

“German Water Diplomacy in Central Asia”

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Abstract:

Central Asia has a long history of challenges with water management. The region does not suffer from water scarcity, but its water resources are unequally distributed temporally and spatially. As a legacy of the Soviet Union, the five states of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) share a vast transboundary water infrastructure that necessitates transboundary cooperation on water management. However, attempts to cooperate on water management have not been successful. Water remains a highly contested resource and its provision is increasingly threatened by climate change.

Germany has been engaging in water diplomacy in Central Asia since 2008 with the Water Initiative Central Asia, also known as the “Berlin Process”, to support the five Central Asian states in the development of system of sustainable transboundary water management. The initiative included activities aimed at rehabilitating infrastructure, fostering transboundary cooperation, expanding research and data collection capacities, and training water professionals and public servants with capacity building measures. In 2020, it was continued by the Green Central Asia Initiative, which expanded the scope, aiming at fostering cooperation on adapting to the impacts of climate change in general. Academic research on these two water diplomacy initiatives has been limited, so this master thesis provides a comprehensive account of both by means of a document analysis of over 100 sources which discusses the goals, involved actors, structure and realised activities of both initiatives.

Based on an in-depth analysis of the reviewed literature, a conceptual framework of nine factors required for the establishment of a system of sustainable transboundary water management within the framework of water diplomacy has been developed. The nine factors are political assent, mutual benefit, financing, data, innovation, governance, capacity development, trust, and institutional anchoring. Each factor is required for a system of sustainable transboundary water management to be established between states and to persist over time, albeit at different stages of the water diplomacy engagement. This framework offers an analytical approach to assess the extent to which the respective water diplomacy activities contribute to fulfilling each of the factors, and therewith to the establishment of a system of sustainable transboundary water management.

The analysis finds that Germany’s water diplomacy engagement in Central Asia has provided a comprehensive approach that has addressed each of these factors. Therewith, Germany has substantially contributed to advancing the process of establishing a system of sustainable transboundary water management in Central Asia; however, the process is still ongoing, thus a final assessment cannot be made yet.

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Abbreviations

AA	German Federal Foreign Office
ASBP	Aral Sea Basin Program
BMUV	German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection
BMZ	German Federal Ministry for Economic Cooperation and Development
BIMBF	German Federal Ministry of Education and Research
CAIAG	Central Asian Institute of Applied Geosciences
CAREC	Central Asia Regional Economic Cooperation Program
CAWa	Research Network “Central Asian Water”
CRMCA	Climate Risk Management in Central Asia
CSWRMCA	Climate-Sensitive Water Resources Management in Central Asia
DAAD	German Academic Exchange Service
DKU	German-Kazakh University
DLR	German Aerospace Centre
EC-IFAS	Executive Committee of the International Fund for Saving the Aral Sea
ETH Zürich	Swiss Federal Institute of Technology
EU	European Union
GIS	Geographic Information System
GIZ	German Society for International Cooperation
GFZ	German Research Centre for Geosciences
ICSD	Interstate Commission on Sustainable Development
ICWC	Interstate Commission for Water Coordination of Central Asia
IFAS	International Fund for Saving the Aral Sea
IO	International Organisation
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
MLU	Martin Luther University Halle-Wittenberg
MODIS	Moderate Resolution Imaging Spectroradiometer
NGO	Non-governmental organisation
PIK	Potsdam Institute for Climate Research
RAP	Regional Action Plan
RCCAS	Regional Climate Change Adaptation Strategy for Central Asia

RDCWRM	Regional Dialogue and Cooperation on Water Resources Management
RWG	Regional Working Groups
SDC	Swiss Development Cooperation Agency
SDG	Sustainable Development Goals
SIC	Scientific Information Center
TIIAME	Tashkent Institute of Irrigation and Agricultural Mechanisation Engineers
UBAI	Ulugh Beg Astronomical Institute of the Uzbek Academy of Sciences
UN	United Nations
UNDP	United Nations Development Program
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USSR	Union of Soviet Socialist Republics
WMBOCA	Water Management and Basin Organisations in Central Asia Project

1. Introduction

Water is essential for human life. The growing impacts of climate change are increasingly limiting the availability of water, which exacerbates water scarcity and creates challenges of water distribution (Pohl et al., 2017). Water scarcity creates competition between states over its use, which can create tensions or exacerbate existing ones, and even cause conflicts (Islam & Repella, 2015). As an estimated 90% of humanity lives in countries that share a basin with another country, there is a substantial conflict potential associated with water (Salmoral et al., 2019). One example is Central Asia, where water management is inextricably linked with energy and security politics (Abdolvand et al., 2015) and disagreements over water distribution have repeatedly led to regional tensions and conflict (EBRD, 2019; Rheinbay et al., 2021). Central Asia is considered a ‘hot spot’ of climate change, which is projected to severely impact water availability in the region (Karthe, Chalov & Borchardt, 2015). Germany has been engaging in water diplomacy in Central Asia since 2008, supporting efforts to establish a system of sustainable transboundary water management that fosters cooperation and prevents conflict over the use of the shared water resources (Auswärtiges Amt, 2015).

Water diplomacy encapsulates a concept in academia and diplomatic practice aimed at preventing conflict and fostering cooperation over shared transboundary water resources (Sehring et al., 2022). There are over 276 transboundary river basins in the world, many without a joint system of sustainable transboundary water management (Choudhury & Islam, 2015). With ongoing economic and population growth, future projections estimate global water demand to rise by 55% by 2050, while more than half of the world’s population will live in water-stressed conditions (BMUV, 2023). Consequently, the growing discrepancy between rising water demand and decreasing water supply poses a substantial conflict risk. Simultaneously, water can also serve as a basis of cooperation between states that otherwise do not cooperate (Pohl et al., 2014). However, establishing transboundary cooperation on water resources management is a complex process that requires the consideration of various policy issues and scientific insight and that is dependent on various factors to ensure ongoing engagement (Choudhury & Islam, 2015).

In Central Asia, “water was and still is the most important and regularly contested natural resource” (Abdullaev & Rakhmatullaev, 2013, p. 849). Water is unequally distributed, both temporally and spatially (Schrader et al., 2009). Central Asia’s water management situation is peculiar because of the existence of an extensive transboundary water infrastructure, a legacy of the Soviet Union (Blumstein, Pohl & Tänzler, 2016). Hence, the

Central Asian states depend on transboundary cooperation for successful water management (Abdullaev & Rakhmatullaev, 2013). However, “non-cooperation tends to prevail” (Sorg et al., 2014, p. 72) and the Central Asian states utilise “all forces: political [...], economical [...] in order to achieve more control of water management at the interstate level.” (Abdullaev & Atabaeva, 2012, p. 111).

The topic of water management and water diplomacy in Central Asia is very broad and complex, with extensive research within and between many different academic disciplines. While water diplomacy in general and the water management struggles of Central Asia in particular have received extensive academic consideration, there is little research on third-party water diplomacy activity or impacts (Sehring et al., 2022). German water diplomacy in Central Asia as a whole has been assessed in only five academic publications (Abdolvand et al., 2015; Boyarkina, 2018; Eschment, 2011; Hakala, Mustasilta & Hadi, 2023; Schrader et al., 2009).

Germany is one of the states proactively engaging in water diplomacy efforts in basins across the world to promote peace, stability and regional cooperation (Hakala, Mustasilta & Hadi, 2023). The German government regards climate diplomacy as a preventive security policy, as climate change has become a factor and a threat in geopolitics (Auswärtiges Amt, 2022), and engages in conflict prevention by promoting the sustainable use of water and fostering transboundary cooperation between riparian nations (Bundesregierung, 2023). In 2008, the German Federal Foreign Office (AA) initiated the “Water Initiative Central Asia” together with the five Central Asian states Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. Also called the “Berlin Process”, it was a project aimed at fostering regional stability and prosperity by supporting the establishment of a joint system of sustainable transboundary water management in Central Asia. It was continued by the “Green Central Asia” initiative in 2020 (Hakala, Mustasilta & Hadi, 2023).

In this master thesis, three research aims are pursued to contribute to the academic discussion on water diplomacy in political science: First, writing a comprehensive account of German water diplomacy activity in Central Asia, specifically of the Berlin Process and the Green Central Asia initiative, to contribute to closing the existing research gap on German water diplomacy in Central Asia. Second, the development of a conceptual framework of nine fundamental factors required for the successful establishment of a sustainable transboundary water management. Finally, Germany’s water diplomacy activity in Central Asia is analysed with the framework to assess how Germany has been contributing to the establishment of a system of sustainable transboundary water management in Central Asia.

To this end, this master thesis seeks to answer the following research question: “*How has German water diplomacy activity in Central Asia contributed to the establishment of a system of sustainable transboundary water management?*” To answer this research question, it poses the following two sub-research questions: “*What activities have been realised within the framework of German water diplomacy in Central Asia?*” and “*Which factors are required for the establishment of a system of sustainable transboundary water management?*”

The research focus of this master thesis is on German water diplomacy in Central Asia, specifically the activities realised by the involved state actors and the organisations and research institutes employed by the German government to implement the goals of its water diplomacy initiatives. As it is a very specific and contextual topic, its composite parts – water diplomacy, Central Asia’s challenges with water management, and Germany’s general water diplomacy policy - are first succinctly explained to provide the necessary context for the analysis. In the chapter on water management in Central Asia, references to publications providing more detailed analyses of the respective topic areas are provided. The geopolitical aspects influencing Germany’s water diplomacy engagement in Central Asia are not discussed.

This master thesis is structured as follows: The second chapter explains the methodology applied in this master thesis. Subsequently, the third chapter discusses the emergence and importance of the theory of water diplomacy, providing a definition for this thesis, as well as assessing nine factors required for the establishment of a system of sustainable transboundary water management, which form the basis for the conceptual framework. In the fourth chapter, Central Asia’s water management struggles are succinctly explained. The chapter is separated in five subchapters, addressing the general geographic and demographic factors as well as the projected impacts of climate change on water availability in Central Asia, the history of water management in the region and its impact on water management today, the competing interests over water between the Central Asian states, past conflicts and cooperation attempts over water between the Central Asian states, and non-German water diplomacy activity in Central Asia. Next, the fifth chapter discusses German water diplomacy in Central Asia. The first subchapter analyses Germany’s general water diplomacy policy to situate it within Germany’s overall foreign policy, assessing the approaches and instruments it comprises. Subsequently, the second subchapter addresses the perspective of the German government on water management issues in Central Asia, assessing the reasons for Germany’s engagement in Central Asia. The third and fourth subchapters provide detailed accounts of the two programs of German water diplomacy in Central Asia, the Water Initiative Central Asia and the Green Central Asia Initiative, respectively. Next, the sixth chapter introduces the

conceptual framework, and then applies it to the findings of the fifth chapter to answer the main research question. Finally, the seventh chapter discusses the findings of the master thesis and provides a conclusion.

2. Methodology

To answer the research questions and complete the research aims of this master thesis, a qualitative research approach is applied. The first research aim, constructing a comprehensive overview of German water diplomacy activity in Central Asia, is completed by means of a document analysis of academic, governmental and third-party publications. An in-depth inductive analysis of the gathered documents and reviewed literature is conducted to build towards the conceptual framework to fulfil the second research aim. Consequently, the findings of both research aims then serve to answer the main research question, by analysing the findings of the document analysis with the conceptual framework. The motivation for this research is twofold: In Central Asia, water is becoming scarcer due to the impacts of climate change, so the potential of conflict over transboundary water resources grows steadily, which increases the importance of water diplomacy; consequently, it merits further academic analysis. Additionally, there is a research gap regarding German water diplomacy in Central Asia, which this thesis aims to fill.

a. Case Study Selection

In Central Asia, water is inseparably linked to agriculture and energy production (Janusz-Pawletta, 2018). The Central Asian states share a high number of transboundary rivers (Karthé, Chalov & Borchardt, 2015), and, as a legacy of the USSR, a vast and complex transboundary irrigation system that covers over eight million hectares of irrigated lands (Abdullaev et al., 2012). Unequal water distribution, unsustainable water management and disagreements over water deliveries have repeatedly created political tensions, which are exacerbated by the growing threat of water scarcity caused by climate change (Boyarkina, 2018; Sehring, 2020). Regional attempts to establish a joint system of sustainable transboundary water management have not been successful (Sorg et al., 2014). Germany has been engaging in water diplomacy in Central Asia since 2008, seeking to contribute to stability and prosperity in the region by supporting the establishment of a system of sustainable transboundary water management (Auswärtiges Amt, 2013) with a wide array of activities and substantial funding in comparison to other water diplomacy initiatives in Central Asia (Boyarkina, 2018). The German

government considers water an important factor of regional cooperation and has attributed its water diplomacy initiative in Central Asia a possible model character (Bundestag, 2012).

Water diplomacy in Central Asia has been the subject of multiple academic publications (Sehring, 2020). However, Sehring et al. (2022) in their analysis of academic publications on water diplomacy wrote that “[u]nderstanding the role that third parties can play, why and how such actors get involved, with which tools and on which tracks they do so, what the explicit or implicit objectives of these parties are, and why and under which conditions their engagement is actually conducive to certain desired outcomes clearly remains a research gap” (p. 218). This research gap exists for German water diplomacy in Central Asia, as it is discussed only in five academic publications: Schrader et al. (2009), Abdolvand et al. (2015), Boyarkina (2018), Eschment (2011), and Hakala, Mustasilta and Hadi (2023). The first three provide more extensive accounts, detailing the initiation of the process, its activities and focus areas, as well as discussing some of the impacts, while the latter two only provide short overviews; none provides a comprehensive overview of Germany’s water diplomacy activity in Central Asia from its initiation until 2024.

Therefore, this master thesis seeks to provide an extensive account of German water diplomacy in Central Asia and analyse its contribution to the establishment of a regional system of sustainable transboundary water management. Given the existing research gap, the qualitative method approach has been chosen to allow for a broad assessment of non-technical publications on the topic in order to synthesise a comprehensive account of the activities realised within Germany’s water diplomacy activities in Central Asia.

b. Method of Data Collection and Analysis

The first research aim – constructing a comprehensive overview of German water diplomacy in Central Asia – is completed by means of a document analysis as described by Bowen (2009). Over 100 sources have been analysed, including research articles, policy papers, government-related publications and websites, to gather information and establish a comprehensive understanding. The document analysis is conducted by assessing available research articles on Germany’s water diplomacy activities in Central Asia, information published by the German government within its internet presence and official documents, publications by and internet presences of the implementing partners, and other pertinent publications. The governmental sources used include publications of the AA, the Federal Ministry for Economic Cooperation and Development (BMZ), the Federal Ministry for the Environment (BMUV), the Federal Government (“Bundesregierung”) and the Federal Parliament (“Bundestag”) of Germany. No

primary data has been collected for this master thesis. The overview starts with Germany's perspective on Central Asia and the interests that have motivated Germany to proactively engage in Central Asia, also with respect to its official water diplomacy policy, to explain the initiation of Germany's water diplomacy engagement in Central Asia. Next, the first part of German water diplomacy in Central Asia, the Water Initiative Central Asia, is discussed, from its inception to its end, assessing the structure, involved actors, goals and the realised activities, as well as the outcomes. Subsequently, the successor of the Water Initiative Central Asia, the Green Central Asia initiative, is discussed and presented in a similar manner, albeit to a more limited extent given the fact that it is still ongoing. While this master thesis seeks to provide a comprehensive overview, it cannot guarantee an exhaustive account, and only includes information published until May 2024. Moreover, given the limited extent of this master thesis, it can neither provide in-depth information on every activity realised within the framework of German water diplomacy in Central Asia.

The second research aim of this master thesis is the development of a conceptual framework to analyse the impact of water diplomacy activity on the establishment of a system of sustainable transboundary water management. Based on the thorough document analysis of policy papers and academic literature to complete the first research aim, a conceptual framework of nine factors was developed through an in-depth analysis with an inductive method. The framework is the result of the application of an explorative process conducted in an iterative manner. During the analytical review of the literature used for this thesis, nine different factors were identified that are always required for the establishment of a system of sustainable transboundary water management, irrespective of the geographical and political circumstances of the basin. The factors are based on research by other scholars, but the framework and its conceptualisation are the work of the author. These nine factors describe the different aspects that are involved in the process of establishing a system of transboundary water management through water diplomacy engagement, from the initiation of the process to the long-term consolidation of the system. While the framework shall be applied for the analysis in chapter six, it shall also guide the structure of chapter four and the first subchapter of chapter five to determine which factors are not given in Central Asia, and which factors are addressed by Germany's general water diplomacy policy.

Lastly, to answer the main research question "*How has Germany water diplomacy activity in Central Asia contributed to the establishment of a system of sustainable transboundary water management?*", the findings of the document analysis are analysed with the conceptual framework by means of a qualitative analysis. Each factor is discussed

separately, analysing how the activities of the German water diplomacy activities have contributed to developing or achieving the respective factor. The goal of this analysis is not to evaluate the impact of German water diplomacy in Central Asia, as this would require a larger, quantitative study that is beyond the scope of this master thesis, but to assess how Germany's water diplomacy engagement in Central Asia has contributed to each of the nine factors that are necessary for the establishment of a system of sustainable water management according to the discussed literature.

3. Theoretical Framework

a. Water Diplomacy

Water diplomacy is a relatively new concept in both academia and politics (Keskinen, Salminen & Haapala, 2021). It has emerged in response to the global politicisation of water in the 1990s, when the international community started to concern itself with its increasingly limited availability (Mollinga, 2008). The concept is used by academic scholars, policy makers and think tanks, who have created not one but multiple definitions (Sehring et al., 2022). This chapter discusses various understandings and definitions of water diplomacy to streamline the concept and to propose a working definition for this thesis.

Water diplomacy's relevance stems from the central importance of water: Water is at the heart of life and society. Humans need it to live and survive, to produce energy and food, as well as for agricultural and industrial production (Sehring et al., 2022). There is no substitute for water, and it is already scarce in some parts of the world (Pohl et al., 2014). It is a mobile resource: it can only be stored temporarily and in limited quantities, and is simultaneously present and moving across borders, thus it cannot be owned in terms of state sovereignty like other natural resources. Moreover, water is variable, as its natural provision and availability differ and fluctuate from year to year, due to a variety of factors (Sehring et al., 2022). A major factor influencing, and increasingly threatening water availability and access is climate change: Precipitation patterns change, increasing temperatures lead to higher evaporation and accelerate glacier melting, and extreme weather events like floods and droughts become more prevalent (Auswärtiges Amt, 2013, 2019b; Sehring et al., 2022). Water pollution and salinification of groundwater supplies put additional strains on water supply and further exacerbate water scarcity (Auswärtiges Amt, 2019b; Musie & Gonfa, 2023). At the same time, the continuous growth of populations and economies steadily increases water demand, which can no longer be met by conventional solutions (Boltz et al., 2019).

In the 1990s, as part of the global dialogue on sustainable resource use, a rhetoric of potential conflict over vital resources such as water emerged (Endres, 2014). Consequently, the dialogue on water resources shifted from the technical realm to the political, from water management to water control (Mollinga, 2008). Ensuring and maintaining access to sufficient water resources became a question of national security and thus a political task, complicating the process of agreeing on mutually beneficial water management solutions in many transboundary basins (Pohl et al., 2014). Between its absolute indispensability, growing demand and diminishing supply, water has a substantial conflict potential: A study by De Stefano et al. (2010) has determined water as one of the two most controversial points of contention between states since 1948. Despite its conflict potential, however, water has only been the cause of one war in recorded history, 4500 years ago in Mesopotamia (Wolf, Yoffe & Giordano, 2003), and disputes over water have overwhelmingly been resolved in a cooperative manner (De Stefano et al., 2010). Scholars attribute a unique potential for cooperation to the universal demand for water, even between actors who otherwise do not cooperate with each other (Salmoral et al., 2019; Sehring et al., 2022).

Nonetheless, Zeitoun and Warner (2006) argue that “the absence of war does not mean the absence of conflict” (p. 437) because many conflicts over water take place silently due to a power imbalance between the states that share the basin. Water has been a substantial point of contention in many national and subnational conflicts and can exacerbate other conflicts (Pohl, Blumstein & Schmeier, 2021). Moreover, water disputes can already create damage before they escalate into a conflict by creating political tensions and regional instability that negatively affect society and economy (Pohl et al., 2014). Warner and de Man (2020) argue that water conflicts are often influenced by regional power dynamics. In transboundary basins where two or more states with different interests vie for access to and control over the same critical resource, conflict is a likely possibility, especially if there is a previous history of conflict between them (Choudhury & Islam, 2015). The regional tensions and instability created by water, including the threat of conflict, have far-reaching global implications and negative impacts on human security, peace, development and prosperity (Pohl, Blumstein & Schmeier, 2021). Additionally, the exponential impact of climate change is projected to fundamentally alter the availability of water in unpredictable, hitherto unforeseen dimensions, which could increase the uncertainty of assumptions based on past behavioural patterns regarding water conflicts. Thus, the urgency to resolve existing conflicts over water and establish systems of sustainable transboundary water management is exponentially growing (Pohl et al., 2014). These diplomatic activities specifically aimed at preventing conflict in the short term and

fostering cooperation over shared water resources in both the short and long term are summarised under the term *water diplomacy*.

