Sea that was much bigger than in recent times, stretching west almost to the Caspian Sea. But by two thousand years ago, with less rainfall coming down the rivers, the Sea had shrunk into three smaller pools. One, to the north, was fed by the Syr Darya. But the Amu Darya was split into two. One branch

fed the remains of the old Aral Sea, while the other took most of the river's water west along a channel called the Uzboy to an ancient lake known as the Sarygamysh, on the border between present-day Uzbekistan and Turkmenistan.

Then humans took a hand. This region was on the old Silk Road between Europe and Asia and was prospering: a meeting point between cultures that were isolated no more. In 985 AD, irrigation engineers barricaded the Amu Darya with the Gurganj dam. This stopped the flow down the Uzboy channel and diverted the water to irrigate fields that ultimately drained north towards the Aral Sea, causing the water level to rise.

But then some combination of a drying climate and the destruction of the Gurganj dam by Mongol invaders in 1221 restored most of the flow to the Sarygamysh. The Aral Sea dried out again until the late 16th century, when the restoration of diversions for irrigation restored its flow. By the beginning of the 20th century, the Aral Sea had greatly expanded, while its constant rival the Sarygamysh had turned again into a small sump.

But in the mid-20th century, the tables turned once again — thanks to further human interventions. Soviet irrigation schemes flourished, but this time they diverted much of the Amu Darya's water west along the newly dug Karakum Canal, which at 1,300 kilometres long and 100 metres wide, is one of the world's largest irrigation canals. The canal took as much as half the water in the river to cotton fields in Turkmenistan. But the inefficient irrigation systems ensured that large volumes of the water ended up draining into the Sarygamysh.

Today, the region's hydrology is almost back to where it was two millennia ago. The Syr Darya enters the old northern pool of the Aral Sea, now named the Small Aral, which since 2005 has been maintained by a dyke that stops any water flowing south towards the rest of the sea. While the remaining flow of the Amu Darya is split, with some still entering the Aral Sea, most is diverted down the giant Karakum Canal and ultimately into an anthropogenic version of the old Sarygamysh.

In this largely human-made landscape, what happens next? With full restoration of the Aral Sea itself ruled out for now, attention has turned to establishing vegetation on its former seabed and surrounding desert lands – to stabilize soils and sand dunes, reduce toxic dust storms and sustain livelihoods. Farm workers who tend cotton fields now spend part of the year planting drought- and salt-resistant trees, such as native black saxaul (Haloxylon ammodendron), on the desert that their crop has created.

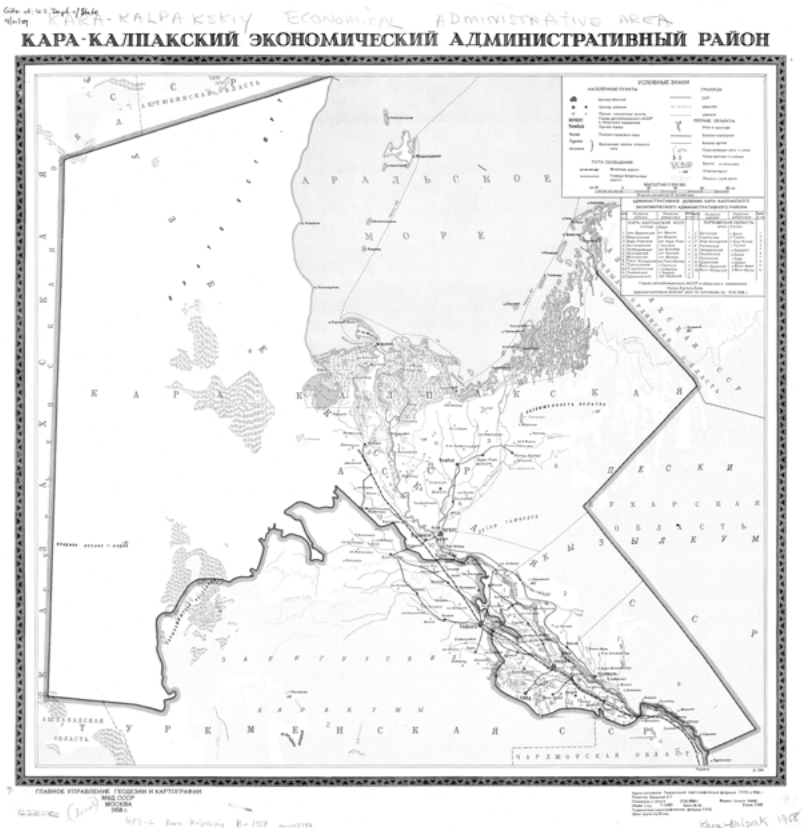
Government agencies say an area equivalent to a quarter of the dried-up seabed has so far been planted. It is not clear how many of these trees have survived the hostile conditions, especially with a run of hot, dry years since 2020. But some stands are mature enough to allow natural vegetation to develop in their shelter. Bird life has increased too.

Decisions await about where it is best to plant. Michael Glantz, a geographer at the University of Colorado, told the UN Water Conference in New York in 2023 that the top priority should be restoring the dried-out Amu Darya delta, a once-rich wetland where the last Caspian tiger was reported as recently as 1968, and where the majority of local people live. In any event, reforesting "would represent a major victory for the future of this inland delta and sea," Glantz said. It would show the world how other dried-out river deltas — such as the Colorado delta in Mexico, drained by American abstractions along the River Colorado — can be brought back to life.

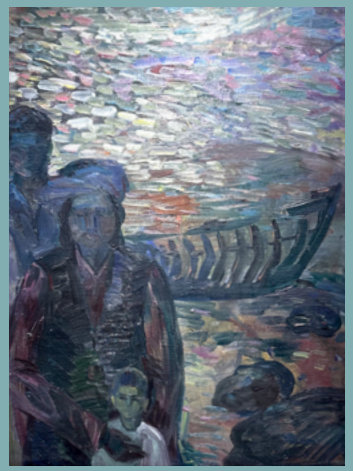
But trees need water to grow. And more changes afoot in this constantly changing landscape could threaten that. Some 16 percent of the Amu Darya basin is in northern Afghanistan. Rainfall on Afghan land typically contributes around a tenth of the river's natural flow, second only to Tajikistan. Now, for the first time, the country wants to extract a share of this water for irrigation.

I first visited the Aral Sea in 1995, to attend a UN-sponsored International Conference for the Sustainable Development of the Aral Sea, held in Nukus on the Amu Darya delta. Back then, there were high hopes that, with Moscow's irrigation engineers no longer in charge, water might return to the Aral Sea. The event ended emotionally, with local school children serenading the delegates for promising to bring back the Sea. "We want to see the sea, rather than sand," one student from the Pushkin School in Nukus told the assembly. It was never going to be that simple.

Fred Pearce is a freelance author and journalist based in London. A former environmental consultant at the UK-based New Scientist magazine, he writes regularly for the Yale e360 website. He has reported from 89 countries, and published 26 books in 28 languages, including When The Rivers Run Dry.



Karakalpak Economic Administrative District (1958)



People of Moynaq by Bakhtiyar Serekeev (1990). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Digital Heritage and Dark Tourism

Gai Jorayev

A scholar of heritage management at Macao University of Tourism and the president of ICOMOS's AeroSpace Heritage Committee, Gaygysyz (Gai) Jorayev argues that new ways of preserving humanity's past — from remote sensing and landscape modelling to improving the educational component of disaster tourism — could be pivotal in Karakalpakstan.

As cultural heritage specialists, my colleagues and I look at the Aral Sea region, and Karakalpakstan, with awe and fascination. From the magnificent remains of Ayaz-Kala and Toprak-Kala to the hillside necropolis at Mizdakhan and remote Beleuli — a toll point and desert sanctuary — the area holds some of the most interesting archaeological remains anywhere in the world. The unique local culture in the region was developed in harmony with this spectacular landscape. It is not surprising to see this place operating at the intersection of heritage and tourism today, where both the tangible and intangible, geological and cultural riches of the region, have become a part of the offering.

The area south of the Aral Sea has a long history of archaeology and heritage-focused research, with periods that were significant to the history of how monuments and artefacts are documented and studied. The Khorezmian Archaeological-Ethnographic Expedition, which was led by renowned Soviet scholar Sergey Tolstov and ran from 1937 all the way up to the 1990s, is certainly one of the best-known examples. The Khorezmian expedition, along with other scholarly endeavours over the last 150 years, has left behind archives and scientific records that the Central Asian Archaeological Landscapes Project — a multi-year international effort to create a geospatial heritage database for the region — is in the process of digitising and linking with modern-day research data generated using new computational tools.

This archaeological research continues today with more pronounced international interest. Yet global research collaborations are only possible when anchored by local support. The advantage here is that Karakalpakstan has a unique local research community, one of a kind domestically and worldwide. Institutions such as the Nukus Museum of Art — known informally as the Savitsky Museum — help to sustain that research community, but so do clusters such as the Karakalpak Humanities Scientific Research Institute under the Karakalpak branch of the Uzbekistan Academy of Sciences. The local academic research community, which includes talented archaeologists, ethnographers, and other researchers invested in

studying and preserving aspects of culture, landscape and ecology, provides the essential linkage which makes current research future-oriented, and lends it additional weight.

According to official tourism surveys, a majority of the growing number of international visitors to Uzbekistan select it as their destination for its heritage assets. This finding becomes particularly meaningful when considered in the context of the environmental changes that the Aral Sea region has undergone over the past 100 years. Within the frameworks for preservation and heritage management set by international organisations such as ICOMOS and UNESCO, it is a well-established norm to highlight the contribution heritage offerings can make to bring about transformative change. We now see an increased focus on climate change as an animating factor in which specialised cultural knowledge will be required to enable adaptations and mitigations. The Global Research and Action Agenda on Culture, Heritage and Climate Change, co-sponsored by the IPCC, UNESCO and ICOMOS in partnership with IUCN (International Union for Conservation of Nature) and ICLEI (Local Governments for Sustainability), argues that heritage and cultural practices must act as a bridge between a plurality of knowledge systems and serve as entry points for climate action.

In archaeology and heritage management, we work in multidisciplinary teams to integrate methods from the environmental sciences, geography and ecology in addition to existing overlaps with anthropology, ethnography and sociology. In my view, when looking at Central Asia, with its large-scale archaeological remains and cultural landscapes, the integration of technology in the form of remote sensing, landscape modelling, and the inclusion of big data in our toolset for managing humanity's past is instrumental.

Technology and the convergence of disciplines allow us to study heritage sites in a non-intrusive manner — a sharp contrast to the large-scale and often destructive excavations of a bygone era — but they also help us analyse incoming threats. Aerial photographs

taken during the 20th century can be digitised and combined with satellite imagery from the 21st. The addition of drone-based aerial mapping allows us to create a change-over-time view that makes long-term dynamics clear. It also helps us to understand what adaptation measures local communities had been taking to try and cope with environmental changes in the recent past.

The impact of this type of work is already feeding into climate change-related discussions and will become more visible as interest in the work grows. As a lightning rod, it can make cultural tourism more progressive, increasing its educational and awareness-raising potential, while on a more pragmatic level, it can support tourism infrastructure planning. And yet these technologies must be deployed in tandem with another set of methodologies — those of a more embedded kind, led by local scholars. We should employ methods of researching, understanding and engaging through local and community-led initiatives to address issues in this specific geographic area with direct contributions into policy development.

As scholars of heritage studies we talk at length about the insights and economic power generated by heritage and culture, and their potential usefulness to climate adaptation and mitigation. In this we must not fail to take seriously the day-to-day experiences and existing adaptations taken over the last several decades by people on the ground. I commend the Aral Culture Summit for placing culture front and centre. The promotion of Karakalpakstan's past and future, and efforts to preserve its cultural riches, are certainly going to be challenging, but will surely prove to be a worthwhile endeavour.

Recent research in tourism and heritage studies encourages us to reconsider the form of tourism appropriate to Karakalpakstan. Internationally, at least in the level of written literature, it is fashionable to use terms such as "dark tourism" or "disaster tourism" to describe visits to destinations with challenging pasts and ongoing circumstances. The most visible examples might

include the museum at Auschwitz-Birkenau in Poland, or Pripyat, site of the 1986 nuclear disaster in Ukraine. Although these terms may fail to capture the complexities of visitors' motivations, and do not always respect the sensitivities of host communities, they help explain that not all tourism offerings are celebratory in nature.

Tourism management plans could adapt their visitation policies, navigation, interpretation and presentation to reflect more concretely on the changes in ecology, landscapes and culture in the region. Expeditions to remote yurt camps and the shores of the remaining sea could be accompanied by interpretative materials explaining the impact of the disaster on the region and its people. The visitors who come to Karakalpakstan looking for culture, music and arts — as with, for example, the festival Stihia held annually in Moynaq — could be provided deeper narratives of a difficult recent past through culture. The technological tools and data that we use to build up our understanding of the catastrophe and its implications for people today can and should be made available for wider use.

The fundamentals of Aral Sea regional tourism should be reoriented — to create a destination brand that fully respects environmental change and showcases the diversity of local culture and cultural adaptations. This type of thoughtful tourism will help shape the questions that humanity needs to tackle in the 21st century.

