IWES

INNOVATIVE WATER & ENVIRONMENTAL SOLUTIONS

COMPANY PROFILE

Contact

INNOVATIVE WATER & ENVIRONMENTAL SOLUTIONS

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1. COMPANY OVERVIEW

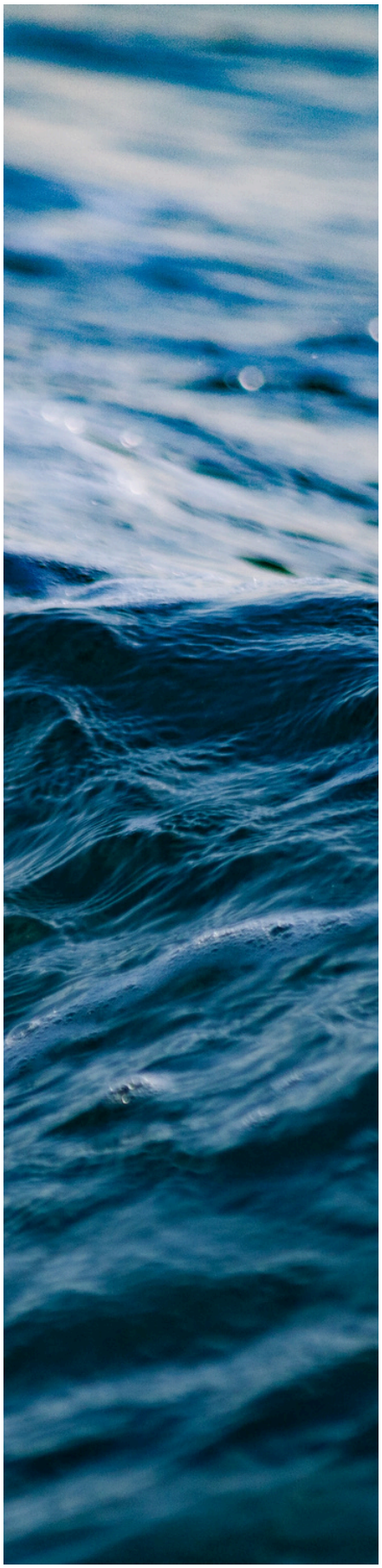
About Us

Innovative Water and Environmental Solutions (IWES), an international company based in Berlin, Germany, was founded in June 2019 and registered at the district court of Charlottenburg and finance office of Berlin. As a „Spin-Off“ company to GFZ Potsdam, our commitment lies in conducting scientific research with robust practical applications to combat climate change and mitigate its negative impacts. IWES specializes in offering science-based advisory services and support for water and environmental projects.

Goals

IWES aims at using innovative methods, data, and tools to enhance our understanding of nature and address emerging challenges in the water and environmental sectors. We have a strong focus on utilizing remote sensing-based products as a data source and advanced Geographic Information System (GIS), complemented by proficiency in various programming languages to solve complex issues. Additionally, the company provides services aimed at developing new operationalized tools and methods to enhance environmental monitoring capabilities.

2. OUR PROCESS



Mission

Our mission is rooted in conducting cutting-edge scientific research, with a robust emphasis on practical implementation. We are dedicated to addressing the challenges posed by climate change and actively working towards the development of effective mitigation strategies.

Vision

Our vision is to lead the way in addressing the global challenge of climate change. We aim to pioneer scientific research, advancing our understanding of nature and translating these insights into practical solutions that make a meaningful impact on our environment. We envision a future where our innovative approaches and specialized expertise contribute significantly to creating a sustainable and resilient world.

3. COMPANY VALUES

1. Expertise and Collaboration

We value the diverse and extensive expertise that each team member brings to IWES. We believe in the power of collaboration, where our collective knowledge and prowess contribute to addressing the complexities of water and environmental challenges.

2. Innovation and Continuous Learning

At IWES, we thrive on innovation. Committed to utilizing advanced methods, data, and tools, we stay at the forefront of water and environmental sciences. We foster a culture of continuous learning, encouraging our team to embrace new ideas and approaches.