There is no official definition of water diplomacy but a variety of different ones in academic publications, reports and policy documents, often depending on the context and purpose of the publication (Keskinen, Salminen & Haapala, 2021). Sehring et al. (2022) reviewed several publications on water diplomacy, determining that water diplomacy is often defined by its goals: improved water management, mutual benefits beyond the scope of water, and conflict resolution. Other definitions include normative values of equity and fairness in water use. Keskinen, Salminen and Haapala (2021) attribute five key aspects to water diplomacy: inherently political interactions between stakeholders, mediation and conflict prevention, integration of all stakeholders from different political levels and economic circumstances, focus on cooperation and mutual benefits, and technical solutions to control the water cycle. According to Mirumachi (2020), various water diplomacy definitions converge on the common theme of “a deliberative process that addresses contested shared waters and seeks dividends beyond those specific to water” (p. 86). Sehring et al. (2022) argue that fundamentally, various water diplomacy definitions consider water diplomacy as a sub-form of diplomacy that addresses the political dimension of transboundary water conflicts, that involves non-state actors in the search for a mutually beneficial solution, is mainly defined by negotiations and corresponding analyses, and that serves the broader goal of regional cooperation and integration beyond water management. Keskinen, Salminen & Haapala (2021) consider water diplomacy as the interstate practice specifically focused on resolving intra- and international disputes over shared water resources, such as basins or rivers, seeking to prevent conflict and instead foster cooperation between the involved stakeholders to jointly manage and use the shared water resources sustainably and responsibly.

A common theme of several actors engaging in water diplomacy is the attempt to depoliticise water by trying to find a technical solution that leaves all states better off (Pohl et al., 2014). Cooperation on water has substantial benefits for all involved actors and creates economic benefits beyond the advantages of better water management, as it influences a region’s political stability and future development (Pohl et al., 2017). Pohl, Blumstein and Schmeier (2021), however, argue that a positive-sum solution might not work in a basin where interstate relations are defined by political tensions and devoid of trust. Warner and de Man (2020) furthermore argue that power imbalances can influence the success of water diplomacy efforts if the power asymmetries are not addressed.

Scholars such as Schmeier and Shubber (2018) and Janusz-Pawletta (2015) argue that a long-term, sustainable transboundary water management solution requires an institutionalisation of the agreements reached through water diplomacy in form of a river basin organisation, which can be empowered by the participating states to manage the shared water resources as agreed upon. Blumstein, Pohl & Tänzler (2016) add that such a river basin organisation needs a flexible capacity to adapt water distribution quotas according to water levels and availability, and an integrated dispute resolution mechanism to avoid the re-emergence of political conflicts over technical disagreements.

However, Salmoral et al. (2019) argue that the analytical lens of the theory of water diplomacy is limited in an important aspect: While water diplomacy accounts for the political intricacies and various stakeholders' interests involved in transboundary water contexts, it disregards the implications of water management solutions on energy production and agriculture. The interdependence of water, energy and agriculture is defined as the 'water-energy-food nexus' (Jalilov et al., 2016). By including both aspects, the scope of the analysis can be expanded to highlight the various implications of water on the regional economies, which allows for a more comprehensive understanding of the different national interests. Moreover, considering this water-energy-food nexus and the far-reaching implications broadens the analysis to include further respective benefits of cooperation, which can help convince the involved stakeholders of the mutually beneficial consequences of engaging in transboundary water management cooperation (Salmoral et al., 2019). This analytical nexus is reflected in the prevalent paradigm on water resource management, *Integrated Water Resources Management (IWRM)*. The Global Water Partnership defines IWRM as: "a process which promotes the coordinated development and management of water, land and related resources in order to maximise economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment." (GWP, 2011).

In this thesis, water diplomacy is defined as follows: *Water diplomacy encapsulates a foreign policy strategy consisting of a variety of diplomatic and other activities that seek to prevent or stop conflict between states over shared water resources and facilitate cooperation by supporting the establishment of a mutually beneficial system of joint water management.*

b. Factors of Sustainable Transboundary Water Management

Competition over water use within countries and across borders, paired with inefficient water management and wasteful water use can create tensions over the use of shared water resources. To ensure continuous interstate cooperation, the long-term goal of water diplomacy is the

establishment of a system of sustainable transboundary water management, which considers and meets the needs of all stakeholders across borders, distributing the resources fairly and sustainably to facilitate long-term water provision and provide mutual benefits (Sehring et al., 2022). Establishing such a system is a lengthy, multifaceted and complex process without a uniform approach because every transboundary basin has different geographic, geological, environmental, sociological and political characteristics. Additionally, the process must consider the “different political needs, boundaries, knowledge, know-how, management capacity, and political power of the disputants” (Choudhury & Islam, 2015, p. 45).

Nonetheless, there are several factors discussed in academic literature that can be considered generally required for the successful establishment of a system of sustainable transboundary water management through the approach of water diplomacy. Nine factors have been determined, based primarily on the six factors described in the UN’s SDG 6 Global Acceleration Framework (UN Water, 2020) and the research article by Hearn, Henshaw & Paisley (2014) on the design of institutional architecture for effective transboundary water governance. These nine factors are: political assent, mutual benefit, financing, data, innovation, governance, capacity development, trust, and institutional anchoring. Further in-depth research of the reviewed literature has confirmed this selection and provided further aspects for the importance of each of the nine factors. The factors are explained in detail subsequently and form the basis of the conceptual framework, which is developed in the sixth chapter.

Political Assent: Water diplomacy seeks to support states in finding a sustainable mode of cooperation over the shared water resources. For this process to be established, the involved states need to be willing to participate in and commit to the process, as well as to its outcome. As water diplomacy is a reaction to the politicisation of water management, any solution seeking successful water management needs to consider and navigate the national and regional politics to garner political assent. Without the agreement of each state involved, no solution can be implemented, independent of its prospects (Hearn, Henshaw & Paisley, 2014; Pohl et al., 2014; Sehring, 2020; Sehring et al., 2022).

Mutual Benefit: The proposed solution must consider the interests of all involved states and stakeholders and provide a mutually beneficial solution that is better for all involved states than the status quo – a positive sum game – as a motivation to establish and maintain a system of shared water management (Choudhury & Islam, 2015; Pohl et al., 2017). Without deriving a substantial benefit by cooperating on joint water management, states have no incentive to participate in the process or commit to the outcome (Hearn, Henshaw & Paisley, 2014). This analysis must consider the different economic dependencies on water, especially the water-

energy-food nexus (Salmoral et al., 2019). Pohl et al. (2017) argue that cooperating on joint transboundary water management always outweighs choosing unilateral approaches. The benefits of cooperation extend beyond economic gains from improved water management because cooperation provides political stability in the region, which allows for greater economic development of the entire region (Pohl et al., 2017).

Financing: The process of establishing a system of sustainable transboundary water management is cost-intensive, as it involves a variety of activities, trainings, and infrastructure development, amongst others – the subsequent factors will describe that in more detail. For the process to take place and be successful, sufficient funding must be ensured, either by the involved stakeholders or third-party actors. Currently, most institutions managing transboundary basins are financed mostly by third party donors (Pohl et al., 2014; Salmoral et al., 2019; UN Water, 2020).

Data: Managing water resources efficiently and sustainably requires accurate and ample data as well as modern information technologies (Abdullaev et al., 2012). This includes data collection infrastructure, the research capacity to analyse the collected data, and political consideration of the findings in the further development of water management strategies. In practice, this can involve research cooperation between the stakeholders and the involved water diplomacy actor(s). Successful transboundary water management furthermore requires states to share their data amongst each other: As water is a resource of high political interest, its data is often treated as a national secret and thus not shared, to the impediment of efficient water management. One possible resolution is the establishment of joint fact finding and data collection missions by all involved states, which produces data and can furthermore contribute to building trust between the stakeholders (Blumstein, Pohl & Tänzler, 2016; Salmoral et al., 2019; Sehring et al., 2022).

Innovation: An essential aspect of sustainable transboundary water management is the reduction of water demand, which can be achieved by reducing water losses as well as by increasing water use efficiency in infrastructure, agriculture, economy and society. This includes improved irrigation technology, expanding non-water based renewable energy production capacity and improving or rehabilitating existing infrastructure, as well as wastewater treatment and recycling (UN Water, 2020).

Governance: Implementing a system of sustainable transboundary water management requires functioning public administrations responsible for water supply that ensure and manage the universal access to and fair distribution of water (Wegerich et al., 2015). This involves the principles of good governance of transparency, accountability, stakeholder

participation and the rule of law (Abdolvand et al., 2015). Moreover, the system must be implemented across all sectors and on all political levels through establishing clear roles and responsibilities, and strengthening public institutions (UN Water, 2020).

Capacity development: Skilled workers are required for the use and operating of the transboundary water management system because it requires technical knowledge, basin planning capacities and expertise. Through capacity building, workers can be trained to operate the water management infrastructure and ensure its continuous functioning. Skilled workers in different branches of the water sector furthermore contribute significantly to integrating the water economy and improving its efficiency (Schrader et al., 2009). Moreover, it includes educating the general population on water saving techniques and using improved technology to save water, as well as training public administration officials on principles of good governance (Abdolvand et al., 2015; UN Water, 2020).

Trust: While political assent is required for the deliberative process to take place, several authors discuss trust as a necessary component for all stakeholders to agree to the implementation of a joint management approach. In a context of politicised water management, states will only agree to relinquish some or all their control over the water resources if they can believe that the other states will equally relinquish theirs and follow the joint plan (Keskinen, Salminen & Haapala, 2021; Penny et al., 2021; Pohl, Blumstein & Schmeier, 2021). This is especially complicated in basins where the stakeholders have little trust in each other. However, trust can be built over time between the stakeholders, and several activities under the aforementioned factors can contribute to it (Pohl, Blumstein & Schmeier, 2021).

Institutional anchoring: To depoliticise the question of water distribution and ensure the fair application of the agreed-upon system of sustainable transboundary water management over time, many authors discuss the establishment of a transboundary institution tasked with managing the shared water resources. This institution, designed according to the interests of the involved states, can operate the water distribution regime based on an agreed-upon quota and provide a conflict resolution mechanism to resolve disputes and tensions according to the agreed-upon protocol and without political escalation (Hearns, Henshaw & Paisley, 2014; Pohl et al., 2014; Schmeier & Shubber, 2018). Janusz-Pawletta (2015) posits the importance of basing the institution on an explicit and comprehensive legal framework to clearly delineate the mandate and responsibilities of the institution, while simultaneously designing the distribution quota to allow for flexibility based on natural or climate change induced fluctuations in water availability to prevent future conflict over the institution in situations of increased water scarcity. Hearns, Henshaw and Paisley (2014) furthermore argue that the

institutional design must be based on financial feasibility – the larger and more ambitious the institution and its mandate, the higher the costs. To ensure the continued application and use of the system of sustainable transboundary water management, it must reflect the needs of the stakeholders and its funding must be ensured in the long-term, as it will otherwise fail (Hearn, Henshaw & Paisley, 2014).

4. Water Management in Central Asia

In this chapter, the challenges of water management in Central Asia shall be succinctly discussed to provide context for the subsequent chapter. Extensive accounts on Central Asia’s water struggles have been written by Abdolvand et al. (2015), Pohl et al. (2014, 2017), Sorg et al. (2014), and Zhiltsov et al. (2018), amongst others.

a. Geography, Demography and Climate Change

Central Asia is a semiarid to arid region with low precipitation, cold winters and hot summers (Sorg et al., 2014). The region is comprised of five nations – Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan (see Figure 1) – with over 70 million inhabitants (Zhiltsov et al., 2018). According to estimates of the UN, the population of Central Asia will grow to over 90 million by 2100 (Jalilov et al., 2016).

Figure 1:
Map of Central Asia

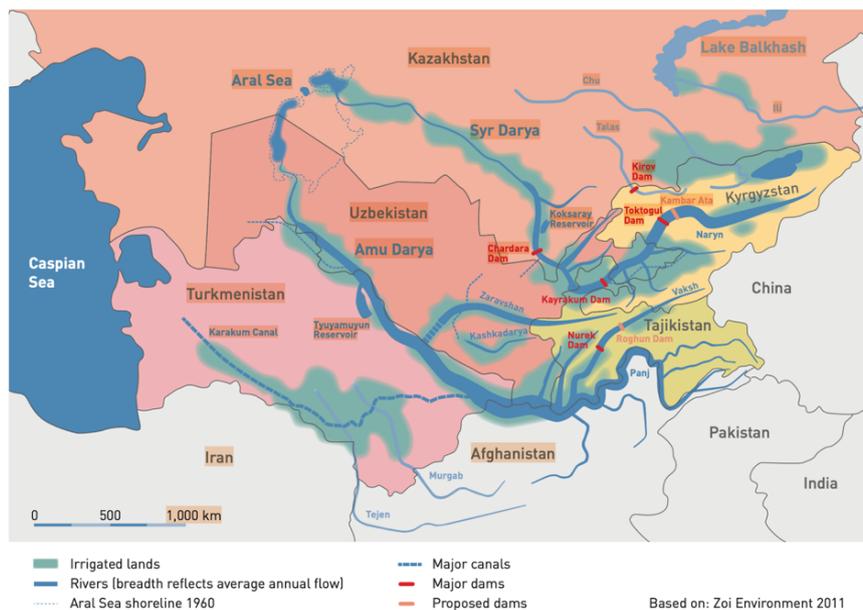


Source: (Pohl et al., 2017, p. 1).

The main freshwater supply comes from melted glacial water from the Tien-Shan, Alai, Altai and Pamir glaciers in Kyrgyzstan and Tajikistan (Bens, 2023; Sorg et al., 2014). The water is distributed in the region by the two main rivers, the Amu Darya and the Syr Darya, and their tributaries (see Figure 2). These rivers are the primary water sources of Central Asia, flowing through all five states and leading into the Aral Sea (Blumstein, Pohl & Tänzler, 2016; Karthe, Chalov & Borchardt, 2015). However, their water flows vary substantially from year to year, and consecutive years of low water-levels are a common occurrence (Zhiltsov et al., 2018). Water is the determining factor of socioeconomic development and prosperity in Central Asia, generating hydropower in upstream countries and irrigating agriculture in downstream countries (Didovets et al., 2021). Consequently, it is the most contested natural resource in the region (Abdullaev & Rakhmatullaev, 2013).

Figure 2:

Water resource use in the Aral Sea Basin



Source: (Pohl et al., 2017, p. 9).

Kyrgyzstan and Tajikistan, the upstream countries, are comparatively small countries with few natural resources for energy production but have primary control over the water coming from the Syr Darya and the Amu Darya rivers. During winter, they use hydropower production to meet their countries' increased energy needs. Kazakhstan, Turkmenistan and Uzbekistan, the downstream countries, have large agricultural land and fossil fuel resources but little hydropower energy production possibilities, and need water especially during the

summer months for irrigation (Abdolvand et al., 2015; Pohl et al., 2017). The downstream countries are considered to possess greater non-material and material power than the upstream countries, which creates asymmetrical regional power relationships (Sorg et al., 2014).

Central Asia is one of the regions worst affected by climate change (Blumstein, Pohl & Tänzler, 2016). Precipitation patterns have changed over the last decade with increasing rates in low altitudes and decreasing rates in high altitudes, and future projections expect rainfall to increase during winter and decrease during summer (Sorg et al., 2014). Temperatures have been steadily increasing since the 19th century (Karthe, Chalov & Borchardt, 2015). Scientific estimates calculate a temperature increase of 6.5°C by 2100 (Didovets et al., 2021). Negative mass balances have been detected in the Central Asian glaciers in the last decades: Smaller glaciers have disappeared, and larger glaciers have significantly shrunk, creating temporary increased water flow levels (Karthe, Chalov & Borchardt, 2015). However, water shortages will become more frequent during summer with decreasing precipitation and decreased glacial meltwater quantities in the future (Sorg et al., 2014). The region is also affected by desertification and is increasingly experiencing weather extremes such as droughts and floods, landslides and dust storms (Eurasianet, 2023; GIZ, 2023b; Green Central Asia, 2024a).

In short, water supply in Central Asia depends on transboundary rivers and is threatened by climate change. Simultaneously, the population and economies of all five Central Asian states have grown strongly within the last decades – both of which consequently lead to increased water demand, which puts a further strain on the existing water resources (Pohl et al., 2017). However, the problem with water availability is not an issue of water scarcity yet but rather one of water access (Rheinbay et al., 2021). An extensive assessment of the impacts of climate change in Central Asia can be found in Sorg et al. (2014), Karthe, Chalov and Borchardt (2015), and Mosello et al. (2023). Climate change's socio-economic consequences are discussed by Didovets et al. (2021) and the security implications by Rheinbay et al. (2021).

b. History of Water Management

Water management has a long history in Central Asia, which influences the present situation (Abdolvand et al., 2015). Initially, water management was organised locally by each community. When Russia colonised the region in the 1860s, the central government began to exert control over water management, establishing small-scale water bureaucracies, while irrigation structures were still managed and maintained locally. In the 1920s, the USSR began to pursue the water management paradigm of *hydraulic mission*, which subordinated water to human control by means of hydraulic engineering with the goal of maximising water extraction

(Abdullaev & Atabaeva, 2012). Water became an exclusive state property (Abdolvand et al., 2015) and its management a purely technical issue to be managed by state water bureaucracy (Abdullaev & Mollinga, 2010). To achieve its goals, the USSR expanded education on and research into water management, increasing its funding and making water managers an essential component of the state apparatus (Abdullaev & Atabaeva, 2012).

Seeking to achieve energy independence, the USSR constructed a vast network of large-scale hydropower structures within ten years, becoming one of the largest hydropower producers by the 1940s. After 1945, the USSR began to expand agricultural production in Central Asia, especially of cotton and grain (Abdullaev & Atabaeva, 2012). Local subsistence farming was replaced with large-scale farms focused on mass production (Abdullaev & Rakhmatullaev, 2013). Given the low precipitation in Central Asia, the USSR constructed a vast infrastructure network of canals and irrigation systems to supply the required water quantities (Sorg et al., 2014), including major dams and reservoirs in Kyrgyzstan and Tajikistan mainly for water storage purposes to release water in summer (Blumstein, Pohl & Tänzler, 2016). The scale of the agricultural production and the choice of crop – especially cotton is a very water intensive-crop – caused a strong increase in water demand, which was supplied through increased water abstraction from the Aral Sea, the Syr Darya and the Amu Darya (Abdolvand et al., 2015).

As water was a state property, the USSR did not charge for its use, which led to excessive water abstractions without concern for the environmental consequences (Janusz-Pawletta, 2018). Consequently, fixed water quotas were implemented, with 90% of the water being directed to Uzbekistan and Kazakhstan, mainly withdrawn during summer to meet the agricultural irrigation needs (Abdolvand et al., 2015). To compensate the upstream countries for their reduced hydropower production, the central government established a unified water-energy system in the region, in which the downstream countries provided fossil fuels to the upstream countries in exchange for storing water in winter and releasing it in summer (Janusz-Pawletta, 2018). The increased, continuous water extraction, together with the environmental pollution caused by fertilisers and pesticides, had a calamitous impact on the Aral Sea, which had shrunken to a tenth of its original size by the mid-2000s (Blumstein, Pohl & Tänzler, 2016).

The dissolution of the USSR created various institutional, technical and political challenges for water management in Central Asia: Newly established borders made the rivers and canals in the region transboundary, which halted the previously existing regional water management system (Sorg et al., 2014). Bureaucratic structures and decision-making processes changed with the general political decentralisation in the region, and with the separation of the

large collective farms into smaller units, vacuums of responsibility, governance and decision-making emerged in local water management and canal maintenance (Sehring, 2020). Consequently, the responsibility of water delivery and infrastructure maintenance was often returned to the local governments, who did not possess the capacities to fulfil that responsibility. Funding for the water sector was drastically decreased, which reduced the frequency of water infrastructure maintenance, repair and rehabilitation (Abdullaev & Rakhmatullaev, 2013). Many of the meteorological and hydrological monitoring stations built by the USSR stopped their operations, especially in remote regions (Karthe, Chalov & Borchardt, 2015). As water became a topic of national security (Sorg et al., 2014), national interests began to dictate national water policies that were often contradictory (Waśkiel, 2018). Data access was restricted and transboundary data sharing prohibited (Abdullaev et al., 2012). Due to the interdependence on water in Central Asia, water-related conflicts thus became more likely (Karthe, Chalov & Borchardt, 2015).

More extensive discussions of the history of water management in Central Asia can be found in Abdullaev & Atabaeva (2012) who also discuss how Russian and Soviet water bureaucracies have influenced the establishment of regional cooperation institutes in Central Asia. Abdullaev & Rakhmatullaev (2013) assess governmental processes that influenced and designed the post-Soviet water management. Waśkiel (2018) discusses how political relations have influenced water management after 1990. Sehring (2020) offers a comprehensive review of the academic publications discussing the development of water governance in Central Asia.

c. Competing Interests

The central problem of finding a long-term water management solution in Central Asia are the competing interests between the five Central Asian states (Pohl et al., 2017). Disputes arise over disagreements regarding the schedules of water delivery (Boyarkina, 2018). The agricultural production in the downstream countries requires water release in summer, while the upstream countries release water mostly in winter for hydroelectricity production (Jalilov et al., 2016). With limited water resources, these diametrically opposed interests pose a threat to regional stability (Rheinbay et al., 2021). The construction of hydropower dams has been a frequent source of interstate tensions (Pohl et al., 2014). Climate change further exacerbates the competition between the different interests, as it decreases water availability, changes precipitation patterns and affects water levels in rivers. The current projections of changes in river runoff could for instance force the upstream countries to increase their water storage to

ensure sufficient energy production in winter, to the detriment of the agricultural production in the downstream countries (Blumstein, Pohl & Tänzler, 2016).

