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The Impact of Emotions on Climate Action on the Example of the Aral Sea Case Study in Kazakhstan and Uzbekistan

A Master's Thesis submitted for the degree of
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supervised by
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Affidavit

I, **SABRINA KASCHOWITZ, BA MA**, hereby declare

1. that I am the sole author of the present Master's Thesis, "THE IMPACT OF EMOTIONS ON CLIMATE ACTION ON THE EXAMPLE OF THE ARAL SEA CASE STUDY IN KAZAKHSTAN AND UZBEKISTAN", 66 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
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Abstract

The aim of this study is to examine how the personal experience of massive human-induced irreversible environmental changes affects individuals' hopes in the face of the global climate change threat and their perceptions of the effectiveness of environmental activism and the contribution they can make in this context.

Emotions and personal storytelling are currently under-represented in climate change research neglecting their important role as a source for climate change communication and mobilization. Climate change is often encountered as an abstract scientific concept that does not take into account local realities and experiences. This is why this study tries to draw a link between rational and abstract information about environmental degradation and climate change and emotionally charged local narrations to get a better understanding on how to include people's lived realities into climate change communication and activism. Such an approach forms the basis for the development of locally accepted measures and thereby is, in addition to technical and scientific considerations, an important factor for the sustainable implementation of environmental measures.

The Aral Sea region is a good case study in this context because the desiccation of the Aral Sea is known as one of the most severe human-induced ecological disasters of the 20th century. It is also a very climate-vulnerable region: the region's water supply heavily depends on the limited water resources available and its capacity to reduce the damage induced by the Aral Sea desiccation. In addition, the Aral Sea region includes two countries, Kazakhstan and Uzbekistan, which have developed largely different approaches to deal with the disaster consequences. This is why they are found applicable for a comparison of local perceptions.

The study includes six qualitative interviews conducted with locals in Uzbekistan and Kazakhstan. The results show that hope and climate action can be activated even in ecologically damaged regions where the local population witnessed irreversible anthropogenic interventions in the environment. It is an experience that can foster creativity to find new solutions in the understanding that ecosystems and human beings are capable of adapting to new living conditions. However, it can also cause resignation and hopelessness in the light of the inaction of actors who are perceived to have more potential power to take action. In this light, storytelling and good examples of local environmental activism can serve to counteract individuals' feelings of powerlessness and reactivate hope that their contributions can make a difference.

Table of Contents

Introduction

In contrast to usually better established natural science approaches in climate change research, social aspects of climate change are under-researched. However, the contributions of interdisciplinary concepts and theories within the social sciences, such as anthropology, psychology, sociology or economics, have increased significantly in the past years (Whitmarsh and Lorenzoni 2010). Social aspects of climate change include, alongside the impact of climate change on socio-economic systems, questions of local perceptions of climate change and responsibility, but also people's individual role in environmental activism and the emotions influencing their perceptions and shaped by their different local realities.

Different local realities play an important role for the questions raised above, and the emotions related to them might be essential for an effective change of behaviour. They can be an opportunity for policy makers and environmental activists to personalize and localize climate communication and effectually call for climate action (Roeser 2012; Razavi 2021). This is especially important in the light of the many empirical studies indicating that there is generally little sense of urgency for climate action when climate change is perceived as far away in space and time. In contrast, the direct exposure to ecological disasters increases the individuals' concern about climate change (Roeser 2012; Lowe et al. 2006).

This is why this study focuses on a selected environmentally damaged area that has witnessed a major human-induced environmental disaster, the Aral Sea desiccation. The Aral Sea region is well-suited for a case study about the influence of local realities and emotions on climate change perceptions. This is the case, on the one hand, because of the region's climate-vulnerability: the region's water supply, as well as its main economic sectors heavily depend on the region's limited water resources and its capacity to reduce the damage induced by the Aral Sea desiccation (Narbayep and Pavlova 2022). On the other hand, the Aral Sea region includes two countries, Kazakhstan and Uzbekistan, which have developed largely different approaches to deal with the disaster consequences. This is why they are found applicable for a comparison of the local perceptions of climate change.

The study aims at understanding how the immediate experience of massive human-induced irreversible environmental changes and subsequent local, national and international mitigation attempts affect people's hopes and engagement in the face of

climate change and their perceptions of the effectiveness of environmental activism. This approach forms the basis for the development of locally accepted measures and thereby is, in addition to technical and scientific considerations, an important factor for the sustainable implementation of environmental measures. This will be demonstrated by the means of six qualitative interviews. The interviews will be analysed based on the three hope themes according to Ojala (2012), dividing individuals' hope to tackle climate change into three aspects: their ability to generate positive perspectives which help coping with the climate change threat, their trust in national and international structures to effectively counteract climate change and environmental degradation, and their trust in that their own actions can contribute to positive changes.

The interview partners were chosen as equally as possible from both Kazakhstan and Uzbekistan due to their visibility in relation to the Aral Sea, either through their profession tightly connected to the Aral Sea or their personal interest and activities in the region. This is to make sure, on the one hand, that their background knowledge about the Aral Sea is profound enough for them to reflect rationally on their local reality and, on the other hand, that they are not indifferent towards the disaster and its implications.

The present study helps to draw a link between rational and abstract information about environmental degradation and emotionally charged local narrations to get a better understanding on how to include people's lived realities into climate change communication and activism.

1 Emotions and Climate Change

Even though climate research continues to focus on natural science, research is increasing, for example, on the correlation between emotions, climate change communication and climate action. Emotions are "a necessary source of reflection and insight concerning the moral impact of climate change" because they can raise the motivation to do something about it (Roeser 2012). There are many studies today examining the role of emotions in climate change perception, action and communication (Morris et al. 2020; Marlon et al. 2019; Feldman and Hart 2017; Ojala 2012; Lowe et al. 2006). While emotions are largely considered as irrational conditions and are therefore often treated with negligence in political decision making and climate change communication, they are essential "for practical and moral decision making" (Roeser 2012).

This chapter will take a closer look on the emotion of hope, as opposed to doubt and pessimism, in the context of climate change, its impact on climate action, as well as its role in climate communication.

1.1 Hope as emotion

Hope is not only a feeling. Snyder defines hope as "the perceived capability to derive pathways to desired goals" including the capacity of motivating oneself to make use of the pathways (Snyder 2002, 249). Likewise, for Lueck, hope is "not simply optimism", but an essential element of agency which involves goal-setting, the visualization of hindrances and the willpower to achieve the goal (Lueck 2007, 250). People with higher hope perform better athletically and scholastically, demonstrate more situational *willpower*, which Snyder defines as necessary commitment for a goal, and more *waypower*, the ability to find effective methods to reach these goals (Snyder 2000). Hope offers a tool for the creation of a plan which is a crucial element "of the feedback loop between planning, action, and outcomes" (Lueck 2007, 252).

Hope is a complex concept that includes cognitive, existential, emotional and social aspects (Ojala 2012). Chadwick criticises that in many hope concepts and definitions, including Snyder's, hope constitutes a mere cognitive ability and neglects hope as emotion which "individuals experience even when they perceive themselves to lack efficacy and control" (Chadwick 2010, 22). In terms of climate change, Marlon et al.

distinguish between two types of hope, *constructive hope*, hope that is intrinsic in political engagement, and *false hope* that dissociates people from the problem and leads to disengagement (Marlon et al. 2019).

In her empirical study with young people and their hopes for the fight against climate change, Ojala (2012) identified three hope themes that will be further taken into account in the empirical study of this thesis. The first theme is called *positive re-appraisal* which she defines as the ability to "reverse one's perspective and also activate positive emotions" even though the threat is perceived as real and agonizing (Ojala 2012, 636). This includes, for example, putting today's situation into a historical angle and stress the fact that the awareness of climate change has increased in the past decades (Ojala 2012). The second theme Ojala identified as *trust in sources outside oneself*. Outside sources are, for example, trust in science, environmental and international organizations or technology. The third hope theme is *trust in one's own ability to influence environmental problems in a positive direction* and involves, for example, trusting that daily activities such as recycling can lead to long-term change (Ojala 2012). How hope and the belief that an individual has the capacity to bring about change might in practice be connected with climate action will be analysed in the next subchapter.

1.2 Hope and Climate Action

The chapter above implies that hope might be strongly linked to environmental engagement. The correlation between hope and climate action is currently under-researched (Marlon et al. 2019; Ojala 2012). Snyder's (2002) hope theory includes the motivational component of hope as what he calls *agency thought*, "the perceived capacity to use one's pathways to reach desired goals", leading to engagement and activism (Snyder 2002, 251).

Generally, hope occurs to a larger extent in individuals whose efforts towards social improvement meet with some extent of success (Bandura 1982). In the context of climate change, previous studies have shown that when individuals feel they are able to meaningfully address climate change they are more inclined to show engagement (Hart and Feldman 2016). The perceived efficacy gives a sense of control. Even though this feeling of control is partially illusory, it helps to focus, sustain motivation against an omnipresent threat, and thus maintain pro-environmental behaviour (Hornsey at al. 2015). This is reflected in findings about individuals' reactions to different climate change-

related images and texts: sources with hope-related associations, such as sustainable solar panels or texts about climate action, significantly increased intentions to conserve energy and engage in political actions (Hart and Feldman 2016). A similar study found that flood aerial images happened to evoke the most salient reactions but were the least efficacious ones when it comes to environmental engagement. This shows how the perceived loss of control disengage and distance individuals (O'Neill 2013).

The correlation between hope and individuals' capability to act effectively on climate change is as well examined in Marlon et al.'s research (Marlon et al. 2019). The results showed that constructive forms of hope are persistently related to higher political environmental engagement and policy support, while false hope led to a negative relationship with both environmental behaviours and policy support (Marlon et al. 2019). Similarly, Ojala tested whether hope has a positive relationship to environmental engagement among teenagers and young adults (Ojala 2012). Her results led to the same conclusion: constructive hope, based on the three hope themes, positive re-appraisal, trust in their own influence and the influence of other actors, significantly facilitates pro-environmental behaviour, such as energy conservation. Hope based on denial is negatively related to engagement (Ojala 2012).

It goes without saying that the issue of climate change inevitably evokes other strong emotions alongside with, or sometimes opposed to, hope. These emotions as well have to be taken into account when it comes to environmental engagement and climate change communication. In the following subchapter, research outcomes of the correlation between negative emotions and climate action will be discussed.

1.3 Doubt and pessimism in Climate Change

Climate change can be perceived as an existential issue, strongly related with uncertainties about the earth's future, and can thus provoke feelings of hopelessness, pessimism and anxiety (Ojala 2012). These negative feelings, together with anger, can be reinforced by the many messages that tend to focus on the causes and impacts of climate change. They often point to a certain threat, and thus diminish the feeling of hope (Feldman and Hart 2017).

Many scholars, however, suggest that even though doubt or pessimism can possibly reduce hope they can as well evoke the desire for change and in this way lead to climate change activism (Marlon et al. 2019; Morris et al. 2020; Lueck 2007). Morris et al. (2020)

observed respondents being even more receptive to pessimistic notions in climate change appeals: they increase risk perception, especially true for those respondents who are usually less concerned about climate change. Morris et al. (2020, 6) argue that optimistic endings in climate change appeals "may comfort a public suffering from apocalypse fatigue" while pessimistic endings foster people's understanding that their own individual behaviour has an impact on climate change.

Marlon et al. (2019), however, found that both fear and hope have to be stimulated for collective climate change action to happen. They distinguish between constructive doubt which "reinforce[s] hope in a constructive manner" and fatalistic doubt which appears to prevent engagement (Marlon et al. 2019, 12). Constructive doubt can show itself, for example, through questioning whether we are counteracting climate change with the appropriate measures. It might lead to action out of the realization that the worst case scenario will occur when people will be mere bystanders of environmental degradation (Marlon et al. 2019).

The fact that both doubt and hope can lead to activism for environmental protection is also reflected in interviews conducted in the framework of the Yale Project on Climate Change Communication during a climate march (YPCCC 2014).

The findings collected here demonstrate how the appeal to negative emotions can be critical in sensitizing people for the climate change threats. There is, however, further research required to better understand the correlations between individuals' emotions and their subsequent actions (Morris et al. 2020).

1.4 Hope in Climate Communication

Even less research has yet been done in understanding the role of hope and doubt in climate change communication and how this impacts pro-environmental activism (Marlon et al. 2019). Emotions have a critical role in effective climate change communication, especially for their potential to convey constructive hope in news stories (Roeser 2012; Feldman and Hart 2017; Marlon et al. 2019). The emphasis on hope is particularly crucial in environmental sociology when communication is about "combating the depressing fate many perceive if environmentally destructive lifestyles are not changed" (Lueck 2007, 252).

Specifically, news stories involving activism to address climate change increase hope and motivate public engagement (Feldman and Hart 2017). This should be accompanied

with information that acknowledges the hurdles and the serious threats in order to add the above-mentioned notion of constructive doubt (Marlon et al. 2019). The constructive doubt is important in climate communication in order to counteract the effect of comforting a public too easily with optimistic messaging (Morris et al. 2020).

One aspect that has yet hardly been covered in research about climate communication is the impact of lived experiences and personalized storytelling on the public's perception of climate threat. Rödder criticises the current approaches in climate change communication, revolving almost exclusively around scientific knowledge. He sees it as the result of "a social hierarchy of expertise, which puts scientific knowledge on top and lived experience, religious philosophy and anecdotal evidence below" (Rödder 2020, 6). Storytelling, however, has high potential in engaging more people through transforming "complex subject matters into something that feels personal, local, relatable and solvable" (Razavi 2021). Still, there is a general tendency to communicate climate change in a rather abstract matter which fails to connect to lived experiences and local communities, even in geographically exposed regions (Rödder 2020). In addition, the generally in climate communication predominant attributions to a global scale of climate change can distant the audience from both impact and causes of climate change and shift the sense of responsibility away from local and individual causes (O'Neill 2013; Rödder 2020; Roeser 2012). The same is true for the often highly politicized components of climate change communication. A content analysis of images connected to climate change collected out of 13 Australian, British and US-American online newspapers of 2010 showed that much of the of mass media coverage tends to put climate change in the context of political events: there appeared to be significantly more images of protests or political leaders acting on climate change compared to, for example, weather events (O'Neill 2013).

