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Geological
Survey

BGS INTERNATIONAL

Our partnerships in Central Asia



Acknowledgements

Our international work would not be possible without the collaboration of our partners in the Central Asian region and beyond, and the British Embassy network.



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BGS International

Global partnerships for a connected future

The British Geological Survey (BGS) is the world's oldest geological survey. We are proud to collaborate globally with governments, industry and research organisations to provide scientific expertise, innovative solutions and a commitment to delivering shared value.

As a trusted international partner, we help decision makers understand the critical role of the subsurface in supporting resilient economies, sustainable environments and robust infrastructure. Through our world-leading geological data, insight and expertise, we work across borders to tackle some of the world's most significant challenges, from hazard mitigation to resource security.

I am pleased to introduce this prospectus of BGS's activities in Central Asia, showcasing how our

partnerships are delivering lasting value across the region. Working closely with governments, geological surveys, industry and research organisations, we are helping to unlock the potential of the subsurface to support sustainable development, resource security and economic resilience.

As the director of BGS International Geoscience, I am proud to highlight collaborations that are translating scientific expertise into real-world outcomes. The examples that follow demonstrate the strength of these partnerships, the impact they are achieving today and the opportunities they create for future collaboration and shared success.

Thank you for your time and consideration.

Dr Maggy Heintz
Director of BGS International Geoscience



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Delivering value across Central Asia

Central Asian countries are pursuing ambitious programmes to:

- strengthen water security
- develop critical mineral resources
- improve climate resilience
- modernise their geoscience capabilities
- diversify their economies

Governments across the region have identified high-quality geological information, digital transformation and sustainable natural resource management as essential foundations for future economic growth and investment.

BGS works in partnership with governments, geological surveys, development organisations and industry in Central Asia to support these ambitions. Drawing on our internationally recognised scientific expertise, we support partners in strengthening their geoscientific capability, making informed decisions and creating opportunities for sustainable and resilient development and investment.

Water security is emerging as a particularly important regional challenge. Increasing pressures on shared water resources, including population growth

and climate change, are resulting in the need for improved groundwater characterisation, monitoring and evidence-based management. BGS helps partners understand groundwater systems, assess long-term resource sustainability and develop the scientific evidence needed to support climate adaptation and sustainable development.

Countries across the region are also trying to increase the value derived from their mineral resources through enhanced geological exploration, improved resource assessment and growth in domestic processing industries. BGS supports responsible resource development goals through sharing its expertise in geological mapping, geochemistry, mineral systems analysis, critical raw materials and investment-ready geoscientific data.

However, our approach extends beyond technical delivery. Through long-term partnerships, training programmes and knowledge transfer, we help develop specialist skills and strengthen national capabilities. By combining our world-class science with practical implementation experience, we can help countries in Central Asia attract responsible investment, strengthen environmental stewardship and achieve their long-term development goals.



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Trusted partnerships, lasting impact

Central Asia faces complex challenges that demand strong partnerships, trusted scientific expertise and long-term capacity strengthening. As a globally respected geoscience organisation, BGS works alongside governments, geological surveys and international partners to deliver practical, evidence-led solutions that support sustainable development and informed decision making.

Our offer

BGS helps organisations across the globe strengthen the management, accessibility and use of geoscientific information, build resilience to environmental and climate-related challenges, and promote sustainable economic growth through the responsible development of natural resources. Through collaboration, knowledge exchange and technical expertise, we support institutions in strengthening the capabilities needed to address current priorities and future opportunities.

Our expertise covers the full range of earth sciences; however, the focal areas outlined on the following page showcase where BGS can deliver particular value in partnership with organisations across Central Asia.

Our technical expertise

Groundwater and climate resilience

As the climate changes and populations grow, groundwater is becoming increasingly important across Central Asia. BGS provides the scientific evidence needed to strengthen water security, improve climate resilience and support sustainable resource management. We provide expertise in:

- groundwater assessments, aquifer characterisation and hydrogeological mapping
- water security risk assessment, groundwater modelling and climate resilience planning
- earth observation applications for monitoring droughts and assessing climate impacts
- water quality assessment and monitoring
- capacity strengthening and technical training
- databases, monitoring networks and renewability assessments

Digital transformation

Across Central Asia, organisations are modernising geoscience information systems to improve data access. BGS supports this through development of data infrastructures, digital workflows and information management systems to maximise the value of data.

