Livelihoods and Social-Environmental Change in the Syr Darya Delta:

Adaptive Strategies and Practices

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Abstract

In this dissertation, I examine how local communities in the Syr Darya River delta (Kazakhstan) have been adapting to rapid social-environmental change. While the current environmental change discourses in the study area overwhelmingly focus on the desiccation of the Aral Sea and its consequences, I focus on the Syr Darya Delta, which represents an interesting case of the rural livelihoods such as herding, fishing, reed mowing, and gardening used by locals as common-pool resources. This case is particularly interesting against the backdrop of the Aral Sea catastrophe, which is often regarded as a classic example of the tragedy of commons.

I also draw the reader's attention to the ontological aspects of the environmental change and describe iconic places, iconic species and iconic forces that shaped the irrigation infrastructure development in the Syr Darya Delta. By analyzing the rural livelihoods in the Syr Darya Delta from the commons perspective, I demonstrate some of the limitations of the commons' institutional design principles and explain why the tragedy of the commons did not happen in the Syr Darya Delta. I further analyze these livelihoods from commoning perspective and make contributions to the commons literature by highlighting how cooperation and competition unfold concurrently and how the cooperation varies across different steps of commoning.

Then, I present an overview of the various adaptation strategies used by the local communities in the Syr Darya Delta. I demonstrate that the commonization of resources served as an overarching adaptation strategy, i.e., former state-owned lands and resources have been turned into de-facto common-pool resources. I also describe other adaptive strategies such as shifting agriculture, local soil knowledge, local irrigation techniques and demonstrate how rice-growing corporations can afford a wider range of coping strategies as opposed to a small-scale commoners.

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Last but not least, I want to express my gratitude to my family for giving me strength throughout this endeavor. The journey seemed quite lonely and challenging at times but your presence gave me a reason to keep marching forward.

Note on transliteration and pronunciation

For transliteration of Russian words, I use Library of Congress transliteration. For the Kazakh (Qazaq) words, I use a recently-adopted Latin script for the Kazakh language, which is claimed to represent the phonemes of Kazakh better than Cyrillic. Having said that, I transliterate some well-known proper nouns as Kazakh, Kazakhstan, Kyzylorda, or Kazaly as opposed to Qazaq, Qazaqstan, Qyzylorda, or Qazaly as it is suggested by the Latin-based Kazakh alphabet because the 'old' way of transliterating these words is more familiar to a broader readership.

The table below presents the new Kazakh alphabet (Figure A):[1]

ЖАҢА ҚАЗАҚ ӘЛІПБИІ

№	латынша	кириллше	әріптің атауы	№	латынша	кириллше	әріптің атауы
1	**A a**	А а	*а*	18	**O o**	О о	*о*
2	**Ä ä**	Әә	*ә*	19	**Ö ö**	Ө ө	*ө*
3	**B b**	Б б	*бы*	20	**P p**	П п	*пы*
4	**D d**	Д д	*ды*	21	**Q q**	Ққ	*қы*
5	**E e**	Е е	*е*	22	**R r**	Р р	*ыр*
6	**F f**	Ф ф	*фы*	23	**S s**	С с	*сы*
7	**G g**	Г г	*гі*	24	**Ş ş**	Ш ш	*шы*
8	**Ğ ğ**	Ғғ	*ғы*	25	**T t**	Т т	*ты*
9	**H h**	Х х, Һ һ	*һы*	26	**U u**	Ұ ұ	*ұ*
10	**İ i**	Й й, И и	*ий*	27	**Ū ū**	Ү ү	*ү*
11	**I ı**	І і	*і*	28	**Ū ū**	Ұ ұ	*ұ*
12	**J j**	Ж ж	*жы*	29	**V v**	В в	*вы*
13	**K k**	К к	*кі*	30	**Y y**	Ы ы	*ы*
14	**L l**	Л л	*ыл*	31	**Z z**	З з	*зы*
15	**M m**	М м	*мы*				
16	**N n**	Н н	*ны*				
17	**D ŋ**	Ң ң	*ың*				

*C, X, W таңбалары цитаталық принциппен жазылатын шеттілдік сөздерде қолданылады.

[1] Source: https://bit.ly/QazaqAlphabet

Glossary

Akim (Kaz.: äkïm,) is a head of local administration. Every village, district, city, and region has an akim. The akim of a particular city is effectively a mayor, while the akim of a region (e.g. Kyzylorda) is the Governor. The Akim's office is called akimat (Kaz: äkïmat, äkïmdïk).

IPCC is the Intergovernmental Panel on Climate Change (IPCC) the United Nations body for assessing the science related to climate change (https://www.ipcc.ch/).

Ispolkom (исполком in Russian) is an abbreviation for the Executive Committee of the Communist Party. Communist Party branches of all levels (i.e., local, district, region, etc.) had their own Executive Committees.

Kazgosplan (Казгосплан in Russian) is an abbreviation for the State Planning Committee of the KazSSR. It was the agency responsible for central economic planning in the KazSSR.

Kazminvodhoz (Казминводхоз in Russian) is the Ministry of Water Resources of the Kazakh Soviet Socialist Republic

Kazsovmin (Казсовмин) is an abbreviation for the Council of Ministers of the Kazakh SSR. Kazsovmin was the de jure government of the Kazakh Soviet Socialist Republic, comprising its main executive and administrative agency from 1946 until 1991.

KazSSR (КазССР) is an abbreviation for the Kazakh Soviet Socialist Republic.

Kazvodhoz (Казводхоз in Russian) is the Kazakh Water Management Agency (https://qazsu.kz/kz/)

Kazvodpromstroi (Казводпромстой in Russian) was a governmental trust, which specialized in building water infrastructure.

Kyzylordavodstroi was a governmental trust, which specialized in building water infrastructure.

Narkomzem (Наркомзем in Russian) is an abbreviation for the People's Commissariat for Agriculture. It was established in the USSR in 1929.

Obkom (Обком in Russian) is a Regional Committee of the Communist Party of the Soviet Union. Obkom is a regional branch of the Communist Party of the Soviet Union.

PMK (ПМК (передвижная механизированная колонна) in Russian) is an abbreviation for a mobile mechanized convoy. PMK was a sort of building company.

Qojalyq is a privately-owned company in modern Kazakhstan.

Sazvodproiz or Sredazgiprovodkhlopok («Сазводпроиз» and «Средазгипроводхлопок» in Russian) was a Tashkent-based planning and research institute. After the collapse of the Soviet Union, it was renamed UZGIP (https://uzgip.uz/).

Shejire is a body of traditional knowledge on local (mostly patrilineal) genealogies. In shejire,' the Kazakh tribes are grouped into three meta groups called 'juz.' The three juz are 'senior juz' [kaz. Uly juz], 'middle juz' [kaz. Orta juz], and 'minor juz' [kaz. Kishi juz].

Sovkhoz was a form of a state-owned farm in the Soviet Union.

Sovnarkom (Совнарком in Russian) is an abbreviation for the Councils of People's Commissars. Sovnarkom was the highest executive authority of the Soviet Union and the Soviet republics from 1917 to 1946.

Tasattyq is an annual sacrifice ritual described in detail in Chapter 8.

Tenge (KZT) is a Kazakh currency. For most of my fieldwork, the exchange rate was around 400 KZT to 1 Euro.

Vachta (вахта in Russian) is short-hand term for a rotational shift job. A single shift usually lasts for two weeks.

Upsyrbas (Упсырбас, Управление Сырдарьинского Бассейна in Russian) is an abbreviation for the Directorate of the Syr Darya River Basin. The Directorate was a unit within Kazvodhoz, the Kazakh Water Management Agency.

UzSSR (УзССР) is an abbreviation for the Uzbek Soviet Socialist Republic.

Chapter 1. Introduction

Figure 1.1. My host brother Jylkybai and I are riding our bicycles to the reed mowing spot. August 2016.

It is 6 a.m. in Aqsu. My host family is having morning tea, and everyone is about to start their daily routine. My host brothers, Jylkybai and Imanali, and myself put on our working clothes, rubber boots, and fabric gloves. In the meantime, Imanali s wife is packing a snack for us, which consists of two liters of water and melon. The melon is from the family's own garden. The three of us hop on bicycles. They were assembled with different spare parts of older bikes. We head off to the reed bed that we have been mowing for the last few weeks. The reed bed we have been mowing is part of the shared reed bed, other parts of which are mowed by other villagers.

It takes us about 30 minutes to get to our mowing spot located on the bank of an irrigation canal. The irrigation canal was built back in the Soviet era. It takes water to the rice fields cultivated by a local rice-growing company (Kaz. qojalyq). This and other irrigation canals are also used as common fishing grounds. We set up a net across the canal the other day. We check the nets every day before returning home to take the fish with us.

We head out of the village and take a beat-up inter-village road leading to Jarma village. After crossing over the Left-Magistral Canal, which diverts water from the

> *Syr Darya River to the villages located on the left bank of the river, we turn off to the dirt road that leads to the reed beds. The dirt road goes through the reeds. But these reeds are too small and sparse for us to mow. I see cattle grazing on their its own here and there. When the dirt road ends, we leave our bikes on the roadside and go on foot for about 20 minutes. Until we get to our mowing spot, we pass by reed beds being mowed by other villagers. Even though I have seen them many times by now, I keep noticing some areas covered with white a crust formed by soil salinity, a sign that reminds me that this area has an official status as a Zone of Ecological Catastrophe. (Field notes, August 29, 2016).*

I wanted to start my thesis by describing my arrival to the Syr Darya Delta and not with this excerpt from my field notes taken closer to the end of my first field season. Starting with my arrival would have allowed me to talk about my first (and exciting) impressions of Kazakhstan as it took me about two days to get there: first, I had to take a minibus [*marshrutka]* from Tup located in eastern Ysyk-Kol to Bishkek (Kyrgyzstan) and then I had to get on a Moscow-bound train that took me to Kazaly in little over 28 hours. Starting with arrival would have been chronological and it would have lent itself well to poetic comparisons such as comparisons between the Ysyk-Kol Lake, the 11th largest lake in the world by volume (1,736 km^3) and the Aral Sea, once the 12th largest lake in the world by volume (1,100 km^3) and between the snow-capped mountains of Teskey Ala-Too (where the Naryn River's first tributaries take source) and the Turan depression, where Syr Darya River delta spreads out (Figure 1.2.).

While it would have been logical to start from the beginning, I decided to start by describing one of the most typical days during my stay in the Syr Darya Delta for several reasons. First of all, throughout my thesis, I will give an account of rural livelihoods and that is why this vignette sets the tone for the following chapters and prepares the readers for the type of ethnography that I present. My ethnography sheds light on how river delta inhabitants have lived in the area, which has officially been designated as a Zone of Ecological Catastrophe in 1992. This designation acknowledges the deterioration of the local environment and harsh social-ecological conditions.

Secondly, rural livelihoods such as herding, reed mowing, *baqşa* gardening, and fishing are shared among the villagers as common-pool resources. The opening vignette gives the glimpses of the shared common-pool resources and directs the reader's attention to the process of engaging with the commons, i.e., commoning.[1] Moreover, this vignette helps to set up one of the main 'hooks' of my research: while the Aral Sea catastrophe has often been framed as a classic example of the tragedy of the commons (Peachey 2004, Glantz 2012), the Syr Darya Delta inhabitants' rural livelihoods are shared as commons! Hence, my research tells an unexpected story of how commons thrive in an area, which also represents the failure of commons.

[1] See Section 1.3.2 and Chapters 6 and 7.

And last but not least, I use descriptions of the delta residents 'rural livelihoods to investigate local delta ontologies, irrigation infrastructures, common-pool resources, and adaptive strategies in response to the changing environment. Indeed, the Syr Darya Delta has undergone a drastic environmental change in the last few decades as the Aral Sea retreated and partially bounced back (cf. Wheeler 2016). So my guiding question reads as **'how have the delta residents been adapting to this drastic change?'**

In order to answer these questions, I have to take a reader on a long journey to discover the Syr Darya Delta. I intend to answer my guiding question through 4 steps that correspond to 4 parts of the thesis (for a detailed outline of the thesis please see Section 1.4):

1. Part 1 sets the ethnographic, theoretical, and methodological scene for the main arguments and describes the local livelihoods in the study area, research questions and methods, and the bodies of literature that I engage with.

2. Part 2 historicizes the river delta by highlighting the ontological dimensions of the envirotechnical changes in the Syr Darya Delta. In relation to the guiding question of 'how the delta residents have been adapting to the drastic envirotechnical change,' this Part helps the reader understand what kind of envirotechnical change happened in the Syr Darya Delta and what forces drove that change.

3. Part 3 introduces the reader to the current state of the rural livelihoods in the Syr Darya Delta and analyses these livelihoods from the commons perspective. While Part 2 focuses a lot on historical dimensions of the river delta, Part 3 focuses on the delta's present.

4. Part 4 focuses the adaptive strategies employed by local communities to adjust to environmental change in the Syr Darya Delta. In relation to the guiding question of 'how the delta residents have been adapting to the drastic envirotechnical change,' this Part helps the reader understand the 'how' part of the question.

Thus, I set the scene in the part 1, introduce the envirotechnical changes in part 2, present the current state of livelihoods in part 3, and analyze the adaptive strategies in part 4 to tell the story of how local communities in the Syr Darya Delta have adapted to environmental change that they had to face in the last 50-60 years.

While I used the 'alternative start' to give the reader a general idea about my thesis, it is time to do a proper start and tell the story from the beginning. In the following Section 1.1., I recount how I got acquainted with my field site and local livelihoods. Through a rather long first-encounter recollection, I intend to paint a background picture of complexities of making a living in the Syr Darya Delta.

1.1. Syr Darya people and their livelihoods

I met Sakbolot on February 22, 2016, and have stayed in touch with him throughout my fieldwork. It has been a few weeks since I arrived in the Kazaly district in January. After getting used to living in Aiteke Bi, which is a railroad hub and an administrative center of the Kazaly district, I was going to visit one of the district's villages for the first time. My host family in Aiteke Bi made several calls and introduced me to their in-law relatives from Aqtas Sovkhoz. In everyday language, the villages are referred to as *sovkhoz*[1] because that is what they used to be during the Soviet Union. Kazakh names of the villages were well-known, although the Soviet names are still used as well. My host father's younger brother is married to Saikal, a woman from Aqtas. Her relatives agreed to host me in Aqtas, a medium-sized village (with a population of about 1,500 inhabitants) on the left bank of Syr Darya River located, about 40 km southwest of Aiteke Bi. Saikal's paternal cousin, Sakbolot, was supposed to take me to the village. I talked on the phone to Sakbolot, and he said he would be in Aiteke Bi as soon as his shift was over. We agreed he would pick me up from his cousin Saikal's house sometime in the afternoon.

Sakbolot came by around 5 pm. He was driving an old Opel Vectra made in 1990. The car was pretty run down – some doors could not be opened from the inside whereas others could only be opened from the outside. The ignition key slot was detached from the panel. A ball of wires dangled under the steering wheel. The gear stick's base was detached from the floor and moved together with the stick. Sakbolot apologized for the 'bad condition' of his car. He continued with a sincere smile that despite being old and looking ugly, his car was indispensable in making a living and providing for his family. Sakbolot said, '*this is my reliable companion! It takes me to work and home. I drive it to the fields to fetch melons and watermelons*!'

Before we hit the road, we sat down for a cup of tea. I introduced myself, and over tea, he was constantly made fun of by Saiqal and her husband, Serik, for 'being a person who talks a lot.' And before Sakbolot and I left their house, his cousin, Saikal, and her husband Serik, jokingly told Sakbolot not to give me a headache by talking too much.

This comment did not affect Sakbolot's behavior, and we talked the whole way from Aiteke Bi to Aqtas. Right after we left Saikal and Serik's house, Sakbolot started explaining to me the kinship between him and Saikal through *shejire,* an account of genealogical descent. Sakbolot told me about his *jeti ata* [seven forefathers] and asked about mine. Later, I learned that most of the people I interacted with in Kazaly belonged to the descendants of Alim within the Kishi Juz (the minor Juz).[2] Besides that, some of my interlocutors belonged to the 'white bone' clans of the Qoja and Töre. Although these tribes claimed to be distinct from the other? Kazakh tribes, linguistically and culturally, I did not observe any differences. In fact, the Kazaly district is predominantly

[1] Collective farm during the Soviet era.
[2] In a traditional Kazakh genealogy called 'shejire,' the Kazakh tribes are grouped into three meta groups called 'juz.' The three juz are 'senior juz' [kaz. Uly juz], 'middle juz' [kaz. Orta juz], and 'minor juz' [kaz. Kishi juz]. For more info please read (Esenova, 2002).

homogenous when it comes to ethnic composition. According to the 2019 census, 99,55% of the population are Kazakh, 0,29% are Russian, and 0,17% are other ethnicities.

We drove for about half an hour and stopped several times because I wanted to take some pictures of the irrigation canals and the river. While driving to Aqtas, I asked Sakbolot about his work. It turned out that he had just finished his shift before picking me up from his cousin's house. He worked at the railroad security service as a security personnel. Rather than being a nine-to-six job, his shifts were 24-hour long, and Sakbolot had to do one shift every four days. In other words, he worked for 24 hours and had 72 hours off. As a security guard, he made regular trips to Kyzylorda on cargo trains and ensured that nothing got stolen en route from Kazaly to Kyzylorda. Since Aiteke Bi is an important railroad hub for Central Asia, the railroad and railroad-related services provide most of the available wage jobs in the Kazaly district. Aiteke Bi is also the major 'market town' in the Syr Darya Delta. People from Kazaly and Aral districts come to Aiteke Bi's market for shopping. Other wage jobs are limited to government-funded establishments such as local *akimat* [local administration], schools, kindergartens, hospitals, post offices, and community centers, which are locally referred to as the 'club' [*клуб* in Russian] or *dom kultury* [Rus. Дом культуры, lit. House of Culture].

Although Sakbolot was not happy with his salary of 80,000 Tenge per month, he told me he felt lucky to have his job. Many villagers competed for a limited number of locally-available wage jobs. As an alternative, Sakbolot considered working in construction in Almaty, Astana, or other northern regions of Kazakhstan, given that his younger brother had been working in Astana for many years. However, Sakbolot did not want to leave his wife and two kids behind in the village. Another decisive factor was that despite getting paid more in Astana, there was always a risk that the employer would cheat and not pay anything. That was why Sakbolot preferred a lower risk but lower pay railroad security job over a higher wage but more risky construction job in a big city.

Despite all the risks, labor migration to big cities and northern provinces of Kazakhstan is ubiquitous.[1] Quite a lot of households that I interacted with during my stay had at least one family member who was a labor migrant. Another type of labor migration was *vahta* jobs, a long-term, usually 15-day-long shift employment in northern and western provinces of Kazakhstan. The *vahta* jobs were perceived to be more reliable and desirable.

After 40 minutes on the worn-down countryside road, we approached the village. Some of the buildings in the village were old and low 8-room bunkhouses shared by two families. These houses had different yards and entries but shared common front and back walls. Sakbolot lived with his family in one of those shared bunkhouses. His parents lived in one room, while Sakbolot and his wife and kids occupied another. The other two rooms were the kitchen and a dining room.

[1] More on internal labor migration in Kazakhstan: (Dietz and Aldashev, 2011; Nurzhanova et al., 2020).

While Sakbolot's wife was preparing dinner, we visited Sakbolot's cousins Adai and Alban, who lived nearby. Adai and Alban were the sons of Sakbolot's paternal uncle. Adai was 31, and Alban had just turned 20 in 2016. Both of them used to work as electricians in Kyzylorda City. They were sent on unpaid leave for the winter season because there was no work for them. The company promised to call them back as soon as they had some work for Adai and Alban. However, it did not happen even when winter was almost over. Adai took up a job as a tractor driver in a local rice-growing corporation.

The local rice-growing corporations, locally-known as *qojalyq,* were privately-owned businesses that rented the villagers' lands to grow rice. As of 2016, there were eight such rice-growing companies. The RZA-Agro and Syr Marjany are the two biggest rice corporations, while the other six are Jalangtös Batyr, Agro-Örken, Aqmarjan, Merei, Alshyn, and Aimakhanov (Table 4).[1] The RZA Agro and Syr Marjany cultivate rice on more land than all other rice corporations combined. While smaller rice corporations focus exclusively on rice, the RZA-Agro and Syr Marjany also have dairy cattle farms. All rice corporations lease land from the local government to cultivate rice and forage for their livestock. Such practice of leasing the land from the local government attracts a lot of questions from the readers related to the land ownership issues in particular and ownership/property issues in general.[2] Lipski (2019) mentions three alternatives that were considered in post-Soviet Russia in relation to privatizing the agricultural land such as a) returning the land to those who owned it before nationalization, b) distributing the land shares to the entire population, and c) targeted privatization by new and efficient owners. Kazakhstan selected the option (b) mentioned by Lipski (2019) and underwent 4 stages of privatization in 1991-2000. Lipski (2019) also mentions the issue of unclaimed land shares, which is also present in the Syr Darya Delta. Although every villager owns land on paper, the plots have never been divided and assigned to particular individuals. That is why the local government serves as representative of the villagers when leasing the land to the rice corporations.

The yields of the rice corporations make up most of the agricultural output of the district and are supported by governmental subsidies. Some of the local villagers are employed by these rice-growing companies as irrigators, tractor drivers, and managers. However, the number of people employed in each village is not substantial. For example, RZA Agro cultivated alfalfa in Alga village and employed about 20-30 locals out of more than 1,000 villagers. Moreover, starting in 2017, RZA Agro started employing labor migrants from Uzbekistan who agreed to work for much smaller wages than locals.

[1] The rice-growing corporations lease land from the villages. However, not all villages possess the same amount of land. After the collapse of the Soviet Union, every village inherited the lands used by the sovkhoz located in that village. Former rice-growing sovkhozes tended to have more land than others. As a result, some villages nowadays have more land than others, which means that the rice-growing corporations' presence is not the same in every village. For example, Aqtas, Aqsu, and Sarytal are the three villages that are located one next to another. Aqsu used to be a 'livestock-fattening base' during the Soviet times as opposed to the other two, which were 'rice-growing sovkhozes.' That is why Aqsu's lands are much smaller than the land of the neighboring villages. That is why the Aqsu-based rice corporation is much smaller than the ones based in Aqtas and Jarma.

[22] I do not focus on the land ownership issues in my thesis by placing the focus on de facto land use patterns. As a result, I engage mostly with the commons literature as opposed to land ownership literature.

Sakbolot's cousin Adai worked as a tractor driver at one of those rice-growing corporations. Alban, who was still waiting for a call from his company in Kyzylorda, was unemployed. In the meantime, he was planning to help Sakbolot and Adai with 'usual' rural activities in Aqtas, such as cultivating shifting gardens called *baqşa*, mowing reed, herding, and fishing. Sakbolot mentioned that he did these additional activities when driving from Aiteke Bi to Aqtas:

> *What you are doing [your research] is very interesting. I always wanted to become a scholar or a teacher. I even graduated from a vocational school with honors. But since I am the oldest child in the family, I had to start working early to help my parents raise my younger siblings. I grew up in difficult times. My family could not afford to send me to the university. Nevertheless, I am happy. I am 36-year-old. I have a wife and two kids. I have a job, although the salary is not great. My salary is not enough for a family like mine. So I have three days between my shifts, and I do other things for a living as well. For example, I do baqşa gardening, mow reeds for sale and do some fishing from time to time. Occasionally, I work as a taxi driver. (Sakbolot, 36 years old, Aqtas, February 2016).*

Sakbolot's lifestyle is somewhat common in Kazaly. Most villagers try to get a wage job and complement it with herding, gardening, reed mowing, and fishing as their livelihoods. Such combinations of livelihoods are somewhat typical in all rural areas of Kazakhstan (Hauck et al., 2016). These livelihoods are often subsistence-oriented with only a fraction being sold for money. Almost every household has a family member who is in labor migration. Many households also depend on pensions that elderly family members receive from the government.

Such combinations of livelihoods are necessary because almost every household is moderately or highly indebted. For example, almost every person of age in the households I interacted wi has a bank loan, which they took for 'upgrading their lives' renovating a house, getting married, buying a phone, etc. Although there is no open data for the Kazaly district, as of 2018, the Kyzylorda province has been the fifth highest-ranking region in Kazakhstan in terms of bank loans taken by the citizens. It was calculated that on average every 'economically active citizen' had 307,000 Tenge in loans.[1] The cash from a wage job is often taken away by the bank to cover the loan. Thus, rural livelihoods such as herding, gardening, mowing reeds, and fishing serve both as a source of subsistence and an additional source of income. My research question on the river delta environment led me to spend most of my time in rural areas observing herding, reed mowing, gardening, and fishing (to a lesser extent). My ethnography pertains mostly to these rural livelihoods. Although local wage jobs, *vahta* jobs, taxi jobs, and commerce, as well as pensions and remittances, are all important parts of local livelihoods, they are beyond the scope of the thesis.

[1] Which is an equivalent of ca. 767 Euro or 5-7 average monthly wages.

Figure 1.2. The Map of Kazakhstan and the Syr Darya Delta

1.2. Why river delta?

My research is part of 'The 'Social life' of a river: environmental histories, social worlds, and conflict resolution along the Naryn-Syr Darya' project funded by the Volkswagen Foundation. I joined the project in 2015 and proposed research in the Kazakhstani stretch of the river (see Chapter 2. Methodology). I selected the river delta because the Syr Darya Delta and the Northern Aral Sea represent an area where drastic and rapid environmental changes have taken place since 1960 (Saiko and Zonn 2000). Once a flourishing fishing area, it turned into a critical environmental zone (Micklin 2016), and in the last ten years, there have been positive dynamics in restoring the ecosystems, local economies, and communities in the area (World Bank 2011). For many years, due to an ineffective irrigation system and poorly managed river banks, the inflow from the Syr Darya and Amu Darya rivers to the Aral Sea diminished to such a degree that the sea started drying up (Mitrofanov and Mamilov 2015). By 2010s, the Aral Sea has shrunk to merely 10% of its original size (Micklin 2016) (Figure 1.3.).

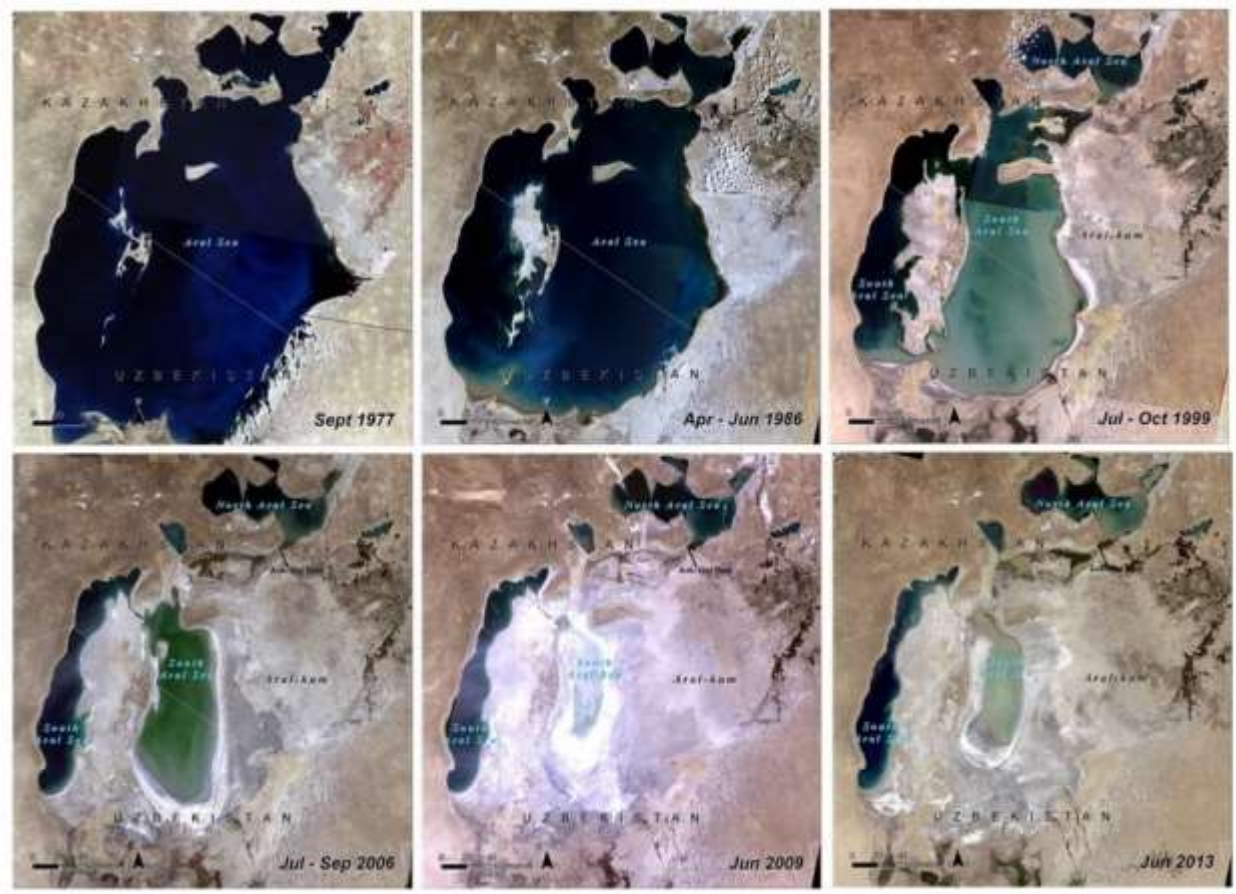


Figure 1.3. Satellite images of the Aral Sea 1977-2013. Source Anchita et al. 2021.

With the World Bank's financial support, Kazakhstan's government has launched the Syr Darya Northern Aral Sea project. During Phase 1 of the project, a 13 km dike (known as the Kokaral dike) was built to keep water flowing into Big Aral from the Northern Aral Sea. The project also improved river management infrastructure and built the institutional capacity of river management entities along the Syr Darya. Phase 1 of the project seems to have helped reverse the degradation of the northern Aral Sea. Seven months after the dike's completion, the water level had risen three meters and covered 800 km^2 of the dry seabed (World Bank 2011). Phase 2 of this project aims at increasing the water level in the Northern Aral Sea by further improving river management along the Syr Darya and by upgrading the Kokaral dam (or building another dam) (World Bank 2010). Rising water levels in the Northern Aral boosted the revival of fisheries (both legal and illegal) and aquaculture (Mitrofanov and Mamilov, 2015). Thus, the drying up of the Aral Sea and its partial revival is a story of a rapid and quite significant environmental change. As the world is trying to anticipate various scenarios of climate change impacts, the Aral Sea and Syr Darya Delta case could enrich knowledge about how local communities adapt to the accelerated climate change.

Figure 1.4. A map of irrigation infrastructure in the Kazaly district. The map was made by the Kazvodhoz branch in Kazaly and was displayed at the Kazvodhoz office in Kazaly. February 2016.

1.3. Research questions and theoretical approach

This thesis is a story of rural livelihoods, rapid social-environmental change, and the adaptive strategies used by locals in response to this change. The thesis is guided by and seeks answers to such questions as ‘what are the livelihoods of the Syr Darya Delta inhabitants?’, ‘what drove the environmental change in the Syr Darya Delta?’, and ‘how did delta residents adapt their livelihoods in response to the environmental change?’

Since any of these questions deserves a thesis dedicated solely to answering that particular question, by attempting to combine three questions into one thesis, I do not analyze all three questions in the same level of detail. For example, I thoroughly analyze how the local communities use and share their pastures, reed beds, gardening plots, and fishing grounds. However, in the chapter dedicated to the environmental change in the Syr Darya Delta, I do not provide a

comprehensive nor detailed environmental history of the area. Instead, I focus on only those aspects of the environmental change that had been overlooked in the existing literature.

In the following sections, I provide an overview of the literature I engage with throughout the thesis and point out some gaps that the thesis attempts to fill.

1.3.1. Livelihoods lens: the ethnographic basis of my thesis

I mentioned earlier that I intend to describe rural livelihoods in the Syr Darya Delta. My ethnography on rural livelihoods can be contextualized and interpreted from many interesting perspectives, such as agrarian change (Trevisani 2010), labor (Craumer 1992), and skill (Ingold 2020). At the same time, I must acknowledge that some scholars use livelihoods as a theoretical lens in their own right (Scoones 1998). The definitions of livelihoods are also numerous. Livelihoods can be defined as a 'way of life' (Nayak and Berkes 2011, p. 137; Rigg 2006) or more specifically as 'assets (natural, physical, human, financial and social capital), the activities (strategies of use), and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual and the household' (Ellis 2000, p. 10). Some define livelihoods as the way individuals, households, or groups make a living to meet their various consumption and economic needs (Marschke 2005, p.121, De Haan and Zoomers 2003). Within the livelihoods literature, the concept of 'sustainable livelihoods' has attracted a lot of attention (cf. Scoones 1998, Bebbington 1999, Marschke and Berkes 2005) in recent decades. Although my ethnography describes rural livelihoods in Marschke's (2005) sense, I do not engage with or contribute to the current debates in (sustainable) livelihoods literature. Instead, I engage with the commons literature to contextualize my findings because such major local livelihoods as herding, reed mowing, *baqşa* gardening, and fishing are run as commons. But what are the commons?

Figure 1.5. Communal herd and the ‘kezek’ practice

1.3.2. Commons literature

In the introduction I mentioned that one of the main ‘hooks’ of my research is that it tells an unexpected story of how commons thrive in an area, which also represents the failure of commons. In order to understand what commons are and what main debates exist in the commons literature, I provide a brief overview in the following paragraphs.

The commons literature has been quite interdisciplinary in the last few decades (van Laerhoven et al., 2020). Despite its intrinsic interdisciplinarity, there are different schools of thought that are rooted in various disciplines (Acheson 2011, Vivero Pol et al. 2019), such as a) the economic approach; b) the legal approach; and d) the radical-activist approach. Marshall (2005) noted that these three schools of thought are somewhat divergent. That is why I decided to give an overview of each approach below because I engage with all three of them in my thesis. The existence of multiple approaches to commons often causes confusion (Wagner 2012). Some scholars have framed the commons as a lawscape (Bruncevic 2017) or a keyword (McCarthy 2009, p. 498).

Wagner (2012) notes the inconsistency about how the term ‘commons’ is applied both in academic and public discourse and suggests seeing commons as ‘social imaginary:’

> *The term commons’ has been appropriated over recent decades by individuals, corporations, and interest groups seeking to benefit from the positive emotional responses that the term seems to evoke. In some cases—shopping commons, for instance—use of the term appears to be mainly a marketing strategy, but in other cases, the term carries a definite political argument, most typically an argument against commodification, privatization, or enclosure and in favor of egalitarian, grassroots approaches to resource management. It is at this point that a clear break occurs between commons as a particular kind of institutional arrangement and commons-as-social-imaginary’ (Wagner 2012, p.620).*

Aware of the potential mess that manifold interpretations of the commons can cause, I use the following paragraphs to explain the three approaches to the commons and their respective bodies of literature, which I engage throughout my thesis when analyzing delta livelihoods.

The economic approach (or school of thought) refers to commons as the common-pool resources (CPRs) and foreground resources ’excludability and subtractability (Figure 1.6.). It posits that the commons is a type of good that demonstrates certain ‘excludability ’and ‘subtractability ’features. Subtractability is a measure of how the use of the resource by one person diminishes its availability to other users. Excludability is a measure of how easily a user can be prevented from using a resource. Thus, common-pool resources (commons) can be defined as ‘natural and human-constructed resources in which: a) exclusion of beneficiaries through physical and institutional means is especially costly, and b) exploitation by one user reduces resource availability for others ’ (Ostrom et al. 1999, p. 278). In sum, the commons is a shared, rivalrous, and finite resource.

Figure 1.6. The difference between various types of goods

Excludability	Subtractability	
	Low	High
Difficult	Public goods	Commons
Easy	Toll goods	Private goods

Marshal (2005, p.30) succinctly summarizes the differences between the goods types presented in Table 1.

> *Private goods are characterized by complete rivalry and complete excludability. Complete rivalry exists when appropriation of units (e.g., liters) of a good (e.g., potable water) subtracts these units entirely from the stock remaining for*

> *subsequent appropriation. Complete excludability exists when the actor providing a good can prevent others from appropriating any units of the good or can restrict appropriation to those who fully compensate the actor for the loss in benefits that the appropriation causes them. All goods other than private goods are known as public goods. A pure public good is a good characterized by complete non-rivalry and complete non-excludability. A classic example is a lighthouse. Goods that are less than completely non-excludable or non-rival are known as impure public goods. Commons dilemmas are concerned with a particular class of impure public goods known as common-pool resources (CPRs). These are natural resource systems (e.g., watersheds) or human-made resource systems (e.g., communal irrigation works) that produce resource units (e.g., megaliters of water). Appropriation of resource units from CPRs is rival because the supply of units is replenished at a finite rate, if at all (Ostrom, 1990). Moreover, it is difficult for providers of CPRs to completely exclude others from appropriating the resource units produced as a result. This difficulty is often attributed to the costliness of the existing physical or institutional means of exclusion. However, constitutional and cultural considerations can also make some exclusion options costly, at least in a political sense (e.g., privatizing a beach).'*

When introducing the rural livelihoods in the Syr Darya Delta in Chapter 5, I use the above-mentioned 'subtractability' and 'excludability' criteria to demonstrate that pastures, fishing grounds, reed beds, and agricultural lands in the Syr Darya Delta are predominantly used as common-pool resources (CPRs). Moreover, I use the 'institutional design principles' (Ostrom 1990) to analyze how the delta commons managed to avoid the 'tragedy of the commons' (Hardin 1968). Both the institutional design principles as well as the notion of the tragedy of the commons are explained in more detail in Chapter 6

Another school of thought[1] takes its roots in Marxist radical-activist scholarly tradition. It is slightly divergent from the two previous schools of thought. The radical-activist school considers the commons as 'the most subversive, coherent and history-rooted alternative to the dominant neoliberal narrative.' (Vivero Pol et al. 2019, p.xii). This approach critiques the CPR literature's focus on small-scale natural resources and instead argues for shifting the focus to 'the common ' in the singular as a principle of organizing production and as the shared commonwealth of humanity (McCarthy 2005). According to this school of thought, 'the common 'is not only the natural resources but also the 'languages we create, the social practices we establish, the modes of

[1] **The third approach (or legal school of thought)** to understanding commons focuses on property rights and how they affect resource management (Schlager 2004). While the CPRs stem from an economic definition of commons, common property is a legal concept that foregrounds property rights. It describes three types of proprietary regimes (private, public, and collective) and different layers of entitlement (bundles of rights) (Schlager and Ostrom 1992). In my thesis, I do not describe or analyze the legal (de jure) ownership of resources in the Syr Darya Delta because the fishing grounds, reed beds, pastures, and agricultural lands used by the delta residents are de facto commons.

sociality that define our relationships, and so forth ’(Hardt and Negri, 2009, p. 139). Hardt and Negri (2009, p. viii) also argue that ‘the common’ focuses on ‘the practices of interaction, care, and cohabitation in a common world’ and challenges the ideas of seeing humanity as separate from nature, as either its owner, exploiter, appropriator, or custodian.

This school also criticizes the institutional approach of the economic school of commons and argues for framing the commons as ‘commoning’ (Linebaugh 2008). This body of commons literature critiques the CPR approach for being enclosed ‘in a far-too-narrow set of assumptions and caught in the debate about private-property versus state interventions, i.e., state-market duopoly’ (Harvey 2011, p. 58). While common pool resources (CPR) work in the Ostrom tradition seeks an alternative to the powerful and reductive narratives derived from liberal and neoliberal economic theory, it tends to reproduce the very defining features of these narratives (Bresnihan 2016). Working with the same methodological individualist assumptions of neoliberal economic theory that it critiques, it assumes that without proper rules, incentives, and sanctions, individuals will degrade and ultimately destroy common resources (Bresnihan 2016, Cleaver 2007). In contrast to the work of CPR scholars, a growing number of commons activists suggest that diverse commoning projects represent ‘an alternative form of production in the making ’(Caffentzis and Federici 2014, p. i95) and are reminders that ‘alternative social relations are entirely thinkable’ (McCarthy 2005, p. 16). Summing up this perspective, Caffentzis and Federici (2014) emphasize that the commons are not only the practices for sharing in an egalitarian manner the resources we produce but are also a commitment to fostering common interest in every aspect of our lives and political work. These activists advocate thinking about commoning as a set of generative practices that support sustainance and enhancement of life (Linebaugh 2008, Bollier 2014, Bollier and Helfrich 2014). Gibson-Graham (2016, p. 196) frames commoning as a post-capitalist, transformative strategy.

Out of a very wide array of interesting and provocative ideas presented by this body of literature on commons, I heavily use the notion of commons being a ‘commoning’ process. I use this commoning literature to critique overly ‘static’ CPR literature and use it to capture a ‘dynamic’ nature of the delta commons. While the ideas about alternative, other-than-capitalist subjectivities, values, and modes of production seem to be quite central fro this body of literature, I only briefly engage with it in Chapter 9.

My usage of the commons theory to analyze the livelihoods in the Syr Darya Delta provides a vast body of literature for comparison. Pastures, fisheries, forests, irrigation systems, and water management are often framed as the ‘Big Five’ in the study of the commons (Van Laerhoven et. al. 2020, p. 208). Van Laerhoven et. al (2020) found in their review article that these topics drew most of the combined attention of commons scholars in the last few decades. At the same time, Van Laerhoven et al (2020) indicate that Central Asia is not among ‘the usual suspects’ to publish in the International Journal for the Study of the Commons and encourages the scholars from

understudied regions such as Central Asia to draw their attention to the commons. My study is the first study of the commoning practices in the Syr Darya Delta and the first study that describes the commonization of resources as an adaptive strategy to rapidly changing social-ecological conditions in Kazakhstan. That is why my findings will fill that glaring gap in the commons literature on Central Asia in general and the Syr Darya River delta in particular.

1.3.3. Environmental change: coping, adaptation, and transformative change

A specific type of environmental change called 'climate change' has become a big buzzword in recent years (Viard-Crétat and Buffet 2017). Most of the literature on environmental change acknowledges an environmental crisis, which needs to be addressed as soon as possible (IPCC 2014). The commons theorists also engage with environmental change literature and point out that the current environmental crisis stems from our ways of being human (Singh 2017). Moreover, they advocate for drastically changing (transformative change) our ways of being human and living in this world (Singh 2017, Plumwood 2003). The radical activist school of commons argues that the commons and commoning can transform society and help address the current environmental challenges (Hardt and Negri 2009). That is why looking at the commons in the Syr Darya Delta, which has been an area of rapid social-ecological change and which is an officially designated Zone of Ecological Calamity, is likely to provide interesting insights into the coping, adaptation, and transformative change literature. The most recent anthropological study of the environmental change and fisheries in the Aral Sea was conducted by William Wheeler (2021, 2016), who argues that the environmental change in the Aral Sea region cannot be detached from socialism and post-socialism.

Adaptation is defined through the adaptive capacity of a system, institutions, humans, and other organisms as an 'ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.' (IPCC 2014, p. 118). A group, an individual, or a system may be able to respond to adverse stresses or shocks in different ways. These responses can be classified as coping, incremental adaptation, or transformative adaptation (Fedele et al. 2019, p. 116). Coping is an immediate response to adverse stresses based on available skills, resources, and experience (Biermann et al. 2012). Coping strategies are often reactive and strive to maintain the affected system in a business-as-usual state (Kates et. al 2012). Incremental adaptation strategies tend to be more anticipatory than coping strategies and consist of minor and small-scale adjustments to a changing current social-ecological system (Adger and Jordan 2009). Transformative adaptation strategies aim to address the root causes and/or drivers of adverse effects by shifting systems away from unsustainable or undesirable trajectories (Olsson et al. 2014). Adaptive capacity is often mentioned within the context of resilience literature (Folke et al. 2010, Berkes et al. 1994), vulnerability (Füssel 2006), and mitigation (Fawzy et al. 2020).

Different actors within a community may have different capacities to adapt to changes due to a number of 'barriers' or 'limits' (Antwi-Agyei et al. 2015, Shackleton et al. 2015). The barriers can

be financial or economic (Bryan et al. 2009, Hoque et al. 2018), natural (Sallu et al. 2010), socio-cultural (Curry et al. 2015), institutional (Quinn et al. 2011), and psychological (Gifford 2011). These barriers may affect different actors differently (Hoque et al. 2018), leading to several adaptation strategies within the same locality (See Chapter 10 for Syr darya Delta examples).

1.4. Thesis structure

The thesis sets out to analyze how the Syr Darya River delta communities have been adapting to social-ecological change. The thesis consists of four parts, which in turn consist of several chapters each. Part 1 contains the introduction (**Chapter 1**), which describes the study area, research questions, and the theoretical approach as well as Chapter 2, where I thoroughly describe the conditions of knowing, i.e., methods, timeframes, and limitations.

Part 2 consists of Chapters 3 and 4 and aims to historicize the river delta by demonstrating the envirotechnical changes based on archival materials and oral history. **Chapter 3** is guided by the 'what is the river delta?' question and explores local river ontologies (Morita and Jensen 2017). I briefly introduce and discuss such terms as 'delta' and 'lower Syr Darya,' which are used in the literature to refer to my study area. Building on the concept of 'iconic places' (Féaux de la Croix 2011), I present a local river ontology of the Syr Darya Delta, according to which the delta region comprises two distinct yet interconnected iconic places: that is, 'Syr' that covers riparian areas and 'Qyr' that covers Karakum semi-desert pastures north of the river. By foregrounding the infrastructure in 'Syr' and 'Qyr,' i.e., irrigation canals and wells, respectively, I claim that the local ontology of the Syr Darya Delta is shaped by the interactions of these two iconic places. I also introduce the notion of 'iconic species' which, like iconic places, have shaped the river delta. Hence, the envirotechnical changes in the Syr Darya Delta, e.g., building of large dams and irrigation canals to irrigate and turn pastures of Qyr into rice fields during the Soviet era, can be seen as an 'expansion of Syr into Qyr' and later deterioration of irrigation infrastructure as 'Qyr's expansion into Syr.' Thus, Chapter 3 contributes to the literature on environmental change by highlighting the ontological change that accompanies environmental change. **Chapter 4** introduces floods and water scarcity as 'iconic forces' that alongside 'iconic species' shaped the envirotechnical change in the Syr Darya Delta. It discusses how fear of floods and water scarcity drove the infrastructure development in the Syr Darya Delta. I also discuss in detail the various ways in which water scarcity was defined, i.e., as a recurrent natural phenomenon, water scarcity as a management problem, or as an infrastructural problem. Chapters 3 and 4 come together to give picture of the environmental change in the Syr Darya delta and foreground the ontological aspects of understanding the environmental change. Building on the Féaux de la Croix's concept of 'iconic places,' these chapters paint a more dynamic picture of the iconic places in the Syr Darya Delta through introducing the concepts of 'iconic species' and 'iconic forces.'

Part 3 introduces rural livelihoods in the Syr Darya Delta, such as fishing, herding, gardening, and reed mowing, and demonstrates that they are rivalrous and limited, i.e., commons. The introduction

to this part reminds the reader the basics of the commons theory outlined in the introduction. By engaging with the commons theory from the livelihoods perspective, the chapters in Part 3 demonstrate that commons in the Syr Darya Delta can be better described as commoning, i.e., the infrastructure-mediated process of (re)negotiating the access, use, and sharing of the river delta resources.

Chapter 5 provides an account of local livelihoods in the river delta. Having looked at them from the property rights perspective, I claim that local livelihoods such as reed mowing, gardening, herding, and fishing are run as common-pool resources. I demonstrate that various commons (e.g., gardens, reed beds, and pastures) co-exist as a patchwork on the same territory and show how various commons can be at odds with one another. I also analyze the local abundance and scarcity discourses and set a question of why the tragedy of the commons did not happen in the Syr Darya Delta?

In Chapter 6, I answer the guiding question set in Chapter 5 of 'why the tragedy of the commons did not happen in the Syr Darya Delta?' I compare the Syr Darya Delta commons against successful commons' 'design principles '(Ostrom 1990). Based on my ethnographic data I engage with each design principle and show their limitations in understanding the commons. I also review other possible explanations (from economics and commoning literature) for why the tragedy of the commons did not happen in the Syr Darya Delta.

In chapter 7, I discuss cooperation and collective action in the Syr Darya Delta. First, I review the conditions conducive to cooperative behavior. Then, I describe baqşa gardening step-by-step and conceptualize commons as a process of commoning. I engage with the growing body of literature on commoning and contribute insights on how kinship, friendship and other networks enable commoning.

Chapter 8 focuses on a 'tasattyq' annual sacrifice ritual. I showcase how this ritual plays an important role in enabling commoning. Moreover, I provide thorough ethnographic descriptions of the tasattyq ritual and analyze the multiplicity of meanings that various participants assign to the ritual. I also review the diverse way, in which the different communities organize the ritual and claim that those organizational practices also serve as conditions that enables commoning.

Part 4 is built around adaptive strategies employed by local communities to adjust to environmental change. It describes both overacting adaptations such as 'commonization' of resources and shifting agriculture. It engages with the growing body of literature on coping, adaptation, and transformative change. **Chapter 9** conceptualizes the commonization of resources as an adaptive strategy that emerged after the collapse of the Soviet Union. I show that commons institutions existed during the Soviet times in the marginal areas and sprung into dominance after the collapse of the Soviet Union to fill in the void. These findings provide grounds to my claim that institutional diversity is important for adaptive capacity. **In chapter 10,** I give an account of

specific adaptations pertaining to doing agriculture in the Syr Darya Delta. I conclude my thesis with my insights into the commons and adaptation literature.