The different economic interests and their impact on water management in Central Asia are discussed by various scholars: Gleason (2001), for instance, discusses the relation between water and energy in Central Asia and how it affects regional stability and relations. Thevs et al. (2015) discuss the water demand of agriculture in the Lebap Province in Turkmenistan and the impact on the Amu Darya River. Sorg et al. (2014) assess how a decrease in water availability affects economic production and transnational relations in the Syr Darya Basin. Jalilov et al. (2016) have conducted a study on the water-energy-food nexus and optimised water distribution in the Amu Darya River Basin.

d. Past Conflicts and Cooperation Attempts

Diverging national interests have led repeatedly to conflict over water resources between the Central Asian states. These conflicts are usually resolved by means of bilateral or multilateral agreements, which however only resolve the temporary conflict but have not yet led to the establishment of a lasting transboundary water management system (Zhiltsov et al., 2018).

In 1992, the newly independent states codified the Soviet water management system into the 'Almaty Treaty on Cooperation in the Field of Joint Water Resources Management and Conservation of Interstate Sources' (Sorg et al., 2014). To institutionalise the agreement, the treaty established the Interstate Commission for Water Coordination (ICWC), which was given the responsibility for policy formulation and water allocation. However, the treaty had neither an explicit definition of transboundary waters, nor a clear scope of application, nor a clearly defined process governing the cooperation and barter mechanisms. Moreover, the agreed-upon water quotas were deemed unacceptable and had to be adjusted through several bilateral and multilateral agreements (Abdolvand et al., 2015). The treaty also created the International Fund for Saving the Aral Sea (IFAS) to coordinate the various national Aral Sea organisations (Schrader et al., 2009). Growing national interests started to complicate the adherence to the agreement - Kyrgyzstan and Tajikistan increased their hydropower production to meet their power needs, releasing water in winter, while Uzbekistan, Kazakhstan and Turkmenistan further expanded their agricultural production (Pohl et al., 2017). Kyrgyzstan and Tajikistan were increasingly unwilling and even incapable to provide the set water quotas of the agreement, and the downstream countries did not provide financial support for the infrastructure maintenance, which led to emerging regional tensions (Abdolvand et al., 2015).

The first interstate conflict arose in 1993, when Kyrgyzstan did not pay its debts to Uzbekistan, which in turn ceased its gas deliveries (Zhiltsov et al., 2018). Faced with insufficient energy resources and lacking funds to pay its debts, Kyrgyzstan started to release water from the Toktogul reservoir in winter to expand its hydropower energy production. This caused floods in downstream Kazakhstan and Uzbekistan and impacted their agricultural production in summer, which created interstate tensions and the need to renegotiate water release schedules every winter (Abdolvand et al., 2015). In 1995, the Nukus Declaration was signed to resolve conflicts peacefully and reaffirm the adherence to prior interstate agreements. A drought in 1997 further exacerbated the tensions, which started to gather the attention of the international community (Blumstein, Pohl & Tänzler, 2016). In 1998, Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan agreed on an official sharing mechanism for the Syr Darya river, but it failed due to its energy exchange design causing a dispute over energy prices between the signatories (Abdolvand et al., 2015).

Subsequent attempts to establish a regional system of water management through international agreements and with regional water management institutions have also been unsuccessful (Zhiltsov et al., 2018). Uzbekistan has obstructed attempts at regional water solution, as it benefits from the continuation of the 1992 Agreement (Abdolvand et al., 2015). In 2012, the Uzbek President Islam Karimov threatened an escalation of tensions with the possibility of “water wars” over the planned Rogun Dam construction in Tajikistan and the Karambata-1 power station in Kyrgyzstan (Reuters, 2012). Kyrgyzstan has paralysed the IFAS by not formally leaving but ceasing participation in all activities and meetings of the organisation, challenging the IFAS’ decision-making ability and subsequent legitimacy of these decisions (Schmeier & Shubber, 2018).

Due to the geographic circumstances and existing transboundary water infrastructure, the Central Asian states need to find a mutual solution on transboundary water resources (Abdolvand et al., 2015; Karthe, Chalov & Borchardt, 2015). However, this has been complicated by a variety of reasons: Central Asia has not developed a regional identity, lacking political integration and a developed community of interests. Instead, national interests lead to often contradictory national policies (Wański, 2018). Due to the deterioration of the Soviet data collection infrastructure, there is a lack of comprehensive data on water resources, especially in high mountain areas (Mosello et al., 2023). The absence of data exchange mechanisms and political communication on planned regional measures has created distrust in water resources management, while the separation of national decision-making processes concerning agriculture, energy and water into various ministries has complicated the national

and regional integration of effective water management structures (Sorg et al., 2014). The legal frameworks of the regional water agreements were inadequate to provide a sustainable solution (Janusz-Pawletta, 2015), and the existing institutions of water management in Central Asia have not been able to resolve the situation, either (Schmeier & Shubber, 2018). Efforts to establish a lasting cooperative water management solution are further complicated by unresolved border disputes (EBRD, 2019; Peña-Ramos, Bagus and Fursova, 2021) that sometimes escalate into conflicts (Auyezov, 2021; IFCR, 2023; Valieva, 2014).

To conclude, the Central Asian states have a history of repeated conflicts over water due to diverging national interests. Attempts to establish a regional system of sustainable transboundary water management have been unsuccessful due to several reasons. Comprehensive accounts of the interstate conflicts over disagreements relating to transboundary water management treaties, the subsequent interstate agreements reached between the Central Asian states to resolve the conflicts, and the reasons for the failures to establish lasting water management systems have been written by Abdolvand et al. (2015), Janusz-Pawletta (2015, 2018), Pohl et al. (2017) and Zhiltsov et al. (2018), amongst others.

e. Non-German Water Diplomacy Activity in Central Asia

There are various international actors engaging in water diplomacy in Central Asia besides Germany (Schrader et al., 2009). International donors have attempted to support the establishment of a regional solution by implementing projects with local water governance structures based on the principles of IWRM since the mid 1990s (Sehring, 2020).

The Swiss Development Cooperation Agency (SDC) engages in water diplomacy with its Blue Peace initiative, providing political support in finding joint solutions for competing interests on water, and has funded and implemented projects on cryosphere monitoring, IWRM, forecasting and research in long-term climate impacts (Hakala, Mustasilta & Hadi, 2023; Wegerich et al., 2015). The UNDP has implemented a project offering workshops on climate-resilient water resources management in the Ferghana valley. Finland provides technical and financial assistance in the region with a special focus on water quality monitoring (Hakala, Mustasilta & Hadi, 2023), and has funded the water management program FinWaterWEI, which sought to capacitate state institutions to ensure universal water access. The program included support for national policy dialogues and projects of inter-institutional cooperation between Finnish, Kyrgyz and Tajik ministries aimed at improving water management and protection (SYKE, n.d.), as well as the provision of instruments of economic and financial analysis and IWRM in cooperation with the OECD (Hakala, Mustasilta & Hadi, 2023).

The Organisation for Security and Cooperation (OSCE) funded the launch of the interdisciplinary and bilingual e-Journal “Integrated Water Resources in Central Asia” to support academic research on issues of water management (Unger-Shayesteh et al., 2015c), as well as an analysis into climate risks in Central Asia (Mosello et al., 2023). The Stockholm International Water Institute promotes the inclusion of female water professionals in decision making and governance in the water sector with its Women, Water Management and Conflict Prevention Program, and has established a network of female water experts in Central Asia together with the OSCE and the Central Asia Regional Economic Cooperation Program (CAREC). The United Nations Regional Centre for Preventative Diplomacy for Central Asia promotes dialogue on transboundary water management, facilitates information exchange and offers capacity building on water diplomacy and legal reform of regional agreements on water, as well as the provision of monitoring and analysis to the Central Asian governments. The World Bank has been promoting energy and water security with its Central Asia Water and Energy Program since 2009 in cooperation with the EU, Switzerland, and the United Kingdom by providing data analyses, capacity building and investment support (Hakala, Mustasilta & Hadi, 2023). The EU has furthermore financed the Aral Sea Water Resources Programme in the 1990s (Schrader et al., 2009), as well as the EU Water Initiative to expand access to water and sanitation and to support transboundary cooperation (Boyarkina, 2018).

5. German Water Diplomacy in Central Asia

German water diplomacy in Central Asia encompasses a variety of state and non-state actors that have contributed to the implementation of the two initiatives. While the AA has been the leading force, other ministries have been involved, including the BMZ, the BMUV and the Federal Ministry of Education and Research (BIMBF). Since the initiation of the process in 2002 that led to the establishment of German water diplomacy activity in Central Asia, Germany has had six different governments and three different chancellors. Assuming governmental continuity, this chapter will not discuss the impacts of these government changes on German foreign policy in Central Asia. Unless otherwise specified, the different state actors shall be jointly referred to as ‘German government’. There are various non-governmental German actors also involved in the implementation, which are introduced later. Unless otherwise specified, all state and non-state actors engaged in the implementation of the initiatives are subsumed under the term ‘German water diplomacy’.

a. General German Water Diplomacy Policy

Germany's water diplomacy policy is part of its broader climate foreign policy strategy, which in turn is one aspect of Germany's overall foreign policy. As a member of the EU, Germany aligns its foreign policy with the overarching EU foreign policy and supports the implementation of the EU's Water Law. Moreover, Germany proactively contributes to the implementation of the UN's Sustainable Development Goals (SDG), in this context especially the sixth goal, which aims to secure the availability and sustainable management of water and sanitation for all humans (BMUV, 2023; Bundesregierung, 2023).

The German government acknowledges the global dimension of climate change and, accordingly, the need for concerted international action to mitigate its effects. It perceives climate change as a substantial threat to global security and stability and considers its climate foreign policy an important tool of preventative foreign policy (Auswärtiges Amt, 2013). Germany also recognises the geostrategic impacts of climate change – altering trade routes, shifting modes of production, and affecting supply chains, amongst others – and therefore subordinates its climate foreign policy goals to its general foreign policy interests. Germany's overall foreign policy is based on the tenets of promoting its values – human rights, humanitarian assistance, sustainability, economic development and ecosystem preservation – and maintaining Germany's economic and security interests: The climate foreign policy of the German government explicitly seeks to design its measures as not to compromise Germany's prosperity and economic competitiveness (Bundesregierung, 2023). Given the global economic interdependence and Germany's position as a trade nation, Germany proactively supports other nations in adapting to the challenges of climate change (Auswärtiges Amt, 2013; BMUV, 2023; Bundesregierung, 2023). In short, the German government considers its climate foreign policy to be value-led and employs it to act in the economic and security-political interests of Germany, which by extension also applies to its water diplomacy (Bundesregierung, 2023).

The German government models its water diplomacy policy around three key aspects of water: that it is fundamental and irreplaceable for society, economy and environment to function and thrive; that access to it is a human right; and that its scarcity or absence can and will cause societal tensions and violent conflict, which will create suffering, instability, migration and economic losses beyond the affected region (Auswärtiges Amt, 2019b; BMUV, 2023; Bundestag, 2008b). Especially water scarcity can have far-reaching consequences: It threatens agricultural production and therewith food security, causes migration, hinders energy

production, and can create tensions and conflict in and between nations, which then might threaten the stability and security of entire regions (Auswärtiges Amt, 2013; BMUV, 2023).

German water diplomacy perceives water as a resource of peace with the potential to become a catalyst for cooperation: Most conflicts over water have been resolved peacefully if a mutually beneficial solution was available and achievable, and some have even offered a pathway to extending transnational cooperation between states to areas other than water (Auswärtiges Amt, 2019b; BMUV, 2023; BMZ, 2019). Shared transboundary water resources can also become a source of tensions and conflict between states, so the German government considers helping other states establish transboundary water management cooperation as an essential aspect of the preventive security policy dimension of water diplomacy (Auswärtiges Amt, 2013). Given its indispensability for humans, society and nature, the German government seeks to preserve water as a resource for current and future generations with its water diplomacy policy (BMUV, 2023). Thus, Germany's water diplomacy policy aims to ensure the universal application of the human right to water access for everyone, to contribute to achieving global water security to avoid conflict and enable economic development, and where and when possible, use conflicts over water resources as a chance to expand interstate cooperation beyond water in the affected region (Auswärtiges Amt, 2019b; BMZ, 2019).

Moreover, German water diplomacy extends beyond international politics into development cooperation. Germany has a long history of engagement in the water sector as one of the largest donors for creating access to clean water. Through development cooperation, Germany has worked for decades to provide access to drinking water and clean sanitation for millions of people on several continents (Auswärtiges Amt, 2019b; BMZ, 2019).

One central driver of conflict over water is its scarcity. The German government distinguishes between two types of water scarcity: economic and hydrological. Economic water scarcity is human made, the consequence of inadequate management or inefficient use. Hydrological scarcity exists where there is a natural limit of available water resources so that even highly efficient water management cannot sustainably meet growing water demand. With economic water scarcity, the German government considers inefficient water management as the main problem in most cases, which can be resolved by helping the affected nation to improve their water management system (Bundestag, 2008b). For instance, agriculture is the sector with the largest water footprint, with irrigation being the main driver of increasing water use; by improving irrigation efficiency, water scarcity can already be avoided in many situations (Auswärtiges Amt, 2019b). In cases of hydrological water scarcity, the challenge becomes more complex, requiring increased water use efficiency and reduced water demand

to allow for sustainable water use. Both types of water scarcity are further complicated by climate change, which alters precipitation patterns and water availability, especially in regions whose water supply depends on glacial meltwater, and which increases the frequency of extreme weather events (Auswärtiges Amt, 2013; Bundestag, 2008b). Demographic growth and economic development put an additional strain on available water resource. With growing demand and decreasing supply, finding lasting and sustainable water management solutions is becoming increasingly urgent (Auswärtiges Amt, 2019b).

To achieve global water security, Germany's water diplomacy policy suggests a variety of necessary steps: First, the existing shortcomings of water management must be overcome, and water management must be specifically adapted to the future challenges of climate change. Second, water bodies and catchment areas need to be sustainably managed and improved for long-term use. Third, ecosystem services and biodiversity must be protected. Fourth, agricultural and food production need to become more water-use efficient. Fifth, current water demand needs to be reduced. Sixth, water use efficiency must be improved. And last, the sustainable management and use of water resources and ecosystems must be ensured (BMUV, 2023). Moreover, the German government aims to support its partner countries in increasing their resilience and adaptive capacity to climate change, and to unite prosperity and social and economic development in the process of adapting to climate change (Bundesregierung, 2023).

At the core of German water diplomacy are precautionary measures to prevent conflict and scarcity from emerging at all and lobbying for the global implementation of the universal human right to water and sanitation (BMUV, 2023). To reach the goal of transboundary water cooperation to avoid conflict over water, Germany believes in taking a proactive and pre-emptive approach promoting it because establishing interstate cooperation is a lengthy process while climate change is limiting the window of opportunity (Bundestag, 2008b). The German government follows the IWRM approach in its water diplomacy policy: Recognising the nexus of water with agriculture and energy production, it seeks to involve all stakeholders in the decision-making process regarding shared water resources and promotes positive-sum benefit sharing as an advantage of cooperation on water management over conflict (Bundestag, 2008b). Additionally, Germany uses the *Water Stewardship* approach to specifically involve actors from businesses and civil society in the process. Thereby, Germany seeks to find an efficient solution that meets the various water demands, making cooperation more desirable than conflict (BMZ, 2019).

German water diplomacy comprises a variety of diplomatic measures to promote Germany's vision of sustainable transboundary water management as a contributor to regional

stability and cooperation (Bundestag, 2012). However, the establishment of a sustainable transboundary water management structure requires more than an agreement between all stakeholders, so German water diplomacy commands a variety of technical and financial instruments and tools that support the practical implementation. These measures extend beyond diplomatic tools into the area of development cooperation. Germany agrees with the accelerators of sustainable water management as proposed by UN Water (UN Water, 2023) and has included them in its water diplomacy policy (BMUV, 2023). Table 1 provides an overview of the instruments of German water diplomacy. Based on the factors of sustainable transboundary water management as discussed in the theoretical framework, they are separated into the categories of diplomatic measures, data, capacity building, innovation, governance, and financing,

Table 1

Instruments of German water diplomacy

Type	Instrument
<i>Diplomatic measures</i>	Advocacy for Germany's stance on international climate protection in embassies ^c
	Water as a resource for peace: active support for transboundary water management ^b
	Bi- and multilateral engagement to develop and strengthen international dialogue, coordination and cooperation on sustainable water resource management ^{a, b, c}
	Advise partner countries and international organisations (IOs) on transboundary river cooperation, joint data management, knowledge transfer activities, cooperative use of planning and financing mechanisms ^a
	Participate in multi-donor partnerships and international pioneer initiatives to accelerate global climate adaptation processes ^c
	Promote ratification of international treaties on protection and use of transboundary water resources in the UN and other IOs ^c
	Advocate for a UN interstate process to resolve water disputes ^c
	Advocate for strengthening the mandate of UN Water as a UN cooperation mechanism on water-related issues ^a
	Active engagement for and support of a coherent UN approach to achieve the SDGs ^a
	Establish cooperation in transboundary water as a task field of IOs ^d
	Engage in bi- and multilateral initiatives for regular global freshwater resources status assessments ^a
<i>Data</i>	Promote the use of regional climate models ^c
	Improve existing data sets and early warning systems ^c
	Help development of research strategies as well as data collection structures and capacities to continuously collect, manage and interpret hydrological and meteorological data as a reliable basis for future planning and decision-making ^{a, b}
	Support the mapping of distribution networks ^b
	Support real-time information collection on water infrastructure conditions in remote rural areas ^b
	Establish international partnerships with the <i>Water Stewardship</i> approach to facilitate knowledge transfers and to share technical innovations and management solutions ^b
	Implement results of scientific research in water planning and management practice ^a

	Foster international cooperation and networks between researchers and political actors ^a
	Support creation of scientific knowledge and specific water resource management tools to better understand the relationships between water resources, aquatic and terrestrial ecosystems, and human activity ^a
	Support creation of recognised joint databases of jointly used water resources as a starting point for transboundary cooperation ^d
<i>Capacity building</i>	Provide vocational education and training of water management staff, especially for newer technologies like desalination or wastewater treatment ^b
	Introduce standardised planning instruments in river catchment areas to improve analysis of water supply and demand and to identify areas for investment ^b
<i>Innovation</i>	Moderate water demand to facilitate water management ^d
	Introduce efficient technologies, e.g., drip irrigation to improve water productivity ^b
	Support construction of resilient infrastructure, e.g., storm- and wastewater drainage systems ^b
	Support prevention of water pollution and overuse ^a
	Support protection and restoration of water-based ecosystems and their biodiversity ^a
	Improve coordinated access to drinking water, sanitation, and hygiene in development cooperation context ^a
	Promote spread of hydropower plants to increase renewable energy production and increase water storage capacities ^b
	Develop alternative energy sources to relieve stress on drinking water ^b
	Support use of water recycling technologies such as pumping, desalination or water treatment to expand water availability ^b
	Use grey water or dry cooling technology in thermal power plants ^b
	Support effective and energy-efficient water management and supply strategies, e.g., using alternative water resources like treated wastewater and desalinated sea water ^b
<i>Governance</i>	Apply existing water management strategies for climate variability events on climate change impacts, and further develop these mechanisms for upcoming challenges ^d
	Support public institutions such as regulatory authorities, water utilities and river commissions to improve efficiency and effectiveness of local water management ^b
	Establish transparent budget processes ^b
	Regulate water extraction, e.g., of groundwater ^b
	Support reforms aiming to modernise the water sector ^b
	Support introduction of legislation to regulate responsibilities at all levels ^b
	Set socially equitable tariffs and water extraction quotas ^b
	Define standards for water provision ^b
	Advocate for transparent appointment procedures in public institutions ^b
	Support the establishment of anticipatory and integrative, national and regional water management structures ^d
	Support measures to eradicate corruption, inequality and discrimination at all levels of water supply, allocation and distribution ^b
	Expand access to water and sanitation in schools and health care facilities ^b
	Support creation and implementation of regulations to protect water bodies ^a
	Support the application of best practices in urban sanitation and industrial wastewater management ^a
	Halt blanket water subsidies that warp the macroeconomic costs of water provision ^d
	Ensure institutional agency of water management institutions by resolving present inadequacies and strengthening their adaptive, institutional and financial capacities ^d
	Use and further develop existing protocols for climate variability to prepare water management structures for future water provision challenges ^d
<i>Financing</i>	Policy-based loans to support water sector reform efforts ^b
	Invest in construction of resilient infrastructure in other countries ^b

	Climate financing: Financial support for climate protection measures and economic transformation ^c
	Focus on local capital markets to develop innovative finance mechanisms ^b

Sources: ^a(BMUV, 2023). ^b(BMZ, 2019). ^c(Bundesregierung, 2023). ^d(Bundestag, 2008b).