3. Environmental Stewardship

Our commitment to combating climate change is at the core of our values. We actively engage in fields such as climate change impact assessments, water resource monitoring, and disaster risk reduction, aiming to be responsible stewards of our environment.

4. Client-Centric Solutions

We tailor our services to meet the diverse needs of our clients. Our focus is on providing impactful and client-centric solutions through climate change impact assessments, model development, capacity building, disaster risk reduction, and expert advisory services.

5. Sustainable Solutions

Joining IWES means being part of a collective effort to create sustainable solutions for a better and more resilient future. We are dedicated to making a positive impact on our planet, and our values reflect a commitment to environmental sustainability and long-term success.

4. FIELD OF EXPERTISE

- ☑ Mountain Hydrology (Snow and Glaciers)
- ☑ Climate Impact Assessment on Water Resources
- ☑ Disaster Risk Reduction (DRR)
- ☑ Capacity Development
- ☑ Water Security and Political Dialog
- ☑ Impact of Water Availability on Agriculture Sector of Economy
- ☑ Agricultural Water Management and Irrigation Technology

Mountain Hydrology (Snow and Glaciers)

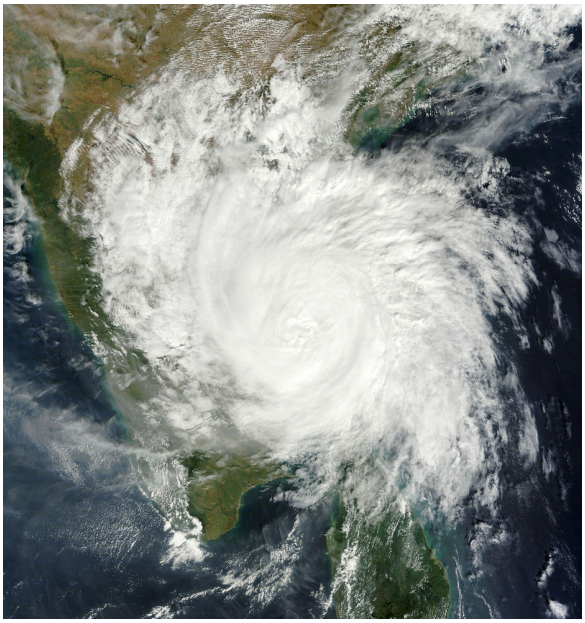
IWES boasts extensive expertise in mountain hydrology, with the co-founder, Abror Gafurov, notably creating a user-friendly MODSNOW tool for operational snow cover and snow depth monitoring, hydrological forecasting, and glacier monitoring using satellite data and modeling techniques. This tool is currently operational across all five Central Asian countries as well as South Asian countries such as Nepal and Pakistan, including their hydromet services, water organizations, and research institutes. Its application ensures an assessment of water availability in transboundary basins, promoting balanced and informed water distribution in the region.

In addition to cryosphere monitoring and hydrological forecasting, IWES brings valuable experience to glacier monitoring. For almost a decade, the co-founder of IWES has been actively engaged in glacier mass balance measurements through annual summer expeditions to selected glaciers in Central Asia.

The data collected during these expeditions (e.g. glacier shrinkage, accumulation, ablation) contributes to modeling studies of different projects.

Climate Impact Assessment on Water Resources

IWES utilizes complex hydrological models for climate change impact assessment on water resources. This involves hydrological simulations until the end of the 21st century for strategic river basins applying IPCC CMIP5 climate scenarios, and assessing climate impact on individual discharge components (e.g. snow, glacier, rainfall, groundwater).



Disaster Risk Reduction (DRR)

IWES has valuable experience in DRR, stemming from the founder's assignments in Central Asia for international organizations. The range of DRR services provided includes flood forecasting, debris flow, and landslides, to addressing mountain hazards associated with specific mass movements.

Capacity Development

IWES possesses extensive expertise in capacity building within the water and environmental sectors, derived both from past involvement in scientific projects and consultancy-driven capacity building activities.