From a cultural heritage management perspective, examining tourism alongside the public discourse helps reframe current challenges in heritage practice. By interpreting heritage sites within the context of rapid, fundamental change, observing developments in technology, global development and on the ground, we can develop innovative approaches to conservation and heritage. This is particularly relevant for the region's distinctive mud architecture — which extends from the fertile agricultural lands of Ellikqala District to the breathtaking Ustyurt Plateau — a singular building tradition renowned for its indigenous character. The same consideration applies to broader cultural landscapes and

their relationship with local communities. We must examine how environmental and social changes affect people's connections to their land, from local shrines and pilgrimage sites to areas of outstanding natural beauty. By approaching tourism planning with an understanding of these ongoing changes and challenges, we can establish a foundation for more nuanced discussions about heritage preservation.

Dr Gaygysyz Jorayev is a cultural heritage researcher and university lecturer with extensive expertise in contemporary heritage management, cultural tourism, and digital heritage. He is a co-lead of the multi-year, transnational Central Asian Heritage Landscapes (CAAL) project.

Kum-Baskan-Kala (1964). Khorezmian Archaeological-Ethnographic Expedition of the Academy of Sciences of the USSR

Drying nets at the Aral Sea by Kdyrbay Saipov. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

The Lake Is a Time Machine

Anson Mackay

Palaeolimnologist Anson Mackay reveals how scientists use the former Aral Sea bed as a time machine to study ancient ecosystems, drowned settlements and a changing climate.

Everything that disappears leaves a trace — a trace of what once lived, a trace of the conditions that nurtured the living. But what has disappeared and is hidden from sight can also be rediscovered. And what has vanished can sometimes return. Using novel scientific approaches and techniques, the environmental history of the Aral Sea is recreated through the traces left behind in the landscape — specifically, in lake sediments which have built up over millennia. These sediments form an archive, a memory, if you like, of how much salt the water of the Aral Sea has contained (its salinity) and in the diversity of a place that once teemed with plants and animals. Although this memory remains incomplete, it offers us a window into how the fortunes of the Aral Sea have ebbed and flowed, influenced by changes in climate and the human societies that have lived around it.

The environmental catastrophe that has drastically reduced the Aral Sea since the 1950s is well documented and largely understood. Water was diverte from the lake to intensively irrigate of cotton plantations in the surrounding deserts. The scale of water diversion led to a decline in the volume of the lake by over 90 percent and ended all economic activity that depended on fishing. It also led to a sharp decline in the diversity of life in the lake as its waters became more and more salty. In 2014, satellite images revealed that the largest basin of the Aral Sea had completely dried up for the first time in its recorded history.

However, the history of the Aral Sea is complex. Several lines of evidence reveal that, over the past 10,000 years, the lake has actually shrunk to very low levels several times (these are called "regressions"), and that these levels of lake shrinkage may have been as low as the regression we have seen in modern times. The causes of these previous regressions are still debated, but they usually involve the interplay between geological movements of land, climate change and the activity of humans.

Evidence for previous Aral Sea regressions comes from many different disciplines, including geomorphology, archaeology and palaeolimnology. For example, from a geomorphological perspective, we can actually see the past shorelines of the lake at different heights throughout the Aral Sea basin. From these past shorelines, we can work out when, during the past 10,000 years, the lake levels were either high (i.e. the lake was more than fifty metres above sea level) or low (when it was only 30 metres below sea level). From an archaeological perspective, low lake levels today have revealed abandoned settlements that were once drowned under water. These have been dated to the late Middle Ages (about six or seven hundred years ago), showing that during the 13th-14th centuries, the northern region of the main basin of the Aral Sea must have been dry enough that people could settle there.

Palaeolimnology refers to the study of layers of sediment that fall to the bottom of a lake, and how we use the information in these sediments to reconstruct the lake's history. These mud (or sedimentary) strata are a kind of natural archive, recording, through time, not only changes in the lake, but far beyond it. The Aral Sea's catchment area is vast — spanning over 1.7 million km^2 through the river systems that feed it. Changes in the sediments of the lake can tell us about changes in the catchment too. Sediments can even tell us about the atmosphere above the lake, and what falls through the air into its depths. The deeper the lake sediments — the further back in time the record goes. This is the palaeolimnological perspective, which I will focus on here.

Lake sediments consist of a matrix of inorganic (e.g. sands, silts and clays) and organic materials (e.g. tiny biological fossils). These biological microfossils may be the remains of minute plants like diatoms and dinoflagellates, both kinds of single-celled algae, or animals, such as water fleas, midges and tiny crustaceans called ostracods. These all once lived in the lake. In arid and semi-arid

regions, water levels in lakes such as the Aral Sea are very sensitive to even minor disruptions to water input. These disruptions might be from abstraction of the water by people for agriculture, or perhaps a decline in rainfall. They could also come from the sun and wind increasing the amount of evaporation from the lake surface.

All of these can cause lake levels to fall, and when that happens, the concentration of salts in the water increases and the lake becomes more saline. That has a direct effect on the chemicals in the water, as new chemical reactions take place in both the water and the sediments. These changes in salinity also have a direct influence on how well different plants and animals function in the new environment, with some being able to tolerate higher salinity far better than others. Species that are tolerant survive and increase. Those that are sensitive will decline or even die out completely.

By looking at the chemical composition of lake sediments and the proportions of microfossils preserved in them, we can gain real insight into how the nature of the Aral Sea changed through time. And there are other ways in which this unconventional way of viewing history has helped us understand the changing levels of the Aral Sea. The first example involves sediments containing minerals such as gypsum. (The events I am about to describe have all been dated using radiocarbon dating.)

Gypsum forms naturally when water salinity is very high, and in the Aral Sea high salinity suggests very low lake levels. Since gypsum is a calcium mineral, we can measure concentrations of calcium in the sediment and work out how saline the lake was at different periods.

Since the early 1980s, Russian scientists have used low levels of gypsum in sediments to argue that the Aral Sea remained at high levels for much of the past 4,000 years. However, several sediment layers containing high concentrations of gypsum have also been

found, including one around 3,600 years ago. This suggests that lake levels fell and seem to have persisted at a low level for between 100-200 years before rising again. Archaeological records also reveal that around 3,900 years ago, irrigation along the Amu Darya started in earnest, and so there is a strong possibility that this early regression was influenced, at least in part, by human activity.

Another example is a major regression phase around 2,000 to 1,600 years ago. The evidence for this comes from multiple sources (including diatoms, dinoflagellates, ostracods and calcium concentrations in the sediments) all indicating high levels of salts in the water.

For example, scientists have found the fossilised diatom *Cyclotella choctawhatcheeana* in abundance in the sediments next to where gypsum is deposited. This diatom species is highly tolerant of extreme salinity. There is other evidence too, from tree rings and the sediments of other lakes that also show that this was a cold and dry period in the region.

Cold and dry periods tend to mean lower lake levels. Archaeological evidence also shows extensive irrigation in several of the Aral Sea river deltas around this time, which would have further reduced the amount of water that flowed into the lake. All of these together are strong reasons to believe that there was a significant lowering of lake levels. After about 1,600 years ago, the water levels in the Aral Sea rose again. This was most likely due to the invasion of the nomadic Huns, who destroyed irrigation structures as they plundered the land, allowing water to once again flow freely into the lake. That there were lake level increases (known as "transgressions") is supported by decreases in the proportion of fossils of the salt-tolerant diatom, *Cyclotella choctawhatcheeana*.

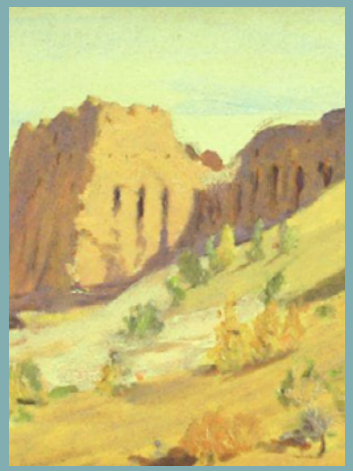
Very low lake levels in the Aral Sea also occurred during the Middle Ages, about six to seven hundred years ago. During the current regression, a group of old settlements in the northern Kerderi region were exposed and excavated, including two mausoleums of particular archaeological significance.

It appears that a severe regression took place between AD 1195 and 1355. Again we can see the occurrence of a gypsum layer around 1250, and the microfossils found in that layer are those that appear when the lake is highly saline, including *Cyclotella choctawhatcheeana* and another salt-tolerant diatom called *Chaetoceros wighamii*. The cause of this medieval regression was probably tied to climate change and exacerbated by human impact. It seems there was an arid period with an excessively dry climate across the region: other records indicate, that Lake Issyk-Kul in Kyrgyzstan also experienced lower water levels.

In Central Asia, this period is notable for immense social upheaval. It is the period associated with the violent expansion westwards of Genghis Khan and the Mongols, destroying the irrigation infrastructure around the Aral Sea. It appears that, during an already arid period of climate, human impact further drove lake levels down to a historic low for at least a century. This then allowed settlements to develop and agriculture to take place on the exposed seabed. However, as with previous regressions, it wasn't long before these settlements were submerged, as the Aral Sea entered a new transgression phase and the water level rose again.

In this brief picture of the lake in deep time, I hope I've given some sense of the continual changes that the Aral Sea has undergone over the past few millennia. I hope I've also shown how we can use the techniques of paleolimnology, studying the layers of ancient memory that lie in the depths of the lake, in conjunction with archaeological and geomorphological evidence, to draw a picture of not only the growth and shrinkage of the Aral Sea, but also of the subtle interactions between climate change and human society. These sorts of interactions shape us, as much as they are shaped by us, in the past and in our modern world too.

Anson Mackay is Professor emeritus at University College London. They are a Palaeolimnologist with extensive experience of working on lakes and diatoms throughout Central Asia.



Southern towers of Angka-Kala on a gloomy day by Igor Savitsky (1953).
Courtesy of the State Museum of Arts of the Republic of Karakalpakstan
named after I. V. Savitsky

Who Were the Khwarazmians?

Richard Foltz

Historian Richard Foltz describes
ancient life in the Amu Darya delta,
a world of horse-backed raiders, polymaths,
scribes and acolytes of the divine priest,
Zarathushtra.

The historic territory known as Khwarazm (Chorasmia), encompassing Karakalpakstan, as well as adjacent areas of Uzbekistan, Turkmenistan and Kazakhstan, continues to suffer from the drying up of the once great Aral Sea. Yet, for over two millenia — until modern times — it was an advanced and highly productive region, frequently positioned at the crossroads between Western and Eastern civilisations.

Early proto-Iranian-speaking nomads from the southern Urals, associated with the Andronovo culture which extended across the central Eurasian steppe as far east as the Altai Mountains, moved into the area during the second millennium BCE. Alternately trading with or raiding the settled peoples of the Oxus River basin — today the Amu Darya — these "Aryans," as they called themselves (literally "Noble Ones"), were ancestors to the Massagetae who, under Queen Tomyris, defeated and killed the Persian Empire-builder, Cyrus the Great, in 529 BCE.

By the beginning of the Common Era, the Massagetae had moved westward into the Pontic–Caspian Steppe, from which, now known as the Sarmatians, they raided parts of Eastern Europe. A century later, written sources begin to refer to them as Alans (again, "Aryans", through a phonological shift of -ry- to -l- typical of east Iranian languages). Together with the Germanic Goths, they were the scourge of the Roman Empire, which struggled to counter their highly skilled cavalry. Eventually placated by the Romans and settled on estates throughout central France, Spain and northern Italy, the Alans can be credited with introducing horses and equestrian culture into Europe, and survive today as the Ossetes in the Central Caucasus.

The Massagetae were but one of many Iranian-speaking tribal groups of mounted archers, feared by both Greeks — who referred to them collectively as "Scythians", from the Indo-European root *skuda**, "to shoot" — and Persians alike, for their redoubtable combat skills and unconventional battle tactics. The Persians called

them "Sakas". For centuries, Saka bands conducted repeated raids across Central Asia and into the Indian subcontinent, establishing a number of Saka "kingdoms". Their connections with India exposed them to Buddhism, and by the 3rd century CE the Saka state based in Khotan (in today's Xinjiang province of western China) had become one of the great centres of Buddhist learning.

Khwarazm, on the other hand, is home to some of the earliest manifestations of a purely Iranian religion, Zoroastrianism. The origins of this faith — which continues to be practiced today by about 69,000 followers in India, the Parsees ("Persians"), a few thousand in Iran, and a few thousand more throughout their global diaspora — remain obscure and contested. There is no solid evidence that could enable us to pinpoint either the precise time or location of its founding figure, a hereditary priest by the name of Zarathushtra.

Known in the west as Zoroaster, his Iranian name means "owner of many camels", reflecting that he lived in a pre-cash society where payments for services (such as priests performing rituals) were given in the form of livestock. Unfortunately his biography as preserved in the Zoroastrian tradition, which places him in Azerbaijan "258 years before Alexander", is unlikely to be historically accurate. Rather, by combining artefacts from the archaeological record with a linguistic analysis of the oldest parts of Zoroastrianism's sacred text, the Avesta, it would appear that Zarathushtra lived much earlier and farther east, somewhere in southern Central Asia during the latter part of the second millennium BCE.

The Avesta, which was transmitted orally for over fifteen centuries until finally being written down around the 6th century of the Common Era, was composed in two archaic east Iranian dialects. These are the earliest surviving examples of Iranian language, and are very closely related to the Sanskrit of the Rig Veda, a set of Sanskrit hymns and one of four canonical texts of Hinduism, evidence that the text originated in Central Asia during the second millennium BCE and not in India as is commonly supposed.