The data raise the question of how and to whom responsibility is attributed, both in terms of causes and mitigation actions. It is a question that is further elaborated in the following subchapter as it plays a role in the empirical part of this thesis.

1.5 The question of responsibility in climate action

The externalization of responsibility, alongside denial and downplaying, is a wide-spread psychological coping mechanism when it comes to climate change (Ojala 2012).

Interviews with activists during a climate march disclose mistrust and doubt in the government, while hope is predominantly placed in ordinary people (YPCCC 2014). This

may match with the findings of O'Neill et al.'s (2013) study about the individual's reaction to different climate change images taken from mass media sources. The data showed that images of politicians combating climate change undermined not only the respondents' perceived ability to do something about climate change, but also their feeling that climate change is at all important (O'Neill et al. 2013). However, when participants of the climate march where asked "When you think of 'global warming solutions,' what is the first word or image that comes to your mind?", the same amount of respondents named "people" as they named "politics" (YPCCC 2014).

The perception of a combined government-society action is reflected in Lowe et al.'s (2006) study about the impact of the movie "The Day after Tomorrow" on individuals' perception of climate change. By a majority of respondents, climate change was recognized as an issue of common human responsibility, while only 24 percent felt the responsibility lies exclusively with global leaders and governments. At the same time, respondents generally believed that "public concern could not lead to action without the aid of political support" (Lowe et al. 2006, 448).

Drawing the line to Ojala's (2012) above-mentioned second hope theme, *trust in sources outside oneself*, her study shows that a strong belief in the actions of environmental organizations and technological solutions is very common among individuals. The same, especially in terms of trust in technology and similar resources, holds true for Lowe et al.'s (2006) research results. Particularly important in this respect is Ojala's (2012) remark that it has not been further investigated whether this trust is constructive for pro-environmental action or rather an excuse to escape individual responsibility.

One aspect strongly connected to the question of responsibility and trust in technology in this context is climate change adaptation, a term often used as excuse for inaction. In Lowe et al.'s (2006) study, this manifests itself in two ways, one connoted with hope and one with resignation: the thought that people have since ever been capable of coping with and adapting to major disruptions in history on the one hand, and the belief that it is anyway impossible to change the lifestyles and behaviour of humankind on the other hand.

These ideas, common in the climate change discourse, are what Martin et al. put as, "combination of denial, uncritical faith in technology, and the anaesthetic effect of modern comfort" preventing us from undertaking the necessary shift from our current exploitative attitude towards the environment to a respectful human-nature

interrelationship in which we accept the planet's biophysical limits (Martin et al. 2016, 6108). How tightly coupled human-nature interconnections are has ever since been neglected and undervalued (White 2013).

The socio-economic context of the Aral Sea disaster is strongly connected to the questions raised in this chapter. The desire to master nature was very strongly reflected in the Soviet regime's approach of taking economic advantage of the Aral Sea region, with little space for reflecting on human-nature interrelations. Even today, the question of responsibility for the disaster has not found its way neither into the public nor the local private discourse (Wheeler 2021). However, acquiring specific information about "cause and effect for many problems remains a key element of learning" (Marlon et al. 2019, 12). It is crucial for a vulnerable region's preparedness to counteract its climate change susceptibility (Narbayep and Pavlova 2022).

In the context of the Aral Sea, the global scientific discourse of the environmental disaster of the 1980s, displaced on satellite images of the shrinking sea, "did not [yet] resonate with local worlds" at that time because there was no public discourse about what was happening (Wheeler 2021, 233-234).

Drawing on Roeser's (2012) criticism of the abstract climate change discourse, there might be little effort to put the personal disaster story of the Aral Sea into a broader climate change context.

In terms of emotions, the Aral Sea case is a difficult field of research. On the one hand, one can argue that direct exposure to an anthropogenic environmental disaster reinforces the motivation to address climate change (Lowe et al. 2006; Roeser 2012). On the other hand, it is also true that when efforts to improve a situation does not meet with any success over a long period of time, hope can turn into discouragement (Bandura 1982).

2 Research questions and hypothesis

As the previous chapter shows, emotions play an influential role for both environmental activism and climate change communication, and research in this context is largely focused on understanding how to effectively stimulate and channel them to fit the purpose of collective climate change action. The emotions of the Aral Sea region's local population in this regard do not have to be stimulated. The locals' perceptions of environmental degradation are intertwined with their personal disaster stories of the Aral

Sea and may not even have to purposely be put into the broader climate change context: the region's climate vulnerability is an integral part of the local everyday life.

Drawing on this example, the aim of this study is to understand the impact of the immediate experience of a massive human-induced environmental disaster on people's emotions in the context of climate change, their perceptions of the effectiveness of environmental activism and how empowered they feel to bring about change and take responsibility. The following questions will be addressed:

1) To which extent does the personal experience of an anthropogenic environmental disaster influence people's activism in the context of the global climate change threat?
2) How do emotionally charged personal narratives tie local realities to global climate change?
3) Can the chance to preserve an ecological condition, as in Kazakhstan, as opposed to witnessing irreversible ecological change, as in Uzbekistan, activate hope and motivate for environmental activism?

The literature review shows that there are different scenarios. The personal experience of a human-induced environmental disaster may lead to a strong motivation to address climate change because of the realistically felt fear of a worst case scenario. However, it may also have the opposite effect: resignation and a perceived loss of power occur in the case of irreversible damage where no restoration efforts have met any success or there has not been taken any collective effort at all. In this regard, the Aral Sea desiccation is a good case study: its consequences were dealt with differently in Kazakhstan and Uzbekistan, the two countries affected by the disaster. While the construction of a dam in Kazakhstan has raised the sea level of the Small Aral Sea, located entirely in Kazakhstan, and brought back ecological conditions that remind of the times before the desiccation, the Uzbek part of the seabed has ever since continued to dry out. Based on these two different situations, it is assumed that the local population in Aralsk, benefitting from the sea restoration by reassuming their fishing industry, experience a positive, hope-based reappraisal of the environmental disaster. It is thus assumed that the interviewees from Aralsk are more likely to believe that action can bring about change and that climate change can be tackled if action is taken. For the interviewees on the Uzbek side, it is assumed that the experience of irreversible damage to the environment induced by humans and subsequent non-action to restore the Aral Sea decreased their hope that climate change will or can be addressed effectively.

3 The Aral Sea

Before the questions raised above can be addressed, a comprehensive historical, economic, environmental and social context of the case study on the local, national and international level shall be provided in this chapters to give a better understanding of the socio-economic implications of the Aral Sea desiccation for the local population.

Figure 1: Aral Sea river basin (FAO 2012)

The Aral Sea, illustrated in Figure 1, has a drainage basin that in total covers about 2.7 million square kilometres across seven countries: all five Central Asian states – Kazakhstan, Uzbekistan, Kyrgyzstan, Turkmenistan and Tajikistan – and Afghanistan and Iran (Narbayep and Pavlova 2022; Micklin 2010; Plotnikov et al. 2016). Geographically, it covers 60 percent of the Central Asian region, including, as of 2020, 80.7 percent of the population in Central Asia. This corresponds to 60 million people (Narbayep and Pavlova 2022). The basin is fed by the two main rivers of the region, the Syrdarya in the north and the Amudarya in the south (Kulmatov 2017; Kumar 2002; Wheeler 2021).

The region around the Aral Sea is a naturally very dry zone which encompasses the massive Karakum, the Red Desert, and Kyzylkum, the Black Desert (Kulmatov 2017; Micklin 2010). In such an arid area, the Aral Sea used to mitigate the continental climate extremes and supplied sufficient rainfall for pastures (Wheeler 2021).

The Aral Sea is a terminal lake and thus does not have any surface outflow. The water level is therefore fully determined by the water balance between the Syrdarya and Amudarya inflows and by net evaporation. Net evaporation is defined as the "evaporation from the lake surface minus precipitation onto it" (Micklin 2010, 193). Roughly half of the rivers' flow used to reach the lake (Kumar 2002).

The Syrdarya is the second-largest, but longest river in the Central Asia region with a length of 2,337 kilometres, most of which is located in Kyrgyzstan, the country of its origin (Rahaman 2012). The Amydarya originates in Afghanistan and is the main water resource for Tajikistan, Turkmenistan and Uzbekistan (Zhunusbekova et al. 2018; Kumar 2002). Together, the Amudarya and the Syrdarya provide approximately 90 percent of the annual river flow in Central Asia (McKinney 2003).

The only countries to share the Aral Sea itself are Kazakhstan and Uzbekistan. As of the 1960 dimensions of the sea, its shorelines were more or less equally divided between the two states. The entire Aral coastline within Uzbekistan lies within the Republic of Karakalpakstan, an autonomous region in Uzbekistan (Micklin 2010).

Until 1960, the Aral Sea was the fourth largest lake in the world, covering a surface area of more than 68,000 square kilometres of a total water volume of about 1,093 cubic kilometres (Gaybullaev et al. 2012). From 1911, when instrumental observations were first established, up to the first years of the 1960s, the water balance of the lake was in a long-term stable condition, and the range of water level variations was less than one meter (Micklin 2010). The inflows of the Amudarya and Syrdarya balanced the losses to evaporation, curbed the salinity levels to an average of about one third compared to ocean water and thus guaranteed the access of freshwater fish to the sea (Wheeler 2021; Micklin 2010).

Since 1960, the sea suffered constant desiccation and salinization. Over the following 40 years, more than 36,000 square kilometres of the waterbody had dried out (Micklin 2016; White 2013). The salinity of the lake multiplied 20-fold (Micklin 2010). This can be explained by the reduced freshwater inflow from the rivers: the salinity of the Amudarya and the Syrdarya lies under 0.7 parts per thousand and used to balance the brackish Aral Sea water with its salinity of more than 9 parts per thousand (Kumar 2002). The salinization of the sea led to the exodus, or in the case of endemic species even extinction, of the freshwater fish species (Plotnikov et al. 2016; Kumar 2002). The surface area of the lake declined by 88 percent, the water volume by 92 percent (Micklin 2010).

By 1987, the Aral Sea had broken up into two waterbodies, a smaller Aral Sea in the north-east entirely lying within the Qysylorda region in Kazakhstan, and a larger Aral Sea in the south-west (Micklin 2016; White 2013; Kumar 2002; Figure 2, Figure 3, Figure 4). The Syrdarya flows into the Small or Northern Aral Sea, the Amudarya into the Large or Southern Aral Sea. Thus, the two waterbodies have become completely different hydrological systems (Micklin 2016; Plotnikov et al. 2016; Izhitskiy et al. 2016). The Kokaral, a former island and now peninsula, separates the two waterbodies and forms a natural borderline between Kazakhstan and Uzbekistan (Kumar 2002).

By 2009, the Large Aral Sea itself had broken up into three waterbodies: the deeper Western Large Aral and the shallow, about 1.5 meters deep Eastern Large Aral which are connected through a narrow channel, and the entirely separated Lake Tshchebas (Micklin 2010; Izhitskiy et al. 2016; Sala 2019). All three waterbodies are high in salinity and no fish, as well as almost no invertebrates, could exist in any of them (Micklin 2016; Aladin et al. 2017).

By 2003, the volume of the Aral Sea had decreased to about ten percent, its surface area to approximately one fourth of its original size. The sea shorelines retreated 100 kilometres into the inside, creating the salty Aralkum Desert (Khaibullina et al. 2022).

It is what has been characterized by scientists and historians as one of the worst human-induced ecological disasters of the 20th century (Wheeler 2021; Kulmatov 2017; Kumar 2002; Wiggs et al. 2003).

In the 1990s after the collapse of the Soviet Union, intensive research on the Aral Sea disaster was launched resulting in more than a thousand articles and books and over 30 international projects (Wheeler 2021). Today, the ecological disaster of the Aral Sea region is well-known and highly researched. What is less studied is the human tragedy. Socio-economic and political aspects are important to consider when attempting to understand the interrelationships between humans and the environment (White 2013). Before focusing on socio-economic and political questions, this chapter in the following will give an overview of the Aral Sea history and the causes and consequences of the ecological disaster. This contextualization serves the understanding of the socio-economic and political conditions in which the Aral Sea region is embedded today.