Water Security and Political Dialog

IWES is actively engaged in projects centered around water security and fostering political dialogue in different regions of the world. The objective is to incorporate scientific knowledge to encourage discussions and initiatives related to water security in the region.

Impact of Water Availability on Agriculture Sector of Economy

IWES implements projects assessing future water shortage impacts on economies, particularly in agricultural production, considering climate as well as anthropogenic impacts.

Agricultural Water Management and Irrigation Technology

IWES brings practical and scientific expertise in sustainable irrigation and agricultural water use. Our work spans from policy-level analysis to field implementation of innovative technologies, responding to the increasing pressure on water resources due to climate change and outdated infrastructure.

For example, IWES developed a concept for a pilot project, “Enhancing Agricultural Efficiency through Solar-Powered Drip Irrigation in Uzbekistan” where water scarcity, outdated irrigation, and climate stress are major challenges.

The proposed concept compares traditional flood irrigation with solar-powered drip systems on identical test fields, measuring water and energy use, crop yields, and cost efficiency over a year. The goal is to create a replicable, economically viable model to support policy development, farmer training, and sustainable water use.

5. OUR SERVICES

Our range of services extends across hydrometeorology, climate impact studies, disaster risk reduction, and more, showcasing IWES's commitment to consultancy excellence. We take pride in delivering precise, innovative, and sustainable solutions that empower clients in navigating complex environmental challenges.

Consulting Services

- General field investigations
- Database development
- Modernisation and installation of hydrometeorological stations
- Climate impact studies
- Disaster Risk Reduction assessment studies
- Hydrological forecasting
- Snow cover monitoring using remote sensing data
- Processing of remote sensing products / satellite images
- Flood and drought forecasting using modelling tools
- Glacier monitoring / field expeditions
- Assessment of spatio-temporal changes in water availability on agricultural sector of economy

Capacity Building

- Geographic Information Systems (GIS)
- Remote Sensing
- R programming
- Data analysis
- Hydrological modeling
- Climate data processing and analysis (including bias correction and downscaling)

Software Development

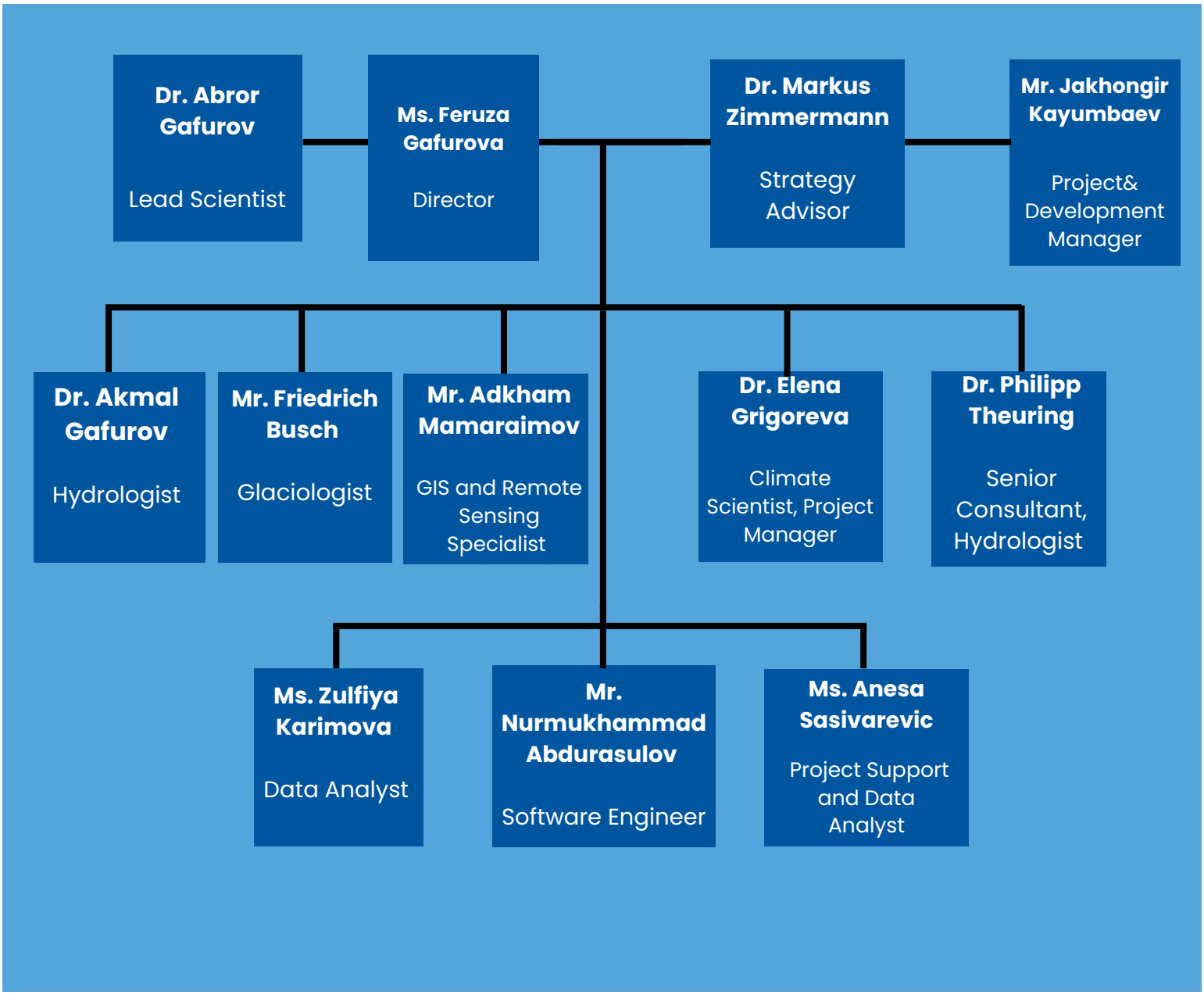
- Small task oriented programming routines
- Development of full software in the context of natural sciences