Zarathushtra's teaching, expressed through a set of hymns called the Gāthās ("songs"), is considered to represent a radical reform of the nomadic Aryans' ritual belief and practice, elevating a single deity, Ahura Mazda, to a supreme position. For this reason, Zoroastrians today like to claim that theirs is "the world's first monotheistic religion". As Zoroastrianism developed, however, it is clear that rival deities from the original Aryan pantheon, which in India was incorporated into the tradition now known as Hinduism, were not eliminated. Instead, a number of them — most notably the god of spoken contracts, Mithra, and the goddess of the waters, Anahita — were merely subordinated to Ahura Mazda while retaining their own cults, rituals, and mythical personalities. In Central Asia, Anahita was assimilated with the Mesopotamian goddess Inanna as Nanai, the favoured deity of the Khwarazmians' eastern cousins — the Sogdians, a mobile, mercantile people who came to dominate the trade networks we now call the Silk Road.

Interestingly, it is in the Avesta that we find the first mention of the geographical term Khwarazm (Yasht 10, the Hymn to Mithra, stanza 14), dating to the early 1st millennium BCE. Later Zoroastrians even considered Khwarazm to have been the original homeland of the Iranians, called *Airyanem Vaējah*, "the Land of the Noble" (Middle Persian *Ērān-vēj*, modern Persian *Īrān*), although the oldest texts, the Gāthās, more closely reflect the Aryans' prehistorical southeastward movements. In the Gāthās, their ancestral territory is described as having two months of summer and ten months of winter, as one can find in parts of the Ural region. In a much later text, the Bundahishn, which relates the Zoroastrian creation myth, we find a land where summer lasts seven months and winter five, resembling more closely the milder climate of Khwarazm, which was far more agreeable before the loss of the Aral Sea in the 20th century.

The same text states that one of the three imperial Zoroastrian fire temples of the Persian Sasanian Empire (224-751 CE), Adur

Farnbag, was originally located in Khwarazm before being transferred to Persia. Zoroastrians revered fire as an earthly symbol of Ahura Mazda, and did not allow their sacred fires ever to be extinguished. The famous Fire Temple of Baku in Azerbaijan, was built by Parsees from India during the 18th century.

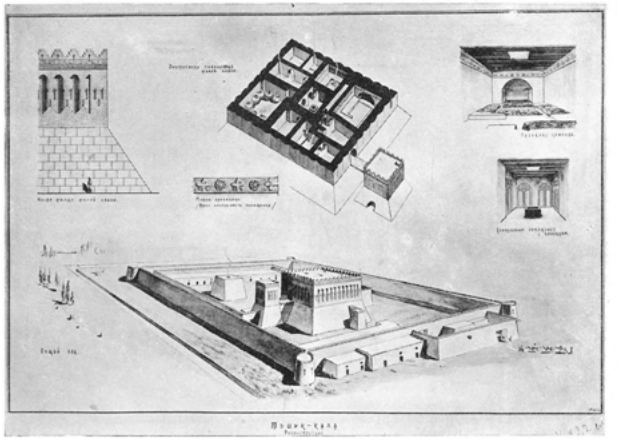
Another well-known feature of Zoroastrianism was their funerary rites. The deceased were exposed in hilltop "towers of silence", called *dakhmas*, where the bodies would be picked clean by vultures and the bones bleached clean by exposure to the sun. Thus "purified", the bones would then be collected and placed into ossuaries — stone or earthen boxes which were often decorated with images from Zoroastrian mythology. The Sogdians developed an elaborate and highly sophisticated tradition of ossuary art, which is found from Central Asia all the way into China. Zoroastrian ossuaries have been found in Khwarazm as well. The famous Tower of Silence at Chilpyk, near Nukus, has been dated to around the beginning of the Common Era, and has preserved much evidence of Zoroastrian burial traditions.

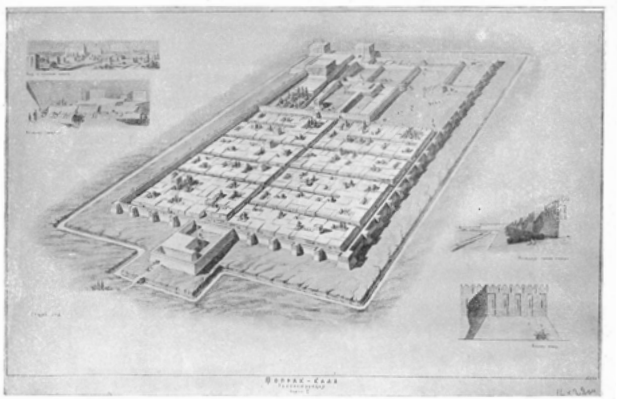
Khwarazm had its own calendar throughout the first eight centuries of the Common Era — up to the Islamic period. The fact that it was based on the Zoroastrian calendar attests to the enduring importance of this religion in the region. While the Arab conquest of Khwarazm dates to 712 CE, local traditions remained prevalent for at least another century. The great medieval polymath Abu Rayhan al-Beruniy (973-1050), who was a native of Khwarazm, roughly corresponding to Karakalpakstan in modern Uzbekistan, included much information about the pre-Islamic Khwarazmian culture and language in his various written works (although unfortunately no copy of his regional history survives). According to al-Beruniy, when the Arab army led by Qutayba ibn Muslim overran Khwarazm, they "swiftly killed all their Zoroastrian priests and burned and destroyed their books, until only the illiterate remained, and hence the region's history was mostly forgotten."

Around 25 centuries before the present age, Proto-Turkic peoples from northeastern Asia established themselves in the area of the Altai Mountains (today in Mongolia), where they began a long process of cultural and genetic mixing with the Indo-European Iranian speakers from further West. Turkic speakers continued to move westward in successive waves over the next two millennia, slowly displacing Iranian languages even as they absorbed many aspects of Iranian culture.

The decisive linguistic Turkicization of Khwarazm began with the Ghaznavid conquest in 1017 CE, and the Khwarazmian language, which was closely related to Sogdian, and is confirmed by inscriptions on coins and various personal objects as well as by some Arabic dictionaries, had completely given way to Turkic by the end of the 13th century. While the region today is considered part of the Turkic world, its rich heritage attests to a long and productive process of cultural symbiosis and synthesis between the Turkic and Iranian peoples of Central Asia that spans well over two thousand years.

Richard Foltz (PhD, Harvard) is Full Professor in the Department of Religions and Cultures at Concordia University in Montréal, Canada. The author of seven books and over one hundred scholarly articles, he has traveled to Uzbekistan several times from 1990 to the present.





1. *Teshik-Kala. Reconstruction* (1948). Source: Old Khwarezm by Sergey Tolstov
2. *Toprak-Kala. Reconstruction* (1948). Source: Old Khwarezm by Sergey Tolstov

Kazakh-Darya, Yurts on a grey day by Igor Savitsky. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Savitsky and the Restless Sea

Aygul Pirnazarova

A former cleaner at the Nukus Museum who rose to become its Head of Ethnography, Aygul Pirnazarova worked closely with Igor Savitsky, the renegade electrician, artist and collector who used Nukus's "advantage" as a closed city in the Soviet Union — far from Moscow and Tashkent — to display work by dissident artists outlawed under Stalin. He also collected everyday artefacts the Karakalpaks no longer prized, as Pirnazarova explains.

It's actually a pretty funny story. In 1974 I came to work at the museum as a cleaner. One evening I was on the second floor, washing the floors, when I noticed that some of the exhibits seemed familiar. There was a *qızıl kiymeshek* [a ceremonial headdress worn by Karakalpak women], a *jipek jegde* [silk robe] and plenty of other things I recognised.

Representatives from outside Karakalpakstan would often walk by them with guests. They would point to an artefact, maybe say its name, with no explanation, and move on. Seeing this I would put the mop aside and explain a little. "This is *qızıl kiymeshek*," I explained. "It was worn by brides and comes in three parts. My grandmother had one."

When Savitsky saw this, he told the head of the department, "There's a girl walking around in the hall. We need to teach her about our field." In July 1976 I was transferred to the position of invigilator. Three years after that I was transferred again to the department of applied folk art as a junior assistant. Later I enrolled at the university and graduated through correspondence studies — all while raising my four children. I worked in various departments. Since 1985 I have been the head of the department of applied folk art, which was later renamed the department of ethnography.

Back then we didn't have much space. One hall was dedicated to world masterpieces. Two halls featured folk applied arts. Another was for sculptures, archaeology and ethnographic objects, and there was a long corridor filled with paintings. At that time, to be honest, I didn't understand the meaning of the words avant-garde — to me they were just landscapes. Savitsky explained that these were precious paintings by Russian and Uzbek artists, but it was only much later that I began to understand their significance. The paintings were hung close together because Savitsky wanted to show as many items as possible.

Savitsky first arrived in Karakalpakstan as part of Sergey Tolstov's Khorezm Archeological and Ethnographic Expedition [which

uncovered much of Khwarazm]. He was struck by the *kiymesheks* [traditional headdresses] he saw lying around in homes, no longer used in everyday life and being played with instead by children. People saw these items as remnants of the past. Those who wore them were considered "enemies of the people." Carpets, jewelry and other items were simply ignored. The *kiymesheks* were rolled up and set aside or given to children instead of toys. Over time, Savitsky became a collector. People in the villages called him the "collector of second-hand goods." [He was also known as "the widow's friend" for taking the work of Russian and Uzbek dissident artists to Nukus].

When he showed these pieces in Moscow, people couldn't believe it. The combination of color, craftsmanship and imagination was impressive. Savitsky was particularly drawn to Karakalpak national ornaments: zoomorphic, plant, and geometric patterns. These patterns were embroidered into women's clothing and indicated the area from which a girl originated. If the local people were engaged in farming, the patterns were plant-based; if they were herders, they were zoomorphic; if they were fishermen, the patterns reflected water, rivers and the sea. Over time the interest in Karakalpak life increased. Visitors would watch how I went to the garden, baked flatbreads in a tandyr [clay oven], and asked me questions. When Amanda Pope made her movie about the museum [*The Desert of Forbidden Art*, 2010] I traveled with her through many districts, meeting people.

People like Savitsky are born perhaps once every hundred years. You could call him the "Tretyakov of Karakalpakstan" [for the 19th Russian collector and philanthropist]. He lived for the museum — sparing neither his health or himself. He was given two apartments by the state and gave both of them to museum staff. He fully supported his artists. He inspired them. He bought their works. He understood each of us and would talk to every staff member. He empathised with us. He even knew everyone's favourite dishes. He dedicated his life to Karakalpakstan. That's why, on his tombstone, we wrote: "Everything fades, everything

disappears eventually, only the stars remain forever" which is a line from the Karakalpak poet Ulmambet Khojanazarov. He is buried in the Russian cemetery.

People recognise me on the street. They call me "Museum Auntie." My department has 9,672 exhibits. All of them are dear to my heart because they've all passed through my hands. When I see car license plates I imagine museum artefacts. For example, 5971 is the *saukele*, a traditional Karakalpak bridal headpiece from 1916. Then 4463 is *kok koylek*, a blue wedding dress. I mentally connect the license plate numbers to the exhibits. Some other favourites are the *tobelik*, a headpiece; *haikel*, a women's jewelry chest decoration and *tumar*, a protective amulet.

We preserve everything carefully. We store some items horizontally, placing acid-free paper between them. We wear gloves. We conduct inventories. We record which exhibit is in which shelf of which cabinet under which number. Everything is documented. Everything is reflected in the catalogue.

There is a wave motif: a design that was created to represent the sea. There's also a fish eye pattern that's very popular. Through these designs, the embroiderers wanted to reflect their lives spent on the shores of the sea. There's another called *espe* — the restless sea. When the sea is agitated, wave crests form, and they wanted to reflect this in their patterns. They were able to pass this down to us, and in turn, we must pass it on to future generations.

The fate of the Aral Sea is intertwined with the fate of the people here. Today they mourn the dried-up sea, but they still have hope. We have artefacts that we can be proud of. The Aral Sea and delta may be drying, but we will survive, and we will show the artefacts that remain to the world. The Aral Sea is not only a source of pain but also of joy.

Aygul Pirnazarova is head of ethnography at the State Museum of Arts of the Republic of Karakalpakstan named after I.V. Savitsky. She began her career at the museum in 1969 under the guidance of the museum's founder. For her contributions to the development of culture and the preservation of ethnographic heritage, Aygul Pirnazarova has received numerous awards, including the "Dostyk" Order and the "Shukhrat" Medal.

Igor Savitsky

Early spring by Victor Ufimtsev. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

A Forest in the Desert

Bakhitjan Khabibullaev

A former diplomat and trade minister, today Bakhitjan Khabibullaev directs the Innovation Center for the Aral Sea Basin in Nukus, a scientific node for global cooperation on questions of soil science, high salinity, climate change-induced threats and headquarters for the grand ambition to prevent further erosion by planting a forest of saxaul on the former seabed.