Key areas of expertise include:

- digital transformation strategies and implementation roadmaps
- creating geological data centres and databases
- providing repository solutions for geological core and implementing sample management systems
- digitising legacy maps, records and reports
- online data delivery platforms and metadata catalogues
- artificial intelligence and machine learning applications for geoscience
- skills development and technical training

Resource security and decarbonisation

Central Asian governments are increasingly focusing on critical minerals, creating domestic value, securing supply chains and transitioning to lower-carbon economies. Responsible resource development helps countries to advance their critical mineral strategies and support the energy transition. Our capabilities include:

- pre-competitive geoscience data acquisition, management and dissemination

- mineral prospectivity mapping and mineral systems analysis
- geochemistry, petrography and geometallurgy
- responsible mining and environmental, social and governance research and advisory services
- carbon capture and storage assessments and carbon management strategies

Geological hazards and modern geological mapping

Central Asia faces significant risks from geological hazards. Robust geological information underpins risk reduction and resilience planning. Our technical capabilities include:

- earthquake, landslide and subsidence assessment and monitoring
- multi-hazard risk assessments and resilience planning
- modern geological mapping and digital survey workflows
- remote sensing, earth observation and 3D geological modelling
- training in assessment and mitigation of natural hazards

Our work at a glance

DIGITAL TRANSFORMATION CASE STUDY

Empowering digital transformation through data

BGS is working across Central Asia to co-design digital solutions to drive countries' digital transformation agendas. Storing legacy geological information in digital formats will strengthen geological surveys' capacity and allow easier dissemination of geological data to stakeholders.