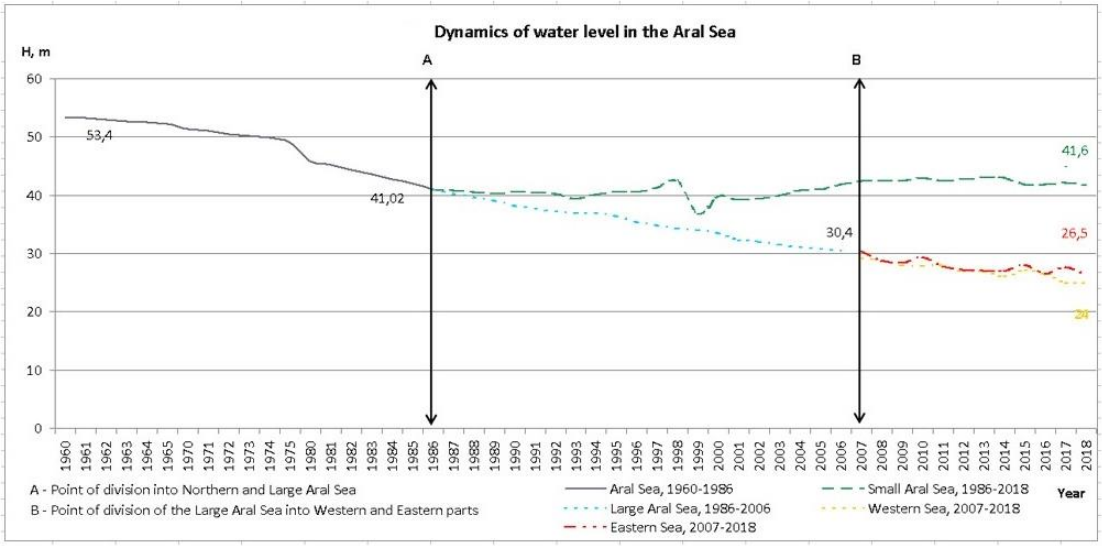

Figure 2: Development of water level of the Aral Sea (CAWater 2018)

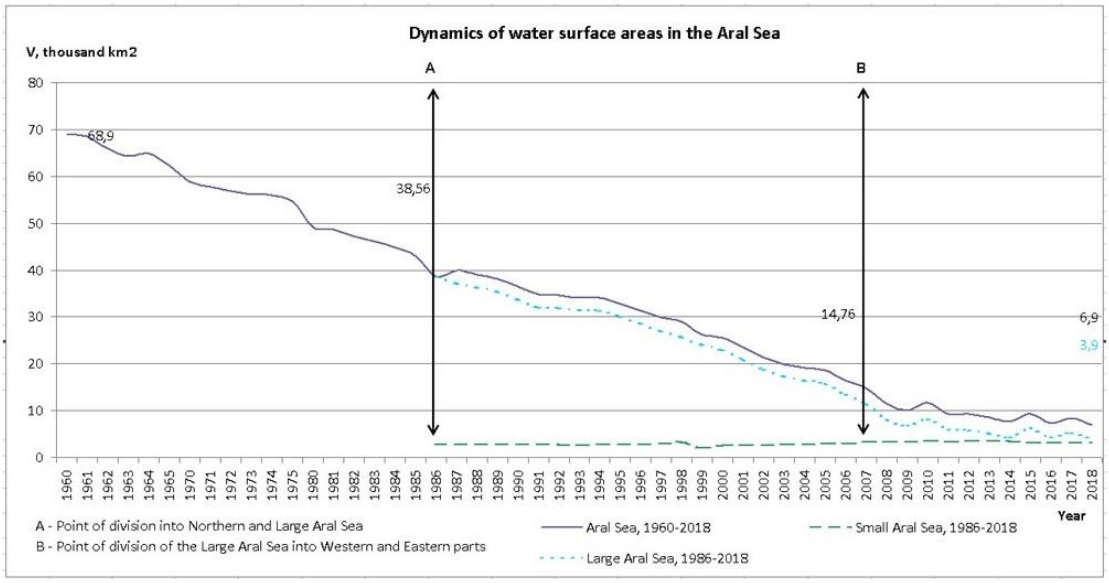

Figure 3: Development of water surface areas of the Aral Sea (CAWater 2018)

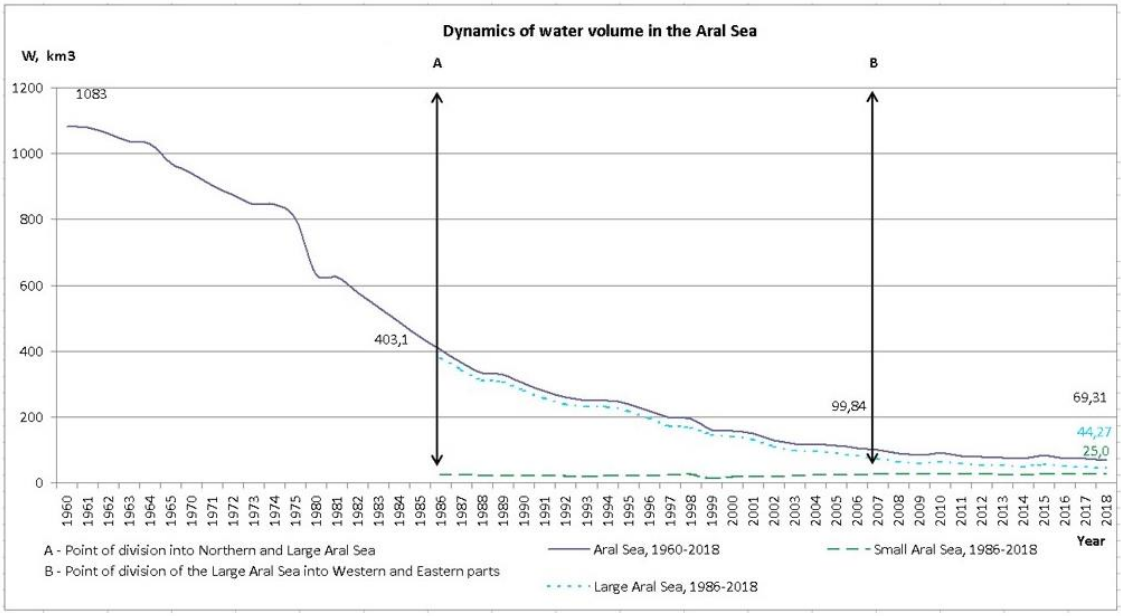

Figure 4: Development of water volume of the Aral Sea (CAWater 2018)

3.1 A hand-made disaster: A historical overview

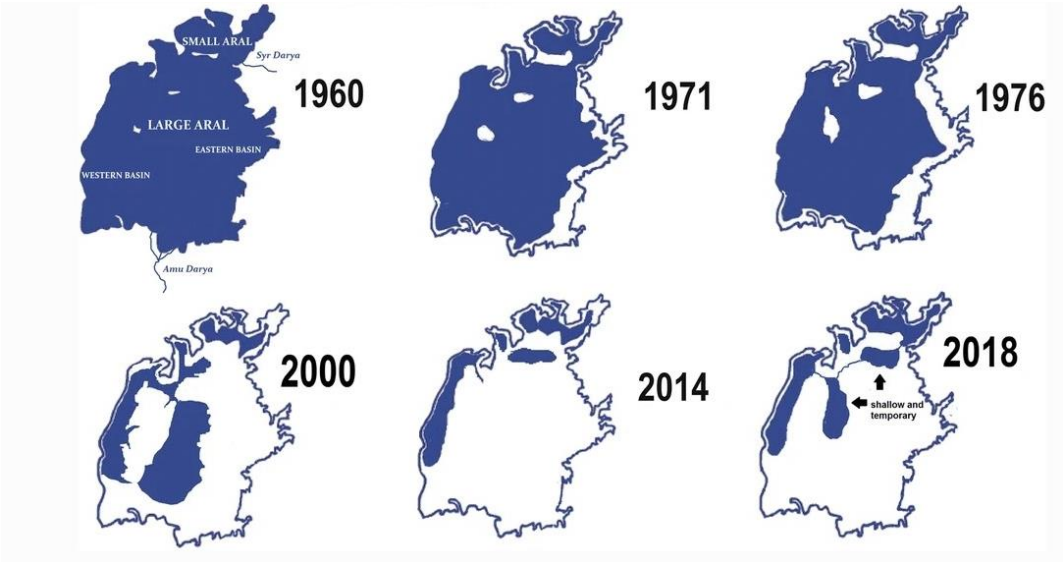

Figure 5: Desiccation of the Aral Sea from 1960 – 2018 (Aladin et al. 2019)

1960 is generally specified as the starting point of the Aral Sea desiccation. It is the result of an extensive diversion of the Syrdaya and Amudarya water flows leading to a reduction of the inflows into the sea (Wheeler 2021; Plotnikov et al. 2016; Wiggs et al. 2003). The

rivers were diverted to serve the purpose of intensive irrigated agriculture starting in the early twentieth century and intervening heavily in the "long-lasting natural balance between ecological change in the Aral basin and the sea" (Zonn 2008, 157). Even at that early time, the diversion of the rivers showed first signs of an environmental problem: the underground water table raised leading to water logging and soil salinization (White 2013).

The Central Asian region's potential as major cotton producer was identified as far back as in mid-19th century by Tsarist Russia (Shtaltovna and Hornidge 2014). Cotton seeds prefer warm temperatures and a rather arid climate (Kumar 2002; Shtaltovna and Hornidge 2014). However, it requires large amounts of water. Even in the few regions in which cotton might be possibly grown under natural rainfall conditions, no optimum yield can be reached without irrigation. This is why irrigation plays a larger role in cotton cultivation compared to many other plants (Cetin and Bilgel 2002).

By the late 19th and early 20th centuries, the expansion of the Russian textile industry strongly increased Russia's interest in cotton cultivation (Zonn 2012, 97). By the beginning of the First World War, Central Asia already was a major provider of cotton (White 2014). In the 1920s, the region gained Lenin's attention who initiated a large infrastructure plan for southern Kazakhstan (Shtaltovna and Hornidge 2014; UNEP 2011).

Without doubt, the local population's economic activity and irrigation practices have been putting pressure on the region's water resources for thousands of years before the turn of the 20th century (Micklin 2016; Andrianov 1995). Intensive colonialization of the Aral Sea region was pushed by Tsarist Russia far before the 20th century, and large-scale cotton cultivation started towards the end of the 19th century (Zonn 2008; Kumar 2002). However, the dimensions of water use were then technologically limited, and the tipping point had not been reached before 1960. Only in 1960, the expansion of these activities "could not be supported [anymore] by the hydrologic and related natural systems without incurring significant damage to them" (Micklin 2016, 13).

The first considerable irrigation project was put into practice in 1939 when a major canal was constructed around the Ferghana Valley in Uzbekistan (Kumar 2002). In 1953, the construction of the Karakum Canal in Turkmenistan was launched, today with its 1,380 kilometres one of the largest water supply channels globally. Around 13.5 cubic kilometres of water are diverted annually from the Amudarya to the Karakum Canal (Zonn 2012).

As early as in 1940, the cotton output was three times the amount produced in 1913 (Pomfret 2002). In the late 1950s, Moscow established a system of cotton monoculture in Central Asia. The consequences were an over-dependence on cotton cultivation and the destruction of the local agricultural practices (Kumar 2002; White 2013; Glantz 2008). Other traditional plants, such as crops for vegetable oil or orchards, were not cultivated anymore (Kumar 2002). The expansion of cotton cultivation in the desert region intensified the dependence on irrigation water especially for Uzbekistan (Kumar 2002, 3798). Alone in the period from 1960 to 1990, the irrigated area in the region expanded from 4.7 to 7.4 million hectares and constituted 8.5 million hectares in 2019 (Micklin 2010; Khasanov et al. 2022).

Even though at that time, the sea already started to withdraw, the Soviet agricultural planners simply weighed the economic benefits of the water-intense cotton cultivation against those of the Aral Sea, in its value for the fishing industry (Cerny 2012; White 2013).

The local farmers supported the irrigation plans because they recognized their economic benefits from subsidized or free water enabling them to reach the cotton target yield. Effective water usage or environmental externalities of the irrigation projects were not in the focus (Pomfret 2002). No attention was paid either to land drainage. The canals were often unlined and the floodgates closed during the season. Irrigation water was introduced straight to the fields and accumulated in drained lakes. Decreased return flows to the Amudarya and Syrdarya, massive water losses and exfiltration were the consequences. Not more than 10 percent of the water ended up as valuable to the crop while 90 percent evaporated or went into the desert soil (Kumar 2002: Micklin 2016).

The high water evaporation contributed to soil salinization. This is why in the late 1970s, highly insufficient drainage channels were built with the aim of flushing out the salts from the soil (Kumar 2002). Even in the mid-1980s, despite all the evidence of the time, the official discourse was “still in denial as to the costs of desiccation of the Aral Sea” (Pomfret 2002, 185): As early as in the 1970s, no water from the Syrdarya arrived to the Aral Sea, but nevertheless, the cotton yield amounted to four and a half times the amount produced in 1940 (Kumar 2002; Pomfret 2002). In addition to the high consumption of water due to irrigation, a large amount of fertilizers, pesticides, herbicides and defoliants were applied to the crops (White 2013).

Large-scale diversions, the transition to a water-intense monoculture and the mismanagement of water resources have been determined as the central causes for the major disturbance of the ecological balance of the Aral Sea which, subsequently, led to its desiccation.

3.2 Consequences

The historical overview of the Aral Sea disaster given above shows that even though distinct human activities do not lead to severe environmental issues immediately, this does not mean that they will not generate problems at some point in the future (Micklin 2016).

The environmental problems occurring alongside the desiccation of the Aral Sea plunged the region into a deep environmental, hydrological, economic and health crisis. The consequences are far-reaching, from changes in the regional climate, declining crop yields and the breakdown of the fishing industry to quality losses in the drinking water supply (Glantz 2008; Kumar 2002; Narbayep and Pavlova 2022). The following subchapters shall elaborate on a chosen set of consequences that have not been discussed here so far and contribute to defining the necessary context for the empirical study.

3.2.1 Desertification and soil contamination

Due to the gradual retreat of the Aral Sea, the exposed desert areas are continuously expanding with the wind. By the turn of the 21st century, five million hectares of new dry desert areas have appeared east and south of the Aral Sea (Kumar 2002). The salts of the exposed seabed accumulate on the land surface and create conditions under which no vegetation can grow. Additionally, they are mixed with pesticides and fertilizers (Micklin 2016; Narbayep and Pavlova 2022). For example, the for Central Asia typical Tugay forests that grow alongside river courses have significantly diminished and might not regenerate (Gond and Cesaro 2021). The vegetation changes, resulting in a gradual decline of bird and mammal species (Micklin 2016).