AI-Driven Services

- AI-Driven Hydrological Forecasting
- Deep Learning for Remote Sensing Analytics
- AI-Based Disaster Risk Prediction & Early Warning Systems
- Machine Learning for Water Resource Optimization
- Big Data Analytics for Hydrometeorological Monitoring

6. ORGANISATION AND PERSONNEL

Guided by our co-founder and Lead Scientist, who possesses 15 years of experience as a natural scientist and international development cooperation consultant, IWES is dedicated to meaningful scientific research with practical applications. Our diverse team of professionals collaborates to enhance the company's capabilities across various disciplines, positioning IWES to effectively address complex water and environmental challenges.



7. PROJECTS

Technical Assistance on Irrigation Norms in Uzbekistan / Central Asia

Client: World Bank

Duration of assignment: 6 months

Description of Project

The study conducted a comprehensive review of hydromodules and irrigation norms in Uzbekistan, examining their historical evolution, current usage, and the urgent need for climate-adaptive reforms amid growing water scarcity. It highlighted the inefficiencies of outdated Soviet-era practices and emphasized the potential of technologies like remote sensing and GIS to modernize irrigation planning and promote sustainable water management.

Challenge

Irrigated agriculture is vital to Uzbekistan's economy and food security, yet it operates under outdated Soviet-era irrigation norms that no longer align with today's climate realities. These legacy standards contribute to excessive water use, salinization, and inefficiencies in irrigation planning, especially in the face of increasing water scarcity, shifting cropping patterns, and institutional capacity constraints.

Solution

The project conducted a comprehensive review of hydromodule zoning and irrigation norms, tracing their evolution and assessing current practices across Central Asia.

By integrating remote sensing, GIS, and water balance modeling tools (e.g., MODIS, Sentinel, SEBAL), the team developed recommendations for climate-responsive, data-informed irrigation planning, and proposed a hybrid approach that balances technical rigor with stakeholder engagement.