Chapter 2. Methodology

Figure 2.1. A day with the local rice corporation employees. March 2016.

When preparing my research proposal, I did not know where exactly I would like to do my research. I was certain that the research site would be in Kazakhstan's stretch of Syr Darya, but I still had to select a particular spot along the 1,200 km stretch of the river. By browsing along the river on the Google Maps, I preselected two locations: a) the Shaulder district of the Turkestan region (back then, it was called the Southern-Kazakhstan Region), where the Syr Darya River meets its tributary, the Arys River, and b) the Kazaly district of the Kyzylorda region, a place which is considered to be to be the beginning of the river delta. The advantage of the former was its proximity to Kyrgyzstan, while Kazaly was about 1,000 km further. Besides, the town of Turkestan had a Kazakh-Turkish University where I intended to take Kazakh language courses. On the other hand, there were some very recent publications about water use in the Southern-Kazakhstan region (e.g., Zinzani 2014, 2015), while there were none on Kazaly and very few publications about the human-nature relationships in the river delta. I made up my mind to select

Kazaly as my research site primarily because it was not recently studied by (environmental) anthropologists despite its proximity to a much more ‘popular ’and notorious Aral Sea.

After settling with the location, I started preparing for the fieldwork. This fieldwork was going to be my first research project outside of Kyrgyzstan. This anticipation of a new experience made me quite excited and a bit anxious at the same time. I did not know anybody in Kazaly. My supervisor encouraged me by noting that it is quite uncommon for Central Asian researchers to do studies in the neighboring countries, instead opting for doing research in their home countries, and that by going to Kazakhstan, I am doing something different. This comment gave me a feeling of being ‘a pioneer’ in a sense (although I am not sure I was, there might have been others who were the ‘first’).

I made my first contact with my host family in Kazaly while I was still in Tübingen. The archeologists from Tuebingen had been participating in the excavations of the medieval ‘swamp ’ city of Jankent in the Syr Darya Delta. Through them, I got in touch with Kazybek, an archeology student of Kyzylorda State University, who eventually became my research assistant and host brother. Besides talking to Kazybek, I reached out to the Central Asian Regional Ecological Center (CAREC), an intergovernmental organization working on environmental issues including river basin cooperation in Central Asia. I also sought advice from other scholars who worked in the region such as William Wheeler, Niccolò Piancolla, Isabelle Ohayon, and Irina Arzhantseva.

At the time of my research, the University of Tuebingen did not have a formal research ethics review process. Despite a formal research ethics process being unavailable, I consulted with my supervisor to create an independent ethics approval process. First, I discussed my ethics protocol with and received approval from my supervisor. While in Kazakhstan, I presented my intended research to the CAREC staff and obtained their support letter. When I arrived at my field site, I went to the Kazaly district *akimat* (the local government office) and presented my support letters (one from the university and one from the CAREC) to the internal policy department, which granted me permission to do research in the district. Within five days of arrival in Kazakhstan, I would obtain a registration card at the local police station. Then I would approach the local village head in every village I visited and obtained permission to do research. On an individual level, I asked the informants to give me their permission to record the interviews, conversations, as well as take pictures and make video recordings. I always explicitly mentioned to my interlocutors that their anonymity and confidentiality were guaranteed. It may sound odd to those who are not familiar with the region that most of my interlocutors did not care about being anonymized. Their rationale was that what they were telling me was known by everyone, hence there was no need to anonymize them. Nonetheless, I informed all my interlocutors that I would have to anonymize their names to comply with the overarching ethical requirements in academia.

Kazybek's family ended up being one of several host families I stayed with over the course of my research. I deliberately chose to stay with a number of host families: firstly, it was inevitable since I stayed in a number of different villages. I stayed in 14 villages in Kazaly and in the Aral districts with the primary villages being Aiteke-Bi, Baskara, Pirimov, Abai, Jankent, Birlik, and Kojabachy.[1] Secondly, even though I could and did stay sometimes with other families to spread my networks and get better insights into things I was researching, I ended up staying with one family in each village. This was partially due to the fact that my relationships with host families eventually shifted from being a guest and a researcher to being 'a long lost son who found his way back.' Surely, it was not a full adoption in its proper sense and my host families never treated me the way they treated their proper sons. My host fathers would introduce me to other villagers and their friends as 'a son from the first marriage.' In many families, presenting me as the 'host's illegitimate son' turned into a running joke and everyone seemed very amused. This served as a great ice-breaker. Such 'adoption' into the family is quite common in the Central Asian context (cf. Féaux de la Croix 2011, Hoelzchen 2018).

Being a guest, my hosts would always take me along to the village feasts, called '*as*,' '*toi*,' and '*kudai joly*.' (Cf. Mustafina 1992, p. 14). I talk more about a specific type of annual feast called *tasattyq* in Chapter 9. These feasts were a great place to meet the villagers. When I would introduce myself and explain the purpose of my stay, the group conversation would turn into an informal group interview. In the consequent feasts, I did not have to introduce myself but those attending the feast would always ask what I found or how my research was going. That presented me with convenient chances to get comments on some of the bits of information I gathered before. These group interviews and discussions would last for about 10-15 minutes only until the other topic would not take over the conversation, or the food would be served. I brought my small notebook with me to these feasts, which allowed me to jot down what was being said and identify potential interviewees.

Since the seating in such feasts is gender-segregated, I would always be seated either with male elders (being a guest I had a high status and that is why was seated with the elders) or later on with the middle-aged men. Moreover, most of my other interactions were also with men between 25 and 70, which is why my ethnographic accounts largely lack female voices, perceptions, and views.

Over the course of my research, I only spoke Kazakh, which turned out to be very close to Kyrgyz, my mother tongue. I would listen, observe the differences between Kyrgyz and Kazakh, and then try to 'tweak' the Kyrgyz to sound Kazakh. Most of the time it worked and I could speak on 'autopilot 'by tweaking my Kyrgyz. But surely, it did not always work. Some words were completely different and I would know that when people would ask me what I meant. The

[1] These are actual (not anonymized) names of the villages. I mention these real names of the villages here only. Elsewhere in the text, these village names are anonymized.

improvement of my language skills can be traced to the westward movement of locations, in which people in Kazaly placed my accent. For example, at the beginning of my research, people in the market would ask whether I was Uzbek. Sometime after that, people who did not know me would guess that I was from Shymkent or Turkestan. Then, people would place my accent in eastern Kyzylorda districts. By the end of my stay, I think my accent was almost indistinguishable from the local, Kazaly accent because when I would go to Kyzylorda, people would ask if I was *akudai*, 'a term used to refer to people from Kazaly and Aral districts. Local accents are brought up a lot in relation to local identities. Kazaly accent is often talked about as 'rude. 'Yet, the locals in Kazaly claim that the local dialect is the purest of all Kazakh dialects[1] since they claimed it had no trace of Uzbek, Kyrgyz, or Russian languages.

Learning a language has helped me to establish rapport. The locals were very appreciative that I was trying to speak Kazakh. Language learning also went hand in hand with learning about rural livelihoods. That is why I provide a lot of Kazakh terms in the thesis. For example, I participated in mowing reeds, tending to melon gardens, herding, and fishing in several villages. Even though I grew up in the village and knew a thing or two about herding and farming, I learned the local ways of doing it. Out of all these livelihoods, I had the least luck with fishing. Since the local fishermen did not obtain the required paperwork for fishing on the Syr Darya River canals, and the delta lakes, local fishermen did not want to take me with them most of the time. And I did not insist to avoid exposing them unintentionally. My participatory research methods were extremely rewarding as the interactions and conversations I had while learning to mow reed, grow melons, herd sheep, or catch a fish gave me many insights.

I did my field research during 2016-2017. My first and longest stay was in 2016 when I stayed in Kazaly from January through September. In March 2016, I was visited by Dr. Trevisani, my second supervisor at my field site. In 2017, I spent two months in Almaty and Kyzylorda archives and about four months in Kazaly in spring and summer. During my stay in Kazaly in the spring of 2017, I focused on gathering data on the *tasattyq* ritual in various villages. Dr. Ashirov, our research team member from the Uzbek Academy of Sciences, visited me for one week and we attended together a tasattyq ritual conducted by the local community in Kojakazgan. In 2018, our team conducted a dialogic workshop for decision-makers and local water users in Kazaly. My supervisor Dr. Féaux de la Croix and our team member Dr. Suyarkulova attended the dialogic workshop and visited a few villages where I conducted my fieldwork.

[1] Although Fierman (2009) noted that the Kazakh language has relatively minor dialect variations as opposed to Uzbek or Tajik.

2.1. Field research methods

Figure 2.2. A villager is explaining to me how the local irrigation system works

Participatory observation and interviews formed the backbone of my ethnographic data. As I mentioned earlier, informal interviews would start as soon as I introduced myself to the people I met. So I would keep in mind the major points that each new acquaintance shared and write them down in my notebook right after the encounter. At first, I tried to take notes right away while people were talking to me; however, it seemed to have introduced a degree of formality, so that the interlocutors would often shy away from the conversation. That is why I quickly learned not to pull out my notebook as soon as I heard something interesting. Instead, I would continue the conversation and fix a date for an interview with a voice recorder.

Although this approach worked well, sometimes I was in situations when I knew that I would not be able to meet that person again. In those cases, I tried to turn on my voice recorder if the interlocutor was sharing information that I found pertinent to my research. Overall, I conducted proper semi-structured interviews with 101 people, the majority of whom were male between 22-

80 years old. Only 8 interviews were with women aged 40-70. Besides these recorded semi-structured interviews, I also had numerous everyday conversations and interactions with my host families. Although women and children are grossly underrepresented in the interviews I conducted, I still got to interact with them in everyday life and ask them some questions. Yet, those interactions were also quite brief and formal, which were dictated by local cultural norms that shaped the gender roles. Hence, I would encourage future researchers to fill in this obvious gap in my research data.

During my interviews and conversations, I noted that some informants would start drawing schemes on the ground with their feet or a stick or draw imaginary lines on the table with their fingers. These drawings showed where people fished, herded their flocks, and mowed the reeds. In other words, it was a graphic tool to show the local people's livelihoods. Since rural livelihoods are dependent on the water from the Syr Darya River, these schemes featured the river (or the names of different stretches of it) and the networks of irrigation canals. Since this drawing represented internalized reflection and reconstruction of space and the information, perceptions, and beliefs about the environment the process of drawing these maps could be called cognitive mapping (Kitchin 1994).

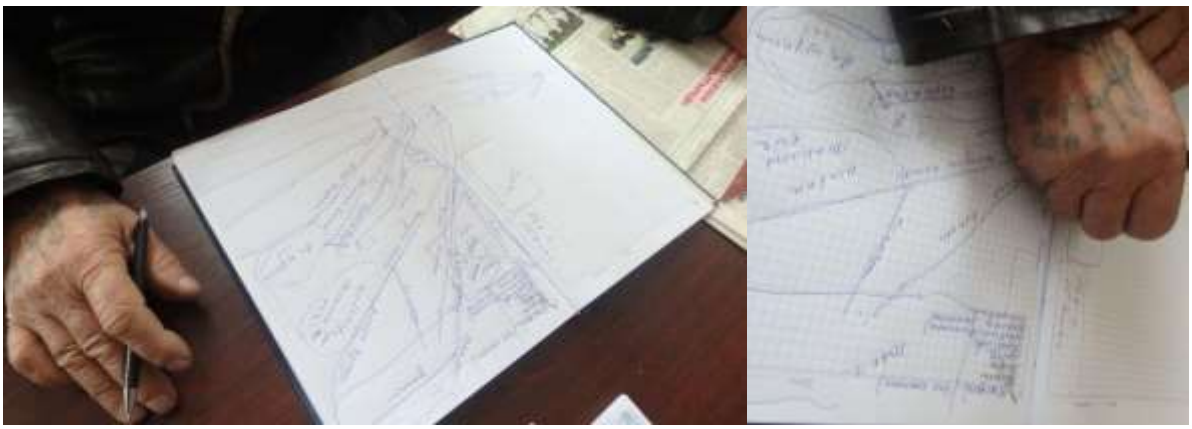


Figure 2.3. A villager is telling me the oral history of the local canal names

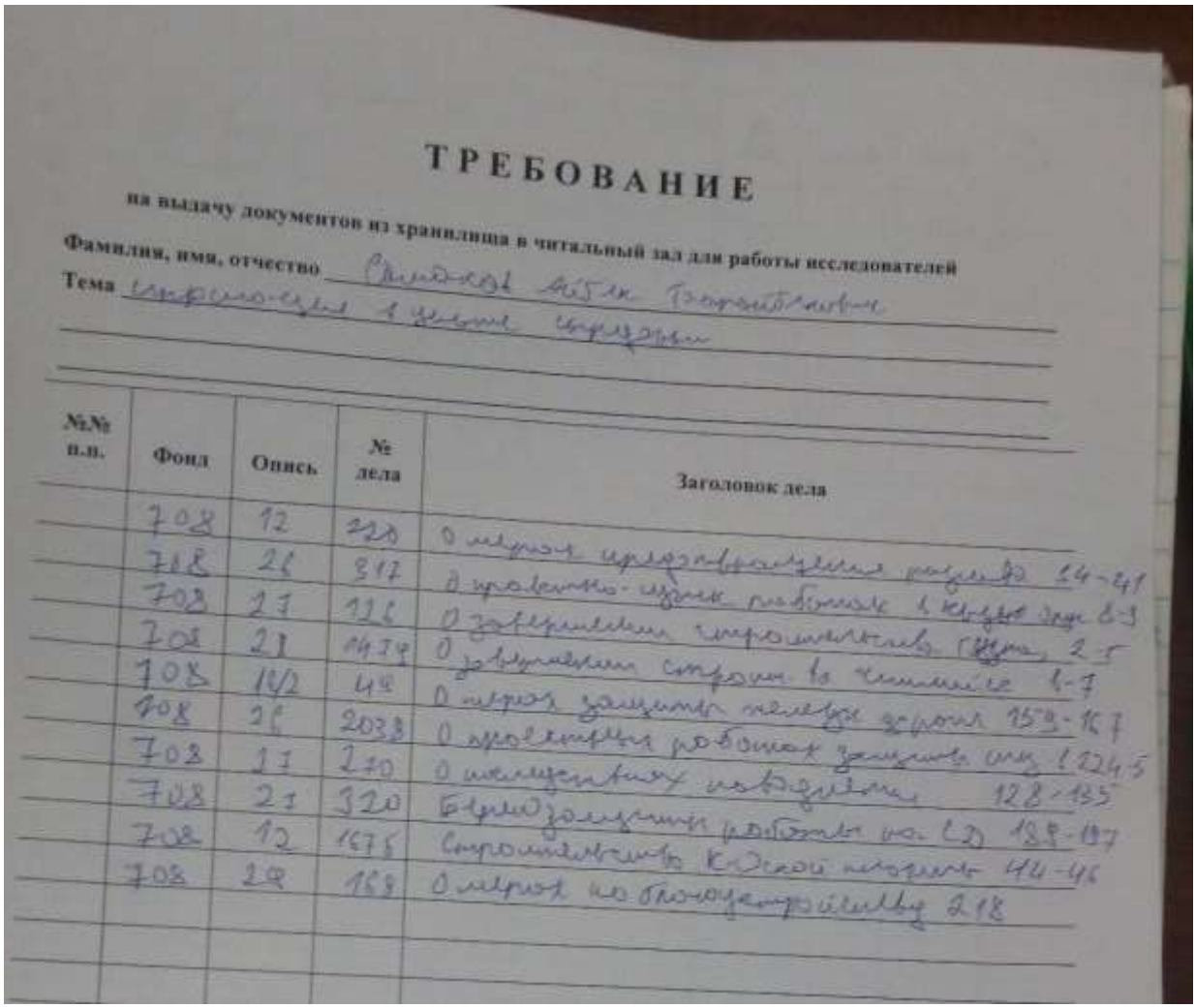
First, I tried to take pictures of the lines on the ground or reproduce the lines my informants drew on a table (or other surfaces) in my notebook based on my memory of it. It did not go well due to the lack of my drawing skills as well as due to the fact that it was difficult to remember the image drawn by imaginary lines. Then, I started carrying with me a larger notebook, which I would offer to my informants for drawing in case they started to draw things. Although it was definitely a better way to capture those drawings, it did not always work as intended. For example, some people became unsure of their drawing skills and it felt like they were intimidated by a clean sheet of paper. When I suggested drawing the map in my notebook, the mapping became a performative exercise (Crampton 2009), which invoked the feeling of shyness for some, while others tried to

achieve perfection as if it was an art and would ask if they could redraw their maps as they were unsatisfied with the previous one.

During the second field visit, I tried to use preprinted maps of the area and Google Earth to further experiment with the mapping method. Printed maps did not work well as the scale was too small for the informants to show the areas they wanted me to show, although they were definitely interested in maps and often asked me to leave a copy with them, which I did. That is why I ended up using maps as an elicitation tool for my interviews.

Google Earth was a more successful tool, although it required using a laptop and it was more time-consuming. With Google Earth, the informants would show me the areas where they fish or collect reeds. The capacity for zooming in and out was very convenient and those who agreed to show their livelihoods on the map seemed very engaged. Thus, even though the spatial analysis and GIS do not feature in my thesis, the maps and cognitive mapping exercise contributed a great deal to gathering the ethnographic data used for the thesis. Thus, these mapping methods were used more as an elicitation tool for interviews and allowed me to get a better understanding of local livelihoods.

2.2. Archival research in Kazakhstan



ТРЕБОВАНИЕ

на выдачу документов из хранилища в читальный зал для работы исследователей

Фамилия, имя, отчество

Тема

№№ п.п.	Фонд	Опись	№ дела	Заголовок дела
	708	12	220	
	708	21	817	
	708	21	116	
	708	21	1419	
	708	1/2	48	
	708	21	2038	
	708	21	210	
	708	21	320	
	708	12	1675	
	708	29	169	

Figure 2.4. A request form for archival folders in the Central State Archive in Almaty

My field research methods included both ethnographic and archival methods. Gouda et al. (2009) and Decker and McKinlay (2020) note that the use of archives in anthropological research has been increasing in recent years. When going into archives I did not have a goal of doing very systematic and in-depth research on the Syr Darya River delta. The main goal of the archival research was to obtain background information to historicize the Syr Darya Delta. As Hoffman (2021) notes that a foray into archives has almost become a 'right of passage' for the anthropologists interested in exploring the changes over time in their field sites.

Although ethnographic data formed the backbone of this thesis, the archival research yielded enough data to highlight some aspects of the environmental change in the Syr Darya Delta, which are presented in Part 2. Thus, the combination of ethnographic and archival research helped me to

better historicize the river delta, which is [i.e., historicization] one of the primary reasons why anthropologists go to the archives (Punathil 2021). Decker and McKinlay (2020) noted that working in archives offers a researcher a deeper understanding of how actors understood events and processes at the time and what their fears and expectations were. Similarly, Zeitlyn (2012) notes by working in the archives researchers can follow the development of ideas and processes across historical periods. Incorporation of the archival research helped me better understand the 'iconic forces' in the Syr Darya River Delta, i.e., the fears of floods and expectations of droughts and water-scarce years. These archival insights are reflected in Chapter 4.

Here I describe the process of my archival research to give the reader an idea about how I obtained the archival materials that I used in some parts of the thesis.

While the oral history has been collected during my first and second field seasons in 2016 and 2017 and a short visit in 2018, I spent two months in 2017 working in the Central State Archive in Almaty,[1] the Archive of Photo and Video Documents in Almaty,[2] the Presidential Archive in Almaty,[3] and the Kyzylorda Regional Archive of Social and Political History.[4] Up until 2017, I had no experience in conducting archival research and took into account Trevisani's (2007, p.353) experience who complemented ethnographic research with archival sources in Khoresm:

> *[Having] no previous training and experience about how to work in an Uzbek district state archive, I had to acquire confidence over methods and over the adequate way to proceed in a process of learning by doing, ending up hence and forth with some beginner's mistake.'*

Having noted how prone I am to making beginner's mistakes, I had sought advice from William Wheeler, Nicollo Pianchola, Isabel Ohayen, and Xenia Prilutskaya on how to best organize my work. Indeed, Marsh (2021) noted that many anthropologists lack an understanding of common archival practices. Based on their advice, I started my archival work in Almaty archives as opposed to one in Kyzylorda. The rationale was that the provincial archive would be more willing to co-operate if they know that I already had worked in the central archives in Almaty.

One of the main challenges that I encountered was that the archival rules were quite restrictive when it came to copying the archival materials. For example, as a researcher, I was allowed to photocopy no more than 300 pages per year. In addition to that, I could not copy more than 30% of a single folder. At the photo archive, I was allowed to copy up to 5 minutes of video footage and 8 pictures. I inquired informally why the copying limits were so stringent. One of the archive staff told me that a few years ago, Kazakhstan's archives experience an influx of researchers from Uzbekistan who copied the entire registries and recreated these registries in Uzbek archives. Such

[1] Tsentral'nyi gosudarstvennyi archiv, abbreviated as TsGA
[2] Archiv kinofotofono dokumentov, abbreviated as AKFFD
[3] Archiv president Respubliki Kazakhstan, abbreviated as APRK
[4] Gosudarstvennyi archiv obschestvenno-politicheskoi istorii Kyzylordinskoi oblasti, abbreviated as GAOPIKO

practice was seen as piracy and copyright infringement by the Kazakh archives, so they imposed stringent restrictions on copying.[1]

Regardless of the underlying motifs for restricting the copying of archival materials, these restrictions seemed to sprout from a notion that archives contained some secret information. I think that was why the archive officials often treated me with suspicion and wondered why it was not a Kazakh person doing a study on the Syr Darya Delta.

While working in the archives, I ended up focusing on the period between 1938 till 1975. I did not select this timeframe for a historical or any other reason. Rather, this timeframe was 'imposed' on me by the availability of the archival materials. I will take a few sentences to explain it: the first archive I worked in was the Central State Archive, where I wanted to go through the yearly reports of the KazSSR's Ministry of Water Resources from 1938 to 1991. I managed to get hold of those reports published between 1938 and 1975 but the folders from 1975-1990 were missing (although the registry indicated that they were available). Since my data from the central archive was limited to the 1938-1975 time period, I focused on the documents from the same time in the three other archives. This choice may raise questions, e.g. would it not make sense to get from other archives that I could not get from the central archive? That is a fair question but I decided to focus on the same timeframe in all archives because the types of documents stored in every archive were different and by focusing on the same timeframe I could put together a more detailed picture of Syr Darya Delta in that time period. For example, the Central State Archive contained the annual reports of the KazSSR's Ministry of Water Resources, whereas the President's Archive contained documents of Kazakhstan's Communist Party. Thus, focusing on the same timeframe allowed me to have a more complete picture of that period and triangulate my findings. In the following paragraphs, I provide an overview of the sources I worked with.

2.2.1. The overview of the archival sources

Decker (2013) emphasized the importance of considering how archives were created, and how one can legitimately use them despite their limitations. The archival materials in all four archives I worked in were set compiled during the Soviet era and hence, can be seen and understood as Soviet archives.[2]

The practice of interacting with the archival sources was set up in a similar fashion. E.g., the first archival list I was given was a directory of archival funds. This directory was a laminated book that contained the list of funds (фонды in Russian) organized and grouped together in accordance with the governmental agency or other entity (фондообразователь in Russian) that produced the

[1] It should be noted that this information was communicated to be by only one archive staff member. Hence, it could be just an opinion or a hearsay. I did not follow up on that with other archive staff members or check the validity of this claim using independent sources.
[2] See Kragh and Hedlund (2015) for an introduction to working in Soviet archives.

documents contained within a particular fund. For example, the Fund Ф.Р – 1999 contained the documents of the Kazvodhozsnabjenie (Supply of the Kazakh Water Department).

Each archival fund contained a more detailed list(s) called the registries (описи in Russian). These registries contain references to the actual folders with documents (дела in Russian). For example, Fund Ф.Р – 1999 by Kazvodhozsnabjenie contained several registries. Registry #2 contained references to folders produced by Kazvodhozsnabjenie from 1961 to 1973. The work in the archives was set up in a way that I received the list of funds on the first day and placed the order for the registries. On day two, I looked through the registries and placed the order for the specific folders. Only on the third day, I was given the folders with archival documents.

In the Central State Archive, I looked into two funds such as Р – 1999 and Р-1626. The Р –1999 Fund contained information on wells in pastures and nothing about the Syr Darya River. The Fund Р-1626 by the Kazminvodhoz, the Ministry of water management contained information about the water resources of Kazakhstan. I looked at annual reports, construction plans, Ministry orders, and directives, and the correspondence with obkoms and other ministries. Most of the information I found in those annual reports was related to the construction of irrigational systems (including Kyzylorda and Kazaly dams), and the amount of water in the irrigation sources (including the Syr Darya) as well as bogging (formation of swamps), water logging, and salinization. Overall, I looked at around 108 folders from those two Funds of the Central State Archive.

In the Presidential archive, I started working with the thematic catalog and wrote down the folders related to Syr-Darya, Kyzyl-Orda, and water. When I received the first batch of folders, I realized all of them were from Fund #708. After that, I ordered the registries of that fund and looked through the years 1948-1991, and wrote down the reference numbers of the folders I would like to look into up until 1991. Due to the time limitations, I managed to look through the documents from 1948-1969 only.

I worked in the President's archive for three weeks and looked through 57 folders from Fund #708 by the Central Committee of Kazakhstan's Communist Party, which contained the letters and correspondence between the regional obkoms and the Central Committee of the Communist Party of the Kazakh SSR. Most of the documents in this Fund relate to the correspondence of the district/region/country Communist Party committees about various issues including hydrological infrastructure and planning as well as extreme weather events. It contained classified folders that were declassified after the collapse of the Soviet Union.

The archive of the Social-Political History of the Kyzylorda Region was formerly the Kyzylorda's Communist Party's archive. Thus, it was a subsidiary of the Presidential Archive in Almaty, which is a former Archive of the KazSSR's Communist Party.[1] In the archive of the social-political

[1] There was another archive in Kyzylorda, which was a regional branch of the Central State archive. Due to the time limitations, I did not visit that archive.

history of the region, I looked at Fund #268, which consisted of a single registry containing references to folders from 1938-1991. I examined 109 folders covering the period from 1938 till 1991. These folders contained the letters, telegrams, and correspondence pertaining to irrigation development in the Kyzylorda Region.

Since archival sources are used extensively in Chapters 3 and 4, I should tell the reader more about what I was looking for, and what I did not delve deeper into. As mentioned above, my research focus within the archives naturally dovetailed into 1-2 Funds pertaining to the water issues in the study area. To avoid 'cherry picking' (Yoneoka and Rieck 2023),[1] I browsed through all available folders within the given Fund. These Funds contained the Water Ministry's annual reports as well as Kyzylorda Obkom's correspondence related to irrigation issues in the Kyzylorda region. That is why one can notice that in your account, there are few real people as actors, just institutions. This bias toward institutions was not my preference. It stemmed from the actual language of the documents, in which the authors of the reports or even letters would speak on behalf of the institution. For example, such phrases as 'Kyzylorda Obkom asks the KazSSR Sovmin….' were very common. Such focus on institutions as opposed to people is a very interesting phenomenon that I did not have a remit to delve deeper into. Moreover, within the scope of my thesis and the archival fieldwork, I could not explore more the power relations among those institutions, their rivalries, struggles, the reasons why some documents were addressed to a certain institution rather than a different one. Certainly, the secondary literature could help me with situating my findings within a broader historic context. However, since these questions are tangential to my main claims in the thesis, I did not explore them any further.

While working in the archives, I encountered a frequently-mentioned challenge of the sources being partial and incomplete. For example, Registry 3 (1972-1977) of the 1626 Fund was supposed to have folders until 1977. Although the reference numbers for the folders of 1975-77 were present, the folders were not found in the depositories when I requested them. Interestingly, the rest of the P-1626 (i.e., 1977 onwards) were not deposited in Almaty. When I inquired where it could be found, the archive workers made a guess that it could be in Astana archives. Thus, it became a gap in my review of the 1626 Fund. 'Missing 'and incomplete materials are a common feature of archives around the world (e.g., Punathil 2021, Kipping et al. 2014) and in Kazakhstan in particular (Wheeler 2021, 2016).

[1] "Cherry picking" refers to the selective use of data, evidence, or information to support a particular argument, hypothesis, or point of view while ignoring or omitting data that contradicts it. It involves picking and presenting only the information that aligns with one's preconceived beliefs or desired conclusions, while disregarding or neglecting data that might provide a more balanced or accurate perspective. Cherry-picking can be intentional or unintentional and stems from arbitrary defining of the inclusion and/or exclusion criteria for a subset of all studies/sources that changes the result and leads to one's desired conclusions (cf. Yoneoka and Rieck 2023).

Figure 2.5. The Kyzylorda dam. February 17, 1956. AKFFD, P911.

Part 2. Environmental change in the Syr Darya River delta

The starting point of my thesis is the premise that the Syr Darya Delta has been an area of rapid social-ecological change. This seems to be a claim that does not require much proof. However, most of the literature on environmental change in the Syr Darya Delta has been framed as the environmental change around the Aral Sea. The fate of the Aral Sea made it a popular research topic, which is why there is a substantial body of literature to draw from. The excerpt below from a newspaper article on the Aral Sea published in the Moscow-based Novaya Gazeta [lit. the new newspaper] is a rather popular narrative in the mass media publications:

> *The Aral Sea dried up just in 40 years. The tragedy started in the 1960s due to unchecked diversions of water for irrigation. At the turn of the century, the former 4th largest lake in the world had only 10% of its water volume and its size shrunk by three-quarters. Ships lay stranded in a saline desert, while people living on its shores found themselves in the epicenter of the ecological catastrophe* (Hasanov 2020).[1]

This excerpt is very typical for both academic and non-academic publications because a) it foregrounds the shrinkage and/or desiccation of the Aral Sea in the last 40-60 years, b) it uses the language of 'ecological tragedy,' or 'environmental catastrophe/disaster,'[2] and c) it frames diversions of water for irrigation as the main reason for the catastrophe (e.g., Gaybullaev et al. 2012, Kosarev and Kostianoy 2010).

Although the Aral Sea level fluctuations were quite significant reaching up to 40m in the last 10-15 thousand years (Boomer et al. 2009, Boroffka et al. 2006, Cretaux et al. 2013, Krivonogov et al. 2010, Krivonogov et al. 2014), the sea level stayed the same from 1911 (when the instrumental measurements began) to 1960s (Micklin, 2007, p. 49). While there is no consensus on the reasons for the Aral Sea fluctuations from Holocene until Middle Ages,[3] the post-1960s shrinkage is unanimously considered to be caused by anthropogenic factors. For example, the UN website described the UN Secretary General's visit to the Aral See in 2010 as follows:

> *Secretary-General Ban Ki-moon on Sunday witnessed one of the world's worst environmental disasters as he flew over the shrinking Aral Sea – a sight which he said underscores the need for collective action to save the planet's resources. The*

[1] Original text reads as follows: 'Арал высох всего за сорок лет. Трагедия началась в 60-х — из-за неумеренного забора воды для сельского хозяйства. А к нулевым в некогда четвертом по величине озере мира ее осталось всего 10%. Площадь Арала сократилась на три четверти. Корабли оказались в соленой пустыне, а люди, жившие по берегам, — в эпицентре экологической катастрофы. Новая Газета, 26.11.2020'
[2] Wheeler (2016, 2021) addresses this narrative and attempts to decenter the environmental disaster narrative.
[3] For example, the archeological and geomorphological analysis of the Aral Sea basin has shown periods of substantial water level fluctuations (Boomer et al. 2009; Boroffka et al, 2006, Cretaux et al. 2013, Krivonogov et al. 2014). The reasons for the Aral Sea level fluctuations since Holocene and until the 1960s are the subject of heated debate with some scholars pointing at climatic cycles (Krivonogov et al., 2014), while other scholars claim that anthropogenic factors could have played quite a big role since the evidence suggests that irrigation in the Aral Sea Basin from Late Antiquity until the Early Middle Ages seems to have been comparable in scale to the current one (Boroffka et al. 2006).

> *Aral Sea, once the world's fourth largest lake, has in recent decades shrunk in size by more than 70 per cent after tributary rivers were diverted for irrigation projects. The salinity of the region's soil has soared and the area is also heavily polluted. "It was shocking," Mr. Ban told reporters in Nukus after a helicopter tour of the area with Prime Minister Shavkat Mirziyoyev of Uzbekistan, the latest stop on his visit to Central Asia. "It is clearly one of the worst environmental disasters of the world... It really left with me a profound impression, one of sadness that such a mighty sea has disappeared," he stated. The Secretary-General said that, standing on the shores of a vanished sea, he could not see anything except a "cemetery of ships marooned in the sand." As a result of the disaster, people are getting sick, the land is poisoned, and storms blow dust and salt as far as the North Pole." It was a vivid testament to what [...] happens [...] when we waste our common natural resources, when we neglect our environment, when we mismanage our environment."* (Ban, 2010)

This last quote is very similar to the opening vignette from Novaya Gazeta as it exploits the same imagery (e.g., stranded ships) and narratives (e.g., drastic shrinkage of the sea due to water diversions for irrigation). This evidence showcases that the Aral Sea including the Syr Darya Delta has always been an area of environmental change. However, the change in the Sy Darya Delta does not have similar 'recognizable' discourses and imagery. While the Syr Darya River delta is often overlooked by researchers focusing on the environmental change around the Aral Sea, the delta presents an interesting case of successful commons, whereas the Aral Sea tragedy has been seen as a classic example of the tragedy of the commons (Debaere 2020, Peachey 2004). That is why Part 2 of thesis consisting of three chapters strives to foreground the river delta in describing and conceptualizing the environmental change in the study area.

Chapter 3. Syr Darya River Delta Ontologies

Chapter 3 starts with exploring 'what is the river delta?' question. I outline approaches to defining the river delta and discuss the meaning of frequently used terms such as 'delta' and 'lower Syr Darya,' which are used in the literature to refer to my study area. Building on the concept of 'iconic places,' i.e., places that are immediately recognizable to people beyond the Syr Darya Delta' as somewheres that matter, that one will have an opinion on and a relationship with' (Féaux de la Croix 2011, p. 25), I present a local river ontology of the Syr Darya Delta, according to which the delta region comprises two distinct yet interconnected iconic places: that is, 'Syr' that covers riparian areas and 'Qyr' that covers the Karakum semi-desert pastures north of the river. Inspired by Morita and Jensen's (2017) description of terrestrial and amphibious delta ontologies that emerged due to infrastructural development in the Thai Chao Phraya delta in the 20th century, I attempt to foreground the infrastructure in 'Syr' and 'Qyr,' i.e., irrigation canals and wells respectively. Such foregrounding of irrigation infrastructure allows me to describe the local

ontology of the Syr Darya Delta as the interactions of these two iconic places, i.e., Syr and Kyr. In other words, I frame the envirotechnical changes in the Syr Darya Delta, e.g., building of irrigation canals to irrigate and turn pastures of Qyr into rice fields during the Soviet era, as an 'expansion of Syr into Qyr,' while later deterioration of irrigation infrastructure as well as increased channelization of the Syr Darya as 'Qyr's expansion into Syr.' Thus, Chapter 3 contributes to the literature on environmental change by highlighting the ontological aspects of environmental change.

3.1. What is the river delta?

> *The Syr Darya River is the main water artery of the region. The river flows for about one thousand kilometers within the Kyzylorda region and makes up a broad delta with the Aral Sea.* [1]

This is an excerpt from an introductory note on the management of irrigation systems in Kyzylorda found within an annual technical report of the Kazakh Ministry of Water Resources, which mentions that the Syr Darya River makes up a broad delta with the Aral Sea. Even though I read similar passages in almost every annual report by the Ministry of Water Resources the question of **'**What is the river delta?' stayed in the shadows for quite a while. In fact, I started contemplating it only when I started writing. In a hindsight, it appears to me that I could have gone to the field with a 'what is a river delta?' question and I would have gotten enough ethnography to write an entire thesis on it. I am very surprised now how come this question eluded me all this time given that I would always introduce myself as a 'delta' guy: e.g., at the conferences, seminars, and online meetings as well as when explaining my research to my friends and relatives I have always referred to the 'Syr Darya Delta.' On the other hand, I am glad that I went to the field without a predefined notion of the delta because as Richardson (2021, p. 48) notes 'the term 'delta 'almost automatically positions us 'above 'the landscape because of its entanglement with modern cartography, engineering, and state-building agendas.' Bearing in mind that every definition of terms is purpose-bound, in my case the definition of delta seemed to have always been implicit both for me and others. Indeed, I am not striving to find the true boundary or characteristic of 'the' delta. Instead, I discuss the different approaches to defining delta to use them as a background against which the local delta ontologies become more vivid.

'What is the river delta?' is still an open question as many scholars 'treat the delta more as a question than as an already-established notion.' (Krause and Harris, 2021, p. 3). The textbook definition of a river delta tells us that it is a landform at the 'end' of the river, where it enters the ocean, sea, or lake. While exploring geological perspectives on the Mississippi Delta, Cox et al. (2015, p. 11) notice that 'in a strict geological sense, a 'delta' is a pile of gravel, sand, and mud

[1] p. 1. TsGA, 1972, F.1626, Op.3, D.929.

that is being dumped at a continent's edge at the mouth of a major river.' The delta is formed by the sediment carried by the river and can have different shapes and sizes.

The term delta historically comes from the Nile delta, which forms a triangle-shaped floodplain, which resembles the Greek letter '*delta*.' Hence, the term. The Syr Darya River branches out into many smaller streams not far from where it enters the Small Aral Sea and forms a triangle-shaped 'bird-foot' delta. However, this area is a hundred kilometers downstream from the Kazaly district, where I conducted most of my ethnographic research. So can I claim that my fieldwork was in the river delta? The short answer for my earlier question is 'yes' because, in many delta regions of the world, the customary meaning of delta stretches beyond the 'bird-foot' physiographic feature of the landscape. For example, Collins (2015, p. 2) notes the following about the Mississippi river delta:

> *Defining the Mississippi River Delta, however, is a much more difficult task. If etymology is considered, the literal definition is the most narrow: the Mississippi River Delta is the land built up by alluvium where the Mississippi River enters the Gulf of Mexico in Louisiana. This physiographic feature, however, is not the customary meaning of the Delta. The region more typically associated with the term is not actually a river delta but is the land that lies along the Mississippi River north of the river delta, which includes the Mississippi embayment, the sedimentary basin that is part of the larger alluvial plain created by the Mississippi River' (Collins 2015, p.2).*

Similarly, the literal definition of the Syr Darya Delta is the most narrow one, i.e., the triangle-shaped floodplain where the Syr Darya River flows into the Northern Aral Sea. However, just like in the Mississippi delta, the customary meaning of the Syr Darya Delta stretches far beyond the 'bird-foot' feature of the landscape.

Another geophysical feature of some deltas is river distributaries (also known as arms or channels), which are streams of water that branch out from the main river course. In a sense, distributaries are the opposites of river tributaries. In the case of the Mississippi River, Davidson and Paradise (2015, p. 65) note that:

> *In defining the Delta as a region it is important to first note that a strictly hydrological definition would set the northernmost extent of the Mississippi Delta at the confluence of the Mississippi River and the first distributary that begins the process of separating the river flow into a multitude of downstream channels that eventually reach the Gulf of Mexico.*

In the case of the Syr Darya River, Jangadarya [lit. The New River] is the first largest distributary of the Syr Darya River, which branches out from the primary river course around Kyzylorda City and it used to flow into the Aral Sea. It is a bit ironic that in Kazakh this distributary is called the

New River, as the archeological evidence suggests that it used to be the ancient riverbed (Adrianov 2016), i.e., it would have made much more sense to call it the 'old river.' If one perceives the Syr Darya River delta to start from the Jangadaya River (Kyzylorda City), then Syr Darya Delta encompasses almost a 1,000 km stretch of the river. In this case, the beginning of the river delta will be about 400 km upstream from my study site. Although I spend some time both in Kyzylorda City and on the shores of the Aral Sea near the 'bird-foot' delta of the Syr Darya River, my research site ends up being in between those two localities, from where one can claim that the river delta starts. Thus, having taken this evidence into account I must inform the reader that even though my research was located within the river delta, it did not cover the delta area in its entirety.

Over the course of my research, I used Kazakh, Russian, and English language literature. If the term delta was quite widespread in the English language literature, the Russian language literature as well as local hydrologists and water professionals seldom use the term delta and use the term '*nizov e* '[низовья Сырдарьи], i.e., Lower Syr Darya or the Lower stretches of Syr Darya. In the Russian language terminology, the river is divided into three parts: Upper, Middle, and Lower Syr Darya. It seems like such three-piece separation of the rivers is quite common, e.g.:

> *Geologists divide the Mississippi Valley into three broad regions: Lower, Middle, and Upper. The upper segment begins at the headwaters in Minnesota and continues downstream to the Missouri River; the middle section is the area from the Missouri River to the Ohio River, and the lower reach extends for almost one thousand kilometers (about 620 miles) to the Gulf Coast, including the bird-foot' delta below New Orleans. The broad, lower valley alluvial plain is known as the Delta' in common parlance' (Dye 2015, p. 28).*

If in the case of the Mississippi River, such a threefold division is more geological, in the case of the Syr Darya River, it seems to be more hydrological, i.e., the way the Syr Darya River was managed from the water-resource management perspective. According to this approach, the Upper Syr Darya starts from the confluence of Naryn and Karadarya and stretches until Kairakkum Reservoir, the Middle Syr Darya is the stretch between the Kairakkum and Shardara Reservoirs, while the Lower Syr Darya starts from the Shardara Reservoir and ends with the Aral Sea. My hydrologist and water professional interlocutors could not explain to me why, when, and how such division came into being. They often simply told me that that's what they were taught in university. I saw such a three-piece division of the Syr Darya River stream terminology also featured in the archival sources.

Without making any claims about hydrological, socio-political, or environmental reasons behind such division, I cannot but notice that the borders between the Upper, Middle, and Lower Syr Darya are politico-envirotechnical in nature (cf. Pritchard 2011 for Rhone River). Indeed, the Lower Syr Darya starts below the last major water reservoir, i.e., Shardara water reservoir, which is located at the border of Kazakhstan and Uzbekistan (former KazSSR and UzSSR). The political

(administrative) and envirotechnical aspects, also cut up the river into stretches even within the Lower Syr Darya. For example, the archival documents of the Kyzylorda Water Management Directorate, as well as the local government of Kyzylorda, often referred to the amount of water they were receiving at the Tumen-Aryk hydro post, which is at the border of the Kyzylorda and Turkestan[1] regions.

In everyday life conversations with water professionals or farmers, the distinction between 'upper' and 'lower' rivers also came up frequently, however, in a slightly different way. For example, for local farmers in the Kyzylorda region, the areas above the Kyzylorda irrigation dam are considered as upper stretch, while areas below the river as lower Syr Darya. I observed a similar situation in Kazaly, where the Kazaly (aka Baskara) dam serves as the point that splits the stream into upper and lower parts. Thus, the infrastructure objects coupled with political or administrative borders often serve as a basis for delineating stretches of the river. Thus, similar to how the Rhone River has never been a purely environmental or technical system (Pritchard 2009), the Syr Darya Delta is not merely geographical but also a technical and social concept.

3.2. Local delta ontologies: iconic places in the Syr Darya Delta

I have shortly introduced geological, hydrological, and archeological approaches to defining the Syr Darya Delta. Besides these, there are other approaches that focus on sociodemographic (Green 2015), biotic (i.e., species composition (Saikku 2015, Dye 2015)), as well as vernacular (aka perceptual) and functional (Davidson and Paradise 2015) characteristics of river deltas. Having examined a number of these characteristics in the Mississippi delta, Davidson and Paradise (2015, p. 85) concluded that:

> *There is, in fact, not a single significant economic, political, or demographic measure that is unique to the Delta; nor is it possible to layer different indicators to create a composite of factors that allows the Mississippi Delta to emerge as a unique region that can be defined by particular physiographic, sociodemographic, economic, or political criteria. … from a geographic perspective, the Delta can be said to exist only as a perceptual or vernacular region.*

Similar to what Davidson and Paradise (2015) found in the Mississippi delta, I too observed that there were no significant sociodemographic criteria that could define and/or describe the Syr Darya Delta. Within the Syr Darya River delta population I was interested in people living in a river environment, and whose livelihoods were (partially) dependent on it. Yet, even this criteria was not helpful in attempting a definition because not all households living close to the river depended on it (i.e., those who had wage or *vahta* jobs), whereas many households living farther away from the river complemented their livelihoods with income from occasional fishing. That is why I turned

[1] Formerly, Chymkent region, Southern-Kazakhstan region, and since 2019 Turkestan region.

my attention to the perceptual or vernacular dimensions of the Syr Darya Delta, which are discussed below.

Figure 3.1. A typical landscape in the Syr (top row) and Qyr (bottom row)

3.2.1. Qyr and Syr: iconic places of the river delta

> *February 2016. Aiteke Bi. My host father in Kazaly was telling me about his genealogy over lunch. Genealogy seems to be a common topic for conversation here. After naming his seven forefathers, he said: Since you are our host son, you can call yourself Jachaiym as well!' I agreed to introduce myself like that from now on and everyone around the table was happy about it. Then, my host father started telling me that one of the practical reasons for knowing at least seven generations of ancestors is to prevent marriages between relatives. He explained that if a groom and a bride are related within seven generations along with patrilineal ancestry, they are considered siblings, hence their marriage will not be allowed as incestuous. Then, I asked my host mother to tell me about her genealogy. To my surprise, she turned out to be from the Jachaiym tribe as well! So I asked them how come they are married if they belong to the same tribe? Because just a few minutes earlier my host father was telling me that marriages within the same tribes were a taboo. They explained to me that even though both of them belong to the Jachaiym tribe, they do not have a common ancestor within seven generations. They further*

> *explained that Jachaiym is a very large tribe, which has two informal branches, called Qyr Jahaiym and Syr Jahaiym. So my host mother belonged to the former, and my host father to the latter.*

This distinction between Syr and Qyr often made by my informants caught my attention and I would go on to hear this comparison in my interviews throughout my fieldwork. In this section, I explore this Syr-Qyr comparison used by delta people to describe particular places, livelihoods, habits, and self-perception. In essence, this Syr-Qyr duality is what defines the Syr Darya Delta as a vernacular or perceptual region.

My first claim in this section is that the 'Syr' and 'Qyr' are the river delta landscapes that can be understood as the iconic places in Féaux de la Croix's (2016) sense:

> *[I] call these three kinds of places [dams, pastures, holy sites] iconic because each of them inspires a degree of reverence, albeit not always in the strictly religious sense. … But they are also iconic in the sense of being immediately recognizable to Central Asians beyond the Toktogul valley as somewheres that matter, that one will have an opinion on and a relationship with. Like an icon on a computer desktop, they are embedded in systems of value. Clicking on an icon like the dam opens up a whole program of responses – although unlike in a computer, these are programs in the plural and consist of a repertoire of possible responses rather than strict commands. I employ the term icon here in the immediate, everyday sense associated with iconic figures like Elvis Presley and with computer desktops. The places I discuss are not full-blown icons in the strict semiotic sense, as a sign or representation which stands for an object and somehow resembles it. However, they do serve as shorthands for talking about the life choices of individuals and groups. And they have charisma: like Elvis Presley (Féaux de la Croix, 2016, p. 25).*

In other words, I claim that Syr and Qyr are 'iconic places' (Féaux de la Croix 2016) that make up the 'river delta' from a 'vernacular/perceptual' perspective (Davidson and Paradise 2015). I learned that 'Syr' referred to the river and the riparian areas, while the 'Qyr' referred to the semi-desert steppes on both sides of the river.[1] Such distinction between a river-fed strips and the territories beyond is not unique to Syr Darya. For example, a riparian biodiversity-rich papyrus wetland/marshland in the Sudanese stretch of the Nile River is referred to as Sudd (Conniff et al. 2013, p. 15).

[1] Only later I was corrected: it turned out that 'Qyr' refers only to the Karakum semi-desert steppe north of the river, while the pastures south of the river are called Kyzylkum [kaz. lit. Red sands]. When I inquired why the term Qyr did not encompass the Kyzylkum desert, I was instructed that up until a couple of hundred years ago, the Syr Darya River was the boundary between the Turkmen and the Kazakh tribes, with the former controlling the areas south of the river, i.e., Kyzylkum and the latter controlling the north, i.e., Karakum. My informants speculated that the Syr-Qyr division might have appeared before the Turkmens conceded Kyzylkum to the Kazakh tribes.

Traditionally both Syr and Qyr were pastures, with the former being the wintering ground, while the latter serving as summer pastures similar to Kyrgyz *jailoo*. The seasonal migrations of the Kazakh tribes and their flocks happened between Syr and Qyr: in winter flocks were taken to 'Syr' to feed on reed beds and other vegetation abundant in the riparian zone, while in summer the tribes would migrate to Qyr as it was cooler and there were no mosquitoes and bugs that would plague the livestock in the riparian zone during the summer. The logic behind this pattern of migration is eloquently captured in the proverb 'Qyrda ming bale, Syrda ming bale,' which means 'there is one curse in the Qyr and thousand curses in Syr.' The single curse of the Qyr area referred to wolves that posed threat to the flocks, while a thousand curses of the Syr area included various bugs, ticks, and mosquitoes that plagued the livestock in summer and did not let it fatten up.