The ongoing desertification and soil salinization also have a significant impact on agricultural pastures. The deterioration of agriculturally useable land leads to a forage shortage for domestic animals and thus to a decline in pasture productivity. This, is turn,

forces farmers to counteract soil salinization by adding more fertilisers and pesticides to the soil (Kumar 2002).

In addition, the soil of the exposed Aral Sea seabed is heavily polluted with toxic chemicals. During the Soviet period, a secret laboratory was set up by the Soviet military on the Vozrozhdeniya island in the middle of the Aral Sea (Wheeler 2021; Kumar 2002). The laboratory was used to test "various genetically modified and 'weaponized' pathogens", such as smallpox, typhus and anthrax (Micklin 2010, 204). During the testing period of the programme, Vozrozhdeniya was entirely surrounded by the Aral Sea and the pathogens could not escape, but the desiccation of the lake united the island with the mainland (CNS 2002; Shomurodov and Adilov 2019). Only in 2002, the government of Uzbekistan, with technological support of the United States, launched a decontamination project for the island (CNS 2002).

3.2.2 Climate Changes

Towards the end of the 20th century, the desiccation of the Aral Sea caused significant changes of the local climate conditions (Kumar 2002).

Generally, the Aral Sea basin is located in a heavy continental climate with sharp meteorological contrasts and high temperature differences ranging from 30 degrees Celsius below zero in winter time to 40 degrees Celsius in summer time (Narbayep and Pavlova 2022; Kumar 2002).

Before the Aral Sea started to shrink, it had a mitigating effect on these desert-continental conditions: in winter, the water moderated cold winds coming from Siberia and in summer, it kept the temperatures down (Grabish 1999; Kumar 2002). The reason for preventing the summers from getting too hot was high water evaporation (Narbayep and Pavlova 2022).

With the desiccation of the lake, the arid climate conditions have become more extreme: the summers have become hotter, shorter and less humid, and the winters longer and colder (Micklin 2010). The temperatures fluctuate from a maximum of 50 degrees Celsius to a minimum of 27 Celsius below zero (Khaibullina et al. 2022; World Bank 2018). This has resulted in shorter growing seasons: on the one hand, autumn frost sets in earlier and spring frosts end later, on the other hand, precipitation happens less frequently and more irregularly (Micklin 2010; Kumar 2002). 60 percent of the total amount of precipitation takes place in the winter and spring time (Khaibullina 2022 et al.).

The elevated dust and salt levels in the region's atmosphere also decrease surface radiation which is why photosynthetic activity adds to acidic precipitation (Micklin 2010). In addition to that, dust transported through dust storms from desert areas to the mountains contribute to glacier melting. This in turn negatively affects freshwater generation for the rivers: decreased water storage in the glaciers leads to irregular periodic runoff volumes. There are very strong runoffs in spring and weak runoffs in the summer (Narbayep and Pavlova 2022).

3.2.3 Health Conditions

Unsustainable and intensive human activity in the Aral Sea basin has been "a dominant driver of the destruction of the Aral Sea and its natural ecosystems" and, as a consequence, reciprocated with hazarding the livelihoods of the local population (White 2013, 29).

One of the immediate consequences of the desiccation and the subsequent dust storms for the local population are digestive and respiratory diseases. This concerns especially cancer as a result of ingesting and inhaling moving dust and salt particles and toxic residues, such as the metals cadmium and lead (Kumar 2002; Micklin 2010; Wiggs et al. 2003). In Karakalpakstan, for example, the tuberculosis rates are the highest in the entire post-Soviet space, esophageal cancer is seven times more frequent than in the rest of Uzbekistan (Wiggs et al. 2003; Kumar 2002). Even though dust storms occur in the entire region around the Aral Sea, the heaviest storms happen with northeast and north winds and particularly affect the Amudarya delta to the south of the Aral Sea which is the most densely populated area in the region (Micklin 2010; Wiggs et al. 2003).

The high occurrence of kidney diseases in the region is presumably linked to the extremely high concentrations of salt in the drinking water. The concentrations amount to more than six grams per litre which is four times above the World Health Organisation standard level (Kumar 2002; Micklin 2010). The industrial, agricultural and municipal wastewater in the region is insufficiently treated or sometimes completely untreated. Drainage water contains excessively toxic ingredients, especially defoliants and pesticides from the cotton cultivation, and is released directly into the Syrdarya and the Amudarya (Narbayep and Pavlova 2022; Kumar 2002; Micklin 2010). The majority of the local population uses open wells or hand-pumps for drinking water and thus directly take in the toxins. The high levels of pesticides in the water are, among other diseases,

associated with the wide-spread iron-deficiency anemia which inhibits the human body's capacity to absorb iron (Kumar 2002; Lall 2012). Infant mortality rates are extremely high. In Karakalpakstan, for example, they used to be double the Soviet average, and today correspond to a ratio of 100 to 1000 live births (Wiggs et al. 2003; White 2013). Similarly, the Qysylorda region has witnessed an increase of cardiovascular diseases by one and a half times, of diabetes by three times and of bronchial asthma in children by two times. Noticeable are also a high numbers of developmental disabilities in children and stillbirth cases in an occurrence of 20 percent above the average in Kazakhstan (Khaibullina 2022; Kudaibergenov 2021). In the Kazakhstan Aral Sea region too, the iron-deficiency anemia is the most frequent blood disease (Khaibullina 2022).

Altogether, decreased ecosystem services, desertification, high concentrations of toxic chemicals and salts in air, water, land and the food supply "significantly contribute to poor human health in the region" (White 2013, 29).

High rates of other, not directly related diseases are rooted in the high level of poverty in the region as the collapse of the commercial fishing industries and other economic activities, inter alia, led to poorer diets (Micklin 2010; White 2013). Poorer diets, together with income losses, let the local population end up in a vicious circle and be even "more susceptible to poverty-related illnesses" (Cerny 2012, 238). These and other socio-economic side effects of the environmental disaster will be further discussed in the next subchapter.

3.2.4 Socio-economic consequences

The Republic of Karakalpakstan in Uzbekistan and the Qysylorda Oblast in Kazakhstan are the regions which are most affected by the Aral Sea disaster (Micklin 2006; Kudaibergenov 2021).

In the first half of the 20th century, the main income source for the regions surrounding the Aral Sea was the fishing industry. The fishing industry had developed significantly over the course of the early 20th century in the two major port cities, Aralsk and Moynaq (Micklin 2006; White 2014). Aralsk is located at the former northeast end of the Aral Sea in the Qysylorda region, Moynaq at the southwest end of the lake in northern Karakalpakstan (Encyclopaedia Britannica; Lall 2012).

The Aral fish was processed in the Aralrybprom factory in Aralsk, founded in 1925, and the Moynaq canning factory established in the 1930s. In the late 1950s, Aralsk

annually processed about 20,000 tonnes of fish, Moynaq almost 22 million fish cans. At its peak, the Aral Sea fishing industry provided for seven percent of the entire fish yield in the Soviet Union (White 2014; Lall 2012).

In the early 1980s, the commercial fishing industry terminated as a consequence of the lack of fish (Micklin 2006). The ports of Moynaq and Aralsk closed in 1978. With them, the entire navigation on the Aral Sea stopped as with the continuous water retreat away from Aralsk and Moynaq it would have been too expensive and challenging to continue extending the channels between the seashores and the ports (Wheeler 2021; Micklin 2010). As a result, the fish processing factories in Aralsk and Moynaq was forced to shut down (White 2013; Lall 2012; White 2014). Over 100,000 of the Aral Sea Basin population lost their work due to the collapse of the fishing industry and other activities associated with the Aral Sea, such as ship maintenance or spa-health facilities (Cerny 2012; Lall 2012). Today, employment in these industries accounts for only a tiny percentage of their former levels, and most of the infrastructure is ruined (Wheeler 2021; Micklin 2010). The loss of the fishing industry was gradually succeeded by "unemployed agricultural workers and a growing, but underemployed, population" due to water shortages (Cerny 2012, 238).

When the Soviet Union still existed, many workers, in order to keep employment, started constructing barge sections that were transported to Siberia and used for oil transportation. Especially in winter, however, the majority of the local workers left for seasonal work elsewhere (Wheeler 2021). The abrupt decline of livelihood caused massive outmigration from Moynaq as early as the 1960s, showing a population drop "from 30,100 to 21,600 between 1960 and 1970" (Lall 2012, 264). In Kazakhstan during the 1970s, the majority of the non-Kazakh population who had moved to the Aral Sea region previously for work, left. This is why many of the older Aralsk population associate the Aral Sea retreat with the "loss of the cosmopolitan, urban nature of Aralsk" (Wheeler 2021, 164).

The collapse of the fishing industry, the deteriorating conditions for agricultural activities, health issues and poor education and healthcare systems altogether were responsible for even more out-migration after the 1970s and 1980s. By today, about thirty percent of the working-age population of Karakalpakstan have left, mostly to Russia or Kazakhstan (World Bank 2018).

Today, Karakalpakstan is at the bottom of fourteen Uzbek regions in terms of economic development, "[t]here is hopelessness in the people" because the opportunities

are scarce and many leave without considering coming back (Cerny 2012, 230). Uzbekistan's capital Tashkent or other larger urban centre are far away, the connection to other former port communities is lost, and Moynaq is an isolated town surrounded by an expanding desert (Lall 2012). The population of Karakalpakstan today, as of July 2022, makes up 1,962,000 people which constitutes less than six percent of the total population of Uzbekistan. More than half of them live in rural areas (UZSTAT). The poverty rate in Karakalpakstan in 2018 was 37% (World Bank 2018).

In Qysylorda, since the turn of this century, the numbers of emigration and immigration have been relatively stable, with only a slightly negative net migration rate (Khaibullina et al. 2022; Anand 2015; Kudaibergenov 2021). Anand and Khaibullina et al. both argue that a reason for this might be many people's lack of the necessary financial means for moving away (Anand 2015; Khaibullina et al. 2022). The financial means for starting a life elsewhere are probably an important factor. In the first years of the 21st century, the region was strongly affected by poverty: in 2005, 47.7 percent of the Qysylorda population lived below the subsistence minimum. By 2019, this figure has reduced to 4.4 percent, but within Qysylorda, the Aral District continues to be the poorest area: approximately 44% of the local population has an income beneath the subsistence minimum (Khaibullina et al. 2022).

Interestingly, a survey carried out in the Aral District in 2020 showed that 70.4 percent of the respondents do not consider moving away. They say to have adapted to the ecologic, climatic and health conditions of the region. This might have partly to do with the fact that the state is actively supporting the heavily affected region with incentives, such as enhanced job creation, subsidized housing, a bonus to teacher salaries and extra payment in form of an "environmental catastrophe bonus" (Khaibullina et al. 2022).

Table 1: Development of Aral Sea basin 1960 vs. 2017-2020 (Narbayep and Pavlova 2022, Micklin 2010, Khasanov et al. 2022, CAWater 2020,, Gaybullaev et al. 2012, Sala 2019)

	1960	2017-2020
Population	16 M	60 M
Irrigated lands for agriculture	4.7 M ha	8.5 M ha
Aral Sea surface area	68,000 km^2	4,000 km^2 (North Aral Sea) 3,000 km^2 (Western Large Aral) 1,000 km^2 (Eastern Large Aral)
Aral Sea water volume	1,093 km^3	53.5 km^3 (North Aral Sea) 26.7 km^3 (Western Large Aral) 0.9 km^3 (Eastern Large Aral)
Aral Sea water level	53.4 m	41.6 m (North Aral Sea) 26.5 (South Aral Sea)
Annual Aral Sea water inflow	36 km^3/yr (Amudarya) 17 km^3/yr (Syrdarya)	2.69 km^3/yr (Amudarya) 1.82 km^3/yr (Syrdarya)

4 Two countries, two realities: Kazakhstan and Uzbekistan and the Aral Sea disaster

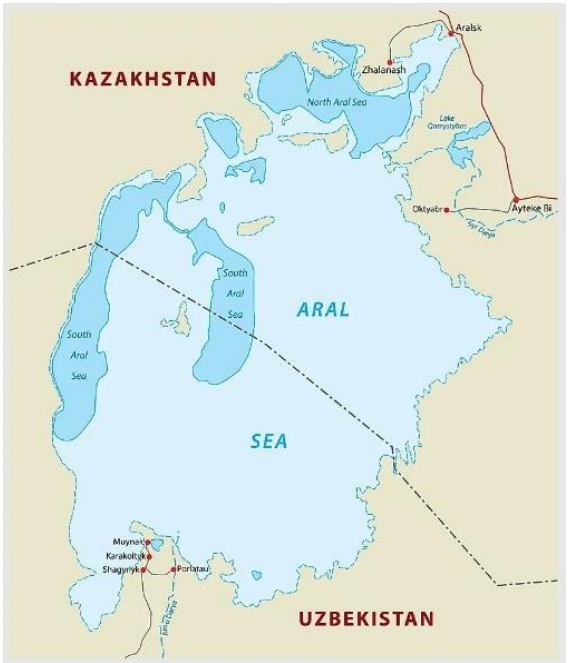

Figure 6: Location of the Aral Sea in Kazakhstan and Uzbekistan (WorldAtlas 2021)

It became apparent in the previous chapter that despite of many shared issues between the Aral Sea regions of Kazakhstan and Uzbekistan, there seem to be some differences at least at the demographic level. This chapter will outline the differences in more detail after putting the two countries' approaches to the Aral Sea disaster into the wider political context of the Central Asian water disputes.