Technical Advice for a Solar Irrigation Demonstration Project in Astrakhan

Client: German Govt (FFO & BMWK), Astrakhan State Univ **Duration of assignment: 18 months**

Description of Project

This project supported the development of Russia's first fully automated, solar-powered drip irrigation system, implemented at Astrakhan State University as a demonstration site for sustainable agriculture. IWES provided technical advice throughout the planning and installation process, facilitating collaboration between German and Russian partners.

Challenge

The Astrakhan region faces increasing pressure to adopt environmentally sustainable agricultural solutions due to rising temperatures, water scarcity, and outdated irrigation practices. However, the integration of clean energy into irrigation systems remained largely unexplored in the region, with limited technical experience and institutional capacity to implement such systems at scale.

Solution

IWES provided technical assistance to support the design and implementation of an innovative solar-powered irrigation system using German-Russian technology.

The project established a 4-hectare pilot site equipped for scientific monitoring and demonstration, offering a scalable model for sustainable irrigation that integrates clean energy, precision watering, and international cooperation.

General FbF feasibility study on mudflow scenarios in Kyrgyzstan, Tajikistan, and Uzbekistan

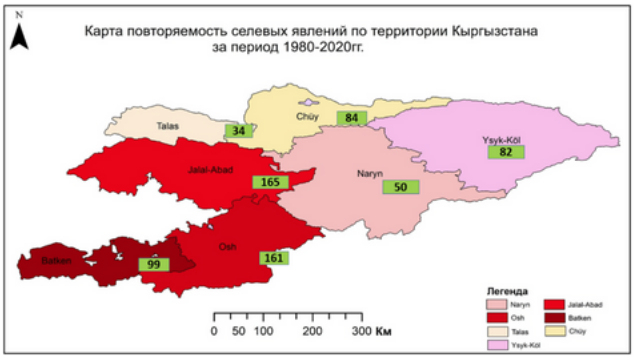
Client: German Red Cross **Duration of assignment: 6 months**

Description of Project

The project involved an in-depth study and analysis of mudflows in Central Asia, with a focus on the development of an Early Warning System (EWS) using the Forecast-based Financing (FbF) mechanism. This study was conducted to explore the feasibility of implementing Forecast-based Financing (FbF) for mudflow hazards in Tajikistan, Kyrgyzstan, and Uzbekistan.

Challenge

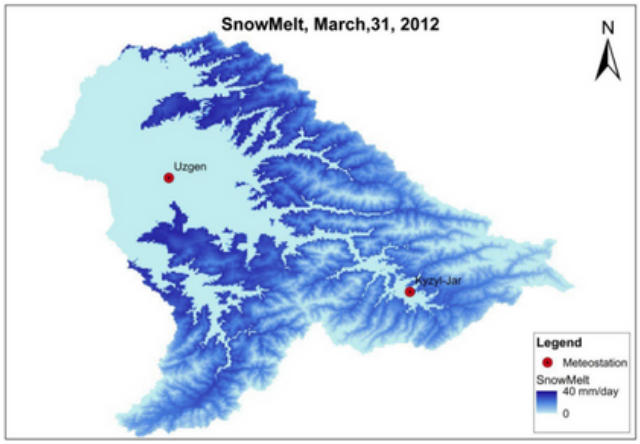
Mudflows are a severe natural hazard in Central Asia and pose significant challenges for the National Hydrometeorological Services (NHMS) in Tajikistan, Kyrgyzstan, and Uzbekistan. Mudflows hinder high-quality forecasts due to limited meteorological data, data management capacity, and the absence of standardized modeling tools, leading to qualitative forecasting based on short-term rainfall predictions.



Solution

Mudflow hotspot areas were identified using historical data, DEMs, land use, and soil information, along with climate data and models such as MODSNOW to determine high-risk periods linked to snowmelt and rainfall.

Collaborating with local communities, NHMS, and Red Cross/Red Crescent societies, IWES sought input to improve information flow and mudflow warnings, emphasizing awareness and capacity-building initiatives.



Recommendations for EAP´s

Creating guidelines for swift donor-sponsored Early Action programs aiding communities before and after mudflow hazards.