During the Soviet era, such winter-summer pasture arrangement between Syr and Qyr was mostly preserved, although the Syr became predominantly an area of irrigated agriculture. For example, an annual report for 1968 of the Kyzylorda Vodhoz[1] highlighted in its introductory note that:

> *The pastures in the [Kyzylorda] region are divided by the Syr Darya River into two zones: southern zone is Kyzyl-Kum and the northern zone is Kara Kum.*[2] *…There are a 50 km long migration corridor for livestock in Kazaly district. Livestock migrations happen twice a year in April-May and August-September.*[3]

My interlocutors from Sentas village located in the riparian area (i.e., Syr), which used to be a herding sovkhoz confirmed that during the Soviet times, they would migrate with their livestock to the Qyr in summer and return to the village for wintering.

I claim that both Syr and Qyr are iconic places because each of these places a) inspires a degree of reverence to the delta inhabitants, has a charisma, and immediately recognizable to people in Kyrylorda region and b) is a geographic marker used as a shorthand to talk about livelihoods, lifestyles, and life choices of individuals and groups. To illustrate the first point about reverence, I turn to a very common catch phrase that turned into a proverb that reads 'Syr is the mother of Alash.' This proverb can be seen painted on walls and administrative buildings and is reported to have been coined by Nursultan Nazarbaev. This proverb did not appear to be only a piece of state's nation-building discourse as many of my respondents mentioned it in the interviews. When I asked to explain the proverb, the responses I got were also quite similar and went along the following lines: in Kazakh genealogy, there is a term called *Alty Alash* [lit. Six Alash], which refers to six brother-nations that are very close kin to one another. The six Alash include Kazakh, Kyrgyz, Karakalpak, Nogai, Bashkurt/Tatar,[4] and Uzbek. Syr is revered as a birthplace of all these nations and that is why it is referred to as the 'mother' of Alash. Thus, Syr area was iconic in a sense that

[1] Kyzylorda Regional Directorate of Melioration and Water Resources
[2] p. 7, TsGA, 1969, F. 1999, Op. 2, D. 20.
[3] p. 9, TsGA, 1969, F. 1999, Op. 2, D. 20.
[4] Some respondents named Tatar and Bashkurt as separate ethnic groups, whereas some lumped these two into a single group.

it is revered as a birthplace of Kazakh nation (as well as five other neighboring nations) and the local inhabitants take a particular pride in 'being from Syr.'

As for the Qyr, the reverence the locals have towards it is very similar to the way Kyrgyz people value *jailoo*, the summer pastures. There are many similarities[1] between Qyr and jailoo as both of them are summer pastures.[2] Just like in the case of Kyrgyz *jailoos* (cf. Féaux de la Croix 2026, p. 75-76), Qyr is often portrayed as blessed, prosperous [kaz. *berekeli*], spacious [kaz. *darkan*], full of livestock [kaz. maldy], clean [kaz. taza], and aligned with traditional Kazakh lifestyle [qazaqi jasoo].[3] Thus, the iconic quality of Qyr is very much aligned with the way Féaux de la Croix (2016, p. 82-83) describes summer pastures in Kyrgyzstan as iconic places that:

> *are aesthetically stunning, provide wealth in the form of fat livestock, generate health through air, water and foods, and bring the symbols of ethnic Kyrgyz nationhood and statehood together as a lived experience. While the jailoo 'hosts' these features, this should not be taken as a causal argument in the sense that it is these features that make the jailoo so precious. On the contrary, it is the jailoo as a whole from which these good things flow. What makes the jailoo so powerful is not the coming together of isolated qualities, but the tenacious persistence of this way of life, the genuine enjoyment it can evoke, and the ease with which it fuses together notions of ethnic nationhood allied to state and territory.*

Having explained the 'reverence' aspect, I would like to turn to the second part of my argument and demonstrate that the terms Syr and Qyr as geographic markers that are used as shorthand for indexing lifestyles and livelihoods. For example, one of my interlocutors explained his transition from Qyr to Syr as follows:

> *I grew up in the Qyr herding our flocks of sheep and horses. I started living in the Syr after I got married and got a job here in Sentas. I am Jachaiym. Do you know that there are two varieties of Jachaiym people [laughs]: the Qyr Jakhaiym and the Syr Jachaiym? I am a Qyr person as I grew up in Qyr. Qyr people are herdsmen, I grew up on a horseback. Unlike the Syr people, the Qyr people do not know how to fish whatsoever. When I first came here I only could catch a fish with a fork from my plate. As I started living here, I learned how to set up nets, swim, and row, and I also learned gardening. Shandykbai, Sentas village, April 2016).*

It is an oft-repeated option that Qyr is associated with livestock herding and that Syr is associated with agriculture and fishing. Such association is somewhat true at the moment with people in Qyr almost exclusively focusing on herding, while inhabitants of Qyr engage in a variety of livelihood activities such as herding, gardening, mowing, and harvesting reeds, and fishing.

[1] There are differences as well. Although there are nuances, the largest difference is that there are much fewer mountain pastures in Kyrgyzstan that are grazed all year around, whereas most of the herders in Qyr do not migrate back to the riparian zone anymore.
[2] This was demonstrated earlier in the chapter.
[3] All of these evidence stems from short conversations I had with my interlocutors, discussions that took place at feasts, etc. Unfortunately, in my interviews I could not find a suitable quote that would capture all these elements. Hence, I am relaying this point without a proper quote.

While looking at it from a historical perspective, the lines between Syr as an agricultural domain and the Qyr as a herding domain become more blur. Indeed, the archeological, historical, and local oral history accounts show that the riparian areas of the Syr Darya Delta have been used for agriculture. For example, the introductory note on the management of irrigation systems in Kyzylorda within a 1972-annual technical report of the Kazakh Ministry of Water Resources refers to archeological sources to explain that:

> *The Kyzylorda province is located within the Turan depression and is dominated by plains. The most part of it is the ancient Syr Darya and Sary-Su Deltas. Most of the territory of the region is flat with a slight tilt westwards, i.e., in the direction of the Aral Sea. The central part of the region is occupied by the Syr Darya valley and all irrigated areas are located in this valley. Archeological findings, as well as remnants of the irrigation canals near the ancient settlements, suggest that irrigated agriculture was practiced as early as 2-3 millennia BCE.*[1]

Even though these settlements from 2-3 millennia BCE may not have much to do with the ancestors of modern Kishi Juz tribes living in the Syr Darya Delta, a research report on the Syr Darya Delta and Karakums conducted in 1946-1952 found that in the 1840-50s, about 3-4 thousand out of 7 thousand households around Kazaly had some crops.[2] The claim that Kishi Juz tribes dug canals to divert Syr Darya's waters for irrigation is supported by oral history as well. For example, the irrigation canals in the villages in the Syr Darya Delta bear the name of a particular tribe or clan. Stories about local ancestors who initiated the digging of a particular canal came up frequently when my interlocutors talked about their *shejire*, i.e., genealogy. For example, irrigation canals in Aqtas village bear the names of local clans living in the village, e.g., Jenei, Baqy, Jyluan, and others. In the Aktan Batyr village, there is a major irrigation canal called Qyrgyz jarma, i.e., Kyrgyz canal. Here is a story of the Kyrgyz canal recounted by villagers of the Aktan Batyr village:

> *Legend has it that back in the day two Kyrgyz brothers came to these lands. They escaped from their home because there they committed some sort of crime and were sentenced to death (or maybe exile). They came here and married local Kazakh girls, who were daughters of local tribe leaders. After some time, the wives tell their Kyrgyz husbands to go to their father-in-law and ask for their* enchi *' (share of their inheritance). So Kyrgyz brothers go and ask for land. The chief asks, how much land do you want? ', and the brothers respond 'as much as one bull s skin can cover '. The chief laughs and tells them You can have it '. So they slaughtered a bull, then cut its skin into very thin stripes, which allows them to encompass quite a large piece of land. They dug a canal from the Syr Darya to bring water to their land. Ever since this canal is called Kyrgyz jarma. Later during the Soviet times, these*

[1] p. 11, TsGA, 1972, F.1626, Op.3, D.929.
[2] p.42, GAOPIKO, 1952, F.268, Op.1, D.4549

> *canals were deepened and people use them up to these days (Samir, Kazaly, June 2016).*

This local history of the irrigation canal is quite typical for the Syr Darya Delta in the sense that many canals bear the names of local tribes and clans, which, according to local accounts, dug a particular canal. Such oral histories of the local canals are in line with Peterson's (2019, p. 52) finding that historically water rights in Central Asia were managed according to local customs:

> *On most systems, the water rights of users were at least partially renegotiated and redistributed on an annual basis according to well-established and understood local customs. In the late 1880s, state councilor Nikolai Dingelshtedt, assistant to the military governor of Turkestan's Syr Darya region, sought to collect information from notables about such water-use customs. When he asked for documentation, he received the perplexed response from a Kazakh that, as every Kazakh community knew its spring or its irrigation channels, what use could there be for paper?*

Indeed, while people in the Qyr area engage with herding almost exclusively (often tending to the livestock of people living in the Syr for a fee), Syr people engage in herding, fishing, gardening, and harvesting reeds (More on these livelihoods in Chapter 5). Historically, the two areas were more closely linked and the livelihoods separation was not that rigid. For example, I recorded my interlocutors' accounts of how Kazakh tribes would plant melon and watermelon seeds in the stem of the camel thorn in spring while migrating from the Syr to Qyr. By the time they returned to the Syr's wintering grounds, the melons and watermelons would grow big and ripe drawing water through the deep roots of the camel thorn. While wintering in the Syr area, local Kazakhs would also set up fish traps made out of reeds, which were called 'qaza,' hence, the name Kazaly came into being.[1] However, the separation between Qyr and Syr is more rigid currently. The herders from Qyr do not migrate to the Syr for wintering, while the inhabitants of Syr keep their livestock on the riparian pastures all year round.[2]

Thus, these short descriptions of how locals use Syr and Qyr as a shorthand for communication and description of the various aspects of the river delta lives and livelihoods demonstrate that the Syr and Qyr can be conceptualized as iconic places of the Syr Darya Delta. Fascinated by Syr-Qyr iconic places that make up the river delta, I wanted to understand how these two iconic places were related to one another. For example, I wondered if there are any physical or imaginary boundaries between those two areas?

[1] Locals also say that Kazakh people learned to make qaza from Russian and Korean settlers.
[2] Most of my ethnographic data is limited to the Syr area and that is why I do not make extensive comparisons between Syr and Qyr beyond this chapter. Although I am not discussing it in my thesis, the disruption of herds' migratory routes is a very interesting topic, which requires additional scrutiny.

When pondering this question, I had to rely on my own interpretation of my observations and my experiences in the Syr and Qyr areas. As mentioned earlier, I spend most of my time in the Syr area. In fact, I only visited Qyr proper once for a couple of days, when I was attending a *tasattyq* ritual in the area called Koja Kazgan [lit. The well that was dug by a Haji]. The herders in the Qyr settle around wells, most of which were dug during the Soviet era. According to the annual report of the Kyryzlorda's Regional Directorate of melioration and water resources management, as of 1972, there were 106 wells in that part of the Karakum.[1] These wells as pieces of infrastructure were significant components of how people experience and engage with space (cf. Dourish and Bell 2007).

My understanding of the Syr-Qyr delineation is that there is no fixed borderline between these two iconic places. Instead, the line is fluid and ever-changing. Based on the traditional herder's view of Syr and Qyr as winter and summer pastures respectively, Syr must be an area that stretches as far as the river water reaches, e.g., during the floods. In other words, Syr Darya's floodplain is the Syr area, whereas the steppes beyond are Qyr areas. Yet, if we look at the Syr and Qyr infrastructure, this water-centered view might be challenged. The typical infrastructure of the Syr area is irrigation canals, while a typical infrastructure in the Qyr area is wells. But the water in the wells is replenished by the groundwater table, which is almost solely replenished from the Syr Darya River:

> *Explanatory note on the current state of the irrigation infrastructure to the Kyzylorda Obkom: In the riparian zone, the underground water table is 1-3 meters deep. In the territories, which are farther away from the river the underground water table is 5-10 meters. The underground water table is almost exclusively fed by the Syr Darya waters.*[2]

Thus, even though Syr Darya's water may not reach Qyr via floods or via canals, the water in the wells located in Qyr also comes from the river. Thus, according to vernacular boundary between the Syr and Qyr, the Syr stretches as far as the Syr Darya's surface water reaches. If we do not make a distinction between surface and subterranean water flows, this argument becomes a bit inaccurate because the wells in Qyr are too replenished by the Syr Darya waters.

Nonetheless, drawing the line between the Syr and Qyr iconic places along the lines of annual flooding makes sense because that would define what kind of vegetation would grow. The flooded areas are often dominated by water-dependent reed, while Qyr is dominated by other more drought-resistant plants. Depending on the water abundance in the Syr Darya River the flooded areas ranged in size and consequently, it led to the fluctuation of the Syr-Qyr borderline.

[1] p.7, TsGA, 1972, F.1626, Op.3, D.1046
[2] p. 18, GAOPIKO, 1941, F. 268, Op. 1, D.1226.

Even though I identified that fluxing and changing borderline, the Syr-Qyr interactions were not purely environmental but rather were envirotechnical in nature. Here I would like to remind the reader about Morita and Jensen's (2017, p. 8) account of how infrastructural development in Thai Chao Phraya delta created a palimpsest of complexly layered terrestrial and amphibious infrastructures:

> *Western terrestrial ontology shaped by colonial irrigation projects and techno-scientific expertise, imagined the potential of river deltas in terms of the possibility for land reclamation for agriculture. This led to an infrastructural orientation focusing on drainage and the making of dikes. In contrast, an amphibious ontology affiliated with Southeast Asian galactic polities did not rely on an agricultural imagination. Instead, deltas connected inter-Asian trade networks and were primarily perceived and engaged as extensions of the sea. This infrastructural orientation centered on water traffic and trade and on architectures capable of tuning in with the flows of deltas.*

In the similar vein, the infrastructural development in the Syr Darya delta region during the Soviet potential of the river delta in terms of agriculture, in particular rice (see next Section 3.3). Thus, building of irrigation canals during the Soviet era expanded the Syr area further into Qyr by facilitating the transportation of river water to places, that it would have not reached otherwise. For example, the irrigation canals dug by the local Kazakh tribes were further expanded during the Soviet times. By 1943,[1] there were 17 major canals in the Kazakh stretch of the Syr Darya River, five of which were in the river delta; those were Kazaly, Jana, Qarlan, Ishke, and Kara-Aryk.[2] As of 1972, according to the annual report of the Kyzylorda regional water resources directorate, there are about 15 irrigation networks of inter-company importance and 4 irrigation systems of inter-district importance in the Kyzylorda region,[3] which diverted water from the Syr Darya to the former Qyr lands, which were converted into rice paddies.

After the collapse of the Soviet Union, most of these canals deteriorated, and the area under rice cultivation decreased. Former rice paddies turned into pastures, which can be seen as Qyr's reclaiming the territories from the Syr areas. This idea about Syr extending into Qyr and vice versa made me think that the Féaux de la Croix concept of 'iconic places' does not lend itself well to describe the dynamic river delta ontology in my study site. My ethnography of the Syr and Qyr iconic places showcases that those areas are not empty but rather inhabited by different species, which can also be labeled as iconic (e.g., the proverb about a single curse in the Qyr and the

[1] I was interested to know how many canals existed there before that date. I could not get any relevant information either in the archives or from my interviews.
[2] p. 10, RGAE. F. 9256. Op. 1. D. 428
[3] p. 1, TsGa, 1972, F.1626, Op.3, D.939

thousand curses in Syr). In the next section, I talk about rice as an iconic species that shaped and changed the Syr Darya.[1]

3.3. The biological perspective on the river delta: iconic species view

While studying the environmental history of the Mississippi delta, Saikku (2015, p. 51) noted that:

> *The alluvial bottomlands of the Lower Mississippi Valley, commonly referred to as the Delta, have experienced enormous environmental change during the last centuries. Agriculture, lumbering, and the remaking of the vast floodplain s hydrological system have transformed the landscape, originally dominated by mature bottomland hardwood forest, beyond recognition and resulted in irrevocable alteration of local ecology. (Saikku 2015, p. 51). Large-scale Euro-American settlement of the Delta commenced with the rapid expansion of the cotton economy in the region at the turn of the nineteenth century (ibid., p. 58) …By the turn of the twentieth century, the bottomlands of the Lower Mississippi Valley had become a leading production center for cotton and hardwood lumber (ibid., p. 59).*

Similar to the Mississippi delta, Syr Darya Delta has been an area of drastic change. If cotton was one of the main drivers of change in the Mississippi delta and the middle stretch of Syr Darya it was rice in the Syr Darya Delta. Although there is not much information about the scale of the rice cultivation in the Syr Darya Delta in the pre-Soviet period, my interlocutors the oldest of whom were in their 70s could not remember their parents or grandparents talking about cultivation of rice. Hence, it is safe to assume that rice started being promoted to become an iconic species of the Syr Darya Delta during early Soviet period (Figure 3.2.).

Currently, rice is definitely an iconic species of the Syr Darya delta because (just like with iconic places) it inspires a certain degree of reverence, holds a prominent position in a local cuisine and is used as a shorthand for describing the river delta as a 'rice-growing' region (e.g., the Turkestan region located further upstream is often referred to as a cotton-growing area). In the following paragraphs, I provide some evidence to illustrate each of these points.

The most obvious indication of the 'iconicity' of rice is its prominent position in the local cuisine. Although rice is not such a dominant staple food in everyday life in the Syr Darya delta as it is, for example, in India or East Asia, rice has become the main course in collective meals. For example, all collective meals served at *toi*'s (feasts for various occasions such as weddings, childbirth celebrations) as well as religious rites and rituals such as funerals, *tasattyk* (Chapter 8), *sunnot toi* (lit. a celebration of sunnah, the feast organized to commemorate circumcision of young boys)

[1] In the first draft of this chapter I attempted to include more iconic species such as the Turan tiger, the Aral Sea sturgeon, catfish, local sand snakes, and sacred bushes. I intend to publish a separate article on the iconic species of the Syr Darya Delta and tell the delta's environmental history from the more-than-human perspective.

feature a main course made with rice such as *plov*[1] or *botka*[2] (see Chapter 8). My interlocutor told me that around 50 years ago, the main dish in such feasts and festivities used to be *naryn* (also known as *besbarmak*), however, gradually it has been replaced by rice-based dishes (mostly plov and to a lesser extent by botka). Indeed, naryn/besbarmak is often regarded as the main national dish of the Kazakh (and Kyrgyz) people (Alymbaeva 2020). Thus, the dominance of rice in collective meals in the Syr Darya Delta demonstrates how rice has become 'iconic.'

When I inquired why rice took over *besbarmak*, my interlocutors would often tell me that cooking rice for large groups of people is *jengil* [lit. easy] meaning that it was less labor intensive and more practical than making *besbarmak*. Rice was also described as *berekeli* meaning that a relatively small amount of rice would be enough to feed a large group of people. Many interlocutors mentioned a proverb that reads 'kurish paigambardyn tisi' [lit. grains of rice are the prophet's teeth] to illustrate that the rice was a blessed crop. Moreover, many interlocutors took pride in living in the rice-growing province [i.e., Kyzylorda] and regarded the local rice to be the most delicious [kaz. *tatti*] and nutritious [kaz. *paidaly*].

Thus, rice aligns well with the iconic species concept, however, it is not at all the only iconic species in the river delta. For example, I could have made similar arguments about the 'iconicity' of the common reed, local melons and watermelons. However, I am foregrounding rice as an iconic species in this section because rice has driven the infrastructural change in the river delta. Indeed, rice cultivation necessitated infrastructural development that changed the Syr Darya Delta a great deal.

Figure 3.2. The rise of rice in the Syr Darya Delta

When I first came to Kazaly, people would introduce the region as a rice-growing one. It has become such a cliche that almost none questions how the decision to grow rice in the Syr Darya Delta was taken. As one might guess, it was not as straightforward. There were debates about whether it was feasible to grow rice at all in the river delta. In the 1920s and 1930s, some individuals and institutions developed schemes on how to best use the land and water resources in the Syr Darya Delta.[3] Based on the main conclusions and the recommendations of the authors, these schemes can be put together into two groups: a) schemes that promoted the development of irrigated agriculture in the lower stream of the Syr Darya River and b) schemes that claimed that the irrigated agriculture in the lower stream of the river is not economically feasible.

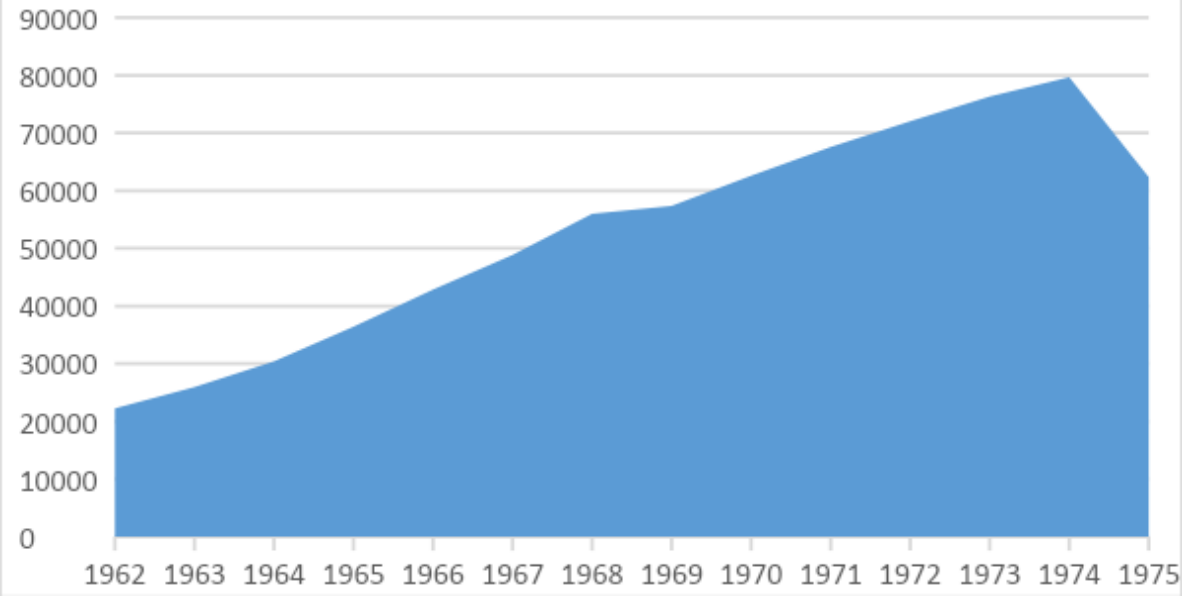
The first group 'in favor' of irrigated agriculture in the river delta included (1) a scheme developed by Alexandrov I.G., the Member of the Academy of Sciences,[4] published in 1923, and (2) A General Scheme of Activities in the Lower Stream of the Syr Darya developed by the UpSyrBas[5] in 1928. These two development plans came to similar conclusions and argued that there is a possibility and good reasons for increasing the irrigated areas in the lower stream of the Syr Darya up to 1.6 million hectares. These schemes proposed to irrigate all these areas by diverting water from the Syr Darya River and claimed that such an increase in irrigated areas in the lower stream of the Syr Darya River would not restrict the agricultural development in the middle and upper stretches of the basin.[6]

[1] Steamed rice dish also known as osh, palau, kurish, etc. (cf. Alymbaeva 2020).
[2] In Syr Darya Delta, botka is sort of a rice porridge made with rice and broth.
[3] p.2, GAOPIKO, 1941, F. 268, Op. 1, D. 1226
[4] In Russian language there is term 'Academic' which means a Member of the Academy of Sciences. This title is very prestigious and regarded to be more important than e.g. Professor and Doctor.
[5] This is an abbreviation for the Upravlenia Syrdarinskogo Basseina, which literally means the Directorate of the Syr Darya River Basin. The Directorate was a unit within KazVodHoz, the Kazakh Water Management Agency
[6] p.2, GAOPIKO, 1941, D. 268, Op. 1, D.1226.

The second group, which argued 'against' the development of irrigated agriculture in the river delta included (1) a scheme developed by Rizenkampf G.K., the Member of the Academy of Sciences,[1] developed in 1929, and (2) the Technical-Economical Report by the Tashkent-based institute Sazvodproiz[2] developed in 1934-1935. These two development plans claimed that irrigated agriculture in the lower stream of the Syr Darya River is not economically feasible and profitable. These plans suggested keeping agriculture in the lower stream to a minimum; that is limiting agriculture to purely local needs, abandoning ideas of cultivating rice, and relying on pumps for irrigation (ibid).

Given that the two most recent schemes discouraged the development of irrigated agriculture in the lower stream of the Syr Darya River, the KazSSR requested support from the Sovnarkom.[3] Thus, on November 3, 1939, upon request from the KazSSR, Sovnarkom of the USSR issued a Decree tasking Narkomzem[4] to develop a scheme on using the land and water resources of the Syr Darya River and assuring water supply in the lower stream of the river. In turn, Narkomzem delegated this task to the Kazvodpromstroi,[5] which developed a new schema that favored the development of irrigated agriculture.[6] Thus, only at the end of the 1930s and early 1940s, rice was officially 'approved' as the main crop in the river delta.[7]

By 1972, more than 90% of rice produced in the KazSSR was cultivated in the Kyzylorda region[8] and from 1962 to 1972 the rice cultivation in the Kyzylorda region has grown more than threefold by a factor of 3.2. (Figure 3.3.).[9]



[1] Riesenkampf (Gubenko) Georgy Konstantinovich (1886-1943) was a Russian hydraulic engineer. He graduated from St. Petersburg Institute of Railway Engineers in 1909. From 1910 to 1912 he drafted irrigation schemes for the Caucasus and Turkestan. He participated in developing the irrigation scheme of the Hungry Steppe. In 1918, he addressed Lenin with the report on the state of the irrigated agriculture in Turkestan. On May 17, 1918 the Sovnarkom established the Special Administration of Irrigation Works in Turkestan (IRTUR in Russian) under the chairmanship of G.K. Rizenkampf. His research conducred in 1920s served as a foundation for the construction of Chirchik-Bozsuu cascade, Uch-Korgon, Farkhad and Khishrau hydropower stations. In 1924-1929, Rizenkampf revised his irrigation scheme of the Hungry Steppe and developed a new scheme for the use of water resources of the Syr Darya River. In the mid 1930's, he developed the project of the Volgo-Don Canal. He got arrested in Moscow in 1941 and died in a prison camp in 1943 (Beliakov 2017, 2020: URL: http://www.literatura.kg/articles/?aid=2373; https://proza.ru/2020/06/14/644).

[2] «Сазводпроиз» in Russian. It was later renamed «Средазгипроводхлопок».

[3] Sovet Narodnykh Kommissarov SSSR, the Council of the Peoples' Commissioners of the USSR.

[4] Narodniy Kommissariat Zemledelia, the People's Commission of Agriculture

[5] The abbreviation means Kazakh Hydro Industry Construction

[6] p.2, GAOPIKO, 1941, D. 268, Op. 1, D.1226

[7] According to historical accounts, the Korean minorities were relocated to Kazakhstan (including the Syr Darya Delta) to cultivate rice. Archival sources suggest that there were several waves of Korean relocation to Kazakhstan from Far East between 1920-1940, the last of which were forced relocations in 1938-1939 (Suleymenov 2017).

[8] p. 4, TsGa, 1972, F.1626, Op. 3, D. 929

[9] Please see the MS Thesis of Merle for rice cultivation dynamics in the Syr Darya Delta after 1984.

Figure 3.3. The area under rice from 1962 to 1975 in hectares (The vertical axis indicates hectares. The horizontal axis denotes the years).

Figure 3.4. A list of canals of intra- and inter-district importance managed by the Kazaly UOS and the area of rice fields irrigated by each canal (Based on: p. 1, TsGA, 1972, F. 1626, Op. 3, D. 939.)

	1972	1973	1974	1975
Baskara	349	280	1,200	420
Right bank	1,642	1,880	1,140	1,320
Left bank	6,100	7,500	8,100	2,510
Tasaryq	--	--	200	--
Total	8,091	8,660	10,640	4,250

My claim that the rice cultivation was at heart of infrastructural development can be supported by the following evidence. Firstly, the correspondence on droughts and irrigation infrastructure always highlighted the impact on rice. For example, even though rice was not the most dominant crop by area at the time, Kyzlorda obkom's letter to Kunaev specifically mentioned how many hectares of rice were saved by the Kyzylorda dam:

> *It should be noted that the availability of the Kyzylorda dam allowed saving 35,000[1] hectares of crops including 10,000 hectares of rice serviced by this dam despite the catastrophic water scarcity.[2]*

Similarly, Water Ministry's annual reports on the current state of the irrigation canals in the Syr Darya Delta had a special column dedicated to rice, which provided information about how much rice fields were irrigated by a particular canal (Figure 3.4.). Secondly, the building of large pieces of infrastructure such as the Kyzylorda and Kazaly dams was also justified by the need to irrigate rice fields. For example, a Ministry report in 1972 read:

> *Favorable climatic conditions allowed allocating more than 90% of Kazakh SSR's rice cultivation in the Kyzylorda Region. In order to provide a sustainable supply*

[1] At a first glance, it may seem that the rice was not the dominant crop. The figure of 35,000 hectares includes alfalfa, barley (both of which were used as an animal feed), melons, etc. Thus, rice was the largest crop by area but not larger than all other crops combined.
[2] P. 85-86. APRK, 1961, F. 708, Op.34, D.249.

> *of water to the irrigated lands, a Kyzylorda dam was built in 1956 and Kazaly dam in 1970.'*[1]

Rice cultivation started being used to justify building of large-scale irrigation infrastructure in late 1930s. On November 9, 1939, Sovnarkom USSR and USSR's Central committee of the communist party approved a program for developing irrigation in Central Asia and Kazakhstan. This document stipulated the construction of the Kyzylorda dam and Chardara Reservoir. On August 16, 1940, the Sovnarkom USSR approved the building of the Kyzylorda dam, which later would be dubbed the First Giant of the Syr Darya Delta [rus. Pervyi gigant nizoviev Syrdar'i]. The technical project of the dam was developed by the Sredazgiprovodkhlopok[2] Institute based in Tashkent. The water management authorities of Kazakhstan started construction in 1940. Due to the outbreak of WWII, the construction was frozen in 1941 and resumed in 1945 in accordance with the Decree of the USSR Sovmin on December 31, 1945 #1525.[3] The Kyzylorda dam was designed to irrigate 202,000 hectares of land as opposed to 34,000 hectares cultivated at that time, most of which were earmarked for the rice paddies.[4] It was also planned to equip the dam with hydropower generators but those plans were dropped during the construction.[5]

As for the Kazaly dam, the Second Giant of the Syr Darya Delta, the central government decided to build the Yany-Kurgan and Kazaly dams on the Syr Darya River in addition to the Kyzylorda dam back in 1939. However, the construction of these dams kept being postponed for various reasons. Firstly, the plans to build the Kazaly dam were thwarted by World War II. Then, in the 1950s, the building of the Kyzylorda dam was prioritized. Despite the fact that the Kazsovmin approved building the Kazaly dam on February 15, 1961 #165, Gosplan KazSSR did not include construction of this dam in the 1962 plan despite the recommendations of the Kyzylorda region and the Kazminvodhoz. The obkom and ispolkom of the Kyzylorda region asked the Kazsovmin to oblige Kazgosplan to include the construction of the Kazaly dam in the 1962 plan and budget a minimum of 1.5 million rubles for it. And to include the project development for the Yany-Kurgan dam in 1962, so that the construction could start in 1963.[6] Upon the request from the Kazsovmin, Kazgosplan examined the suggestions of the Kyzylorda region and informed the Kyzylorda obkom, ispolkom, and Sovmin that their request cannot be granted due to lack of funding for 1962.[7] The Kazgosplan's response read:

> *Due to the limited funding, it is not possible to provide funds for … starting construction of the Kazaly dam. Construction of the Yany-Kurgan dam is not*

[1] p. 4, TsGA, 1972, F. 1626, Op.3, D.929.
[2] Средазгипроводхлопок in Russian
[3] p. 29-30. APRK, 1959, F.708, Op.32, D.1485.
[4] p.6, TsGA, 1956, F.1626, Op.3, D. 263.
[5] p. 29-30. APRK, 1959, F.708, Op.32, D.1485.
[6] p. 85-86. APRK, 1961, F. 708, Op.34, D.249.
[7] p. 87. APRK, 1961, F. 708, Op.34, D.249.

> *planned until 1965, and that is why it does not make sense to start developing the project in 1962.*[1]

In order to secure funds for constructing the Kazaly dam, the Kyzylorda obkom had to repeatedly reach out to Kunaev, the secretary of the Central Committee of Kazakhstan's Communist Party. Thus, in the obkom's letter to Kunaev on October 12, 1961, the obkom's emphasized the need to build Kazalinsk and Yany-Kurgan dams on the Syr Darya River to mitigate the negative impact of droughts on rice cultivation (More on droughts in Chapter 4):

> *The multiyear observations of the river delta revealed a constant pattern according to which water-abundant years are followed by the water scares years. In the last 10 years, there were several water-scarce years such as 1950, 1951, 1957, and 1961. The water scarcity of 1961 was the most severe one in the last 50 years. Measures taken during water scarce years such as deepening of irrigation canals [are not efficient and] only increase the amount of work required to clean those canals during the water abundant years that follow after water-scarce years, thus, wasting state and cooperative funding. In 1961, besides deepening the irrigation canals, some 169 pumps were installed. On the territory of the Kazaly district, the river flow was completely stopped by earth dams in two locations, which cost 120,000 rubles. Despite these measures, some of the crops were lost due to insufficient water supply. Overall, 18,200 hectares of crops were lost by the kolkhozes and sovkhozes in Yany-Kurgan, Chiili, and Kazaly districts, which are not serviced by the Kyzylorda dam. … The dam could raise the water level and assure a constant water supply to the fields. This fact proves how important it is to have blocking' [peregorajivayushie] dams on the river. The Kazaly dam would assure sustainable irrigation of the fields in the Yany-Kurgan and Chiili districts.*[2]

The building of the Kazaly dam started in 1963 to irrigate 60,000 hectares of land including 50,000 hectares of rice.[3] Despite various drawbacks (Figure 3.5.), the Kazaly dam was completed at the end of 1969. Thus, rice cultivation prompted building of Kazaly (and Kyzylord) dams and these dams served the rice cultivation well, e.g., the Kazaly dam allowed saving the rice crops even during the extremely water-scarce year such as 1974. Despite the extreme water shortages in 1974, the Kyzylorda region fulfilled the rice plan by 112%. As a result of the 'successful' actions against drought, Kyzylorda's regional water department (rus. *vodhoz*) received a monetary reward from the Ministry of melioration, while many individual workers received a title of udarnik 9th *pyatiletki* (the hard worker of the 9th five-year plan).[4]

[1] p. 89, APRK, 1961, F. 708, Op.34, D.249.
[2] P. 85-86. APRK, 1961, F. 708, Op.34, D.249.
[3] p. 196, GAOPIKO, 1965, F. 268, Op. 1, D.7298.
[4] p. 118, TsGA, 1974, F.1626, Op.3, D.1396.

Figure 3.5. Challenges of building Kyzylorda and Kazaly dams

Star (1999) encourages us to look at the mess 'backstage' behind the seemingly smooth work of the infrastructural system. The seemingly smooth construction of the Kyzylorda and Kazaly dams were plagued by different sorts of hick-uFor example, it was expected that the Kyzylorda dam would be built quickly, e.g., an obkom letter from 1944 stated that the expected date of completion for the Kyzylorda dam was 1947,[1] while in another water ministry's letter Kyzylorda dam was expected to be completed at the end of the 1953[2] and then, in 1956.[3] It is not surprising that the construction took longer than expected. The final project was only approved by the Ministry of Agriculture on January 29, 1953, and the total costs were estimated at 157.5 million rubles.[4] In 1954, the Central Committee of the Communist Party of Kazakhstan found the progress in building the Kyzylorda dam to be unsatisfactory. The construction was ongoing for 13 years since 1941 and in those 13 years, only 60% of them had been completed. Uzbekgidrostroi's work on building the dam was deemed unsatisfactory.[5] On December 20, 1958, the dam was finished and accepted into service by the special commission, which noted that there were some justified simplifications to the original blueprint.[6] Thus, it took 17 years to complete the Kyzylorda dam,[7] which was often dubbed the First Giant of the Syr Darya Delta [rus. Первый гигант низовьев Сырдарьи].

As for the Kazaly dam, its construction costs were initially estimated to be 13.2 million rubles and completed by 1967.[8] In 1966, the costs were re-estimated to be 17.1 million.[9]Kyzylordavodstroi complained in its report to Kazsovmin on 21 July 1966 №505 that gravel supplied by the Yany-Kurgan gravel pit 'often was not good enough quality to make concrete. When the quality was acceptable, the supplied amounts were not sufficient. Oftentimes, the supply was intermittent. For example, the Yany-Kurgan gravel mine was supposed to supply 3,200 cubic meters of gravel in the 4th quarter of 1966. However, it only supplied 1,100 cubic meters of gravel.'[10] Moreover, the Kyzylordavodstroi often suffered from a short supply of 'cement, thick steel rods and other deficits.'[11]

In 1967, V. Polkanov, the chief engineer of the Kyzylordavodstroi wrote an Information Note on the progress in building the Kazaly dam. The plan for the first quarter of 1967 is fulfilled completely. The reasons for not completing the plan from previous years: 1) lack of excavating (soil digging) equipment in the early stages of the construction, 2) Most of the efforts were directed towards building the railroad base, concrete plant, and the housing for workers. In order to fulfill the plan for 1967 the following things need to be done: 1) ratify [utverdit] the project tasks, 2) provide the working blueprints for the 8,000 cubic meters of concrete laying works by the end of the 3 quarter, 3) Kazaly dam construction project is experiencing a dramatic lack of workers. As of April 1, 1967, the Kazaly PMK[12] has only 390 workers while it is needed to have 620 people to fulfill the plan. As of now, there is a capacity to house 110-120 individual workers and 20-25 families. This amount of workers needs to be found for the construction of the dam. The remaining need in manpower needs to be covered via building brigades. 4) the Alma-Ata plant

[1] p. 10, РГАЭ.F.9256.Op.1.D.428.
[2] p. 76, TsGA, 1952, F. 1626, Op. 3, D. 108.
[3] p.6, TsGA, 1956, F.1626, Op.3, D. 263.
[4] p. 29-30. APRK, 1959, F.708, Op.32, D.1485.
[5] p.2. APRK, 1954, F.708, Op.27, D.126.
[6] p. 92-113, GAOPIKO, 1958, F.268, Op.1, D.6245.
[7] p.76, APRK, 1959, F.708, Op.32, D.1485.
[8] p. 196, GAOPIKO, 1965, F. 268, Op. 1, D.7298.
[9] p. 99, GAOPIKO, 1966, F.268, Op.1, D. 7494
[10] p.57, GAOPIKO, 1966, F. 268, Op. 1, D.7494.
[11] p.99, GAOPIKO, 1966, F. 268, Op. 1, D.7494.
[12] ПМК (передвижная механизированная колонна) in Russian is an abbreviation for a mobile mechanized convoy. PMK was a sort of a building company.

of industrial machinery signed the contracts three years ago for supplying the mechanical equipment, however, nothing has been delivered. 5) supply 2,500 cubic meters of wood, and 6) improve the provisioning of food for the workers.[1]

This 'backstage' mess behind building these dams demonstrates that it was not an easy feat. While facing these challenges, the need to finish building these dams was justified by the need to irrigate an X hectare of rice. The letters written by the Obkom, contractors, and the Central Government to one another contained the same information reiterating the hundreds and thousands of hectares of rice that would be irrigated if the dams are completed. In other words, rice irrigation was situated as a primary value used to justify and complain about the challenges of the construction. From these archival sources, it is evident that rice cultivation was one of the primary arguments for building these large pieces of infrastructure.

Figure 3.5. sheds light on how 'messy' and complicated the construction process was. From December 8th, 1969 onward, the dam was working in a testing mode.[2] The dam worked for around 10 months in a testing mode without any incidents.[3] Then, the Kazaly dam entered full service after being examined by a reviewing committee on October 8-11,1970 despite objections by several committee members.[4] These objections and the fact that they were ignored are quite interesting when examined from the iconic species perspective as they demonstrate that rice was more important than fish.

For example, comrade Quttybaev, the head of the Kyzylorda vodhoz, pointed out five flaws he noticed at the Kazaly irrigation dam on October 12, 1970: 1) reducing valve of the fishway's gate[5] was not functioning; 2) the lifting mechanisms on the 12 beams out of 15 made noise while operating; 3) the trestle crane did not have functional brakes; 4) Hatches were not heated in winter; and 5) The fish monitoring containers and fish barriers[6] were missing. Having pointed out these flaws, Quttybaev stated that 'it was not possible to accept the Kazaly dam into service until those flaws were eliminated.'[7]

Comrade Orozaliev, the deputy director of the AralRybVodhoz Directorate mentioned that 1) Experimental fish barriers were not installed in the mouth of the Right-bank canal; 2) The fish monitoring container was not installed; 3) Some stretches of the canals had a water flow capacity, which was less than indicated in the project. That was why Aralrybvodhoz recommended not accepting the dam into service until these flaws were eliminated the.[8] Nonetheless, the Kazaly dam entered service despite having flaws related to its fishways. The rice was a more iconic than fish that needed water and that is why flaws related to fishways were overlooked. This claim is in line with the mainstream discourse that points to the prioritization of irrigated agriculture (spearheaded by rice in the delta and cotton in the middle stream) over fisheries as a primary reason for the Aral catastrophe.

[1] p.5-6, GAOPIKO, 1967, F. 268, Op. 1, D. 7721.
[2] p. 196, GAOPIKO, 1965, F. 268, Op. 1, D.7298.
[2] p. 99, GAOPIKO, 1966, F.268, Op.1, D. 7
[3] p. 66, TsGA, 1970, F. 1626, Op. 3, D. 827.
[4] p. 23, TsGA, 1970, F. 1626, Op. 3, D. 827.
[5] Fishway is a special passage integrated into the dam that allows fish to swim upstream.
[6] These are special nets that prevent fish from being washed into the irrigation canals.
[7] p. 23, TsGA, 1970, F. 1626, Op. 3, D. 827.
[8] p. 25, TsGA, 1970, F. 1626, Op. 3, D. 827.

Such prioritization of certain iconic species over others is another similarity between the Syr Darya and Mississippi deltas. Dye (2015, p.28) points out that the Mississippi River delta which was dominated by 'dense hardwood forests, cypress-tupelo swamps, and cane or palmetto thickets,' had only 20% of the original floodplain forests left by 1970. Similarly, the Syr Darya Delta's *tugai* riparian forests have shrunk significantly. For example, the *tugai* forests in Central Asia occupy only 10% of their habitat against 1960 baseline,[1] whereas the tugai forests in southern Kazakhstan shrunk by half from 472.7 thousand hectares in 1979 to 233.1 thousand hectares in 2018 (Abaeva et al. 2021). Saikku (2015, p. 59) who studied the environmental history of the Mississippi delta also noted that:

> *The immense ecological transformation in the Mississippi Delta was not limited to the reduction of forested acreage or removal of mature trees by planters and loggers: the native fauna of the bottomlands similarly underwent significant changes. The Delta had formed an important part of the original range of several animals, which more or less disappeared by the mid-twentieth century. The most striking examples of local—and sometimes even global— faunal extinctions were provided by the red wolf, cougar, Carolina parakeet, and ivory-billed woodpecker.*

Similarly, the environmental change in the Syr Darya Delta can be told from the perspective of species extinction. For example, the extinction of the Turan tiger or sturgeon came up frequently in interviews, some folk songs, and proverbs. Some species of fish such as *tolstolob* (introduced to clear reeds growing in the canals) have become a part of local cuisine. Thus, the environmental change in the Syr Darya Delta is not just a story of how an iconic species such as rice transformed the environment but it is also a story of the extinction of native species and the proliferation of introduced and invasive species.

3.5. Conclusion

Chapter 3 set out to explore the 'what is the river delta?' question. What Collins (2015) noted about the Mississippi River Delta claiming that the delta cannot be narrowed down to a single geographical, geological, historical, or vernacular definition is also true for the Syr Darya River delta. While there are scholarly works that discuss the Syr Darya Delta from archeological (Härke and Arzhantseva 2016, 2021) and hydrological perspectives, local 'vernacular/perceptual' perspectives on the river delta (Davidson and Paradise 2015) have not been analyzed before. Having turned my attention to local perceptions of the Syr Darya Delta, I found that the delta area consists of two 'iconic places' (Féaux de la Croix 2011) called Syr and Qyr, which are immediately recognizable to people beyond the Syr Darya Delta. Then, I foregrounded the irrigation infrastructure represented by irrigation canals and wells in 'Syr' and 'Qyr' iconic places to claim

[1] Such tenfold shrinkage in tugai forest coverage is surprisingly similar to the tenfold shrinkage of the Aral Sea. However, it should be noted that the tenfold shrinkage is not referring to the tugai forests along the Syr Darya River only. This figure is for the entire Central Asian region, which also includes tugai forests in Amu Darya, Tarim, Ili and other rivers.

that the local ontology or the Syr Darya Delta is shaped by the interactions of these two iconic places. Hence, the envirotechnical changes in the Syr Darya Delta, e.g., building of irrigation canals to irrigate and turn pastures of Qyr into rice fields during the Soviet era, can be seen as an 'expansion of Syr into Qyr,' while later deterioration of irrigation infrastructure as well as increased channelization of the Syr Darya as 'Qyr's expansion into Syr.' This interaction between Syr and Qyr are somewhat similar to what Morita and Jensen (2017) described as terrestrial and amphibious delta ontologies.

Building on the concept of 'iconic places,' I claimed that those iconic places are not empty spaces. Instead, they are inhabited by 'iconic species,' which (similar to iconic places) '*matter, that one will have an opinion on and a relationship with'* (Féaux de la Croix 2011, p. 25). In the case of Syr Darya Delta, rice was (and still is) an 'iconic species' that shaped and motivated modification and change of the Syr Darya Delta through building irrigation infrastructure. Thus, Chapter 3 described the iconic places as well as iconic species of the Syr Darya Delta. However, these do not paint the full picture of the environmental change in the river delta. In order to better understand that change, one needs to take into account the 'forces' of the Syr Darya itself, which will be discussed in the following chapter.

Chapter 4. Water scarcity, water abundance, droughts and floods: iconic forces of the Syr Darya Delta

> *The river carries a lot of sediments, i.e., 1.5-2 kg of sediments per cubic meter. These sediments are carried by the river water into the irrigation canals, thus increasing the costs of cleaning the irrigation canal network. The sediments have been deposited in the riverbed for a long time. That is why the Syr Darya s riverbed is elevated above the surrounding areas. On one hand, this aids in diverting water into the canals but on the other hand, during the floods, the area flooded river stretch for tens of kilometers [on both sides of the river]'*[1]

> *In the SD Delta water-abundant years are often followed by water-scarce years. In the last 10 years 1950, 51, 57, and 61 were water-scarce. The water scarcity of 1961 was the most severe one in the last 50 years.*[2]

These are some typical excerpts from the annual reports of the Ministry of Water Resources in Kazakhstan. The excerpt describes as a matter of fact that the Syr Darya River's geophysical conditions make it prone to floods or water scarcity. Saikku's (2015, p. 54) concept of a 'disturbance regime' refers to a 'certain type of landscape that is created and maintained by a disturbance that occurs with characteristic frequency' such as wildfires in the tall-grass prairies or

[1] p. 1-2., 1972, TsGA, F.1626, Op.3, D.929
[2] p. 85. APRK, 1961, F.708, Op.34, D.249.

flooding on alluvial plains. Saikku (ibid.) further argues that 'disturbance regimes can provide a general norm for acceptable human intervention in nature.' In this chapter, I demonstrate that the floods and water scarcity created the disturbance regime in the Syr Darya Delta. Moreover, further building on the concept of iconic places (Féaux de la Croix 2016), I conceptualize the floods and water scarcity as iconic forces that drove the environmental change in the Syr Darya Delta.

4.1 Floods

> *An excerpt from Shayachmetov s[1] letter to Stalin: Syr Darya River stretches for 920 km within the Kyzylorda region. The river bed is elevated for 4-8 meters above the surrounding plains that stretch for 40-50 km on both sides of the river.[2] Annually, there are two flood periods: the first 40-50 day period is in February and March during the intensive melting of snow, and the second 50-60 day period is in June-July during the time of the glacier melting.[3]*

As one can see from this archival excerpt, the floods in the river delta were not unexpected natural calamities. Richter and Richter (2000) identified natural streamflow variability as a primary force within riverine ecosystems. In other words, annual floods were defined by the natural streamflow variability. Although the long-term observation could not predict the severity of floods in any given year, the local authorities and the local communities knew the window of time within which floods tended to occur. Indeed, seasonality is one of the defining features of many rivers (Neiff et al. 2000). For example, that is how the floods were described in the hydrological and meliorative study of the Syr Darya Delta in 1946-1952:

> *The Syr Darya River gets covered in ice from its delta up to Turkestan every year. Upstream from Turkestan, the ice cover does not form every year. In Kazaly, the ice cover on the river lasts from December 4th till March 21.[4] The river is free of ice 264 days a year. Due to the fact that the river delta freezes over earlier than the upper stretches of the river, both freezing of the river, as well as thawing, leads to forming ice jams, which in turn cause floods.[5]*

These two excerpts show that floods in the Syr Darya Delta were part of the 'disturbance regime' (Saikku 2015) that occurred with a characteristic frequency. The annual floods threatened and sometimes caused damage to the villages and livestock, irrigation canals, and the railroad. These potential damages were emphasized in the archival documents to advocate for the ever-increasing

[1] Shayakhmetov was the First Secretary of the Communist Party of the Kazakh SSR from 1946 till 1954.
[2] For some readers this sentence might sound confusing since the river beds are usually located below the surrounding floodplains. However, in the case of the Syr Darya River that flows through Turan depression, the river bed is actually located higher than the surrounding floodplains. For example, while the average elevation of the Syr Darya river bed is 42 meters above sea level, the surrounding floodplains are several meters lower, e.g., ca. 34-38 meters above sea level. That happened because the sediments carried by the river gradually elevated the river bed above the surrounding floodplains.
[3] p. 264, 1952, APRK, F. 708, Op.16.2, D.49.
[4] These exact dates may seem bizarrely precise. However, it is more of an indication of the maximum length of freezing.
[5] p. 48-50, 1952, GAOPIKO, F. 268, Op.1, D.4550.

channelization of the river course and the building of protective dams, which has been a very common way to mitigate floods around the world (Juarez et al. 2021). Thus, floods can be seen as an 'iconic force' of the Syr Darya Delta.