Today, Central Asia remains one of the top three cotton exporters after the United States and Francophone Africa (Shtaltovna and Hornidge 2014). In the cotton sector, Soviet practices are still dominant in Central Asia, particularly in Uzbekistan and Turkmenistan: the economic systems are highly centralized with the government setting "production quotas and artificially low procurement prices" (White 2013, 30). Overall, agriculture in the region today is responsible for 90 percent of the surface water use in the Aral Sea basin which is more "than in any other region of the world" (Kulmatov 2017, 4). Large quantities of water, however, could be saved by more efficient irrigation systems. The problem is that technological and institutional improvements of the existing practices would be very costly and still not enough to release the water pressure in the region without considerably reducing water use (Micklin 2010). This, in turn, would have heavy social and economic repercussions: The cotton production is a crucial economic and job-securing sector in the Aral Sea region. Rapid and inconsiderate cuts in this sector would heavily impact the national economies, increase unemployment and, consequently, cause political and social unrest. Sustainable and stable solutions, in addition to the technological innovations, call for "fundamental political, social and economic changes that take time" (Micklin 2016, 13).

Linked to cotton production and its political, social and economic implications is also the question of water use in the wider Central Asia region. With the collapse of the Soviet Union, the Aral Sea basin was separated into five independent Central Asian states who inherited the Soviet ecological and socioeconomic issues. Soviet centralism had made sure that Kazakhstan, Uzbekistan, Kyrgyzstan, Turkmenistan and Tajikistan had comparable economic preconditions at the beginning of their independence, but they were very differently equipped with natural resources. Thus, they also have different interests when it comes to water consumption (White 2013; Wheeler 2021).

In the centralized Soviet water infrastructure system, economic and natural resources were commonly used. This included constant water supply by the upstream countries Tajikistan and Kyrgyzstan to the downstream countries Kazakhstan, Uzbekistan and Turkmenistan, and, in exchange, energy supplies by the downstream countries who are

richer in fossil fuels (McKinney 2003; Zhunusbekova et al. 2018). Since their independence, the Central Asian states have taken different directions of governance, social development and economic liberalization which caused a loss of regional economic integration (McKinney 2003; White 2013).

As cotton output numbers, water infrastructure plans and resource sharing were no longer determined by Moscow, the Central Asian states were also free to exploit their domestic resources as much as economically profitable (White 2013). And in spite of increasing water resources scarcity, their national programs and strategies are still based on extending water extraction for irrigation and hydropower (Narbayep and Pavlova 2022). For example, their dysfunctional energy-and-fuel balance let Tajikistan and Kyrgyzstan utilize the Amudarya and Syrdarya waters as hydropower source by releasing water in the winter period. The downstream countries, however, require water release in the summer period for their irrigated agriculture and water storage in winter to avoid flooding (Wheeler 2021; Janusz-Pawletta et al. 2015; Boklan et al. 2017). From Afghanistan, there is approximately 10 percent of inflow joining the Aral Sea Basin water. In Kyrgyzstan and Tajikistan jointly, about 80 percent of the Basin water is generated while only 16 percent is used by them (White 2013; McKinney 2003). Generally, water is mostly considered as a freely available good (White 2013).

The disintegration of the Central Asian economies and increase in water consumption for different purposes, in addition to population growth, shifted the ecological and socioeconomic problems of the Aral Sea region to an international level. This entails conflicts, ethnic nationalism among the local populations and the question of intergovernmental cooperation (White 2013; Kulmatov 2017). The competing interests of the downstream and the upstream states bear a huge conflict potential which is why the need for a shared regional water management system is high (White 2013; Narbayep and Pavlova 2022).

This need has been realized by the Central Asian States as early as 1993 when they ratified the Agreement on Cooperation in Joint Management, Use and Protection of Interstate Sources of Water Resources. It forms the basis of the Central Asian common water management until today (White 2013; Zhunusbekova et al. 2018). In accordance with this agreement, the highest regional decision-making body in transboundary water management, monitoring and allocation is the Interstate Coordination Water Commission (ICWC) (McKinney 2003; Janusz-Pawletta et al. 2015). Decisions in the ICWC are made unanimously while each of the five member states has one vote (McKinney 2003). Since

then, the commission has dealt with a large number of disputes, especially on the Syrdarya between Kyrgyzstan and the two downstream states, Kazakhstan and Uzbekistan, and on the Amudarya between Uzbekistan and Turkmenistan (White 2013).

The executive bodies of the ICWC are the Basin Water Associations Syrdarya and Amudarya (BWOs) responsible for, among others, measuring water flows and maintaining water quality, and determining the allocation and amounts of water releases to the various regions (Janusz-Pawletta et al. 2015; Rahaman 2012; McKinney 2003). The BWOs were founded back in 1986 by the Soviet administration and are often criticised for their allocation plans: they are based on out-dated Soviet schemes and disregard the national interests and economies of the Central Asian states (Zhunusbekova et al. 2018; McKinney 2003). In addition, their technical and legal means are limited as the bodies have no executive power over water consumption schemes on the territories of the individual states (McKinney 2003).

Explicitly concerning the Aral Sea, the dissolution of the Soviet Union led to an influx of international experts and organizations aiming at investigating the Aral Sea disaster. This was at a time when the new independent leaders of the Central Asian states continued to discuss about rehabilitating the Aral Sea by diverting rivers from Siberia, a plan born in the late phases of the Soviet Union. International experts and organizations though, such as the UN, the World Bank or the International Fund for Saving the Aral Sea, came to the conclusion as early as in the beginning of the 1990s that the entire sea could not be restored and suggested focusing on poverty alleviation and institutional reforms instead (Wheeler 2021).

However, international collaboration and decision-making until today has not managed to establish social and environmental sustainability in the region immediately surrounding the Aral Sea (White 2013). The accumulating adverse impacts of climate change will further intensify the competition for water resources "with long-lasting and significant implications for political, food, energy, sanitation, and environmental security in the region" (Narbayep and Pavlova 2022, 43). The multifaceted crisis in the Aral region cannot be addressed without the administrative units of the Central Asian states collaborating and sharing the water resources of the Syrdarya and Amudarya rivers (Glantz 2008).

While this part of the chapter gave an overview on the economic and political contexts of the larger Aral Sea basin, the following subchapters will focus on the two

countries immediately sharing the Aral Sea, their different social and natural conditions and approaches to tackle the consequences of the Aral Sea shrinking.

4.1 Aralsk and the Kokaral Dam

Aralsk, located in the northeast of the Aral Sea in Kazakhstan, used to be a well-functioning port city. Its fishing industry was crucial for the Soviet Union and associated industries flourished. Aralks was equipped with a shipbuilding yard, a ferry service, and a central railway intersection connecting Tashkent, Almaty and Moscow, the most important railway track in entire Central Asia (Kumar 2002; White 2013). In the shipbuilding yard, ships of 50 to 500 tonnes were built for fishery and cargo on the Aral Sea, and the Aral Sea provided the local fish industry with "annual catches of more than 40,000 tonnes" (Kumar 2002, 3799). The local fishermen were considered as heroes since during the Civil War between the Bolshevik and Menshevik armies the Aralsk fish cargos saved Russia during a major drought and starvation period (White 2014). The fish of the Aral Sea was associated with wealth, heroism and pride (Wheeler 2021; White 2014). Even today, a request letter from Lenin dated back to 1921 to Aralsk is pithily placed on the main square of Aralsk (White 2013).

In 1975, when fishing activities and ferry services ceased in the Small Aral Sea, Aralsk "was a port without a port" (Kumar 2002, 3799). Interviews with the local population show that for many of them, the Aral Sea is associated with memories of natural abundance and a good life while its retreat is perceived to be linked to the collapse of the Soviet Union. In the Soviet Union's monopoly of public discourse, there was no place for private counter-narratives while later, in the post-Soviet context, nostalgia for many became a form of resistance against new narratives (Wheeler 2021).

Contrary to the fishing industry, cotton does and did generally not play a major role in Kazakhstan's economy. Kazakhstan is globally on the 22nd position among cotton producers and on the 15th among exporter countries with a raw cotton output of about 379,000 tons in 2012 (Shtaltovna and Hornidge 2014; White 2013). Cotton in Kazakhstan is, in addition, cultivated in only one of Kazakhstan's 17 regions, the Southern Kazakhstan oblast, and thus, a more regionally important agricultural product (Shtaltovna and Hornidge 2014). For Kazakhstan's economy, the priority lies on the oil and gas sector (Shtaltovna and Hornidge 2014).

Important in terms of agriculture generally is that Kazakhstan has gone through a more comprehensive transition to market economy, compared to, for example, Uzbekistan. This means that from the late 1990s, agricultural production and processing, land use and marketing became more and more decentralized and market-oriented while state control was reduced to the least (Shtaltovna and Hornidge 2014).

In terms of the Aral Sea, Kazakhstan managed to restore and stabilize the Northern Aral. This has been made possible only "through massive human intervention" by a immense dam construction funded by the World Bank (White 2013, 30). The construction of the 200 meters high and 13 kilometres long Kokaral dam was concluded in August 2005 and increased the water level by two meters (Micklin 2016; White 2013; Wheeler 2021; Micklin 2010). The full cost of the project amounted to almost $86 million USD and included besides the dam construction other infrastructure projects and safety measures along the Syrdarya in order to improve not only the inflow into the Northern Aral and other lakes in the river delta, but also the irrigated water supply for farmers along the river shores (White 2013; Micklin 2016; World Bank 2005). Fishing lakes at the delta that are now supplied with more water can "serve as hatcheries from which to restock the Northern Aral Sea's fish population" (World Bank 2005).

The water level of the Small Aral, as well as of the lakes in the river delta, are dependent on the river flow regime of the Syrdarya. The Syrdarya water flow is very irregular, strong in the winter and spring period and weak in the summer and autumn period (Plotnikov et al. 2016; Aladin et al. 2017). This is why the dam is equipped with outflow control gates to discharge excess water into the Large Aral in high inflow periods (World Bank 2005; Aladin et al. 2017).

The effects of the Kokaral dam exceeded estimates and expectations as the Small Aral's "ecological recovery has been dramatic" (Micklin 2010, 193). The salinity level declined to values similar to the 1960 values, fish and invertebrates species returned and the sea regained some of its climate balancing function (Micklin 2016; White 2013; Micklin 2010). The Northern Aral Sea established a positive water balance meaning that river freshwater, precipitation and ground inflow in sum now deliver more water than is lost through evaporation from the lake's surface (Aladin et al. 2017). The Kokaral dam has become an abrupt success story and a symbol for the materialization of the Kazakh state (Wheeler 2021). Locals called the Kokaral dam "dam of life" (Aladin et al. 2017, 452).

The success of the dam construction has given optimism and new hope to the small remote villages around the Northern Aral (White 2013). The restoration of the lake and, consequently, its biodiversity allowed for increasing fish catches. This, in turn, allowed for the resumption of a decent small-scale artisanal fishery and fish processing activities in the villages all year round (Wheeler 2021; Plotnikov et al. 2016; Aladin et al. 2017). The rise of the sea level has brought the Aral Sea water again closer to Aralsk and generally improved the ecology and socioeconomic conditions of the region (Khaibullina et al. 2022; White 2014). This, in combination with other factors such as the overall improvement of the healthcare system and the water supply infrastructure, has had a very positive impact on the local livelihood (Khaibullina et al. 2022). It has, for example, contributed to a stable reduction of diseases thanks to improved drinking water quality (World Bank 2005; Khaibullina et al. 2022). The Kazakh government "has demonstrated a combination of financial resources and political will" to tackle the socio-ecological crisis of its share of the Aral Sea (White 2014, 329).

4.2 Karakalpakstan and social-ecological resilience

The construction of a dam like the Kokaral dam would geographically not be possible in Uzbekistan. It is thus understandable that the government of Uzbekistan, as well as its local population, had to find other ways to deal with the consequences of the Aral Sea desiccation. This chapter will take a closer look at their approaches, as well as the national context, under which these approaches are implemented.

Currently, the Large Aral Sea cannot be used for fishing purposes. In the Eastern Large Aral, only one invertebrate species has survived, the brine shrimp Artemia, whose eggs today are industrially harvested (Aladin et al. 2017). The eggs are the most commonly used live diet for fish and shellfish larviculture (Van Stappen 1996).

The number of species increases when excess water is released through the Kokaral dam from Kazakhstan and reaches the Western Aral Sea through a connecting channel and, in some years, also the Eastern Large Aral (Aladin et al. 2017). Besides these minor inflows, the Large Aral "continues its desiccation, and the socio-ecological crisis is as dire as ever" (White 2014, 329).

The disruption of the fishing industry, as well as deterioration of agriculture, education system and healthcare have caused people to leave Karakalpakstan. What is left from the economy of the region today is primarily focused on cotton production,

livestock and melons, all of which depends on mostly poorly managed, large-scale irrigation (World Bank 2018). In Uzbekistan, there are more than 1,200 canals for irrigation covering more than 170,000 kilometres of the country's territory. Irrigated agriculture has a share of 90 percent of all the water resources consumed by Uzbekistan while two thirds of the agricultural irrigation systems rely on inefficient furrow irrigation (Kulmatov 2017).

30,000 square kilometres of land are used for agriculture, of which about 13,500 square kilometres in all twelve regions of Uzbekistan, including Karakalpakstan, are used for raw cotton (Eurasianet 2016). The cultivation of cotton "is a top economic priority in Uzbekistan" (White 2014, 329). In 2021, Uzbekistan was the eighth-largest cotton exporter globally, with a growth rate of 60 percent that makes the country the fourth-fastest growing cotton exporter in the period 2020-2021 (Workman 2022).