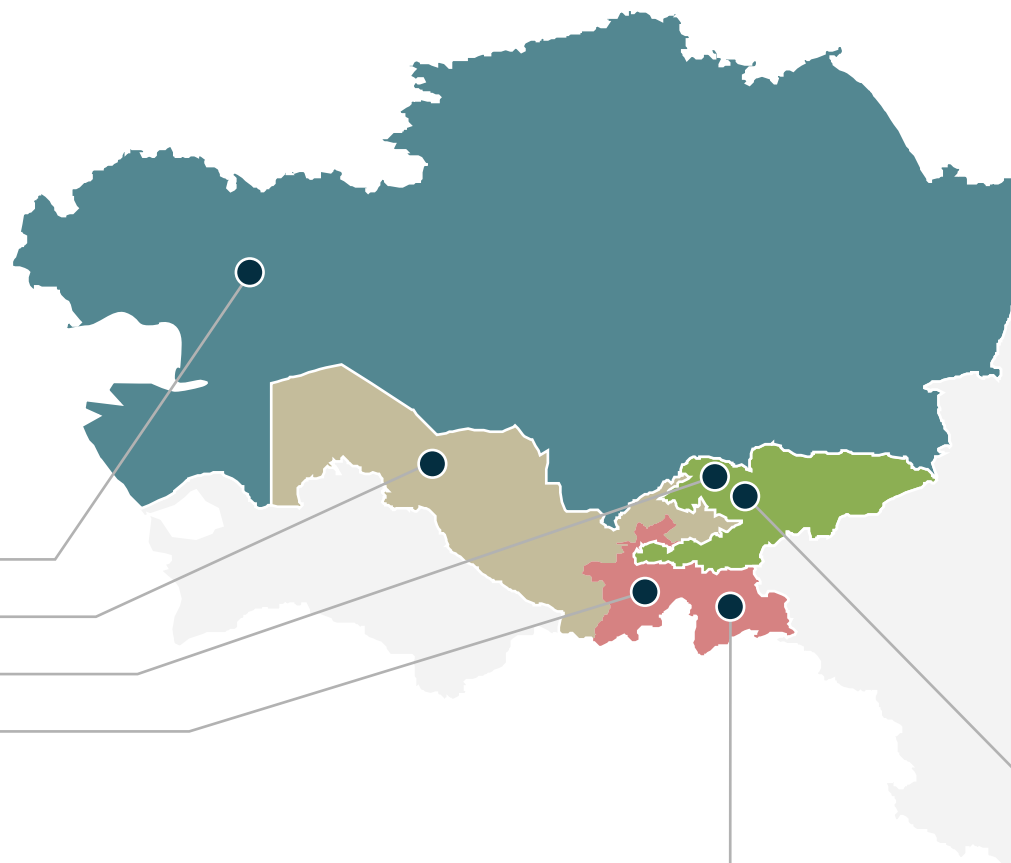
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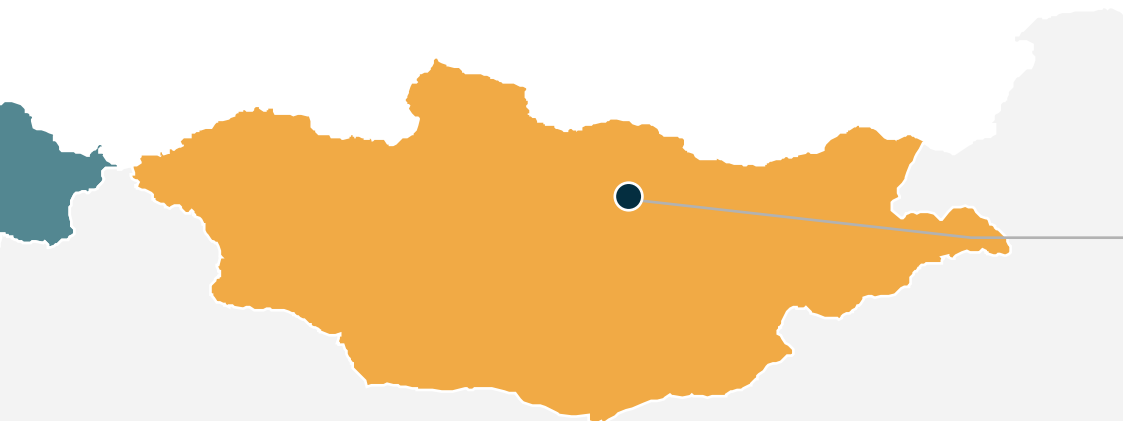
MAPPING CASE STUDY

Field-based training in Tajikistan

By combining field-based learning with expert technical support, BGS worked with Main Department of Geology under the Government of the Republic of Tajikistan to interpret complex geology, understand mineral deposits and inform evidence-based decision making.

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HAZARD RESILIENCE CASE STUDY

Monitoring the Kambarata-2 dam

BGS provides essential multi-hazard support to Central Asian countries, exploring potential impacts on populations and infrastructure. This includes work on the Kambarata-2 dam in Kyrgyzstan, mapping potential hazards around the dam site and informing more resilient design.

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- Kazakhstan
- Tajikistan
- Kyrgyzstan
- Uzbekistan
- Mongolia



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RESOURCE SECURITY CASE STUDY

A Mongolian minerals roadmap

BGS is working with and supporting the Mongolian National Geological Survey in exploring its critical mineral potential, developing baseline geological data to enable a better understanding of resources in the country and attract investment potential.

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GROUNDWATER AND CLIMATE RESILIENCE CASE STUDY

Securing water resources in Central Asia

Providing the scientific evidence needed to manage and protect groundwater resources, BGS is supporting Central Asian countries to build long-term water security in a future shaped by climate change.

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THEME ONE

Groundwater and climate resilience

Central Asia is one of the world's least water-secure regions, with many areas receiving less than 400 mm of annual rainfall. Climate change is further exacerbating this challenge, with rising temperatures accelerating glacier retreat across the region. As glaciers underpin many major river systems, their loss is placing millions of people at risk of water insecurity and increasing pressure on already vulnerable resources. Understanding how communities can adapt to these changes is essential for building long-term resilience.