Indeed, although flooding per se was an annual occurrence, between 1900 and 1975, the most severe floods occurred in 1900, 1921, 1934, 1951-1954, 1956, and 1969.[1] The authorities reported that floods in November and December of 1951 severely affected seven kolkhozes in the Kazaly district and threatened Kazalinsk, so that almost the entire population of the district capable of working was mobilized for the anti-flood activities;[2] in December 1952 and January 1953, the Syr Darya waters flooded pastures and villages in Kazaly district, which necessitated the evacuation of the livestock, forage and other property of kolkhozes;[3] and the floods between November 1953 and April 1954, severely damaged the settlements and other infrastructure of more than 30 kolkhozes in Kyzylorda region. Among those 30, about six kolkhozes in the Kazaly district sustained the most damage[4] and about 70-80 thousand cubic meters of dams and dykes were washed away by the floods, which were to be reconstructed before the start of the irrigation season.[5] Every annual flood took a toll on dykes and dams and after some severe floods, i.e., like in 1960, some parts of protective dykes were completely destroyed.[6]

Annual floods were portrayed in the obkom communications as a significant threat to the Orenburg-Tashkent railroad,[7] which ran parallel to the Syr Darya River for over 700 km. If a flood was big enough to disrupt the functioning of the railroad, it was always reflected in the annual reports. E.g. the floods in 1921 were so severe that the railroad did not function for 1.5 months;[8] the severe floods in 1953 damaged the 'Orenburg-Tashkent railroad on 20 Nov 1953, so that the trains were halted for almost 24 hours';[9] and report of 1969 mention on the first page that 'when the water horizons were extremely high in 1900, 1921, 1934, 1951-1954, it threatened the railroad. In 1956 some parts of the railroad were flooded. This year's flood level was the highest since the construction of the railroad.'[10]

The adaptation methods included blowing up the ice jams on the river, organizing 24/7 monitoring squads, which are first mentioned in the 1945 annual report,[11] evacuation of people and livestock[12] as well as ever-increasing channelization of the river. For example, when the Executive committee of the Kyzylorda region requested the support of the KazSSR's Sovmin (the Ministerial Council)

[1] p. 1. 1969, GAOPIKO, F. 268, Op.1, D.8328
[2] p. 159-161, 1952, APRK, F.708, Op.16.2, D.49
[3] p. 40. APRK, 1953, F. 708, Op. 26, D.317
[4] p. 128-134, APRK, 1954, F. 708, Op.27, D.270
[5] p.87, APRK, 1954, F.708, Op.27, D.1569
[6] p.33, TsGA, 1960, F.1626, Op.3, D.404
[7] p. 40. APRK, 1953, F.708, Op.26, D.317
[8] p., 65, GAOPIKO, 1941, F.268, Op.1, D.1226
[9] p. 128-134, APRK, 1954, F.708, Op.27, D.270
[10] p. 1. GAOPIKO, 1969, F.268, Op 1, D. 8328
[11] p. 105, GAOPIKO, 1945, F.268, Op.1, D.2257 or see p.70, TsGA, 1964, F.1626, Op.3, D.540
[12] e.g. p. 40. APRK, 1953, F.708, Op.26, D.317

in combatting the severe flood of 1953,[1] the Sovmin sent over a wagon-load car of explosives, an airplane for monitoring ice jams, 400 cubic meters of timber, 100 tons of cement and 10 tons of wire, 100,000 rubles and 10 tons of gasoline.[2] After the severe floods wreaked havoc on Stalin, Abai, Muratbaev, Kommunism, Lenin and Andreev kolkhozes in Kazaly district, these kolkhozes were relieved of a duty to supply animal products and crops to the state and from paying water fees.[3]

The measures described above were more reactive and that is why can be labeled as coping strategies (Carver et al., 1989). Fortification of the river banks and dykes and straightening of the meandering stretches were seen as measures that address the root cause of the floods. For example, in 1948, the Central Committee of the Communist party of Kazakhstan raised an issue of strengthening the right bank of the SD River at the meandering stretch to protect the Kyzylorda City from annual floods[4] and the list of measures to protect the railroad and the villages in the Kyzylorda region always included building new or fortifying existing dykes and levees.[5] Such thinking is still dominant nowadays. For example, one of the main components of the World Bank-supported Aral Sea restoration project was the fortification of the levees along the Syr Darya River.

Although most of the archival sources from the Ministry of water resources and Kyzylorda obkom portrayed floods as something undesirable, which needs to be prevented, there were some rare documents that highlighted that increased fortification of the riverbanks and prevention of floods negatively affected their livelihoods. For example, Kazaly raikom wrote a letter to the Kyzylorda obkom on October 25 1966 #59 ‘On creation of the sustainable feeding stock for the livestock of the Kazaly sheep sovkhoz:’

> *Due to the rapid change of the Syr Darya River s regime, many depressions and lakes located on the territory of the Kazaly sovkhoz are cut off from the water source. Before all these areas were flooded by the Syr Darya, which allowed herding 10,000 sheep around them and harvesting forage for winter. At the moment, the harvesting of forage is possible only at the Sagir stretch, which is 120-150 km away from the sovkhoz and it provides 50-60% of the needed forage. That is why raikom asks to give 4,000 ha of arable lands in Alpar, Aqsu, and Kentup for growing alfalfa, corn, and other crops for feeding livestock.*[6]

Although the Kazaly obkom mentions ‘the rapid change’ of Syr Darya’s regime without further elaborating on causes of such change, it is clear from the excerpt that by 1966 the floods started to

[1] p. 40. APRK, 1953, F.708, Op.26, D.317
[2] p. 39, APRK, 1953, F.708, Op.26, D.317
[3] p. 24. GAOPIKO, 1954, F.268, Op.1, D.5324
[4] p. 34-40. APRK, 1948, F.708, Op.12, D.220
[5] p. 163, APRK, 1952, F.708, Op.16.2, D.49
[6] p. 86, GAOPIKO, 1966, F.268, Op.1, D.7494.

occur less frequently,[1] which in turn had a negative effect on the availability of forage for the livestock. This point of view was also seconded by my interlocutors from the delta:

> *Floods are actually not that bad. When the floods retreat, the floodplains have fresh grass, tall and thick reed. Back in the day, when the river used to flood in much higher volumes, a lot of fish would be left in the puddles. It was so much fun to collect stranded fish. So although floods are dangerous and can cause distraction, they leave good gifts after they are over. Floods make people respect the river because you see the power of all the water the river carries, while during the water-scarce years, the river turns into a small creek, an irrigation ditch that no one has respect for. (Sarsenbek, Aqtas village, field notes, 2016).*

Although floods were mostly portrayed as destructive in the state's narratives, the local people sometimes acknowledged the positive effects the floods had on pastures and general soil fertility. These local notions about the positive effects of floods are in line with the ecologists' views who highlight floods irreplaceable role in maintaining riparian ecosystems (Poulard et al. 2010). For example, the ability to protect or restore the natural streamflow variability (i.e., the occurrence of seasonal floods) was found to strongly influence riverine biodiversity conservation (Richter and Richter 2000).

Thus, the delta inhabitants reverence towards the floods is centered more around the fear of floods, which is not exactly the same reverence as in the case of Féaux's definition of the 'iconic places.' Yet the floods are inseparable from the iconicity of Syr. For example, one of the most recurring *bata* [kaz. wishes, prayers] at the *tasatty*k annual sacrifice rituals, which is conducted on a river bank, is the protection from floods (See Chapter 9). Moreover, the floods per se and actions to mitigate them such as construction of dykes and embankments have driven some of the changes in the river delta, hence I claim that floods in the Syr Darya Delta can be thought of as an 'iconic force.'

While the floods have been an iconic force that shaped the Syr Darya delta s we know it, currently, there is not a big risk of floods. Traditionally, the danger of flooding in the lower course of Syr Darya stemmed from the seasonal (late winter/early spring) ice formation at certain meandering stretches of the river. These 'dangerous' stretches are monitored and when necessary the ice blockages are blown up by the Ministry of Emergency Situations [Rus. МЧС]. Water discharges upstream to generate more electricity in winter can technically pose a flooding threat in the river delta. However, due to extreme regulation of the Syr Darya's course (there about 30 major dams in the basin), there is dominant discourse that 'the danger of flooding is rather a question of proper

[1] Obertreis (2017) found that an ecological discourse existed as an 'academic critique' rather than as a social movement in Soviet Central Asia in the late 1970s. The archival sources do not feature such ecological discourses. The rapid change of the Syr Darya River's regime seems to have been a code word for water diversions upstream. Additionally, my interlocutors pointed out that by mid-1960s, the protective dykes along the river were built, which also reduced the amount of floods.

water management at transboundary level, than a real environmental problem.' (Savoskul et al. 2003, p. 18). However, due to the climate change impacts winter precipitation is likely to increase by 4–8% by 2050, which can exacerbate the risk of flooding (Sorg et al. 2012). The same climatic projections (Sorg et al. 2012) predict that the summer precipitation is expected to decrease by 4–7%. Such decrease coupled with +3.1 to +4.4 °C temperature increase by 2050 is very likely to result in more extreme events such as droughts and water scarce summers.

4.2 Malovodie: dreaded water-scarce years

When I visited the district office of the Water Department, I was advised to reach out to Mr. Bekbolov. His picture was displayed on the Honor Board (*doska pocheta* in Russian) and he was one of the respected retirees of the department. I visited his house and we had a long conversation. When we finished the interview, he asked me: 'So you are studying the [Syr Darya] river. In your opinion, what is the biggest problem that we have here?' I answered that I did not know. I continued that I wanted to hear what locals say their biggest problems were. To which he answered,' *malovodie* is our biggest problem!' (Field notes, interview with Bekbolov, June 2016). Later when working in the archives,[1] I came across the word '*malovodie*' and its variations very frequently, e.g.:

> *According to the long-term observations of the Syr Darya River, some years with water abundance in the river are followed by malovodnye' years [i.e., years characterized by water scarcity]. In the last 10 years, 1950, 1951, 1957, and 1961 were the years of severe water scarcity. The water scarcity of 1961 was the most severe in the last 50 years.*[2]

Malovodie means 'little water' and is used to refer to the water scarcity or little water availability in the Syr Darya River. The best English equivalent of this term is drought but I translate the term *malovodie* as 'water scarcity' in my text because the drought [*zasukha* in Russian] is usually perceived as a period of below-normal precipitation, while during the water-scarce years in the river delta the precipitation was often within the norm. I use the term 'water scarcity' because it reminds the reader that the Syr Darya River was the main and only source of irrigation water in the delta region. Water scarcity was another 'iconic force' that shaped the Syr Darya Delta.

Every annual report of the Ministry of Water Resources and the Ministry of Agriculture had sections describing the water availability in the Syr Darya River in a particular year. Those sections were called the 'Regime of the irrigation sources [*Rezhim istochnikov oroshenia* in Russian].' In the case of the Kyzylorda region, these sections always had the word 'irrigation source' in the singular form as the Syr Darya River was the only source of irrigation water in the region. For example, almost all annual reports of the Kyzylorda regional water resources directorate contained

[1] For the overview of the archival materials, please see Methodology chapter.
[2] p. 85-86. APRK, 1961, F.708, Op.34, D.249

lines like this: 'The Syr Darya River is the main source of irrigation and flows in the Kyzylorda region for almost 1,000 km. Most of the irrigation in the region is done by gravity and partially using pumps.'[1] These sections were always present in the annual reports that I looked into and had some solid historical 'facts' such as which year was water-scarce and which one was water-abundant. Since I went to the archives without a well-defined idea about what I wanted to find there, these 'facts' about water availability in any given year presented themselves as a good find.

These 'facts' seemed like pieces of historical data that I could potentially use in my work given that my ethnographic fieldwork also yielded some local accounts of droughts and floods in the river delta. Thus, I started methodically writing down the information about water availability in any given year between 1938 and 1975. Some archival documents mentioned a few extreme water-scarce years that happened before 1938, e.g. 1917 and 1928. The years were usually classified as *malovodnyi* (water-scarce) or *polnovodnyi* (water-abundant). By the end of time in the archives, I managed to compile a multi-year calendar of water-scarce and water-abundant years in the Syr Darya Delta (Figure 4.1.).

Figure 4.1. Water-scarce (marked with orange) and water-abundant (marked with blue) years

1917	…	1928	…	1938	1939	1940	1941	1942	1943	1944	1945
1946		1947		1948	1949	1950	1951	1952	1953	1954	1955
1956		1957		1958	1959	1960	1961	1962	1963	1964	1965
1966		1967		1968	1969	1970	1971	1972	1973	1974	1975

A critical reader may ask 'but what water scarcity and water abundance meant? How was it defined if a particular year was water-scarce or abundant?' These were the questions I too started asking myself while analyzing my archival data. Thinking along the lines of (Pritchard 2011), I claim that water scarcity and water abundance in the Syr Darya Delta were defined mostly from the water-management perspective, i.e., a particular year was labeled as water-scarce only if there was not enough water to irrigate crops. Moreover, although there were years when water scarcity was reported along the entire Syr-Darya River, during other years water scarcity was reported only in some stretches of the river, i.e., in the delta. For example, with the help of the irrigation infrastructure, the fields which had been fed by a dam enjoyed water abundance at the expense of the territories downstream. Thus, in 1967, the irrigation canals above the Kyzylorda dam had no shortage of water, while canals in Kazaly could not divert water to the fields due to the river's low

[1] p. 1, TsGA, 1972, F.1626, Op.3, D. 939.

water horizons. That is why some 35 pumps were installed in Kazaly as early as the beginning of June, 1967. The availability of water in the Kyzylorda dam, in turn, depended on the Qairaq Qum and Shardara reservoirs.[1]

These examples 'complicate' the archival narrative of water scarcity being a 'natural.' Indeed, just like with the floods, the water scarcity was portrayed as something quite predictable.[2] As the section's opening vignette suggests, the water-scarce years were perceived as 'natural' and recurrent. These conclusions were based on long-term observations and were used to predict water-scarce years. Thus, the archival sources often referred to these natural cycles of the river to explain why certain years ended up being water-scarce. For example, an excerpt from a letter from the Kyzylorda Obkom to Brezhnev, the Secretary of Kazakhstan's Communist Party, on August 26th, 1955 reads:

> *The [multi-year] observations on the Syr Darya River show that water-abundant years are followed by water-scarce years. Thus, after three years of water abundance from 1952 till 1954, the year 1955 was water-scarce. The year of 1956 is also likely to be water-scarce.*[3]
>
> *Since 1917, there were six water-scarce years. The most severe of those were in 1917 and 1961. The water volume at the Tumen Aryk hydro post was 198 m^3 and 154 m^3 in July 1917 and 1961 respectively, whereas the average flow is 400-500 m^3. In August 1961, the volume decreased to 111m^3.*[4]

In Chapter 3, I demonstrated that rice cultivation shaped the development of the irrigation infrastructure in the Syr Darya Delta. Thus, water scarcity was defined in terms of the availability of water for irrigation, including in the rice paddies. Rice is known to be a 'thirsty' crop as it requires 2-3 times more water than other crops such as wheat or barley (Silalertruksa et al. 2017). Thus, if instead of becoming a rice-growing province, the Syr Darya Delta' chose' to cultivate some other less water-demanding crops (as opposed to rice), many of those 'water-scarce' years would not have been labeled as such. This illustrates how the administrative decisions about cultivated crops shaped the local perceptions of water scarcity.[5]

4.2.1 Water scarcity as the management problem

It was not only the administrative decisions in the lower stream of the river that constructed water scarcity. The development of irrigated agriculture in the middle stream of the Syr Darya River was

[1] p. 34, TsGA, 1967, F.1626, Op.3, D.635.
[2] When reading these archival sources, it always felt like this alleged predictability was a bit naïve. All it could say is that "some water abundant years are followed by water scarce years." It is almost like saying that if you keep flipping a coin, it will land either on its head or tail.
[3] p.101 APRK, 1955, F.708, Op.28, D.317.
[4] p. 150.APRK, 1962, F.708, Op.35, D.290.
[5] It is interesting that 'iconic species' that shaped the irrigation infrastructure development along the Syr Darya were all 'thirsty' crops such as cotton in the upper and middle Syr Darya and rice in the Syr Darya Delta.

well underway in the 1930s. The water diversions upstream were mentioned as a reason for the water scarcity in the river delta as early as the 1940s. For example, the obkom's reports on mitigating water scarcity [*meropriiatia po bor be s malovod em* in Russian] explicitly mentioned the water diversions upstream as a reason for water scarcity downstream:[1]

> *The difference in the water horizons between the multi-year average and the water level of 1940 reaches 1.5 meters. The reason for water scarcity in the river delta is the water diversions upstream.*[2]

> *The situation in the Syr Darya Delta became extremely challenging after several recent water-scarce years. Due to the development of irrigation infrastructure in the upper and middle stream of the Syr Darya River, this situation will only worsen.*[3] *… With the current volumes of water diversion for irrigation upstream, growing rice in the lower stream of the Syr Darya River will be impossible. That is why the Kyzylorda region needs big state investment into irrigation infrastructure.*[4]

> *Syr Darya River s fluctuations result in recurrent water-scarce years. For example, the following years were extremely water-scarce, i.e., 1917, 1928, and 1938. Another big factor that contributes to water scarcity in the river delta is the diversion of water for irrigation upstream. The building of the Fergana Canal, Tugai Branches number 1,2, and 3 of the Fergana Canal, as well as the extension of the Yangi Aryk Canal, lead to the diversion of additional 240 cubic meters per second from the Syr Darya River in 1940.*[5]

> *The development of irrigation infrastructure upstream certainly negatively affects the water availability in the lower stream of the Syr Darya River.*[6]

The archival sources indicate that the year 1946-47, 1950-51, and 1955-1957 were water-scarce, although the same source does not contain complaints from the Kyzylorda province about the water diversion upstream. However, the lack of complaints about the water diversions upstream does not mean that the problem was solved somehow. In fact, in 1957 the Kyzylorda government[7] was seeking assistance from the republican and USSR authorities to resolve the issue of water scarcity due to diversions upstream. For example, the Kyzylorda government asked assistance from the TajSSR Sovmin to release water from the Qairaq Qum reservoir:

[1] These quotes from 1940-1945 are quite unique as they explicitly place the blame for water scarcity on water diversions upstream. In the later sources, I haven't encountered such an explicit reference to the water diversions upstream. Instead, the later sources cited in this chapter mostly refer to the natural cycles of the water abundance and water scarcity.
[2] p.34, GAOPIKO, 1940, F.268, Op.1, D.941.
[3] p.2, GAOPIKO, 1941, F.268, Op.1, D.1226
[4] p.67, GAOPIKO, 1941, F.268, Op.1, D.1226
[5] p.66, GAOPIKO, 1941, F.268, Op.1, D.1226
[6] p. 265, GAOPIKO, 1945, F.268, Op.1, D.2257
[7] Obkom and Ispolkom, i.e. Provincial Committee and the Executive Committee

> *The Kyzylorda region is growing the main crop, which is rice. Due to the low water horizons in the Syr Darya River, there is a danger of losing crops. In order to secure the crops, we need the following volumes of water: 850 m^3 per second in May, 750 m^3 per second in June and July, and 500 m^3 per second in August (rates for the Tumen Aryk hydro post). We ask for your assistance in releasing water from the Qairaq Qum reservoir. In order to facilitate the resolution of this issue, we are mandating comrade Musaev, the Director of Irrigation Systems to visit your Republic.*[1]

The fact that the Kyzylorda officials sent an officer to Qairaq Qum shows that those were quite long-distance water negotiations. For the readers' reference, it must be noted that the Qairaq Qum located in the Tajik SSR was almost 1,000 km upstream from Kyzylorda. Moreover, there was a an entire republic, i.e., the Uzbek SSR in between the Kyzylorda located in the Kazakh SSR and the Tajik SSR.

Kazakh Sovmin was also attempting to influence Uzbekistan and Tajikistan to release more water via USSR Sovmin. For example, in the letter from Kazsovmin to the Kyzylorda obkom, the former state that '*We also inform you that a need for creating an inter-republican commission on water sharing on the Syr Darya River is brought to the attention of the USSR Sovmin.*'[2] And the annual report for 1963 mentioned that 'at the meeting dedicated to sharing waters of the Syr Darya River conducted in Tashkent, the KazSSR and the UzSSR reached an agreement. That is why there were no shortages of water in the Kyzylorda province throughout the vegetation season this year.'[3]

The disputes over the water diversions upstream were not limited to the intra-republican level but also happened between the provinces within Kazakhstan. For example, Kyzylorda *oblvodhoz* mentioned in the 1975 annual report how the Kyzylorda province had to reach out to the Kazakh SSR Sovmin[4] to deal with excessive water diversions in the Chymkent region, which is located upstream from Kyzylorda:[5]

> *Extreme droughts of 1974-1975 had an adverse effect on the agriculture in the Syr Darya Delta. In Aralsk, Kazalinsk and Leninsk most of the lakes became shallow or dried up completely. Those lakes are used for catching muskrat and fish. The feed crops dried up on 39,000 ha and the natural grasslands productivity fell*

[1] p. 7. GAOPIKO, 1957, F.268, Op.1, D.6029
[2] p. 15. GAOPIKO, 1957, F.268, Op.1, D.6029
[3] TsGA, P.70. 1963, F.1626, Op.3, D.511
[4] The Ministers Council of the Kazakh SSR. Effectively, the Government of the Kazakh SSR.
[5] This kind of disputes between the Kyzylorda province and the Turkestan province (former Southern-Kazakhstan province, which was called Chymkent province during the Soviet times) persist even nowadays. Unfortunately, I do not elaborate on this because the current inter-regional water disputes were beyond the scope of my research. However, this topic has attracted attention of international development organizations and donors. For example, the Central Asian Regional Ecological Center (CAREC) has been promoting the basin dialogues along Syr Darya with an aim of improving water-sharing and integrated water-resources management (IWRM). Sehring (2020) notes that 'Much of the academic literature is driven by the question how policy concepts from the Global North, like IWRM or good water governance, promoted and implemented through projects by international donors, can be effective in the political and socio-economic context of Central Asia.'

> *dramatically. That is why most of the sovkhozes could not supply themselves with enough feed. The water supply from the Chardara was low in spring and summer and completely stopped at the beginning of August, which worsened the situation with overripe rice. Only 43,000 ha out of 63,000 ha was good for harvesting. The water managers in the Chymkent region made serious mistakes while calculating the amount of water they could draw from the river. The monitoring conducted in early June by the KazMinvodhoz found out that 147 pumping stations and 7 canals located between Chardara and Kok-Tobe (the hydro post on the border of Kyzylorda and Chymkent regions) withdrew 90 cubic meters per second, whereas the set limit was 25 cubic meters per second. This commission ordered shutting down some of the pumps. This allowed reducing the water withdrawals to 40-50 cubic meters per second.*[1]

Such lack of horizontal cooperation across the regions was quite typical to the Soviet-era water management and in fact are still common in the post-Soviet Central Asian countries. For example, Sehring's (2009, p.65) found that 'the water administration is still characterized by a predominantly hierarchical culture, strong fragmentation, and a lack of horizontal coordination, all legacies from the Soviet Union.'

As large reservoirs were built in the upper stream of the Syr Darya River, the focus of the archival sources shifted from the 'natural water scarcity cycles' to the water availability in those reservoirs. If earlier archival materials would definitely mention the cyclical nature of water abundance and scarcity, starting from the mid-1960s the same sources highlighted the role of the reservoirs for regulating the Syr Darya River, e.g. 'the availability of water in the Syr Darya River is regulated by the Qairaq Qum and Shardara reservoirs. The water availability at the Kyzylorda dam depends on Shardara Reservoir'[2] (Figure 4.2.).

Figure 4.2. Some excerpts from the Water Ministry's annual reports that show that every year from 1968 till 1973 was water-abundant due to the water discharges from the reservoirs upstream:

> **In 1968:**' *High temperature and abundant precipitation in early June in the mountainous regions of the Syr Darya Basin made a lot of water available for irrigation. However, this favorable period was followed by a cold wave, which reduced the water flow in the Syr Darya River. Despite that, the irrigators enjoyed water abundance due to the release of water from the water reservoirs.*'[3]
>
> **In 1969:** *'The year of 1969 was a water-abundant year due to the large discharges from the Chardara Reservoir*[4] *into Syr Darya River.*[5]
>
> **In 1970:** '*There was enough water for irrigation due to water discharges from the water reservoirs upstream.*'[6]
>
> **In 1971:** *There was enough water for irrigation in 1971. The flow of the Syr Darya River is regulated by the Qairaqqum and Chardara Water Reservoirs. The irrigation water is distributed by the Kyzylorda and Kazaly dams in the lower*

[1] p. 8, TsGA, 1975, F.1626, Op.3, D.1602.
[2] p. 34, TsGA, 1967, F.1626, Op.3, D.635
[3] p. 31, TsGA, 1968, F.1626, Op.3, D.735
[4] There was so much water that year, that water was also discharged into the Arnasai depression. The man-made water body that emerged as a result of this discharged is called Aidarkul Lake, which is also referred to as the Aidar-Arnasai lake system (AALS). The AALS consists of three lakes called Aidarkul, Tuzkan, and East Arnasai, which cover an area of 2500 km^2 (although the size fluctuates depending on the discharge volume from the Syr Darya River.
[5] p.32, TsGA, 1969, F.1626, Op.3, D.776
[6] p.56, TsGA, 1970, F.1626, Op.3, D.825

> *stretch of the river. Regulated discharges from these reservoirs and distribution by these dams satisfy the Kyzylorda region's need for irrigation water.*[1]
> **In 1972:** *'The availability of water in the Syr Darya River was within the norm. The Chardara was filled to 105% of its capacity (p.79). … The Kyzylorda province's water withdrawal percentage was 113% of the plan and the percentage of water supply was 114%.* '[2]
> **In 1973:** *'The year of 1973 was a water-abundant year and the Chardara Reservoir was filled to 101% of its capacity.* '[3]

However, the building of the large reservoirs upstream did not liberate those living along the Syr Darya from the latter's natural cycles. After a few years of 'natural' and 'engineered' water abundance, the water scarcity of 1974-75 was very severe. Despite the emergency release of some 1.7 billion cubic meters of water from Charvak and Qairaqqum Reservoirs, the Chardara Reservoir with a capacity of 5.7 billion cubic meters was filled only to 53% in 1975 and the Kyzylorda province had to reduce its rice fields from 85,500 hectares to 70,000 hectares.[4] Many of my interlocutors remembered the water scarcity in mid-1970. For example, Sarsenbek aga from Aqtas village who used to work in a rice-growing brigade recalled that year as following:

> *We sew many hectares of rice. All of it got burned. In the spring, there seemed to be enough water. But when rice grew one karys*[5] *tall, there was no water. The river flow completely stopped. We tried to alternate the water diversions between the Left and Right Magistral canals, we installed pumps but all efforts were futile. We crossed the river on foot because it literally turned into a creek (Sarsenbek, Aqtas village, June 2016)..*

Thus, both the water diversions and water discharges upstream influence which year was water-abundant or water-scarce in the Syr Darya Delta. The irrigation infrastructure has become a primary instrument for mitigating the water scarcity in a particular area. Concurrently, the same irrigation infrastructure was creating water scarcity downstream. For example, Zou et al. (2019) argue that severe water scarcity in 1974-1975[6] were caused by the construction of the Toktogul reservoir, which started accumulating water from 1973 onward. Interestingly, the Aral Sea does not feature at all in the Water Ministry's reports, although all these water diversions came at the expense of the Aral Sea.

4.2.2 Water scarcity and water loss

The inefficiency of irrigated infrastructure on the Amu Darya (exemplified by immense water loss due to infiltration) is often cited as one of the main reasons for an overdraft of water, which lead to the Aral Sea catastrophe (Edelstein et al. 2012).[7] The irrigation in the Syr Darya Delta also had

[1] p.53, TsGA, 1971, F.1626, Op.3, D.876
[2] p.63-64, TsGA, 1972, F.1626, Op.3, D.929.
[3] p.79, TsGA, 1973, F.1626, Op.3, D.1144.
[4] p. 101, TsGA, 1975, F.1626, Op.3, D.1591
[5] Karys is a traditional unit of length equivalent of the distance between the tips of the thumb and index fingers.
[6] Zou et al. claim that 1973 was a water scarce year. However, based on my archival evidence, I assumed that Zou et al. meant the water scarcity of 1974.
[7] Interestingly, the water loss problems remain to be a major issue in the Amu Darya Delta. For example, Conrad et al. (2013) found that throughout the vegetation period, approximately 58% of the total available water is lost as drainage water.

high water losses despite the fact that from 1945 till 1959, some 271.5 million rubles were invested into the irrigation infrastructure of the Kyzylorda, which accounted for 24% of all expenses on irrigation in the whole of Kazakh SSR.[1] Despite all these investments, the inefficiency of the irrigation system is mentioned quite often in the archival sources dating back to 1938-1975, which provides grounds to claim that increasing the irrigation system's efficiency was always on the agenda. In fact, the inefficiency of the irrigation system showed up a lot in my ethnographic data as well.

So how has the efficiency of the irrigation system been measured? In a narrow sense, the efficiency of the irrigation systems was measured as a ratio between the water diverted from the river and the water delivered to the users. For example, it is reported that the efficiency coefficient of the irrigation system in Kyzylorda province was 68% in 1952. Such a low efficiency was cited as a reason for failing to fulfill the 'plan for irrigation' that year,[2] while a report from 1959 states that about 50-60% of irrigation water diverted from the river is lost due to excessive water infiltration, which is in turn caused by poorly-designed and maintained canals.[3] The archival sources always emphasized how much crops were lost due to water scarcity and how it contributed to water-logging and salinization[4] of soils, e.g.:

> *In 1938, 70% of rice crops were lost due to water scarcity.*[5]
>
> *In 1962, all canals in the Kazaly district did not have enough water. There was a threat that 100% of crops may be lost. Measures taken this year allowed irrigation at 62%.*[6]
>
> *The 'lost' water replenished the groundwater table and contributed to water logging and soil salinity.*[7]

The 'water loss' problem persists nowadays as well. A water department worker in Kazalinsk told me in the interview that 50-70% of irrigation water is currently being lost depending on how far the fields are from the main magistral canals (pers. comm. 2016).

In a broader sense, the efficiency coefficient was a measure of all the efforts and resources needed to keep the irrigation system functioning. One of the most labor-intensive elements of keeping the canals functioning was cleaning them.[8] For example, in 1951 it was reported that annually the kolkhozes in Kazaly district have to remove about 260,000 m^3 of silt from the district's irrigation

[1] p.76, APRK, 1959, F.708, Op.32, D.1485
[2] p.17. TsGA, 1952, F.1626, Op.3, D.108
[3] p. 79 APRK, 1959, F.708, Op.32, D.1485.
[4] I will discuss soil salinization in Section 10.4. of Chater 10.
[5] p. 114, GAOPIKO, 1942, F.268, Op.1, D.1515
[6] p. 71, TsGA, 1962, F.1626, Op.3, D.470
[7] p. 79, APRK, 1959, F.708, Op.32, D.1485
[8] p, 67, GAOPIKO, 1938, F.268, Op.1, D.1226

canals, which takes up 40-55% of their working time[1] and in 1958 it was reported that more than 370,000 m^3 of silt was removed from only two major canals. This number did not include the volume of the cleaning work done in smaller irrigation canals.[2] Moreover, often times the lack of proper planning made some efforts to improve the irrigation system completely useless. For example, the Kyzylorda obkom described the following initiative of local sovkhozes as a waste of time and resources:

> *Two kolkhozes in Kazaly district, namely Oktyabr and Jana Aryk, initiated building a half-dam on the river without a permit and technical assessment from the vodhoz. As of May 26, some 2250 cubic meters of soil were placed on the banks of the river to narrow its flow.[3] The width was reduced from 120 meters to 95 meters. However, the water level above the half-dam did not rise. According to the conclusion of the vodhoz engineer, the building of a half dam did not make economic sense because it would have taken 75,000 workdays to save 305 ha of rice. The half-dam would only last for one season.[4]*

The archival sources from the Ministry of Water Resources point out a couple of interconnected reasons for the general inefficiency of the irrigation infrastructure. On one hand, it is noted that irrigation systems in the lower stream of the Syr Darya Delta were created 'spontaneously' [*stihiyno* in Russian] and without proper planning.[5] On the other hand, the Water Ministry reports and obkom letters to the Ministry mentioned that the local workers do not have the capacity for managing the irrigation systems, e.g.:

> *Most of the canals in the Syr Darya Delta are made without technical assessments. The irrigation canals are long and meandering and often run parallel to each other, which leads to water losses and the low efficiency coefficient of the irrigation system.[6]*

> *When cleaning the irrigation canals in the Kazaly district, the measurements are done by eye-balling without proper measurements and calculations. Those who clean canals cannot make the calculations on spot due to their lack of knowledge.[7]*

> *Despite all the work done in the last decade, the irrigation system of the Kazaly district is still poor. In the last 10-12 years, many irrigation canals were built with a total length of 1,776 km (637 of which are magistral and distributing canals of state significance). Due to the technical flaws, these canals are damaged every year*

[1] p. 534. GAOPIKO, 1951, F.268, Op.1, D.4167
[2] p. 19, TsGA, 1958, F.1626, Op.3, D.341.
[3] The villagers hoped that narrowing of the waterflow would increase the water levels upstream. Thus, those canals located upstream would have gotten more water inflow.
[4] p. 86. GAOPIKO, 1938, F.268, Op.1, D.1226
[5] p. 230, TsGA, 1954, F.1626, Op.3, D.198
[6] p. 67, GAOPIKO, 1938, F.268, Op.1, D.1226
[7] p.31. GAOPIKO, 1948, F.268, Op.1, D.3050

> *during the floods and during the vegetation period, a lot of silt is deposited into them.*[1]

As mentioned earlier, the water was considered lost if it did not make it to the crop fields. The concept of 'lost water' [rus. *Poteri vody*] stemmed from the concept of irrigation efficiency [rus. Коэффициент полезного использования воды на поле], which was defined as a ratio of a particular crop's water needs to the amount of water used to irrigate it[2] (CAWATER Info,[3] n.d.). Water infiltration and evaporation are identified as the primary reasons for water loss. Such definitions are in line with the irrigation efficiency concepts used by engineers globally. For example, the 'duty of water' concept was defined by Wilson back in 1912 as 'the ratio between a given quantity of water and the area of crop which it will mature,' which reads very similar to the irrigation efficiency concept used in Central Asia (Wilson 1912, p. 48).

These volumes of water, which seeped through the canals raised the groundwater levels, which in turn was the primary cause of the water-logging and soil salinization.[4] Bruisch and Gestwa (2016, p.5) note that:

> *In the second half of the 20th century, … the dry zones of the Soviet Central Asian republics became prominent showplaces of the hazards of large-scale irrigation. The water diverted into open fields often washed salt into the topsoil from the earth below. It accumulated in the roots of arable crops, causing significant losses. As a result, more agricultural land was ultimately lost than proved possible to regain through improvement projects. Irrigation, once promising, turned out to be a threat.*

Salinization and water-logging, in turn, forced the kolkhozes and sovkhozes to employ shifting agriculture (called 'nomadic' agriculture [*kochevoe zemledelie* in Russian].[5] Interestingly, Peterson (2019, p. 59) notes that waterlogging and soil salinization was a common challenge for the irrigated agriculture in Central Asia before the Russians started exploring the area ion the 19th century and one of the most common ways to deal with it was leaching (See Chapter 10). Peterson (2019, p. 60) also notes that:

> *One European observer, perhaps reluctant to give credit to the sophistication of the local irrigation techniques, claimed that "experience here has revealed the very*

[1] p. 534. GAOPIKO, 1951, F.268, Op.1, D.4167.
[2] Rus. Коэффициент полезного использования воды на поле — отношение биологической нормы водопотребления культуры и фактических затрат воды на полив.
[3] This is an online 'knowledge bank' for water-related issues in Central Asia, which consists texts used to educate water professionals in the Central Asian institutions. This particular page that I am referring to here is an excerpt from a book on the 'Use of Land and Water Resources in the Aral Sea Basin.' URL: http://www.cawater-info.net/bk/4-2-1-1.htm. Accessed on October 22, 2023.
[4] p. 79, APRK, 1959, F.708, Op.32, D.1485
[5] p. 5. TsGA, 1972, F.1626, Op.3, D.929

> *unexpected fact that corn [i.e., grain] grows even better in saline soil than on ordinary alluvial ground!"*

While waterlogging and salinization remained to be a problem for the kolkhozes, the Soviet-era managers gave little credit to the local irrigation practices. For example, comrade E. Qutybaev, the head of Oblmeliovodhoz wrote a short report [*spravka* in Russian] about the irrigated agriculture in the region and noted that:

> *Due to soil degradation [due to soil salinization and waterlogging] and the low quality of agrarian technologies the irrigated lands are covered with weeds. With an aim of getting good harvests, the water users keep moving to new virgin lands, thus prolonging the irrigation canals.*[1]

This quote explains the crux of the challenge that kolkhozes faced. On one hand, the sovkhozes were supposed to fulfill the state plan and that was why they needed good harvests. However, the production plans were not always attainable due to existing soil degradation (mostly in a form of soil salinity) and general low fertility of local soils. Thus, the kolkhozes had to covertly use new virgin lands that were more fertile and unaffected by soil salinity to meet state-imposed production plan. Such local kolkhoz's practices are similar to what Obertreis (p. 41) describes as the 'tension between local knowledge and given policies.' For example, my interlocutors who worked in the rice-growing kolkhozes admitted that every kolkhoz used to have 'unreported' rice fields to produce enough rice to meet the state's production plan. This necessitated the extension of the irrigation infrastructure through elongation of the irrigation canals, which in turn lead to more water infiltration into soil and the rise of the underground water tables leading to soil degradation in a form of increased soil salinity and waterlogging.

4.3. Conclusion

Chapter 4 demonstrated that the floods and water scarcity were the disturbances that occurred with characteristic frequency (Saikku 2015). Indeed, floods and droughts are key driving forces shaping riparian ecosystems around the world (Parasiewicz et al. 2019). The floods and water scarcity are the 'iconic forces' that (along with iconic species such as rice (See Chapter 3)) changed and shaped the Syr Darya Delta by promoting and justifying the building of irrigation infrastructure as well as protective dykes and riverbank fortifications. Yet positive impacts of floods for biodiversity conservation (Richter and Richter 2000) were often overlooked in the archival sources, while the Syr Darya Delta inhabitants highlighted both the flood threats and benefits.

In this chapter, I also analyzed the concept of water scarcity. Although the natural variability in the water flow in the Syr Darya River existed, the water scarcity or abundance was determined based on the availability of water for the crops, especially rice (which is one of the iconic species

[1] p.7-8, GAOPIKO, 1967, F.268, Op.1, D.7721.

of the river delta). In other words, those years when the kolkhozes did not have enough water for irrigating rice were labeled water-scarce, while when they had enough those years were labeled water-abundant. Thus, the concept of water scarcity stemmed from the water-resource management practice. As the irrigated infrastructure grew on the river, this dependence on the natural cycles has seemingly diminished by 1970s. In other words, some naturally water-scarce years were water-abundant years for the river delta communities because the large water reservoirs released water. Indeed, water infrastructure in rural areas is often built to 'improve availability, predictability, and timeliness of water access for producing high yield crops and livestock.' (McMartin et al. 2018, p. 1038). Although we know that mitigation of the negative effects of the water-scarce years came at the expense of the Aral Sea. Indeed, Zou et al. (2019, p.1) found that 'the river discharges in the upper stream of the basin had significantly risen from 1930 to 2006, mainly due to the increase in temperature (approximately 0.3 ◦C per decade), which accelerated the melting of glaciers, while it decreased in the middle and lower regions due to the rising irrigation.'

In Chapter 4, the water-scarcity and floods have been framed as 'iconic forces' that shaped the envirotechnical change in the Syr Darya Delta. This 'iconic forces' perspective coupled with the 'iconic places' and 'iconic species' views described in Chapter 3 draw a more complete picture of the Syr Darya Delta ontology and shift the reader's attention from the Aral Sea (see opening vignette of Part 2) to the Syr Darya Delta.

Thus, I started Part 2 of this thesis by providing a typical description of the environmental change it the Aral Sea area (which also includes the Syr Darya Delta). Part 2 foregrounded the environmental change in the Syr Darya delta, which has undergone a significant envirotechnical change. For example, in the first quarter of the XX century, the river delta communities relied on livestock breeding (as well as fishing and baqşa gardening to a lesser extent). Riparian zones (Syr) were used as winter pastures, whereas Karakum (Qyr) was used as summer pastures. In the second and third quarters, rice has become a dominant iconic species that necessitated the development of the large-scale irrigation infrastructure, which transformed the river delta. This irrigation infrastructure was also designed to deal with floods and water scarcity, which can be conceptualized as the iconic forces of the Syr Darya Delta. After the collapse of the Soviet Union in 1991, most of the extensive irrigation infrastructure started deteriorating and the local communities had to adapt (See Chapter 9).

Having historizied the river delta in Part 2, in the following Chapters I describe the current state of rural livelihoods in the Syr Darya Delta. While Part 2 has heavily relied on the archival sources and secondary literature, Part 3 (Chapters 5-8) is built upon my ethnographic accounts recorded during my fieldwork.

Part 3. Common-pool resources and commoning in the Syr Darya Delta

Chapter 5. Rural livelihoods in the Syr Darya Delta: common-pool resources

Figure 5.1. Goats grazing on a highly salinized patch of pasture.

Part 2 of the thesis has demonstrated that Syr Darya Delta has undergone a significant envirotechnical change from 1940 until present times. The iconic species such as rice and iconic forces such as water scarcity and floods have promoted the development of large scale irrigation infrastructure. Along with irrigation infrastructure development upstream, the water diversion from Syr Darya (and Amu Darya) eventually resulted in the Aral Sea catastrophe that has often been framed as a classic example of the tragedy of the commons (Peachey 2004, Glantz 2012). As a result, the districts around the Aral Sea including the Syr Darya Delta was officially declared a Zone of Ecological Catastrophe in 1991 and that designation is still there as of 2023. At the same time, it is quite intriguing that Syr Darya Delta inhabitants' rural livelihoods such as reed beds, pastures, fishing grounds, and land for gardens are shared as commons. Hence, my guiding research question for this part of the thesis is tells 'how do commons function in the Syr Darya Delta?' It is a very intriguing question because (as I mentioned earlier) Syr Darya Delta is part of the Aral Sea region, which at large also represents the case of the tragedy of the commons.

Hence in this chapter, I describe my engagement with the rural livelihoods in the Syr Darya Delta. First, I describe herding, reed mowing, gardening, and fishing practices and compare those rural livelihoods to similar livelihoods in Central Asian and global contexts. By describing these four rural livelihoods, I demonstrate that locals use finite and rivalrous resources for their livelihoods, which are two criteria used to define the commons (also referred to as the common-pool resources or CPRs). Although the commons' definitions have been discussed in detail in the Section (1.3.), I would like to remind the reader that commons are defined as finite and shared/collectively-used resources, in which the appropriation of one user decreases the resources availability for other users. This quality is usually referred to as 'subtractability.' To give an example, let us imagine that a hypothetical group of herders collectively uses 100 hectares of pastures. If one herder puts up his flocks and occupies 1 hectare of pastureland, there will be only 99 hectares available for other herders to use. Thus, the appropriation, i.e., the use of the shared pastureland by one herder 'subtracts' that 1 hectare from the overall amount of pastures available to others. The second quality of the commons is that it is a shared, collectively-used resource and is referred to as 'excludability.' It means that it is possible to exclude other users from appropriating the resource. However, such exclusion is costly and/or not easy.

5.1. Herding

February 2016. When Sakbolot and I arrived at Aqtas located several kilometers south of the river, he dropped me off at his uncle's house. His uncle, Sarsenbek, and his wife, both in their late 60s, were an elderly couple. Sarsenbek's wife had prepared a welcome dinner that featured *besbarmak* as the main course. When serving the *besbarmak*, Sarsenbek apologized that he had not slaughtered a sheep for me as I was his guest coming from afar. I reassured him that it was alright and that I did not take it as an offense. We went on talking about how slaughtering a sheep or other livestock is a hospitality tradition among both the Kazakh and the Kyrgyz. Sarsenbek continued to talk about how slaughtering livestock is an indispensable element of local cultural practices ranging from welcoming guests and weddings to funerals and various other rituals. He concluded that that is why almost every household in the village has some livestock. Indeed, livestock is bred for subsistence as well as a primary generator of employment and income in many parts of rural Kazakhstan (Tazhibaev et al. 2014).

Livestock breeding has been a primary livelihood of Kazakh pastoralists in rural areas (cf. Ohayon 2013, 2023; Yessymkhanova et al. 2021, Kerven 2021). Almost every household in Syr Darya Delta possesses some livestock. While goats, sheep, and cattle are more common, fewer families have horses, and even fewer breed camels. The generic Kazakh term for the livestock is *tort tuluk*, which literally means four types of livestock (e.g., sheep and goats are called '*jandyk*' and are seen as the one type; cattle is called '*iri qara*' and is the second type; horses are the third type, and the camels are the fourth type). The conversation about the tradition of slaughtering livestock to welcome guests ended up being a convenient entry point to ask about the local herding practices.

Over the course of the dinner conversation, I learned from Sarsenbek that only the sheep and goats are looked after on a daily basis. The other types of livestock are left free to roam, because this kind of herding technique minimizes the labor. Another reason why cattle, horses, and camels were roaming free was that these animals could fend for themselves, whereas the sheep and goats were vulnerable to jackals. As for the horses and camels, they are herd animals that stay in groups. The downside of such free roaming herding technique was that the flocks often become semi-wild and that is why herding gets somewhat similar to hunting. For example, when an owner wants to sell cattle, horses, or camels, they first need to catch them. Sometimes, the livestock owners send their livestock to Qyr, where professional herders look after them. It is similar to the practice of going up to the summer pastures in Kyrgyzstan (Dörre and Kasymov 2021). Livestock is one of the favorite investments of local people and historically has been a symbol of wealth (Konuspayeva and Faye 2020, p. 2013). Most households own 10-20 sheep, and 2-3 heads of cattle. The horses and camel are breed by wealthier households. Such a small size of livestock owned by every individual family do not justify the efforts that are necessary for seasonal migrations (Kerven et al. 2006), e.g., to Qyr pastures.

Since the majority of households in the village have goats and sheep that need to be looked after the neighborhoods within a village organized into small groups that herded their sheep and goats together. This practice is called *kezek*, which literally means ‘a turn’. It was called like that because people would join their livestock into a single herd during the day and have one of them look after that herd. People take turns to look after the herd, hence the name. Such herding practices also exist throughout other parts of Central Asia (cf. Kaziev 2021). Some people who have larger herds tend to their sheep on their own every day. Kerven et al. 2016 found that wealthier ‘new elites’ who can afford to rent out from the government large areas of land prefer to move with their livestock to the remote pastures awa from the common pastures, which are mostly located in the vicinity of the villages.

I kept visiting Sarsenbek every now and then and during one of my stays at his house his turn to look after kezek came up. It was April 4, 2016. I volunteered to help Sarsenbek to serve his turn for *kezek*. It was 8:15 am and Sarsenbek and I headed out to the ‘gathering place ’for sheep, located at the outskirts of the village. We collected all the sheep and goats from the neighborhood and the herd size approached 200 heads. We headed towards the big canal nearby the river. Our main task while herding was to keep all sheep as one flock. Since there was not much forage, sheep kept moving so there was not much time for me to talk to Sarsenbek. He was at one end of the pasture and I was at another. Sheep always try to stick in groups, so if one wanders away, few would follow it. We looked after the flock for the entire day with a lunch break from 12 till 2. In some villages, a herder brings back the herd from 12.00 till 14.00, so that a herder can have a lunch break. In other villages, the herder is supposed to prepare and take his lunch with him in the morning. These lands were dominated by bushes, which signals that they were not managed. However, there were signs that locals set fire here earlier. Some areas were burnt down (that is

where they had fresh grass).[1] Over the course of the day, Sarsenbek shared some stories when we happened to be close enough to talk. He said that most of the pasturelands were cultivated sometime in the past either as rice paddies or small-scale gardens, or mowed for animal feed. Milner-Gulland et al. (2006) found that for the smallholder pastoralists in Kazakhstan the availability and costs of mowing and storing winter fodder were the key determinants of flock size (Milner-Gulland et al., 2006). Thus, the land where 'our' kezek herd was grazing was a common pasture, which also had been used as a common reed beds and communal gardens sometime in the past.

While herding we went towards the left-bank magistral canal. This was the area, which was used by Sarsenbek's neighborhood. The other adjacent areas were used by collectively by people in other neighborhoods. The villagers can put as much livestock on it as they want or can. In more technical terms, pastures were finite (subtractability) and shared (excludability) criteria of the commons. Although the pastures are run as commons in other parts of Kazakhstan as well (cf. Robinson et al. 2021) and Kazakhstan's 2017 Pasture Law recognizes both private and collective rights for pastures (Kerven 2021), the pasture commons are largely understudied in Kazakhstan's context and the following chapters will fill in this gap.