Even though Kazakhstan and Uzbekistan share a common cotton-growing history, their cotton sectors developed very differently since the countries' independence, not only in terms of the quantities produced (Shtaltovna and Hornidge 2014). While in Kazakhstan liberal market-based policies and price negotiations dominate the sector, in Uzbekistan, the state monopoly over the cotton and wheat production has been retained through a single state cotton company 'Uzpakhatsanoat'. The company purchases all products at a fixed price from the farmers and "there is neither space for price negotiation, nor choice for the […] farmers about where to sell cotton" (Shtaltovna and Hornidge 2014, 33-35). The government's tight control over its population is not only reflected in the economy, but also in the social sphere: there is not much tolerance for political criticism, not even on a domestic level, and demands for more freedom, and in the case of Karakalpakstan for more autonomy, have so far been repressed (Cerny 2012).

When it comes to the Aral Sea, a new economic sector of state interest has manifested itself on the dry seabed of the Large Aral: the extraction of natural gas, discovered in 2010 (Aladin et al. 2017; White 2014; Walton 2010). Since then, new gas and oil fields are constantly explored in Karakalpakstan and other regions and getting prepared for extraction (Uzbekistan National News Agency 2018). This is also reflected in Uzbekistan's official export numbers showing that oil and gas exports alone in 2018 rose by 65.9 percent (UZSTAT).

Under these circumstances, stabilizing or even partly restoring the Large Aral is unlikely a priority as the future of Aral Sea in Uzbekistan is primarily linked to gas and

oil extraction and Artemia shrimp harvesting. There seems to be little political will for sustainable solutions (Aladin et al. 2017; White 2014).

4.2.1 The development of tourism in Karakalpakstan

There are small-scale projects and efforts made in the Large Aral Sea region aimed at mitigating the social-economic and ecological consequences of the Aral Sea shrinking in the framework of sustainable development. Some of these efforts are shortly presented in the following.

A sector that has not yet played a role in the Aral Sea region in Kazakhstan but more and more in Karakalpakstan, is tourism. Karakalpakstan's many ancient cultural heritage sites make the region attractive for the development of larger-scale tourism if investments are made and incentives set.

The Great Silk Road, the ancient and middle age trade route connecting Asia with Europe, intersected the region and left over 300 unique sacred sites and historical monuments in Karakalpakstan (Karlibaev 2015; Pikkat 2015; Alimov et al. 2020). The heritage of this location at the "crossroads of ancient civilizations" includes traditional craft, oral folklore and performing arts (Pikkat 2015, 3). Remains of human colonization can be explored in the region reaching from the Old Stone Age up to the 20th century (Alimov et al. 2020). Tourism services and infrastructure are being more and more established and grow constantly, including the construction of new restaurants and hotels (Karlibaev 2015).

The many special cultural, historical and natural resources allow for very different types of tourism and includes also recreational tourism or ecological tourism (Alimov et al. 2020; Koshanov et al. 2020).

The World Bank, as well as UNESCO, actively support community-based sustainable eco-tourism in Karakalpakstan (World Bank 2021; UNESCO 2021; Pikkat 2015). For example, trainings in tourism development with international experts are organized by UNESCO in collaboration with the Ministry of Tourism and Cultural Heritage of Uzbekistan. They shall contribute to addressing "the environmental, social and economic insecurities in the most vulnerable communities of the Aral Sea region" (UNESCO 2021).

Eco-tourism includes, for example, the exploration of wildlife in the region, such as the Saiga antelope, an endangered endemic species that is protected by the "International

Union for Conservation of Nature's Red List of Threatened Species", or the 187 bird species that have been observed in the region (Alimov et al. 2020, 1259).

Last but not least, it is the very ecological disaster of the Aral Sea that attracts more and more national and international tourists, notwithstanding its isolated location. Disaster tourism in the region revolves around the drying Aral Sea and the abandoned ghost ships in the middle of the desert (Robinson 2022; Koshanov et al. 2020). Every year since 2018, with the exception of 2020 due to the Covid-19 pandemic, the area around some of these ghost ships in the former Aral seabed is the venue for the STYKHIA festival of electronic music, art and science close to Moynaq in Karakalpakstan. STYKHIA is a project implemented by Uzbek producers with the support of the Ministry of Tourism and Cultural Heritage of the Republic of Uzbekistan (Karakalpakstan 2019; Uzbekistan Travel 2022; Stihia 2022).

Ironically, Karakalpakstan's heritage of the anthropogenic Aral Sea disaster seems now to be the very "key to a better future for the town" and can be a source of education in environmental awareness, especially for young people (Robinson 2022). Undoubtedly, Karakalpakstan has not yet fully explored its potential for international tourism (Koshanov et al. 2020).

4.2.2 Resilience projects in Karakalpakstan

Besides the numerous development projects in the tourism sector, other projects and programmes predominantly aim at the resilience of the local population against the environmental changes. The UNDP, for example, runs projects in the field of capacity-building and job creation to empower the local community, some of which are directly funded by the European Union (Cerny 2012).

A shared project by the UNDP and the Adaptation Fund called "Developing climate resilience of farming communities in the drought prone parts of Uzbekistan", initiated in 2013, aims at enhancing "climate resilience of farming and pastoral communities" in dry Karakalpakstan (UNDP and Adaptation Fund 2015, 4). Climate resilience shall be achieved, inter alia, by covering 70,000 hectares of arid desert with drought-resilient plants, specifically the saksaul trees and tamarix shrubs, in order to counteract sandstorms, desalinize the soil and ensure local communities jobs at the plantations (UNDP and Adaptation Fund 2015).

The approach of repopulating the dry areas of the former Aral seabed with desert plants enjoys growing popularity in Uzbekistan. Students of the PASCH school in Uzbekistan, an initiative of the German Federal Foreign Office, also planted Saksaul trees in the framework of one of their projects (Goethe Institut Usbekistan 2021). An initiative by the World Bank put into practice a locally born idea of planting honey trees with the aim to increase bee populations and, consequently, crop pollination which should, in turn, lead to more biodiversity (World Bank 2021).

Most of the international projects, however, are aimed at the farmers of the region, either through fostering sustainable pasture and livestock management or improving irrigation systems by modernizing channels or replacing water pumping systems with new technologies (Cerny 2012; World Bank 2018). A long-term goal in terms of water infrastructure is to enable private farmers to "grow higher-value crops, such as fruits and vegetables" instead of water-intensive and low-income wheat and cotton (World Bank 2018).

5 The empirical study

The extensive literature review of the previous chapters provides an idea of the interlinkages between emotions and environmental activism, climate communication and responsibility, and depicts the environmental and socio-economic context in which the local realities of the Aral Sea region are embedded.

The empirical part of this study explores how the subjective perceptions of these local realities shape the individuals' hopes that environment damage, and subsequently climate change, can be tackled and who are the actors who are perceived as capable of bringing about positive change. For this to be examined, six interviews with locals were taken from both the city of Aralsk in Kazakhstan and the Karakalpakstan region in Uzbekistan which will be analysed and discussed in this chapter.

5.1 Methods

The approach to the empirical study was divided into three stages, data collection, data processing and data evaluation. During each of the stages, a specific method and instrument was applied which will be described in detail in the following.

5.1.1 Data collection method

The data collection method chosen is the problem-centred interview according to Andreas Witzel (2000). In problem-centred interviews, the "data collection and evaluation must much rather be organized as an inductive-deductive mutual relationship" (Witzel 2000). Previous knowledge about the topic is a necessary prerequisite and shall be incorporated into the questions to the interviewees. The researchers partly leave their usually in a narrative interview expected low-profile attitude as interviewers in order to provide a stronger structure of the interview (Kurz et al. 2009). At the same time, the principle of openness as basic concept of the qualitative social research shall be assured by stimulating the subjective relations and meanings through narration (Witzel 2000).

Witzel divides the problem-centred interview into three basic principles, the *problem-centered orientation*, the *object orientation* and *process orientation* (Witzel 1989; Witzel 2000). Problem-centered orientation towards a socially significant problem serves to systematically elaborate the individuals' actual problems based on pre-established objective framework conditions to the problems. These are necessary to understand the individuals' explanations and go into detail through further questions (Witzel 1989; Witzel 2000). For the interviewees, it is often the first time that they are asked to reflect systematically on the examined topics from their subjective point of view in connection with wider societal aspects (Witzel 1989). The researcher thus works "on the interpretation of the subjective viewpoint of the individuals" already during the production of the data material while constantly working towards the research question (Witzel 2000).

Object orientation accounts for a necessary flexibility in the methods and conversation techniques applied. As establishing "a communication situation focused on the individual respondent" is central for the problem-centred interview, both either frequent questioning or narration can be prevalent "depending on the varying degree of the respondent's reflection and eloquence" (Witzel 2000).

Process orientation refers to a sensitive approach to the communication process during the interview. This implies the understanding that the interviewees need to reconstruct actions and orientations through, for examples, self-corrections, contradictions and redundancies. Addressing them in the process can lead to constant new results and different perspectives and, thus, allow a more accurate interpretation of the respondent's lived reality (Witzel 1989: Witzel 2000).

5.1.2 Instruments: questionnaire, interview guideline and audio recording

The short questionnaire for each interviewee serves to collect relevant socio-demographic data, such as occupation or age, and allows the subsequent interview to focus on open-ended questions instead of short question-answer schemes (Witzel 2000; Witzel 1989).

Audio recordings are preferred to interview transcripts as they allow for a more complete and precise interpretation of the interviewees' viewpoints. An interview guideline serves as supportive instrument to ensure that the researcher keeps the research topics in mind and the interview results can afterwards be compared (Witzel 2000; Witzel 1989; Friebertshäuser 1997). Open questions without answer options are recommended in order to encourage the narration of relatable everyday situations in the context of the problem and to ensure a qualitative evaluation of subjective and detailed appraisals (Kurz et al. 2009; Brosius et al. 2009).

5.1.3 Processing method and transcription of the interviews

In order to manage the collected data, the method according to Gerald Poscheschnik was applied, characterized by three processing steps, *fixation*, *selection* and *structuring* (Poscheschnik 2010). In the case of audio-recorded interviews, the first step, fixation, refers to transcribing the interviews (Poscheschnik 2010:84). This has been done by applying the rules according to Kuckartz et al. (2008). They include a word-for-word transcription in the form of written language and punctuation. Additional sounds, such as laughing, are noted in additional brackets only in cases when they are relevant to the speaker's statement (Kuckartz et al. 2008).

The second step, selection, is characterized by preparing the interview statements which are relevant in order to answer the research questions for the further analysis. In the last step before the data evaluation, the collected and selected data are structured by numbering the interview lines (Poscheschnik 2010).

The interviews used for the present study were all but one held in Russian; one interview was held in English due to a personal preference expressed by the interviewee. The statements from the five other interviews included in the analysis of this study were translated from Russian into English by the author.

5.1.4 Evaluation method and category formation

Qualitative content analysis according to Mayring (2010) is applied to the present study. The qualitative content analysis ensures that the material is comprehensible and verifiable as it is broken down into interpretation units and assigned to abstract categories. The interpretation steps are pre-defined which allows for a systematic, but flexible procedure. There are three fundamental types of interpretation, summary, structuring and explication. In the present study, the summarising technique will be applied. Its aim is to "reduce the material in such a way that the essential contents remain" to ensure a comprehensive overview of the material through abstraction (Mayring 2010).

The core of a qualitative content analysis are the categories which can be assigned deductively or inductively. In deductive category formation, categories are formed through theoretical considerations on the basis of previously elaborated theories and theory concepts, while for inductive category formation, the categories are derived directly from the collected data material without considering the theory concepts (Mayring 2010). For this study, deductive category formation was applied which was possible due to the theoretical concepts discussed extensively in the first part of the thesis. The categories formed for the analysis of the present study are oriented on Ojala's (2012) three hope themes *positive re-appraisal*, as *trust in sources outside oneself* and *trust in one's own ability to influence environmental problems in a positive direction*.

5.2 The interview partners and their connection to the Aral Sea

K1, the director of the Aralsk museum of local history, was born in 1959 and grew up about 20 meters from the shore of the Aral Sea. He learned swimming in the sea when he was five years old. His memories of the sea are very emotional: he sometimes shows his children photographs of the sea, of the places where he used to bath. He stresses how those "pictures are dear to me" (K1, 188-189). He remembers that fish was so abundant that the fish-processing manufactory could not provide enough space for the amount of caught fish to be unloaded, so people could take it home for free. When his family had to buy fish for the first time, K1 was surprised that "fish costs money, or what?" (K1, 110-111). K1 remembers how the sea gradually retreated, starting from the year he was seven years old (K1, 5). At that time, nobody talked about it because "that was the policy in the Soviet Union at the time: no talking about bad things" (K1, 216). When the elders raised the alarm, they were told that everything was under control and the sea would come back.

"It did. In the form of sand and salt" (K1, 219). He remembers that Aralsk was a multinational city, while by now, all the other nationalities have left and only the native Kazakhs stayed (K1, 188-189; 52-53). His children, aged 20 and 40, have also left (K1, 56-58). He himself never thought of leaving because "where would I go?" (K1, 55). He cannot imagine how he would leave a place where his family's history took place and the graves of his father and grandfather are located (K1, 59).