As in many water-scarce regions, the sustainable development of water resources has the potential to play a critical role in strengthening climate resilience and improving water security. However, effective management is often constrained by limited evidence on the extent, availability, quality and sustainability of these resources.

BGS provides the scientific evidence and technical expertise needed to support informed water resource management and climate adaptation. We help identify and characterise resources that can underpin sustainable development, assess their long-term viability and design monitoring programmes that enable effective stewardship. Through collaboration with geological surveys, water authorities, development partners and international organisations, our work supports evidence-based investment decisions, strengthens institutional capacity and informs policy.

GROUNDWATER AND CLIMATE RESILIENCE

Case study

Securing water resources in Central Asia

BGS is working with the Central Asian Regional Glaciological Centre (a UNESCO centre) and the University of Reading to investigate how meltwater from glaciers interacts with the aquifers that provide drinking water across the region. Using stable isotopes, dissolved gases and water chemistry, we are tracing the movement of water from high mountain glaciers, through rivers, springs and canals, to groundwater systems across Kazakhstan, Uzbekistan and Kyrgyzstan.

The project combines field-based monitoring, hydrogeological expertise and advanced geochemical techniques to build a clearer picture of how water moves through the landscape. By systematically sampling surface water and groundwater, the team is identifying the connections between glaciers and aquifers and assessing how they may change as glaciers continue to retreat.

Early findings indicate that the large aquifers in the plains, which are formed of sediments transported from the surrounding mountains, have significant potential to act as natural reservoirs. These

groundwater resources could help offset changes caused by increased glacier melting, providing an important source of resilience for the communities



and economies that depend on reliable water supplies.

By providing the scientific evidence needed to manage and protect groundwater resources, this project will help Central Asian countries build long-term water security in a future shaped by climate change.

PARTNERS

- Central Asian Regional Glaciological Centre
- University of Reading

We are helping safeguard future water supplies by understanding how groundwater can buffer the impacts of rapid glacier loss in Central Asia.

ALAN MACDONALD, HEAD OF GROUNDWATER



THEME TWO

Digital transformation

As society increasingly embraces a digital-first future, geoscience organisations have a critical role to play in connecting people, data and technology to improve both understanding and management of the geological environment.

Geological survey datasets are valuable national assets. Transforming this data into accessible, interoperable and user-focused digital platforms unlocks economic opportunities, supports evidence-based decision making and enables the sustainable management of natural resources.

A key focus of BGS's international work is supporting partner organisations in strengthening their capabilities in digital geoscience and 3D geological modelling. By integrating, visualising and analysing subsurface information in three dimensions, organisations can develop a more comprehensive understanding of geological conditions and make informed decisions about the future use of the subsurface.

Through expert technical assistance, targeted training programmes, technical workshops, collaborative projects and knowledge exchange, BGS helps build the digital systems, skills and capacity needed to adopt and apply advanced digital geoscience approaches. These capabilities generate new insights, enhance decision making and support sustainable development, resilient resource management and long-term environmental stewardship.



DIGITAL TRANSFORMATION

Case study

Empowering digital transformation through data

Central Asian countries have legacy Soviet extractive sectors and their geological surveys hold huge amounts of data crucial to unlocking, as well as de-risking, geological opportunities.

Many of these data sources are still in analogue format or have been digitised in a fragmented manner, resulting in a lack of interoperability. A lack of online delivery platforms also means the data is inaccessible to stakeholders.

Since 2017, BGS has worked with the geological survey organisations of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan to strengthen their ability to support the clean energy transition, through provision of their own digital geological data. Our work has assisted these institutions in acquiring, managing, analysing and disseminating digital geological data, as well as strengthening the geological skills essential for improved management of critical minerals.

Sustainability is a core aim of our work in Central Asia. By co-designing digital systems with our partners

and facilitating knowledge exchange, advice and support, we ensure that expertise remains within the geological surveys and that digital solutions for accessing and disseminating data are sustainable for the long term. In doing so, we have empowered our partners to drive their own digital transformation agendas.