5.2. Harvesting reeds

Figure 5.2. Reed bundles are used for construction in the Syr Darya Delta

February 2016. After a few days in Kazaly, I fixed a trip to Aqtas. While walking through the village I made a mental note of the fences neatly made out of tightly bundled reed rolls, bales of dry green reed stacked up on top of barns 'roofs, or sometimes on the ground. I was told that this was an unusual winter with very little snow, warm days, and abundant rains. An abundance of rain this winter took its toll on village houses – the outer layer of clay especially around the windows

[1] This practice of setting fire on old grass in early spring does not seem to be regulated. I also took part in this process in Alga village. My host brother and I set fire on last-years reed thickets along a canal nearby the village.

was washed away revealing neatly stacked reed rolls that make up the filling of the walls. In fact, I started seeing reed everywhere! Many fences were made out of reed bundles and piles of loose reed lay here and there… And I wondered where locals got all this reed from?

This question paved my way for exploring the interactions between local communities in the Syr Darya Delta and the reed beds. I learned that reed is one of the key livelihoods provided by the Syr Darya River in its delta: it is the main construction material and forage for livestock (Figure 5.3.).

My first engagement with reed happened in February 2016 just several weeks after my arrival to Kazaly when Sakbolot took me to harvest winter reeds with his cousins. We drove out of the village and continued along a mud road along a large irrigation canal. The canal banks were overgrown with tall reeds but every now and then there were stretches, where reed was mowed and neatly stacked along the road. Sakbolot explained to me that these piles of mowed reeds indicate the boundaries of the reed beds, which are already being mowed by somebody else. Thus, our aim was to find a spot, which had no such signs. After about a half an hour ride, we arrived at a stretch, which seemed untouched. The water in the canal was frozen and Sakbolot explained to me that as the ice starts thawing, it will become impossible to mow the reeds. He also said that I was lucky to catch the last days when it is still possible to mow the reeds. We walked on ice along the canal banks for a little while before to make sure that this stretch has not been marked by anyone. Reed on the side of the canal opposite the road was taller and thicker than on the side closer to the road. So we decided to mow the reeds on the opposite side, where the reed was better. We had just half a day for mowing. Over the course of the afternoon, we harvested more than a hundred bundles. Sakbolot told me that when there are three of them and they start in the morning, they usually manage to harvest 200 bundles a day. We were planning to mow about 150 bundles but we did not manage to do so because the mower broke. The two questions that interested me were: a) who mowed the reeds and b) how the reed beds were shared. I asked Sakbolot and he explained to me that the reed bales we saw on the side of the road were mowed by other villagers. As for the sharing rule, he told me that a villager can mow any area, which is not being mowed by another villager. Since the reed beds are finite (i.e., appropriation by one user diminishes the availability of the resource to others) and a shared resource (i.e., one villager cannot easily exclude others from using the reed beds), the reed beds in the Syr Darya Delta are common-pool resources.

Figure 5.3. What is reed?
Phragmites australis L. (common reed) is a robust plant, with annual stems that develop from perennial rhizomes. The common reed is one of the most common wetland crops on Earth (Struyf et al. 2009) and is found on every continent except Antarctica, and may have the widest distribution of any flowering plant (Asaeda et al. 2003). It forms large and dense monoclonal stands and can grow in the damp ground as well as in standing fresh, brackish, and saline water more than one meter deep and even as a floating mat (Asaeda et al. 2003, Brix et al. 2014). The common reed can grow to 2–6 m in height with up to 200 rood stocks per square meter (Haslam 1972). Reed beds are a defining feature of many river deltas such as Euphrates, Danube, Yangtse, and others. The Syr Darya Delta is also dominated by reed beds. Local communities in the Syr Darya River delta (Kazaly and Aral districts) use reed as feed for livestock and a construction material (More detail on uses of the reed can be found in the next chapter). In 'standard' Kazakh, there is a single generic word for reed (*qamys*), whereas, in Kazaly, *pshen* is a term for a green growing reed as well as for the bundles of harvested summer reed. Reed grows on the banks of the river, around the lakes and pond, along the irrigation canals, around the rice paddies, and on pastures, which are purposefully flooded in spring to ensure the reed growth.

Figure 5.4. Reed fences are very popular in the Syr Darya Delta

5.3. Gardening

Figure 5.5. Growing melons in the Syr Darya Delta

While we were driving to Aqtas from Aiteke Bi on the first day we met, Sakbolot told me that he cultivates a *baqşa* [a 'shifting' garden in the common fields]. I asked him if he could take me to his garden, to which he agreed. In my mind, I wanted to follow and document Sakbolot's gardening from start to end. However, he was busy with his wage job and other things, so I started visiting other villagers 'gardens in the meantime. The air and soil start warming up in mid-March, however, gardening does not take up speed until late April. According to the local informal calendar, a time period between April 18 till April 25 is considered auspicious and gardeners start planting and other gardening activities after that period. This period is called '*bes qonaq*', which literally means 'five guests.' The term 'five guests' is an allegory for five natural phenomena, which are detrimental to gardens and crops. The 'five guests' are frost, rain, snow, hail, and strong wind. So the rule of thumb is that gardening starts after the 'five guests' have come and gone. Before the '*bes qonaq*' the gardeners prepare their plots.

Local term for a garden is *baqşa* (бақша). It is used both to refer to the gardens that many households have right next to their houses as well as to the gardens that some locals make out in

the fields. The main difference is that house gardens are permanent, meaning one plot of land is used for gardening every year. On the other hand, the 'field gardens 'are cultivated for one or two years and then abandoned for several years. Thus, gardening in the fields is a form of shifting 'slash-and-burn' agriculture. Such a 'use-abandon-reuse' system is a local adaptive strategy to cope with the low fertility and other adverse factors that do not allow cultivating the same plot year after year (see Chapter 10). Villagers cultivate melon and watermelon, pumpkin, cucumber and tomato, potatoes, and carrots in the field gardens. However, most of the gardens are occupied by melons. Every villager decides how much of each plant one wants to grow.

Thus, I managed to go see Sakbolot's garden on April 29th, 2016. The plot has already been fenced and plowed. I helped Sakbolot to reinforce some stretches of the improvised fence with wooden poles and to plant the melons and watermelons in his plot. While helping Sakbolot, I was asking questions about the gardening process and his personal reasons for gardening. For Sakbolot, gardening was a way to obtain additional income:

> '*During summer and fall, everyone and especially the kids want to eat something sweet like fresh melons and watermelons. If I don t grow melons and watermelons myself, I will have to buy them from someone else. So by cultivating a garden, I provide fresh fruits and vegetables to my family and save money, which I would otherwise spend on buying those fruits and vegetables. In addition to that, I can sell the excess melons in Kazaly, which is an additional income for me. I work for one day and I am free for three, so I do gardening in between my shifts*' (Sakbolot, Aqtas, 2016, field notes).

Thus, for Sakbolot who has a wage job, gardening (along with reed mowing and breeding livestock) is an additional source of income and a way to save money. At the end of the growing season, I learned that each melon and watermelon vine yields three fruit on average, thus a gardener harvests about 9 melons (or watermelons) from one nest. So almost every gardener ends up having some extra that he can sell. Sometimes gardeners take the melons to the vegetable merchants in the *bazar* of Aiteke Bi and sometimes merchants visit the gardens and buy melons from gardeners straight from baqşa. The merchants retail one melon depending on its size for about 300-500 KZT (0.8 – 1.3 Euro), while buying it from merchants for about 100 KZT (0.3 Euro).[1] During the high season for melons, supply ends up surpassing the demand. At that time, households start making local melon sweets called *Qauyn qaq* and *Qauyn qurt*.

Qayun qaq is made by cutting the melons into very thin slices. After those slices dry, they are soaked in watermelon juice, braided, and dried again. *Qayun qurt* is done by boiling overly ripe melons in a big pot and adding flour to it. Both deserts can last through winter and are often served at feasts, weddings, and funerals. It is considered a women's job to make these desserts, whereas

[1] In 2016-2018.

gardening itself is mostly a ‘men’s job’. Usually, it is the gardeners ’wives who make it, although there are other women who buy cheap melons and also make these desserts. One kilo of *qauyn qaq* and *qauyn qurt* costs about 2,500-3,000 and 1,500-2,500 KZT respectively.

While for Sakbolot gardening is more of a ‘side job,’ for some households, which do not have much livestock or where none of the family members has a wage job, baqşa gardening is a primary source of income. They tend to have larger plots and almost the entire family works in the garden. Such families may have revenue of over 3,000 euros in one growing season from growing and selling various vegetables. In Aqtas village, about 20-30 percent of households do gardening. Those are mostly families that have spare labor and time. Those villagers who do not garden also buy melons and watermelons from the gardeners. For example, Sakbolot’s younger brother who has been working as a private construction worker did not see the point in growing baqşa:

> ‘*Growing baqşa is a lot of work and it does not pay well. I d better do construction work, house repairs, or renovation and get paid much more. So let the gardeners grow melons in baqşa, I will simply buy whatever they are growing if I want it*’ (Qurmangazy, Aqtas, August 2016).

Thus, cultivating gardens is a viable source of local livelihood because there is an internal demand for baqşa produce.

Although the topic of the local baqşa economy was quite interesting, I was more focused on finding out how the land for baqşa gardens were shared among the gardeners. Although there is no formal limit to the size of the plot for an individual gardener, the rule of thumb is that one should take just as much as they are capable of taking care of. The size of the individual baqşa varies from 0.1 to 1 hectare with an average-sized plot being 0.2-0.4 hectares. The latter number is an average of how much one gardener usually can manage. Not all gardeners in the same group take equal plots, as a rule some people tend to take smaller plots of land (because they are capable of taking care of only that much land) and those who have more resources (such as children who can help) or more time to invest into baqşa tend to take bigger plots.

The interactions of gardeners at this stage vividly demonstrate how land for gardening are perceived and run as commons. It meets both of the key characteristics of commons (Ostrom 1990): a) exclusion is costly and b) exploitation by one user diminishes the availability of a resource to others. There are informal rules of who and how much land one can take for gardening. The local rule of thumb dictates ‘one takes as much land as one is capable of taking care of ’ because as locals say ‘there is so much land around’. That is why the families who have more human resources usually end up taking bigger plots of land for gardening.

5.4. Fishing

Figure 5.7. Villagers are setting up their fishing lines

I learned about fishing when I went to mow winter reed with Sakbolot, Adai, and Alban in February 2016. After all the bundles were piled up on the ground, we went back on the ice and started checking the fish nets. Adai and Alban had set up the nets in this canal a few weeks ago and kept coming every day to check them and collect the catch. These nets are set under the ice. When setting the net for the first time, Adai and Alban made two holes on ice, about 10 meters apart from one another. The holes are made on opposite sides of the canal so that the net runs diagonally. After the holes are made, Adai pushed the nets under the ice using long reed stems. The ends of the nets are tied to reed stems as well and the latter is placed perpendicularly on the ice, so that the net does not drown. When it is time to check the nets, a thin rope is tied to one end of the net and the net is pulled out from the opposite hole. When the net is out of the water, the rope takes its place under the ice. When the nets were checked and cleaned, Alban pulled the rope and the net came back into its place.

Alban and Adai put up about ten nets in that canal. On average, they catch about 10 kg of fish every day. Fishing on the Syr Darya River is illegal, whereas fishing on the smaller irrigation canals and ditches is somewhat of a grey area in the law. To enhance the catch, Adai and Alban (just like other fishermen) use a tool called *dompuldak*. It is a stick with a bucket-looking thing at the other end and which reminds me of a huge cup plunger. The fishermen make a number of holes right in the middle of the canal in between the two net holes. And then put the *dompuldak* into

those holes and push it up and down. The purpose of this activity is to make noise and scare the fish to make them swim towards the net.

It took us about half an hour to check all nets and put the catch in the sack. The catch consisted of carp, catfish, and snakehead species of fish, which are praised by locals for their fattiness and good taste. Adai collected all his nets and said that now the ice fishing season is over because the ice got too thin. We drove back to Adai's and Alban's house first. His mother and wife had prepared borsch and fish chops from the fish that was caught the day before. Adai gave today's catch to Sakbolot and asked to leave some fish at Sarsenbek aga's when going to drop me off.

This family uses their catch for subsistence as an additional source of food. It is usually passive fishing done in delta ponds and irrigation canals. They set up nets and go check on them every day or every other day. Fishing is often a complementary activity to reed mowing. The reed mowers set up nets in the irrigation canals nearby their mowing spots. When I was helping my host family to mow summer reed in Aqsu, we also set up nets in the adjacent irrigation canals. The rules for sharing the fishing grounds are very similar to those of reed mowing and gardening. Thus, the fishing grounds represented by the Syr Darya River, irrigation canals, and delta lakes are also shared as common-pool resources. At the same time, there are villagers who fish as a primary source of their income. However, those fishermen primarily go to the Aral Sea (for more information on how the quota system works in the Aral Sea, please read Wheeler 2016, 2021).

5.5. Property landscape of the Syr Darya Delta

Although most of the pastures, reed beds, and fishing grounds are run as commons, I must point out that not all natural resources are commons in the Syr Darya Delta. First of all, I need to mention the land used by local rice-growing corporations (introduced in Section 1.1.) is obviously not a common-pool resource. Secondly, there are some plots of land, which are purchased or leased from the local government by some locals to mow reed for their livestock and sale, herd their livestock, and cultivate gardens.[1] Those are usually well-to-do villagers who own tractors and mechanized mowers. In other words, not all resources in the Syr Darya Delta are commons but rather common-pool resources co-exist with private and corporate ownership. Indeed, even the early scholarship on the commons noted that commons almost never exist in isolation but rather co-exist with private property (Ostrom and Hess 2007). Moreover, Rotherham (2013, p.44) claims that 'commons should not be seen as a singular phenomenon, but as a component of larger landscapes incorporating both commons, and individually controlled non-commons.

While the privately-owned plots are not numerous, the land leased to the rice-growing corporations is much larger. Nonetheless, some lands rented by the rice-growing corporations are de facto used

[1] The typical lease period is 49 years. There are a 2-3 or maximum handful of households in every village who can afford to rent the lend from the government. That is why these privately-owned lands are not numerous and do not take away much land from the commons. I tried to find out how much it costs to lease the lend from the government. However, I did not manage to obtain specific numbers.

as commons. For example, due to using shifting agriculture, the rice-growing corporations do not cultivate rice on every hectare of the land they leased. The land, which is not under rice or other crops (e.g., alfalfa) de facto used by locals as pastures or *baqşa* gardens. Moreover, the the reed growing around the rice paddies is considered the best because it tends to be tall and thin (kaz. *maisa pshen)*. The workers who work for the rice corporation often mow reed for themselves around the rice paddies that they are looking after. Often, the friends and the relatives of the workers also mow reed around the rice paddies. In cases, when the area under rice cultivation is large, the other villagers are also allowed to mow reed around the rice fields because tall reed casts shadow on rice and thus unwanted. Thus, the reeds around the corporately-owned rice paddies are also shared by the local communities and thus can be seen as commons too. Such co-existence and interlay of property rights has been documented in many parts of the world. Schlager and Ostrom (1992, p.254) noted that 'within a single common-pool resource situation a conglomeration of de jure and de facto property rights may exist which overlap, complement, or even conflict with one another.'

Moreover, all commons in the Syr Darya Delta depend on rice corporation to a certain degree. By paying for water diverted from the Syr Darya river to irrigate the rice fields, the rice growing corporations create favorable conditions for the commons. For example, baqşa gardens appear along the canals that deliver water to the rice paddies because it is most convenient from the economic and infrastructural perspectives. When diverting water into a particular irrigation canal, the vodhoz calculates the amount of water it needs to deliver as well as the amount of water, which would be lost due to infiltration. Thus, if we take a hypothetical situation when a rice corporation paid for diverting 1,000 cubic meters of water into a particular canal, the vodhoz needs to divert 2,000 cubic meters because half of it would be lost due to infiltration. Thus, the *vodhoz's* water diversion logic is as follows:

- When baqşa gardeners set up their gardens along the canals leading to the rice paddies (that, for example, need 1,000 cubic meters of water), the vodhoz has to add only the amount of water needed to the gardeners (let's say 200 cubic meters) into the existing flow. In other words, the vodhoz will divert 2,200 cubic meters of water into a particular canal to meet the rice growers and baqşa gardeners demand for 1,000 and 200 cubic meters of water respectively. Thus, vodhoz gets paid for 1,200 out of 2,200 cubic meters of diverted water with 1,000 cubic meters written off as a 'water loss' as per our hypothetical example.

- If the baqşa gardeners set up their gardens along a canal that is <u>not</u> taking water to the rice paddies, the vodhoz would have to divert 1,200 cubic meters of water into that canal in order to deliver 200 cubic meters to the baqşa gardeners (1,000 cubic meters would be lost

> due to infiltration). Thus, the vodhoz would only get paid for 200 out of 1,200 cubic meters of diverted water, which is economically not feasible for the vodhoz.[1]

As for the reed beds, most of the best mowing spots appear along the irrigation canals that take water to the rice paddies and around the rice paddies. As mentioned before, those irrigation canals are also used as fishing grounds. And only the pastures do not depend much on water diversions for the rice fields. In other words, almost all commons in the Syr Darya Delta depend on privately-run rice cultivation.

Thus, when looked from a birds-eye view perspective, the resources that form the basis of rural livelihoods in the Syr Darya Delta represent a mosaic of different property regimes such as common-pool resources, corporate property, and private property.

5.6. The tragedy of the commons in the Syr Darya Delta: why did it not happen?

The term 'tragedy of the commons' coined by Gareth Hardin (1968) is considered to be one of the most influential ideas that affected the thinking of generations of scholars and decision-makers (Doolittle 2014). The parable of a free-to-all pasture, presented by Hardin in his paper, claimed that the commons are likely to inevitably collapse because the common-property nature of the resource regime incentivizes resource users to increase the use of this resource for their own benefit (Wall 2014). Although the concept of the tragedy of the commons is often associated with Hardin, there were economic models that predated Hardin's work. For example, Howard Scott Gordon (1954) argued that open access conditions in fisheries lead to the fisheries becoming biologically and economically nonviable. To prevent the tragedy of the commons, Scott Gordon (1954) advocated either for government interventions or imposing a single owner on the fishery. Both of Gordon's 'solutions' for the commons were tried in the Soviet and post-Soviet era in Syr Darya Delta. Butler (1984) notes the state ownership of land and other means of production were always considered as a cornerstone for building a socialist order. Skyner (2004) notes that the post-Soviet privatization of agricultural land intended to increase the efficiency of land use, lessen the demand for the governmental subsidies and contribute to the capital accumulation. Such predictions that the commons are destined for tragedy unless managed by the centralized governments or private owners were quite mainstream until a critical scholarship challenging this idea accumulated from around the globe (cf. Poteete et al. 2010).

One of the main points of critique was that what Hardin (as well as Gordon) were referring to was in fact an unmanaged commons or open-access resource with no rules of using it. In fact, Hardin later agreed with this criticism stating that:

> *To judge from the critical literature, the weightiest mistake in my synthesizing paper was the omission of the modifying adjective unmanaged.' In correcting this*

[1] I got these explanations from a few Kazaly vodhoz employees, which I wrote down into my notebook during the field research.

> *omission, one can generalize the practical conclusion in this way: A managed commons describes either socialism or the privatism of free enterprise. Either one may work, either one may fail: The devil is in the details. But with an unmanaged commons, you can forget about the devil: As overuse of resources reduces carrying capacity, ruin is inevitable' (Hardin 1998, p. 683).*

So are the commons in the Syr Darya Delta 'managed 'or 'unmanaged'? Did the tragedy of the commons already happen in the Syr Darya Delta? Or is it likely to happen in the future?

In the previous section where I introduced the rural livelihoods in the Syr Darya Delta, I have demonstrated that pastures, reed beds, land for gardening, and fishing grounds are rivalrous and finite, hence qualify to be considered as commons. While helping my host families in their daily livelihoods, I observed how commons such as pastures, reed beds, land for gardening, and fishing grounds are shared among the villagers. From what I have learned the rules were quite simple. Let's take reed beds as an example to illustrate the general rule for sharing commons in the Syr Darya Delta: a) everyone can mow as much reed as one is capable of mowing and b) one is not allowed to mow an area, which is already being mowed by somebody else. Exactly the same rules were in place with sharing pastures, using land for gardening, and fishing. These rules seemed like an ideal recipe for the tragedy of the commons in the Syr Darya Delta as described in Hardin's essay. Indeed, if there were no restrictions on how much one villager can mow, one would try to mow as much reed as possible to maximize his benefit, which is exactly what Hardin predicted. However, the reed beds in the Syr Darya Delta did not seem to be degraded or depleted, so I started wondering how come the river delta communities evade the tragedy of their commons?

When I asked the villager how they manage to avoid conflicts over sharing common-pool resources, the first answer they would give was that a particular resource is abundant and there is enough of it for everyone. For example, my interlocutors would say 'since there is so much reed, every commoner can mow as much reed as one can,' 'there is so much land, one can take as much land for gardening as one is capable of taking care of.' Thus, the abundance of commons was mentioned as the main reason for having such an open-access-like arrangement with no limits other than the capacity of the commoner. In the following sections, I will problematize this notion of resource abundance and show that there is an underlying scarcity.

Are common-pool resources abundant in the Syr Darya Delta?

While an in-depth analysis of the local abundance discourse is beyond the scope of my thesis, I want to provide a couple of examples of it. In a vernacular speech of delta residents, the word for reed (i.e., *pshen*) is used to describe something plentiful and abundant. The locals also take pride in Kazakhstan being one of the largest countries in Eurasia and bring up this fact to demonstrate that 'there is a lot of land in Kazakhstan.' Indeed, the claims of abundance appear quite plausible at first sight. With a population density of 2 persons per 1 square km, it may not be surprising that

local people claim that there is enough land for every delta resident. On a district scale, the abundance seems to be there due to low population density.

However, when one zooms in on a village scale, the underlying scarcity starts revealing itself in some cases and some places. For example, the amount of land and infrastructure needed for reed beds and cultivating gardens varies from village to village. The boundaries of lands that belong to every village coincide with the boundaries of the Soviet-era sovkhozes. Former rice-growing sovkhozes tended to have more land than others. As a result, those villages have more land than others, which means that commoners from different villages have different access to land where they can make field gardens or mow reed. For example, Aqtas, Aqsu, and Saarytal are the three villages that are located one next to another. Aqsu used to be a 'livestock-fattening base' during the Soviet times as opposed to the other two, which were 'rice-growing sovkhozes'. As result, nowadays, Aqsu has much less land than the other two villages. As a result, inhabitants of Aqsu make no field gardens and use their lands as reed beds and pastures. In contrast to Aqsu, inhabitants of Jarma and Aqtas have enough land for pastures, mowing reed, and cultivating gardens (about 30% of the population in these two villages cultivate field gardens).

Another factor is a geographic variation within the river delta. Even though many villages can rely on irrigation by gravity, some villages are located above the river level and require pumps to draw water. As a result, villages, where irrigation by gravity is feasible, tend to have more reed beds, e.g., Aqsu, Aqtas, Jarma, and others, while such villages like Mailybas where irrigation by gravity is not possible to tend to have very little amount of reed beds. In some areas, the reed is outcompeted by other species such as *oshagan* grass (*Arctium lappa*, eng. Greater burdock), thus further restricting the availability of reed beds in some particular vicinities. Thus, although there might be an abundance of reed beds, pastures, and land for gardening on the larger district scale, under closer inspection the 'abundance' narrative does not hold up for every commons on the village level.

Furthermore, my ethnographic data also challenges the abundance narrative not only in the villages with the small amount of land but also in those, which seemingly have a certain commons in excess. To illustrate my claim I use two examples: firstly, the case of reed in Aqsu village where the narrative about the reed bed abundance is strong, and secondly, the case of gardening in Aqtas village, which is known for an abundance of fields where gardens are cultivated.

5.7. Is there a lot of reed in Aqsu?

Figure 5.7. Burning reed in spring to allow the young spouts to emerge

After having morning tea on July 16th, 2016, Jylkybai and I hopped on two old bicycles and went looking for a place to mow reed this summer. Aqtleq, Jylkybai's father, gave us some final instructions about our scouting route. Aqtleq mentioned several locations that he wanted us to inspect. Jylkybai and I hit the road and took an asphalt road leading to Aqtas village. After 20 minutes, we turn off the main road into the fields and after another 20 minutes, we reached the reed bed that Jylkybai mowed last year. To my inexperienced eye, the reed looked just fine - it was about 1.7 meters tall and it seemed to cover quite a large area. However, Jylkybai did not like what we saw. He said that this reed was short and sparse and that mowing here would not be worth the effort. Later I learned that not all reed is created equal and from the local perspective, reed beds

differ in terms of their quality. For example, the best reed beds are thick and dense ones where the reed grows tall with juicy leaves.

The different quality markers for reed are used in everyday communication about reed. For example, tall reeds with juicy and soft leaves are called *maisa pshen*, a very tall and thick-stemmed reed is called *narlyq*, and a very tough reed is called *tas quraq*. The *maisa pshen* grows around rice fields, enjoys good access to water and that is why it is soft and nutritious. *Narlyq* grows on the banks of the canals, it is tall and strong but tends to get too thick. *Narlyq* makes good winter reed because its length and thickness is needed for using it as a construction material. *Tas quraq* is the reed that grows in dry areas. Due to lack of access to water, its stems are hard and brittle, whereas its leaves are not juicy. Usually, the reed beds are burned in early spring. If not burnt, the reed beds end up having sharp stem leftovers of the mowed reed from the previous year, which makes it difficult to mow read in a current year by getting on the way of a sickle and poking the hands of the mower with sharp edges. The areas which were not burnt in the previous year are called *qos kötek* (lit. double stem-base).

Jylkybai's former reed bed produced *tas quraq* reed this year, so we had to look for another place to mow. Jylkybai explained to me that we needed to find a place with a thick and tall reed. In case, we could not find anything, mowing this old spot would be the backup plan for us.

The next spot in our 'itinerary' was a stretch of the irrigation canal locally known as 'Canal 3.' While riding our bikes to Canal 3, we passed by other canals with thick and tall reeds growing along its banks and some reed thickets growing around rice fields. I asked Jylkybai why not mow one of these reed beds. He explained to me that before claiming some reed bed, we must check if no one else was already mowing that area. We did not bother stopping there to check if anyone had claimed these areas because Jylkybai already knew that those places had been taken. He knew it from conversations with other men in the village.

Finally, we reached the intersection of Canal 3 with the main asphalt road. This was a medium-size canal about 4-5 km long, 2 meters deep, and about 4-5 meters wide. Jylkybai had heard from his friends that there was good reed along its banks. Some villagers were known to have already claimed some stretches along Canal 3, but there was still a chance that some areas were unclaimed. Jylkybai and I already knew that the stretch of the canal closest to the asphalt road has already been marked and claimed by one of the villagers, so we had to ride along the canal further away from the road. After riding about 1 km, we got off our bikes because there was no road anymore and started roaming the reed bed looking for marked territories. The reed was indeed very tall (ca. 2 meters) and thick, so it felt like I was going through a reed forest or a reed jungle.

It was a very desirable spot and Jylkybai liked it a lot. I thought that our quest for a new spot culminated in great success but Jylkybai told me we need to keep looking for signs. We were hoping that will not find any markings and that we could mow it. Alas, after a little bit of roaming

we came across a mowed area. The mowed reed was piled in bundles and left on the ground, which indicated that someone had already claimed this area. When we came out of the reed 'forest 'back to where we left our bikes, we saw a villager, who was heading towards the village. We had a short conversation and Jylkybai told him that we were looking for a spot to mow. The villager confirmed that his neighbor had already claimed the area Jylkybai and I had just inspected. The villager told us that he himself is mowing the opposite end of the canal and that there is some space in the middle.

Jylkybai and I went to the stretch of the canal that the villager pointed out. This stretch is known among locals as Tal [a willow tree] since a lonely willow tree grows there. It can be seen from afar and that is why it is often used as a landmark. We walked to check if anyone has left signs and after discovering none, we marked the boundaries of the area we wanted to mow. We mowed reed at the two ends of the stretch we claimed and left the reed bundles on the ground. By marking the stretch we wanted to mow, we diminished the reed beds 'availability for others.

I presented this ethnographic snapshot to demonstrate that even in those villages, which have a lot of reed beds, there is an underlying scarcity when one takes into account the quality of reed. In other words, from the quantitative/area coverage perspective reed beds in Aqsu are abundant. However, when the quality of reed beds is factored into the equation, the high-quality reed beds are rather scarce. Thus, it is not an absolute scarcity but rather a relative scarcity related to efforts needed to mow the same amount of reed. Since the villagers prefer mowing a high-quality reed, there is some scarcity even in those villages with seemingly abundant reed beds.

5.8. 'There is enough land for everyone!' Or is there not?

After spending more time in the field, I realized that the 'abundance' narrative does not quite hold up for other commons as well. I was surprised to see that gardeners from those villages that emerged from the rice-growing kolkhozes and tend to have a lot of land for gardens struggle to find suitable spots for gardening. Wagner (2002) defined scarcity as a lack of adequate supply of natural resource(s) to meet required human demand, while natural resource economists such as Barnett and Morse (1963 in Norgaard 1990) emphasized the quantity of labor and capital needed to extract a unit of resource and downplayed the changes in the physical quality and availability of resources and Bell et. al (2012) conceptualized scarcity in terms of the balance of physical supply and demand in a given location.

In the case of Sakbolot from Aqtas, he had his garden in the same plot for the last two years. For this year it was no longer suitable, so he had to abandon it and look for another plot. Finding a suitable plot for *baqşa* is the first and most important task before starting gardening. To find a new spot, Sakbolot has been going for scouting rides on a motorbike around the fields to locate potential spots for making his garden. Sakbolot told me that he eyed a few potential spots while herding his livestock. Other villagers who have already picked their plots for this year also gave him a few

pointers. So Sakbolot has been visiting those spots and making up his mind about which one to pick. Sakbolot explained to me the factors that would affect his choice of the plot. They were: a) proximity to the major irrigation canal(s), b) soil salinity, c) soil fertility, d) topographic features of a plot and d) proximity to the village. In the following paragraphs, I will unpack each of these factors.

Proximity to the irrigation canals.‘

> *First important thing I bear in mind is that my plot should be close to water. Water is everything for gardening. A place with good access to water usually yields good harvests. If you are close to water you can leach your plot and decrease its salinity. However, if a plot is too close to the canal - it gets muddy. You know that water seeps out of the canals? It is called filtration. The ground water level is also higher if you are too close to the canal, which is not good. That is why you have to be close to the irrigation canal but not too close. Striking the balance between proximity to the canal and a distance from it is the key to good yields*’ explained Sakbolot.

Although all irrigation canals are known to the locals, there is still an element of uncertainty. Not all irrigation canals get water in summer. Only those that take water to the rice fields do. Because rice corporations also shift their rice paddies to increase their yields, gardeners hunt for plots along the canals that take water to those fields. Unlike rice corporations, local gardeners cannot afford to pay for diverting water to a particular canal. That is why corporations ’decisions on where to grow rice affect the location of *baqşa* gardens. Usually, the rice corporations ’plans as to where to cultivate rice in a particular year are known to the villagers because most of the rice corporations ’ workers are local. That is why there are no sudden or unexpected changes in rice cultivation plans that could be ruinous for the baqşa gardeners.

Soil salinity.

When we approached his plot Sakbolot said:

> ‘*I am not that happy with the plot I found this year, it was not the best – it still has salt on it. As gardeners you should try to pick the least salinized land’* while pointing at the white areas covered with salt.

Kazaly district is severely affected by soil salinity. It is estimated that almost all areas of Kazaly are salinized to various extent with 64.3% being characterized as ‘moderately salinized’, 22.6% as ‘slightly salinized’, and 13.1% as ‘extremely salinized ’(Karlykhanov and Toktaganova 2016). Soil salinity is another decisive factor in choosing the plot for a garden. Gardeners use a variety of local methods to estimate soil salinity (More details in Chapter 10).

Soil fertility.

Soils in the Kazaly district are characterized by low fertility (Karlykhanov and Toktaganova 2016). Low soil fertility was one of the primary reasons for local shifting agriculture practices (Chapter 10). Sakbolot confirmed that it is the main reason for rotating gardens:

> ‘*The plot I used for last two years had very little salt. But I already cultivated it for two years. The land fertility decreases after one season of cultivation, especially if you grow melons and watermelons. In rare cases, you can cultivate it for two years, after that its fertility will be really low. That is why we shift out gardens, we simply cannot make baqşa in the same place for a few years in a row.*

According to local experience, a particular plot of land needs at least 3-5 years to restore its fertility. 3-5 years of fallow period is considered a rather quick recuperation period. In the areas where slash-and-burn agriculture or shifting agriculture is practiced soils are observed to recover for over 10 years (Metz 2002). Since the soil fertility depends on when a particular plot has been cultivated last time, the gardeners have a couple of ways to tell it with certainty. One is that they ask other gardeners, if anyone has cultivated a particular spot in the last few years. Another way of telling it is by looking at the irrigation ditches on the plot. If those ditches look fresh and new, it means that a plot has been cultivated recently.

Topographic features of the plot. Such features as relative elevation, evenness, and vegetation are also taken into account when selecting a plot. The plots located in depressions are considered inferior to the elevated ones. Relatively elevated plots tend to have fewer weeds and are less prone to salinization. At the same time, the land should not be too elevated. Irrigation water should be able to reach the plot by the power of gravity because otherwise, it would necessitate setting up a pump, which means additional costs for the gardeners. Some villages along the river such as Kentup, Alga, and Sentas do not have field gardens because their lands a too elevated for irrigation by gravity:

> ‘*In our neighboring villages downstream, e.g. Aqtas, Aqsu, Targyn and others, about 30-40% of households do baqşa gardening and in Alga no one makes gardens in the fields. If you ask them why people in Alga do not do gardening, they say that we are lazy [laughs]. In fact, the crucial limiting factor for us is that all our land is located higher that the river level and that is why pumps are required for irrigating gardens. In fact, our sovkhoz had baqşa gardens during the Soviet era. Back then there were 21 pumps to bring water to our village and now there is only 1. One pump provides us just enough water to water trees along the streets of the village. Because gardening in Alga requires a lot of investment and a lot of work, no one in the village is interested in cultivating baqşa’* (Arman, Alga village, July 2016).

Evenness of a plot means whether all of its parts are leveled. Evenly leveled plots are easier to water, that is why gardeners take this factor into account. Last but not least, gardeners assess how much vegetation is already growing on a prospective plot. If there are too many shrubs, clearing the plot will turn into a tedious task.

Proximity to the village. Sakbolot was still holding a handful of dry soil in his hands, while staring at the distance: '*There were some better plots farther away… I was thinking of making a garden there. But at the end, costs dictate their restrictions. I just calculated that I would spend too much money on fuel for my motorcycle to go there on daily basis. That is why I settled for this land, which is closer to my home*.' Indeed, proximity to the village is an important criteria for the commoners because they have to commute to their gardens almost on a weekly basis. That is why those plots that are closer to the village are more desirable than those farther away.

Thus, even though such village as Aqtas seem to have a lot of land at their disposal, the amount of land suitable for gardening is quite limited when such restrictions as soil salinity and fertility, as well as the proximity to the irrigation infrastructure, and to the village are taken into account.

These two examples demonstrate that even within the villages where a particular commons seems to be abundant, this particular commons might actually be considered as rather scarce when additional quality factors are taken into account. To conclude, in this section, I problematized the existing abundance discourse in the river delta on two levels. Firstly, I demonstrated that different villages have different access to various commons. In other words, some commons are indeed abundant in some villages and scarce in other villages. Secondly, I further challenged the abundance discourse even in the commons-abundant villages. In other words, even in those villages that have a lot of reed beds or a lot of lands for gardening, the commoners have to deal with scarcity because not all lands are suitable for gardening and not all reed beds are equally desirable for mowing. Thus, the notion of scarcity in relation to the commons can be seen as relative scarcity. Indeed, when talking about scarcity of land for gardening or reed for mowing, Sakbolot and his fellow villagers think similar to the classical natural resource economists, who emphasized the quantity of labor needed to extract a unit of resource (Barnett and Morse 1963 in Norgaard 1990).

Thus, the explanation I was offered by my interlocutors, according to which the abundance of commons prevents the tragedy of the commons does not hold up under closer scrutiny. So what reasons do really prevent the tragedy of the commons in the Syr Darya Delta?

Chapter 6. Why did the tragedy of the commons not happen to rural resources?

6.1. Institutional design principles: how commons are shared in the Syr Darya Delta

Hardin's tragedy of the commons narrative lead to the emergence of the commons literature that challenged and critiqued this narrative (Poteete et al. 2010). The bulk of this literature focused on documenting and theorizing the case studies of successfully managed commons, i.e., the commons that did not succumb to the tragedy that Hardin had predicted (Van Laerhoven and Ostrom 2007). In her Nobel Prize-winning work, Ostrom (1990) proposed the institutional design principles, which are the common traits that the majority of successful commons exhibit. Indeed, the institutional design principles have been one of the primary interests of the commons scholars around the world in the last few decades (Van Laerhoven and Ostrom 2007, Van Laerhoven 2020), including in Central Asia where Shigaeva et al. (2016) documented pasture commons, while Theesfeld (2019), Sehring (2009), and Soliev et al. (2020) studied irrigation commons.

The previous chapter has demonstrated that some livelihoods in the Syr Darya Delta such as reed beds, gardens, pastures, and fishing grounds are the common-pool resources or simply the commons. Taking into account that the institutional design principles are one of the aspects of the commons that are attracting the most attention in the literature, I, too, engage with the literature on the commons 'institutional design principles and demonstrate that the design principles must be more nuanced to reflect the current state of the commons in the Syr Darya Delta. Thus, in this chapter, I further explore the delta commons and compare them against the eight institutional design principles (Ostrom 1990).[1]

While I discuss some principles in more detail, some principles are not discussed in depth. This discrepancy stems from the fieldwork data availability and applicability of certain principles to the Syr Darya Delta commons. This chapter aims to answer the guiding question I formulated in Chapter 5: i.e., why is there no tragedy of the commons in the Syr Darya Delta? This question is quite provocative because on a regional scale the water-sharing arrangements in the Syr Darya and Amu Darya basins as well as the desiccation of the Aral Sea are the perfect examples of the tragedy of the commons.

6.1.1. Design principles: boundaries

The first design principle highlights the importance of boundaries and correlates with the principle of exclusion (Schlager 2004), which is a key criterion for defining the commons. The 'exclusion' principle means that successful commons have clearly defined boundaries for both the resource

[1] Building on Ostrom's (1990) eight 'design principles' for collective action for common pool resource management, Agrawal (2002) extended this list to a total of 24 enabling conditions for sustainability of commons use. Nayak and Berkes (2011) argue the internal variables that Ostrom (1990) and Agrawal (2002) emphasized, external drivers can be of key importance.

and the group of users. In other words, in most of the successful commons, it is clear which individuals and households have the right to use the commons (one can label them as social boundaries). It is also clear where the commons start and end, i.e., the geographic boundaries of the commons are clear. Are these boundaries of the Syr Darya Delta commons well-defined? Since this principle implies two types of boundaries, i.e., the geographic and social ones, the answer to this question also consists of two parts. First, I start with analyzing whether the geographic boundaries of the Syr Darya Delta commons are well-defined and then, I turn to social boundaries.

In the previous chapter, I mentioned that different villages have different amounts of arable land. While some have hundreds of hectares (i.e., Aqtas), others have much less (e.g., Aqsu) (Map 2). The inhabitants of a certain village tend to use only the land that belongs to that village. There are of course very few exceptions when the villagers from neighboring villages are allowed to use the commons of a certain village. But such cases are very rare and are negotiated on case by case basis. For example, over the course of my fieldwork, I was able to record only two cases of outsiders being allowed to use a certain village's commons. So on the village level, the geographic and social boundaries are clearly defined: i.e., inhabitants of a certain village are entitled to use the commons that are located within that particular village's land.

However, the geographic boundaries of the different commons (and non-commons) within the common lands are fluid. For example, the Jarma village's lands are used by an Agro-Orken rice corporation, which grows rice on hundreds of hectares of land. Within each village's land, there are rice-growing corporations similar to Agro-Orken (Table 4). They rent land from the local government and make rice paddies. Due to soil salinity and low soil fertility, the rice corporations use shifting agriculture as an adaptation strategy (more in Chapter 10). The rice corporations are first to pick the land and consequently, they pick the best available lands. In other words, the rice corporations are de-facto considered as one of the commoners that have the right to make the first choice for land. The rice corporations pay the *vodhoz* for diverting water to irrigation canals that lead to their rice fields. The reed beds pop up along those canals and around the rice paddies. The villagers make their gardens close to the irrigation canals that deliver water to those rice paddies.[1]

The areas, which are not occupied by rice paddies, are run as commons by the villagers and are used as pastures, reed beds, and *baqşa* gardens. The irrigation canals that transport water to the rice fields and gardens are also used as fishing grounds. Thus, in the Syr Darya Delta, various common-pool resources such as reed beds, pastures, and baqşa gardens as well as privately-owned such as rice fields coexist as a patchwork on the same territory. Moreover, since rice cultivation and baqşa gardening are done in a form of shifting agriculture, the boundaries between the various

[1] In other words, commons depend on non-common resource such as rice fields. I touched on this issue in Chapter 5. The land leased by the rice corporations are run as private property, the rest of the lands are run as commons. Technically, there is no formal restrictions for limiting a potential greed of rice corporations. The rice corporations are limited by their own financial capcaities. In fact, the villages would prefer to have more areas under rice because that way there will be more reed beds and more options for gardening. Surely, it is only the case because most of the land underused. If the population density was higher, i.e., like in Ferghana Valley the tensions between the rice corporations and the gardeners would have been more likely.

commons and non-commons are fluid over the years. In other words, there is no clear boundary between common pastures and the plots used for field gardens or rice paddies. For example, particular plots can be under rice or a baqşa garden for a few years in a row. When the rice or baqşa cultivators abandon those plots and shift the paddies and baqşa gardens to other plots, which were used as pastures before. At the same time, those abandoned plots become pastures. Thus, if we look at such co-existence of commons from the perspective of a particular plot, this plot can be used as a rice paddy for several years, then as a pasture for a few more years, and then as a baqşa garden after that (surely, the concession of use can be in any given order).

Although some existing articles on commons in Central Asia focus on the boundaries issue such as Shigaeva et al. (2016) who found that boundaries between the pasture user associations in Kyrgyzstan were not neat, none of them problematize the boundary principle the same way it is done in this chapter. Contrary to Shigaeva et al.'s (2016) example, the geographic boundaries of commons in the Syr Darya Delta are clear on the village level and coincide with the village land's boundaries. However, the internal boundaries between various commons and non-commons within the village are fluid and may change from year to year. Thus, on one hand, the Syr Darya commons display Ostrom's design principle no 1 (on the inter-village level) and on the other hand, show that boundaries are fluid over time on a smaller (intra-village level). This conclusion adds depth to the first design principle and demonstrates the importance of scales in conceptualizing and describing the commons 'boundaries. In other words, the outer boundary of the commons does not change. Several commons such as reed beds, gardens, and pastures exist within those external boundaries and the boundaries between these commons are not clearly defined.

6.1.2. Social dimensions of the commons' boundaries

Now I turn to analyze the social boundaries of the commons, i.e., I ask who has a right to use commons and who does not (see the excludability criteria of the commons)? In principle, the social boundaries are more or less the same as geographic ones. That is the inhabitants of a particular village use their village's land as commons. However, there may be some exceptions when an inhabitant of another village is allowed to use the commons. For example, I met a person from one village making a baqşa garden in another village:

> '*I live in Aqsu but my baqşa is Sarytal. It is in the village next to ours. My baja' (a husband of his sister-in-law) invited me to do gardening with him there*.' Qanat, Aqsu, July 2016.

However, this rare case still does not disprove the claim that social boundaries are more or less the same as geographic ones. Those outsiders who are allowed to use the commons are not complete strangers. They tend to have some connections to the local villagers through affinity or consanguinity like in the above-mentioned example, where the outsider is related to someone in the community that uses the commons.

However, the social boundaries have layers of complexity to them as well. For example, in April 2016, I tagged along with Sakbolot to help him with planting the melons and watermelons. He showed me his seeds that were kept in an old sock filled with manure. This was a trick used by many gardeners to germinate their seeds before planting them. When I rolled up my sleeves and asked him to show me how exactly he plants the seeds, Sakbolot explained it to me like this:

> *You take six seeds and stick them into the soil with your fingers. Before starting planting the seeds we usually say 'baldarymdyn nesibesi'[lit. my children's share] or 'köptün nesibesi [lit. many people's share]'*

I did not think about the meaning of these phrases at first because I was too focused on planting the seeds correctly. Later, in my interviews with other gardeners, I learned that saying '*köptün nesibesi*' is very common among the gardeners. I also heard how fishermen would say one of these phrases before casting a net or a fishing rod. After hearing it again and again, it caught my attention and I became interested in understanding the meaning behind these expressions. I included these phrases in my interview questions and asked a number of people in different villages to explain to me why locals say them. The answers I got from different interlocutors were very similar and can be boiled down to the following quote: 'We say that so that God gives us good harvest/catch.' When I pressed more and tried to explore it deeper, my interlocutors expressed the belief that if a gardener or fisherman does not say either of those phrases, he will get yields or catch fish in the amount, which is enough for just one person, i.e., the one who is sewing seeds or casting a net. However, my interpretation is that saying these phrases has something to do with the social boundaries of the commons. I claim that these phrases remind the commoner that the circle of commoners is much larger than just the ones who are directly interacting with the commons and appropriating resources from it. This claim of mine is eloquently and precisely illustrated by Sakbolot during one of our meetings, which happened on August 29, 2016.

On that day, Sakbolot and I drove his old Opel to his garden to pick some melons and watermelons. In quite a short time, we picked about 30 melons and Sakbolot said it was enough for this time. Then, we went towards the plot [kaz. *taqta*] where he had watermelons and picked up just a couple. Sakbolot also showed me remnants of melons that got eaten by badgers, crows, and some rodents. He noted with notes of pity and respect in his voice that badgers always pick and eat the best melons because their sense of smell is superb. Out of all pests, badgers are 'the best' because they pick a few melons and eat them almost completely leaving just peal behind, whereas crows are the worst because they make holes in a bunch of melons thus wasting all of them.

> *You know I used to get really upset when I saw my melons eaten and spoiled by pests. I d think that I spend so much time and effort growing them and here come those pests and eat up the fruit of my labor. Only after some years of gardening, did I understand the meaning of the words we say when planting those seeds. We say köptin nesibesi' (kaz. a share of the many). It means that not only me and my*

> *family but also others, many others have a share in my crops, and they are all entitled to claim their share whenever they need it. This understanding helped me to stop worrying about melons and watermelons lost' to other creatures*' (Sakbolot, Aqtas, August 2016).

Over the course of my stay in the Syr Darya Delta, I noticed that such sentiment shared by many gardeners. However, it does not mean that all other creatures' intrusions into the gardens are welcomed. As I described in Chapter 7, fencing the gardens is one of the most important tasks that every gardener undertakes to keep the livestock and other animals out of gardens. Thus, the gardeners recognize that other animals are also entitled to have a share [nesibe] in somebody's harvests mstly after these animals have claimed their 'share' and garneders cannot do anything about it.

Since it was late August, cantaloupes were already out of season. Most of the melons that Sakbolot picked were Kazakh melons and some *shytyrlaq* melons. When Sakbolot and I loaded all the melons and watermelons in the trunk of his car, he selected one of the melons by sniffing them and taking the one that smelled best. We cut it up right there and started eating it. Sakbolot jokingly said that this is the melon that I had planted back in the day. 'Do you like it Aibek? Does it taste good?' he asked and I nodded while enjoying the fresh melons. He continued: 'Pick two best melons and take them with you when you go back to Sarsenbek's house later today. One is your '*nesibe*' and the other one is for [Sarsenbek].' Tell him that the melon is from my garden.' After we returned to the village, I stayed at Sakbolot's house for tea and then, headed to Sarsenbek's house to stay overnight. Surely, I did not forget the melons that I was supposed to take to Sarsenbek because it was his '*nesibe*' [share].

Here I reiterate that this sentiment towards the 'lost' crop is shared by many people that I interacted with. This sentiment is not limited to gardening commons but is also very common in the reed, and fishing commons. Planting the seeds with the intent that 'this is not just my share, it is the share of the many' means that the concept of 'commoners' is not limited to the people who physically do gardening. The 'commoners' include a wider group of people such as family, kin, neighbors, and friends as well as wild animals who are entitled to a share of the yield. In that sense, all those who benefit from one's yields become 'legitimate pests 'and legitimate commoners. This conclusion concurs with commons literature that has been claiming that we 'need to include more-than-humans in our thinking about the commons 'community' (Bresnihan 2016). In general, my ethnographic data from the Syr Darya Delta demonstrates that the commons 'community is definitely wider than those who are directly involved in the appropriation of a particular resource. The concept of '*nesibe*' concurs with the commons literature that challenges an often presupposed homogeneity of a community (Bruncevic 2017, p. 158). Moreover, my claim takes this critique a step further by demonstrating that the community of commoners may include non-human beings.