The Aral Sea disaster is one of the largest environmental catastrophes caused by humans. Its scale is colossal and it remains a tragic chapter in our history. Its main cause was the uncontrolled use of water resources, and unbalanced agricultural and water management policies, especially during the Soviet era. Changes in the global climate — rising temperatures and adverse weather conditions — manifest in this region at twice the global average. While the world's average temperature rise is between 1-2 degrees Celsius, here things are happening much faster, accelerating desertification. Salty dust and toxic sands from the new desert spread across Central Asia. These particles are dispersed by the wind over vast distances, causing the degradation of distant agricultural lands, which negatively impacts crop yields and the living conditions of ordinary people.

I am from Karakalpakstan, but the first time I visited the dried-up Aral Sea I was actually there as a translator with a German project which hoped to green parts of the former seabed. They were just getting started planting saxaul trees and other plants. Since then I have fallen in love with the problem, strange as that might sound. I was one of the first diplomats of the independent Republic of Uzbekistan. I worked in Frankfurt for almost three years, then at the Uzbek embassy in Berlin and later in Kazakhstan. But seeing what our scientists and partners were doing in Karakalpakstan, trying to plant trees and restore nature, I decided to stay. I became an advisor and later a project coordinator.

As part of the same project, in collaboration with colleagues from Germany, I implemented several initiatives related to greening, restoring horticulture, fish farming and other environmental programs in the Aral Sea region. When our president, Shavkat Mirziyoyev, came to power in late 2016, he started inviting people with international experience to work in the country. In 2017 I saw the speech he gave, outlining his political directives and upcoming reforms. I told myself that if I were invited to participate, I definitely would. A few weeks later, I received an invitation and was given an interview. That's how I became the Deputy Chairman of the Council of Ministers and later the Minister of Investments and Foreign Trade. I held this position for five years. Now I head the International Innovation Center of the Aral Sea Basin.

Twenty years ago, when we began, it was difficult to speak openly about the many issues connected to the Aral Sea crisis. But since the president initiated the large-scale program to green the seabed, wider attention to the problem has increased. We now work with multiple international partners. For example, we are working with the Dubai Development Fund on drought-resistant agricultural crops. These are halophytes, plants adapted to salty conditions, and we selected several varieties which we received in seed form this year. They are drought-resistant and yield high crops, both in terms of green mass and feed for livestock.

We're also working on three projects with the German Society for International Cooperation. One is the creation of licorice root plantations. Licorice root is one of the most valuable crops in our region, with an annual export value between $140-150 million. China was once a major exporter, but their wild reserves of licorice root have all but disappeared. We've developed a new method of propagation using seeds, rather than using old roots, as was done before.

We have launched a gardening school in Nukus where we teach modern plant cultivation. We have brought various root systems from Europe, including dwarf trees. Because the groundwater in our region is so salty, when you try to grow tall trees their root systems reach down to deep levels and the water dries out the plants. That's why we suggest using dwarf plants, whose root systems don't go deeper than 1.5 metres. You can plant 400 trees per hectare with a regular root system, but with dwarf trees, you can plant up to 3,500, and they start bearing fruit much faster too. These plants start bearing fruit in two or three years, which is much faster than local varieties, which only start producing between seven and ten years.

The school teaches young people, and those who want to get involved in gardening, geographically appropriate methods of selection and preparation. We share all the secrets of plant care, drip irrigation and other modern gardening methods, which allows participants not only to grow plants but also to create a sustainable agricultural system that yields a good harvest. Sesame is another agricultural crop that we've been working on. This plant requires very little water, making it ideal for the Aral Sea region. Our hope is that we will be able to develop local varieties that our farmers can use.

In the future it will be difficult to grow crops that require a lot of water and many regions around the world are facing the same problem. In this context, halophytes are increasingly important. This year we gathered over 60 species of such plants. When the soil becomes unsuitable for farming, salt-resistant plants help restore it over the course of two or three years by extracting salt from the ground. We're sending these plants to Russia for agricultural use. We also plan to continue cooperating with key partners like the Xinjiang Institute of Geography and Ecology. This year we received seeds from China and some from America. We don't get them in large quantities, maybe 200 grams. But if they adapt well, in a few years we can receive several tons.

I've worked with a lot of farmers in this region. If you just present them with experiences from overseas, that's one thing, but when you show it in the field — it's completely different. For each project, we have planted examples in the test fields at our center. We demonstrate everything to the farmers ourselves. Our center was created specifically for this purpose.

Everything takes time. The whole process requires patience and a lot of preparation. One cannot jump to conclusions. We want to understand how much harvest can be obtained with this cultivation method, and what results each crop will yield. This year there were no temperatures near -40 degrees celsius, but it

happens. When it does we can lose an entire crop. Conducting scientific research takes several years. Mistakes can be made, and the conclusions might be wrong, so it is important to observe the crops for several consecutive years. Some of the projects we have done in previous years are now being adopted in other regions. This makes us very happy as it saves them time.

So far we have afforested 500,000 hectares of the former seabed. We're not only planting saxaul, but tamarisk, capsicum and others. In total about 10 species of desert plants. But saxaul is the dominant species, revered for its resilience and ecological importance in this region. It might sound simplistic, but you shouldn't start a project if you already know it can't be implemented. There are certain areas where vegetation won't grow at all because the salinity is too extreme. If you know plants won't grow, you shouldn't waste money and time. Before starting any afforestation or agriculture project, extensive research is necessary to understand prior efforts in similar conditions.

I've been to many countries, but I think the Aral Sea region is one of the most challenging places in the world. If a plant can grow here, it will definitely grow elsewhere. And yet, growing *anything* is hard work. These are saline landscapes, but I think, over time, the Aral Sea region will change. In the future it will become more harmonious and adapt. The Aral Sea should become a symbol for humanity, a reminder of how important it is to treat water resources with care. One shouldn't change riverbeds and natural conditions without proper preparation — but things do need to change.

It's important to work with children and young people so that they take ecology seriously. Last year, our center ran a tree-planting initiative with several schools, kindergartens, hospitals and health clinics. At the center we grow over 60 types of trees and this free activity brings a lot of benefits to people. I'm not pessimistic about the future. In part this is because methods for adapting to scarce water resources are already well known. For example,

Israel has successfully reduced its water extraction significantly. And we currently have much more water than they do — between six and seven billion cubic meters compared to their two billion. We need to move forward and switch to new technologies that will improve water supply systems. This includes the use of drip irrigation, as well as the implementation of the latest medical and engineering solutions.

Climate change is happening globally. We can exchange experiences with one another. Scientists from across the world are interested in our region because it is rich in unique conditions, even if they are extreme. In places like this, it might seem impossible to grow much, but in fact, despite the high salinity, plants can still grow. In general, it is my hope that humanity will realise that sharing knowledge and experience is key to problem-solving.

Bakhitjan Khabibullaev is a former diplomat and Minister of Investments and Foreign Trade who now directs the International Innovation Center for the Aral Sea Basin under the Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan.

Jugari harvest by Bekmukhan Toguzbaev. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Boats by Faim Madgazin (1978). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Two Poets, Two Daughters

Malika Zhumamuratova
Ayzhamal Yusupova

Malika Zhumamuratova, professor of journalism at Berdakh's Karakalpak State University, and Ayzhamal Yusupova, director of the State Museum of History and Culture of the Republic of Karakalpakstan. Ibrahim Yusupov, Ayzhamal's father, was a celebrated poet and penned the republic's national anthem. Tleubergen Zhumamuratov, Malika's father, was also a key figure of the region's treasured literary culture and drew inspiration from the sublime and vast landscape of the Aral Sea coast.

Malika Zhumamuratova

Tleubergen Zhumamuratov, my father, was born in Moynaq in 1915. Back then the homes of Moynaq residents were surrounded by reeds and resembled museums more than ordinary dwellings. Seins, gillnets and old boats were displayed like ornaments. Drying fish swayed in the wind — carp, sturgeon, pike, perch and zander — tied up on wires hung between posts.

Moynaq was not only naturally beautiful. It was home to a rich cultural heritage. Many esteemed figures of Karakalpak literature — Kunkhozha, Azhiniyaz and Berdakh — also lived in Moynaq, on the lake shore. Ancient customs and traditions were preserved there, passed down from generation to generation. In the mid-20th century, when few people had any reason to fear for the sea's future, Tleubergen was already sounding the alarm.

His work often got him in trouble with the authorities. He was expelled from the Communist Party of Uzbekistan. His works combined both lyric and epic quality, and were filled with satire and storytelling. One of my father's satirical poems, "Don't Mess with the Sea!" was written in 1947 and addressed "To certain officials..." It was published in the Moynaq-based newspaper *Krasny Rybak* ("Red Fisherman") and criticizes government officials, calling them out by name as he warned against avarice and carelessness. He was furious:

Do not take this as something normal,
Do not assume your greed is justified!

These were leaders driven by personal gain, as he saw it, neglecting their sacred duty to protect nature. Toward the end of the poem, he is stern and unforgiving:

I have nothing more to say to you —
Just don't mess with the sea!

Tleubergen's work spanned a wide spectrum of literary and artistic genres: riddles, fairy tales and children's poems, as well as prose and journalism. As a specialist in oral folk art — and gifted with a phenomenal memory — Tleubergen played a crucial role in helping local folklorists restore many lost pearls from our tradition. He was a skilled translator; he masterfully rendered works by Omar Khayyam, Alisher Navoi, Alexander Pushkin, Mikhail Lermontov and Anna Akhmatova into the Karakalpak language. In 1969 he was the first Karakalpak to receive the title "People's Poet of Uzbekistan".

Regardless of the genre, subject or medium, his emotionally expressive thinking, his metaphors and epithets all originate from his greatest inspiration — his beloved sea. It is as if his entire body of work is interwoven with a single red thread. The symbol of the wave embodied his inner world — his love, his joy, his sorrow and his pain. Even in adulthood, he couldn't help but turn back.

Having rolled up the years behind me, like silk
I have left behind so many. And old age —
like a night on my path,
With not a single glimmer in sight.

I have returned once more to the Aral.
Reminding me of my youth,
A twisting wave surged forward.
A ray of light shimmered on the crest.

— From "On the Wave" (c. 1977)

My father welcomed many people into our home. Among them was a man named Almagambet, who suffered from leprosy. He

had no relatives, so my father often invited him over, fed him and took care of him. We children didn't like him. After he left, we would joke among ourselves, saying, "Be careful, Almagambet-aga drank from that bowl..." My father, when he heard us, was very angry. He told us that the best person in the world is one who helps orphans and the needy. The worst is a person who mocks instead of helping.

My father died in 1990. After independence, other poets like Ibrahim Yusupov and Tolepbergen Kaipbergenov became well known, but my father wasn't alive then. Looking back, at times, it seems as though the poet sensed a hidden anxiety in the air — as if he was attuned to some deeper shift taking place. He carefully directs attention to this unease:

One current always follows after another,
And gives up its own place without a fight —
Swiftly pursued by yet another rush,
But rarely do we truly see the change.

— From "The Beautiful Makarya" (1971)

Between 1969 and 1971, Central Asia began to feel the consequences of mismanaged water resources, affecting in particular the Amu Darya delta and the Aral Sea. Where in his early works the river was described as a mighty force of life, later, the poet noticed it weakening. This worried him. Perhaps he understood that as the river changed, so too would the world around him — that something fundamental, something vital to the Karakalpak people's existence, was slowly disappearing. If he saw in the river a reflection of human destiny, of an entire nation's fate, then its shrinking waters symbolised not only an environmental crisis but also cultural and social transformations that should not be ignored.

Ayzhamal Yusupova

Ibrahim Yusupov was born in 1929 in the village of Azat. His father was a scholar of Islam named Yusuf Ahun. There is evidence that he was repressed and imprisoned in Turkmenistan in the 1930s. After his mother, Honbibi, was left without a breadwinner with her small children, she had to bear all the hardships of life alone.

My father started working at the age of 13 to help her. Despite the difficulties of life at that time, he taught himself to read, write and draw. He learned to speak Arabic fluently and read all the books left by his father. We thought our father did not know how to perform *Namaz* [*Salah*, or formal worship] because we never saw him praying. But he knew the Quran well.

Our mother, Bibizada Zhumanazarova, was an incredibly beautiful woman, with braids that reached her ankles. She was the eldest daughter of Mateke Zhumanazarov, a public figure who led the Jokargy Kenes [Karakalpakstan's highest legislative body] for many years. The love my parents had for each other was one in a thousand. It was an eternal love and she was his muse. From his earliest works to the verses written in the last days of his life, we can see this love in the lines dedicated to our mother:

A red shirt passed by me.
A light breeze blew, inspiring a young soul.
From this gentle breeze,
A storm arose in my heart.

— From "Untitled" (1957)

This storm awakened in the poet's heart the feelings of true, eternal love. Friends who studied with Bibizada in Moscow recall she was a woman whose beauty and good manners demonstrated to the world the high culture and elegance of the Karakalpak people. Our childhood was filled with happiness because our mother was happy. If a woman is happy in a family, everyone is happy.

Our home welcomed outstanding figures of literature within the Soviet Union including Gafur Gulyam, Rasul Gamzatov, Kaisyn Kuliev, Konstantin Simonov, Chingiz Aitmatov and Mustai Karim. My father was very happy to be a writer among such people. But then a great tragedy struck our home. Our mother passed away from heart disease. She was only 46 years old. It was a tremendous loss and affected me deeply because I was the youngest in the family. It felt as if our world had plunged into darkness and everything had come to a halt.