K2, born in 1941, has never seen the Aral Sea entirely before it split into the Small and the Large Aral (K1, 43). His parents, however, experienced the gradual retreat of the sea (K2, 21-22). His father used to work in a shipyard (K2, 27-28). He used to take K2 with him to the sea when he was little which is what sparked K2's interest in the Aral Sea (K2, 90). Although he left Aralsk for Russia with his family four years ago he describes his connection to the Aral Sea as "no matter where I go on vacation, […] I still want to go back to where I was born […] even just to take in this smell, the smell of childhood. But people don't talk about the disaster because they can't express it fully; for them, it is a pain they feel inside" (K2, 12-16). He is very active on his own social media channels dedicated to the Aral Sea where he shares information about the area for tourists who want to see the Aral Sea: "I have my own destinations, my own locations, and many tourists who just want to get there, I tell them how to get there, what interesting to see, and so on. […] I just give them that information, because nobody else does" criticising that the Kazakh tourism sector in the Aral Sea region is not at all developed, in contrast to the Uzbek one (K2, 91-97). His social media channels for him also have the function of learning and sharing experiences about "what can happen in the same way with other states" (K2, 550-551).

K3 from Kazakhstan is 65 years old and member of the Public Advisory Council of the Central Asia Regional Economic Cooperation Program. He established and coordinated several regional platforms on water issues and climate change in Central Asia and is part of many projects on the Aral Sea since the early 1990s (K3, 3; 116-117). He was involved in preparing the first ever programme on the Aral Sea with transnational participation, as well as in the working group of the Kazakh Supreme Council dedicated to the development of a water code for Kazakhstan (K3, 68-71).

U1 is 43 years old and currently works in the field of project management for the European Bank for Reconstruction and Development. Since 2012, he regularly accompanies tourists in Karakalpakstan as a guide, describing these tours as "emotional" for him because "every Karakalpak has special feelings for the Aral Sea" (U1, 17-20).

Even though his wife would like their family to leave Karakalpakstan, he never wanted to because "the Karakalpaks have always lived in a very close relationship with the Aral Sea. There are even proverbs related to the sea" and "the Aral has always been like a father […] to the nation" (U1, 77; 55-56; 64-65). Growing up, he did not experience the sea in Moynaq anymore, but his childhood memories are still mainly connected to abundant fish at home and fishing excursions (U1, 96). About the desiccation he says, similarly to K2, that "the whole life of the Karakalpaks was built on the sea, and now, to see it die over the past dozen years is, of course, a major tragedy for all the people" (U1, 66-70). His son, 19 years old, wants to leave: he applied for universities in Europe (U1, 398-390).

U2 from Karakalpakstan is 71 years old and left Uzbekistan as a young adult for a couple of years in order to study ecology in Moscow. Prior to his retirement, he worked in the field of renewable energies for the Karakalpakstan branch of the Academy of Sciences where he is still active even after his retirement. Growing up and living in Karakalpakstan, he calls himself a "victim of the Aral Sea disaster" which is why he felt he had "to study and research and think about the water management" (U1, 19-21). He has a personal connection with the Aral Sea mostly due to his father, a historian and former chairman of the Karakalpakstan branch of the Academy of Sciences who was scientifically involved in the Aral Sea problem since the end of the 1960s (U2, 38-40). This is how U2 witnessed from an early age that "something was wrong with the Soviet water management" (U2, 49-50). From his school graduation class, only six people are still living in Karakalpakstan; his daughter has left for the United States. He himself, however, has never considered leaving because "there is no state without problems. But here, in Nukus, I am already used to solve my problems" (U2, 331-334).

U3, born in 1967 in Tashkent, works as zoologist and director of the Uzbekistan branch of the international organization *Saiga Conservation Alliance*. Her personal story with the Aral Sea also begins at a very young age when her parents used to work as geologists on the development of oil and gas fields near the Aral Sea. She remembers spending all her summer holidays there and bathing in the Aral Sea (U3, 125-128).

5.3 Positive re-appraisal

K1 sees the Aral Sea disaster and its consequences as a feedback loop through which "nature takes revenge on humankind". This happens through "the salt storms, containing

pesticides and reaching up to the Pamir Mountains in Tajikistan and contribute to glacier melting" (K1, 70-72). Similarly, K2 says that "a catastrophe develops into another catastrophe" because the salt dust from the bottom of the Aral Sea reaches the snow on the South Pole or the glaciers and results in them melting even faster (K2, 588-593). He is convinced that this domino effect of catastrophic events cannot be stopped anymore because humankind has done nothing than leaving destruction behind them and will ever continue to do the same over and over again (K2, 386-389): "[w]e have been killing this planet for several thousand years. It's too late now […]. Nothing can be done" (K2, 430-431). K3 as well is certain that a point of no return has been passed. He talks about a study showing "that even if the Paris Agreement is fully implemented, it will not change anything in terms of the climate system's collapse" (K3, 302-305). K1 considers the discounting of future generations' living conditions: "We have borrowed the land, the rivers, oceans, and seas from our future grandchildren who have not yet been born. We should leave everything to them in the same way. And what do we leave them? This. Deserts. The dried up sea, the dried up banks, the dried up rivers. We borrowed from them, and we will not pay them back" (K1, 153-158). U1 expresses this issue figuratively: "we are shooting ourselves in the foot, well, sawing it off gradually, not realizing that tomorrow we won't be able to walk" (U1, 207-209).

For K2, the discounting happens due to a lack of choice in a hopeless situation to which many have resigned themselves. Growing cotton for many people means having enough to survive. This cannot be compensated by preserving the environment for the long-term future (K2, 340-346). K3 connects this to a universal human trait: "[h]umankind, like any biological species, can't see through and live according to long-term plans" (K3, 581-583). This corresponds to a statement by U3 that people are stuck in short term-thinking that does not reach beyond the economic benefit for a period of maximum twenty years (U3, 169-171). U1 is of a similar opinion when he talks about the profitable gas extractions on the seabed stating that it would be naïve to think people would consider what happens tomorrow when they have an opportunity to make profit of something today (U1, 121-122; 263-265).

U2, however, has hope in human beings when he sees they are now "united to support Ukraine" or how many countries have so far agreed to the Paris Agreement and it shows him that "if we will continue this way, […] then maybe we will be able to save the planet" (U2, 357-361). Adding to this statement, he calls himself "a pathological optimist" (U2, 361).

According to U1, the ecological situation can be improved only by changing the "structure of the state in general" towards a more democratic and transparent European model (U1, 528-548). K3 goes further stating that the only chance to save the planet is a system change through "a proper world-wide revolution" to make sure that our current system of allegedly sovereign states that are in fact controlled by the major business players, as well as the United Nations, the Bretton Woods system – all has to be demolished. He says that it is gradually already happening but it is not clear whether this process will be faster than the destruction of the planet (K3, 571-577).

When it comes to the Kokaral dam, K1, K2 and K3 report on the visible positive effect of the project on Aralsk. They talk about the re-appearance of fish species and the revival of the fish industry and the subsequent appearance of, new cafes, schools and hospitals and municipal budget (K1, 43; K2, 211-217; K3, 422-426). Hope has emerged among the local population that has stopped them from considering leaving Aralsk (K3, 422-425; K1, 43)

However, K2 calls the dam an "experiment for the time being" (K2, 660): the rising water level was not so much owed to the dam construction than to glaciers melting as a result of global warming. This means that with less and less snow being left in the mountains, the water level of the Small Sea will soon drop again (K2, 253-260; 352-353; 427-428). K1 states that the water flow has already become noticeable less in the past years, for which in his opinion Kyrgyzstan, Uzbekistan and Kazakhstan are to blame because they returned to unsustainable ways of using the Syrdarya (K1, 44-47).

U3 talks about a specific positive re-appraisal, the adaptive capacity of the ecosystem, she encounters in her everyday work in the form of new ecosystems she frequently discovers on the exposed seabed: "we're seeing the processes of an evolution right now. With every new visit we find something new, because it is kind of a territory in development" (U3, 375-352).

5.4 Trust in sources outside oneself

About state cooperation, K1 states that the river-sharing countries Uzbekistan, Tajikistan, Turkmenistan, were and are not interested in dealing with the Aral Sea problem (K1, 81). After the collapse of the Soviet Union, the newly independent states were able to do with their resources whatever they wanted and Uzbekistan weighted the economic benefit of the cotton production against the Aral Sea (K2, 330-334). K2 points out that "[i]f the

rivers flowed through one state, I think there would be some compromise", but as "politics is money" it is clear that upstream states will try to sell their water to downstream countries in the exchange of something else (K2, 374-381). However, the Central Asian states have no interest in collaborating and sharing the water resources, and their promises exist only on paper (K1, 94; 120-121). Similarly, U1 criticises that decision-making in Uzbekistan is an "incomprehensible game by some politicians" who use slogans for a good cause merely for promoting themselves (U1, 514-516). It is for the appearance that governments talk about the necessity of cooperation because if there was a real understanding of the problem, "the heads of the states and governments would immediately task all ministries […] to completely revise their strategies" that are not designed to deal with the rapidly growing challenges of water shortages, climate change or natural disasters (K3, 178-187).

A topic raised by many interviewees is corruption. K1 explains that after the construction of the Kokaral dam and its positive effects, the World Bank allocated additional financial means to Kazakhstan for more new projects, but "not a single one has yet been implemented" by the state. He asks himself "where does [the money] go? Into the sand, just like the water?" (K1, 85-90). Similarly, U1 states that the most of the money raised for the *International Fund for Saving the Aral Sea*, located in Tashkent, "stays in Tashkent, unfortunately, because […] their only goal is to put money into their own pockets – and so, in essence, nothing happens" (U1, 125-129). K3 as well does not believe in the government's water management mechanisms which are "decorative" because they match the interests of the private sector (K3, 280-283). In addition, the state itself consists of officials have their own private business interests because "they have their own fields, they have their own collective farms […] and so on, and, of course, they do not want to limit themselves to anything" (U1, 232-236). In addition to that, in line with the short-term thinking characteristic for human beings, "the political leadership works within a short-term framework from election to election" (K3, 192-193). By this, they "do not use resources for solving problems, but for creating the appearance of solving problems" (K3, 204). He is convinced that this will not change until the very bottom is reached and adds that this is not a Central Asian problem, but everywhere "there are decorative policies talking about the commitments of the Paris agreement and so on, but in reality, no one changes anything" (K3, 312-315; 294-297).

Even the efforts of international organisations and NGOs, engaged for example in awareness-raising activities, they "hold on for a day; the next day, [people] forget" (K1,

177-178). For U1, the various in the region active international organisations and foreign-funded projects, are like the "water in the sand" with at best minimal effect because the people will not care more about saving water unless they are not forced to (U1, 239-243). K2 as well states that "70% of [projects by IOs and NGOs] is useless work" and brings up the example of tree-planting activities on the Aral seabed in Karakalpakstan where the soil does not contain any moisture: videos proudly document how the trees are planted but "they do not show what happens in a year or two with these bushes" (K2, 651; 617-621).

For U2, international actors are limited in their activities because their presence depend on the goodwill of the host state which is why they have to agree with the policy of the government and thus, "the most power comes from inside [the country]" (U2, 255-257). U3, however, is convinced that it is the other way round: state programs are important, but the state cannot solve all the problems and this is where non-state actors step in. Their strong point is their "different directions [so that] everyone can focus on their own specialisation" (U3, 542-544). K3 sees the key in educational programmes that give the local population "the opportunity to learn new activities, so that they have new financial and technical means, and to understand the need for these changes, supports and participates in them" (K3, 466-471). Such programmes exist, but they are fragmented and unsustainable: people are sent to the region where they discuss the problem, but as soon as the project runs out of its grant, they leave and none of their structures stays (K3, 473-476).

Similar to what U1 mentions above about people saving water only when they are forced to, K1 is convinced that "tightening the law" is the only way of changing something, although he does not believe that this will happen because those who control compliance with the law are corrupt (K1, 127; 130-131). U1 specifies that strict laws and severe penalties will lead to water saving which he compares to wearing masks during the pandemic: people started wearing masks only when high fines were introduced (U1, 219-226).

However, U1 has also hopes in the young generation and their ability to come up with innovative technology solutions: "young people try to study technology […], to do research […] and solve problems […] to revive, or at least to preserve the microclimate, the biodiversity" (U1, 457-461). For U2 similarly, the solution is research, but also market mechanisms such as water pricing where payment should go "to the real owner, to the environment" (U2, 407-408). He imagines a stewardship company that can provide a

connection between society and the environment by "collecting money from the society for pollution and water consumption and spend the money for taking care of the river, the forestry, the riverbed pollution" (U2, 407-412).

5.5 Trust in one's own ability to influence environmental problems in a positive direction

U2 has been voluntarily active in the region since 1989 when he founded his own NGO, the *Union for the Defence of the Aral Sea* which he calls the "first NGO in Karakalpakstan, maybe even the first NGO in Uzbekistan that was not established by an order from the top, but by a grassroots activity" (U2, 67-68). The aim of the NGO is, on the one hand, to make research about the Aral Sea disaster accessible to the people through its own newsletter, mass media articles and interviews, and, on the other hand, propose problem solutions to the scientific world by participating in conferences. The NGO has published a concept of introducing market rules to the water management system which includes not only "the Aral Sea, but also […] the attitude of human beings towards nature – it is a universal concept" (U2, 79-84). However, he mentions that after the Soviet Union collapsed, "people became poorer and started to think more about their own problems, so our staff declined and now we are only a few people", mostly scientists, because other groups of people lost their interest (U2, 75-77). According to him, today, the problem is a different one: people are not well informed. Especially during the era of Karimov, the first president of Uzbekistan after its independence, people were afraid to openly discuss the problem "because we are used to grow up with dictatorships" (U2, 93-95). U3 states that environmental activism is not very well developed among people in the region, compared to Europe. Those who are active and, for example, plant trees are rather rare exceptions. Similar to U2, she is hopeful that this can be changed by making information more accessible and enhancing exchange between people (U3, 564-571).