6.1.3. Design principles: rules and conditions

The second design principle highlights the congruence between rules for using commons and local conditions (Ostrom 1990). In other words, the local practices of using commons (e.g., time, place, technology) should be suitable for local social and environmental conditions. As I have shown in the previous sections, different villages have different access to different common-pool resources. For example, the areas with more rice fields tend to have more reed beds as the reed grows along the canals that bring water to the rice fields. This difference in availability of the reed beds paved the way for the emergence of different rules for sharing the reed beds. For the reed abundant communities (such as Aqsu, for instance), the rule is that every commoner mows as much reed as one can. It means that if there are 3 mowers from a particular household, they can occupy an area that can be mowed by three persons like in the case of Jylkybai's family. Moreover, mowing reed in a particular spot gives almost an exclusive right to mow the same area in the next year. For example, while looking for a new mowing spot, Jylkybai and I did not even bother checking some areas with good reeds. That was because other villagers have been mowing those areas for several years and those areas were considered to be 'theirs.' Thus, the reed-sharing rules give a particular commoner a far greater possibility for exclusion after a particular area had been marked and mowed by a commoner.

At the same time, in the areas, where there is a shortage of reeds, the local communities came up with other rules for sharing the reed beds. For example, Bedel village does not have many reed beds. To divide up the mowing spots among themselves, the locals use the method called *arqan tartu* (lit. measuring with a rope). First of all, the reed bed is divided into 'n' number of more or less equal squares. The number 'n' is the number of families who are willing to mow reed any given year. Each square is assigned a number. Then all commoners agree to come together in someone's house or yard and make a raffle. The pieces of paper with numbers written on them are placed into a bag and every commoner puts one's hand into a bag and draws out a number. The number one has drawn out defines the square one has a right to mow.

The commoners in Bedel explained that they have such a system because the rule 'a commoner can take as much reed as one capable of mowing' obviously would lead to many conflicts. Unlike in Aqsu (where the reed beds are abundant), inhabitants of Bedel do not use a rule that dictates that a person who used a particular spot in any given year has a priority for mowing the spot in the following year.

> *We use arqan tartuu because it is fair. There is not much reed in our village and everyone has livestock to feed. If we do not have such a precise rule, there will be many conflicts. When you draw out your number, you depend on your luck. Some areas have good reeds and some are not that good. So if you draw a number and the land you got has a bad quality reed you have no one to blame. If you end up getting a good spot, you feel lucky (Erbol, Bedel, 2016, field notes).*

Thus, there are quite specific rules about sharing the commons, which are flexible to reflect the local climatic conditions and the availability of the commons. Thus, flexibility is congruent with the second design principle, i.e., there is congruence between the resource environment and its governance structure or rules (Ostrom 1990).

Now I turn to the third and fourth institutional design principles. **The third principle** highlights the ability of the commoners to change the rules of using commons. In other words, in the successfully managed commons, the commoners can participate in making and modifying the rules of using and sharing the commons. In order to illustrate whether this institutional design principle is displayed in the Syr Darya Delta commons, I use the example of reed beds in reed abundant villages, although this principle is also applicable to many other villages and other commons.

When I started helping Sakbolot and his cousins to mow reed, I was told that the general principle behind sharing reed beds was ‘one is allowed to mow as much reed as one can.’ Later, many interlocutors from different villages reiterated this principle. However, through observation, I learned that the statement ‘as much as one can’ does not mean limitless. Instead, there are some informal rules of productivity, which define how much ‘as much as one can’ actually is. For example, on average, every person can mow around 100-120 bundles per day. The commoners mow reed twice a day, early in the morning and in the late afternoon. While mowing reed with a sickle, a commoner tries to mow about 50 bundles per session, which makes it 100 bundles a day. Mowing with a gasoline mower seems to be a bit more efficient. One can mow 120 bundles per session, which is 240-250 per day. However, it takes two people for mowing with a gasoline mower: one person operates the mower, while the second person stacks the reed stems into bundles. The productivity ‘norm ’for winter mowing is about 160-170 bundles per day for two people. Thus, the notion that one can harvest ‘as much as one can mow ’is quite a fixed amount, which is estimated based on the above-mentioned local norms of productivity.

If a commoner has marked a territory that exceeds one’s mowing capacity, other commoners may see it justified to contest the ‘extra ’area. In other words, if other commoners see that a particular commoner is trying to claim more than one can mow, they contest the marked area and make the commoner diminish his ‘claimed area. ’Surely, these ‘norms of productivity are not contestation-proof concepts. A person may claim that one is capable of mowing as much as he had marked, whereas the other commoners make a claim that one cannot. However, this rule works only when there is a sufficient amount of that resource for all the commoners. If a reed abundant area does not have enough reed for everyone for some reason (e.g. drought), the commoners may ‘force ’the other commoners to share the marked reed bed with others. Thus, the commoners can change the rules or rather emphasize certain rules over the other rules depending on the environmental conditions in a particular year.

6.1.4. Design principles: monitoring, sanctions, and conflicts

T**he fifth principle** highlights effective monitoring of commons usage (Ostrom 1990). In other words, the commoners should be able to effectively monitor who is using the commons and how. A commoner marks a territory one wants to mow by cutting down and piling up bundles of reed. Before picking an area, the commoners make sure no one has already marked it. Thus, the commoners try their best to signal to other commoners if a particular plot is taken and make sure that they are not 'claiming' the plot that had already been taken. For example, a 60-year-old baqşa gardener explained this to me as follows:

> *Well, we put some signs on the ground and tell each other which plot you are planning to use this year. We clean the land and tie up some rags on bushes around the plot. If the land is big, two or more people can share it. Through communicating with other villagers, preparing the land, and putting the signs we divide the land among ourselves. We also use omaqa.' It is an old Kazakh word, which means a small bump. So if you picked a land, you can pile up soil and make a bump. One can also put a stick in it and tie a rag on top. That signals that this land is taken. (Toregali, Targyn village, August 2016)*

Such practice of marking the territory and communicating gives the commoners greater monitoring ability.

The **sixth principle** highlights the sanctions for misuse of commons (Ostrom 1990). In other words, if someone violates some agreed-upon rules of using commons, the other commoners should be able to impose sanctions. It is also emphasized that in successful commons, the sanctions are often graduated, i.e., they vary depending on the seriousness and context of the misuse. Over the course of my fieldwork in 2016-2017, I did not observe any commoner getting sanctioned (and by extension, I did not observe any graduated sanctions in place). However, it surely does not mean that nobody got sanctioned. Yet, I observed the mechanisms that could be used to sanction those who violated the rules of using the commons. In Chapter 7 on comonning (i.e., commons as a process), I demonstrate that commoning is done in small groups. For example, the baqşa gardeners get together in small groups and do gardening together to minimize their expenditures. Commoners in a particular group find a suitable plot of land and divide it among themselves. So if a commoner violates the rules of commoning, the exclusion from the group can be seen as a sanction. It usually does not happen right away. Rather, the other commoners will refuse to team up with the violator to do commoning in the following year. It concurs with the game theorists findings on cooperation, i.e., if the game is repeated, the players are more likely to cooperate and follow the rules (Milinski et al. 2002). Since the groups for commoning emerge and change annually, one can see it as a game, which is repeated every year. Thus, for the commoners in the Syr Darya Delta, their trustworthiness becomes their 'currency' (Milinski et al. 2002, p. 424).

The **seventh principle** highlights the availability of low-cost conflict resolution tools that can be used to resolve conflicts among the commoners.

> *There are usually no conflicts over land because there is a lot of land that belongs to our village. If you have already selected a plot, no one would dare to come and contest it because there is just so much land around and one would feel ashamed to contest that particular plot. Moreover, we are all related to one another in the village. You can pick anyone from my village at random, and he or she will end up being my kin, or my in-laws, or my neighbor, or my friend, or my classmate, or the person I served in the military with. We are all related to each other in one way or another. So you will not quarrel with somebody you know well over a plot of land. If we quarrel today, how are we going look at one another tomorrow? (Toregali, Targyn village, August 2016).*

I have heard that 'there is so much land' so many times in my interviews. However, gardeners also highlight that not all of this land is suitable for gardening. In fact, high-quality land for gardening is very limited. And that is why there is a great deal of competition among the commoners (I addressed this abundance discourse in Chapter 5). Limited availability of resources coupled with a rule of thumb that dictates that 'a commoner can take as much land as one is capable of taking care of' sounds like a recipe for eternal conflicts. However, there are checks and balances in place that prevent many conflicts. I was also surprised and quite skeptical in my mind when Sakbolot and his cousins told me that there were barely any conflicts over sharing reed. I posed a number of paraphrased questions about conflicts between the villagers over mowing reed but every time I got an answer that there were none. Later on, I asked the same question to other villagers and they would also say that there were no conflicts. At first, I thought that the villagers are not telling me about the conflicts because it would somehow damage the reputation of the village but as I spend more than a year there, I realized that, in fact, there were very few conflicts over sharing commons. The reason for having fewer conflicts may be plentiful but I want to point out just a couple. For example, local gardeners know from experience that one person cannot take care of more than 1 ha (with rare exceptions) and on average one commoner is capable of managing around 0.5 ha. Thus, since the productivity limits are more or less stable, there is an unspoken consent for the amount of land one usually takes. That is why it is very rare that someone tries to take more reed or land than one can manage. Hence, there is not that much ground for the emergence of conflicts. Secondly, the social cohesion of the villages is quite strong. On one hand, such a strong social cohesion prevents conflicts, and on the other hand, if conflicts occur, the parties can use kinship and other social networks to help them settle the conflict. Over the course of my fieldwork, I haven't witnessed any conflicts over commons. When I shared my preliminary findings with my colleagues and supervisors, there was a portion of skepticism about a conflict-free commons in the Syr Darya Delta. When I went back to the field in 2017 and 2018, I tried to investigate more if some villages were more conflict-prone when managing commons than others. However, I was

unable to document any instances of any commoners who caused any major conflicts. All conflicts seemed to be quite small scale and got resolved with relative ease.

The **8th principle** highlights the rights of the commoners to manage their commons without being challenged by external governmental authorities. Although both village- and district-level authorities seem to know that the rural livelihoods in the Syr Darya Delta are run as commons, these livelihood activities were effectively the 'unseen' parts of the local economy. By 'unseen' I mean that commoners were not taxed for using the commons. For example, the baqşa gardeners only paid for irrigation water to the Kazvodhoz[1] and did not pay the land tax. The reed bed mowers, herders, and fishermen did not pay any taxes at all. Moreover, even though the lands were legally under different ownership statuses, i.e., de jure some lands were owned privately or by state, those lands not leased by the rice corporations were used as commons. However, I am far from claiming that common lands will not be challenged in the future. In fact, when Nazarbaev's government passed a decree allowing the long-term lease of agricultural lands to foreigners, inhabitants of the Syr Darya Delta got worried about their common lands and organized anti-government demonstrations.[2] Only after Nazarbaev vetoed the degree, the demonstrations stopped. Thus, the seventh institutional design principle is also present in the Syr Darya River delta commons, however, it cannot be taken for granted.

Thus, the Syr Darya Delta commons demonstrate most of the recurring features of the successfully managed commons around the world.[3] The features help the Syr Darya Delta communities to avoid the tragedy of the commons despite the underlying scarcity and the rules that seemingly may lead to the tragedy. The case of the Syr Darya River delta commons also challenges some of the seemingly straightforward principles such as the exclusion (boundary) design principle. This also supports the claims in the commons literature that scholars must bring non-human beings into the commons thinking and analysis (Bresnihan 2016). In the second part of the chapter, I turn my attention to other perspectives that can explain why the tragedy of the commons did not happen in the Syr Darya Delta.

6.2. Other perspectives on why the tragedy of the commons did not happen

The institutional design principles are known as the recurring features of the successfully managed commons (Schlager 2004). In other words, many commons that did not degrade, i.e., faced the tragedy of the commons, display most of these institutional features. Ostrom (1990) was very careful not to make a claim that the institutional design principles necessarily prevent the tragedy

[1] The Kazvodhoz workers told me that there was an attempt to create Water User Organizations sometime between 2005-2015 (nobody could pinpoint an exact year). However, this attempt failed. Firstly, the creation of WUAs were initiated by central government in Astana, i.e., it was not a local initiative. Secondly, local water users did not see any value in creating an official institution because having a WUA implied more work for the gardeners, i.e., having official records, stamps, and keeping books.
[2] When those anti-government demonstrations started, I got called for an interview by a KNB officer.
[3] I did not analyze the eighth principle, which mostly pertains to the larger common-pool resources and highlights the existence of multiple layers of nested enterprises. However, this principle does not seem to apply to the Syr Darya Delta commons and that is why I skipped it in this section.

of the commons. Yet, the bulk of literature compares the struggling commons to the institutional design principles and makes recommendations to develop the missing elements of the institutional design (see Cima 2020). Although institutional design principles are among the most popular topics within the commons literature (Van Laerhoven et al. 2020, Van Laerhoven and Ostrom 2007), the institutionalist approach is a subject of critique from different standpoints. In this chapter, I explore three such standpoints that offer alternative explanations for why the tragedy of the commons did not happen in the Syr Darya Delta. These three standpoints are a) an economic model for open-access resources by Dasgupta (1982), b) anthropological literature on subjectivity and affects (i.e., Singh 2017), and c) the agency of non-human beings (Ingold 2000).

6.2.1. Dasgupta's model for unmanaged (open-access) resources

In Chapter 5, I already mentioned that Hardin and neoliberal economists such as Gordon and Scott (both of whom created economic models that predicted the tragedy of the commons) were heavily criticized for collating open-access resources with the commons. Hardin (1998, p. 683) later agreed with this criticism stating that:

> *To judge from the critical literature, the weightiest mistake in my synthesizing paper was the omission of the modifying adjective unmanaged.'*

In response to such criticism, some neoliberal economists (e.g., Dasgupta 1982) continued to explore the economic models, in which even open-access, i.e., unmanaged commons do not fall into the tragedy of the commons. In a nutshell, Dasgupta (1982, 2005) claimed that 'in the context of a fully dynamic model an open-access renewable resource would not be ruined if the cost of extraction was large relative to the value of the resource itself.' (Dasgupta 2008, p. 20). To support his argument, Dasgupta (2008, p.20) refers to the 'tropical rainforests that had been safe until the chainsaw made its appearance and the fisheries of the open seas were not threatened until the emergence of sophisticated fishing pieces of equipment for tracking schools and trawling the sea bottom.' In this section, I claim that the river delta commons demonstrate the qualities that Dasgupta highlighted in his model for the open-access (unmanaged) commons, i.e., a) the renewability and b) the large extractive costs in relation to the value of the resource itself. Thus, these are the additional reasons for the delta commons avoiding Hardin's tragedy. By engaging with Dasgupta's model, I highlight the important aspects of the Syr Darya River delta commons, which are 'invisible' from the institutional design principles 'vintage point.

According to this model, an additional answer to why the tragedy of the commons did not happen in the Syr Darya Delta may be that: 1) Syr Darya commons are renewable resources, and 2) extraction costs are large in relation to the value of the resource, i.e., the locals spend a lot of time and get little money. The first part of the argument is quite straightforward. The reed beds, fish

stocks, and pastures are renewable resources. Now, let us try to analyze the second part of the statement and determine the cost of extraction relative to the cost of the resource itself. I would like to start with a quote from my interlocutor:

> *I have three children and I also have to look after my parents. My wife and I, both have taken a loan from a bank. I am a teacher at the local school and I get about 50,000 Tenge per month but this is not enough for anything. That is why I mow reed both in summer and winter to have an additional source of income. (Erlan, Targyn, pers. Comm. 2016).*

From the quote above, one can understand that reed is a source of additional income for many local households. Indeed, the reed was a very important source of income for almost all households I stayed with during my fieldwork. But how much money do families earn from mowing and selling reed? And what are the costs of mowing reed? I answer these questions by highlighting the costs and benefits of mowing and selling reed and describing how both summer and winter reed is sold and bought.

In Aqsu, just like in many other villages in the Kazaly district mowing summer reed is much more popular than mowing winter reed. For example, when Jylkybai and I were mowing reed I estimated that up to 90 percent of households in the village mow summer reed. The percentage was high because every household that possessed livestock needed summer reed for forage. However, out of 90% of households that mowed summer reed, not all of them mowed extra reed for sale. Some households mowed just enough reed to provide feed for their own livestock as they could not afford to buy it from other villagers. My host family had planned to mow 2,000 bundles of summer reed, which included 1,000 bundles for our livestock and the same amount for sale. Thus, the summer reed was a source of additional income for some households, i.e., those that mowed extra for sale (like our household), whereas for others mowing summer reed was a way of saving money.

Mowing winter reed was not as popular as the summer reed and only about 15-30% of households engaged in this activity. The winter reed is primarily harvested for sale. In some cases, a household that plans to build a new house or barn mows winter reed so that they can save money on buying the *pashyn* rolls from someone else. While both summer and winter reed are harvested by some households for sale, the summer reed is harvested by many more households for their own needs.

So how much money did my host family earn from selling reed and saving by mowing it ourselves? An estimate without taking into account the expenses is 180,000 KZT.[1] If I try to generalize and make an estimate for an ‘average ’person in Aqsu, the math will be as follows. On average one person mows around 80-100 bundles per day, although depending on the skill and the quality of the reed bed, the productivity of a particular person can be higher or lower. By taking 100 KZT as

[1] 1 Euro was about 400 KZT in 2016.

an average price for one bundle of both summer and winter reed, the daily income can be estimated to be around 8,000-10,000 KZT, which is about 17-22 Euro per day. In the case of the winter reed, the revenue may be doubled if a household invests more time and effort into making the tighter-bound bundles (*pashyn*) out of the harvested reed.

When the expenses are taken into account, the revenue diminishes significantly. There are several types of expenses associated with mowing and selling reed. For example, the reed mowing households should have sickles and/or a petroleum mower, straps for reed bundles, and a means of transportation both to get to the mowing spot and to transport the mowed reed. While the sickles are cheap and these expenses are almost negligible, an increasing number of households started using petroleum mowers, the cheapest of which cost in the ballpark of 30,000 KZT. Although we mowed most of the reed in 2016 with sickles, at the end of the mowing season Jylkybai got his petroleum mower as a gift from his brother-in-law. As an additional cost, a petroleum mower requires 1 liter of gasoline for every 70-80 bundles of reed. To tie up the reed bundles the locals prepare bundle straps from a big roll of baling rope, which is bought in Kazaly for 3,000 KZT. Each bundle strap is about a meter long. To save up rope, each piece of rope is split in half the fiber lines, thus making it thinner but keeping the same length. One roll of the baling rope is enough to make 1500-2000 bundle straps.

The reed mowers need to get to the mowing spot every day. As described in the previous chapter, the locals use different means of transportation depending on what they have. There are some commoners who go on foot, while others either go on bicycles, motorbikes or by car. In 2016, Jylkybai and I would go to the mowing spot on bikes, whereas in 2017 we used a car. The transportation costs also include hauling the harvested reed bundles home or to the customer. For example, it costs about 2,000 KZT and 10 liters of diesel fuel to hire a tractor to fetch about 500 bundles of reed from the fields to home.

So after the reed is mowed and hauled home, how does one sell the reed? There is a difference in the way in which summer and winter reeds are sold. For example, summer reed is usually sold in Aiteke Bi. It is the administrative center of the district and has the biggest population. Many households in Aiteke Bi have livestock but they do not mow reed themselves and that is why they are the primary customers of the reed sellers from the villages. In October 2016, my host family hired a truck for 12,000 KZT, stacked 500 reed bundles on it, and headed towards Aiteke Bi. In Aiteke Bi, the truck drove through the streets making noise with a honk every so often. While driving on one of the streets, a person came out of his house and raised his hand signaling that he needs reed. They negotiated the price and all five hundred bundles were sold right away. Of course, in some cases, a particular customer may want fewer bundles than 500. In that case, a reed seller leaves as many bundles as needed with the customer and keeps on driving along the streets looking for another one. Having sold the reed, my host family bought 3 tons of coal for 12,000 KZT per ton and fetched it home on the same truck as the truck fee of 12,000 KZT is for a round trip. The

second batch of 500 bundles was sold the next day and the host family bought some winter clothing and foodstuffs. In some cases, the reed sellers can have regular customers. In this case, they do not drive along the streets trying to sell their reed.

As for the winter reed, it is the customers who seek out the households that have winter reed for sale. Since there is only a limited number of households who harvest winter reed and make *pashyn* rolls, the customers find them using informal networks. Winter reed is usually bought and sold starting in late winter until late summer when the construction season is going on. As for the summer reed, it is bought and sold from August till March with sales peaking in August-October of each year.

Overall, my host family earned 90,000 KZT by selling 1,000 bundles of reed and saved as much money by not having to buy forage for their livestock. The expenses associated with mowing and transporting added up to 42,200 KZT which consisted of 3,000+4*(2000+1800)+(2*12,000) KZT. Thus, my host family received the benefit of 137,800 KZT for roughly one month of work. However, all this work included the full-time involvement of Jylkybai and some help from me, his older brother, and his father. Thus, 3 persons earned 137,800 KZT for one month of work, which makes it about 46, 000 KZT per person. For the sake of perspective, the monthly wage of a rice corporation worker is about 40,000 KZT per month. Thus, the cost of extraction is quite high. That is why Dasgupta's model can be used to explain why the tragedy did not happen.

According to Dasgupta (1982) even the open-access resources (unmanaged commons) that demonstrate the two qualities such as renewability and high costs of extraction relative to the resource's value may avoid the tragedy of the commons. In Section 6.1., I demonstrated that the Syr Darya River commons are indeed managed commons that showcase many of the institutional design principles of successful commons (Ostrom 1990). In addition to the institutional design principles, the Syr Darya River delta commons also demonstrate the qualities that Dasgupta (1982) described in his model. Thus, one could have made a claim that the Syr Darya River delta commons would not have resulted in the tragedy of the commons even if there had been no institutional design principles. However, I refrain from making such an argument because it appears to be speculative to me. Instead, I showed in this section that these two qualities of the delta commons (i.e., a) renewability and b) high costs of extraction relative to the value of the resource) are additional reasons why the tragedy of the commons did not happen in the Syr Darya Delta. This finding contributes to a better understanding of the Syr Darya River delta commons because these qualities of the delta commons are overlooked when approaching the delta commons from the institutional design principles perspective.

6.2.2. Affects and subjectivity

One of the biggest critiques of the commons 'institutionalist literature comes from anthropologists, who rightly point out that the design principles often overlook affects, emotions, and subjectivity

of the commoners (Singh 2017). When looking at the tragedy of the commons from this perspective, one can see that the affective life of the shepherd in Hardin's parable is muted; a shepherd can refuse to keep putting an additional head of livestock (i.e., refuse to act rationally as per Hardin) on the pasture because 'the shepherd might grieve the loss of his green valley when it degrades, or that grief might galvanize him into action to avert the tragedy.' (Singh 2017, p. 752). Thus, in this section I demonstrate that local commoners 'affects, feelings, and emotions towards their commons also contributed to avoiding the tragedy in the Syr Darya Delta.

After learning that the reed bed that Jylkybai mowed for the last few years, Jylkybai and I started looking for a new spot to mow and found it on July 16, 2016. Jylkybai was quite happy with the mowing spot we had found: firstly, the reed was of high quality and secondly, the new spot was closer to the village than the last year's spot.

From the next day onward, Jylkybai and I would go to mow reed every morning and evening. The morning 'shift' was from 7 am till 11 am and the afternoon shift was from 4 to 7 pm. Imanali, Jylkybai's oldest brother, would join us every now and then, whenever he was not busy with his main job.[1] These daily visits to the mowing grounds were very rewarding, yet quite challenging. Although the current mowing ground was closer to Jylkybai's home (in comparison with the previous year's spot), it was still a rather long way.[2] On average, it took us an hour to get from Jylkybai's home to the mowing spot. First, we would ride our bicycles for half an hour through the villages and into the fields. Then, we would leave our bikes on the ground and walk along the irrigation canal for another half an hour. Right before reaching our spot, we also had to go through a *qandek*, a thigh-deep depression in the ground filled with chilly cold groundwater. So by the time we reached the mowing spot, I was already a bit tired and my legs were wet from crossing the furrow filled with cold water. Yet, it was just the beginning of work.

Despite growing up in the countryside, I never had to mow reed before. Where I grew up, the grass is mowed by a scythe or more often with a tractor. Nonetheless, I had a quite good command of a sickle, or at least, that was what I thought. But when I started mowing reeds, I realized that I never tried to mow anything as tough as reeds with it. In general, local people acknowledge that mowing is hard and physically challenging. [3]

The first few days of mowing were particularly difficult for me because I was still learning the mowing technique. Jylkybai mowed 50 bundles of reed in the morning and 50 in the evening. I managed to mow only around 16 bundles a day a the beginning and by the end of the mowing

[1] I am not providing information on Imanali's job for confidentiality and anonymity purposes.
[2] Of course, the feeling of distance can be relative depending on the means of transportation. In 2016, Jylkybai and I got to the mowing spot on bikes, whereas I saw other commoners who would walk, go by bike (like us) or drive a motorcycle or a car. In fact, in 2017, Jylkybai bought a used Russian car for Aqtleq and we used that car to get to the mowing spot.
[3] Some locals (both men and women) use it as justification why women do not and should not mow reed. For example, in one of our conversations a villager whose wife used to mow reed told me that 'I was mad at my wife because she got sick after mowing pshen. She hoped that we would have more money if we mow more reed and sell it. But we spend more money on medicine after she got sick mowing reed' (Jenis, Aqsu village, 2016, field notes). The gender aspect of the local reed economy might be an interesting topic for future research.

season I brought my numbers up to 25 in the morning and 25 in the evening, which was still only half of what Jylkybai was mowing. The reed grows tall and dense, almost like a jungle. It made the air hot and humid and I could not feel any breeze going through the thick forest of reed. The first urge was to take off the shirt to cool down but an abundance of blood-thirsty mosquitoes and ticks made me wear long-sleeved shirts despite being extremely hot. On top of that, a *shyrmauq* grass (*Convolvulus*) that used reed stems to climb up to get more sunlight, would bundle up several reed stems together thus making mowing even more challenging. After a week or so, when blisters on my hands toughened up and I learned not to notice mosquito bites anymore, the mowing reed started being fun. My bundles became more uniform and even my mowing more smooth and steady. After I stopped being bothered by these 'inconveniences, 'I started noticing more fine details of this seemingly homogeneous reed 'forests': a giant spider web glittering on the sun or an abandoned bird nest. And a real treat was to suddenly sense a mint smell in the air when you cut a mint plant hidden in between the reed that you have just mowed.

Such firsthand experience with reed mowing shifted my attention from rules of sharing the reed beds, property rights, and institutions to feelings, emotions, and affects that a commoner has while engaging with the commons. In my conversations with Jylkybai and other commoners, I noticed that mowing reed was not just a process of appropriating the commons. Young men in the village start mowing reed from the age of 13-14. They learn how to mow the reed from their fathers and older brothers. So while teaching me the mowing techniques, Jylkybai would tell me something like 'Do it so and so, that's how my father taught me to mow reed.' During the water breaks, Jylkybai and I would sit on the freshly mowed reed bundles and have conversations during which he'd tell me different stories that happened to him while mowing reed:

> *A few years ago, my cousin and I set up a net in that canal over there. After mowing reed, we checked the nets and grilled fish right here. That fish was so delicious.*
>
> *Once a calf went missing and I was looking for it all over the place. I found the calf close to this place. There is reed all over the place but the calf wanted to eat the dry reed!*

So the reed beds and mowing reed are clearly not just the resource and the process of appropriating that resource. It is a whole experience that creates some affects and emotions. For example, while mowing reed, we also set up nets across the irrigation canal. So reed mowing was also a fishing trip in some sense. In August, when the weather got really hot, I saw many commoners taking a plunge in the canal to cool off. Jylkybai told me that swimming in the canal was his favorite part of mowing reed when he was a teenager.[1] The Syr Darya Delta commoners 'interactions with their

[1] Interestingly, Aqtleq, my host father also attributed Jylkybai's contracting tuberculosis when he was a teenager to mowing reed. He believes that because Jylkybai was mowing reed a lot, he got tuberculosis. Aqtleq did not make any direct causal link between reed mowing and tuberculosis. The logic was rather as following: 'Jylkybai mowed reed a lot. It is physically challenging, so it weakened Jylkybai's organism. While mowing

CPRs are similar to the experience of villagers in Odisha, who have forged intimate relations with forests through embodied practices of engaging with the commons (Singh 2013). Singh (2013, p. 6) demonstrated that through *thengapalli,* the labor of patrolling and taking care of the forests in Odisha, the locals forge affective connections with their environments. Similarly, Syr Darya Delta commoners spend a lot of time with their commons and form affective connections to their commons. Similarly, Bird-David (1992, p. 29-30) demonstrated how spending time in forests contributed to the development of intimate relations between the Nayaka in South India and their forests. Thus, these insights showcase that locals interactions with their commons is not only rational, as the institutionalist approach and economic models presuppose. My ethnographic engagement with the Syr Darya Delta commons shows that local commoners forge feelings, emotions, and affects toward the commons through close interactions with the commons. The very existence of these affects challenges the 'tragedy of the commons' narratives that presuppose 'the rational behavior' of the commoners (Olson 1965, Hardin 1968). So do I claim that the affective relationships between the commoners and the commons averted the tragedy of the commons in the Syr Darya Delta? I surely do not. Yet, I wrote this section to demonstrate that the 'affective' piece was missing in both institutionalist and economist's explainantions of why the tragedy of the commons did not happen in the Syr Darya River delta. Although my educated guess is that the affective side is an important element for explaining the puzzle (of avoiding the tragedy of the commons in the Syr Darya Delta), I understand that the affective aspect of the commons and commoning (Chapter 7) in the Syr Darya Delta begs further analysis.

6.2.3. Foregrounding environmental constraints

> *The tragedy of the commons develops in this way. Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. Such an arrangement may work reasonably satisfactorily for centuries because tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land. Finally, however, comes the day of reckoning, that is, the day when the long-desired goal of social stability becomes a reality. At this point, the inherent logic of the commons remorselessly generates tragedy. As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, 'What is the utility to me of adding one more animal to my herd? … Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another.... But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy.* (Hardin 1968, p.3).

reed on hot days, guys (including Jylkybai) take a plunge in the cold water of the canal to cool down. Such hot air-cold water stress also had a negative impact on Jylkybai. These factors contributed to Jylkybai contracting tuberculosis.

This is Hardin's famous parable that illustrated the tragedy of the commons. This parable about herdsmen has been criticized from many perspectives but one concern I have is that Hardin makes it look very easy to 'add another animal to his heard. And another…' In fact, I argue that in the Syr Darya Delta (and similarly in many other places), it is quite difficult to add animals to your herd, or to cultivate an additional square meter of land, or to mow an additional bundle of reed. In other words, the act of extracting an additional unit of resource from the common-pool resources is limited by the natural environments. Below I give examples related to herding that illustrate my point.

Let me start with herding because Hardin used a herdsman for his example. As demonstrated earlier, the pastures in the Syr Darya Delta are commons, so following the tragedy of the common's logic, every delta herdsman is supposed to be trying to add an additional animal to one's herd. Indeed, local people try their best to make their herds larger. For example, when blessing someone[1] it is very common to wish a person that his flocks and herds multiplied and got bigger.[2] So in fact, every host family I stayed with actually wanted to add an extra animal to their flocks. However, most of their herds were more or less the same size and those villagers who managed to increase their flocks were considered successful. In one of my conversations, Arman aga said the following:

> *I have two dozens of sheep and a few cows. The ewes lamb every year and the cows birth calves. I want to have more livestock but it is not easy. For example, some lambs get eaten by jackals. The jackals might even eat calves. So I lose a few heads of my livestock to predators. There are also some diseases that kill a few heads of my livestock every once in a while. Everybody loses their livestock to predators and sickness. The more livestock you have, the more you lose (Alga village, 2016).*

This quote perfectly demonstrates the environmental constraints to adding an additional animal to one's livestock. In Hardin's parable, the environment is silenced and denied any opportunity to influence and limit such an increase in the size of the herd. In other words, the commoners 'current size of their herds is the result between human needs and desires and the possibilities afforded them in the river delta environment.[3] Thus, nature's effects on humans and their livelihoods (the idea that is often labeled as nature's agency) (cf. Nash 2005, Ingold 2000) limit the ability of commoners in the Syr Darya Delta to keep increasing their herds and thus contribute to avoiding the tragedy of the commons.

Secondly, it is not so easy to keep adding additional animals to one's herd in the Syr Darya Delta due to social reasons. For example, Arman from Alga further elaborated his explanation:

[1] In Kazakh, it is called bata [lit. blessing].
[2] For example, they say 'mal-janyng aman-sau bolyp, kobeie bersin' [May you and your livestock be safe and may it multiply.'
[3] For the similar argument in relation to infrastructure in Andes was put forward by Harvey 2010, p.136-138

> W*hen honorable guests come, I slaughter a lamb. When my kids go to school, I have to sell a few lambs to buy new clothes and school supplies for my kids. Some people get their livestock stolen sometimes. So in short, it is hard to increase one s herd s size.*

This limitation for putting an additional animal to the pasture is somewhat reflected in Hardin's quote when he mentions that '*tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land.*' However, Hardin's further claim that the time of 'stability' comes, when all these factors won't limit the ability of commoners to add more animals is not quite applicable for the Syr Darya Delta. In other words, there are still some everyday life practices such as a custom of slaughtering lambs for guests or for various feasts, selling livestock for cash, or occasional loss of livestock to theft that does not concur with Hardin's predicted 'time of stability.' Hence, this is an additional factor that helped avoid the tragedy of the commons in the Syr Darya Delta.

6.3. Conclusion

The guiding question for this chapter was 'why the tragedy of the commons did not happen in the Syr Darya Delta?' I presented the answers from several perspectives, which can be roughly labeled as a) the institutionalist approach, b) economics, c) affective perspective in anthropology, and d) ecological perspective. These explanations for why the tragedy of the commons did not happen in the Syr Darya Delta are not contradictory but rather complementary. Indeed, the commons in the Syr Darya Delta exhibit most of the qualities (i.e., the design principles) shared by other successful commons (i.e., the commons that did not fall into the tragedy of the commons scenario). At the same time, the high costs of using commons in comparison with the benefits are also reducing the pressure on the commons, thus preventing the tragedy of the commons. Moreover, I highlighted the affective and environmental aspects of the commons that likely contributed to avoiding the 'tragedy.'

Chapter 7. Cooperation and collective action: commons and commoning

September 9th, 2016. A few days before Jylkybai's family was supposed to fetch reed bundles home, Jylkybai had to go to Astana. His older brother Sabirjan had a job opening for him at the same construction company where Sabirjan was working. The mowing was completed and the only task remaining was fetching the reed home. After a short discussion with the family, it was decided that Jylkybai should buy the train ticket and head to Astana. Jylkybai's father, older brother, and myself were supposed to haul the reed bundles home.

The family was waiting for its turn to hire the tractor. On the day when our turn for the tractor came, Imanali had to go to Kazaly for the work-related meeting that he could not miss. So this put us in a difficult situation: on one hand, we did not have enough manpower to fetch the reed home, on the other hand, if we missed our turn for the tractor we would have to wait for about two weeks or so to get another chance. It takes at least two persons to load the reed on a truck. One person is supposed to throw the reed bundles on the truck from the ground, while the second person arranges and stacks up the reed bundles on the truck. While the first job is not complicated, although it does require some skill in using a pitchfork, especially when the stack on the truck gets really high, the second job, i.e., stacking reed bundles on a truck, requires much more skill and experience. Aqtleq was very experienced and could easily do both of the tasks when he was younger, at this age he had an injured back and therefore could not do either of them. As for me, I was good enough to throw the reed bundles on the truck but we needed one more person. And not just any person but one who can stack up the reed.

Aqtleq started phoning neighbors and other villagers to see if anyone is available and luckily one of the neighbors agreed to help. (As a token of gratitude, Imanali helped the neighbor with mowing reed a few days later). The neighbor was in his early fifties. While fetching the reed, Aqtleq sat in the tractor beside the driver, while the neighbor and I sat on top of the reed stack, while holding onto the ropes. The entire situation sparked an interesting conversation about *kömek*, a mutual help among the relatives and neighbors. The neighbor lamented that back in the day villagers used to help each other more frequently. He mentioned that in the last ten years or so, it has changed and that people ask each other for help less and when asked to help fewer people agree to help. Nowadays he said that everyone tries to manage things on their own. He said that ‘people have changed’ [kaz. *adamdar ozgerdi*]. When I asked what he meant by the change, he explained that everyone was more individualistic nowadays.

These exchanges made me think about cooperation among the commoners in the Syr Darya Delta. My main observation was that different commons that co-exist in the Syr Darya Delta display a varying degree of cooperation among the commoners. For example, the commoners in Aqtas cooperated most in gardening and in herding, less in reed mowing, and almost not at all in fishing. Of course, I did not set a goal of measuring the degree or intensity of cooperation. However, I was very puzzled to see that the villagers cooperated more easily when growing *baqşa* gardens than when mowing reed or fishing. For example, while gardening local villagers cooperate when selecting the plot, fencing it, sharing the seeds, watering the plots, and even sharing the yields to a certain extent. While herding, the villagers unite their animals into a common herd and take turns to look after the herd all year around. As for reed mowing, the villagers cooperate only in the initial stages, i.e., when finding the mowing spot and dividing it up between the commoners. The commoners might help one another with mowing the reed or fetching it home but it has become rare. As for fishing, the villagers rarely share information with one another about the good fishing

grounds. Thus, the same villagers who cooperate in gardening and herding, choose to cooperate less in reed mowing and fishing. So in this chapter, I ask myself why this is the case?

Moreover, there is another interesting variation in cooperation in the Syr Darya Delta. The same commons, e.g., reed mowing can display a varying degree of cooperation in different but adjacent villages (i.e., Jarma and Kyzyl-Jar). Thus, in this chapter I attempt to untangle the puzzle of the Syr Darya Delta commons that a) co-exist on the same territory and b) are used by the same community but display the varying degree of cooperation among the users. Based on my ethnographic data, I engage with the cooperation-related debates in the commons literature and ask 'what fosters cooperation among commoners in the Syr Darya Delta?' In the first part of the chapter, I engage with the institutionalist approach to explaining cooperation among the commoners (or lack thereof), while in the second part I bring in the commoning perspective that frames commons as relational processes of negotiating 'access, use, benefit, care, and responsibility' (Gibson-Graham et al. 2016, p.195).

7.1. Cooperation and collective action from an institutional design principles' perspective

Cooperation and collective action has been a popular topic in the commons literature (Schlager 2004). Ostrom (1990) analyzed the conditions and attributes that support long-term cooperation and coordination among the commoners. Those attributes that are supportive of the emergence of cooperation can be divided into two groups: A) those pertaining to the common-pool resources such as A1) feasible improvement, A2) indicators, A3) predictability, and A4) spatial extent; and B) those pertaining to the commoners (appropriators in the commons terminology) such as B1) salience, B2) common understanding, B3) low discount rate, B4) trust and reciprocity, B5) autonomy, and B6) Prior organizational experience and local leadership (Schlager 2004). At the same time, commons scholars are very cautious about not framing these attributes pertaining to the common-pool resources and the appropriators as necessary or sufficient conditions for the emergence of cooperation and collective action (Schlager 2004). Instead, these attributes are framed as:

> *'…conditions positively related to the emergence of collective action. In a setting in which all attributes are met, appropriators are very likely to engage in collective action, whereas in a setting in which only one attribute is met, appropriators are much less likely to engage in collective action.' (Schlager 2004, p. 153)*

Having these nuances in mind, I explain each of those attributes in the following paragraphs and discuss whether or not those attributes are visible in the Syr Darya River delta commons.

7.1.1. The attributes of the common-pool resources that support cooperation

As I mentioned earlier, the commons literature points out four features of the commons that support cooperation. The first attribute, which is often referred to as 'feasible improvement' implies that the resource conditions must not be at such a point of deterioration that cooperation becomes useless. It also implies that resources must not be so abundant or underutilized so that there is little advantage from cooperating. In other words, the current state (of deterioration) of the resource makes it either worth-cooperating-for or not. So can this particular attribute explain the variation in community cooperation across various commons in the Syr Darya Delta?

My answer is that it can but not all of it. For example, I named fishing as a livelihood that showcases the least cooperation among the villagers. It is very common to say that everyone is a fisherman in Kazaly (kaz. *Eldin bary balykshy*). Indeed, almost all men I talked to over the course of my stay knew a thing or two about fishing. There are three types of fishermen (which are not mutually exclusive) who can be classified based on their devotion to and reliance on fishing as a livelihood. For example, the first group is the professional fishermen,[1] who pursue fishing as a vocation. In each village, there are just a handful of professional fishermen. These fishermen self-organize and cooperate by getting together in small groups to fish together. They share their nets, boats, and off-road vehicles. However, they go fishing in the Aral Sea during the fishing season (Wheeler 2021, 2016).[2] These cooperating groups do not fish in the Syr Darya River or irrigation canals because it is not economically feasible.

The second group is the fishermen, who catch fish as a complementary activity. They use their catch for subsistence as an additional source of food. It is usually passive fishing. They set up nets and go check on them every day or every other day. Fishing is often a complementary activity to reed mowing. The reed mowers set up nets in the irrigation canals nearby their mowing spots (Chapter 5). And everyone else, who knows a thing or two about fishing belongs to the third group whom I call the recreational fishermen. They use a diverse set of fishing gear such as anglers, tridents, and screens. They usually go fishing, if they hear that somewhere fish is 'biting well.' This 'biting 'happens only once in a while. These two types of fishermen who usually fish in the Syr Darya River, irrigation canals, and delta lakes do not cooperate with one another.

The current fishing strategies in the Syr Darya River delta can be explained by the fact that fish stocks declined over the last few decades:

[1] Even though I call them professional, their livelihoods are not exclusively depended on fishing. Most of these fishermen only go fishing during the cold seasons. They do not fish in spring and summer because during the hot seasons the fish go bad very quickly. Since most of the fishermen can't afford refrigerated vehicles, they go fishing only in autumn and winter when refrigeration is not needed. During the summer time, these professional fishermen might work as construction workers, mow reed, or just stay busy with everyday chores.
[2] And fishing grounds in the Aral Sea are not commons. To read more about how fishing grounds are leased to the users, please read Wheeler (2016, 2021).

> *When I was younger, I would work the whole day and go fishing at night in the river. But now there is no fish. Every now and then, when someone catches fish in the river, the news that the fish is biting spreads through the entire village, and everybody goes fishing in the river hoping to catch something. But most of them return empty-handed. We used to have more fish before the Aqlaq dam was built. Nowadays, fish can t go past that dam. Aqtleq, Aqsu, August 2016.*

Surely, the infrastructure development such as the construction of dams definitely had an adverse affect on the fish stocks because it is a well-established fact worldwide (cf. Larinier 2001). But how does one explain the lack of cooperation among fishermen who fish in the Syr Darya Delta, irrigation canals, and lakes? I claim that the deterioration of fish stocks in the Syr Darya Delta as a primary reason for the lack of cooperation in fishing among the villagers. Fishing in the Syr Darya River is at such a degree of deterioration that there is no need to self-organize.

The second attribute that facilitates the emergence of cooperation is referred to as 'indicators.' This attribute highlights the low-cost availability of reliable and valid indicators of the commons ' current condition. I can say that since most of the villagers use one or a few common-pool resources, they all have a first-hand account of the current state of the commons in the area.

The third attribute supportive of cooperation is the predictability of the flow of resource units. This attribute can explain why there is more cooperation in gardening, herding, and reed mowing than in fishing. The fishermen say '*eginshi jylda armanda, balykchy kunde armanda*,' which roughly means that the farmer plans for a year and the fishermen plans for a day. Wheeler (2016, p.34) also documented such attitude in the Aral Sea fisheries. Indeed, when one is mowing reed there is a certain degree of predictability, i.e., if one mows reed for one day, one is likely to mow around 100 bundles of reed. In contrast, fishermen can set up a net in the irrigation canal or the river and might not catch a single fish for weeks. That is why there is less cooperation in fishing than in other commons.

The fourth important attribute for the emergence of cooperation is spatial extent. The commons should be sufficiently small so that the commoners have accurate knowledge of external boundaries and internal microenvironments. I already described earlier that external boundaries of the commons coincide with the administrative boundaries of the villages. This attribute is present in virtually all commons in the Syr Darya Delta and that is why it can quite explain the differences in cooperation across various commons in the same communities. Yet, this attribute is of interest to explain why the tragedy of the commons is actually happening on the larger scale, i.e., on the scale of provinces and countries that share the Syr Darya Basin. One can argue that the extremely large spatial extent of the Syr Darya Basin is one of the reasons why there is poor cooperation between the provinces and countries that share the river.

Thus, certain characteristics of the commons as resource systems (i.e., the attributes pertaining to the common-pool resources, which are supportive of cooperation) can help explain why the same communities that share gardening, reed mowing, herding and fishing commons tend to cooperate more when using, for example, reed beds than when using the common fishing grounds.

7.1.2. Appropriator attributes that support the emergence of cooperation

Besides the resource attributes that support cooperation, the commons literature also highlights the appropriator attributes, which are supportive of the emergence of cooperation. Here I provide an example of cooperation among the villagers in Aqsu.

June 15th, 2016. My host family in Aqsu has a big garden beside the house. Aqtleq, my host father, is the chief gardener in the family. He knows everything about gardening and does most of the gardener-related work himself, although Jylkybai (my host brother) and I help him by doing what Aqtleq tells us to do. The inhabitants of Aqsu do not have common gardens. Instead they have private gardens located beside their houses within their property. In fact, house gardens exist in almost every village and even in the district's administrative center. Gardeners grow the same variety of vegetables in house gardens as in field gardens such as melons, watermelons, potatoes, cucumbers, tomatoes, onions, and pumpkins. Since these gardens are permanent, locals fertilize them with manure and apply crop rotation to sustain soil fertility and combat salinization. Although the home gardens are not run as commons, other elements linked to the home gardens like irrigation canals are still considered as commons because those who use the canals share the responsibility for maintain them (mostly cleaning) and sharing the water they deliver.

For the last few days, Aqtleq has been worried because we should have irrigated our garden 7-10 days ago but there was no water in the irrigation canal. Up until now, we all assumed that the water has not been diverted to the irrigation canal that brings water to our neighborhood because it was not our turn yet. The village is informally divided into two neighborhoods and each gets the water flowing in its canals for about a fortnight. It provides an opportunity for each gardener to irrigate one's garden on a regular basis. But this time, there was something wrong with the schedule, so Aqtleq went to talk to the neighbors in order to find out what was going on.

After some time, Aqtleq came back and told the family that Kazvodhoz was refusing to divert water into the canal in our neighborhood because it got overgrown by reeds and had not been cleaned for a while. When canals are not cleaned, it leads to water loss due to excessive filtration and there is a threat that the area around the water distribution juncture may be flooded. Aqtleq started calling the neighbors who had gardens and took water from the same irrigation canal. I thought that the entire neighborhood would be mobilized but it turned almost half of the households owned small Chinese-made pumps that run on petroleum. So Aqtleq did not even bother calling them because they did not need the water from the irrigation canal. With the help of this pump they could get water directly from the river over the protective dyke. The pumps cost

40,000-45,000 KZT (about 120 Euro). In order to fully water an average-sized home garden, one needs about 1 Euro worth of petrol. Since Aqsu is located literally on the bank of the Syr Darya River, those living along the protective dyke could draw water directly from the river using the pumps.

So for the next three days, 8 men (including myself) from 7 households that did not own pumps[1] worked together to clean the neighborhood's irrigation canal. We worked for two hours in the morning from 8 till 10 and for two hours in the afternoon from 5 till 7 pm. The work included mowing the reed in the canal on its banks as well as removal of dirt from the bottom of the canal. The canal is quite broad near the distribution juncture but it narrows down as it gets into the neighborhood. This canal has been cleaned in spring but that cleaning was limited to simply burning down the reed stacks inside the canal.

Cleaning of the irrigation canals helped to invoke cooperation because of the salience of the resource. Schlager (2004) explained salience as a situation when appropriators are dependent on the resource system for a major portion of their livelihood or other important activity. The seven households from the neighborhood depended on the irrigation canals to water their gardens and that is why they acted collectively. The rest of the neighborhood (around 5 families) who owned pumps did not participate in cleaning the canals because it was not salient to them. Thus, this criteria of the appropriators also can explain the variation in cooperation among the villagers.

Other attributes of the appropriators did not seem to be able to explain the variation in cooperation across various commons in the Syr Darya Delta. For example, attribute 2 implies that if appropriators have a common understanding of how the resource system operates (such as fish stocks, reed beds, common canals, etc.), i.e., how appropriators' actions affect one another and the resource system, they are more likely to cooperate than those appropriators that do not have such common understanding. Since it is the same people who cooperate most in gardening and in herding, less in reed mowing, and almost not at all in fishing, this criteria would have suggested that the commoners in the Syr Darya delta have a better understanding of how the baqşa and pasture commons work as opposed to reed beds and fish stocks. However, I did not notice that and if appeared to me that the commoners have the same degree of understanding of how all commons work. Hence, this particular attribute of the appropriators did not lend itself well to explain the differences in cooperation. The fourth attribute is called '*Low discount rate.*' The concept of a discount rate stems from a standard cost and benefit analysis in economics and implies that something in the present (e.g., a bundle of reed) is more valuable than the same bundle in the future (Heinzerling 1999).[2] Hence, the discount rate shows how much the buddle of reed in the future is less valuable than the same bundle in the present. In the Syr Darya delta context, I did not

[1] Interestingly villagers don't share or buy the pumps together. One of the reasons is that installing and reinstalling pumps is labor intensive. Secondly, pumps require gasoline and many households do not wish to spend money on gasoline to irrigate their house gardens.
[2] Some environmental economists (e.g., Lietaer 2012) posit that the current practice of discounting future promote unsustainable consumption and is one of the sources of environmental crises.

notice that the future benefits are discounted at all (i.e., the discount rate is close to 0).[1] In other words, a bundle of reed harvested now has more or less the same value as a bundle of reed that will be harvested next year, and the same was true for the other commons. Hence, since there is no observable difference in discount rates across various commons, this criteria does not lend itself well to explain the varying degrees of cooperation across various commons in the Syr Darya delta. The other attributes such as 'trust and reciprocity,' 'autonomy,' and 'p*rior organizational experience and local leadership*' are the same across the commons and cannot explain the variation in cooperation. Thus, the importance (i.e., salience) of the resource to the appropriators was clearly an attribute that explained why there was cooperation among some commoners and not among others. Thus, the institutionalist approach can explain some variation in the cooperative behavior among the commoners in the Syr Darya Delta. However, by focusing on the resource system's and the resource users 'attributes, this body of literature paints a very static picture of cooperation. Are there approaches that can explain cooperation (or lack thereof) as a dynamic process?