Table 1 provides a comprehensive but not exhaustive overview of instruments of German water diplomacy to foster and establish sustainable water management structures in partner countries. In each situation, an approach is chosen based on the requirements of the situation at hand (BMUV, 2023). The instruments of German water diplomacy include diplomatic tools aimed at garnering political assent from states in shared river basins to attempt establishing a system of transboundary water management and involving the UN and international water cooperation mechanisms in the implementation process. With the analytical approach of IWRM, German water diplomacy seeks to find solutions beneficial for all involved stakeholders. The tools also include funding mechanisms to finance the process, the development of data infrastructure and data exchange to facilitate water management, the construction of infrastructure and new technologies to reduce water loss and increase water use efficiency, and capacity building to expand technical knowledge and governance capacities of the responsible authorities of the involved countries. Additionally, Germany seeks to foster trust in public authorities and between neighbouring states of a shared river basin with its measures and supports the establishment of a transboundary water management institution.

b. Germany's Perspective on and Interest in Water Management in Central Asia

In an address to the German parliament in 2008, the German government expressed concerns for the threat of water scarcity in Central Asia, given that it is a semi-arid region mainly depending on glacial meltwater for its water supply, and the possible impacts of failed regional water cooperation in Central Asia in times of water stress, considering the past conflict history in Central Asia (Auswärtiges Amt, 2008a; Bundestag, 2008b). The scientific council to the German government assigned Central Asia a particularly high conflict vulnerability due to the socio-economic circumstances in the region and the projected exacerbating impacts of climate change. Moreover, the German government argued that it had a responsibility to support other states in developing approaches of sustainable resource management, for example by supporting the development of sustainable transboundary water management in Central Asia as part of the EU's Central Asia strategy (Bundestag, 2008b).

The German government furthermore provided a future projection for Central Asia if the water management situation were to remain the same: With growing temperatures, the

Central Asia glaciers are projected to shrink by 20% in size and their volume to decrease by a third by 2050, substantially limiting water availability. At first, the increased temperatures will lead to higher glacial meltwater runoff and subsequent increased water availability in summer. To avoid damaging the existing water infrastructure and hydropower plants, runoff will be increased, and agricultural areas flooded. The subsequent decreasing water volume will impair hydropower production and drastically curtail agricultural production, leading to stark increases in poverty and unemployment in rural areas, which will cause migratory streams. Inefficient irrigation and cultivation processes will cause desertification, and the agricultural sector will not be able to adapt to the challenges of climate change. With increasing water scarcity and desertification, sand and dust storms will become more frequent, causing substantial health hazards in areas with high pesticide application. Social disparities will further expand, and weak institutions remain prevalent, leaving the population without a reliable provision of public goods. Recurring droughts and high water demand between the opposing interests of upstream and downstream countries will further create tensions and conflict over water resources between the Central Asian states (Bundestag, 2008b).

Additionally, the scientific council to the German government provided two possible fictitious future scenarios for Central Asia – one of conflict and one of cooperation. The conflict scenario foresees the growing impacts of climate change leading to conflicts over water use: the upstream countries increase their hydropower production to meet their energy needs as fossil fuel prices rise, while the downstream countries require larger quantities of water in summer due to the growing temperatures. In absence of a shared water management system, the mutual dependencies are ignored, and each country follows only their national interest, causing repercussions and conflict - albeit no outright war – between the upstream and downstream countries. Without efficient water irrigation technologies and expanding droughts, the rural population is affected the worst and increasingly discontented, leading to growing domestic and interstate conflicts along religious and ethnic lines. State-sponsored repression will increase in turn, further exacerbating the conflict into a downward spiral, to the detriment of the population and stability of the region. As the national governments increasingly fail to maintain public order, organised crime and extremists use the power vacuum to expand their influence (Bundestag, 2008b).

In the cooperation scenario, the Central Asian states recognise the long-term drastic increase of water scarcity and proactively effectuate a structural change of the economy, investing especially the proceeds from natural resource exports into new business sectors. One of these sectors is wind energy: Production capacities are starkly expanded, mainly in

Kazakhstan and Turkmenistan but accessible to all Central Asian states, to meet the existing and growing energy demand and to reduce the dependency on fossil fuels and hydroelectricity. With the support and development cooperation of the international community, this structural change can be achieved without expanding the social disparities in the region. By introducing sustainable resource management and integrated water resource management in the agricultural sector, the extent of land degradation and water scarcity can be confined and slowly reduced, preventing an expansion of social disparities while rather strengthening social structures. Trust building measures reduce border conflicts, to the benefit of the region's population and economic development (Bundestag, 2008b).

In short, the German government perceived a substantial future risk and conflict potential in 2008 stemming in case of the continued absence of a sustainable transboundary water management system in Central Asia, arguing that stability in Central Asia is only certain if the water resources are used sustainably, reasonably, eco-sensitively and with consideration of the neighbouring states (Abdolvand et al., 2015). Therefore, following its policy of proactive diplomatic engagement to help ensure water security, Germany engages in water diplomacy in Central Asia to support the development of a regional system of sustainable transboundary water management as a means of preventive foreign policy (Auswärtiges Amt, 2015).

However, there are further reasons for Germany's particular interest in Central Asia. After the German reunification, the German government pursued a proactive policy of supporting post-Soviet states, in part due to a significant number of ethnic Germans living amongst their populations. Germany furthermore has economic interests in Central Asia, which is one of its largest trading partners, and security interests, given the geostrategic location of the region, as well as the intention to foster regional cooperation and environmental protection, all of which depend on water (Boyarkina, 2018; Bundestag, 2018).

c. The Water Initiative Central Asia / The “Berlin Process”

Germany began its water diplomacy engagement in Central Asia with the “Water Initiative Central Asia” as a part of the EU's 2007 Strategy for Central Asia (Auswärtiges Amt, 2008b). The initiative is also known as the “Berlin Process”, and both names will be used interchangeably in this chapter. German water diplomacy engagement in Central Asia was the result of a lengthy diplomatic process, after the Central Asian states had started to detect the impact of climate change on water availability and, having had no success establishing a regional system of sustainable water management so far, petitioned the EU for assistance in the matter. In particular, the Central Asian states requested support and knowledge on

transboundary water law, automated collection of hydrological data, sustainable management concepts for catchment areas and the conduct of independent expert studies on projects of cross-border significance (Schrader et al., 2009).

While the EU started diplomatic relations with the five Central Asian states in 1992 at the start of their independence, there was little progress until the US-led invasion in Afghanistan in 2001, which elicited a more frequent diplomatic exchange (Matveeva, 2023). After consultations and joint meetings with the German government, the topic of water was first adopted into the EU's Central Asia Strategy Paper 2002–2006. Germany expressed explicit interest in aiding the Central Asian states with their water management challenges, while the other EU member states showed limited interest in the region (Boyarkina, 2018). During its EU Council presidency in 2007, the German government prioritised the development of a regional strategy for Central Asia and proactively suggested and lobbied for the inclusion of the action field of sustainable water management in Central Asia in the EU Strategy for Central Asia 2007–2013. This strategy was then also adopted during Germany's EU Council presidency, paving the way for the inception of the Berlin Process in 2008 (Abdolvand et al., 2015; Auswärtiges Amt, 2008a; Bundestag, 2008b).

On April 1st, 2008, the AA hosted the international ministerial conference “Water Unites”, attended by delegations from all five Central Asian states, to discuss the security challenges posed by water and how to prevent future conflicts over it. The conference was planned to serve as a starting point for a political dialogue on how to manage water in Central Asia and to discuss specific projects to support this process (Auswärtiges Amt, 2008a). During the conference, the then German foreign minister Frank-Walter Steinmeier introduced the German Water Initiative for Central Asia, with which Germany wanted to support expanding transboundary water management in Central Asia (Auswärtiges Amt, 2008b). The initiative was officially adopted with the 2008 Berlin Declaration, which proposed five topic areas: Establishing a Central Asian water conservancy institute and linking the national water centres; expanding cooperation between German and Central Asian research institutes; extending the study programme of the German-Kazakh University (DKU) in Almaty; connecting water experts from Europe and Central Asia and funding research travels to Europe on water-related topics; and intensifying knowledge transfer and investment support from the German private sector to Central Asia (Abdolvand et al., 2015; Auswärtiges Amt, 2008b). Subsequently in the same year, expert missions were conducted in all five Central Asian states in June and July, national planning workshop in three Central Asian countries in September, and the follow-up conference “Water Unites –Strengthening Regional Cooperation on Water management in

Central Asia” was held in Almaty, Kazakhstan, on 17–18 November (Auswärtiges Amt, 2008b; UNECE, 2021a). Initially, the initiative was planned for a timeframe of three years but with expressed German government support for an extension (Schrader et al., 2009).

On March 7–8, 2012, the AA organised the conference “Water Diplomacy for Central Asia” in Berlin, which was attended by ministerial delegations of all five Central Asian states as well as by representatives from Afghanistan, the EU, the OSCE, the UNECE and other donors. At the conference, the Central Asian states and Germany adopted the 2012 Berlin Declaration, in which they agreed to continue the Berlin Process (Auswärtiges Amt, 2012a; Bundestag, 2012). This initiated the second phase of the Berlin Process, which sought to continue establishing and developing sustainable transboundary water cooperation in Central Asia with consideration of the region’s ecological, social and economic circumstances, and to foster sustainable economic development at the national and regional level (Abdolvand et al., 2015). In the joint declaration, the participating states declared transboundary water management as an important pillar of political cooperation in the region but recognised its existing challenges due to the ongoing circumstances of climate and demographic change, and the competing modes of water use in the region. Simultaneously, the conference offered an opportunity to foster the political dialogue between the five Central Asian states and signalled the continued strengthening of regional cooperation in Central Asia (Auswärtiges Amt, 2012b; Bundestag, 2012). Furthermore, Afghanistan’s participation at the conference was welcomed and the plan made to include them in the Water Initiative Central Asia in the long term. A month later, in response to a question by a member of parliament, the German government attached great importance to the Berlin Process and expressed interest in a long-term engagement given its demand and positive development prospects (Bundestag, 2012).

In September 2015, the AA organised the ministerial conference “Water and Good Neighbourly Relations in Central Asia”, during which the six parties discussed several achievements that the first two stages of the Berlin Process had created, including a strengthening of the logistics of the water management institutions, hydro system restoration and notable education capacity expansions among experts from Central Asia, while agreeing on the continuation of the Berlin Process (Boyarkina, 2018). This initiated the third and final phase of the Berlin Process, which primarily aimed to strengthen regional institutions and to sustain the experiences gained and good practices developed during the first two phases (Boyarkina, 2018; Milow, n.d.).

Overall, the Berlin Process was thus structured in three phases: The first from 2008 to 2011, the second from 2012 to 2014, and the third from 2015 to 2017 (Boyarkina, 2018). Phase

I focused on strengthening the institutions of transboundary water management and transboundary river management and providing political advisory services. Phase II aimed to provide priority support for developing approaches to manage and mitigate the growing impacts of climate change on the availability of water resources in Central Asia. Phase III sought to strengthen regional institutions and processes for the long term, to achieve the institutionalisation of self-guided water cooperation in Central Asia (Auswärtiges Amt, 2015).

Goals

The main goal of the Berlin Process was to promote transboundary cooperation on water between the Central Asian states and support them in establishing a system of sustainable transboundary water management that considers the interests of all Central Asian states, allowing all states to use the unevenly distributed water resources sustainably and conflict-free. Moreover, the process was intended to foster trust between the five Central Asian governments, which could then extend into other policy areas and deepen overall regional cooperation and integration (Abdolvand et al., 2015; Auswärtiges Amt, 2013; Boyarkina, 2018; Schrader et al., 2009). Ultimately, achieving cooperation on the shared water resources was intended as a measure of preventive foreign policy to lead to improved stability, security and economic development in the region in the long term (Bundestag, 2012). Water was thus to serve as the catalyst for deepened regional cooperation and dialogue in Central Asia (Abdolvand et al., 2015; Bundestag, 2008a, 2012), and to further develop the cooperation between Germany and the Central Asian states (Schrader et al., 2009).

Approach

To achieve these goals, Germany sought to strengthen the regional water management institutions, in particular the IFAS, and cooperate with them in various projects to increase the water use efficiency and protect the region's water resources (Bundestag, 2018; Schrader et al., 2009). Furthermore, the Water Initiative Central Asia proposed the adaption and implementation of technical, legal and administrative solutions for hydropower, irrigation, rural water supply and wastewater treatment (Schrader et al., 2009). The knowledge production on water resources and transboundary water management in Central Asia should be increased through scientific cooperation (Hakala, Mustasilta & Hadi, 2023) and networking between water experts in Germany and Central Asia (Abdolvand et al., 2015).

The Berlin Process was organised in a three-dimensional approach: scientific-technical, political-institutional, and capacity building. The scientific-technical dimension comprised the

establishment of reliable databases for the regional water resources, increasing efficiency in water use and developing new technological options. The political-institutional dimension sought to foster effective institutions of regional cooperation and political coherence. The capacity building dimension aimed at training people to implement the measures of the Berlin Process and to operate the system of sustainable transboundary water management in the future (Auswärtiges Amt, 2013; Bundestag, 2012). Overall, the Berlin Process was designed to build on the water diplomacy efforts of other international actors and to integrate it into existing activities (Schrader et al., 2009). All five Central Asian states were invited to participate in the implementation on equal terms (Boyarkina, 2018). The approach assumes that economic and population growth in Central Asia will increase water demand in Central Asia in the future (Schrader et al., 2009).

Involved Actors

While the establishment of the Berlin Process was the result of the work of the AA, several national and international actors were involved in its realisation and implementation. The main cooperation partner was the UNECE, whose Central Asia commission SPECA holds a UN mandate empowering it to work on transboundary solutions in the region (Schrader et al., 2009). In Central Asia, the project worked in cooperation with the national ministries for irrigation and water economy and their administrations (Bundestag, 2010). For the implementation, the German government cooperated with and employed different actors.

The German Development Cooperation (“Gesellschaft für Internationale Zusammenarbeit”, GIZ) was employed to design and implement a program for the political-institutional component of the Berlin Process, which they did in form of the “Transboundary Water Management in Central Asia” program from 2009 to 2020 (Boyarkina, 2018; GIZ, 2023d). The GIZ has years of experience working on water management in other countries and has five offices in Central Asia (Schrader et al., 2009).

The scientific-technical component was implemented with the creation of the research cooperation network “Central Asian Water” (CAWa), which comprised various research institutions and universities. From the German side, it was spearheaded by the Potsdam Institute for Climate Research (PIK), the German Aerospace Centre (DLR) and the German Research Centre for Geosciences (GFZ). Furthermore, it was furthermore supported by the Center for International Development and Environmental Research of the University of Gießen, the Commission for Glaciology of the Bavarian Academy of Sciences, the University of Würzburg and the Ludwig-Maximilian University of Munich. In Central Asia, it cooperated

with the IFAS' scientific and governmental structures, the Scientific Information Center (SIC) of the ICWC, the DKU in Kazakhstan, the Central Asian Institute of Applied Geosciences (CAIAG) in Kyrgyzstan, the hydrometeorological services of all five Central Asian states, the CAREC and the Ulugh Beg Astronomical Institute (UBAI) of the Uzbek Academy of Sciences (Boyarkina, 2018).

Moreover, German political foundations supported the process: the Konrad Adenauer Foundation and the Friedrich Ebert Foundation both cooperated with state actors and nongovernmental representatives in the implementation of educational, scientific and social projects. Furthermore, they contributed to scientific publications and supported the organisation of several conferences on water issues. Additionally, the German Development Bank KfW financed water projects in Central Asia (Boyarkina, 2018). The Berlin Process was also supported by the German Water Partnership e.V. program, a cooperation between the private and the public sector in Germany, involving state organisations, NGOs, research centres, water management institutions, and over 350 private businesses (Boyarkina, 2018). The program provides expert advice, equipment and technologies to support the development of sustainable transboundary water management systems (BMUV, 2014).

Lastly, the Berlin Process was supported by other German federal ministries – the BMWi, the BMUV and the BMZ – that were working on other projects in the region that supported the efforts of the Berlin Process (Bundestag, 2012). The BMUV supported projects on protection and adaptation for climate change and capacity development in the environmental sector, the BMZ supported measures on energy efficiency and regional cooperation on sustainable use of natural resources, and the BMWi implemented projects on export business assistance for the German water economy (Bundestag, 2012). The BMUV and the BMZ presented the findings of their international conference “The Water, Energy and Food Security Nexus – Solutions for a Green Economy” at the March 2012 conference “Water diplomacy for Central Asia”, which supported the design of the second phase of the Berlin Process (Bundestag, 2012). Furthermore, the GIZ has also implemented projects funded by the BMZ.

GIZ: “Transboundary Water Management in Central Asia”

To fulfil the political-institutional dimension of the Berlin Process, the GIZ designed the program “Transboundary Water Management in Central Asia”, which was based on a strategy developed in cooperation with local and regional partner organisations and implemented in cooperation with the UNECE (Boyarkina, 2018; Milow, n.d.; UNECE, 2021a). The program,

launched in 2009, constituted the operational and most extensive aspect of the Berlin Process (GIZ, 2013; UNECE, n.d.).

The main goal of the project was to help the Central Asian states find a way to use the unequally distributed water resources sustainably and without conflict (Schrader et al., 2009) by supporting the joint development of practical approaches to develop a system of sustainable transboundary water management (Boyarkina, 2018). Achieving this goal included expanding the political interstate dialogue on water use and economy, increasing water use efficiency and improving water quality in both national and transboundary contexts, and empowering the state institutions and civil society to develop the capacity to resolve problems related to water on their own (Schrader et al., 2009). Moreover, the GIZ sought to strengthen the political institutions responsible for water management in Central Asia, in particular the IFAS, by supporting their position as water distribution regulators at the regional level (Boyarkina, 2018).

The GIZ provided political advice for formulating legal guidelines and provisions for all relevant institutions and supported implementing practical measures of IWRM and sustainable water management. Principles of river basin management were introduced, which were then applied in several pilot projects in selected transboundary river basins to show the mutual benefits that improved water use would bring (GIZ, 2013; Milow, n.d.). Moreover, it encompassed capacity development for institutions and water management personnel, as well as technical assistance. Institutions on all levels were supported in developing practical approaches to establish a system of sustainable transboundary water management. The GIZ organised the project in close cooperation with the donor community and other projects of the Berlin Process (GIZ, 2013). To implement the program, the GIZ applied an interdisciplinary methodology based on a professional approach that focused on fostering political dialogue, regional exchange, and fast-track projects of national water management (see Table 2).

Table 2

Interdisciplinary methodology of the GIZ

Method	Practical aspects
<i>Political dialogue</i>	Continue existing dialogues in ICWC and UNECE
	Involve the AA and German embassies in Central Asia in resolving problems of transboundary water use
<i>Regional exchange</i>	Foster exchange of best practices and new approaches between Germany, the EU and Central Asia
	Cooperate with research institutions like GFZ, DLR and PIK
<i>Fast-track projects</i>	Prioritise projects of IWRM, infrastructure, irrigation and wastewater treatment that can be realised quickly and create a notable impact

	Cooperate with Germany's water sector
<i>Professional approach</i>	Use approaches based on existing practical experience, especially from the EU Water Framework Directive
	Focus on institutions of regional cooperation and the water-energy-agriculture nexus
	Improve water quality and water use efficiency

Source: (Schrader et al., 2009).

The program was structured in three focus areas: Develop institutional cooperation in the region, improve transboundary river management with special focus on the Amu Darya and Syr Darya, and improving national water management through various pilot projects (Schrader et al., 2009; UNECE, 2021a). Table 3 provides an overview of the goals of each focus area, and the approaches taken to achieve the set goals.

Table 3

Focus areas and goals

Focus area	Goals	Approach
<i>Develop regional institutional cooperation</i>	Institutional analysis by Central Asian countries to determine which structures and measures are required ^c	Analysis of the institutional structures of river management integrated in the ICWC ^c
		Improve data collection of the discharge at the gauges and the discharge measuring points ^c
		Improve transboundary data exchange ^c
		Create well-founded forecasts of the discharge volumes to be expected in the growing season ^c
		Support the exchange of experiences on selected topics ^c
	Improve efficiency and effectiveness of regional institutions on water cooperation ^c	Develop proposals to strengthen the institutional capacity of the Executive Committee of the IFAS ^a
		Support the development of the third Aral Sea Basin Program (ASBP) to improve water resource management in the Aral Sea Basin ^a
		Support the ICWC in their consideration of aspects of hydropower use in the interstate negotiations ^c
		Develop clear definition of the mandate and mission of the institutions of regional cooperation such as ICWC and IFAS ^d
		Develop action plans and codes of conducts ^d
	Ensure the involvement of all sides ^c	Organise regular stakeholder dialogues and policy meetings ^b
		Develop and disseminate information materials on basin planning ^b
		Support independent environmental analyses based on a framework agreed upon by the stakeholders, aimed at finding a fair and equitable solution for all involved parties and stakeholders ^c
	Best practices exchange between water specialists ^b	Support networking between European and Central Asian water management organisations ^b
		Apply European experience with existing water law to regulate state interactions on water ^d

<i>Transboundary river management</i>	Improve transboundary river management practices ^b	Introduce and apply principles of river basin management in selected transboundary river basins ^b
		Trainings for personnel of water management organisations on river basin planning and management ^b
		Use experiences of EU Water Framework Directive to develop transboundary management systems ^c
		Develop projects to improve water quality and reduce water pollution, mainly from mining operations in upstream Tajikistan and Kyrgyzstan ^c
		Conduct security assessments of all technical water infrastructure older than 20 years ^c
		Pilot projects: Rehabilitating safety systems in smaller dams ^b
		Pilot projects: Introduction of water saving technologies ^b
		Pilot projects: Reconstruct traditional water supply systems ^b
		Develop proposals for dam safety ^d
		Conduct analyses of environmental impacts of dams ^d
		Support the establishment of monitoring systems and data exchange ^d
	Water yield analysis ^c	Capacity building for national institutions in chosen river areas to prepare and conduct complex analyses and provide recommendations on irrigation, hydropower use, drinking water use and water quality ^c
Support creation of goals for joint development and use in transboundary river basins ^c	Support development of river basin plans ^c	
	include civil society in development ^c	
	Include hydroelectric plants and water reservoirs in water river management planning if they can alter the quantity and flow regime of the river ^c	
	Work on finalising an agreement between Kyrgyzstan and Tajikistan on transboundary river cooperation ^a	
<i>National Water Management</i>	Improve the capacities of national and provincial water management organisations on the institutional and individual level ^b	Fast-track national projects such as setting up modern irrigation systems and the construction of smaller hydropower facilities ^d
		Support development of practical measures for IWRM ^a
		Support the development of legal standards and guidelines in all relevant local, national and regional public structures ^a

Sources: ^a(Boyarkina, 2018). ^b(GIZ, 2013). ^c(Schrader et al., 2009). ^d(UNECE, n.d.).