Undoubtedly, the role of parents in every child's life is important. But time puts everything in its place. Days, months and years passed. Despite all the difficulties, our father never showed his grief to anyone, never despaired, and took great care of us. He became both a father and a mother to his children. He poured his sorrows onto paper and, during those years, wrote many poems dedicated to my mother:

On a black stone, on a white statue,
I dreamed of a swan...
Astonishing us in the season of flowers,
A beauty came into this world and left.

— From "Virtue" (1981)

After our mother's passing, our home became a completely different place. No matter how kind our father was to us, our mother's absence left a gaping void. We tried not to show him our grief and life went on. When I think of my father, I see the boundless love he had for life, for people, for my mother, for children, and for the human heart. He was always with the people, sharing in their joys and sorrows.

The heart is a beautiful garden — if nurtured,
One can taste sweet fruits and journey far.

— From "A Flower Bloomed on a Stone" (1982)

My father taught us to love and respect nature. Even before school, we knew all about Ayaz-Kala, Gyaur-Kala and Chilpyk, their history, and significance. I am a philologist by training. When I started working at the museum I wasn't sure if I could adapt — but I was wrong. Thanks to Aygul Pirnazarova, I learned a lot. Before that I had worked in politics, which was entirely different. I remember when I was elected as a deputy and attended an event in Chimbay, everyone recognised me and even the elders stood up. When they played the national anthem my father wrote, I couldn't hold back my tears. It was a proud moment.

I love my job. At the start of each day I enter the exhibition hall, check everything, and think how we might arrange it better. Last year the museum celebrated its 95th anniversary. It was founded in 1929 in Turtkul, which at the time was the capital of the Republic of Karakalpakstan. In 1944, due to a change in course of the Amu Darya, the entire city flooded and the capital was moved to Nukus.

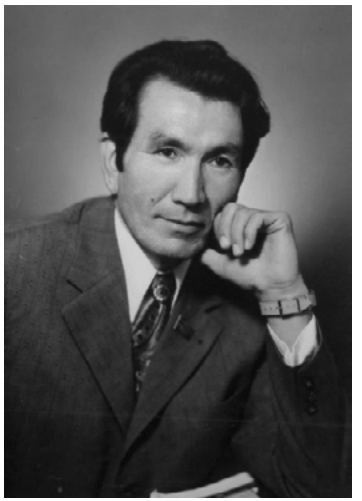
No matter how much I speak of my father, it is never enough. He was a simple, generous, kind, sensitive, hardworking and strong-willed person. I believe that having such a great father was an incredible gift. Even today, on weekends, I take my family to the places my father once visited and recall his stories. He wrote nearly a hundred books, created numerous dramatic works, actively contributed to Karakalpak literary education, helped write textbooks and translated works of world literature, bringing them to our people. He even created the first opera libretto in Karakalpak.

Conditions are gradually being created to mitigate the effects of the Aral Sea disaster. The president is providing great opportunities, planting saxaul trees on the dried seabed and addressing health concerns. The youth are very active, studying abroad, and show great promise. It's inspiring. In my heart I believe everything will be fine.

Malika Zhumamuratova is a professor of journalism at Berdakh's Karakalpak State University. She is a writer and the daughter of the former People's Poet of Uzbekistan, Tleubergen Zhumamuratov. Her work focuses on advancing education and preserving the Karakalpak region's cultural legacy.

1. *Meridians of the Heart* by Ibrahim Yusupov (1966)
2. *The Beautiful Makarya* by Tleubergen Zhumamuratov (1986)

Ayzhamal Yusupova is director of the State Museum of History and Culture of the Republic of Karakalpakstan. She is the daughter of renowned Karakalpak poet Ibrahim Yusupov who, among his many achievements, penned the lyrics of the republic's national anthem.



1. Ibrahim Yusupov
2. Tleubergen Zhumamuratov

Children by Nadezhda Kashina. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

So Many Things to Do

Dilfuza Egamberdieva

From deadly dust to biochar, award winning microbiologist Dilfuza Egamberdieva argues that the future health of Uzbekistan will not be solved by laws, regulations or foreign investment but by the growth of knowledge.

PHILIP MAUGHAN
Tell us a little about your background.

DILFUZA EGAMBERDIEVA
When the Soviet Union broke up in 1991 I was a student. After independence, all the countries that had belonged to the Union suffered economically. When foreign countries began opening embassies in Uzbekistan, all the young scientists left. I was one of them.

After studying microbiology at the National University in Uzbekistan, I did my PhD in agricultural biotechnology in Germany, looking at water-soil-plant interactions. My supervisor told me that food security and environmental issues would be top priorities in the future because of climate change. She said if I studied this I would be on the right path.

She told me no border existed between developed and developing countries when it comes to nature. If you want to live in a developed country and have a good life, you need similar conditions to exist elsewhere. So I went into my field to develop technologies that would improve salinity and drought resistance and address environmental contamination.

PM
And now you've established your own lab here in Tashkent?

DE
Yes, the Ecosystem and Biomes Research Lab. I'm trying to get international certification for food safety because we don't have proper food safety capabilities in Uzbekistan. I invited experts from Italy because there isn't a single lab here with the correct ISO/IEC 17025 certification to analyse

food elements and pesticides. Ours will be the first, and we will analyse water, soil, plants and all types of food.

Uzbekistan can't export directly because it's not accepted. Farmers can't export their products abroad because there are no labs here to test for toxic elements. Turkey has the ISO certification, so Uzbekistan sells to Turkey, Turkey adds their certificate, and then they sell to Europe. That's why we opened the lab.

PM
You've also been taking part in expeditions to the former Aral Sea — will the lab play a role there?

DE
Every year we visit and I take soil samples. We want to know what kinds of chemicals are there because during Soviet times thousands of tons of chemicals used for cotton production flowed into the Aral Sea and dried up. When the wind moves these particles, they spread. Even colleagues in Norway have found particles from the Aral.

There were also closed biological and chemical labs [on the Aral Sea island of Vozrozhdeniya]. Now that the sea is gone and the islands are no more, livestock roam. Animals can enter even though humans cannot. Birds, camels, insects. They had anthrax there. If the animals consume contaminated grass, it could spread dangerous microbes not just across the country but worldwide.

There are many dry areas and salt-affected areas in the world, but the Aral Sea basin is different because we used only chemicals and toxic elements for 40 years. Tashkent is always in the news for its air pollution and it's not just because of the cars. Jakarta and Mumbai have many cars

too — but they're not at the top. It's something else. In Karakalpakstan there are many different diseases among humans because of the chemicals in the soil. We're investigating what's in the dust when the wind blows.

Cancer is rising among women and children. Our hypothesis is that everything is linked to ecology, soil, and water — to what we are eating. If we can find this connection then we won't need to spend so much money on human health; we can spend money on the environment. If the environment is healthy, humans are healthy.

The One Health approach advocated by the World Health Organisation has become very popular. After COVID, scientists realised we should not separate livestock, human health and agriculture as different subjects. We have to consider animal, human and environmental health together, and that applies whether you're a journalist, economist, social scientist, biologist or medical scientist.

PM

What do you think of the saxaul initiative?

DE

Saxaul is OK but you cannot maintain biodiversity with just one plant. You can't just plant in a field — first you have to check the soil. In the Aral Sea, for example, is there soil? Are there nutrients? Can plants grow there, given the salinity and salt effects on root systems? If you think plants cannot survive, you should give up the project. Don't just show that you're planting millions of trees to look good. It's better to plant in another place where they will really grow, where you don't need to add water, where maybe rain is enough or groundwater is near. That's actually the job of science consultation.

I always advise the ministries here that in Germany, for example, there are highly ranked scientists under the federal government. Whatever the government wants to implement, they ask the scientists first. When I worked in German science, they would say, "We want to make some environmental law — what do you prefer? Can you please study this area and tell us what we should do?" Then scientists give recommendations and the government discusses how to move forward with the law — even for building high-rise apartments.

PM

Have you seen successes in other parts of the world?

DE

Yes. Along the roads in China there are forest-like areas created using drip irrigation. Just a few drops can solve the problem. In desert areas like Xinjiang you still see green corridors with birds and insects and different trees. Some trees flower, some don't. It's balanced.

There are various projects with ideas for how to use the Aral Sea basin. In my opinion as a scientist, we have to leave it to nature. We should not use it for livestock or cotton production. Cotton would just repeat the whole cycle again.

I'm also against making it a tourist destination. It's dangerous, first of all, and what do you want to see? It's not a celebration — it's a tragedy. I often tell tourist groups from Germany, "Do you know how many billions of organisms and species died here where we're standing taking photos?" It's a graveyard. We destroyed it, so why should we be celebrating?

PM

People need to make a living. Perhaps they just need more alternatives?

DE

Whatever you do, it's important first to know the gap. If you don't know the gap you cannot fill it. The gap here is that we don't know what's at the bottom of the Aral Sea. We have to keep the sand and chemicals there somehow, using plants or some kind of technology so that it doesn't spread to the cities or neighboring countries.

If we know which pesticides and toxins are in the water and in the sand we can use bioremediation. For example, when oil tankers have accidents at sea and there's black oil, they introduce microbes that degrade the oil. They release microbes and the microbes destroy the oil. You can't clean it chemically or mechanically from the water. It's the same here. If we know what kinds of pesticides, chemicals and toxic elements are present, we can develop microbes that will degrade these elements. Then we can treat the area, leave nature alone and the microbes will degrade the elements into non-toxic components.

PM

The first ever patent on a living thing was for a microbe that ate oil, right?

DE

Today scientists have developed microbes that consume plastic debris. If we can clean the Aral Sea basin, then people can live around it. It doesn't matter if you make nice cities and buildings but the environment isn't liveable — there can be no life.

PM

Where is most food grown in Uzbekistan?

DE

Fergana has most of the foreign investments: horticulture, greenhouses and dried foods. The environmental and climate conditions are much better there compared to Kashkadarya, which is very hot and dry, or Khorezm, Khiva and Bukhara, which are salt-affected. Fergana is very good for agroforestry, with lots of fruits like apricots. Cotton and wheat are major crops. In my opinion, we have to diversify the plants and crops we grow.

Central Asia is one of the hotspots — literally — for climate change. Plus 60 °C is far too high. We can bring some heat and drought-tolerant species from abroad or develop them ourselves. Otherwise migration from Karakalpakstan will increase. We need to think now about the knowledge and technology that can produce food for our 36 million population.

PM

Is anything grown around Karakalpakstan?

DE

There's livestock and some crops. I myself am against too much livestock. I don't eat much meat. I'm not vegetarian, but my family prefers to eat less meat. In my opinion, Uzbekistan eats too much meat for health. We can reduce this by 50 percent and eat more legumes instead.

In Karakalpakstan, greenhouses are difficult because in winter it's very cold and farmers have problems with heating. Water is also a problem, which is why we should be developing hydroponics and urban agriculture. In the

Netherlands they grow all tomatoes in rockwool, not soil. If we can bring urban agriculture to Karakalpakstan, agriculture can develop.

Urban agriculture is very important, not only for Uzbekistan, but for many countries during climate change. It's not expensive. Even on roofs of high buildings you can grow things, like in the Netherlands or Japan — you can put salads or other plants on balconies, growing in small rockwool. Growing vegetables without soil is possible.

PM

Another project of yours uses biochar, right?

DE

Yes. For the biochar project I got funding from the World Bank — you can't do research without funding, after all. We collected all kinds of bio-waste: chicken manure, cotton husks, wheat straw and household waste. We found the best temperature of 200-300 degrees for 30 minutes. With this technology, the biological matter retains its nitrogen, phosphorus, magnesium and other microelements. Then we can apply it to soil — just 0.5 percent or less. We're experimenting with chickpeas, soybeans and mung beans. Biochar has pores, so if you mix it in, the soil becomes very soft even when dry.

Even in the Aral Sea region, I've suggested that if you want to plant trees, first use biochar with soil, because biochar holds moisture and provides nutrients until the trees become stronger. Currently in Uzbekistan and neighbouring countries there's no waste sorting. They burn everything. If we can bring this technology and get funding for waste sorting from 36 million people it would be the best biofertiliser.

PM

How do you see that sort of change happening?

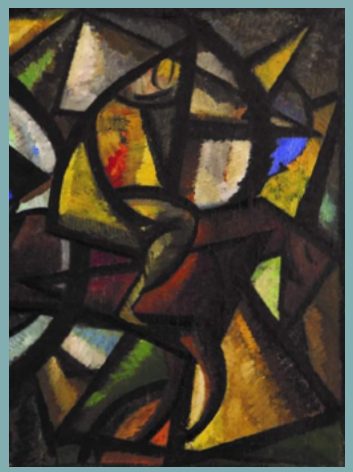
DE

Again, it all comes down to knowledge. We don't have any science communication. We can do science but cannot interpret it for society. We have scientists and journalists, but they are not integrated. Laws and regulations don't develop a country — knowledge does. It's not about censorship. You're free to talk about science. But scientists alone cannot explain to the public, to kids, to schools why we should care about carbon and methane and greenhouse gas emissions.

I worked in Europe and could have continued living there, but there are so many things to do here. Life expectancy is only 50-55 years in some rural areas of Karakalpakstan. We are taking samples from the Aral Sea and from agricultural fields. I want to study their relationship to people's health.

Your job as a science communicator is very important in the world, especially in developing countries: to bring scientific evidence to the public and increase people's knowledge about how they should live in this era of climate change, how they need to change their behaviour reduce meat consumption and not cut down trees. Again, it all comes down to knowledge.