7.2. Commoning and infrastructure: framing cooperation and collective action as a process

The commons literature has paid a lot of attention to institutional arrangements (Ostrom 1990) that enable and mediate cooperation among the resource users. However, the growing body of literature on commoning has critiqued such institutionalist approaches for painting a static picture of the commons. The commoning approach emphasizes that the commons are dynamic rather than static and frames commons as relational processes of negotiating 'access, use, benefit, care, and responsibility' to the resource (Gibson-Graham et al. 2016, p.195). While the previous section presented snapshots of the Syr Darya Delta commons and commoners to highlight the attributes that contribute to cooperative behavior, in this section I attempt to describe the delta commons ' dynamics by describing major steps of the gardening process. In other words, I provide ethnographic details on how local people in the Syr Darya Delta pick their plots for gardening, and how they plough, fence, sow, water, and weed their plots and harvest their yields.

By providing a step-by-step description of gardening, I make several arguments. Firstly, I claim that cooperation process is not uniform at each step of the gardening process. To illustrate this, I provide the evidence demonstrating that level of cooperation varies at the different stages of commoning. For example, while locals cooperate well at the stage of fencing and ploughing, when it comes to choosing the crops, sowing and weeding stages, gardeners focus on their own plots and take care of them as if those were their private lands. Secondly, I demonstrate that cooperation and collective action often goes hand in hand with competition. For example, when selecting plot for gardening or watering the plot, the commoners cooperate in small groups. At the same time, there is a competition between the groups for better lands and access to water. Thus, my ethnography

[1] It should be noted that I did not have an aim of measuring discount rates. Hence, my claims here are solely based on my observations.

contributes to the commons literature by highlighting that cooperation within the small groups as well as the competition between those small groups happen simultaneously. Thirdly, I demonstrate that cooperation patterns unfold along social networks such as kinship, classmate circles, friends and neighbors. I claim that these social networks serve as infrastructure (De Boeck and Plissart 2014, Simone 2009, Omer et al. 2014) that enables commoning in the Syr Darya Delta.

7.2.1. Commoning step by step: teaming up with other commoners and finding a spot

In the previous chapters I established that baqşa gardens are commons, i.e., they are used together and shared by a number of people. The first thing that struck me about the baqşa gardens was that gardening in the Syr Darya Delta was done in groups. While comparing the Syr Darya Delta commons with the institutional design principles, I realized that those principles cannot quite untangle such riddles as 'how and when these groups are formed?' or 'Why does a commoner decide to join a particular group and not the other?'

I first had this question early on in my fieldwork when I met Sakbolot's family on February 22, 2016. While Sakbolot's wife was busy preparing dinner, we went to visit Sakbolot's cousins who lived nearby. This year, Sakbolot and his cousins – Adai and Alban - decided to cultivate a garden in the fields together. Sakbolot had cultivated the same plot for the last two years with some other people in the village. For this year, the plot was rendered not suitable because it was overgrown by weeds and the fertility was reduced by two consecutive years of cultivation. We have been talking with Sakbolot about what he does for a living, and he was telling me about his baqşa gardening on the way to his cousins 'house:

> '*Gardening is a lot of work because the gardening is hard. One has to fence the area, clean the ditches, weed the garden, water the garden, etc. This all cannot be done by a single person. No one can manage it single-handedly' - he said.*

Later I learned that baqşa gardening in the Syr Darya Delta is a collective activity, i.e., nobody cultivates baqşa gardens all on one's own (See Section 6.2.). That is why deciding who to do gardening with is the first step of baqşa gardening. The gardener groups vary in size. In some locations (and sometimes) only 2-3 people get together to do gardening, whereas in other cases up to 5-10 people can create one group. It turned out that Sakbolot cultivated his garden with several other villagers the year before. Staying in the same group with his previous baqşa partners was a valid option for Sakbolot. However, he decided not to garden with them this year. The fact that Sakbolot's cousins Adai and Alban lost their jobs in Kyzylorda and decided to stay in the village created conditions for the three cousins to get together into a small group and cultivate baqşa garden together.

Sakbolot's case of changing gardening partners is not something unusual in the Syr Darya Delta. During my fieldwork, I observed that while there are groups that have been gardening together for

years, the majority of the gardening groups can be quite fluid. For example, some groups decide to stay together for the next season at the end of the current gardening season, while others break up and form new groups. Many groups form throughout winter and take a final shape in spring. Of course, there are groups that get together right before the planting starts. Thus, the take-away point here is that gardening groups are not set in stone and that they are fluid in their composition.

Sakbolot's case also contains some answers to the section's guiding question of how these groups are formed? For example, cooperating with one's kin like Sakbolot's cooperation with his cousins this year is something quite common in the Syr Darya Delta. Besides the example of Sakbolot, where the members of an extended family cooperate, there are cases when a big nuclear family with many children cultivates the garden on their own. There are three kinship lines, which are important for the local communities in the Syr Darya Delta, namely patrilineal ('*ruy*' lit. tribe), matrilineal (kaz: *nagashy*) and in-law (kaz. *quda*). The gardening groups can form along all these lines. Interestingly, these kinship ties often help to overcome the excludability criteria of the commons. As a rule, inhabitants of the same village cooperate to cultivate gardens on the lands that belong to that village, although there are rare cases when outsiders also join gardening groups. So when some outsiders end up joining the gardening group, they are not complete strangers and they have some connections to the local villagers (for example, see Section 6.1.2).

Although kinship is one of the primary networks along which the groups get together to cooperate to garden together, it is not the only one. Over many years of gardening, Sakbolot told me that he gardened together with his neighbors, friends, classmates, and colleagues. Thus, the cooperation is not limited to just kinship networks. Moreover, since the villages are rather small, many people are related to each other in one way or another. Moreover, they are related to one another in multiple ways, i.e., one's neighbors can be one's kin or a colleague, a friend or a former classmate. Thus, the social networks through which gardening groups form are not mutually exclusive. To sum up, gardening groups are formed based on social ties such as kinship, friendship, former classmate-networks, and colleague-networks. Such centrality of above-mentioned networks in the functioning of commons provides grounds for thinking about these networks and people as infrastructure.[1]

Such a model of cooperation fits well into classical debates in the cooperation and collective action literature, which has long-argued whether the group size and homogeneity/heterogeneity affects cooperation (Keohane 2010, Marshal 2005, p.33). Mancur Olson (1965) argued that voluntary cooperation is likely to emerge in smaller groups, while the large groups can cooperate successfully by organizing themselves into a small group of small groups (Olson 1965). The

[1] It was interesting to compare my ethnography with Simone's (2004) 'People as Infrastructure: Intersecting Fragments in Johannesburg,' where he describes how people in the inner-city Johannesburg rely on existing ethnic networks to make living, find work and ensure their security but at the same time show an implicit willingness to interact with one another in ways that draw on multiple social positions (i.e., go beyond the abovementioned (mostly ethnic) networks). Johannesburg example was not a proper comparative case to the Syr Darya delta because the former described urban settings, whereas the latter focuses on rural areas. Nevertheless, I have noticed how Kyzylorda labor migrants in Astana and Almaty were using the same strategies as people in Johannesburg.

cooperation in small groups while gardening in the Syr Darya Delta seems to fit perfectly into Olson's proposed model.

Although these networks help describe how cooperation unfolds while gardening, they do not explain well why certain groups stay as-is while others reshuffle themselves every year. From my observations, it seemed to me that the decisive factor for picking one's gardening partners is the ability to cooperate and work well with someone. From my conversations with Sakbolot I understood that he was not extremely happy with his previous gardening partners (and they may have as well been unhappy with him). That idea was also mentioned by Sakbolot in his quote below.

> *How do you decide who you want to cultivate a garden with?'* – I asked, trying to understand why Sakbolot did it with other villagers last two years and is doing it with his cousins this year. He explained that *you always want to make a garden with someone you can get along well with. That is why your gardening partners should understand and support you and you should do the same. Adai and Alban are brothers and I am their cousin; we are kin. If I say something, they will listen. If they say something to me, I will listen. Last few year I made gardens with some of my friends and acquaintances from Aqtas because Adai and Alban were not available. This time around they [Adai and Alban] are in the village, so I d rather garden with them. Although we are two separate families, we get together, cooperate and garden as a single family. (Sakbolot, Aqtas, 2016).*

Some gardeners feel like they can cooperate better with their classmates, whereas some opt for the extended family. At the same time some gardeners avoid gardening with the extended family because existing family dynamics can hinder cooperation.

> *I prefer gardening with my friends. We are equals, we can work well together. Doing gardening with relatives is challenging. Especially, if they are older than you, you should always try to show syi-kurmet' (respecting and honoring them). So you cannot tell them anything, if they are slacking off. If some sort of conflict arises while gardening, it will have a long lasting effects on my relationships with my relatives. That is why I prefer gardening with my buddies (Syrym, Aqtas, July 2016).*

Another criteria for selecting gardening partners is the person's expertise and reputation. Some villagers are known to be very knowledgeable about gardening and other people try to team up with them or at least take their advice. Those who can select a least saline plot, know watering techniques and other know-how are considered knowledgeable. Some villagers are known to be very reliable, whereas some a considered as 'lazy' or 'unreliable.' Obviously, other gardeners prefer to work with the 'reliable' ones because if their partners do not show up for doing common

tasks such as finding suitable land for gardening, fencing, and ploughing (described in more detail in the next section), it means that a gardeners has to do more work. In some villagers, some gardeners have such a fame that everyone wants and does gardening with them. For example, Baqdaulet, 57, a villager from Sarytal is known around the village as a great gardener. He has been gardening for a long time and cultivates about 1.5 hectares of land for his *baqşa* garden, whereas on average on person can take care of up to 1 ha. He says that he used to cultivate even more when he was younger. His above average productivity and good annual yields gained him reputation of being the best gardener in the village. Because of his knowledge, experience and reputation, all villagers in the Sarytal village consult with him about their field gardens:

> *People come and ask me questions about the gardening. One of the major issues is where to make a garden. People try to team up with those who are knowledgeable about gardening. So that they can ask for advice, discuss how and where to plant things. It is good when your person you are growing baqşa with can point out some of your shortcomings that negatively affect the yield. It is a torture to cultivate the garden with lazy people. For example, when you are fencing the garden and your partners are lazy, you yourself will have to work more to compensate for their laziness.*

The gardeners also told me that it was important to team up with reliable people because the entire group needs to find the best plot possible for making a garden. The size of groups varies but usually is limited to around 3-5 households in each group. After these groups are formed, they compete with one another to find the best spots for gardening.

As a rule, the gardeners make mental notes of places suitable for gardening when they go out in the fields, for instance, herding their livestock or mowing reed. Often times gardeners exchange information and ask one another advice on where to find the best place for baqşa. When looking for a suitable plot, the gardeners take into account several indicators, which define the overall quality of a particular patch of land, such as a) proximity to the major irrigation canal(s), b) soil salinity, c) soil fertility, d) topographic features of a plot and d) proximity to the village (For more detailed information see Section 5.9). The small groups look for a plot that is big enough for all the members of their small group, that is why there are opportunities for free riding for some of the members. Hence, the gardeners always try to team up with those who know the land and who are reliable.

The importance of reputation in commoning in the Syr Darya Delta contributes to one of the key debates in cooperation literature related to the canonical prisoners 'dilemma game, where the game 'participants' have to choose between cooperation, non-cooperation, and free-riding behavior (Marshall 2005). The cooperation is more likely to emerge if the players might meet again (Axelrod 1984, 2000), so since the baqşa commoning happens every year, the commoners try to

build a good reputation for themselves, so that they can find partners easier in the next growing seasons.

Fencing, ploughing and making irrigation ditches

The next step after selecting a plot is preparing it for cultivation. This step consists of a few smaller tasks that are usually done in late March or April after so-called ‘bes qonaq’ [lit. kaz. five guests] period (See Section 5.3.).

The first important task before planting the seeds is constructing a fence around the garden. The fence is needed to keep wandering livestock out because as I indicated in the earlier chapters common pastures and the common gardens coexist on the same territory. Fencing a plot of land turns a part of common pasture into a common garden. A group of gardeners sets up a fence only around outer boundaries of individual gardens. Thus, each individual gardener ends up fencing only a fraction of a fence that he would have erected had there been no cooperation. However, it should not be understood as if a particular gardener only sets up a fence at the outer edge of his own garden. Gardeners help each other end set up the entire fence together because the protection of a plot depends on a proper fence all around the plot. Such cooperation allows each individual to invest less resources and effort into protecting the gardens from the livestock.

The fences are improvised and made out of any available materials such as wooden poles, scrap metal, barb wire, twigs and branches. The distance between the poles is 3-4 meters. Barbed and regular wire is stretched between the poles. Then, twigs, spiky branches of local shrubs and other things are tied to the wires.

> *We make do with whatever we have at hand to build the fence. We use wooden and metal poles as posts and then stretch a barbed wire around the plot. Then we cut and bring smaller branches of jiide (Persian olive) and of shengel (a variety of local spiky shrubs) and weave those branches into the barbed wire. We have to fence it because the livestock wanders around here, sometimes the herds go through these areas. It is done for protection of crops. We do not buy the materials for the fence because it is expensive. That is why we reuse old things. For example, we use old wire, metal, wood, parts of old soviet machinery. If this is not enough, we cut more branches of shengel or Persian olive and use it for fencing.*

When the plot is fenced, gardeners tie up red rags on some of the poles and wire. It is usually some stripes of red cloths or red vegetable sacks. At first, I thought that t was done to scare off crows and other birds but it turned out to be a sort of an amulet to protect the garden from an evil eye. The gardeners explained to me that the first look is the most dangerous and that red things attract person’s first sight, thus taking the dangerous ‘blow’ and protecting crops. Some gardeners even put skulls of domestic animals on the poles. This is also meant to serve as an amulet and ‘works’ exactly like the red rags.

When Sakbolot brought me to his garden, it was fenced and Adai has already ploughed the entire plot. Adai works as a tractor driver for a local rice corporation. So he came to his plot on his tractor after his shift and plowed it. Saving on tractor costs was an additional bonus for the cousins. Every group of gardeners hires a tractor to plow the entire plot. The expenses for the plowing such as the tractor driver's service fee and fuel costs are shared by the gardeners proportionately to the size of their plots. After plowing, the same tractor makes irrigation furrows inside the plots. These furrows are quite deep and reach up to 50 cm in depth. These parallel furrows are cut with perpendicular furrows every 10-15 meters and make up square (locally called 'taqta'). Each taqta has about 20-30 furrows. The size of one's plot is counted by the number of taqta's. The garden made by Sakbolot, Adai and Alban consisted of five taqta's this year. In case the plot of land is not even, a tractor makes extra perpendicular furrows called kese qaryq (lit. cutting furrow). It is done when some parts of the plot are higher and some parts are lower. To make sure every ditch is on the same level, gardeners split up long furrows into shorter, more even-leveled furrows.

This stage illustrates how 'commonning' helps commoners to reduce the costs associated with gardening. In fact, the need to fence and plough the garden, and to make irrigation furrows are most frequently mentioned reasons why commoners opt to garden in small groups as opposed to doing it completely on their own. Indeed, it is more cost-effective to hire a tractor as a group and build only a fraction of the fence. Surely, some gardeners told me that if they had all equipment and resources, they would have liked to do gardening on their own. However, in the current circumstances teaming up with other villagers was the most effective and cost-efficient way of gardening in the Syr Darya Delta.

7.2.2. Choosing your crops

Strictly speaking it is not the 'next step' after plowing and fencing. In fact, a gardeners should already know what he wants to plant at that point because irrigation the distance between irrigation furrows depends on the type of crop.

> *Since my plot is not big this year, I have a little variety. This year, I am managing only two taqtas and that is why I have a mix of melons and watermelons only. If I were cultivating 10 taqtas, I would have had one taqta for each type of melon and watermelon and also some for potatoes and other vegetables. Ideally, each crop should have its own separate taqta but if you have a small plot, it makes sense to have a little bit of everything. For example, one can plant melons, watermelons, pumpkin and cucumber in the same taqta. So this year, I allocated 10 furrows for melons and 10 furrows for watermelons. I can make about 30 seeding nests' along each furrow. I plant three seeds in each nest and each nest yields about 9 fruit. So God willing, my harvest will be about 2,700 melons and as many watermelons. Of course, in reality I will get a much smaller harvest. But even if I get half of it, it is more than enough for my family' (Sakbolot, Aqtas, April 2016).*

The choice of crops is largely an individual process. Each gardener decides for himself what he is willing to grow. Starting from this stage, each gardener starts treating his own gardens without much cooperation with others.

7.2.3. Sowing

Next time I visited Sakbolot on April 29th, we went to plant melons and watermelons in his garden. It turned out that Adai and Alban came to the garden a few days ago and finished sowing more than three-quarters of the plot, that is their own three taqta and one of Sakbolot's taqta. Sakbolot lamented that he is running late with sowing and our plan for the day was to finish planting the seeds. Sakbolot reached inside one of the pipes that connected two irrigation squares (qaz. *taqta*). He took out a small bag made out of fabric and started explaining to me how we will do planting:

> *Let me tell you how we start growing the various crops. There are melon seeds in this bag. There is a similar bag for watermelon seeds. We mix the seeds with manure and wrap it up in piece of cloth and make it look like a bag. And we constantly keep sprinkling it with water. The reason we mix it with manure is that the latter gives energy to the seeds and contributes to fast germination of the seeds. We do the same thing with the watermelon seeds. The seeds stay in the manure for 3-4 days. Seeds need to stay in the manure until they start germinating. Only when the seeds start germinating, we plant them. It is also important to make sure that germinated seeds are planted deep enough to be in moist soil. If seeds are in the upper dry level, they will not sprout. To do that we dig a 3-4 cm deep hole and put 4-5 seeds in it and cover it with wet soil. When planting, we put more seeds than we need in the nest because we are not sure which seeds will grow and which ones won t. Because the seeds are already germinating, they will start growing roots and sprouting leaves faster. (Sakbolot, Aqtas, April 2016).*

After a short demonstration, we started planting seeds. Sakbolot was making the seeding nests in a chessboard order right beside the edges of the irrigation furrows. He explained to me that when plating melons the nests should be at least 2-3 meters apart because melon and watermelon vines sprawl. If we were planting potatoes, the nests would have been only 70 cm apart. While we were planting seeds, Sakbolot continued telling me about the sowing strategies. For example, it is better to plant *angelek* (a variety of melon (cantaloupe) that ripens the earliest) closer to the main irrigation canal because it requires more watering. He told me that starting from this step, every gardener works more or less on his own (except for watering, during which the gardeners cooperate). He also joked that Kazakh people's ancestors were much smarter than current Kazakh gardeners because the former grafted melon and watermelon seeds to a camel thorn stem while migrating from the banks of the river to inland pastures. By the time, they returned with their flocks to the river bank in fall, the melons and watermelons were ripe and ready to be harvested, whereas modern Kazakh gardeners spend a lot of time swinging a hoe to eat some melons. Upon hearing

this story I was surprised that nobody was experimenting with grafting anymore. And I even encouraged Sakbolot and other gardeners to try.

However, nobody actually ended up trying to graft melon seeds to a camel thorn. When I asked several gardeners the following year, I was told that many of them did not have time to experiment with grafting and that they had to focus on the 'usual' growing practice. Another frequently-mentioned reason was that nobody has actually seen the melon seeds being grafted to the camelthorn stem, hence the gardeners did not have confidence in their skills.[1] Sakbolot and other gardeners did not question the authenticity of the practice, i.e., they were quite sure that their ancestors actually were able to use camelthorn roots to grow melons. The gardeners often used this this story to demonstrate that their ancestors even cooperated with wild plants (i.e., camel thorn grass) to grow their melons, whereas modern Kazakh gardeners forgot how to cooperate with wild plants.

7.2.4. Watering

Sakbolot and I finished sowing and he offered to show me the major irrigation canal from where he would divert water to his canal. We were walking along a recently made irrigation ditch that branched out to other commoners 'gardens as well. The irrigation ditch lead us to a quite a large canal locally known as Bürkitbai. This canal is named after a clan, the decendants of Bürkitbai. It is believed that Bürkitbai and his family dug this canal in the past to divert water from the river. There was a nameless irrigation ditch that was branching out from the Bürkitbai canal. The gardener groups whose gardens were located along that nameless irrigation ditch got together and cleaned it in spring so that it can be used to bring water to their gardens from the Bürkitbai canal. When ploughing their plots, every group of gardeners made an irrigation furrow that would take water from that irrigation ditch to their respective gardens.

Gardeners liaise with one another to take turns to water their gardens. On average each garden is watered about 11-13 times. The plot gets watered for the first time even before sowing. It is done to leach (that is to wash away) excessive salts from the soil. The gardeners use deep irrigation furrows that make up squares (called taqta, kese or bölik) for irrigation. Each taqta's may vary in size and on average measure up to from 20x20 to 30x30 meters. They are made up in such a way that all land within the same taqta is on the same level, which makes it convenient to irrigate. There are also small pipes that connect adjacent taqta's, which allows for more even irrigation. Technically, if there is plenty of water, a gardener can water all his taqta's at the same time. However, during the high season there is always a shortage of water and every gardener ends up being able to water only one taqta at a time.

Irrigation is an art, it is a crucial skill for a gardener. Often times the level of

[1] I also wondered if some of the gardeners regarded this grafting technique as an old 'fairytale.' However, I did not notice that the gardeners regarded this grafting technic as impossible. They mostly doubted their own skills.

> *ground is different across your plot. Some parts are higher and some are lower. So if your irrigation furrows are not arranged properly, you end up having one part constantly flooded and another part being dry while watering your crops. Even now you can see that some parts of my plot are elevated. For example, look at that furrow: it is filled up half way at this end and it is almost full at the other end. That means one side is high and the other side is low. To be able to better regulate the water level across the taqta, we also put a few pipes that connect adjacent taqta s (Sarsenbek, Aqtas village, June 2016).*

When I witnessed local watering practices for the first time, I caught myself thinking that those techniques were wasteful. How it works is that irrigation furrows, which are quite deep, are filled with water almost all the way up to the seed nest level. Yet, all the nests should be on one level slightly above the water level. So it takes a lot of amount of water to water rather small plot. When I asked the gardeners about why exactly they do it this way, many gardeners from different locations explained that this is the most suitable irrigation technique for local climatic conditions and soils. The idea is that moisture reached only the roots of the plant. When watering the garden, the water should not cover the nest. If this happens, the top layer of soil tends to form an extremely hard crust after drying up. Thus, making it difficult for the seedlings to grow.

The gardeners also avoid water their melon and watermelon crops too frequently because otherwise, the melons and watermelons tend to become tasteless. The watering season last until July and starting from August gardeners do not water their gardens at all. Around that time, the water quality in Syr Darya is believed to get worse due to the waste water discharges from rice fields upstream.[1] According to gardeners 'observations watering crops in late summer ruins the yields.[2]

7.2.5. Weeding, singling out (thinning out) the crops

Each stage of melon and watermelon growth has its own name and there are some tasks that need to be done at those stages. For example, it starts with a seed (*tuqum*) and grows through the following stages: two leafs (kaz. eki qulaq – lit. a pair of ears), three leafs (kaz. üch kulak), four leafs (kaz. tört qulaq/it taban – lit. four ears/a dog's paw), börik[3] (lit. a fur hat), vines (kaz. örnek – lit. patterns) and fruit (kaz. tüinök – lit. fruit-bud).

When the sown seeds sprout and reach two-leaf stage, they need to be thinned. As mentioned in

[1] Rice paddies are covered with water throughout rice's vegetative cycle. Shortly before harvesting, rice paddies are drained, to allow the soil dry and harden to withstand the weight of rice harvesting machinery.
[2] The melon fruits are reported to become 'leaky,' i.e., the insides become soft and tasteless.
[3] A lot of names here come from actual appearance of the sprouts at any Particular moment. For example, 2-,3- and 4-leaf stages are self-explanatory, the only thing is that locals use the term 'ears' to denote leafs. The 4-leaf stage is also called 'dog's Paw' because the plant at this stage resembles a large dog's Paw. At the next stage, there are too many leafs to be able to easily count them and that is why it is called 'a fur hat' because the plant reaches the size of a hat. The stage when vines start sprawling out is called 'Patterns' because these sprawling vines create intricate Patterns on the ground.

the previous section (see Sakbolot's quote in Section 7.2.3), gardeners intentionally sow around 6 seeds in each nest, which is more seeds than needed. Regardless of how many of those sprouted, a gardener leaves only the three strongest sprouts and plucks out the rest. This pocess of thinning the crops is called *birleu*, which literally means 'singling.' If not thinned out, the sprouts will start competing with one another for limited nutrients and may not bear any fruit or bear low-quality fruit. While thinning the sprouts, a gardener also plucks other weeds, removes the top layer of soil away from the stem and softens the soil around the seedlings. The top layer is removed to prevent the crystals of salt that are present in soil from burning the young and thin stem of the seedling. Those hidden salt crystals are a danger because they trap the sun heat and can get very hot and thus burn the young sprouts. From a biochemical perspective, salinity interferes with the plant's osmosis (water balance),[1] nutrient absorption and photosynthesis[2] (Machado and Serralheiro 2017, p.2).

The next three stages of growth, that is '3-leaf', 'a dog's paw' and 'a fur hat', are very labor-intensive. Ideally, at each of those stages, a gardener should 'hill up'[3] the melon and watermelon stems by pulling up soil around the stems to provide them with better soil support as they grow. This process is called 'dombaqtau' (lit. making a bump). Not only hilling gives the plants more support and nutrients but also makes them less likely to be broken by strong winds, which are common in the area. The gardeners also eliminate weeds, while hilling up their plants. Although ideally hilling should be done three times, most of the gardeners end up doing it only twice.

Weeding and hilling becomes impossible at the 'patterns' stage when melon and watermelon vines sprawl far and wide. At this stage, gardeners can only water their plots. Due to lack of weeding, the plot quickly gets overgrown by weeds. At this stage, the gardeners consider the weeds to be a good thing for plants as weeds provide some shade to keep the moisture in the soil and later protect the melon and watermelon fruits from crows.

Unlike the gardening, where the commoners emphasize cooperation, the reed mowing has a very strong competitive aspect to it. The commoners compete for the best reed beds. If some years ago, it was more common to ask other commoners for help, nowadays most of the commoners try to manage on their own. What are the implications for commons and commoning?

I had similar conversations with younger men in several villages. Once when I went to visit my host family in Alga village, I learned that my host brother there was not home because he went to

[1] Machado and Serralheiro (2017, p.2): 'Salt accumulation in the root zone causes the development of osmotic stress and disrupts cell ion homeostasis by inducing both the inhibition in uptake of essential elements such as K+ , Ca 2+ , and NO3 − and the accumulation of Na+ and Cl−. Specific ion toxicities are due to the accumulation of sodium, chloride, and/or boron in the tissue of transpiring leaves to damaging levels. Accumulation of injurious ions may inhibit photosynthesis and protein synthesis, inactivate enzymes, and damage chloroplasts and other organelles.'

[2] Machado and Serralheiro (2017, p.2): 'Salinity affects photosynthesis by decreasing CO2 availability as a result of diffusion limitations and a reduction of the contents of photosynthetic pigments. Salt accumulation in
spinach inhibits photosynthesis, primarily by decreasing stomatal and mesophyll conductances to CO2 and reducing chlorophyll content, which can affect light absorbance.

[3] In English, this process is called hilling or ridging. It is often used in potato cultivation.

help his friend to mow reed. When he came back, I asked him about this mutual help arrangement and he told me that there is a group of best friends who often help each other. This help is not limited to mowing reed but rather includes a wide variety of occasions. He also acknowledged that these days the neighbors rarely ask each other's help in mowing reed. According to Alimjan, the mutual help can work only between close friends because the close friends are more trustworthy [lit. *senimdi*] with one another. He said that the practice of mutual help had dwindled because those people who come to help you, usually, do not work as hard as yourself. For example, he said the bundles mowed by the helpers usually tend to be smaller than the standard.

The topic of mutual help also came up during one of our evening get-togethers in Aqsu. The young men in Aqsu also confirmed that it is not common to ask others to help you mow your reed. They hypothesized that dwindling of the mutual help in mowing reed has to do with the fact that almost everyone is busy mowing reed at the same time. So someone cannot ask the other person to help because one knows that the other person is also busy. The second reason they named was that you have to 'repay the debt 'by helping the person who had helped you. If someone helped you to mow reed[1] for one day, you have to help him mow the reed for one day. So from the labor perspective it does not make much sense. And it is much better to dedicate your entire time to your own mowing spot because you mow the reed the way you prefer.

7.2.6. Harvesting and preparation for the next season

The first melons in Kazaly ripen some 60-70 days after sowing, while the most of the melon and watermelon varieties ripen in August and September. The gardeners grow several varieties of melons such as cantaloupe[2], shytyrlaq[3] (a very sweet variety with a very narrow and long shape), Kazakh kauyn[4] (a variety of harder melons) and kulabi[5] (a large melon with dark peel). As for the watermelons, there seems to be only one variety that does not have a specific name.

August 29, 2016. Sakbolot and I drove his old Opel to his garden. It was overgrown by weeds and it was difficult to make out the taqta's and irrigation furrows. When we approached the plot, Sakbolot quickly checked the fence around the plot and said:

> *Luckily no livestock has broken in. You know that those gardeners who have big plot actually put up their tents and guard their crops. It would be quite a pity if livestock ruins you garden, so much work would go to waste. Livestock is smart. They can smell when melons are ripe and they try to break in. When the melons are*

[1] Or with any other thing such as fencing the garden, weeding, fishing, herding, etc.
[2] kaz. әңгелек (angelek)
[3] Lit. means 'do not touch me'. This variety got this name because when one starts cutting it, the cracks go all the way till the end of the melon
[4] Lit. Kazakh melon
[5] Kaz кіләбі (meaning the melon from Kulyab)

not ripe yet, the plot is relatively safe. (Field notes, August 29, 2016).

While he was telling me this we went through the small gate. Sakbolot took a long stick and a number of sacks. He was going to find and pick the melons, put several in a sack and leave the sack at the closest edge of the plot. My task was to go around the edge of the plot, pick up the sacks we left there and take the melons to the car Sakbolot was jumping over the irrigation furrows and lifting the melon vines to pick the big melons. In quite a short time, we picked about 30 melons and Sakbolot said it was enough for this time. Then, we went towards the taqta where he had watermelons and picked up just a couple.

When the last melons and watermelons are harvested, the gardeners start preparing for the next year. Gardeners scout for and make mental notes of potential areas where they can make a garden next year. Those who are certain that they will relocate their plot next year, take down the fences and stow the barbed wire and other fence materials until the next growing season. During these stage the some gardening groups dissolve and some start planning new commitments. And the process starts anew.

7.3. Conclusion

I described the process of gardening describing each step and highlighting how it requires cooperation. The commons literature has paid a lot of attention to institutional arrangements (Ostrom 1990), power relations (Amin and Howell 2016, Nightingale 2011) that enable and mediate cooperation among the resource users. My evidence suggests that the process of cooperation is not uniform but its intensity and type rather varies at the different stages of commoning. For example, at some stages of gardening, i.e., selecting land or watering stage, there is cooperation within the commoners 'groups and at the same time there is competition between the groups for better lands and access to water. The stage of fencing and plowing also shows high levels of cooperation, whereas, at the choosing crops, sowing, and weeding stages, gardeners focus on their own plots and take care of them as if they were their private lands. This finding adds nuances to the commoning picture in the Syr Darya Delta for two reasons: a) the same commoners may cooperate more or less depending on the type of the common-pool resource and b) the commoning process itself is not uniform and the intensity of cooperation varies from stage to stage. The latter point is rarely brought up in the commons and commoning literature. Hence, this finding from the Syr Darya Delta could be a meaningful contribution to the current commons literature.

Gibson-Graham et al. (2016) claim that commons are not pre-given but 'rather communities are constituted through the process of commoning' (p.196). The process of commoning for the gardeners is embedded in and unfolds along the existing kinship, friendship and other relational networks. This evidence is in line with Nightingale's (2011) argument that subjectivity and power relations bound up in kinship and community relations affects people's willingness to cooperate or not to cooperate. Moreover, it is interesting that commoning in the Syr Darya Delta is not

subjected to a ‘failure narratives’ similar to cooperatives in other parts of Central Asia (e.g., Kyrgyzstan) (Cima 2020).

I demonstrate that cooperation and collective action often goes hand in hand with competition. For example, when selecting plot for gardening or watering the plot, the commoners cooperate in small groups. At the same time, there is competition between the groups for better lands and access to water. Thus, cooperation within the small groups as well as the competition between those small groups happen simultaneously. Thirdly, I demonstrate that cooperation patterns unfold along social networks such as kinship, classmate circles, friends and neighbors that enables commoning in the Syr Darya Delta.

8. Tasattyq: Blood must mix with flowing water

Figure 8.1. Tasattyq Ritual over the Altai Canal, 2016

> *April 8, 2016. A small crowd is standing on a bridge across the canal that brings water to Kentup village. The right-bank canal*[1] *diverts some water from the Syr Darya River, the only source of irrigation water in the region. There are several cars parked on the banks of the canal and a medium-size truck with a 2-year-old bull in the trunk is parked right on top of the bridge. A group of young men take the bull on the bridge and tie him up. The crowd gathers around it and everyone present lifts their palms up at the chest level. The most respected elder loudly starts making a wish: May there be plenty of water this year for our crops and livestock, may there be peace and prosperity in our lands, may there be accord and respect in our community.' These wishes are called bata', which literally means a blessing. The blessing goes on for several minutes and because the sentences of the blessing rhyme it sounds like a piece of poetry. After every sentence, a crowd univocally utters aumin' (amen) to show that every person seconds that wish. Then, the bull-calf is solemnly slaughtered on the river bank and its blood flows into the canal turning water red for some while…*

In this chapter, I will give an account of the tasattyk sacrifice ritual, which is a part of infrastructure that enables commoning. Singh (2017) conceptualizes commoning as 'affective socio-nature relations.' She further claims that:

> *The commons are thus sites for affective encounters between humans and the more-than-human material world, as well as practices that nurture these relations. Thinking in relational terms about affective encounters helps us appreciate the important role of the more-than-human actors in the production of the commons and commoners.'* (Singh, 2017, p. 767).

In this chapter, I demonstrate that tasattyq ritual is conducive of those affective encounters that Singh (2007) discusses in her paper. This sacrifice is the core element of the *tasattyq* ritual conducted by almost every community in the Syr Darya Delta. The first tasattyq ritual I participated in took place in the Kentup village on April 17, 2016. At that time, I was in Sentas village and was getting ready to go fishing at a lake with my host family. Then, I heard the news that the neighboring village of Kentup would conduct the tasattyq ritual on Sunday and that the elders from Sentas would go there as invited honorable guests. The fishing trip would have taken about two days: the plan was to go to the lake on Saturday morning and set up the nets. We would check the nests in the evening on Saturday and the morning of Sunday and come back home sometime in the afternoon of Sunday. Thus, I had to choose between going fishing or attending the ritual. Since I had never seen this ritual before, I abandoned my fishing plans and went to

[1] It is a major canal that delivers water to the villages on the right bank of the Syr Darya River. In Russian, it is called the Right-bank magistral canal. Magistral denotes that this is a major canal.

Kentup village on Friday evening so that I could be there to record not only the ritual itself but also what happens before it. In the spring of 2016 and 2017, I ended up attending eight tasattyq rituals in a number of villages, e.g. Kentup, Aqsu, Aqtas, Sarytal, Bulaq, Qoja Qazghan, and Aiteke Bi. In several villages I participated in the ritual from the beginning till the end, e.g. in Aqsu and Aqtas I saw the process of collecting money, preparation stage, the sacrifice, and the feast. In other villages, I witnessed only the feast part.

Ritual in general has been a subject of anthropological inquiry since the inception of the discipline (Bell 2009, 1997). Although there are many approaches to theorizing rituals (see Section 8.1), I analyze the tasattyq ritual from the vantage points of the commons theory and the infrastructure literature. These vantage points lend themselves well to building my argument. First of all, I describe how the ritual is conducted and explain the emic interpretations of the ritual. By describing the flow of the ritual and comparing it to the other rituals along the Syr Darya River, I demonstrate that the tasatyq ritual is a common-pool resource in its own right (cf. Hess 2008 on new commons) and an infrastructure that enables the commoning process. In other words, the tasattyq ritual is a form of 'negotiating the access, use, and appropriation' of the common-pool resources. By focusing on the diversity of ways, in which the local communities cooperate and organize themselves to conduct the tasattyq ritual, I claim that those social networks, people, and their knowledge serve as an infrastructure needed for conducting tasattyq. Finally, I claim that tasattyq itself also becomes a part of an infrastructure that enables the functioning of the commons in the river delta.

8.1. What is a sacrifice ritual?

Before I delve into outlining the literature on the sacrifice ritual, I need to touch upon how ritual is understood in the literature. Although there is no single definition of what makes a ritual, the theoretical perspectives can be loosely organized into three groups that focus on: a) the (evolutionary, sociological and psychological) origins and essential nature of rituals, b) the role of ritual in the social life (functionalism and structuralism) and c) symbols, meaning and interpretation of the rituals (symbolism) (Bell 1997). The recent scholarship critiques the attempts to define the ritual and instead shifts the focus on ritualization, which can be understood as a way of acting that makes some activities to appear more distinguished, privileged and special than other activities (Bell 2009). Thus, a wide array of activities can be ritualized.

In this chapter, I give an account of a sacrifice ritual conducted in the Syr Darya Delta. Sacrifice rituals may be one of the oldest rituals conducted by humans (Burkert 1983, Smith 2004). Just like with ritual in general, the scholarly literature on sacrifice can be grouped into the three theoretical perspectives on the rituals mentioned above. Thus, in relation to the origins (perspective (a)) of the sacrifice ritual, the main debate about when humans started conducting sacrifice rituals revolves around domestication: if some scholars claim based on the archeological evidence from Siberia and Europe that sacrifice existed before domestication (Burkert 1983), others claim that

sacrifice rituals appeared only after domestication and that the defining element of a sacrifice is that a sacrificed animal is always a domesticated animal and not a wild one (Smith 2004). The archeological findings in the Syr Darya Delta provide evidence of irrigated agriculture and some of their sacrifice rituals in the bronze age settlements (Tolstov 1962).

As for the role of the sacrifice in the society (perspective b), scholars posit that sacrifice rituals help maintain ecosystem equilibrium (Fabian and Rappaport 1982, Hornborg 2008), and support social order and existing power relations. My claim in this chapter falls within this 'functionalist' perspective on the ritual as I claim that the tasattyq ritual serves as a 'soft' infrastructure that facilitates the functioning of river-dependent commons.

As for the symbolic meaning and interpretations of the sacrifice (perspective c), the emic interpretations of the sacrifice rituals often involve supernatural entity, deity, and/or God. The sacrifice is seen as a gift to the supernatural being. And if the sacrifice, i.e., the gift to the God(s), was accepted those who conducted the ritual could expect the return of the favor by that supernatural being in a form of rain, good harvest, and protection (Aldrete 2014, Kreinath et al. 2006). In this chapter, I describe the diversity of meanings and interpretations that the tasattyq ritual has across and within river delta communities. However, instead of going into analyzing this diversity, I consciously chose to focus on a common feature of the ritual shared across communities; that is the communal nature of the ritual, which gives me the ground to put forth the claim that tasattyq ritual is a type of commons in its own right as opposed to merely being a conduit for the functioning of the other commons.

8.2. How does the ritual unfold?

The tasattyq ritual is preceded by a preparation period, which I describe in Section 8.4 of this chapter. Here I give an account of the general flow of the ritual based on my experience in the Kentup village. Overall, this flow is quite common for the tasattyq rituals conducted in other villages as well. Although there may some differences depending on a village,[1] here I focus on the common features, and I come back to the differences in the other sections of the chapter.

In the late afternoon of Saturday, April 16th, 2020 four cars pulled up to the local mosque. The local mosque has a spacious yard, where locals had already set up two big 100-liter cast-iron pots and a few women had been making a fried bread called *baursaq*. The local imam who had just finished the *Asr* prayer, (which is done in the late afternoon when a shadow from an object is twice the length of the object itself) came out and greeted the car drivers, all of whom were the local villagers. After a short small talk, the drivers and the imam started discussing the plan for picking up the village elders and driving them to the bridge over the irrigation canal locally known as

[1] I also consciously omit the changes in the ritual over time. Some archival materials suggest that during the Soviet times, kolkhoz workers were reprimanded for conducting tasattyq (Ref. Ohayen's archival findings). At the same time, some villages claim to have conducted the tasattyq ritual even during the Soviet era, when the anti-religious sentiment was strong. It might be an interesting topic for a historical inquiry.

'Altai canal.' After dividing up the elders to be picked up among themselves, the cars hit the road. In the meantime, a small UAZ truck arrived and a few men loaded a 1.5-year-old bull on it. The calf had been purchased before and was tied up in the mosque yard. I sat in the imam's car and we headed towards the canal after having picked up two elders from the village.

After about a 10-15 minute drive, we reached the bridge over the Altai canal. The rest of the cars were already there and the UAZ truck with the calf in the trunk arrived shortly after. Overall, there were about 15 men of different ages. There were 5-6 elders, whereas the others were the younger men. There were a couple of young boys who tagged along with their fathers.

After delivering a blessing as described in the chapter's opening vignette, the calf was solemnly slaughtered. After the calf's blood was drained, the younger men loaded the carcass back onto a truck. The local elderly were taken back to their homes, while the truck took the calf's carcass back to the mosque. When we returned to the mosque, the preparations were going full speed. We offloaded the calf's carcass and two men started butchering it, preparing the meat and joints to be added to the main meal of the next day's feast. The women finished making fried bread and cleaning the rooms of the mosque where the men would be seated, as well as the main guest room of the house where the women would be seated. Some women started arranging the *dastakhan*, a tablecloth which is put on the floor, while other women were preparing the salads, washing, drying and preparing the plates, cups, and cutlery to be used during the feast next day. The youngsters were tasked to do 'supporting 'tasks such as peeling carrots for the main rice dish to be cooked the next day, fetching water for everyone who needs it, and cleaning and sweeping the yard. The preparations went on until late at night and continued early in the morning of the next day.

The feast, which is one of the core elements of the tasattyq ritual was scheduled for noon. The final preparations for the feast started early in the morning. The dastarkhans were fully prepared: bread, various salads, sweets, and fruits have been placed on it. The yards were swept and sprinkled with water, so that dust stays put. Locals brought several hand washers[1] from their homes and placed them at the entrance to the mosque so that everyone can wash their hands before the meal. The water was being boiled in two big hand-made boilers, locally called titans. The young boys brought chairs and desks from the local school and put them together to make a long table in the yard of the mosque. That was where the youngsters would be seated during the feast. At around 10 o'clock, the cooks started preparing the main courses for the feast. The main course was *plov*, a traditional Central Asian steamed rice dish. There was a lady in Kentup who was famous for her ability to cook *plov*, so she was in charge of making it. In a separate pot, the meat was being cooked. The boiled meat and bones with chunks of meat on them were placed on top of the pilaf right before it was served.

[1] It is a portable basin that is used to wash hands in the villages where there is no tap water.

At around 11.30 people started arriving at the feast. There were two locations where the feast was taking place, that is the mosque and a house of a local villager situated nearby. The men were seated in the mosque, while women went to the house nearby. In the mosque, there were two seating areas: the elderly villagers and the guests sat inside the mosque, while the younger men and the youth were seated in the mosque yard. One of the reasons why women and men are seated separately is because there is no single space that can accommodate everyone. Another reason may be the fact that gender-separate seating also exists in other rituals such as funerals and stems from a religious and traditional rules of gender separation.

Almost every single person in the village attends the ritual. Both women and men first came to the mosque, where the imam was reciting the Quran. Every now and then the imam would address the verses of the Quran to the souls of the deceased and people would do the *aumin* gesture, i.e., wiping one's face with one's palms. Some dropped donations in the donation box inside the mosque. After this, women went to the house where the feast table was prepared for them, while the men stayed in the mosque. Closer to noon a UAZ van hired by the people of Kentup brought about 12-15 elders from the neighboring villages, namely from Bulaq and Sentas. The elders were mostly men but there were a few women as well. The local elders and the imam greeted them at the entrance gate to the mosque. After having washed their hands the male elders went to the main chamber of the mosque where everything was already ready for the feast. The female elders went to the 'feast house 'nearby. From this time onward, I stayed in the mosque and I did not observe what was happening in the house where the women were seated.

The local elders and the guests sat in the main chamber of the mosque. The seating was done in accordance with the seniority of people. The most senior and respected people were seated in *tör* area; that is the area that is farthest away from the entrance. If the age and status of two people were equal, a more senior spot was given to a guest. There were also two smaller chambers in the mosque. One of them was used temporarily as a kitchen, while the other room also had a *dastarkhan* for locals who did not fit into the big chamber.

The structure of the feast follows the general structure of other feasts such as *Qudai joly*[1], *sadaqa*[2], and funeral feast and consists of a) tea and appetizers, b) main course and c) *Khatim*[3]. When the people arrived and sat at the *dastarkhan*, the tablecloth had already been filled with salads, sweets (such as a variety of biscuits, candy, and chocolate as well as local sweets like *chakchak*,[4] dried melon strips,[5] and dried melon jelly[6]), sour cream, jam, fruits, fried millet, etc. When the guests sat down, a milk tea was served right away. Tea was prepared in the adjacent room that was being

[1] This literally means 'God's Path'. It is an individual sacrifice ritual. This ritual is conducted for various purposes ranging from purchasing a vehicle or a house, securing a major achievement such as graduating from the university or returning from Hajj, a pilgrimage to Mecca and Medina. In the latter case, it is very similar to Hajj feasts in Kyrgyzstan described by Bechtold (2017).
[2] Donation ritual.
[3] A recitation of Quran from the beginning to the end.
[4] It is a desert made with fried dough and honey
[5] Qauyn qaq in Kazakh.
[6] Qayun qurt in Kazakh.

used as a kitchen. Few spoons of tea were put into teapots and hot water, as well as cream milk, were added on top. These pots were brought to the *dastarkhan* and put at the different ends of it so that a smaller subgroup of people could share the tea from the same pot. The most junior person in each subgroup volunteered to pour tea for those people sitting next to him. Locals almost always drink a milk tea and often add fried millet into their cup of tea. Drinking tea lasted for about 20 minutes. When everyone was done drinking tea, those present took some small things from the table e.g. an apple and a few candies for their grandchildren. Then, the men and women from the serving team were called in and the elder from the Sentas village uttered his blessing. This blessing consisted of wishes for prosperity, health, unity, and wellbeing of the entire community:

Иә Алла тағалам! [O Allah!]
Халқымызға молшылық [Give prosperity to our people]
Жеріміз биыл көркейіп, [May our land green this year]
Болсын дейік молшылық. [May there be prosperity]
Бақыт қонып еліме, [May happiness is bestowed on our people]
Жауын жауып жеріме, [May it rain on our lands]
Аулақ болсын қуаншылық. [May the droughts be alien to us/far away from us]
Бәле-жала алыстап, [May the misfortunes distant]
Қауіп-қатер қалыс қап, [May the calamities be left behind]
Ортақ дінде бас қосып, [May we be united in the common religion]
Барша ұлттың баласы, [May all children in the nation]
Көтерілсін қарыштап. [Grow up steadily[1]]

Everyone uttered *aumin* while making the amen gesture and the *kelin s* (daughters-in-law) started removing the salads, sweets, and other things that were on the tablecloth. After the tablecloth was cleaned and everything was put away, the main course was served. Youngsters who had been helping with boiling water and other small tasks all morning brought the big plates of rice with meat placed on top of them.[2] The plates were placed in different parts of the tablecloth so that a group of 3-5 people shared one plate. The youngest person in each group used his hands and a knife to separate the meat from the bones and cut up the meat into smaller pieces and put them on top of the rice. Those who were cutting up meat did not clean the bones thoroughly. In fact, they left some meat on the bones intentionally because it is a custom to pass the half-cleaned joints to the other members of the group, who clean it thoroughly using knives. Then, everyone started eating. The oldest person received the head of the sacrificed calf. Presenting the head of the sacrificed animal to someone is generally considered as a sign of utmost respect. The elder cut off the ear of the sacrificed calf and gave it to someone else in the *tör* area. An ear is usually given to a respected guest[3]. People ate the main course for only about 20 minutes and there was quite a lot of rice left on the plates. I learned that it was a tradition not to eat everything on the plate. Some food should be left on the plate for those who were preparing everything outside. The premise of this custom is that those who are preparing everything outside might have served all the food to the guests. So if guests finish everything, then there will be no food for the hosts. When the

[1] It can be translated literally as “grow up qarys by qarys.” Qarys is a traditional measure of length equaling the distance between a thumb and an index finger stretched as far apart as possible.
[2] It is considered to be very important that every households tastes the food from tasattyq. If someone could not come, the villagers take some food to their houses. Pilaf from tasattyq is also delivered to the rice growers who are working in the fields.
[3] As a researcher and someone who came to the delta area from afar, I often received an ear of sacrificed animal in many Qudai Joly rituals and several tasattyq rituals.

majority of those present stopped eating and just sat still, the eldest person asked if everyone was done. People nodded and several said yes. Then, those who were sitting close to the entrance of the room told people outside to call everyone in for *bata*, the blessing. This time the floor for uttering a blessing was given to the elder form Bulaq village. Once everyone gathered in the mosque, the elder gave his blessing, which was similar in terms of content to the previous blessing. Then, the *kelin* s (lit. daughters-in-law) were called in to take away the plates. Taking away the plates was also some sort of a ritual. The daughters-in-law came in to take the plates and when the elders passed the plates to them, the daughters-in-law bowed, while the person giving the plate gave his blessings to her by saying 'baqty bol', which means 'be happy.' Then, the tablecloth was cleaned and put away and a young boy came with a pot of warm water, a small basin, and a hand towel over his shoulder. The young boy would pour water on the hands of the guests so that they can wash their hands after the meal. He headed straight to the elder who uttered the blessing and poured water on his hands[1]. Then, it was the turn of the elders on both sides of the one who uttered the blessing to wash their hands. Then, the young boy went to the left end of the circle and poured water for everyone one by one. While washing hands, the guests gave their blessings to the young boy.