Enhancing snow accumulation and snowmelt monitoring in Central Asia

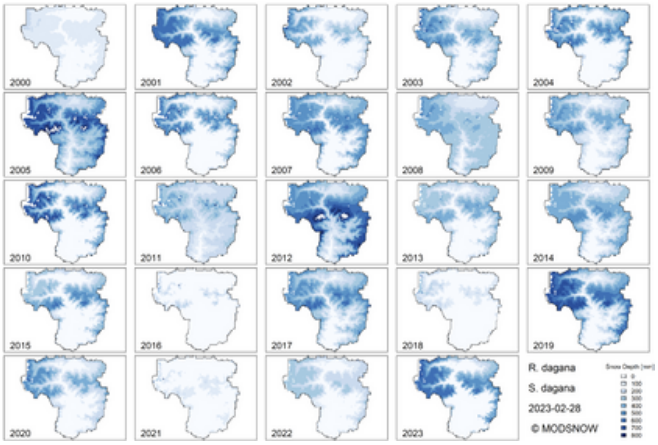
Client: World Bank **Duration of assignment: 11 months**

Description of Project

The consultant provided support in response to the need for a simplified and less data-intensive snowmelt approach. A strategic initiative was undertaken within the framework of the Central Asian Hydrometeorology Modernization Project (CAHMP) in 2020. During the assignment, the consultant provided crucial support in refining and testing the snowmelt approach in five carefully selected pilot river basins.

Challenge

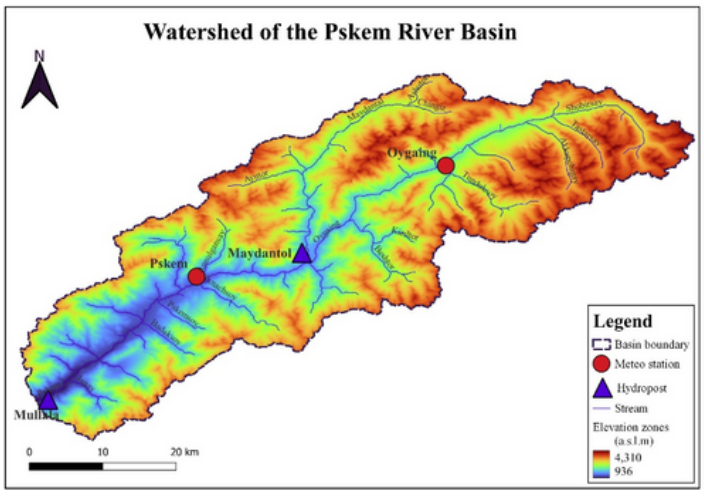
In Central Asia, snow holds paramount importance as a hydrological component. The winter accumulation of snow in the Pamir and Tian Shan mountains plays a vital role in ensuring water availability for hydropower reservoir refilling and agricultural production during the summer months. However, in situ monitoring data is very scarce.

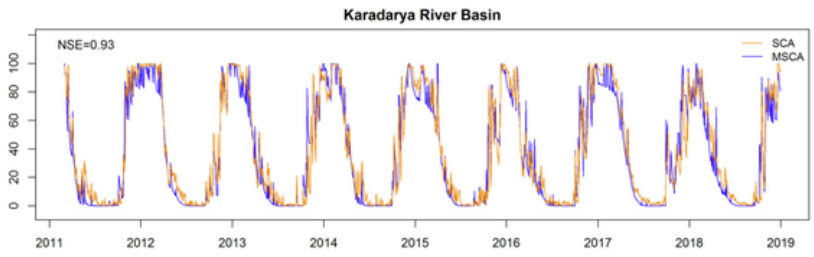


Solution

IWES has developed MODSNOW, a user-friendly tool widely applied in Central Asia for operational snow cover and snow depth monitoring, hydrological forecasting, and glacier monitoring. The tool involves applying the snowmelt module to the entire river basin, creating spatial layers of Snow Water Equivalent (SWE), snow depth, and daily snowmelt.

Verification of SWE and snow depth results was conducted using observational data from permanent meteorological stations or snow surveys. Additionally, temperature and precipitation were interpolated based on station data to a 500m resolution grid for the study region. Historical meteorological data (temperature and precipitation) were utilized to calibrate region-specific snowmelt parameters.