Dilfuza Egamberdieva is a multi-award-winning microbiologist at the Ministry of Agriculture in Tashkent. She heads the National Research University's Biological Research and Food Safety Lab and is the founder-CEO of Ecobiome R&D Ltd., a lab developing resilient, sustainable and socially acceptable farming systems based in Tashkent.



Cart by Alexander Volkov (1924). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Fail Fast, Fail Often

Mels Kosnazarov

Mels Kosnazarov is a former appraiser and entrepreneur whose current role in Uzbekistan's Chamber of Commerce and Industry is focused on skills, technology and business practices in Karakalpakstan. Here he argues that international cooperation and internal reforms have laid the groundwork for commerce, tourism and heritage to boom.

I know it will sound strange, but my name, Mels, is an anagram of Marx, Engels, Lenin, Stalin. My grandfather was a true communist, right down to the bone. He was a cotton picker who was awarded the Order of Lenin for his work and was eternally dedicated to the cause. Unfortunately, he passed away when I was still young. According to Karakalpak custom, children are often named after their grandfathers, which is how I got this name.

I'm a versatile person. I'm an entrepreneur, but I also engage in activities within the nonprofit sector. I co-founded the Destination Management Organization, or DMO, the first NGO focused on bringing business and government together to develop tourism to Karakalpakstan. We see a lot of potential and believe that tourism and leisure can become one of the main drivers of economic growth in the region. At present it is underdeveloped, with no significant promotion or systematic approach, but we have received support from both state bodies and the private sector. We are especially glad to have received support from the local Council of Ministers and are extremely grateful to GIZ, the German development agency, for providing support from the beginning.

Above all, I love working with people. It really brings me pleasure. I was active in business until around 2011 when I started working in the public sector. I first worked as Deputy Mayor for Economic and Social Affairs in the Xojeli district, not far from Nukus. It was an interesting challenge because I'd never worked in government before. I later underwent training at the Academy of Public Administration under the President of the Republic of Uzbekistan before working at the Prosecutor's Office in Moynaq. It was a new stage in my career and opportunity for personal growth.

I'm very interested in environmental issues and the state of the Aral Sea, because, although I was born and lived my whole life in Nukus, I ended up working in Moynaq for four years. In 2018, a department of the Prosecutor's Office was established to focus on the development of Moynaq and the broader region. I worked as part of a team of nine people that included architects

and other specialists to monitor how funds were being spent and to oversee the design and construction of new facilities. We worked on developing the IT sector in Moynaq, and there is now a very well-equipped library there, built with funds from the Prosecutor's Office.

Overall, there is significant potential for business development in Karakalpakstan. However, many entrepreneurs are limited to a few areas, like trade or other service industries. I worked in Moynaq until the end of 2022, and when I came back, I found that there were a lot of new clubs and associations that were focused on self-education, training sessions and participating in international business exhibitions. In the past, entrepreneurs were limited to Uzbekistan. They bought goods in Tashkent, or other regions, and sold them here. That was all they could do. But today they travel abroad, gaining exposure to new knowledge and ideas. Many entrepreneurs from the Chamber of Commerce participated in the international tourism fair ITB Berlin.

I was surprised by how much our entrepreneurs had changed. They are becoming more confident, feeling freer. I saw how they'd started to work on themselves, recognising that if they don't develop, they'll be out-competed. This is especially true among the youth. Young people have more access to information and use modern technologies like artificial intelligence, which gives them a serious advantage over my generation.

I always remind people of how things used to be so they understand how far we've come. We couldn't buy dollars because we didn't know what the exchange rate would be — either the official one or the street rate. I remember when a 15-20 percent charge for currency exchanges was the norm. Many people wanted their salaries paid in cash because there often wasn't enough currency available for withdrawal at ATMs.

A key moment of transition was the opening of borders. In the past, travelling abroad was much harder. You had to go through

different checks and get permits to go overseas. Now, with the advent of the international passport, everything has changed. If you need a visa, you can apply for it yourself without going through complex internal bureaucratic procedures. I would never say that everything was bad in the past, or that now everything is perfect (or that a miracle awaits us in the future). Every period has its pros and cons. I studied and got on my feet during those times, so I can't speak too poorly of them.

Today the IT sector among the youth in Karakalpakstan has really started to develop. While there may not be a large-scale programme, or any unicorns just yet, according to my estimates about a hundred young specialists from Karakalpakstan are already working remotely in the IT sector, officially employed or at least collaborating with companies online. There are examples of successful individuals from our region, like Beknazar Abdikamalov and Aziz Murtazaev who worked at Facebook before founding their own startups and carving out their place in the industry. My main advice to young people getting started as entrepreneurs in Nukus is don't be afraid and believe in yourself. Failures will always happen. It's inevitable. But when you come up with something yourself, sell it, and see that your idea works and even brings in money — that's the thrill, the real joy of life!

To this day, people from other regions of Uzbekistan mainly still come to Karakalpakstan on business trips. But what's nice is that they don't limit themselves to work. They combine their trips with visits to museums, or taking tours and excursions. Overall, the potential for tourism is huge, especially thanks to the Nukus Museum. It's a real gem, but unfortunately it's still not that well known. I think there's a lot of work ahead, but if enough effort and resources are invested, it could become a powerful attraction.

In addition, many new hotels have been built recently, and construction is ongoing with more. Guesthouses, family-run hotels and small hostels are opening in various districts. In the past, if you

travelled to Moynaq or other remote areas, finding a place to stay was difficult. You had to stay with friends or relatives. Now there are hotels. Service may not be at a premium level yet, but it's a start.

There are many stories I could share, but one in particular stands out. It's the story of a businesswoman, Delfuza Benbekova. She owns the Hotel Massaget in Nukus, but to begin with she worked at another hotel in almost every position — as a cook, an administrator and a receptionist. Over time she mastered all the nuances of the business and decided to start her own.

As is often the case, securing initial capital was a challenge. Living on an employee's salary is one thing, but saving up to start your own business is practically impossible. In the end, one of her acquaintances gave her the money to buy a computer and a printer. That's where it all started. Slowly, over time, she and her partner developed the business. Now she is already building her second hotel with even bigger plans for the future. She wants to one day open a private school. It's truly admirable when a person is so dedicated to their work and works on it 24/7.

One of our main goals is to be the link between the public and private sectors. We started our work by studying similar experiences elsewhere. Specifically, we had a trip to Tunisia, organised by GIZ, where we saw how business was developing in conditions similar to ours. Tunisia actually shares many similarities with Karakalpakstan, including its arid climate and comparable economic challenges. We studied their approaches and decided to create something similar. That's how our organisation was born.

Right now, we're working with a coordination council that includes representatives from both government agencies and the private sector. This is a fully initiative-driven project; it wasn't "handed down from above," but it did receive support from our community and the Tourism Committee. In September last year, we held our first council and plan to meet every three months. The idea is that before each meeting our lawyers will analyse

regulatory documents and legislation to identify which laws and rules are causing issues. At the council, we record the participants' suggestions and send them to the administration.

Now we've deepened our focus to explore business and tourism in Karakalpakstan. Our lawyers conducted a survey among entrepreneurs which we're developing into concrete recommendations to be officially presented to the state authorities. The deliberative aspect of this work is elaborate precisely because the perspectives of the private sector, government bodies and our community don't always align. We're trying to find common ground.

In addition to this work, we're collaborating with outside partners on ideas around cultural heritage. One of them is to create a sort of "Red Book" of Karakalpak recipes, in reference to the IUCN's Red List of Threatened Species. This is important because many traditional recipes are being lost. Young people often don't know how to prepare old dishes, like *gurtu*, *khaum-khausau* or *beshbarmak* in the Karakalpak style. Hardly anyone remembers them because there's no one left who knows how to cook them. And creating a book of endangered recipes isn't such an expensive venture. Why not do it for future generations?

Mels Kosnazarov is a former entrepreneur who today serves as the Deputy Head of Administration at the Chamber of Commerce and Industry of Uzbekistan.

The Road by Ural Tansykbayev (1936). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

The First Eco-Influencer

Mutabar Kushvaqtova

Mutabar Kushvaqtova (aka @urikguli) is a journalist and eco-blogger based in Tashkent. Her brand of comedic, civic-minded oriented videos — filmed while outfitted in a plastic carrier bag dress or surprising street cleaners with flowers — is relatively new to Uzbekistan, an achievement that has brought recognition for better and for worse.

On getting started

I have a particular way of dealing with problems. I give myself two days to cry and worry, then I go and try to solve the problem. If I can't solve it entirely, I'll do something to at least not be a *part* of the problem.

My anxiety spikes when I watch films about global catastrophes — or zombies. It really affects me. After my daughter was born, I started thinking about the kind of world she would inherit and the problems she would face. I've attended seminars on ecology in five different countries. When I hear new data that the world doesn't know yet, it really scares me.

I used to write texts and make videos to send to other bloggers. I asked them to share the information, offering it to them for free. At that time, most bloggers were men. Some ignored me. Others told me these issues weren't important (or popular). So I decided to do it myself.

The first video I made was about single-use electronics. This was about four years ago. I saw these electronic cigarettes everywhere in my *mahalla*, my neighborhood. They have small batteries inside them which decay and can be really harmful.

I love Uzbek films, especially old ones, and I knew I needed to add something that would capture people's attention. Before shooting I completed my chores — cooking dinner, cleaning the kitchen, putting my baby to bed. Then, at midnight, when it was quiet, I set up the camera, put on some makeup and started recording. After two hours I began editing the video. It was almost morning by the time I published it.

Before going to sleep I told myself that 100 likes would be enough. If 100 people watched it and learned something — that would be sufficient. I woke up to 120 likes! That was the moment I realised that our people aren't uneducated or unintelligent. They care about ecology. They care about nature. You just need to know how to present the information.

On social media in Uzbekistan

In Uzbekistan — and Central Asia generally — social media requires a lot of emotional energy, because it's not as popular as in Europe.

If you're a woman doing public content, people are always waiting for you to make little mistakes. Because of this I spend a lot of time fact-checking. Three months ago I asked for help getting information about people living in an area where there was a gas leak. I received a lot of hatred from both men and women asking me why I was sitting in Tashkent instead of going to Surkhandarya where the leak was.

I didn't know I had such a big group of haters. I think it intensified further after I received the medal ["Kelajak Bunyodkori" or "Builder of the Future"] from the president. People were saying I didn't deserve the medal because I was in Tashkent asking others for help. They said I should be everywhere solving all the country's problems, even if I have no money to travel and a daughter waiting for me at kindergarten. That doesn't matter to them.

After this, I deleted my Twitter account and blocked all my social media for 10 days. I decided to take a break and travel around Uzbekistan with my family, my husband and daughter. In Bukhara and Samarkand I saw a second-hand shop that was owned by an old man — a really lovely person who has a wonderful place and loves his work. I decided to make a reel about him. Then, in Bukhara I met a teacher who works at the university for little money but is doing experiments to clean water. I thought, "People should know about you."

Next we went to Karakalpakstan where I met a guy who makes brushes from single-use plastics. That's how I returned to making content.

I've never talked about the bullying incident, even in podcast interviews. I actually recorded a few videos where I was crying and talking about the situation, but I deleted them because they were too emotional. I don't know. Maybe someday I will do stand-up comedy about it.

On deciding what to post

I find new topics in my everyday life. For example, I made my last video about single-use coffee cups. I had an hour, so I recorded myself walking and talking. After that, I decided to make a challenge where people had to show their reusable coffee cups and say no to plastic.

You have to stay focused on one topic to get people's attention for each challenge, and to make more people want to be a part of it. Suppose I went to see a great film and wanted to talk about it — I can't. Not really. I need to keep focusing on single-use coffee cups.

That's when I realised our people are becoming more environmentally conscious — especially young people. In Uzbekistan, young people now learn English instead of Russian, and every English lesson includes discussions of ecological topics. My followers often tell me they learned about environmental issues from their English lessons.

On climate communication

I'm actually against radicalism in every sphere of life, whether in religion or ecology. I see eco-activists from Germany who use radical methods, but it won't work for me. I'm not that radical.

In the first year of my making videos I learned a lot about Uzbek culture, our language and our people. I realised that French and German standards won't work here. I've been to Germany twice and saw their methods. They don't work on me. No — you need to come to me and communicate with me like an Uzbek.

No one is right and no one is a fool in our world. If you know how to communicate with people, your project will work. In Uzbekistan, you'd say something like "You're a beautiful woman, why are you throwing away this single-use bottle? It's not good for you." And then they will thank you. That's the Uzbek method.

On prioritising everyday citizens above politicians

People told me it was impossible to change large groups except through politics. I tried that. I was in the Ecology Party (we do have one). I've talked to the Ministry of Ecology and other governmental organisations, but it just confirmed that I'm not a political person.

When I talk about problems online, I first give information about the causes, and then I describe what each person watching the video can do. I have a few videos where I discussed political problems and government mistakes. But these kinds of videos don't speak to people's everyday lives.

We should know that no government, no single organisation, and no one person is the sole decision maker in the system. I've been in big seminars with scientists and skeptics, and when I share my opinion, they tell me: "No, it's the decision makers, politicians and big business players who matter." I agree with that, but when we talk about government and politicians, we forget about ordinary people. They are many — and they have power.