U1, however, does not see the issue of inaction in lack of information, but rather in that people have "enough other worries of their everyday life" (U1, 319). He himself was active during his student times, and, for example, used to plant trees, but now he has "enough other things to do" (U1, 442-444). Even when it comes to the future of his children, he himself does not primarily think about fighting against the environmental problems in Karakalpakstan for them, but where to send them study to enable them to build a better life elsewhere (U1, 326-328). This comes from his understanding over time

that he cannot change anything: "well, what can I do? What I can do is save water, but will I make a difference somehow? […] Even if I go into politics – I don't believe that I can achieve anything there either" (U1, 342-345). The only thing he feels empowered to do is to teach his children, and take care of basic rules: no littering, less plastic stuff but still, "at the same time, I realize that on a global scale we are unlikely to do anything" (U1, 347-355).

Similarly, when K1 is asked what the local population could do to improve their livelihood on the local level, he says that everything has to be decided on the state level, and "the state does not care" (K1, 98). The locals have nothing left to control than asking themselves whether they should stay or leave or whether they should better not have children (K1, 101; 157). Widely spread corruption and nepotism in the country sets the tone for the local population who adapts to the lack of discipline and honesty and thus, by, for example, using inappropriate and illegal Chinese fisher nets or discarding litter into the sea, "they initiate a second ecological disaster" (K1, 142-243; 130-136). For him it is clear that if the leaders themselves are unscrupulous, "what will the rest of the people do – of course they will turn a blind eye" (K1, 140-142).

U2, however, believes that "local people can and should do something on their level" (U2, 365). He gives his own efforts as an example: whenever he goes to a country that has battery disposal centres, he takes his old batteries with him as Uzbekistan does not have such a recycling opportunity (U2, 365-367). What he thinks people would need to become active are good examples of other people's efforts, such as the small-scale local initiatives two of his friends launched: one provides solar ovens to citizens of the Pamir Mountains in Tajikistan, the other produces pipelines out of plastic waste he collects from the streets in Nukus (U2, 383-393).

This view corresponds with U3's belief that "people have brains, they want to do something, they just need to understand how they can do it, through good examples, because there are a lot of good examples" (U3, 538-540). When people get to know about grassroots initiatives established by local people they can see that these people "are not aliens, some miraculous people, but ordinary people just like themselves" (U3, 571-577). U2 also believes that a large number of such local initiatives can have the power to change something on the state level "because the government never listens to individuals but they do pay attention to organizations" (U2, 240-243).

K3 is also very active in this field, is engaged in government lobbyism for more sustainable water management mechanisms and other solutions, and has prepared and

distributed scientific statements to the government. Notwithstanding, he has no hopes that this can lead to change because the government "absolutely does not take into account the growing water deficits and risks related to climate change, they […] do not consider even the cheapest opportunities to save water" (K3, 224-233).

U3 points out that in addition to the government's lack of interest in preserving the ecosystems in the region, the industry sector as well "does their own thing" and there is no interaction with the other sectors in the Aral Sea region (U3, 341-257). Interaction, however, is essential to establish "a balance between nature and human interests […] in order to give local people an understanding of how they can earn money […] without exploiting [the environment]" (U3, 364-367). This is why she started reaching out specifically to the industry, trying to share knowledge about mitigation measures. Collaborating with them is the only way "because we can't eliminate them from this territory […], they are the state's priorities, this is the strategy" (U3, 360-364). In mid-September, she will hold training sessions for the oil and gas industry about how they can include aspects of biodiversity preservation into their work (U3, 632-636).

In addition to that, U3 is actively engaged in public awareness activities in local schools and villages in the whole region: she co-founded a network called "steppe clubs" which organizes ecological events dealing with various specific topics (U3, 280-288). Through a project on the creation national park on the Aral seabed she aims at combining economic opportunities for the local population with nature conservation and awareness (U3, 332-341).

K3, however, is not convinced by the effectiveness of education and awareness-raising under today's circumstances: "these enthusiasts who talk about climate change textbooks and courses at school, who needs this now? This is not the right time to write theoretical textbooks about what greenhouse gases are in the hope that children will grow up understanding what climate change is – they will experience climate change first-hand" (K3, 328-333). This is why, in his opinion, the younger generations should rather be taught how to survive under the new conditions and be prepare to live in a crisis (K3, 343-346). He is not the only interviewee coming up with the question of adaptability. U3 is certain that the Aral Sea cannot be returned in its shape of 1960 but the people can learn to live in this new reality which they can shape and adapt to through new technologies (U3, 590-599). Correspondingly, U2 is convinced that "people will get used to any situation" (U2, 352-353).

5.6 Discussion

Generally, it can be said that both scenarios that became apparent in the literature review – motivation and resignation as a consequence of experiencing an environmental disaster – were present in the interviewees' narratives. Interestingly, the perceived loss of power to improve the ecological situation in the Aral Sea region is more pronounced in the respondents from Kazakhstan.

Fatalistic views become visible through their statements on the domino effect of environmental disasters that, once set off, cannot be stopped, the environment that takes revenge on humankind and the point of no return which environmental degradation has already passed. This is also reflected in their perceptions of how effective environmental activism can be and to what extent they feel they can be themselves part of the solution. They all felt that they cannot do anything to change the environmental situation of the Aral Sea region and generally, global tendencies of environmental degradation and climate change. This relates significantly with previous findings showing that a perceived loss of control disengages individuals (O'Neill 2013). The respondents are convinced that as long as in higher structures, such as the state level or interstate cooperation, there is no willingness to act they have no chance either. This is the core of their hopelessness: they see the power of change on the government level, but they do not trust the government. This only partly reflects the findings presented in the literature review where interviews showed that the government is likewise mistrusted, but, in contrast to the respondents from Kazakhstan, it is not perceived to be exclusively in power to bring about change (YPCCC 2014).

The reasons for the respondents' high levels of mistrust in the government are high corruption and nepotism, the government's lack of understanding the urgency of the environmental risks and the politicians' own business or electoral interests. According to the respondents from Kazakhstan, these are conditions that result in policies being short-living and merely decorative. Even though one of the respondents from Kazakhstan is active in awareness-raising which is especially aimed at politicians the above-mentioned circumstances make him hopeless that under the current global system the planet can be saved. One respondent would believe in the effectiveness of stricter laws on water consumption and environmental preservation, but is convinced that controls would be prone to corruption, too. The picture is similar with respect to NGOs and international

actors who are perceived by the interviewees from Kazakhstan as donor-dependent and thus short-living and fragmented, and useless.

The Kokaral dam did not seem to play an important role in their perceptions. All three respondents did indeed acknowledge the positive socio-economic impact of the dam construction on the city of Aralsk, but as in the past years the water inflow from the Syrdarya river has declined again, it seems like the locals undergo a second wave of disappointment, but with different explanations: one respondent blames the poor water management, another one climate change. This recurrence of a degradation process after a seemingly successful mitigation measure might be even more frustrating than a situation in which a certain action does not meet with any success, and thus strengthen resignation and undermine positive re-appraisal.

The respondents from Uzbekistan, however, demonstrated a capacity for positive re-appraisal. One respondent connects the unity people and states currently demonstrate in related or non-related issues, such as the Paris Agreement or the Ukraine conflict, with his hope that climate change can be tackled; another interviewee, on a more local level, draws hope from her observation how well the ecosystems in the Aral Sea region have adapted to the new arid reality.

One respondent shares some of the thoughts with the interviewees from Kazakhstan: especially when it comes to state action, he talks about corruption and politicians following merely their own interests. However, he does believe that stricter laws can push people to environmental awareness and behaviour. In contrast to the respondents from Kazakhstan, he also mentions technology as future solution to tackle climate change and environmental degradation, even though he sees these development as a task of the younger generations. He himself sees his only power in teaching his children how to respect the environment.

The other two respondents from Uzbekistan, however, are both very active in their communities in awareness-raising, giving access to information and sharing good examples. They emphasize the importance of good examples which corresponds to findings in the literature review showing that news stories revolving around activism to address climate change increase hope and stimulate engagement (Feldman and Hart 2017). In addition to that, the two respondents' hopes lie mainly in the adaptability of ecosystems and human beings to new environments and conditions, by the help of research and technologies. In their case, their hope in the adaptive capacity of humankind and the environment is not an excuse for inaction or externalization of responsibility as

they do recognize the need to active participation in change: they come up with many concepts for possible solutions how to combine economic opportunities with environmental preservation, some of which they are able to implement themselves. This shows that hope indeed can be strongly linked to environmental engagement and is, beyond being a positive emotion, a crucial factor for agency through self-motivation and willpower, as outlined by Lueck (2007) and Snyder (2002).

What respondents from Kazakhstan and Uzbekistan have in common is their belief that humankind inherently discounts benefits and delays the negative environmental consequences for future generations to deal with them. The explanations they have for it differ and vary from necessity to survive and lack of choice to the concept of time preference which some see as characteristic for the human psychology. These statements disclose doubt in humanity present in all respondents, both the more and the less hopeful and active, which reflects the inconsistent literature about the role of doubt: some scholars suggest that doubt can reduce hope and thus activism, while others find that doubt can be constructive and stimulates climate change activism through the desire for change (Marlon et al. 2019; Morris et al. 2020; Lueck 2007).

The outside sources that are mentioned by the interviewees coincide with those given as examples by Ojala (2012): trust in science, environmental and international organizations and technology. Ojala's remark in this context that trust in outside sources might be an excuse to escape individual responsibility seems to apply to one respondent. For the majority of the respondents, however, trust in outside sources and environmental activism do not exclude each other.

The hypothesis about a connection between positive re-appraisal and the experience that an ecological condition could be partly restored in Kazakhstan has proved false. In fact, the comparison between the perceptions in Kazakhstan and Uzbekistan have shown the opposite: the experience of irreversible changes to the environment in the Uzbek part of the Aral Sea seems to have encouraged the respondents' creativity to find new solutions and strengthened their hopes in the resilience of ecosystems and human beings to adapt to new living conditions.

6. Conclusion

The aim of this study was to examine how the personal experience of massive human-induced irreversible environmental changes affects individuals' hopes in the face of the global climate change threat and their perceptions of the effectiveness of environmental activism and the contribution they can make in this context.

Emotions and personal storytelling are currently under-represented in climate change research neglecting their important role as a source for climate change communication and mobilization. Climate change is often encountered as an abstract scientific concept that does not take into account local realities and experiences. This is why this study tried to draw a link between rational and abstract information about environmental degradation and climate change and emotionally charged local narrations to get a better understanding on how to include people's lived realities into climate change communication and activism.

The Aral Sea region is a good case study in this context because the desiccation of the Aral Sea is known as one of the most severe human-induced ecological disasters of the 20th century. In addition, the region today is very climate change vulnerable which to some extent can be attributed the sea desiccation.

The six qualitative interviews conducted with locals in Uzbekistan and Kazakhstan made the correlations between the Aral Sea declining and climate change even more apparent: in the interviewees' narratives, climate change und the Aral Sea disaster are mutually dependent in a constant feedback loop of causes and consequences. This shows how strongly emotionally charged personal narratives tie local realities to global climate change: The interviewees embedded their personal experiences with the Aral Sea disaster and its consequences into the broader context of global climate change which directly affected their hopes and doubts that climate change and environmental degradation can be addressed effectively and that their personal engagement in environmental activism matters.

The results show that hope and climate action can be activated even in ecologically damaged regions where irreversible anthropogenic interventions in the environment have been witnessed by the local population. It is an experience that can foster creativity to find new solutions in the understanding that ecosystems and human beings are resilient and capable of adapting to new living conditions. However, it can also cause resignation and hopelessness in the light of the inaction of actors who are perceived to have more

potential power to take action, such as the government or international organisations. This demonstrates that the correlation between the personal experience of an anthropogenic environmental disaster and activism in the context of the global climate change threat can be both negative and positive. This is why, as pronounced also by some of the respondents, storytelling of local environmental activism can serve as good examples to counteract individuals' feelings of powerlessness and reactivate hope that their contributions can make a difference.

In the case of the Aral Sea, the chance to preserve an ecological condition, as the Small Aral in Kazakhstan, did not activate hope and motivate for environmental activism. The fact that after a period of time, there appeared to be again much less water in the Small Aral seems to increase hopelessness and loss of control in the light of a repeated degradation process beyond their sphere of influence. In Uzbekistan, however, where irreversible ecological damage was expected to reduce individuals' hopes in climate action, the results show the opposite: the irreversible environmental changes that occurred in the region raise hopes in the adaptive capacity and resilience of ecosystems and human beings, leading to a higher level of motivation to find new solutions to foster this adaptive capacity.

The study shows that measures to counteract climate change and environmental degradation should, alongside technical and scientific considerations, be more transparent and relatable by taking into account people's hopes and perceptions in the face of climate change and environmental activism. The individuals' acceptance of and active participation in environmental measures are crucial for the sustainable implementation of any of these measures and thus, should not be underestimated.

This study has some limitations. One limitation is the small number of interviews that could be conducted within the framework of this study. The interviewees were selected according to strict criteria that aimed at facilitating the emergence of personal narratives about the Aral Sea embedded into fact-based background knowledge about the disaster. This is why an essential prerequisite was the interviewees' personal and professional relation to the Aral Sea, either through their job or their personal interest and activities in the region. The age of the potential interviewees was another criterion to make sure that the respondents were born and at least partly grew up in the Soviet context which constitutes a substantial part of this study.

Thus, for further research on this topic it would be interesting to extend the study to other age groups to examine how perceptions change in generations who witnessed the

Aral Sea disaster less directly or to other professional groups, such as farmers, to understand how their personal experiences shape their narratives differently.

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List of tables

List of figures