Assessment of Tajikistan disaster preparedness need

Client: World Bank **Duration of assignment: 10 months**

Description of Project

The Consultant supported the World Bank in helping Tajikistan and specifically the Committee of Emergency Situation and Civil Defence (CoESCD) better target planned activities. The consultant assessed the status, developed a baseline, and identified needs for modernizing disaster communication and information technology systems and capacity building for emergency response.

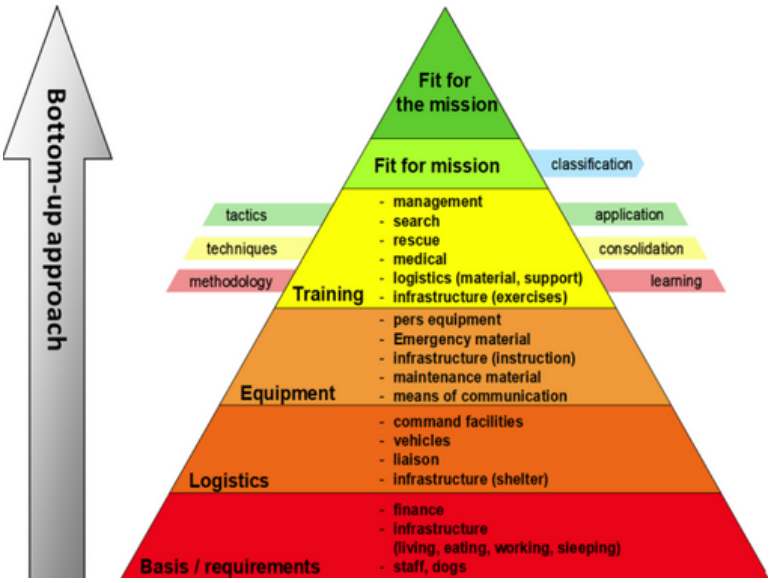
Challenge

Tajikistan faces heightened disaster risk and climate vulnerability, evident in frequent flash floods, mudflows, rockfalls, and avalanches, imposing a substantial burden on communities. The country anticipates climate change-induced temperature rises exceeding the global average, leading to intensified extreme climate and disaster events.

Solution

Based on the findings of the project, the World Bank initiated the Preparedness and Resilience to Disasters Project ("PREPARED") to support Tajikistan in its efforts to build back better from the 2021 floods and enhance its disaster risk management (DRM) capacities.

IWES, together with SwissTeamLeaders, visited the main and key facilities for Operational and Training purposes. IWES reviewed a Capacity Building Methodology, proven in global projects over the last two decades by governmental agencies (SDC, SHA, GIZ). The assessment utilized a bottom-up approach, evaluating current field conditions and identifying needs with appropriate priorities and urgency. This resulted in a comprehensive Plan of Action (PoA) with realistic, effective, and measurable goals.



Guidelines for Natural/Multi-Hazard Structural Mitigation in High Mountainous Regions of South and Central Asia

Client: Aga Khan Agency for Habitat **Duration of assignment: 25 months**

Description of Project

This project focused on preparation a guideline on safeguarding settlements, individual structures, and critical infrastructure elements from various natural hazards in High Mountainous Regions of South and Central Asia. The project included the identification of elements to be protected, such as entire settlements and individual infrastructure components (e.g., roads, bridges, irrigation channels). Critical facilities, including hospitals, schools, grain silos, water treatment facilities, warehouses, and essential administrative buildings, were carefully identified for special attention.