I really want to help people feel their power. If in Uzbekistan, 36 million people start using their own bottles, sorting their trash, and ask for ecological initiatives in their *mahallas*, it will work. If you see water leaking you should call the police or eco patrol and ask them to fix it. In every video and lecture I ask people to learn their rights. When the people know their rights and are intelligent the government will become braver and do bigger things.

Mutabar Kushvaqtova (aka @urikguli) is a journalist and eco-blogger based in Tashkent. Her brand of comedic, civic-minded oriented videos — filmed while outfitted in a plastic carrier bag dress or surprising street cleaners with flowers — is relatively new to Uzbekistan, an achievement that has brought recognition for better and for worse.

Before Lunch by Sergey Kolybanov (1965). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Changing the Algorithm

Elena Kan

Elena Kan directs the KIVA Center for Agroinnovations, Science, Education and Business in Urgench, a knowledge transfer network for farmers that encourages alternatives to cotton crops and overreliance on the state.

On environmental awareness and technology

My degree is in English and German, but in 2003 I joined a large German-Uzbek project led by the Ministry of Education and Research. It was coordinated by ZEF Central, one of Germany's think tanks, together with the University of Bonn, and under UNESCO's aegis in Tashkent. The main local partner was Urgench State University. The project yielded over 54 PhD theses about Khorezm and Karakalpakstan covering agriculture, economics and social issues, supported by numerous master's and bachelor's studies. Many technologies were tested, including conservation agriculture, which requires a significant mindset change among local land users — particularly regarding the practice of not plowing.

Until the end of that project in 2011 I remained a team member, and like many of my colleagues it had a huge impact on my life. Through this work I became interested in environmental awareness-raising and education for adults and children. Since our project focused on sustainable agriculture, I was particularly interested in interactions with end users — mostly farmers. I studied why some technologies were not adopted by local farmers, examining the social and administrative setting here, investigating why farmers would or wouldn't adopt long and short-term technologies like afforestation. One of the project's goals was to establish a center of excellence to maintain the capacities, knowledge and technologies we had developed, so we could continue delivering and transferring them among local land users, teachers and young people. In 2022, I decided to establish my own NGO after connecting with a local entrepreneur, Ruslan Kalandarov, who has experience in both agri-business and teaching.

Children of the kolkhoz

By law, all land in Uzbekistan is state property. Farmers lease the land for up to 50 years. Under their agreements, they may be designated as cotton and wheat farmers, horticulturists or livestock farmers, and are obligated to maintain the land's productivity. Since 2017, Uzbekistan has been undergoing daily reforms, with many changes in the agricultural decision-making system. I think an understanding of climate change's relationship to daily operations is starting to form in the minds of both subsistence and large-scale farmers. However, the government's solutions are often simplistic — like suggesting drip irrigation. Many farmers will tell you this isn't really a solution for them. While the Israelis can make it work, there are problems here with salt clogging the filters and it's the farmers who have to take that risk.

A perception of the interrelation of climate change and its impact on daily activities and subsistence is forming, but not from the bottom up. When problems arise, farmers look to the government for solutions. Many farmers are highly educated people, though not necessarily in agriculture. Most come from rural settings and are the children of those who worked during Soviet times in the kolkhoz system. I know farmers who send their sons — mostly sons — to study agriculture, seeing it as a good path for inheritance. For at least two years, there's been a state support system for young entrepreneurs and farmers. There are now "farmer schools" where young people can receive three or four months of training, not just in agronomy but in bookkeeping, disease treatment and other practical matters.

This system has existed for many years and can't be changed in a single year, even in people's minds. Farmers now are typically between 30 and 60 years old, and they're quite conservative. Young farmers don't have many years of experience working under these harsh conditions. Even if we give farmers decision-making power, most aren't ready to take these decisions

independently. I often wonder why farmers who've grown cotton for 70 years still need annual training and field demonstrations. One answer I received was, "We have new varieties, new diseases, and pests." But the basic algorithm is always the same. It's easier to follow what's taught than to risk being the first to innovate. Whatever innovation in tackling salinity or our daily problems needs to be backed by enabling policy.

The seeds of change

The NGO's full title is the KIVA Center for Agroinnovations, Science, Education and Business. The idea is to establish a decentralised knowledge exchange and transfer system that promotes sesame as a resource-efficient crop suitable for our conditions and socio-economic reality. My co-founder was in academia before entering business and his recommendations come from his own trial-and-error. His business primarily focuses on sesame and other oil seed crops and previously also made tahini and sweets for export. Knowledge transfer and capacity building are fundamental for ensuring product quality. While many claim they know how to grow sesame, we can suggest improved methods based on our understanding of proper storage, handling and seed quality. We provide quality seeds and can coach throughout the production cycle — including export.

One challenge farmers face with sesame is labour. While sesame should ideally be sown and harvested with specialised equipment, Ruslan has demonstrated that it can be done manually, without expensive equipment, which is important for the subsistence farmers who make up a large portion of producers. In Khorezm and Karakalpakstan, local farmers often buy whatever sesame seeds are available in the market, leading to disappointment when the plants don't develop properly. For several years, Ruslan Kalandarov has been sorting seeds and

improving local varieties with Tashkent Agrarian University. We've even tried Turkish white seeds, though they proved unsuitable for our climate.

My first project was funded by GIZ and supported our capacity-building program for farmers and entrepreneurs throughout one production cycle, covering everything from variety selection to processing. GIZ connected us with German buyers, but as a small business, we can't yet deliver the volume needed. There is still a reluctance to stop growing cotton. It's a question I've wondered about for many years. Even though farmers have many problems with cotton growing — not so much in terms of agronomy, but in terms of profitability — they continue. The farmers I know say they would prefer to form cooperatives to make collective decisions about what to grow. They tend to prefer vegetables and sesame, knowing these are profitable. Like rice, sesame can be stored in a warehouse and sold when needed, such as when there's a wedding to pay for.

The last Amu Darya sturgeon

Right now I'm working on getting permission from the local Ministry of Justice to start a project about Amu Darya sturgeon. There's a strong traditional belief, rooted in pre-Islamic belief, that the fish helps with fertility. Our project aims to support conservation through a gene bank in Nukus, transferring fish from the Urgench region to reproduce in laboratory conditions. The sturgeon only lives in the Amu Darya and Syr Darya rivers. Nowhere else. In the Syr Darya, it may already be extinct. Here, it survives only in the Amu Darya's waters. We're currently awaiting a response, despite having international funding and approval at the governmental level. It's illegal to fish them, of course, but it's difficult to catch those who fish illegally. You only hear about it if you happen to come across one at the market. While it's not specifically included in the project,

environmental education and awareness-raising are priorities for me personally. I'll try to organise awareness meetings with communities, either at my own expense or by seeking additional funding, to explain the importance of protecting this *Red Book*-listed fish.

Elena Kan is director of the KIVA Center for Agroinnovations, Science, Education and Business in Urgench, an NGO that helps small and medium-sized farms in the Khorezm region to develop resilient and eco-friendly agribusinesses. She facilitates non-traditional education on matters of ecology and conservation for children and adults.

Uzbekistan (1938–1951). Courtesy of Fung Library, Harvard

Rest by Zhenis Lepesov (1973). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Nothing Is Eternal

Zhenis Lepesov

Born in 1945, Zhenis Lepesov is one of the foremost painters of the 20th- century Karakalpak Avant-Garde. His vibrant landscapes, portraits and still lifes incorporate recognisable motifs and themes from Karakalpak life and are housed in museum and private collections in Russia, USA, Korea, Japan, Sweden and elsewhere.

The first Karakalpak painter was Vladimir Karakalpakov. He was adopted by a Russian family and lived in Moscow. When he was asked what his name was, it turned out he did not know it, which is why he ended up being named Vladimir Karakalpakov after the place he was born. He studied at the art school but soon changed his mind about studying and returned to Karakalpakstan to paint. I did the same.

My brother loved drawing, and by watching him, I also became interested. I was six years old then. In the past, Karakalpakstan did not have painters because in Islam, which we follow, it was forbidden to draw faces, and parts of the human body, or animals. There were many restrictions. If a person painted, it was believed that they had put their soul into the painting. After finishing school, I started working right away, but in 1964 I was accepted into the Almaty Art School to study. In 1970 I graduated and returned to Nukus where I started working as an artist.

In 1958, Igor Savitsky organised an exhibition of artists from Moscow in Khodjeili, which is where I first met him. We met again in 1970 when I came to show him my sketches. At that time, I didn't have a place of my own. I was sleeping rough, inside large pipes on cardboard sheets. I told Savitsky that it would be better for me to return to Almaty because I had nowhere to live, but he convinced me to stay. Two years later I was given a two-room apartment on the fifth floor. But even this was taken from me and given to a married couple since I was living only with my father. It was only much later that I bought my own one-room apartment.

My first painting, shown at an exhibition in Moscow, depicted a musician playing the dutar [a long-necked two-stringed lute]. I painted it in the style of cubism. Among our people, there were those who liked it, but it was also criticized. Eventually, people accepted it. Savitsky used to go to Moscow every week to buy avant-garde paintings. At that time, the Karakalpak Artists' Union was set up and headed by Kdyrbai Saipov. The group started purchasing local artists' paintings to provide financial support. But sometimes, due to financial difficulties, they couldn't buy, and Savitsky paid from his own pocket. He saved many families from poverty.

In the old building of the museum, the roof often leaked, and Savitsky himself would put up buckets, collect water and carry it out. During those times, it was better not to approach him! He also frequently participated in archeological expeditions, for example, to Ayazkala and Janbaskala. During the Soviet era, the government wanted to develop these lands for cotton farming. Savitsky filed a successful petition to protect these cities from destruction.

Every artist has their own style. When I start a new work, I first think about the composition. I spend a lot of time thinking. My children often scold me for taking too long. They say I should start painting without overthinking it. Inspiration comes from everywhere — it could be from watching TV or looking at colorful fabrics. First I sketch on a small piece of paper, and then I transfer it to the canvas. I am not like other artists; I mostly just paint what comes to my mind and my compositions usually turn out to be unusual. This is a picture of children from the past, when there were no televisions. Children would gather like this and sing songs.

A tourist to the region once told me: "Your worldview will change when you start laying carpets on the floor instead of hanging them on the wall. And you'll decorate the walls with paintings." I agree.

I have been teaching art classes since 1970. My students are very young, and they are so open to everything new. They want to see more countries and meet foreigners. I tell them they need to work hard. It doesn't matter who you are — a man or a woman, young or old — first and foremost, you must work. And not just work, but be conscious of what you are doing. I mean no offense to the younger generation, but many don't even know who Michelangelo, Leonardo da Vinci or Chopin were. They don't know who Hamlet and Othello are because they don't read books. This is both frightening and harmful — not only for our nation but for all of humanity.

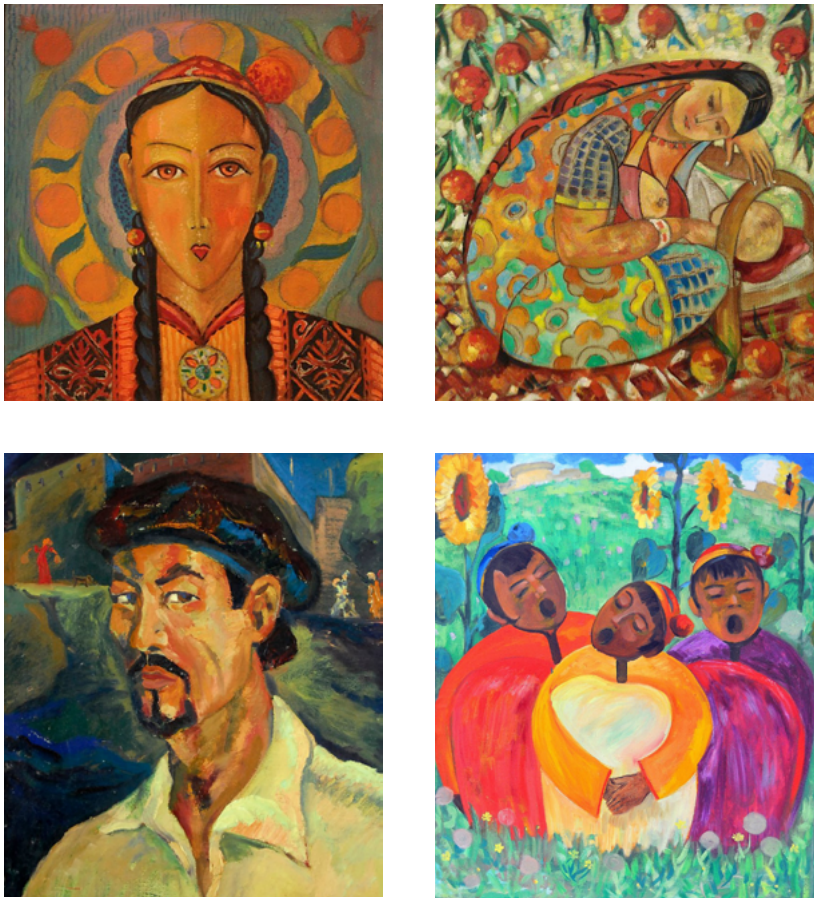
They think that everything they need is in their phones. But the phone deceives them! It can provide superficial information, like what kind of hair and beard Zhenis had, but not who Zhenis

truly was. That is why young people must study, work on themselves, and travel to other countries. In fact, we should send them abroad and even pay for their education. Because they will bring back the culture of those countries. There aren't enough cultural activities now, very few performances, which means that young people only gain superficial knowledge. The best solution for them is to see the world. Travel, learn and work in other countries. After gaining experience, return home and help develop things here.