A key topic throughout our collaborations has been empowering geological organisations to best use their data. Through our work, we aim to enable them to deliver their own data to their own stakeholders.

PARTNERS

- Kyrgyz Geological Service and Kyrgyz Geological Survey
- National Geological Survey of Kazakhstan
- The Main Department of Geology of the Government of Tajikistan
- The Ministry of Mining, Industry and Geology of the Government of Uzbekistan

Our work has assisted these institutions in acquiring, managing, analysing and disseminating digital geological data.

NIKKI SMITH, INTERNATIONAL DIGITAL LEAD



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THEME THREE

Hazard resilience

Over the last century, Central Asia has experienced some of the world's most destructive earthquakes. These seismic events can have profound consequences, resulting in significant loss of life, widespread displacement and extensive damage to critical infrastructure.

Across the region, active faults accumulate tectonic strain over extended timescales, often spanning hundreds to thousands of years, before releasing the stored energy in major earthquakes. In addition, landslides and land subsidence pose significant threats of large-scale surface movement alongside other hazards such as liquefaction.

BGS addresses these challenges by applying advanced monitoring technologies, susceptibility assessments and sophisticated hazard modelling. Using scenario-based approaches, we evaluate the potential impacts of major hazard events occurring under present-day conditions, while also considering the cascading effects and interactions between earthquakes, landslides, liquefaction, flooding and subsidence.

This integrated, multi-hazard framework enables stakeholders to better understand and quantify risk and identify areas where infrastructure damage, economic losses and casualties are most likely to be concentrated. It also aids in assessing the factors that can amplify impacts, such as construction standards and local geological conditions. By providing robust scientific evidence and actionable insights, BGS supports disaster risk reduction and long-term, evidence-based development planning across the region.

HAZARD RESILIENCE

Case study

Monitoring the Kambarata-2 dam

Kyrgyzstan is currently undergoing rapid economic growth and infrastructure development. A key project, the Kambarata-2 dam, is planned for construction across the Naryn valley and is expected to contribute significantly to the country's energy supply. However, steep mountain slopes on either side of the Naryn valley are prone to large landslides and an active fault running through the valley has the potential to generate strong earthquakes.

BGS is part of a project led by the University of Oxford to support local stakeholders to map these hazards and assess their potential impact on the dam. Using a multi-hazard approach, we are exploring potential scenarios such as an earthquake triggering a large landslide into the reservoir, possibly generating tsunami waves that could overtop or damage the dam. Our work will help improve understanding of risk and inform more resilient infrastructure design.

On a wider scale, BGS provides essential information on earthquakes and volcanic activity to Central Asian countries to support disaster preparedness, and early warning and anticipatory action and response. BGS, in collaboration

with the universities of Oxford and Leeds and local scientists, is using an earthquake scenario approach to explore the potential impacts if a major earthquake were to happen in Central Asia today. This enables the assessment of potential fatalities, building and infrastructure damage and economic impact, as well as understanding of conditioning



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factors such as building type and local geology, which amplify these impacts. By understanding the current conditions that increase risk, we can better target mitigation efforts and support the development of long-term resilience.

PARTNERS

- Institute of Seismology of the National Academy of the Sciences Kyrgyz Republic
- University of Leeds
- University of Oxford

By understanding the current conditions that increase risk, we can better target mitigation efforts and support the development of long-term resilience.

EKBAL HUSSAIN, REMOTE SENSING GEOSCIENTIST



BGS International

THEME FOUR

Resource security

Governments, investors and industry stakeholders are under increasing pressure to secure reliable, responsible and transparent supplies of the metals and minerals needed to support the global energy transition.

Achieving this objective is often complicated by fragmented, incomplete or inaccessible geological data, creating uncertainty around resource potential and investment opportunities. At the same time, growing environmental, social and governance, or ESG, expectations and evolving regulatory requirements are increasing the need for evidence-based approaches to responsible resource development.

In many regions, valuable geological information remains locked in legacy datasets and analogue records that are difficult to access, integrate and apply within modern digital workflows. Institutional capacity constraints can further limit the effective management of mineral resources, reducing opportunities to attract investment, strengthen governance and support sustainable economic growth.