To achieve the goals described in Table 3, multiple projects were implemented by the GIZ and its partners in Central Asia. Table 4 provides a non-exhaustive overview of projects implemented by the GIZ, separated into three types of activity – infrastructure, capacity building, and projects commissioned and funded by the BMZ. Each project and the respective goal are shortly described, and where more information was available the specific contents of the project are provided.

Table 4*Projects realised by the GIZ in Central Asia*

Activity	Project	Content
<i>Infrastructure</i>	Develop a system to reuse drainage water in Turkmenistan ^f	Construction of a biological sewage treatment plant based on reeds and other suitable plants to filter highly mineralised drainage water from agricultural areas ^c
		Capacity building measures for water quality analysis ^c
		Building laboratory capacities ^c
		Trainings for chemists and environmental specialists ^c
	Construction of small hydropower plants in the Serafshan Valley, Tajikistan ^f	
	Replace deteriorated pumping systems with alternative water supply for the Garauti irrigation area (~80,000 ha) in Tajikistan from the Vaksh River ^f	
	Two projects aimed at improving drinking water supply in Kazakhstan ^c	
	Support for the development of a drip irrigation system in Uzbekistan ^f	
	Rehabilitation of the Bad Bad irrigation canal in the Bulungur District of Samarkand Region, Uzbekistan ^d	Rehabilitation and electrification of main water intake structure ^d
		Training for local water managers ^d
Provision of required technical equipment ^d		
<i>Capacity Building</i>	Workshop for water supply organisations on GIS use and creating transparency of water flow information ^a	
	Development of Eurasian portal for river basin management by CAREC ^b	Platform for the exchange of knowledge and experiences concerning basin organisations both within and beyond the region ^b
		Contains information on the functioning of the river basin organisations: water inspections, basin councils, meetings minutes, and decisions taken ^b
<i>Projects commissioned and funded by the BMZ</i>	“Sustainable management of water resources in rural areas in Uzbekistan” 2016-2020 ^e	Establishment of a National Working Group to enable a multi-stakeholder policy dialogue ^e
		Analysis of the existing legal framework to assess how to adapt it to international standards ^e
		Exchange of experiences on managing water, land use and energy efficiency ^e
		Capacity building for policy makers ^e
		Improving data access and exchange between state agencies and water users ^e
		Development of a water basin management plan ^e
	Improve monitoring capacities of the safety and technical conditions of hydraulic structures in Uzbekistan together with the State Inspection for Dam Safety 2018–2019 ^e	Provision of high precision equipment for safety and security assessments ^e
		Maintenance of water infrastructure installations ^e
		Provision of a vehicle to monitor remote water infrastructure objects ^e
		Capacity building for the water infrastructure operators ^e

Sources: ^a(Abdullaev et al., 2012). ^b(Boyarkina, 2018). ^c(Bundestag, 2010). ^d(GIZ, 2022c). ^e(Milow, 2022). ^f(Schrader et al., 2009).

As part of the focus area of transboundary river management, the GIZ implemented the project “Water Management and Basin Organisations in Central Asia” (WMBOCA) together

with CAREC. The project aimed at improving national water management and strengthening river basin organisations to expand transboundary river management in the transboundary river basins Isfara (shared by Kyrgyzstan and Tajikistan), Padshota (shared by Kyrgyzstan and Uzbekistan), the Aral-Syr Darya basin (shared by Kazakhstan, Kyrgyzstan, Uzbekistan and Tajikistan), and Murgab (shared by Afghanistan and Turkmenistan). In these basins, the GIZ sought to implement international water management practices. The project included capacity building activities such as training and internships for local specialists, and technical support through the reconstruction and operation of water facilities in these river basins (Boyarkina, 2018).

In the Isfara River Basin, several problems were apparent: Most of the infrastructure was built in the 1960s and had not been rehabilitated since then. The technical conditions were drastically deteriorated, with parts of the infrastructure being in a critical state. Water resources in the basin were managed individually by both Kyrgyzstan and Tajikistan, and the allocation of water was not handled transparently. Neither transboundary water management bodies nor shared basin management and planning strategies existed. Flow measurements were mostly conducted manually with the results being recorded only on paper, which led to disputes between the two countries and local water users on the water allocation. In short, the Isfara River Basin did not have a safe or transparent water allocation system. Additionally, the local specialists in both countries had little experience in basin planning and management, applying different approaches that complicated transboundary cooperation (Dusik & Nurmamedova, 2015). Within the WMBOCA project, the GIZ implemented a series of projects in Kyrgyzstan and Tajikistan to improve transboundary river basin management (see Table 5).

Table 5

Projects implemented in the Isfara River Basin during the WMBOCA project

Project	Activities
Training module on river basin planning for 50 participants (2012–2014) ^b	Capacity building: knowledge transfer on geographical mapping and climate model application ^b
	Assessment of ecological and socio-economic conditions in the Basin ^b
	Support for basin plan development ^b
Trainings on Data management and processing in water management (Conducted by specialists from CAWa) ^a	Comprehensive training for working group members on data handling, databases and GIS to support water resource management.
	Establishment of database systems at local Kyrgyz and Tajik water administrations with digital collection and storage of data on water use, hydro-technical facilities, and hydrological, economic, and administrative conditions in the region ^a
	Training on water and land resources mapping using ArcGIS software and Google Earth's open-source remote sensing data ^a

	Production of preliminary topographic, land-use, and mudflow risk zones maps of the Isfara river basin were produced, which constitutes a main outcome of the programme's activities ^a
	Continuous on-the-job training for local specialists ^a
Elaboration of a transboundary cooperation agreement ^a	Support for multiple joint meetings with up to 12 competent ministries from Kyrgyzstan and Tajikistan ^a
	Development of the "Framework Agreement on Cooperation on the Joint Use of Water Resources from International Rivers on cooperation in the Isfara Basin" ^a
Development of a common strategy for water resources management ^a	Establishment of an intersectoral working group in both countries with representatives from local water management and planning agencies and organisations, local government, other beneficiaries, and representatives from the other country ^a
	Regular meetings to discuss and develop the basin plans for each basin part ^a
	Public hearings to ensure public participation in the drafting of basin plans ^a
Establishment of two small Basin Councils in both countries ^a	Regular meetings, involvement of stakeholders from different water-related sectors and representatives from the general public ^a
	Mandatory advisory bodies since February 2013 ^a
Automatised flow regulation and measurement at the Isfara Headwork in Batken District, Kyrgyzstan ^a	Installation of modern water flow meters and other technical devices to improve flow control and distribution, and to remotely operate the water gates ^a
	Training for staff to correctly operate the automated hydro facility ^a
	Collection and analysis of computer-based data
	Data distribution to the relevant authorities in Kyrgyzstan and Tajikistan ^a
Transparent water allocation for Kyzyl-Kyr Water Users Association Batken Oblast ^a	Installation of modern equipment to measure and control water flow ^a
	Build database workspace at the local administration ^a
	Training for local staff on analysis and distribution of digital data ^a
	Create invoice process based on verified withdrawals ^a
	Reduce water loss and increase agricultural yields ^a
Rehabilitation of Tortgul Reservoir, Batken District, Kyrgyzstan ^a	Restoration of the piezometric network ^a
	Rehabilitation of the hydromechanical equipment ^a
	Strengthening the eastern tower's service bridge ^a
	Rebuilding gate operation mechanism in both towers ^a
Rehabilitation of Zumratsho Headwork in Sughd District, Tajikistan ^a	Removal of soil, stones and gravel from the headwork structure ^a
	Reconstruction of the concrete base and gates ^a
	Improve water flow control and overall operating conditions ^a

Sources: ^a(Dusik & Nurmamedova, 2015). ^b(Unger-Shayesteh et al., 2015c).

The establishment of automatised flow measurement systems led to the fair and safe water resources allocation for more than 200,000 agricultural water users in Tajikistan and Kyrgyzstan and benefited the economic situation of the local population (Dusik & Nurmamedova, 2015).

UNECE: "Regional Dialogue and Cooperation on Water Resources Management"

The UNECE was tasked with the implementation of the focus area of developing regional institutional cooperation in the region, for which it implemented the project "Regional Dialogue and Cooperation on Water Resources Management" (RDCWRM) in 2009 with

support from the GIZ. At the Summit of Heads of State of IFAS in Almaty on April 28, 2009, the governments of the five Central Asian states expressed their commitment to improve the organisational structure and legal framework of the IFAS to increase its efficiency and to expand interaction with financial institutions and donors, which provided the mandate for UNECE’s project (UNECE, 2021a, 2021b). With the project, the UNECE sought to support the Central Asian states in jointly developing mutually beneficial and sustainable solutions for improved long-term transboundary water resources cooperation by strengthening the regional dialogue and the regional water resources management institutions’ capacities. The project comprised three interrelated components: Regional Institutions on Water Management, International Water Law, and Water Monitoring and Data Exchange (UNECE, 2021a). Table 6 provides an overview over the goals of each component and the activities planned to achieve each goal.

Table 6

Goals and activities of the RDCWRM project in Phase I

Component	Goal	Planned activities
<i>Regional Institutions on Water Management</i>	Support the analysis of the legal framework and institutional settings for transboundary water management to determine what reforms were needed, with particular focus on the IFAS	Develop proposals for adaptation of mandates, objectives and responsibilities of regional water institutions
		Develop proposals for the institutional and legal strengthening of the IFAS
		Support the development of the ASBP-3
<i>International Water Law</i>	Capacity development on international water law and policy	>15 national and regional capacity development workshops focused on improving knowledge and application of international water law, including UNECE conventions; based on the specific requirements of each country
	Foster interstate dialogue on the development of a legal framework for regional water management	
<i>Water Monitoring and Data Exchange</i>	Expand water monitoring capacities and data exchange between regional institutions and national representatives	Inception of a dialogue on how to organise information and data exchange in the region

Source: (UNECE, 2021a).

To achieve the goals of its project, the UNECE organised several activities for each component, including national and regional consultations to strengthen the regional water management institutions and to support the development of the ASBP-3, as well as multiple workshops on international water law, water monitoring and data exchange. Table 7 provides a comprehensive overview of the activities organised by the UNECE:

Table 7*Activities organised by the UNECE during Phase I of the RDCWRM project*

Component	Focus area	Activity/program title	Date and Location
<i>Regional Institutions on Water Management</i>	General consultations	High-Level Segment "Transboundary Water Cooperation: the Case of Central Asia" (during the fifth session of the Meeting of the Parties to the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes)	10-12 November 2009 Geneva, Switzerland
		National Consultations	February-March 2010 Almaty, Dushanbe, Ashgabat, Tashkent, Bishkek
	IFAS	Expert Group Meeting on the revision of statutory documents of IFAS	22 October 2010 Almaty, Kazakhstan
			22-23 March 2011 Geneva, Switzerland
			12 December 2011 Almaty, Kazakhstan
		National consultations on the "Conceptual elements for the strengthening of the institutional and legal framework of IFAS",	9 June 2011 Ashgabat, Turkmenistan
			12 August 2011 Bishkek, Kyrgyzstan,
			15 August 2011 Dushanbe, Tajikistan
	Third Aral Sea Basin Program ASBP-3	Consultative meeting with IOs and donors on the development of ASBP-3	17 November 2009 Almaty, Kazakhstan
			3 February 2010 Almaty, Kazakhstan
		Meeting of the Working Group on Institutional and Legal Strengthening and the Development of Aral Sea Basin Programme - 3	10-11 December 2009 Almaty, Kazakhstan
			20-21 April 2010 Almaty, Kazakhstan
		Donors' Coordination Meeting on Third Aral Sea Basin Programme	21 May 2010 Almaty, Kazakhstan
		Donors Coordination Conference on the Third Aral Sea Basin Programme	9 December 2010 Almaty, Kazakhstan
		Joint High-level Meeting of Donors and IFAS Board on the Third Aral Sea Basin Program	15 December 2010 Almaty, Kazakhstan
<i>International Water Law</i>	Seminars	Briefing "UNECE environmental conventions: key aspects and opportunities for Central Asia" (side event in the framework of the Second meeting),	23 March 2011 Geneva, Switzerland
		Seminar on "International water laws and negotiation of mutually beneficial	19-21 April 2009 Almaty, Kazakhstan

		multilateral water agreements in Central Asia”	
		National Seminar “Legislation and procedures for the application of the Espoo Convention in Tajikistan”	22-23 July 2010 Dushanbe, Tajikistan
		National seminar "UNECE Water Convention and its role in international law"	18-19 October 2010 Almaty, Kazakhstan
		National seminar "Strengthening integrated water resources management and transboundary water cooperation: the role of UNECE conventions and of the EU Water Initiative National Policy Dialogue",	6-7 December 2010 Ashgabat, Turkmenistan
		National seminar "On the way to the International Year of Water Cooperation: the role of international law, including the UNECE Water Convention, in strengthening cooperation on water resources management"	14-15 March 2011 Dushanbe, Tajikistan
		National seminar “Strengthening transboundary water cooperation and adaptation to climate change”	26-27 September 2011 Issyk-Kul, Kyrgyzstan
	Trainings	Workshop for representatives of international and donor organisations	17 March 2010 Almaty, Kazakhstan
		International High Level Conference “Strengthening transboundary water cooperation in Central Asia: the role of international water law and of the UNECE Water Convention”	25-27 October 2011 Almaty, Kazakhstan
		Workshop on the Protocol on Water and Health	25-27 October 2011 Almaty, Kazakhstan
		National training session on identification of hazardous activities under the Convention on the Transboundary Effects of Industrial Accidents for Kyrgyzstan and Tajikistan	22-23 November 2011 Bishkek, Kyrgyzstan
		National training session on identification of hazardous activities under the Convention on the Transboundary Effects of Industrial Accidents for Uzbekistan,	6-7 December 2011 Tashkent, Uzbekistan
		Training on international water law for young diplomats in Central Asia (jointly with UNRCCA)	6-7 December 2011 Ashgabat, Turkmenistan
<i>Water Monitoring and Data Exchange</i>		Water Monitoring	Sub-regional training workshop for strengthening capacities in Central Asia for understanding and implementing the Convention on Environmental Impact Assessment in a Transboundary Context and the Convention's Protocol on Strategic Environmental Assessment, with a focus on the water sector
	Workshop on obligations and procedures of Espoo and Industrial Accidents Conventions, and the opportunities the two Conventions provide for Turkmenistan		5-6 June 2011 Ashgabat, Turkmenistan,

		Workshop to strengthen capacity for the development of EIA and SEA systems in Uzbekistan, with sharing of experiences from other countries in the implementation of the Espoo Convention and in particular its Protocol on SEA	9-12 November 2011 Tashkent, Uzbekistan
	Data Exchange	Workshop "Information Exchange on Water Resources in Central Asia"	7 December 2011 Almaty, Kazakhstan

Source: (UNECE, 2021a).

During Phase II of the Berlin Process, the UNECE focused on rapidly improving national governance and expanding regional cooperation to meet the growing water demand, while the water supply was becoming increasingly more irregular and the water quality deteriorating. To that end, new goals were developed for the project, building on the progress and experiences of Phase I. The Water Monitoring and Data Exchange component was discontinued, while the International Water Law component was extended with implementing principles of IWRM (UNECE, 2021b). Each goal comprised various planned activities (see Table 8):

Table 8

Goals and planned activities in Phase II of the RDCWRM project

Component	Goal	Planned activity
<i>Regional Institutions on Water Management</i>	Improve the organisational and institutional capacity of the IFAS and continue modernising its legal basis	Conduct high-level national and regional consultations on key issues of institutional and legal strengthening
		Institutional and legal strengthening of the IFAS through further development of the partnership with the EC-IFAS, including cooperation in the implementation of component 4 of ASBP-3
		Develop proposals for the modernization of the rules of procedures, decision-making processes, coordination with other organisations and institutions, and budgets of selected organisations and institutions of the IFAS
<i>International Water Law and IWRM</i>	Expand capacity of the Central Asian states to apply the relevant instruments and best practices of international law with increased frequency	National capacity building activities on the understanding and correct interpretation of international water law in Central Asia
		Capacity building activities on the application of environmental impact assessment and strategic environmental assessment to water issues for interested countries
	Improve application of IWRM principles at river basin and regional levels	Support the implementation of the Assistance Programme under the Convention on Transboundary Effects of Industrial Accidents, with a focus on transboundary waters

Source: (UNECE, 2021b).

To achieve these goals, the UNECE organised several meetings, workshops and seminars during Phase II (see Table 9).

Table 9

Meetings, workshops, and seminars in Phase II of the RDCWRM project

Component	Activity	Date and Location
<i>Regional Institutions on Water Cooperation</i>	National workshop on the Industrial Accidents Convention and transboundary water management	28–29 October 2013 Bishkek, Kyrgyzstan
	Presentation of the Study of the Expert Group on the Strengthening of Interstate Commission on Sustainable Development of the IFAS	20 November 2013 Almaty, Kazakhstan
	Informal consultations on UNECE support for transboundary water cooperation and the work of joint bodies of transboundary water cooperation in Central Asia	8 April 2014 Geneva, Switzerland
	Workshop "Further development of regional cooperation among the countries of Central Asia in the management of information on the environment and water resources"	9–10 June 2014 Almaty, Kazakhstan
<i>International Water Law and IWRM</i>	Meeting: Outcomes of Rio+20: challenges and opportunities for the Interstate Commission on Sustainable Development	30 May 2013 Almaty, Kazakhstan
	National seminar on international water law	12–13 September 2013 Issyk-Kul, Kyrgyzstan

Source: (UNECE, 2021b).

Additionally, the executive secretary of the UNECE signed a Statement of Intent together with the EC-IFAS Chairman on establishing formal cooperation between the UNECE and the IFAS during his participation in the International Aral Sea Basin Conference in Urgench, Uzbekistan, in 2014, organised by the IFAS (UNECE, 2021b).

With the approval of the ASBP-3 by the member states of the IFAS, the UNECE could continue the third phase of its project with a more explicit mandate to further develop and improve the institutional and legal mechanisms for regional cooperation on water management in Central Asia. Building on the experiences and progress of the first two phases, Phase III sought to support the Central Asian states in the development of practical approaches to establish sustainable transboundary water management, and to further expand the capacities of the regional water management institutions (UNECE, 2021c).

In 2016, the executive secretary of the UNECE signed a Statement of Intent together with the Chairman of the EC-IFAS during the ministerial conference in Batumi, agreeing on UNECE support for the afforestation of the desiccated Aral Sea bottom. Furthermore, the UNECE supported the Interstate Commission on Sustainable Development (ICSD) in organising several meetings that aimed to adopt a Road Map on legal and institutional

strengthening and decide on modalities and explicit steps for its implementation, as well as to create a Coordination Group to support the process (UNECE, 2021c). The meeting of the Inter-State Commission on Sustainable Development held in November 2014 in Dushanbe, Tajikistan, supported the establishment of the Coordination Group, which should facilitate the creation of a regional platform in Central Asia for exchanging information on water and environment (UNECE, 2015). This was succeeded by an informal meeting of participants from Central Asia in the Working Group on IWRM on June 23, 2015, in Geneva, Switzerland, organised by the UNECE, leading the creation of the Coordination Group on Regional Information Space on Water and Environment in Central Asia of the ICSD during its first meeting on September 1-2, 2015, in Almaty, Kazakhstan (UNECE, 2021c). Moreover, the UNECE organised a capacity building workshop for Turkmenistan's IFAS Chairmanship on August 24-26, 2016, in Ashgabat, Turkmenistan, and a capacity building program on information management for the SIC ICSD (UNECE, 2021c).

CAWa Project

Coordinated by the GFZ, a network of German and Central Asian universities and research institutions created the CAWa project to implement the scientific-technical component of the Berlin Process. More than 50 scientists were involved in the CAWa project from various research institutions: the DLR, PIK, the Martin Luther University Halle-Wittenberg (MLU), the University of Würzburg, the University of Gießen on the German side, and CAIAG, CAREC, the Tashkent Institute of Irrigation and Agricultural Mechanisation Engineers (TIAME), SIC ICWC, UBAI, the Khorezm Rural Advisory Support Service in Uzbekistan and the Kazakh Institute of Geography in Central Asia, as well as the IFAS and the national Central Asian hydrometeorological services (CAWa, n.d.-a, n.d.-c; DLR, n.d.).