In 1972, I was at the Aral Sea. I even have a painting from that day. At that time, the water was still there, very blue. Ships used to sail on it. But every day, the news reported that the water was disappearing. They informed us, but nothing was done. I often hold exhibitions with my students. The central theme of one of them was the Aral Sea. In many paintings they depicted the tragedy. At that time, people told me to stop focusing on the disaster and let the children paint something bright and upbeat. But no one talks about the Aral. But we should not forget this tragedy. We need to speak more about it so that we don't repeat these mistakes in the future. After all, even Lake Baikal is now starting to shrink.

Nothing is eternal. Everything will end: oil, gas, water, and the other gifts of nature. So we need to use them wisely. I believe that the Aral will never return.

Zhenis Lepesov is a leading contemporary artist from Karakalpakstan, celebrated for his vibrant, decorative paintings which incorporate national motifs and themes. He actively participates in national and international exhibitions and is an experienced teacher, having taught for over 30 years at the Nukus Children's Art School named after E. Kospolatov.



Karakalpak Woman by Suzani (2014), *Lullaby* (2015), *Self-portrait*, *Song* (1980) by Zhenis Lepesov. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Aral sea by Alexander Volkov. Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

I Love the City, I Love the People

The Youth of Nukus

A conversation with Islambek Dauletiyarov, Nurabulla Matmuratov, Aysulu Telnanova, Indira Zhumabaeva and Gulnara Zholdasbaeva, five young people from Nukus on what is best and worst about growing up in the capital of Karakalpakstan.

Islambek Dauletiyarov, 25, programmer and entrepreneur

PHILIP MAUGHAN
Tell us a bit about yourself.

ID
I'm 25 years old, currently teaching computer science at the Presidential School in Nukus and organising freelance projects by request. At the moment, under the president's decree, my colleagues and I signed a contract with the ministry and are developing a project worth $55,000. It's a social network for students studying abroad.

PM
You've made software applications before, right?

ID
To this day, I have completed about 90 projects for the private sector. In 2020, we developed the NawbetApp — a program for signing up for an electronic queue in any organisation in Uzbekistan. In 2023, we launched Qasimda, a platform that served as a guide and directory for residents in the Republic of Karakalpakstan to find local businesses, as well as for obtaining information about events and generally navigating the area. We officially ended the project today, however. We had an advertising program on the site where people registered their stores and restaurants, but unfortunately the money ran out.

PM
What motivates you to invest your time in these sorts of projects?

ID
I create projects primarily for myself. I used to go to a store that was far from my home before finding out that there

was another store just a few steps away. We are not served well enough by foreign platforms. When we first started, we had many users: 1,862 users were once logged into the site at the same time. There were no complaints, we just lacked financial resources in terms of further marketing so we had to suspend the project.

PM
What sort of things do your students make?

ID
Our students mostly work on environmental projects because they see how the climate is changing in our country, and they want to preserve our ecology. For example, a large amount of electricity in our school does not come from the grid. We have renewable energy sources and the students are involved in that. We have our own greenhouse where we grow tomatoes. Some students have prepared nutrient mixtures to reduce soil salinity.

Nurabulla Matmuratov, 27, writer and editor

NM
I work for a bookshop and publishing house, and run a blog on social media where I share my thoughts. I mostly write about politics, finance and law. I graduated from the Faculty of Foreign Languages but didn't end up working in my field. Even during my studies, I saw how I need to be well-informed in many areas. I like observing people and questioning why they watch trivial videos or why radical feminism is gaining momentum.

PM
Interesting. What is your attitude toward radical feminism? [giggles at the table]

NM
I have nothing against feminism! I even support it, but nowadays it has become quite radical. Gender equality is better developed here than in many other nations. Another interesting point is that those who call themselves feminists often don't know the history of feminism. For example, they are usually unaware that feminism has gone through four waves.

PM
What other sorts of books do you read?

NM
I used to read fiction, but now I have switched to books about politics. For instance, Daniel Kahneman has some interesting works. I picked up his book *Thinking Fast and Slow* and read it, and understood about thirty percent of it. After some time, I read it again and understood about fifty percent. That book is pretty complex.

Aysulu Telnanova, 16, high school student and creative coder

AT
Last August I went to Tatarstan to take part in a technology competition called "Give me five!" My team and I created an application to improve road safety and the quality of life for people with disabilities. We took first place and presented our project to the President of Uzbekistan! Additionally, I participated in a hackathon organised by Technovation Girls and Yandex Go, and have recently become financially

independent by working as a graphic designer. This winter I participated in the IT camp Raqamli Avlod 2025, which was held in Tashkent, where I spent five days learning 3D modelling and digital art.

PM
That's a lot! What do you do to relax?

AT
I love reading books — especially Agatha Christie. I read romance novels mostly and I enjoy studying English.

PM
What's something you recently learned about Karakalpakstan?

AT
When I was at the Savitsky Museum, they showed me a necklace that was only worn by pregnant women. Since everyone used to wear oversized clothing, it was hard to tell whether someone was pregnant or not. The necklace served as a sign.

PM
And what's a change you're excited about?

AT
Public transport right now is a pain for everyone. Buses are unpredictable and you need to wait in the dark for them to arrive because the street lighting is poor. We've been told that starting in April, new buses with GPS systems will begin to operate, which will allow people to track their arrival.

Indira Zhumabaeva, 23, clothing designer and business owner

PM
What made you want to be a designer?

IS
When I was just five years old, I would watch top models. I was always irritated that the clothes were always the same. That's when I became interested in design. I am inspired by global issues, such as the ecological situation with the Aral Sea. I participated in the Dubai International Design Week and won the "Best National Design" nomination.

PM
How did you learn to draw?

AT
It was passed down to me from my father, who was an artist.

PM
Is it hard to be a designer in Karakalpakstan?

AT
Older generations criticise my design choices, which take inspiration from traditional Karakalpak styles and silhouettes. They don't think they should be altered and should remain in their original form. They believe that modernity shouldn't influence them.

PM
Is there a wider community of designers here?

AT
Not yet. But I hope that soon there will be.

Gulnara Joldasbaeva, 23, project coordinator and environmentalist

GJ
I was born in Nukus and originally studied to be a Russian language teacher — but I'm more interested in journalism and topics like equality and ecology. I was going to teach kindergarten but instead after graduation I moved to Tashkent and worked as a journalist and a Karakalpak language teacher (I have some videos on YouTube!).
Eventually I came back to Nukus because I missed my city and my parents, and started working at the Global Green Growth Initiative as communications assistant on a project which aims to address the impact of the Aral Sea crisis by helping people to establish climate-resilient agri-businesses.

PM
What kinds of things did you do?

GJ
We worked in the four main districts of Karakalpakstan — Kegeyli, Bozataw, Chimbay and Karauzyak — closest to the Aral Sea basin. We provided farmers with equipment such as drip irrigation systems, sprinklers and hose reels, which they could not afford otherwise. We planted windbreaks with rows of trees. We also ran training sessions for teachers, nurses and students about sustainable agriculture. Gulzar Toreniyazova from the International Innovation Center for the Aral Sea Basin (IICAS) led a session training women with disabilities about how to grow microgreens. It's great because they can work at home and sell the microgreens to restaurants.

PM

What do you do outside of work?

GJ

Stand-up culture is beginning to develop in Nukus. I'm a huge comedy fan, so I try not to miss any events. I also really like going to the theater. Everyone already knows me there — because I go so often. I must admit that isn't all that much entertainment for young people in Nukus (though I'm thinking about organising some events myself). Maybe that's why I prefer the countryside, traveling around the regions of Karakalpakstan and discovering interesting places.

PM

Do you plan to stay in Karakalpakstan forever?

ISLAMBEK DAULETIYAROV

If the situation worsens, I might move. When I was little, my grandfather often had breathing problems, so we frequently went to Tashkent. Whether I move or not depends on changing circumstances.

NURABULLA MATMURATOV

I have no plans to move. I spent two months in Tashkent. I had to communicate with Uzbeks while I was there, but I couldn't find common ground with them. When I flew back to Nukus, the first thing I did was go to the market to hear Karakalpak swearing. I would like the climate to improve. But since Karakalpaks have always been nomads, I think this will not be a problem for us.

INDIRA ZHUMABAEVA

I have brothers who live in Germany. I see how their lives are changing. I think I will also leave at some point, but I will definitely come back. What I would like to change here

is the education system. Schools don't prepare students to study abroad, even though they may wish to. To enter a university, you need to take additional courses that not everyone can afford. We cannot choose subjects we have never been taught. Instead, we study unnecessary subjects from a fixed curriculum.

GULNARA JOLDASBAEVA

It's normal to migrate and live in other places. We're global people. My home is my family, in the end, and I can take them with me. If I could change one thing here it would be to fix the problem of water distribution. But I haven't heard any good forecasts. On the contrary, all I hear is that there will soon be no water at all. So, I might also move for the sake of my future children. But right now I feel like I'm in the right place. I love the city, I love the people. Maybe it's just my comfort zone speaking, but I don't want to leave.

Evening on the Amu Darya by Kydyrbai Saipov (1966). Courtesy of the State Museum of Arts of the Republic of Karakalpakstan named after I. V. Savitsky

Epilogue: The Aral School

Jan Boelen

The Belgian curator of design Jan Boelen outlines his plans for the Aral School, a new initiative that intends to use design and bioregional practice to connect a broad range of sciences, industries, cultures and traditions, and formulate proposals for a sustainable future.

In October 2025, an interdisciplinary group of twenty postgraduates will become the inaugural participants in the Aral School, a new, experimental and speculative programme for the Aral Sea region. The Aral School will focus on production, research and exchange within the field of contemporary culture, to confront a current crisis of imagination and to tackle a variety of global topics which require visionary responses. These issues are particularly acute when we consider the bioregion of the former Aral Sea.

The concept of bioregionalism offers an alternative organising principle to redefine how we think about material flows, political governance and civil society. Rendered as a verb, "bioregioning" means moving activities within the natural boundaries of a bioregion — often defined by a watershed or geological area – seeking to sustain or revive the health of local ecosystems. It means using the bioregion as a template for organising and making. While bioregions are landscapes, bioregioning is an attitude and approach that is less about redefining borders — what is in and what is out — than it is about reconnecting to the local landscape and its inbuilt cycles. Perhaps even more than this, it is about creating a network of relevant knowledge to ensure that critical decisions are made in the best interest of the bioregion, and that local citizens have greater agency in those decisions.

The overlaps between natural boundaries and political jurisdictions are complex, often incoherent and make no guarantee of mutual support. The opportunity, then, of bioregional thinking is to create what the Belgian chemist Ilya Prigogine called "islands of coherence" in a "sea of chaos." Coherence emerges when the activities of a landscape, its people, its knowledge systems and its politics align to the benefit of all. This is truer than ever in a world where climate resilience will often be best understood and delivered by local citizens in dialogue with central governments.

To date, bioregioning has been put forward as a form of design practice, but what are the implications of this work at a more

strategic level? What are the obstacles preventing bioregionalism from going mainstream? What ingrained systems and patterns of thought need to change? What political or economic structures should be adjusted, and, finally, what are the policy measures that could support bioregional organising and citizen participation?

We at the Aral School believe that we can find both things and knowledge for this transition by bringing different disciplines together and incorporating both local and global perspectives. What we understand by "finding" here refers to a new way of working, built not from fixed research questions, but from sharing individual ideas and creating prototypes. These prototypes will function as conversation pieces between possible actors in the transition, bringing ever-more people to the table to connect with needs, with history, with science, data, the arts, culture, the non-human, the economy and technology. In this way, the school will function as a platform where we develop scenarios around the ideas that emerge.

Issues of sustainability and pollution are often referred to as "wicked problems" because they demand a multitude of perspectives and design approaches to solve. Materials, beauty and aesthetics are crucial tools in this complex process. This means that everywhere, from product design to urbanism, you see that social, critical and speculative methods must be included, a constellation of tools that lead to the development of something truly innovative.

This kind of framework, provided by the Aral School, will allow participants to share their work and their knowledge with the world. Depending on the context, the content and the maturity of the project, we will choose an appropriate medium for the messages our prototypes are able to transmit. This might be an object, a product, a movie, or an exhibition. It could be a book or a single text. However it begins, there will be ongoing loops and iterations, integral to any design process, encouraging a new landscape to evolve.

The Aral School will thus attempt, through design, to connect different sciences, industries, cultures and traditions, with the goal of formulating proposals for a sustainable future. Our prototypes are unlimited in scope: the ambition ranges from the molecular to the cosmic, formed within a global future laboratory. In a sense, the Aral Sea will become an "island of coherence" and a bioregion where all the most urgent concerns of today come together. Soil, water, energy, food, textiles and air quality — these are all vital topics of contemporary life and of the future. These are the issues we need to address if we are going to survive.

Jan Boelen is a distinguished curator specialising in design, architecture and contemporary art. He previously led the master's program in social design at the Design Academy Eindhoven and served as rector of the Karlsruhe University of Arts and Design from 2019 to 2023. He is currently artistic director at Atelier LUMA, an experimental design laboratory in Arles, France.

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