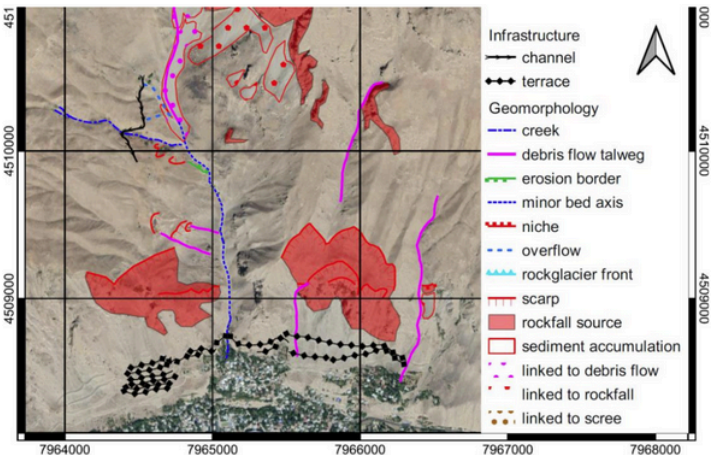
Challenge

In mountainous regions, where development and natural hazard risk management are intricately connected, the challenges of ensuring safety and sustainability are particularly complex. Settlements positioned on plluvial fans or flood plains, face periodic threats from debris flows, floods, or landslides for example. These processes pose significant risks. The management of risks from such natural hazards requires an integrated and systematic approach.

Solution

IWES, jointly with NDR Consulting and DSM Consulting (both Switzerland) focused on boosting resilience and safety in mountain regions threatened by natural hazards. A systematic framework, Integrated Risk Management (IRM), was provided, which encompassed pre-assessment, risk assessment, evaluation, and mitigation strategies, both structural and non-structural. This approach ensured that projects not only address current risks but are also adaptable to future changes, thereby securing investments and safeguarding communities.

The guidelines serves as a comprehensive tool for planners and engineers working on development projects in hazard-prone areas, aiming to enhance the sustainability of investments, ensure safer environments, and ultimately, increase the overall resilience of communities in mountain regions.



Development of Sectoral and Regional Climate Change Adaptation Plans in Uzbekistan

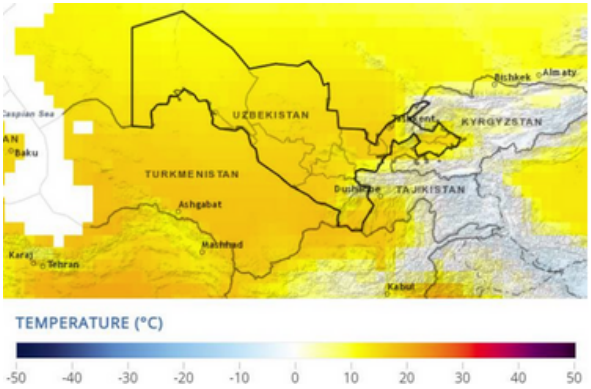
Client: United Nations Development Programme **Duration of assignment: 10 months**

Description of Project

The project prepared a National Adaptation Plan (NAP) for Uzbekistan, targeting the country's water management challenges in the Aral Sea Basin. It prioritized addressing reliance on transboundary rivers and heavy agricultural water usage. The plan aimed to boost adaptation capacity, identify vulnerabilities, and propose risk reduction and resilience enhancement strategies. It includes measures like adopting water-saving technology and optimizing hydropower for improved efficiency and safe water availability. Stakeholder collaboration, data analysis, and structured interviews guided its development, emphasizing cooperation across society for both structural and non-structural solutions.

Challenge

Uzbekistan's water sector is significantly challenged by climate variability and scarcity, impacted by dependency on transboundary water resources. The agriculture-dominated economy, consuming approximately 90% of water usage, is highly susceptible to the impacts of reduced water flows from glacial melt and changing precipitation patterns. The need to enhance policy, technology, and capacity to manage these shifts is urgent to secure water for irrigation, sustain economic stability, and protect ecosystem health.



Solution

To tackle these challenges, the National Adaptation Plan (NAP) for Uzbekistan was created by DEKONTA in partnership with international and local experts, including IWES, where a multifaceted strategy was proposed. This encompassed promoting water-saving technologies, enhancing digital monitoring, improving transboundary water cooperation, and upgrading irrigation systems. Capacity building and policy integration formed the backbone of this adaptive approach, aiming to build a resilient water management framework that can endure amidst the dynamic climate conditions.