Fundamentally, the CAWa project sought to support informed decision-making for sustainable transboundary water management in Central Asia by establishing a regional data collection system that can provide reliable, standardised, comprehensive and consistent hydro-meteorological data of regional water availability and use (CAWa, n.d.-a; DLR, n.d.). To do so, the CAWa project sought to expand research cooperation within the network between nations and sectors, provide methods for optimised water management and train Central Asian scientists and water managers in developing and using data models to analyse the collected data and use it to establish future projections that can guide policy development (Abdolvand et al., 2015; CAWa, n.d.-a, n.d.-b; DLR, n.d.). By constructing a regional data collection network and providing universal access to comprehensive data on water resources in Central Asia, the

CAWa project was thus intended to support further transboundary political and administrative cooperation in Central Asia, as reliable data accessible by all Central Asian states can build trust and allow for the assent to and joint development of regional sustainable transboundary water management strategies (CAWa, n.d.-b). Additionally, a shared database is required to develop and operate early warning systems for flood hazards (GFZ, 2011). Overall, the CAWA project comprised seven task areas and respective activities (see Table 10):

Table 10

Tasks and activities of the CAWa project

Task	Activity
<i>Installation</i>	Construction of hydrometeorological stations to create a regional monitoring network
<i>Monitoring</i>	Use satellite data to determine regional developments in e.g., irrigation or drought development, to complement local data collection
<i>Stocktaking</i>	Assess existing data for water cycle analysis to improve water management
<i>Modelling</i>	Develop climate models to analyse future climate change impacts in Central Asia
<i>Forecasting</i>	Develop hydrological models to project future water availability
<i>Information</i>	Establish an online database containing all data collected and produced within the CAWa project
<i>Training</i>	Short-term vocational training for selected Central Asian water experts and managers

Source: (CAWa, n.d.-a).

To achieve the various goals of the CAWa project, multiple activities were organised. A central aspect of the CAWa project was capacity building through trainings. The short-term vocational trainings provided by the CAWa project sought to transfer technical and methodological knowledge to water professionals from Central Asia, including employees of water management organisations on all levels, employees and researchers of scientific institutions, as well as specialists and university teachers. Trainings were offered on various topics, including geodata management, GIS, remote sensing techniques, hydro-meteorological monitoring, climate change impact assessment, and optimising crop water use. These regional trainings also created networks between researchers and professionals from all Central Asian countries, further contributing to the goal of fostering regional networking and cooperation on water-related issues. Between 2009 and 2015, 16 trainings were given to 239 participants (Unger-Shayesteh et al., 2015c).

The GFZ developed low-maintenance, automated monitoring stations with remote data query and remote maintenance and installed them together with scientists from CAIAG in the mountains of Kyrgyzstan (GFZ, 2011). In total, nine automated monitoring stations with multi-sensor capacities, independent power supply and bidirectional satellite communication systems

that enable real-time data transmission and remote access were installed in Kyrgyzstan, Tajikistan and Uzbekistan (Bundestag, 2012; Schöne et al., 2013; Unger-Shayesteh et al., 2015a). Moreover, the CAWa-project worked on operationalising a system of satellite remote-sensing for continuous regional data collection (DLR, n.d.). The data collected was scientifically evaluated, and both the data and the evaluations were provided to all Central Asian states in a universally accessible standardised information system, contributing to the establishment of a regional scientific database (CAWa, n.d.; GFZ, 2011).

Researchers participating in the CAWa project constructed the hydrological model MODSNOW, which produces daily snow cover maps for Central Asian River Basins with freely available satellite data (Gafurov & Bárdossy, 2009). By 2014, the Hydrometeorological Monitoring Services of Kazakhstan, Kyrgyzstan, Uzbekistan, and Turkmenistan had implemented the tool to improve the accuracy of their seasonal runoff predictions (Unger-Shayesteh et al., 2015a).

Between 2014 and 2019, six summer schools were organised in Almaty, Kazakhstan, to provide practical knowledge and trainings for and foster regional exchange between students, researchers and young professionals from all Central Asian countries on issues related to water management (DKU, n.d.; DLR, 2021). The German Remote Sensing Data Centre of the DLR organised educational seminars at the National Agrarian University of Kyrgyzstan in 2018 and at the Center for Research of Glaciers (Academy of Sciences) in Dushanbe, Tajikistan in 2019 as part of the CAWa project (DLR, 2021). Furthermore, eight scientific exchanges of Central Asian researchers to the University of Würzburg between 2015 and 2018 were funded by the CAWa project (DLR, 2021).

Several studies were realised within the CAWa project (Unger-Shayesteh et al., 2015b), including a regional climate study on the spatial patterns of climate change (Mannig et al., 2013), the area and mass changes of the Tien Shan mountains since 1961 (Farinotti et al., 2015), and the impacts of climate change on agriculture in the Fergana valley (Stulina, Solodkiy & Kurbanova, 2014). On October 9-11, 2018, the CAWa project organised an International Symposium on Water and Land Resources in Central Asia in Almaty, Kazakhstan, to bring together scientists and experts from the international community and regional stakeholders to discuss the regional challenges of water management created by climate change (CAWa, 2018).

Integrated Water Resources Management at the DKU in Almaty, Kazakhstan

In 2011, the interdisciplinary master program “Integrated Water Resources Management” (IWRM) was established at the DKU in Almaty, Kazakhstan, as the main part of the third

component of the Berlin Process, capacity building (FU Berlin, 2013). The DKU, founded in 1999 to provide academic education according to German educational standards to Central Asian students with support by the German and the Kazakh government, is supported by the DAAD and the Freie Universität Berlin (FUB) in the provision of the course (Abdolvand et al., 2015). The study programme was developed by the Berlin Centre for Caspian Region Studies and two professors at the Institute of Geosciences of the FUB and is funded by the AA and the DAAD (FU Berlin, 2012). Moreover, the DAAD and AA fund scholarships for ten students from Central Asia every year (Unger-Shayesteh et al., 2015c). In autumn of 2016, the first UNESCO Chair of Water Management was established at the DKU, financed by the AA as part of the Berlin Process (Bundestag, 2017).

The IWRM study program offers courses on water law, water policy, integrated water resources management, water systems and climate, water supply and wastewater treatment, amongst others (Boyarkina, 2018; FU Berlin, 2013). As the Berlin Process seeks to train local experts on water management, the course is devised for young specialists from governments, universities and NGOs from all five Central Asian states, who shall be trained to work on resolving the various challenges of water management in Central Asia (Abdolvand et al., 2015; Unger-Shayesteh et al., 2015c). Students are taught how to plan and manage processes of sustainable water use, provision and distribution across borders. The study program comprises fundamentals of water law, political and economic interdependencies, ecological and planning fundamentals and technical know-how, for instance the use of geographic information systems to process large data sets and visualise the findings to develop projections of future glacier development (FU Berlin, 2013). With its interdisciplinary approach that provides technical knowledge and scientific literacy on the socio-economic and natural scientific challenges of water management, the program aims to bridge the academic gap between technical water management programs and the more general studies of economics, law, social and natural sciences. Moreover, students gain experience through field work and independent research projects and can write their master thesis at one of the international and regional partner organisations (Unger-Shayesteh et al., 2015c).

At the conception, the course was taught by a ‘flying faculty’ of German professors who regularly flew to Almaty to teach the courses (FU Berlin, 2013). However, the IWRM study was designed to offer PhD level training to graduates to further deepen their studies of water management and to gradually replace the German faculty (Abdolvand et al., 2015). Furthermore, the regional design of the program seeks to connect the students from all Central Asian states to facilitate cooperation between connections between the future water managers

of the region (FU Berlin, 2013). Graduates of the program are intended to work for national and regional water management institutions in Central Asia, or to conduct research on water resources and integrated water management in Central Asia (Boyarkina, 2018). The DKU also has the Institute for Natural Resources (IPR), which was established together with the FUB. The IPR seeks to foster research on integrated water resources management in Central Asia, and it offers trainings, seminars, forums, summer schools and retraining courses, amongst others, in the field of IWRM on a regular basis (Boyarkina, 2018).

Other Activities

Further capacity building on water resources management in the form of trainings and seminars were conducted by the Hanns Seidel Foundation (Boyarkina, 2018). Moreover, the NGO N-OST (Network for Reporting on Eastern Europe) implemented a media project for over 18 months as part of the Berlin process, which offered journalistic training, research and education modules in Central Asia, and talks with international experts in Berlin to journalists from Central Asia. 20 participants from Kazakhstan, Kyrgyzstan, Uzbekistan, Tajikistan, Turkmenistan, Afghanistan, Russia and Germany researched the changing meaning and importance of the Syr Darya river. The results show the importance, conflict potential and multidimensionality of water in Central Asia through the perspective of local journalists (Auswärtiges Amt, 2014).

The workshop “Water Resources Management in the Context of Climate Change for Central Asia and Afghanistan” organised in 2015 united civil servants from all Central Asian countries and Afghanistan at the DKU to discuss water diplomacy and transboundary water management in Central Asia together with experts from Central Asia and several IOs. The workshop also included a study trip to Germany with visits to political institutions and trainings given by specialists from GIZ and CAWa (Unger-Shayesteh et al., 2015c).

Costs

Varying information can be found on the costs of the Berlin Process. In response to questions from members of the German parliament inquiring about the funding of the Berlin Process, undersecretaries of the German government have provided numbers for the years 2009–2012 (Bundestag, 2012), planned funding for the first phase of the GIZ’s program (Bundestag, 2010), and since 2014 (Bundestag, 2018), which are shown in Table 11. According to the 2018 response, the total funding provided by the German government to the Water Initiative Central Asia between 2009 and 2017 was approximately €35 million (Bundestag, 2018).

Table 11*Funding for the Berlin Process by the AA (2009–2012 and 2014–2018)*

Year	Amount (in €)	Recipient	Purpose
2009	5.700.000 ^b	Berlin Process ^b	
2010	6.284.431 ^b		
2011	3.967.764,88 ^b		
2012	3.080.312,99 ^b		
2008-2011	10.300.000 ^a	GIZ ^{a, b}	Transboundary Water Management in Central Asia ^{b, c}
2014 – 2018	1.200.000 ^c	DKU ^c	funding for the IWRM course and scholarships for water experts from Central Asia ^c
	81.200 ^c		
	750.000 ^c		
	10.000 ^c	German Embassy Astana, Kazakhstan ^c	Regional workshop on the adaptation to climate change ^c

Sources: ^a(Bundestag, 2010, p.81). ^b(Bundestag, 2012, p.3). ^c(Bundestag, 2018, p.24).

According to Dr. Caroline Milow, the GIZ’s program manager responsible for Central Asia, the GIZ’s program “Transboundary Water Management in Central Asia” realised within the Berlin Process was funded with 38€ million by the AA between 2009 and June 2020 (Milow, 2022). Additionally, the GIZ acquired €1.999.673 in co-financing by the EU for Phase II (2012-2014) (Bundestag, 2012). The WMBOCA program was funded by the EU with €2 million and by the AA with €500.000 (Boyarkina, 2018). The BMZ funded the project “Sustainable Management of Water Resources in Rural Areas in Uzbekistan” (2016–2020) implemented by the GIZ with €12 million (Milow, 2022).

Outcomes

The Berlin Process, with its comprehensive approach, has led to various outcomes. While there is no official overview, various outcomes that have been mentioned in different publications are compiled in Table 12, divided into the three pillars of the Berlin Process:

Table 12*Outcomes of the Berlin Process*

Pillar	Sub-component	Outcome
<i>Institutional-Political</i>	Institutional cooperation	Establishment of a joint working group that coordinates the activities of all IFAS bodies involved in international projects ^k
		Support for the EC-IFAS in the adoption of the ASBP-3 ^c
		Strengthened logistics of water management bodies, including the Executive Committee of the IFAS (EC IFAS) ^b

		Adaptation of a Memorandum of Understanding between the GIZ and the EC IFAS and a working plan to improve the institutional structure and legal framework of the IFAS ^{b,j}
	Transboundary River Management	Establishment of a Kyrgyz-Tajik ministerial working group to develop a joint river basin committee for the Isfara and the Khodscha-Bakirgan rivers ^c
		Development of the first River Basin Plan between Kyrgyzstan and Tajikistan ^j
		Introduction of a unified approach to basin planning across the region ^k
		Saving up to 2.74 million m ³ of water/year and ensuring water security for an area of over 10,000 ha in the Isfara River Basin (Kyrgyzstan and Tajikistan) ^k
	National Water Management	Implementation of more than 34 national IWRM pilot projects ^l
		Development of River Basin Management plans in Tajikistan and Kyrgyzstan ^l
		Establishment of the first Basin Council in Kazakhstan ^l
		Restoration of water infrastructure and irrigation canals ^{b,i}
		Improved drinking water access in the Khorezm region, Uzbekistan ^b
		Improved water availability, infrastructure functioning and natural hazard forecasting for over 500.000 people ^b
		Improved water distribution infrastructure in the Fergana Valley, enabling farmers to reduce their water use by up to 50% ^g
	Improved irrigation and water supply to 16,000 people working in agriculture in the Samarkand province of Uzbekistan ^k	
<i>Scientific-technical</i>	Data collection capacities	Establishment of a spatial database and a hydrometeorological monitoring network ^c
		Data collection stations built in Kyrgyzstan (4), Tajikistan (2), Uzbekistan (3) and Afghanistan (2) ^c
	Research	Publication of 84 peer reviewed scientific papers, 120 conference contributions, 4 policy briefs, 5 book chapters, 7 scientific reports and data sets, and 24 bachelor and master theses by 2021 ^e
		Organisation of six summer schools on water management between 2014 and 2019 in Almaty, Kazakhstan ^f
<i>Capacity Building</i>		Establishment of the study programme “Integrated Water Management” at the DKU in Almaty, Kazakhstan, in 2011 ^c with 120 graduates from Central Asia and Afghanistan by 2022 ^h
		Trainings for more than 450 Central Asian water professionals ^k
		Publication of the “Water Stories – People, Countries, Rivers in Central Asia” journal ^a

Sources: ^a(Auswärtiges Amt, 2014). ^b(Boyarkina, 2018). ^c(Bundestag, 2012). ^d(Bundestag, 2018). ^e(CAWa, n.d.-e). ^f(DLR, 2021). ^g(GIZ, 2021). ^h(GIZ, 2022b). ⁱ(GIZ, 2022c). ^j(GIZ, 2023b). ^k(GIZ, 2023d). ^l(Milow, 2022).

The Berlin Process has received recognition by the Central Asian states and by international donors. It has provided constructive impulses for trust building and regional cooperation (Bundestag, 2012) and offered multiple opportunities for fostering political dialogue between the Central Asian states (Auswärtiges Amt, 2013). Its political success could

be observed already through the participation of the foreign ministers at the “Water Unites” conference in 2012 (Bundestag, 2012), and in the continuation of the Berlin Process in form of the “Green Central Asia” initiative, which has expanded transboundary cooperation beyond water, as the following subchapter explains. The German government has also been content with the Berlin Process, considering it to have a model character for other transboundary river basins (Bundestag, 2012), and expressing an interest in further deepening the cooperation with the Central Asian states in 2019 (Auswärtiges Amt, 2019a).

d. Green Central Asia Initiative

To continue the efforts of the Berlin Process, the AA created its successor, the Green Central Asia Initiative (GCAI). It was conceived by the German government as part of its preventive security foreign policy and within the framework of the EU’s second Strategy for Central Asia adopted in 2019, which sought to facilitate further cooperation between Central Asia and the EU with a focus on prosperity and resilience. With the GCAI, the AA aimed to develop a political dialogue process on environmental and climate-related security risks in Central Asia and to support the implementation of the SDGs 6 (clean water and sanitation), 13 (climate action) and 15 (life on land) (GIZ, 2021c).

The GCAI was initiated by a joint declaration of intent to cooperate on climate and security, signed by the foreign ministers of Germany, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, and Afghanistan at the “Green Central Asia” conference on January 28, 2020, in Berlin (Auswärtiges Amt, 2020b) with a planned duration of four years (GIZ, 2021a). At the conference, the foreign ministers of the Central Asian states expressed the desire to establish a science-based regional political dialogue on climate, environment and security to foster transboundary cooperation as a means of conflict prevention (Green Central Asia, n.d.).

Principally, the GCAI continues the work of the Berlin Process in pursuit of establishing a system of sustainable transboundary water management in Central Asia, but its scope was notably widened in comparison to the Berlin Process: In addition to water, the topic areas of the GCAI encompass agriculture, biodiversity, energy, glacier protection, and land management, with implementation planned on national and regional levels. Furthermore, Afghanistan was included in the new initiative, as had already been planned in 2012 (Auswärtiges Amt, 2020a; GIZ, 2021a).

The GCAI created the Green Central Asia platform to improve the exchange and coordination between projects implemented and funded by other German federal ministries such as the BMZ, BMUV and BMBF that work on environmental topics in Central Asia, and

to create synergies through the exchange of knowledge, best available techniques and practices between the projects. Simultaneously, the GCAI seeks to build on the progress of projects realised by other actors and invites international stakeholders to participate in the initiative and contribute to the regional dialogue (GIZ, 2021c). Given the focus of this master thesis, this chapter will only discuss activities and plans realised within the GCAI on topic area of water.

Goals

The GCAI seeks to expand transboundary cooperation between the Central Asian states through a regional policy dialogue on the risks of climate change, support them in strengthening their resilience and adaptive capacities to the impacts of climate change in general, and prevent conflict (GIZ, 2021a; Milow, 2022). It continues working on various goals of the Berlin Process: deepening scientific cooperation, expanding scientific and professional connections and networking between Central Asia and Germany, improving data collection and information access in Central Asia, and contributing to the process of regional political rapprochement in Central Asia. Moreover, by expanding access to information and risk analyses, the GCAI aims to empower the Central Asian states to conduct accurate climate change impact assessments to determine appropriate prevention measures. Through dialogues and capacity building measures such as trainings and workshops on environmental governance, Central Asian experts and decision-makers shall be empowered to adequately manage security hazards caused by climate change impacts (GIZ, 2022a; Green Central Asia, n.d.).

The concrete implementation of the goals of the GCAI is facilitated by a high-level political dialogue format (Auswärtiges Amt, 2020a). With measures aimed at further deepening regional cooperation on sustainable and climate-sensitive land use, justice reform, regional trade and capacity-building, the GCAI takes a comprehensive approach to create synergies and merge knowledge and expertise from different sectors (Bundestag, 2019; Auswärtiges Amt, 2020a).

The GCAI seeks to cooperate the foreign ministries and further national institutions and ministries responsible for the environment, natural resources and climate, as well as educational and research institutions and hydrometeorological services of the five Central Asian states and Afghanistan. Additionally, through its engagement, the GCAI seeks to support the population of the Aral Sea Basin in expanding their capacities to adapt to the impacts of climate change, strengthening the political stability of the region in the process (GIZ, 2022a).

Involved Actors

The AA employed several actors to implement the program of the GCAI. Its main cooperation partners were the GIZ, the GFZ, the MLU, the PIK and the DKU (GIZ, 2021c). The GIZ was tasked with supporting the regional political dialogue platform as well as with the implementation of several projects. The GFZ and MLU support the GCAI with the provision of modelling tools and the organisation of capacity building activities for scientists, natural resource managers and political decision makers in Central Asia. The DKU continues to offer the IWRM study program and supports the GCAI with developing and conducting scientific and scholarly research, as well as providing academic programs on water management, climate change and energy efficiency in Central Asia. The PIK also provides capacity building workshops within the framework of the GCAI for different stakeholders, offers research stays for Central Asian scientists, and conducts research into the impacts of climate change on water availability, agricultural production and security and the associated risks. Additionally, the GCAI cooperates with the EU, the UNECE, the ‘Blue Peace’ Initiative of the Swiss Foreign Ministry and its operating partner SDC, the CAREC and the International Union for Conservation of Nature (GIZ, 2022a).

GIZ: Green Central Asia

To support the GCAI and the development of a regional action plan, the GIZ implemented the program “*Green Central Asia: Transboundary dialogue on climate, environment and security in Central Asia and Afghanistan*”, commissioned by the AA and planned for the duration April 2020 to March 2024. It aimed to improve the access of Central Asian states to information and risk analyses to enable them to conduct improved impact assessments of climate change and adapt preventive measures. Through dialogues and workshops, the national decision makers should be capacitated to appropriately manage the security hazards emerging from the impacts of climate change at both the national and regional level, leading to an overall improved resilience of the Central Asian states (GIZ, 2023f).

With the program, the GIZ supported the establishment of a working group responsible for the development of a regional action plan in May 2021 and the adoption of that plan in November 2021, which is explained in the subsequent paragraph. Moreover, the GIZ supported regional dialogues on the development of a regional document on climate change adaptation, the coordination and cooperation on glacier monitoring and modelling in Central Asia, the consideration of a mutually agreeable regional water-energy cooperation mechanism, and the topic of climate risk management in Central Asia (GIZ, 2023f).

Regional Action Plan

In November 2021, the five Central Asian states adopted a joint Regional Action Plan (RAP) with support from the GIZ, detailing measures focused on dealing with the impacts of climate change on water and land management, waste economy and international environmental instruments (GIZ, 2023d). The RAP was drafted in accordance with the Berlin Declaration of Intent of January 28, 2020, to serve as a basis for regional political dialogue addressing jointly selected topics and as a roadmap to guide the policy dialogue, with the support of scientific data, policy advice and capacity building on the agreed-upon topics. The initial list of topics included water, renewable energy, glacier protection and mitigating the negative impacts of the Aral Sea crisis, amongst others (GIZ, 2021c).

Within the RAP, the three main pillars of the GCAI were defined: Regional Political Dialogue, Joint Regional Priorities, and Capacity Building (Milow, 2022). These pillars were designed to be reflected in the subsequent political dialogue and the elaboration of the Regional Climate Change Adaptation Strategy for Central Asia, as well as in the planned capacity building events. Each pillar encompassed several goals (see Table 13). The RAP comprises four different Joint Regional Priorities, however, only the Priority 1 addressing the impacts of climate change on regional water resources management is explained here (GIZ, 2021c).