BGS combines almost 200 years of geological expertise with advanced digital, analytical and multidisciplinary capabilities to deliver integrated mineral resource intelligence. We support the collection, management and interpretation of geological data at regional and national scales, underpinned by mineral systems research, mineral prospectivity analysis and geometallurgical studies. Our capabilities also encompass critical minerals intelligence, supply chain analysis and circular economy assessment, providing insights that support strategic decision making across the resource value chain.

RESOURCE SECURITY

Case study

A Mongolian minerals roadmap

Mongolia is a country with significant opportunities for development. It has the geological potential for rare earth element resources, particularly in the Gobi Desert region, amongst many other critical minerals. To boost its economy, the country is investing in efforts to better understand and develop its resources.

BGS and the Mongolian National Geological Survey (MNGS) signed a Memorandum of Understanding

that establishes a partnership based on several areas of cooperation, including geological mapping, hydrogeology and critical minerals.

A roadmap was signed between the British Embassy and the Ministry of Industry and Minerals Resources of Mongolia in 2025, which highlighted the need for collaboration on geology and resources in the country. BGS was a key partner in the development of the roadmap, providing insight, technical assistance and review, and is a named partner.

Exploration for critical minerals in Mongolia is ongoing and MNGS plays a key role in developing baseline geological data for this purpose. BGS undertook a geological scoping visit in February 2025, delivering a report on rare earth element mineral deposits and hydrogeology in the South Gobi region.

Mongolia has the potential to be a major producer of critical minerals in the future due to the prospective, yet underexplored, geology and BGS is supporting MNGS to deliver that potential.



PARTNERS

- Mongolian National Geological Survey

Mongolia has the potential to be a major critical minerals producer and BGS is supporting MNGS to deliver that potential.

EIMEAR DEADY, ECONOMIC GEOLOGIST



THEME FIVE

Mapping

Field-based training is a vital part of geological capacity strengthening, providing geoscientists with the practical skills they need to observe, collect, analyse and interpret geological information in real-world settings.

While advances in digital technologies and remote sensing continue to transform the geosciences, field expertise remains essential for validating data, understanding geological processes and developing robust evidence bases for decision making.

Strong field capabilities underpin the work of geological survey organisations, enabling them to map geological resources, assess geological hazards and provide authoritative scientific advice to governments, regulators and industry. This is particularly relevant when it comes to the exploration and mining sector. Effective field-based observations and data collection are critical to ensuring that geological assessments are accurate, reliable and aligned with international best practice.

BGS draws on its multidisciplinary expertise to design and deliver high-quality field training programmes, technical excursions and practical learning initiatives to partners. Our approach combines scientific excellence with hands-on experience, enabling participants to apply knowledge directly in the field while strengthening their technical and professional capabilities.

Through tailored training and collaborative learning, BGS supports institutional capacity strengthening and the exchange of best practice to attract responsible investment and long-term economic development.

MAPPING

Case study

Field-based training in Tajikistan

BGS delivered multidisciplinary expertise in Tajikistan through collaboration with the Main Department of Geology under the Government of the Republic of Tajikistan, providing training and technical support to strengthen local capability through two focused fieldwork expeditions. Each expedition addressed a different geological topic: the first focused on metamorphic geology, structural geology and plate tectonics in the Pamir region, while the second focused on critical mineral and precious metal mineralisation, traversing the southern Tien Shan mountains.

Field-based training is widely recognised as an essential component of geological capacity strengthening, helping to build skills in observation, analysis, interpretation and data collection. These skills underpin the work of geological survey organisations, enabling scientists to interpret complex geological data and make informed, evidence-based decisions. This is particularly relevant to the exploration and mining sector.

By investing in skills, knowledge exchange and collaborative fieldwork, these expeditions strengthened local geological expertise and enabled



valuable technical engagement that will support future geoscience collaboration in Tajikistan.

PARTNERS

- Main Department of Geology under the Government of the Republic of Tajikistan

Field-based training is widely recognised as an essential component of geological capacity strengthening.

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