Table 13

Pillars and Goals of the Green Central Asia Initiative

Pillar	Goals
<i>Regional Policy Dialogue</i>	Development of the Regional Climate Change Adaptation Strategy to provide direction and aim for the political dialogue
<i>Joint Regional Priorities</i>	Regional water management based on IWRM principles and basin planning with focus on climate change adaptation and mitigation
	Glacier and Glacier Lake Outburst Flood monitoring and forecast models
	Disaster risk management: drought and flood early warning and forecasting
	Data management and exchange: remote sensing, GIS, MODSNOW, 18 remotely operated multi-parameter stations in Central Asia
	Water-energy nexus: mutually acceptable mechanisms of water-energy cooperation and renewable energies
<i>Capacity Building</i>	Training of national and regional specialists on new modelling and forecasting tools, as well as according to the theme cluster and specific priority, organised on request of the national partners.

Source: (GIZ, 2021c).

The implementation of the RAP takes place in cooperation with various state ministries and institutions of the five Central Asian states and Germany, IFAS, ICSD, CAREC, CAIAG,

as well as with various international and civil partners (GIZ, 2021c). The policy dialogue is science-based and intends to connect scientists with policymakers to enable balanced and informed political decision-making. Additionally, public events on policy decision are organised to raise the awareness in the general population (GIZ, 2023d). Several activities were planned within the RAP, as shown in Table 14.

Table 14

Planned activities of the Regional Action Plan

Pillar	Topic	Measure
Regional Policy Dialogue	Political dialogue	High-level meetings
	Working dialogue	Bilateral talks on the preparation of the action plan
		Regular working group meetings
	Regional Climate Change Adaptation Strategy	Drafting process with bilateral and multilateral meetings, including regular Foreign Ministries working group meeting Presentation of the final document at conference
Joint regional priorities	Climate change impact on regional water resources management	Study tour to Germany
		Glacier monitoring, modelling, coordination and cooperation
		Discussion on mutually beneficial water-energy mechanism
		GIZ Program “Climate Risk Management in Central Asia”
		Climate-sensitive IWRM
		Development of drought monitoring tool for Aral Sea Basin to prepare the specification of a drought forecast system in the Aral Sea Basin
Capacity Building	Climate change impact on regional water resources management	Tashkent Water Security Lectures
		MODSNOW training on assessing seasonal water availability
		Summer School 2021
		Aral Sea Summer School for Young Water Leaders
		Training for civil servants on Water Governance and climate security in Central Asia
		IWRM Master programme at DKU
		Training workshop: Satellite precipitation estimation and applications for scientists and government officials
		GFZ River Discharge Training in Kyrgyzstan
		Uzbekistan Training on ROMPS station operation
		Training on climate data acquisition, climate data handling, analysis and visualisation
		Training for journalists/policy makers on general topic of Climate Modelling and Climate Impacts in Central Asia
		Training: Hydrological modelling for impact assessment of climate change on water resources on a river basin scale
		Workshop on climate change impacts and cooperation strategies for NGOs
		Scientific visits of Central Asian scientists to PIK for trainings on hydrological, climate and agricultural modelling

Source: (GIZ, 2021c).

Aral Sea Basin Program (ASBP)

The GIZ had supported the three consecutive EC IFAS chairmanships of Kazakhstan, Uzbekistan, and Turkmenistan, and contributed to the drafting of the ASBP-3 and 4. The ASBP aims at achieving comprehensive use and protection of water resources, environmental sanitation and socio-economic development of the Aral Sea Basin, as well as improving the institutional and legal mechanisms of IFAS. In the process of developing the ASBP-4, the Central Asian states had the opportunity to redefine the priorities of regional cooperation in Central Asia in the ongoing development of climate change impacts in Central Asia (Green Central Asia, 2021). On June 29, 2021, the fourth Aral Sea Basin Program was approved by the IFAS Board at a meeting in Dushanbe, Tajikistan. It encompasses a variety of proposed joint actions seeking to raise funding for projects to improve water security in Central Asia, remediating the Aral Sea crisis, and strengthening regional cooperation with targeted activities at the regional, international and national level.

The implementation of the ASBP-4 was assigned to the EC IFAS in cooperation with the ICWC and the ICSD (GIZ, 2022c). The GCAI supported the organisation of the third EC IFAS Coordination meeting on September 20, 2022, in Tashkent, Uzbekistan, which was held together with international development partners. Topics at the meeting included complications regarding the implementation of the ASBP-4, the state of progress of improving the IFAS' organisational structure and legal framework, the Work Plan of the EC IFAS on Cooperation with International Development Partners for 2023, as well as the development of expanding regional cooperation within the IFAS' framework in light of Tajikistan's extended presidency (GIZ, 2022c).

Regional Working Groups

As planned in the RAP, the GIZ supported the establishment of several Regional Working Groups (RWG): One to discuss and develop a regional adaptation strategy for climate change, one to discuss a mutually beneficial water-energy cooperation mechanism, and one on glacial modelling, monitoring, coordination and cooperation. Each included representatives from all five Central Asian states (Milow, 2022):

The RWG discussing the regional climate change adaptation strategy involved representatives from the Ministries of Foreign Affairs and Ministries of Environment, as well as representatives of IOs (GIZ, 2022c). It met five times: The first time on February 22, 2022, online, for initial discussion (GIZ, 2022a). During the second meeting on July 7, 2022, in Tashkent, Uzbekistan, the representatives agreed on the structure and format of the strategy.

The third meeting, on October 18–19, 2022, in Tashkent, was attended by representatives of the Ministries of Foreign Affairs of the five Central Asian states, as well as by representatives of the ICSD and the IFAS (GIZ, 2022c). The RWG met a fourth time on July 4–5, 2023, in Almaty, Kazakhstan (GIZ, 2023c), and a last time on September 28, 2023, online, to discuss the finalisation of the text (GIZ, 2024a).

The RWG on glacial modelling and monitoring involved experts from national institutes and hydrometeorological centres of all Central Asia states. For the first meeting on March 30, 2022, held in a hybrid format, the national experts developed analytical reports on glacial monitoring in their country and submitted proposals for joint regional glacial monitoring (Milow, 2022). The second meeting was held on September 27–28, 2022, and the third on December 1, 2022, both in Tashkent, Uzbekistan. At the third meeting, an agreement on the program and methodology for preparing a joint scientific expedition to the Tuyuksu Glacier in Kazakhstan in August 2023 was reached (GIZ, 2022c). At the third meeting on March 17, 2023, again in Tashkent, a Memorandum of Cooperation was signed between eight Central Asian scientific institutions and hydrometeorological services. This facilitated the organisation and implementation of the First Joint Regional Expedition to Study Glaciers on August 19–29, 2023 to the Tuyuksu glacier in Kazakhstan in the Kishi Almaty river basin, in which all eight Central Asian scientific centres participated (GIZ, 2023b, 2024a).

The RWG on a mutually beneficial water-energy cooperation mechanism included representatives from the foreign ministries of the Central Asian states, as well as representatives from relevant governmental agencies and institutions working in the fields of energy and water management (Milow, 2022). The RWG met the first time online on May 19, 2022 (GIZ, 2022b), and the second time on December 15, 2023, in Almaty, Kazakhstan (GIZ, 2024a).

Regional Climate Change Adaptation Strategy for Central Asia

In 2023, the Central Asian states adopted the ‘Regional Climate Change Adaptation Strategy for Central Asia’ (RCCAS), which was developed with support from the GIZ as part of the ASBP-4 (GIZ, 2022c). With the RCCAS, the Central Asian states set the goal to develop a regional cooperation mechanism to mitigate the negative impacts of climate change and jointly implement adaptation measures, as well as to achieve the SDGs and follow the goals of the Paris Agreement with a ‘better together’ approach (GIZ, 2023e; Milow, 2023). While most adaptation measures will be implemented nationally, the RCCAS envisions the regional harmonisation of applied methodologies and a joint resource mobilisation. To reach the goal,

the strategy sets four strategic objectives. It further discusses implementation directions that explain the goals of each objective, and proposes projects to implement the proposed goals, as is shown in Table 15:

Table 15

Strategic objectives, goals, and proposed projects of the RCCAS

Strategic objectives	Goals	Proposed Projects	Time-frame
Strengthening regional coordination for climate change	Creation of a knowledge database to develop the intersectoral capacity on climate change risk, vulnerability, and adaptation processes, and to make use of the regional potential.	Capacity building in the Central Asian countries for national adaptation planning and strengthening regional coordination on climate change adaptation	2024-2027
Create mechanism that develop and implement adaptation projects and attract financing	Capacity development: expand technical knowledge and cooperation on forecasting climate vulnerability.	Capacity building for governments of the Central Asian countries to attract climate financing through regional cooperation	2024-2027
Accumulate and share knowledge and scientific cooperation to improve adaptive capacity	Make necessary data accessible for regional-level climate change adaptation assessments and knowledge sharing.	Strengthen the Informational Portal on Climate Change in Central Asia and establish it as a single centre for the accumulation and exchange of regional climate knowledge	2024-2027
		Develop methodologies for assessing the vulnerability to climate change of territories and sectors of the regional economy	2024-2027
		Improve the understanding of climate change adaptation issues by national government bodies	2024-2030
Develop climate monitoring, information exchange and forecasting systems	Unite and further develop the regional educational and research capacities; Optimise the scientific contributions in the adaptation to climate change; Establish a long-term exchange and develop educational, scientific, student and expert experience.	Expand the climate observation network of Central Asia countries	2024-2029
		Develop regional climate models applicable to the Central Asia	2024-2030
		Establish regional cooperation on glaciological monitoring	2024-2030
		Develop and implement methods for calculating threshold values of hydrometeorological emergencies	2025-2027

Source: (GIZ, 2023e).

The goals and proposed projects of the RCCAS extend beyond the topic area of water management, however they all contribute to the successful establishment of a system of sustainable transboundary water management.

GIZ: Climate Risk Management in Central Asia

The project “Climate Risk Management in Central Asia” (CRMCA), scheduled for the timeframe March 2022 – February 2026, was commissioned by the BMZ and funded with €10 million. It cooperates with the Environmental Ministries and state committees of the five Central Asian states, as well as the Center for Emergency Situation and Disaster Risk Reduction in Almaty, Kazakhstan, to improve transboundary climate and disaster risk management in Central Asia (Milow, 2022). The GIZ provides expertise to water basin organisations and supports cooperation efforts between local communities, national emergency and hydrometeorological institutions, and regional centres for disaster reduction. Through various projects, the regional preparedness to assess and handle transboundary water-related climate and disaster risks shall be improved (GIZ, 2024a, 2024b). Specifically, the capacities of local actors working on transboundary climate risk management shall be strengthened through training sessions. Moreover, the cooperation of these actors across borders shall be discussed in subnational and regional forums, which shall facilitate the cooperation on establishing a transboundary early warning system for hydrological disasters (Milow, 2022). Within the project, activities are planned on the local, national, and regional level (see Table 16):

Table 16

Collaboration levels and planned activities of the CRMCA project

Collaboration level	Planned Activities
<i>Local Level</i>	Jointly conduct climate risk assessments at five small interstate watersheds with local water basin organisations, basin councils and institutions ^a
	Provision of necessary knowledge and tools to support the development of local climate adaptation action plans ^b
	Joint development of adaptation measures based on scientific data ^a
<i>National level</i>	Collaboration with relevant ministries and agencies responsible for water resource management, climate change adaptation, and disaster risk reduction on the development and implementation of policies and plans in their respective areas of responsibility that consider transboundary climate risk management issues ^a
	Encouragement for the active involvement of civil society and non-governmental organisations in climate risk management activities ^b
<i>Regional level</i>	Facilitation of knowledge exchange and coordination of transboundary climate risk management issues among the countries of Central Asia to promote mutual learning and collaboration ^a

	Support the formulation of regional policies and strategies to promote climate-resilient water resources management and disaster risk reduction ^b
	Support for platforms of regional knowledge exchange to support joint transboundary measures ^c

Sources: ^a(GIZ, 2024a). ^b(GIZ, 2024b). ^c(Green Central Asia, 2024a).

The climate risk assessment of transboundary river basins was initiated by a regional seminar in Tashkent on February 20, 2024, attended by experts from all five Central Asian nations and representatives of regional organisations. Chosen were the river basins Chon-Kemin/Chu River in Kyrgyzstan and Kazakhstan, Isfayramsai in Kyrgyzstan and Uzbekistan, Murgab in Turkmenistan, Shakimardan in Kyrgyzstan and Uzbekistan, and Zarafshan in Tajikistan and Uzbekistan. The goal of these climate risk assessments is to determine and implement special local mitigation measures that counter the impacts of climate change (Green Central Asia, 2024a).

By 2024, the project has provided trainings, conferences and thematic study trips for over 150 experts from regional organisations and government agencies to improve their knowledge and skills on climate change adaptation. Moreover, several high-level conferences were organised with support from the project, including the Central Asia Climate Change Conference and the Regional Forum Meeting of the Heads of Emergency Authorities of Central Asian countries. Through the project, new equipment (computers and servers), specialised working gear (climbing gear and drones) and software was funded and provided to eleven partner organisations (GIZ, 2024b). The GIZ has also provided legal support to the Uzbek Inspectorate for Control over the Safety of Water Management Facilities and Water Use in the drafting of the law “On the Safety of Hydraulic Structures”, which was approved by the parliament of the Republic of Uzbekistan on May 4, 2023 (GIZ, 2024a).

GIZ: Climate-Sensitive Water Resources Management in Central Asia

In 2023, the GIZ initiated the project “Climate-Sensitive Water Resources Management in Central Asia” (CSWRMCA), which was developed within the GCAI high-level dialogue platform in accordance with the RAP and is planned until 2027. The project is jointly implemented by the GIZ and the SDC, with support from the MLU, the Swiss Federal Institute of Technology (ETH Zürich), the German Federal Institute of Hydrology in Koblenz, the SIC ICWC and the CAREC (FDFA, n.d.; GIZ, 2023c). It was commissioned by the BMZ, which funds it with 10€ million, and is co-financed by the SDC with 2.9€ million (Milow, 2022).

The project’s goal is to expand and strengthen regional cooperation in the water sector and to promote the application of principles of IWRM in all participating countries (GIZ,

2023c). Moreover, it seeks to improve water quality monitoring capacities in the Amu Darya and Syr Darya river basins based on the principles of the EU’s Water Framework Directive (GIZ, 2023c). To achieve its goals, the project aims to develop an integrated and climate-sensitive approach to water resources management together with representatives of state ministries of all five Central Asian states and transboundary water management institutions of the Amu Darya and the Syr Darya. Additionally, the state ministries and transboundary organisations shall be empowered in their capacities to regionally coordinate and implement the approach (GIZ, 2023a; Green Central Asia, 2024b). The project involves capacity building and professional development trainings, regional dialogues and information exchanges to foster cooperation and facilitate the standardisation of measuring methods (GIZ, 2023a). Furthermore, the program includes the development and provision of a climate- and gender-sensitive IWRM module and the corresponding methodological materials for specialists from the participating national and regional river basin organisations (GIZ, 2023c; Green Central Asia, 2024b). Table 17 provides an overview of the planned activities to achieve the goals of the project.

Table 17

Goals and planned activities of the CSWRMCA project

Goal	Activity
<i>Regional cooperation</i>	Establish river basin dialogues between the relevant representatives of national and regional basin organisations in Amu Darya and Syr Darya river basins ^c
	Exchange information and experience on IWRM, planning processes, water diplomacy and international water law ^{c, e}
	Cooperation with other IWRM projects in the region ^{a, b}
<i>Capacity building</i>	Professional development trainings for leaders of water management organisations ^d
	Trainings on climate sensitive IWRM, planning processes, international water law and water diplomacy ^{c, d}
<i>IWRM</i>	Development of a climate- and gender-sensitive, practice-oriented IWRM training concept and teaching resources for national water ministries and regional basin organisations together with MLU and ETH Zürich ^{b, c}
	Implement four regionally coordinated climate adaptation measures in each of the two water catchment areas of the Amu Darya and the Syr Darya, including pilot measures to improve water efficiency by 10% ^c
<i>Improve water quality monitoring</i>	Establish a working group to improve water measurement and monitoring systems on the Amu Darya and Syr Darya ^{b, d}
	Introduce analysing methods for groundwater monitoring ^b
	Analysis, selection and installation of measuring points on transboundary irrigation canals ^d
	Strengthen water quality monitoring capacities in line with the EU’s Water Framework Directive ^c
	Pilot projects on water quality monitoring, groundwater monitoring, and automatization of transboundary irrigation canals ^f

Sources: ^a(FDFA, n.d.). ^b(GIZ, 2023a). ^c(GIZ, 2023c). ^d(GIZ, 2023d). ^e(Green Central Asia, 2024b). ^f(Milow, 2022).

On February 1–2, 2023, the GIZ organised the ‘Regional Workshop on Monitoring, Assessment and Information Sharing in Transboundary Basins in Central Asia’ in Astana, Kazakhstan, involving representatives from state agencies and IOs, and specialists from scientific institutions to introduce and discuss different practices of information assessment, monitoring and sharing from various transboundary basins (GIZ, 2023b). To establish the River Basin Dialogues on the Amu Darya and Syr Darya, a kick-off workshop and a first meeting were conducted on November 30, 2023, in Tashkent (GIZ, 2024a). Overall, the project is expected to lead to improved joint institutionalised river basin cooperation and planning at regional and national river basin level, successful training of national and regional organisations on the concept and application of climate- and gender-sensitive IWRM, and the future joint implementation of activities of IWRM such as maintenance, governance and information exchange (FDFA, n.d.; Milow, 2022).

Support for international conferences and regional dialogue

The GCAI has participated in three regional conferences to contribute to the regional dialogue, co-organised two conferences in Central Asia, provided support for the participation of representatives of the governments of Central Asia in international conferences, and has provided contributions to international conferences (see Table 18).

Table 18

GCAI: International Conferences

Activity	Conference	Date and Location
<i>Active Participation by GCAI</i>	The second CLIENT II Regional Stakeholder Conference for Central Asia held as part of the Uzbek Innovation Week 2022 “Green Innovations for Sustainable Development” ^b	October 18–19, 2022, Tashkent, Uzbekistan ^b
	5th Central Asia Climate Change Conference organised by CAREC ^d	May 16-17, 2023, Dushanbe, Tajikistan ^d
	International Conference “Central Asia: Towards a Sustainable Future through a Strong Regional Institution” dedicated to the 30th anniversary of the IFAS ^d	June 5-7, 2023, in Dushanbe, Tajikistan ^d
<i>Co-organisation</i>	Regional round table on the Aarhus Convention: Effective public participation for good governance, healthy environment and sustainable development	June 1-2, 2023, in Tashkent, Uzbekistan ^d

	High-level conference on climate change “From global knowledge to local solutions: climate-resilient institutions in Central Asia” jointly organised with the UNDP ^b	December 2, 2022, Tashkent, Uzbekistan ^b
<i>Participation Support</i>	Support for representatives of the Central Asian ministries responsible for the environment, climate change and water policies to participate at the Seventh EU–Central Asia High Level Conference organised under the EU–Central Asia Platform for Environment and Water Cooperation ^c	February 23-24, 2022, Rome, Italy ^c
	Support for Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan to participate at the UN Conference on the Midterm Comprehensive Review of the Goals of the International Decade for Action “Water for Sustainable Development, 2018–2028” ^c	March 22-28, 2022, New York, USA ^c
	Contribution by the GCAI to the regional workshop “Central Asia on the way to the UN Water Conference 2023”, organised by EC IFAS ^b	September 20, 2022, Tashkent, Uzbekistan ^b
<i>Contribution</i>	DKU and the UNESCO Chair on IWRM in CA organised a youth session “Youth for Water and Peace” during the Conference “30 years of Central Asian countries’ water cooperation: confidently looking to the future” ^a	April 26-27, 2022, Turkestan, Kazakhstan ^a
	Panel session on water, environment, and climate resilience within the framework of the “Central Asia Forum – Water for Regional Cooperation” together with the EU Commission at the “Second Decade of Water Action” Conference ^a	June 6, 2022 Dushanbe, Tajikistan ^a
	Organisation of the side events “5 Countries - 1 Region - 1 Voice” and “Monitoring climate change impacts in Central Asia’s cryosphere: cooperation, research and technology for improved climate change adaptation and resilience” hosted at the Central Asia Pavilion at the Conference of the Parties to the UN Framework Convention on Climate Change ^e	December 2–3, 2023 Dubai, United Arab Emirates ^e

Sources: ^a(GIZ, 2022b). ^b(GIZ, 2022c). ^c(GIZ, 2023b). ^d(GIZ, 2023c). ^e(GIZ, 2024a).

In support of the regional policy dialogue, the GCAI supports the organisation of high-level political meetings. In 2016, CAREC with support from the EU organised a meeting of the Ministries of Foreign Affairs and Members of Parliament of the Central Asian countries to discuss urgent matters of regional environmental management and to exchange knowledge, experiences and best practices. With support from the World Bank, it became a biyearly event. Since 2019, the aspects of climate change and improving intersectoral cooperation have become a topic of discussion. The seventh meeting was organised in September 2022 in Almaty (GIZ, 2022c). On April 19, 2023, the ninth meeting was held in Tashkent with support from the GCAI (GIZ, 2023b). Moreover, the GCAI organised together with other regional projects the ‘Regional Dialogue on Transboundary Nature Conservation in Central Asia’ in Tashkent on November 28, 2023, in which governmental representatives of the five Central Asian states as well as representatives of national and international organisations participated, furthering the regional dialogue (GIZ, 2024a).

CAWa-Green Project

The scientific-research component of the GCAI is implemented by the “CAWa-Green” project, the successor of the CAWa-project established during the Berlin Process. It continues the efforts of the CAWa-project of expanding the research and data collection network and of providing comprehensive and constant hydro-meteorological data to support the political decision-making process and transnational water management. Moreover, the project offers capacity building workshops to Central Asian researchers and policy makers through training courses on how to utilise the developed methods and tools. CAWa-Green contributes to the establishment of a regional data basis accessible by everyone in the region that comprises reliable, continuous and up-to-date information on water resources, and promotes further transboundary scientific research into existing water resources and future developments. Thereby, the CAWa-Green project seeks to foster further cooperation and rapprochement between the scientific institutions of Central Asia and support sustainable transboundary water management (CAWa, n.d.-b).

A network of partners is involved in the CAWa-Green project: The German research institutes PIK, GFZ and MLU, CAREC, the SIC ICWC, as well as the Central Asian national hydrometeorological services, and the national research institutes CAIAG, TIIAME, UBAI, the Uzbek Khorezm Rural Advisory Support Service, and the Institute of Geography of the Republic of Kazakhstan (CAWa, n.d.-c).

To achieve its goals, the CAWa-Green project organises and implements a variety of capacity building activities (see Table 19). The workshops organised within the CAWa-Green project offer trainings to scientists and government representatives on climate modelling and other pertinent scientific skills to improve water management. CAWa-Green continued the summer schools from the CAWa-project in 2021 after the 2020 edition had to be cancelled due to the outbreak of the COVID-19 pandemic (CAWa, 2021). The Tashkent Water Security Lectures, jointly organised by the DKU, the GFZ, the PIK and the TIIAME, bring together experts from Europe and Central Asia to improve regional cooperation and foster dialogue on water problems and research in Central Asia (CAWa, n.d.-d).

Table 19

Capacity building activities realised within the CAWa-Green Project

Activity	Topic	Date and Location
Workshops	Seminar on Climate Data Modelling and Analysis, organised by PIK ⁱ	November 26–27, 2020, online ⁱ

	“Open global data sources in climate and hydrology”, organised by PIK ^f	May 31–June 2, 2022 National University of Uzbekistan, Tashkent ^f
	“Hydromodelling 2022”, organised by PIK ^j	July 4 – 15, 2022 Potsdam, Germany ^j
	“Droughtmap ASB”, organised by MLU and GFZ ^g	May 3–5, 2023 Tashkent, Uzbekistan ^g
	“Communicating Climate Crisis: Causes, Pathways, and Solutions in Central Asia” organised by PIK and N-OST ^g	June 4–8, 2023 Dushanbe, Tajikistan ^g
	“From Climate Modelling to River Flow: High-Resolution Scenarios and Hydrology in Central Asia’s Climate Change Context”, organised by PIK, SIC ICWC and GIZ ^h	October 24–26, 2023 Tashkent, Uzbekistan ^h
	“Strengthening climate resilience of the water-energy-food ecosystem nexus in Turkmenistan and Central Asia”, organised by the UNDP and partially funded by the GCAI ^e	May 9–10, 2024, Ashgabat, Turkmenistan ^e
Summer schools at the DKU	"Water in the Aral Sea Basin under Climate Change - Management and policy challenges from data and knowledge perspectives" ^b	June 14–25, 2021 Online ^b
	"Linking scientific knowledge of water and land resources management into decision making support in Central Asia" ^c	July 11-22, 2022 Almaty, Kazakhstan ^c
Tashkent Water Security Lectures	1: “Water Security and Climate Change Adaptation in Central Asia” ^a	December 2020, Online ^a
	2: “Agricultural Water Management in Central Asia – A Regional Perspective” ^a	June 2021, Online ^a
	3: “An Introduction to climate modelling, weather forecasting and data assimilation” ^a	December 2021, Online ^a
	4: “Satellite and in-situ based monitoring of Central Asia water resources” ^a	May 2022, Online ^a
	5: “Integration of scientific knowledge on water and land resources into policy dialogue on climate change adaptation in Central Asia” ^a	December 2022 Hybrid, GFZ Potsdam, Germany ^a
	6: “Decision Making Support to Improve Water Security Under Climate Change in Central Asia” ^a	October 2023, Tashkent, Uzbekistan ^a
	7: “Water resources in Central Asia: Integration of Scientific Knowledge to Support Policy Dialogue and Climate Change Adaptation” ^d	July 2024 (Planned), Embassy of Uzbekistan, Berlin ^d

Sources: ^a(CAWa, n.d.-d). ^b(CAWa, 2021). ^c(CAWa, 2022b). ^d(CAWa, 2024a). ^e(CAWa, 2024b). ^f(GIZ, 2022b). ^g(GIZ, 2023c). ^h(GIZ, 2024a). ⁱ(PIK, 2020). ^j(PIK, 2022).

Furthermore, the CAWa-Green project has organised several study tours: In summer 2022, the heads of departments and chief specialists of the Central Asian hydrometeorological services and Ministries of Foreign Affairs, Environment and Water visited the PIK and GFZ in Germany to exchange experiences on water policy, climate and environment (CAWa, 2022a). On June 23, an Uzbek delegation led by the Minister of Ecology, Environmental Protection and Climate visited the PIK in Potsdam to discuss further collaboration on higher education, capacity building and science with representatives of the GCAI (GIZ, 2023c). In November 2023, delegations from the GFZ, Kazakhstan and Uzbekistan visited the PIK in Potsdam to

learn about climate change impacts in Central Asia and to explore the research approaches applied by the scientists at the PIK (GIZ, 2024a).

Within the CAWa-Green project, new forecasting tools were developed to support transboundary water management in Central Asia. A new version of the hydrological forecasting tool MODSNOW was developed. The model uses MODIS snow cover data collected in the winter months with remote-sensing technology to determine snow accumulation, with which water availability variability in summer can be computed. MODSNOW is operational and used by the hydrometeorological services of all five Central Asian states (GIZ, 2022c). Furthermore, researchers of the MLU have developed Droughtmap-ASB, an online monitoring tool to support drought management in the Aral Sea Basin (DKG, 2023). The tool utilises freely available MODIS remote sensing data, soil moisture data from the ground and calculated vegetation indices to monitor the irrigated agricultural areas of the Aral Sea Basin for possible drought developments (GIZ, 2022c). Moreover, the CAWa-Green project initiated a study of the Pakhtakor glacier in western Uzbekistan in 2023 with funding provided by the BMBF and the Ministry of Higher Education, Science and Innovation of Uzbekistan. It was initiated with an expedition to the glacier on July 27–August 1, 2023, to conduct mass balance measurements as well as to install an automatic weather station and a discharge station to assess impact of climatic factors on melting process of the Pakhtakor glacier (CAWA, 2023a).

6. Analysing German Water Diplomacy in Central Asia

This chapter first discusses the conceptual framework, which is based on the factors of sustainable transboundary water management that were introduced in Chapter 3. Subsequently, the conceptual framework is applied on the findings of the previous chapter to analyse how Germany's water diplomacy activities in Central Asia have contributed to achieving each of the nine factors.

a. Conceptual Framework

In the theoretical framework, nine factors were discussed that are necessary for establishing a system of sustainable transboundary water management: political assent, mutual benefit, financing, data, innovation, governance, capacity development, trust, and institutional anchoring. Each of these factors is required to be either present or established in the process to successfully construct a system of sustainable transboundary water management; however, they relate to different parts and aspects of the process. To distinguish between their procedural

importance and impact, the nine factors are separated into three groups: *establishing* (political assent, mutual benefit, and financing), *implementing* (data, capacity building, innovation, and governance), and *consolidating* (trust and institutional anchoring) factors.

Firstly, the establishing factors are required for initiating the diplomatic process of finding a joint solution in the first place: all involved states' governments must assent to participating in the process, must derive an improved outcome from the participation, and the process must be financed. Moreover, these factors must be continuously given; if any of the three factors is not given any more at some point, the entire process comes to a halt and subsequently fails.

The implementing factors encapsulate the process of constructing the system of sustainable transboundary water management – expanding the data collection and analysis capacity, training workers to operate the system, implementing new technology to increase water use efficiency and reduce water loss, and ensuring the implementation of the new system at all levels of governance. These depend strongly on the many circumstantial factors of the basin and can be developed to different extents, depending on the approach and capacities of the process, as well as the requirements of the involved states.

Lastly, the consolidating factors are required to ensure the long-term functioning of the system. Building trust between the stakeholders ensures that everyone commits to the solution in the knowledge that the others do so as well. The institutional anchoring ensures the long-term application of the new system of sustainable transboundary water management and allows for a peaceful resolution of tensions and disputes through an agreed-upon conflict resolution mechanism to avoid political conflict over water in the future. The consolidating factors depend on the establishing and implementing factors: Trust can be built through activities realised within the framework of the implementing factors, which depend on the establishing factors, and the success of the ninth factor, institutional anchoring, is only possible if the other eight factors are given, but most importantly trust. Table 20 summarises the nine-factor framework:

Table 20

Nine factors of sustainable transboundary water management

Group	Factor	Explanation	Aspects
<i>Establishing</i>	<i>Political Assent</i>	States' agreement to join the process and accept the outcome ^c	Signed agreements ^e
			Level of political delegations ^e
	<i>Mutual Benefit</i>	Positive sum game – the proposed solution leaves everyone better off than	Consideration of all economic dependencies and interests ^g
			Water-Energy-Food Nexus ^g

		individual national water management ^g	Principles of IWRM ^g
	<i>Financing</i>	Funding of the process and the required activities is ensured ^{e, h}	Provision of Funding ^h Support from international financial institutions ^h
<i>Implementing</i>	<i>Data</i>	Water management requires ample, accurate and constant data collection, analysis and implementation capacities ^f	Data collection infrastructure ^f
			Data exchange ^f
			Research cooperation ^f
			Modelling tools ^f
	<i>Innovation</i>	Building technologies and infrastructure that increase water saving and water use efficiency, and reduce demand ^h	Infrastructure rehabilitation ^h
			Introduction of new technologies ^h
			Infrastructure construction ^h
	<i>Governance</i>	Governance structures ensuring universal and equal access, and fair distribution of water ⁱ , implemented on all levels ^h	Institutional cooperation ^h
			Public participation ^a
			Transparency, accountability and rule of law ^a
<i>Capacity Development</i>	Workshops and seminars to transfer necessary skills for water management, good governance and public education on water saving measures ^{a, h}	Technical workshops ^h	
		University programs ^h	
		Trainings for government representatives ^a	
		Public education measures ^h	
<i>Consolidating</i>	<i>Trust</i>	Develop trust between the stakeholders that everyone will commit to the joint system ^f	Expanded commitment ^f
			Transfer of control ^f
			Joint fact-finding activities ^f
	<i>Institutional Anchoring</i>	A transboundary institution responsible for the continued implementation, monitoring and management of the joint solution ^{c, d}	Strengthened institutional structures ^c
			Water distribution regime adaptable to water variability ^d
			Conflict-resolution mechanism ^c
			Financial feasibility ^c

Sources: ^a(Abdolvand et al., 2015). ^b(Abdullaev et al., 2012). ^c(Hearn, Henshaw & Paisley, 2014). ^d(Janusz-Pawletta, 2015). ^e(Pohl et al., 2014). ^f(Pohl, Blumstein & Schmeier, 2021). ^g(Salmoral et al., 2019). ^h(UN Water, 2020). ⁱ(Wegerich et al., 2015).

These nine factors form the analytical framework of this master thesis. Table 20 visualises the separation of the nine factors into three groups, explains the importance of each factor and provides aspects that can be considered when applying the framework.

b. Applying the Framework: The Impacts of German Water Diplomacy

In this subchapter, the findings of the fifth chapter are assessed with the conceptual framework of the previous subchapter to assess how German water diplomacy has contributed to the establishment of a system of sustainable transboundary water management in Central Asia.

Establishing Factors

For the establishment of the Berlin Process, political assent was required by the governments of the Central Asian states, which was expressed through the participation of political delegations at the Water Unites Conference in 2008, and the joint agreement. Initially, the program was planned for three years, but was renewed twice with explicit agreement from the Central Asian governments at conferences in Berlin in 2012 and 2015. Both conferences were attended by high-ranking political representatives, underlining the explicit expression of political assent. Moreover, after the end of the Berlin Process, the Central Asian governments committed to the GCAI, which has expanded its focus from water to the nexus of water, climate and security. Additionally, the GCAI has facilitated the creation of the RAP and the RCCAS, which can both be considered as continued and expanding expressions of political assent.

In its assessment of water management in Central Asia, the scientific council of the German government determined various mutual benefits stemming from cooperation. With its general water diplomacy policy, Germany follows the approaches of IWRM and nexus governance, seeking to find efficient solutions of water management challenges that allow for the best distribution of available water resources. Within the Berlin Process, various joint fact-finding missions were conducted, and working groups established to determine the benefits of joint water management. The expanded scope of the GCAI, seeking regional cooperation beyond water, suggests that German water diplomacy has been able to show the mutual benefits of transboundary cooperation on water resources management.

The German government has provided ample funding for the Berlin Process and the Green Central Asia Initiative, as well as gathering financial support from the SDC, the EU and other international donors. Thereby, various activities could be realised within the framework of the Berlin Process and the GCAI. Moreover, the GCAI has initiated a regional dialogue on approaches to gathering sufficient financial resources to finance regional climate change adaptation measures.

Implementing Factors

The CAWa and the CAWa-Green projects have contributed extensively to the expansion of data collection and assessment in Central Asia, the construction of data collection infrastructure and regional databases with universal access, and the establishment of continuous and real-time monitoring capacities. Multiple research projects were conducted, producing new insights on water resources in Central Asia that support sustainable transboundary water management in Central Asia. Research cooperation between German and Central Asian research institutes was

further expanded through multiple research exchanges and study trips. Additionally, field trips were organised to expand knowledge production and data collection capacities in the glaciers of Kyrgyzstan and Tajikistan responsible for most of the freshwater provision in Central Asia. The climate modelling tools developed within the research cooperation of CAWa contribute to improved water availability and drought projection in the national hydrometeorological institute of Central Asia.

Within the Berlin Process and the GCAI, various capacity building workshops have been offered to public officials, scientists and water professionals in Central Asia on topics of basin planning and management, climate modelling, research methods, irrigation technologies, data collection, and international water law, amongst others. The IWRM study established at the DKU has contributed to further educating young water professionals in Central Asia. The organisation of summer schools and the Tashkent Water Security Lectures have contributed to further educating water specialists in Central Asia and fostering regional scientific dialogue on the approaches to transboundary water management in Central Asia.

The GIZ has supported the rehabilitation of water infrastructure in Central Asia, installing new measuring and control tools to facilitate more efficient and safer water management for local water management authorities. Consequently, fair water access has been expanded. By introducing new technologies such as drip irrigation, water efficiency rates have increased and water use decreased, to the benefit of water users and agricultural production in all Central Asian states. In many transboundary river basins, climate risk assessments and basin planning workshops have contributed to improved management, while the establishment of basin councils have expanded public participation in the process.

Local governance structures have received workshops on basin planning to support practices of sustainable water management. The digitalisation of data collection, especially water use management, and the automated data sharing have contributed to increasing transparency over water use. Establishing basin councils and supporting public participation in joint basin plans has supported transparency and accountability in many local water governance structures in Central Asia.

Consolidating Factors

Trust is complicated to measure, however, various measures of the Berlin Process and the GCAI have been conceived as trust-building activities. Establishing regional databases with universal access as well as digitalising water flow measurements and data sharing has created a rapport of credibility between the states of Central Asia. Regular knowledge exchanges and

transboundary risk assessments have further contributed to establishing a basis of regional cooperation. Generally, the continuous and increasing political assent expressed by the Central Asian governments, especially in form of the expanded scope of the GCAI, suggests that the Berlin Process has been successful in establishing sufficient trust between the governments of Central Asia to commit to a process aimed at establishing more comprehensive interstate cooperation on issues beyond water.

Both the Berlin Process and the GCAI have aimed at strengthening institutions of regional water management. The UNECE has organised various activities within the Berlin Process aimed at expanding the application of international water law and updating the legal framework of the IFAS to reflect the interests of its member states and to strengthen its position and mandate. Institutional support for the IFAS has led to the adaptation of the ASBP-3 and 4, in which the Central Asian countries have further developed their goals and planned joint activities to remediate the Aral Sea crisis, and to strengthen institutional cooperation on various levels.

7. Discussion and Conclusion

German water diplomacy in Central Asia comprises a comprehensive approach to the establishment of sustainable transboundary water management, addressing all nine factors suggested by the conceptual framework. The analytical approach considers the mutual benefit of all five states by assessing the interlinkages of water with energy production and agriculture. Germany has provided ample financing itself and garnered financial support from international donors. The projects realised within the Berlin Project and the GCAI have aimed at establishing the necessary aspects of data collection and exchange, providing technical innovation, rehabilitating deteriorated infrastructure, offering a wide variety of workshops aimed at building the capacity required for water management and strengthening structures of local governance. Multiple activities have been specifically aimed at developing trust between the five Central Asian states and their governments, and at strengthening the position and legal framework of the existing regional water management institutions. However, many of these activities have been realised by actors employed by the German government, and have built on projects of other international actors, which complicates the attribution of the success. Germany has facilitated regional cooperation on water management, providing comprehensive support for the development of the required capacities and infrastructure, but it has not necessarily been the implementing force in each step.

Overall, the two initiatives of German water diplomacy in Central Asia have not yet reached the aim of establishing a system of sustainable transboundary water management in Central Asia. However, they have substantially contributed to rehabilitating the existing water infrastructure, introducing modern technologies to increase water use efficiency, expanding scientific research into water resources in Central Asia, and providing capacity development to Central Asian water professionals. The twice renewal of the Berlin Process and its continuation in the GCAI with the expanded cooperation aim can be considered as proof of the success of German water diplomacy in supporting and advancing the regional dialogue on regional water resources management. Overall, German water diplomacy in Central Asia has successfully contributed to the process of establishing a system of sustainable transboundary water management in Central Asia. Considering the impacts of the initiatives and the growing regional cooperation on water management, the question of attribution can be considered as secondary. Nonetheless, the final impact of German water diplomacy cannot yet be evaluated, as the GCAI is still ongoing.

This master thesis has discussed German water diplomacy in Central Asia, providing a comprehensive account of the Water Initiative Central Asia and the Green Central Asia Initiative that have been established by the German Federal Foreign Office within the framework of German water diplomacy. Moreover, it has constructed a conceptual framework of factors required for the establishment of sustainable transboundary water management within the theoretical framework of water diplomacy. Lastly, it has used this conceptual framework to assess how Germany's water diplomacy activity has contributed to the establishment of a system of sustainable transboundary water management in Central Asia by analysing how the Berlin Process and the Green Central Asia Initiative have contributed to each of the nine factors.

The Berlin Process initiated Germany's water diplomacy activity in Central Asia in 2008. Aimed at fostering cooperation between the Central Asian states on the shared water resources in the region, it contained projects aimed at expanding research and scientific capacities in Central Asia, rehabilitating deteriorated water infrastructure and introducing efficient water use technologies, strengthening the regional institutions of water management, introducing principles of IWRM, and providing capacity building activities for researchers, public officials, government representatives and water experts. It established the university study of IWRM at the DKU provided specifically for students of water management from Central Asia and expanded the data collection infrastructure in Central Asia to facilitate continuous data collection and transboundary data sharing. While the Berlin Process was

initially only conceived for a period of three years, it was renewed twice with expressed interest by all involved parties in continued cooperation.

In 2020, the Berlin Process was succeeded by the Green Central Asia Initiative, which demonstrated the success of the Berlin Process, as the new initiative included aims of regional cooperation beyond the resource of water. The GCAI facilitated the development of the Regional Action Plan, the fourth Aral Sea Basin Program and the adoption of the first Regional Climate Change Adaptation Strategy, as well as the implementation of several regional projects aimed at improving cooperation in transboundary river basins and strengthening the resilience against the impacts of climate change. Various workshops, conferences and regional dialogues were organised to support the general interstate dialogue between the Central Asian states on water management and climate change adaptation. Regional Working Groups have begun intergovernmental discussions on climate change adaptation strategies, regional cooperation on glaciological monitoring, and the development of a mutually beneficial water-energy mechanism that considers the inextricable interlinkage of water and energy production in Central Asia. The GCAI is still ongoing and henceforth not yet concluded by the time of submission of this master thesis.

To conclude, Germany has conceived the Water Initiative Central Asia and the Green Central Asia Initiative together with the five states of Central Asia to support the establishment of a regional system of sustainable transboundary water management. Within both initiatives, a wide variety of activities have been organised and implemented in support of the overarching goal, which have addressed the factors of political assent, mutual benefit, financing, data, innovation, capacity building, governance, trust, and institutional anchoring. Therewith, Germany has contributed to advancing the process of establishing a system of sustainable transboundary water management in Central Asia with its water diplomacy engagement.

The findings of this research have been limited by the chosen methodology: while providing a comprehensive account of German water diplomacy in Central Asia, it cannot provide a quantifiable assessment of the impact that German water diplomacy has had in Central Asia. However, the author invites further research inquiries into German water diplomacy in Central Asia based on the research presented in this master thesis.

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