The space that had been freed up by removing the tablecloth was filled by people who were coming inside the mosque. Everyone outside was invited into the mosque for *khatim*. *Khatim* is a recitation of the Quran dedicated to the spirits of the ancestors. Technically, *khatim* is a term that means reciting the Quran from the beginning to the end. However, since it is practically impossible to recite the Quran in its entirety during such a ritual because it would take a few days, the imams do *khatim sagira*[2], which means 'small *khatim*.' It is believed that despite the fact that the small *khatim* consists of reciting only a few selected surah's from the Quran, the benefits (*sauap*) derived from it equals to reciting the entire Quran. I was told by the local elders that usually, it was the local imam who recited the *khatim sagira*, however, that year the local imam invited the main imam of the district to the *tasattyq* ritual. The district imam cleared his throat loudly and started reciting surah's from the Quran. He started with the surah *Ihlas*, which was recited three times, and then moved on to reciting the following surah's in this order: *Falaq*, *Naas*, *Fatiha*, the first five verses and the verse number 255[3] from the *Baqara* surah. In between each surah, the imam uttered takbir, i.e., glorification of the God by saying Allahu Akbar. After the khatim was completed, the imam devotes all the benefits from this recitation to the souls of the ancestors. Then, the word was passed to the oldest person from the Kentup village who made the final blessing asking God for prosperity, safety, unanimity, and an abundance of water.

[1] This tradition of starting to pour water from tör is unique to the Syr Darya Delta. I was told that in other Parts of Kazakhstan, it goes from the right end to the left before meal and from the left end to right after the meal.
[2] The practice of the khatim sagira (i.e., the small khatim) is a characteristic feature of Islamic practice in Uzbekistan and Kazakhstan. This practice was approved by the fetwa of the Muslim spiritual leadership in Tashkent during the Soviet times. It was done because the Muslims in Central Asia did not have time to do full khatim, partly because of the restrictions imposed on religious practice by the Soviet state. From a sharia perspective, small khatim is based on a hadith that says that reciting surah Ihlas is tantamount to reciting the entire Quran. That is why the fetwa prescribed to start small khatim from the surah Ihlas, while the full khatim should start from the surah Fatiha.
[3] The verse number 255 from the Baqara surah is known as Ayat al-Kursi.

8.3. Meanings of tasattyq

Tasattyq is a ritual conducted in every river delta village I visited. When talking about tasattyq it is often claimed that the tasattyq ritual is the same across the communities. However, having attended a number of rituals in several locations in the delta region I noticed that besides some common features, there is also a number of differences in the way the ritual is conducted and understood. These differences exist not only between but also within the communities. Below I highlight the shared and contested understandings of the ritual that exist in the river delta.

One thing that all informants agree on is that tasattyq is a collective sacrifice ritual. The sacrifice rituals are quite common in the river delta and they are conducted by the households on various occasions to ask the people to bless the upcoming endeavor or to thank God for success or fortune. Such a sacrifice ritual is called *Qudai joly* [lit. God's Path] and conducted in other parts of Kazakhstan as well (Abashin 2014, Light 2015, Privratsky 2001). The occasions for an individual sacrifice ritual can be an upcoming trip or a safe return from the trip, dispatch of children to the university or army, a return of a family member from the hospital after a difficult surgery. The flow of the individual sacrifice ritual is almost identical to the flow of the tasattyq ritual, so one thing that makes tasattyq unique is its communal nature. I heard many times that '*tasattyq is a special type of Qudai joly conducted with people for the wellbeing of all.*' When a family conducts a sacrifice ritual, it collects blessing for itself, while during the tasattyq the blessing and wellbeing are asked for the community as a whole. Thus, both the burden of conducting tasattyq, i.e., resources and labor needed for conducting it, as well as the purpose of it is communal. In other words, the tasattyq ritual can be thought of as a cultural or spiritual commons (Hess and Ostrom 2003, Samakov and Berkes 2017).

Another commonly mentioned characteristic of tasattyq is the time of the year when it is done. In most of the villages, the rule of thumb dictates that tasattyq should be conducted in spring when the water from the river is diverted to the canals for the first time that given year. Since Nauryz, the vernal equinox, is considered to be the traditional New Year, the tasatyq rituals should take place after March 22. In practice, most of the tasattyq rituals are conducted in April, with very few happening in the first two weeks of May. It is also said that tasattyq is conducted only once a year in spring, although in a couple of villages people claimed to conduct tasattyq whenever its needed, i.e., not only in spring, and as many times as needed, e.g., in case of drought in summer.

The rule that tasattyq should be done after the vernal equinox is also not set in stone. For example, the workers of the Aqlaq dam reported conducting the tasattyq ritual in late winter and early spring when the ice drift was threatening the integrity of the dam. Some communities reported that they sometimes combine tasattyq and celebration of Nauryz in one ritual. In the 'qyr' areas tasattyq is sometimes called 'Töl miramy' which means the celebration of the calving season. Thus, although tasattyq is seen as a ritual distinct from other spring rituals such as the celebration of the New Year or of the calving season for the livestock, sometimes these rituals are mixed and conducted

together. In this sense tasattyq becomes a universal spring holiday (similar to Nooruz) to celebrate the end of the winter and beginning of a new cycle – that is a new farming cycle, a new livestock breeding cycle.

Mixing of the tasattyq ritual with the other rituals can be seen in the etymology of the term. I asked almost every informant if the term tasattyq has its own meaning. In fact, it does not, e.g., unlike Qudai Joly. Most of the people did not know where the word tasattyq came from. The imams were pointing to the Arabic roots of the words. According to them it derives from the word *sadaqa* (lit. sacrifice) and is linked to the Islamic prayer for rain called *istisqa*. However, this knowledge was not widely shared by the community.

Another explanation of the etymology was that tasattyq comes from two Kazakh words 'tas' and 'attyq' (lit. we threw the stones). And it is related to the Quranic and Biblical scene of Abraham and Ismael throwing stones at the devil when the latter tried to tempt them. In this interpretation, tasattyq becomes mixed with the Abrahamic sacrifice ritual, which is celebrated as Qurman Ait (Eid al Adha). Thus, although tasattyq is a distinct sacrifice ritual, people tend to bring elements and meanings of other sacrifice rituals to it (e.g. Nooruz or Eid).

When I asked why people in the river delta conduct tasattyq, I was looked at as if I was asking a very silly question. All my informants claimed that there is a shared common purpose for conducting the *tasattyq* ritual. I recorded the answers and it turned out that the ritual's purpose is manifold (i.e. no single purpose) and almost every informant named a slightly different set of purposes. However, I am far from claiming that each informant named completely different purposes for people's conducting the tasattyq ritual. The most frequently mentioned purpose of the ritual was 'asking God for rain' or 'asking God for the abundance of water.' Quite a few mentioned 'good harvest' and 'prosperity' as a lot of health comes from and dependent on the availability of water. The wishes for prosperity uttered at the ritual highlight the direct link between local livelihoods and water coming from the river.

Some claimed that the primary purpose of the ritual is to ask the God for peace (in its most general sense), the wellbeing of all people, for unanimity and social accord in the community, and expressing gratitude for surviving the winter. Other things that were mentioned less frequently were tasattyq being a ritual of purification or appeasing the river. I heard such interpretation from both women and men, while more religious villagers (e.g., those who regularly prayed five times a day) never mentioned it. I was told that back in the day (approximately 10-15 years ago) when the tasattyq was conducted on the river bank, the households would throw in the river the cups and dishes which got broken or chipped during the winter. This was interpreted as a ritualistic purification as the current took away all misfortunes with the broken or chipped dishes. The purifying quality of the flowing water was documented in other parts of Central Asia as well (Féaux de la Croix 2011). The fact that the animal is sacrificed at the river bank has the aim of reminding people where water comes from.

Some informants also mentioned that the river becomes bloodthirsty and that tasattyq ritual is done to appease the river. In fact, the waters of the Syr Darya are considered quite traitorous and a few people of different ages drown in it each year. While some openly say that tasattyq ritual satisfies the river's need for blood, this notion is often implied in the wish that no one drowns in the river this year. This notion of appeasing the river or quenching its thirst for blood is heavily criticized by the local imams, who interpret such a notion as a contradiction to the core Islamic belief of oneness of God.

The notion of quenching the river's thirst for blood may be linked to or stem from another aspect of tasattyq which sets it apart from the other sacrifice rituals. This element is the requirement that the blood of the sacrificed animal must drain into flowing water. The emic explanations of why blood should flow into water also differ:

> *When we slaughter the calf, its blood bursts out from its slit throat like a fountain. We want our water to flow with similar force, so that there is enough water for everyone. This force with which the blood bursts out of the animal s veins transfers the force to water. (Kenjetai aga, Kentup, May 2017, fieldnotes).*

Other informants described the need for blood's mixing with water as following: when the blood of the sacrificed animal mixes with water, it becomes a part of water and thus evaporates together with it. The water vapor takes 'the smell 'of the sacrificed animal's blood to the skies where the rains form. Thus the prayers and wishes for an abundance of water are delivered to the skies via the blood vapor, which leads to more rains, which in turn means more water. Some tell a slightly different version but emphasize that water vapor takes the 'smell of the blood 'to God. And as a sign of acceptance of the sacrifice, God gives back more water in the form of rain.

This 'requirement 'for the blood of the sacrificial animal draining into water is observed even in the water-scarce areas far away from the river such as the 'qyr' zone. Qyr is a local colloquial term for the Karakum and the Aralqum semi-deserts. It is often used in comparison with 'syr' that denotes the riparian areas (see Chapter 3). If for the 'syr folk '(*syr eli*) the Syr Darya River and the irrigation canals that stem from it provide many locations for conducting the sacrifice, there are no open water sources like rivers, canals or lakes in the area[1]. That is why in order to make the blood come in contact with water, the Qyr people make the sacrificial kill at the heavily salinized spot. The logic behind it is that salt is the substance that retains water. Thus, if blood drains into a salinized area, the blood comes in contact with salt, which means that it comes into contact with water that is trapped in the salt. The requirement that the blood of a sacrificed animal should come in contact with water reminds people that the grass that nourished the sacrificed animal comes from and returns to water – the substance that supports all life on Earth.

[1] Qyr people get the drinking water for themselves and their livestock from wells.

8.4. Organizing groups

Although the core elements of the tasattyq such as the sacrifice and the feast are very similar, tasattyq rituals in different villages have different 'flavors' meaning that there are some elements that are unique to a particular village. For example, a tasattyq ritual in the Aiteke Bi township looked like a collective dinner or feast, which is very similar to the Qudai Joly sacrifice ritual, while the tasattyq in Aqquduq included traditional horse races. In this section, I explore what creates those differences in conducting the tasattyq ritual and make a claim that people serve as infrastructure that shapes the flow of the ritual akin to irrigation infrastructure shaping the flow of the water. Stavridis (2016, p. 2) point out that 'commoning practices importantly produce new relations between people. They encourage creative encounters and negotiations through which forms of sharing are organized and common life takes shape. Commoning practices, thus, do not simply produce or distribute goods but essentially create new forms of social life, forms of life-in-common. That is why those practices may be projective (hinting towards possible forms of life-in-common), expressive (attempting to draw attention to the values shared by those who participate in the commoning processes) and exemplary (partially establishing social relations that exceed the limits imposed by dominant models of sociality).'

I observed differences pertaining both to the logistics and practical aspects of the ritual as well as the content of it. In the previous sections, I have already talked about how different people participating in the ritual attach different sets of symbolic meaning to the ritual. By logistical and pragmatic aspects I mean decisions about how exactly the ritual is conducted, i.e., such issues as the place and time of the ritual, individual and group responsibilities, and other logistical issues. By content I mean here the elements of the ritual, i.e., whether it consists of the sacrifice, feast, and Khatim only or whether it has some additional activities.

Preparation to the tasattyq ritual starts a few weeks before the actual ritual. In springtime, people just start talking to each other about it because it is a habitual practice and everyone knows that it is done in spring. The conversations about tasattyq were very short and occurred for instance over the evening meal. It consisted of a question: 'When are we doing tasattyq this year?' and the response was 'I do not know.' In Aqtas village, where the elderly people have a habit of gathering on the local main square every day in the morning, the conversations about the tasattyq started popping up more frequently in spring. An elder said: 'It is already April, it is about time we do tasattyq' and the rest of the elders replied, 'We should.' Thus, the wheels start turning, and the preparation for the tasattyq starts. But who are the people who actually turn those wheels?

In fact, the organizing groups differ from village to village. For example, in the Aqtas village, the informal Elders' Council [kaz. Aqsaqaldar Kengesi] is in charge of organizing the *tasattyq* ritual. The members of the Elders 'Council are the same elders who get together in the main square, although not every elder who comes to the square is in the Elders 'Council. The Elders 'Council members appoint a person responsible for collecting money on every street, set the date of the

tasattyq and distribute the responsibilities among the villagers, i.e., someone is charged with finding a good calf for purchase, one is charged with shopping, while others volunteer to host the ritual.

In other communities like Kentup, the organizational group is formed based on the existing networks of *klasstastar*, i.e., those who graduated from high school in the same year. For example, in 2016, the 78-ers and 79-ers organized the tasattyq. In other words, those who were born in 1978 and 1979. The following year's tasattyq was organized by the 80-ers and 81-ers. Thus, the responsibility for conducting tassattyq is passed on to the graduates of the next year. These 'klasstastar' groups are similar to traditional Uzbek hosts on service (hizmatda) who are in charge of organizing the feast (Trevisani 2016, p. 64). In yet other communities such as Aiteke Bi, there may be one person who has an informal responsibility to organize tasattyq and other rituals.

It is often the decisions of the organizing group that define how the tasattyq unfolds and account for the differences between how the tasattyq is conducted in different villages. For example, the preparation for the tasattyq ritual starts with collecting money. The sum needed is calculated based on the price of cattle and other associated expenses such as flour, rice, oil, vegetables and the like. The price is divided between households and each household ends up contributing something between 2,000 to 5,000 Kazakh tenge (that is 5-12 USD).[1] It is the organizing group that determines how much money is needed for the ritual. Usually, the communities collect the same amount of money year after year unless there are big fluctuations in the market prices.

The organizing group also decides when exactly to conduct the ritual. Because most of the households depend on governmental payments such as pensions or salaries, the tasattyq ritual can be delayed if those payments are delayed. It is also a responsibility of the organizing group to keep reminding people that they should contribute to the tasattyq.[2] The whole process of the tasattyq depends on how effectively the organizing group collects all money. After all, money is collected a date for tasattyq is set. Usually, it is set for a weekend although in some cases it is done on weekdays.

The decisions of the organizing groups also influenced the venue of the ritual. Tasattyq used to be conducted on the river bank. But in the last 10-15 years, the tasattyq is done in the village in mosques and houses of locals. Before shifting inside the village, the tasayttyq was conducted on one day. The entire community would go to the riverbank, slaughter an animal, prepare food, and have a feast on the same day. But locals opted for shifting the feast part to the village, reckoning that it is more practical because a) there is already infrastructure and b) when doing it in the village people are less dependent on the weather. At the same time, quite a few villagers say that the old

[1] These are the numbers for the villages in the Syr (See Chapter 3). In Aqquduq located in Qyr, each household contributed 10,000 tenge and a head of livestock. So there is a big difference on between Syr and Qyr. These difference were explained by the fact that a) herders in Qyr are wealthier and b) the population density is much smaller in Qyr, hence every household should contribute more.
[2] Most of the time, every household pays up. However, the villagers are also quite understanding if a household cannot contribute for various reasons. All families are invited regardless of their contribution.

way was the correct way but that people are too lazy to do it on a riverbank now. Although the discourse of laziness is frequently mentioned, there are some objective reasons for shifting the ritual from the riverbank to the village. Because of the increasing canalization and fortification of the riverbanks, the riverbanks became an unpractical space to conduct this ritual. That is an example of how technical solutions influenced the tasattyq ritual.

The organizing group also finds a venue for the ritual within the village. Some villages make the feast in the mosque (e.g. Kentup, Bulaq, Aqsu, and Aqtas), while other villages do it in private homes (e.g., Aqtas, Aiteke Bi, and Aqquduq). In some villages, women and men are seated at different locations, while in some places they are seated in different rooms of the same house. The decisions about the venue are done by the organizing group. In fact, Beishbek, 43, the local imam told me that he'd prefer if such feast had not been conducted in the mosque. He confessed that according to shariah it is not good to have a feast in the mosque. But it is a necessary measure because there is no other common space. He said that ideally there should be a cafeteria near the mosque.

> *A mosque is a place for praying. Ideally, we should not have such feasts inside the mosque. I hope that we will build a big community cafeteria, where we could do these kinds of feasts. But at the moment we have no other option but to conduct it here. If we had a large enough cafeteria, everyone would have been able to come there for the tasattyq feast. (Beishbek, Kentup, April 2016).*

The organizing group also has a right to reinterpret the key concepts of the tasattyq ritual. For example, even the most mandatory element of the sacrifice, that is a requirement for the blood to mix with the flowing water seems to be changing:

> *It is important that the blood of the sacrificed animal flows into the water. In recent years we were too lazy to take the animal to the river bank [for the sacrifice], so instead, we slaughtered it in the village, collected the blood in the bucket and poured it in the river' (Tuktibai, Aqtas, 2016)*

I observed these kinds of practical reinterpretations of the requirement in other villages as well. For example, Aqtas nowadays does not even take the bucket with blood to the river. Now they started slaughtering the calf in someone's backyard and let the blood flow into an irrigation ditch. It was considered okay because the water would eventually flow in there and the blood would come in contact with any water. In another village, they slaughtered the cattle in the backyard of the mosque. There was a puddle of water after the rain on the previous day. The blood of the sacrificed animal mixed with the puddle. The Imam said it does not matter as long as blood comes in contact with any water.

Different communities also organize some additional activities during the tasattyq ritual. For example, the imam in Aqsu has been trying to introduce 2 extra rounds of namaz, a Muslim prayer,

because as he explains, that's how the *istisqa* ritual is supposed to be done according to shariah. But he was lamenting that only those who regularly come to mosque listened to him and came to the prayer.

Figure 8.2. Kettlebell lifting competition organized as part of tasattyq feast

On the other hand, there are some additions to the ritual, which are outside the realm of religion. For example, in the Sarytal village, some traditional games were organized such as kettlebell lifting and the tug of war (Figure 8.2). Even more lavish celebration was thrown in the Aqquduq settlement. They held traditional horse races and people from different villages attended it. The main prices for the races consisted of calves, cattle, and the grand prize was a camel.

I also would like to point out the size of the community. In most of the villages, the entire village got together for the ritual. In a larger village, for example, in Bulbul or Aiteke Bi township, each neighborhood conducts its own tasattyq and invites only the people from the neighborhood. It is done for practical reasons because people in the neigbourhood are likely to do commoning with one another. Hence, the tasattyq ritual becomes a space where commoners come together.

Thus, although the core elements of the ritual remain the same in every village, the way those 'core elements' are carried out is very much dependent on the organizing group of each community. Moreover, depending on people who are in charge of organizing the tasattyq, the ritual may have additional elements that vary from horse races to voluntary Muslim prayer called istisqa.

8.5. Conclusion

The tasattyq ritual is conducted by every community in the river delta every spring after the vernal equinox and before the summer. The defining feature of the tasattyq is that it is a *communal* sacrifice ritual. Although the tasattyq ritual does not perfectly fit the subtractability and excludability criteria, the ritual entails sharing the burden and the 'benefit 'of the ritual, thus making it an example of a cultural commons (Hess 2008). The burden of the ritual is shared by contributing the money and labor into conducting tasattyq (e.g., rich and poor households

contribute the same, and receive the same), whereas the ‘benefit ’is shared by emphasizing the common well-being of all villagers.

Although the core elements of the tasattyq ritual are the same across the communities, the tasattyq takes different forms in different villages. These differences are stipulated by the organizing groups in each community. I conceptualized these groups as infrastructure that enables and shapes the ritual. Besides being commons in its own right, the tasattyq ritual is also an infrastructure for the functioning of other commons in the area such as baqṣa gardens, reed beds, pastures, and fishing grounds. Because preparation for tasattyq takes quite some time, it is not just one-day interaction. While getting ready for the ritual, community members talk to each other about where each person is making one’s garden or how much reed one’s needs. Just like these commons (i.e., reed beds and baqṣa gardens) are shaped and influenced by the physical infrastructure such as irrigation canals, the tasattyq ritual becomes an infrastructure for affective encounters between humans and between humans and more-than-humans (Singh 2017) that facilitates the functioning of the commons.

Part 4. Coping, adaptation and transformative change

Chapter 9. Commonization as an adaptation strategy

Before laying out my argument in this chapter, I would like to remind the reader that I set out to investigate how the delta inhabitants adapted their livelihoods in response to environmental change. These changes had the envirotechnical aspect described in the Chapters 3-5 and the social aspect, which was linked to and driven by the collapse of the Soviet Union, decollectivization (cf. Trevisani 2010), and the building of the market economy. Currently, the local livelihoods in the river delta are run as common-pool resources. However, this begs a question of how the commons in the Syr Darya Delta came to be?

In this chapter, I describe the process of commonization of resources in the Syr Darya Delta. Nayak and Berkes (2011) identify commonization as the process of converting a particular resource into a jointly used resource congruent with the excludability and subtractability criteria. At the same time, the resource use systems are often dynamic and the property regimes can change over time (Nayak and Berkes 2011). In other words, the commons institutions may go through processes of growth and decline (Seixas and Berkes 2003), i.e., the resources can turn into commons, or alternatively the common-pool resources can get privatized (e.g., for privatization of common pastures in Kenia see Lesorogol (2008)) or become a government property (e.g., collectivization during the Soviet era). Nayak and Berkes (2011, p. 140) claim that:

> *The dynamic nature and fluctuations associated with commons development make it imperative to understand commons as a process, rather than a regime fixed in space and time. Thus, the processes of commonisation and decommonisation may be seen to be continuous, concurrent, and potentially two-way.'*

The most recent book on commonization and decommonization edited by Nayak (2021) provides case studies on these processes around the world, however, the case studies from Central Asia are absent. To fill this gap in literature, first, I describe the privatization of the rice production and commonization of other livelihoods in the Syr Darya Delta and claim that the commonization of the reed beds became the main adaptation strategy in the changing environment. By describing reed mowing in the Soviet era, I show that marginal areas of the reed beds were mowed by local people for their private livestock. These marginal areas were run as commons. When the sovkhozes collapsed, the rules and principles of using the marginal reed beds spread over all reed beds, thus making them common-pool resources.

9.1. Commonization of gardening and privatization of rice cultivation

> *March 1, 2016. Field notes. I took a 11.30 am bus to go to Alga village to visit Alimjan, my new friend who I met at the fish shop in Kazaly. He lives with his parents who are in their 60s and his niece. Alimjan's father, Arman, is a brigadier of the local crew of the RZA-Agro Corporation. Over the dinner, Arman told me that up until 1994, local sovkhoz (a collective farm) in Alga village used the village lands to grow rice. But as the local economy was shattering after the collapse of the Soviet Union, the workers of Alga sovkhoz had to unite into cooperatives and grow rice on their own. The five brigades of the sovkhoz created five cooperatives and elected their brigadiers as the heads of each cooperative. Each cooperative tried to continue doing what they knew best, that is to grow rice. However, it became much more difficult to find fuel for tractors, buy fertilizers and seeds and pay the workers since 'there was simply no money'. Many years of rice production has degraded the land increasing its salinity and lowering productivity. Moreover, Alga's lands are located higher than the riverbed level which makes it impossible to get water unless there are pumps constantly pumping water to the fields. Thus, in 1997 the members of the cooperative received their yearly salary in whole grain rice and the land was abandoned because it was not economically feasible to grow anything there. Almost 20 years after that, i.e., in 2016, RZA Agro leased the land in Alga to start growing alfalfa for its diary farm.*

This vignette vividly demonstrate the processes of decollectivization that happened in all villages of the Syr Darya Delta. During the Soviet era, the sovkhozes were the primary land owner. Since the Syr Darya Delta was a designated rice-growing area, most of the sovkhozes were so called 'rice sovkhozes.' At the same time, there were also a few sheep-breeding and cattle-fattening kolkhozes such as Sentas and Aqsu respectively.

After the collapse of the Soviet Union, many sovkhozes were in distress because as Arman put it: '*the world was working differently. Before we did not have to bother thinking about where to get fuel or spare parts or how to sell our rice. But now all of those things needed to be figured out*' (Arman, Alga village, March 2016). Sovkhozes broke up and the locals tried to find out how to operate within a framework of market economy.

After the collapse of the Soviet Union, governmental policies encouraged development of the market economy institutions through privatization (Narziev 2021). The locals in the Syr Darya Delta set up cooperatives that emerged on the ruins of sovkhozes. Those cooperatives tried to continue growing rice, although they were able to cultivate was just a fraction of what sovkhozes cultivated. However, the vast majority of those cooperatives managed to stay afloat only until mid- to late 1990s, after which they disintegrated due to lack of resources to cultivate rice. Those who managed to adapt to the new realities of the market economy evolved into today's private rice

corporations. Each rice corporation is owned by a single person who had access to capital to lease the land from the government and invest in agricultural machinery. Thus, privatization of land has become an adaptive strategy for the rice corporations. This process of privatization of the rice cultivation is somewhat similar to the decollectivization in cotton-growing districts of Uzbekistan, where sovkhozes were transformed into kolkhozes in early 1990s, which in turn were transformed into shirkats in 1998-1999 (Trevisani 2010, p. 103). For example, Trevisani (2007, p. 88, 90) describes decollectivization of cotton production in Yangibozor district as follows:

> *Anticipating a nation-wide trend, the shirkats of the district were already disbanded by January 2003. By then 18,656.8 of the ca 20,000 hectares of agricultural lands once managed by the 11 shirkats were transferred to 1164 fermer enterprises. In 2006 the remaining tenth of land grown with state crops was finally transferred to the fermers, whose number reached 1406. […] Nationwide Yangibozor was among the first four districts where all collectives were disbanded. The end of the shirkats created space for the emergence of private farms (fermers) as the predominant*
>
> *form of agricultural production. The lands of the former collectives (kolkhozes and sovkhozes, later turned into shirkats) were transferred to newly established fermer enterprises on the basis of individual long-term land leases linked to a compulsory production plan.*

However, unlike in Uzbekistan, the emergence of private rice-growing corporations was not as wide-spread as the emergence of ‘fermers’ in Yangibozor. To the contrary, the number of rice corporations was limited and local villagers resorted to baqşa gardening, herding, fishing, and reed-mowing.

At the same time, the local villagers who had no work started baqşa gardening on the former kolkhoz lands to grow melons, watermelons and other vegetables. Baqşa gardening has not been a primary activity of any sovkhoz in the Syr Darya Delta but it still existed in the marginal areas. When the baqşa gardening expanded into the abandoned sovkhoz lands, those lands have been de-facto turned into commons and the practice of gardening became a practice of ‘commoning.’ Thus, commonization of lands for baqşa gardening can be seen as an adaptive strategy used by local communities to cope with the collapse of the Soviet Union. Thus, we have two different adaptive strategies to a changed social environment manifested by the collapse of the Soviet Union.

While the rice corporations were beyond my focus during my fieldwork, I do not do an in-depth analysis of these two adaptive strategies, i.e., the commonization and privatization, that happened simultaneously in the Syr Darya Delta. Thus, such interesting questions as ‘why did the commonization of rice cultivation not succeed?’ or ‘why did not all resources get privatized?’ are not answered in my thesis.Yet, I can identify some clues that I got from my interlocutors. For example, according to views of my informants, the main reason for rice cultivation not becoming

commons was that the rice cultivation in Kazaly required too much investment and resources such as tractors, fuel, a lot of water, and grain polishing equipment. Thus, rice cultivation required much more investment and commitment, which made it less suitable for commoning in quite volatile times that 1990s were. In contrast, baqşa gardening required collective effort only on some stages such as fencing and watering (Chapter 7). Moreover, the groups for baqşa gardening were (and still are) quite fluid, which makes it easier to arrange and re-arrange the gardening groups.

9.2. Commonization as adaptive strategy

The fact that local communities in the Syr Darya Delta chose commonization of rural livelihoods in parallel with privatization is a very interesting case in its own right. That begs a question of 'what were the reasons for commons arising as an adaptive strategy?' In this section, I turn to the commonization of reed beds to make two arguments related to the adaptation literature. Firstly, I claim that commons institutions in the Syr Darya Delta did not appear from nowhere. Instead, they existed in the marginal areas and filled in the void, when the sovkhozes collapses. Secondly, I claim that commonization was possible because social networks such as kinship, friendship, and neighborhood ties were strong enough to enable commoning.

Indeed, the local communities in Kazaly mowed reed during the Soviet era. The best reed beds were mowed by the sovkhozes to provide feed for their livestock. The marginal areas, which were mostly the areas not accessible to tractors were mowed by the local people, mostly women, the elderly, and children. The marginal areas were shared by the local people in a similar fashion it is shared today. Each household would mark a territory it wanted to mow.

> *I was born in 1938. When I came to this village as a kelin (daughter-in-law), all men would work in the sovkhoz. The Sovkhoz had so much work that my husband and all other men would be gone at dawn and come back late at night. The sovkhoz mowed all reed beds with mechanical mowers mounted on tractors. We had to mow reed for our livestock in the areas, which could not be mowed by tractors such as areas along the canals and irrigation ditches (qaz. aryqtyn, kanaldyn basy). Since all men were busy with the sovkhoz work, young women, elderly men, and children did all the mowing for our livestock. I used to mow 25 bundles in the morning and 25 bundles in the evening. I did all of it in addition to all housework and while looking after my children. Nowadays, women are too lazy to mow reed. Life is too easy for them, they don t feel a need to mow reed. (Asal, Sentas village, 2016, field notes).*

During some years, the sovkhoz would also oblige each household to mow and submit a certain amount of reed to the sovkhoz. It was done whenever the sovkhoz did not have the capacity to harvest enough feed for its livestock. For example, those who worked in the Alga sovkhoz report that depending on the year, each household was supposed to submit 2 or 3 tons of reed to sovkhoz.

One bundle may weigh between 7-10 kg, so 2-3 tons would make 200-300 bundles of reed. Even those not working in sovkhoz, e.g., schoolteachers, culture workers, and doctors used to be given a week off work to go and mow reed for the sovkhoz. This was similar to hay-making and cotton-picking practices in other Central Asian countries (Verboom 2021, Smith 2014).

Thus, mowing reed was a part of the everyday life of the river delta communities during the Soviet times. The local communities used the marginal reed beds to mow reed for their own personal livestock as well as to fulfill the reed quotas for the sovkhozes. Those marginal reed beds were run as commons. In other words, commons institutions also existed during the Soviet times but were marginalized. When the sovkhozes collapsed shortly after the disintegration of the Soviet Union, all the reed beds which were mowed and used by the sovkhozes became available for the villagers. After the sovkhozes collapsed, the commons institutions filled in the void, and all reed beds became commons, i.e. got 'commonized.' The existing kinship, friendship and other networks allowed the Syr Darya Delta residents to self-organize into small groups to do commoning together. This findings are concurrent with the body of literature that emphasizes that local communities and their commons should not be considered in isolation from one another (Nayak 2003) and commonization process (Nayak and Berkes 2011).

9.3 Commons as transformative change?

In this section, I turn to the third branch of the literature on commons and commoning (Linebaugh 2008) that emphasizes the 'transformative capacity' of commons (Bollier and Helfrich 2019). Transformative capacity is understood within the framework of a currently popular transformative adaptation literature as the 'fundamental systemic changes within social-ecological systems' (IPCC 2014) that 'aim to address the root causes and/or drivers of adverse effects by shifting systems away from unsustainable or undesirable trajectories' (Olsson et al. 2014).

In other words, the 'transformative capacity' of commons bridges together two bodies of literature, i.e., the commons literature and the transformative adaptation literature as both bodies of literature claim the following: firstly, both claim that current environmental problems require some drastic changes (Palomo et al. 2021, Feola 2015). E.g., the transformative adaptation literature highlights that the current trends in biodiversity conservation, climate change, and consumption are unsustainable (IPCC 2014). In order to be reversed, the communities and the entire world should change in a transformative way, i.e., make 'profound and fundamental alterations in social-ecological interactions in a way that sustains the Earth's biophysical systems, while meeting human needs' (Palomo et al. 2021, p. 731).

The commons/commoning literature is concurrent with the transformative adaptation literature in claiming that the world must change (Hardt and Negri 2009, p. 227). Singh (2017) argues that the current ecological crisis is deeply connected with our ways of being human. The commons are claimed to express 'relationships in society that are inseparable from relations to nature'

(Linebaugh 2008, p. 279). Vivero Pol (2019) posits that commodification of every single aspect of nature is likely to destroy the very conditions of life and human civilization (see Mattei 2012).

While the transformative change literature mostly claims that some kind of transformative change is needed, the commoning literature takes one step further and claims that commons and commoning is 'that' (i.e., transformative) change. Arguing from the Marxist vantage point, the radical activist commoning literature claims that commoning and commonization is a post capitalist, transformative strategy (Gibson-Graham et al. 2016, p. 196). The commons and practices of commoning are claimed to surpass property rights arrangement issues and articulate an alternate sets of values (Bailey and Mattei 2013, p. 15), alternative other-than-capitalist subjectivities (Singh 2017), and 'an alternative [post capitalist] form of production in the make' (Caffentzis and Federici 2014, p. i95). So do commons and commoning practices in the Syr Darya Delta do all of these?

Each of these claims may deserve a chapter or even a thesis of their own, that is why I will just present my brief comments since neither values, subjectivities, nor other-than-capitalist modes of production were the focus of my research.

Alternative values and subjectivities: Singh (2017) critiques current solutions for the environmental crisis as she claims that those solutions tend to be predominantly market-based. She further argues that marked-based solutions are likely to reproduce the [capitalist] subjectivities and modes of being human that have created those problems in the first place. Ricoveri (2013, p. 31) claims that the commons 'express undeniable human rights of self-government and the need for cooperation and social relationships. These aspects of human behavior are different and alternative to those of *homo œconomicus*.' Vivero Pol takes this a step further and claims that 'commons thinking offers a counter-claim to the idea that society is and should be composed of atomized individuals, acting as rational agents seeking to maximize their individual utility and competing against other individuals in order to thrive as a separate individual rather than as a member of an ecological collectivity' (2019, p. 3-4).

My engagement with commons in the Syr Darya Delta made me believe that the neat opposition of capitalist and commons values and subjectivities that radical-activist scholars are making may become quite tricky. For example, most of the commoners, indeed, try to maximize their individual utility and they compete with one another. At the same time, as I have shown in the previous chapters, the commoners also cooperate and compete with non-human beings, who are often perceived as legitimate commoners. Thus, if one examines a commoner from the Syr Darya Delta to find commoner's values and subjectivities, one is likely to find mix of 'capitalist' and 'commoning' elements.

Alternative to capitalist production: Commoning is seen as an alternative to present day capitalist production and is often framed as a response and adaptation to the crisis of the capitalist

system. (Singh 2017). Vivero Pol (2019, p.1) further argues that the commons have 'the ambition to ground a counter-narrative and a political and institutional organization capable of shifting our pattern of development from an extractive and individual into a generative and collective mode.' Ricoveri (2013, p. 47) argued that the commons are spatially diverse local systems, which 'represent a real alternative (but not the only one) to the 'market paradigm. 'Their diversity and flexibility enable the best use of the natural resources upon which the commons depend, avoiding their over-exploitation, degradation and destruction that is the inevitable consequence of the capitalist system.'

Here again, I find it problematic that radical-activist scholars can neatly separate capitalist and non-capitalist production. Firstly, the commoners in the Syr Darya Delta do not position commons and commoning practices as an alternative to the capitalist production. To the contrary, the commons in the Syr Darya Delta have been part of the local market economy (e.g., reed bundles are bought and sold; reed, baqşa, and livestock are considered as income generating activities). Secondly, most of the commons in the Syr Darya Delta depend on rice corporations that are not commons. Thus, in the context of the Syr Darya Delta commons, commoning and the capitalist production are not mutually exclusive but rather concurrent and intertwined. In that regard, the local livelihoods in the Syr Darya Delta are similar to what Barnes (2006) describes as 'Capitalism 3.0,' in which the commons and the capitalist production system coexist as 'two engines - one geared to maximizing private profit, the other to preserving and enhancing common wealth.'

Chapter 10. Doing agriculture in harsh environment: adaptive strategies in the Syr Darya Delta

10.1. Introduction

In the earlier chapters I demonstrated how Syr Darya Delta inhabitants cultivate rice, melons, watermelons, and other vegetables and fruits. In this chapter, I outline the major challenges of doing agriculture in the Syr Darya Delta such as soil salinity and low soil fertility, and describe specific adaptation strategies.

The analysis of these adaptation strategies will contribute to both academic literature and the local policy in Kazakhstan. Indeed, in 2017-2018, Kazakhstan recognized the importance of halting land degradation and developed the national plan for achieving Land Degradation Neutrality (LDN)[1], which stipulates that 'the Republic of Kazakhstan strives to achieve land degradation neutrality by

[1] Kazakhstan has set its LDN Targets in 2017 and 2018. URL: https://www.unccd.int/our-work-impact/country-profiles/kazakhstan. Land Degradation Neutrality, or LDN in short, is a state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and ecosystems. It focuses on conserving, sustainably managing, and restoring land in the context of land use planning and aims at counterbalancing the expected loss of productive land with the recovery of degraded areas. UNCCD, URL: https://www.unccd.int/actions/achieving-land-degradation-neutrality.

2030.' Kazakhstan pledged to achieve this target by implementing an array of measures such as the inclusion of fallow and abandoned lands in the turnover, the creation of woody and shrub plantations to protect the land from water and wind erosion, investment in the restoration of degraded lands, and irrigation infrastructure. These adaptation strategies are of interest as climate change is likely to further exacerbate the land degradation in Kazakhstan in particular and the Central Asian region in general. For example, climate change scenarios for Kazakhstan anticipate the decrease of the Syr Darya River runoff by 6-10% (Genina et al. 2011), which would result in dramatic falls in agricultural yields, pasture productivity, and overall land degradation. Kazakhstan's irrigated agriculture is likely to be most severely affected by climate change as southern regions of the country will get drier and more arid. Climate change and land degradation are linked: climate change is likely to exacerbate land degradation in Kazakhstan and in turn, land degradation has been one of the drivers of climate change (Mbow et al. 2017). About 60% of land in Kazakhstan (1,619,584 km^2) is degraded, including 57% of croplands, 21% of forested areas and 38% of grasslands (Le et al. 2016). The main drivers of land degradation are wind and water erosion, salinization, waterlogging and industrial pollution of soils (Annual land use report of the Ministry of Agriculture of Kazakhstan 2018). Similar drivers of land degradation have been dominant in the Amu Darya Delta as well. For example, Yu et al. (2020, p.3) note that:

> *The ecosystem around the Aral Sea has been largely destroyed, particularly in the Amu Darya Delta (ADD). Characterized by a fragile ecological environment, the ADD has undergone soil salinization and experienced sandstorms and climate change. Due to both natural factors and human activities, such as extensive expansion of farmland and construction land, grassland and forestland in this area have been extensively degraded, and the structure and function of the landscape are being damaged.*

Kazaly district, located in Syr Darya River delta, suffers from its large areas being affected by extreme soil salinity. Almost all areas in Kazaly district are affected by soil salinity[1] with 64.3% being characterized as 'moderately salinized', 22.6% as 'slightly salinized', and 13.1% as 'extremely salinized '(Karlykhanov and Toktaganova 2016). On a global scale, soil salinization has been one of the major forms of land degradation with about 20% of irrigated land worldwide (45 million hectares) being moderately or severely salinized (Rengasamy 2006). With a growing understanding of climate change's impacts on land degradation, there has been a growing attention towards adaptation and adaptive strategies of the effected communities (Mersha and Van Laerhoven 2016).

[1] The Syr Darya delta soils have always been prone to soil salinity. Some of the archival sources cited in Chapter 4 demonstrate that soil salinity was mentioned as a 'problem' as early as 1940s. The oral history accounts have shown that according to local observations, soil salinity had been gradually increasing during the Soviet times. Then, after the collapse of the Soviet Union, the soil salinity slightly decreased because a lot of lands were not used, which allowed them to recuperate. Rice cultivation is seen as the primary culprit for soil salinity at the moment. According to locals, baksha gardens do not exacerbate soil salinity as much as rice cultivation does.

While analyzing these adaptive strategies, I will engage with coping, adaptation, and transformative change literature outlined in Section 1.3.3. Adaptation is defined through adaptive capacity of a system, institutions, humans and other organisms as an ability 'to respond to a potential damage, to take advantage of opportunities, or to respond to consequences '(IPCC 2014, p. 118).

The current modes of the baqşa gardening and the rice cultivation are the result of two different adaptations in response to the social distress caused by the collapse of the Soviet Union. Although they represent a result of two different social adaptations, that is commonization and privatization, the strategies they employ to react to biophysical challenges are somewhat similar and are described in the next sections.

10.2. What challenges are there for agriculture in the Syr Darya Delta

Over the course of my fieldwork I spend more time with the baqşa gardeners and less with the rice-corporation workers. I helped my host families grow baqşa in Aqtas and Aqsu villages and visited many gardens in Jarma, Targyn, and Satyp villages, whereas most of my interactions with the rice corporations workers have been in Alga village. I also interacted and spend some time with the rice corporation workers in Aqsu, Jarma and Bulbul villages but those were irregular one-day visits. Depending on who I talked to, different challenges seemed to have been emphasized. For example, baqşa gardeners and on-the-ground workers of the rice corporations talked most of all about soil salinity and water scarcity and sometimes about poor soil fertility. At the same time, the accountants or higher-ranking managers of the rice corporations talked more about rice prices, competition with imported rice, subsidies and water scarcity. Because of the field data I collected and my personal interests, in this chapter I focus more geophysical challenges such as soil salinity, low soil fertility and water scarcity and do not analyze the market-related challenges such as rice price fluctuations and governmental subsidies.[1]

Out of the main challenges mentioned above, the soil salinity has been one of the first things that struck me when I arrived to my field research site in Kazaly. In fact, I did not realize right away that patches of land covered with white crust were areas affected by soil salinity. Since it was a winter time (February to be precise) and I came to my field site from snowy Tüp region of Ysyk-Köl (Kyrgyzstan), I mistakenly thought of the saline areas as areas covered with a thin layer of melting snow. Soon enough I realized my mistake when my host in Aqtas started showing me around the village. Saline areas were hard to miss and my host naturally ended up telling me about it. Indeed, Kazaly is one of the areas in Kazakhstan, which is most severely affected by soil salinity.

[1] Although, soil salinity, low soil fertility and water scarcity act as quite major challenging factors for the agriculture in the river delta, the broader market dynamics can also create some challenges. Especially, the rice corporations' decisions about how much land to cultivate every single year is affected by market dynamics. For example, RZA Agro planted 2,500 ha of rice in 2016 as opposed to 3,000 in 2015. The head of the corporation explained it that 'there were problems with irrigation water and the prices for seeds increased earlier this year. That is why we had to act safe and reduce the area of land for rice cultivation' (Kazakh-Zerno 2016). Similarly, other corporations like Syr Marjany, Merei, Agro-Orken, and others. adjust their rice plantation sizes depending on market demands, predicted availability of water and availability of land not severely affected by salinization.

In fact, almost all areas of Kazaly are salinized to a various extent with 64.3% being characterized as 'moderately salinized', 22.6% as 'slightly salinized', and 13.1% as 'extremely salinized ' (Karlykhanov and Toktaganova 2016). Our conversation about the soil salinity went on for a long time. He mentioned 'white' salt and 'black' salt and that some salt was brought by winds from the Aral Sea's former seabed, whereas some salt has already been here. Some of the things he told me were quite confusing, e.g. 'isn't all salt naturally white?' I was thinking in my head. I wrote in down in my notebook and decided to follow up on that. In the meantime, I concluded that I misunderstood my host's words since I was just getting used to Kazakh language. That is how my inquiry into soil salinity in Kazaly started. Later the topic of soil salinity would come up quite often in my conversations with locals about different topics ranging from their livelihoods such as gardening, herding, fishing and rice cultivation to quite general topics such as 'what it's like to live in Kazaly'.

Another frequently mentioned challenge for agriculture is the low soil fertility. The knowledge about the low fertility of local soils is somewhat restricted to those who work closely with soils, that is baqşa gardeners and rice cultivators. The local term for soil fertility is '*құнáр*', which literally means power, energy, essence. Agricultural land in Kazaly district is made up by 45.6% of sandy soils, 24.4% of brown soils, 11.1% of desert wasteland soils, 11% of swampy and wet meadow soils, 3.6% of delta meadow soils and 2.9% of grey-brown soils. All these soil types are poor in soil organic matter with some sandy soils having less than 1% of nitrogen, phosphorus and humus (Karlykhanov and Toktaganova 2016).

Yet another frequently mentioned challenge is water scarcity. The water regime of the Syr Darya River is characterized by the cyclical rotation of water-abundant years and water scarce years (See Chapter 4). Since water scarce years happen regularly, this seem to be one of the most recognized challenges both by gardeners and the rice corporations. The location of Kazaly in river delta also makes it most vulnerable during the water scarce years. Located upstream, the rice growing districts in the Kyzylorda province as well as cotton growing districts in the Turkestan region tend to have more control over water flow in the river.

10.3. Adaptive strategies

10.3.1. Shifting agriculture

> *April 2017. Aqsu village. When the family gathered around the dinner table, Aqtleq told us that he had been approached earlier today by the manager of the local rice corporation. The manager wanted Aqtleq to become one of the brigadiers of local rice-growing crews because Aqtleq knows the land.' Aqtleq told the family that he had accepted the offer.*

I knew that Aqtleq had a lot of experience cultivating rice. During the Soviet times he has been a zvenovod (a person who is responsible for irrigating the rice paddies), a combine driver and a brigadier. From this family dinner conversation, the expression 'know the land' caught my attention and I decided to find out what exactly it meant in this context. After the meal, when Aqtleq was sitting outside enjoying his chewing tobacco I sat beside him and asked him to clarify this term. It turned out that local rice corporation, which was one of the smallest rice corporations in the district, have been going through rough times. There were many reasons one of which was bad yields in recent years. It was due to the fact that some of the old areas for rice cultivation were getting salinized and the soil fertility was depleted. There was a need to make some rice paddies in another place. So when the manager approached Aqtleq and referred to his [Aqtleq's] knowledge of land, the manager meant that Aqtleq must know good areas where the new rice paddies can be made. Just like the baqşa gardeners change their cultivated plots annually and/or biannually, the rice corporations also change the land for rice cultivation, thus making it a variety of shifting agriculture. Shifting agriculture means using the same plot for a number of years and leaving it fallow for a few years before the next cycle of cultivation (Shimbah 2017). The rice corporations tend to use a particular spot for longer (they use leaching to do away with soil salinity and chemical fertilizers to maintain the soil fertility) and then leave the area fallow for a longer periods.

> *July, 2016. Jarma village. Several villagers have suggested to visit Terme and ask him my questions about gardening. He is a school teacher and is respected in the village as a person who is very knowledgeable about gardening. Although I had many questions, we ended up talking mostly about finding a plot for gardening. He emphasized that finding a plot is the biggest headache' [i.e. concern] for a gardeners because baqşa gardeners use the same plot for a maximum of two years and then abandon it. Locals abandon the land because the amount of weeds (such as reed and other salinity-tolerant plants) increases after one year of cultivation, whereas after two years it becomes very difficult to manage. They may return to the abandoned plot after 3-5 fallow years. So the gardeners are constantly on the lookout for good lands, which are not too salinated, not far from the canal and close to the village. He also told me that he employs an experimental' method to find a new spot. Every year, he cultivates a very small plot in the areas he is planning to do a garden next year. If the yield is okay, he makes his garden at the experimental' plot and his fellow gardeners join him.*

Thus, both rice corporations and the baqşa gardeners use shifting agriculture as an overarching adaptation strategy, which allows both reducing salinity and restoring soil fertility. Shifting agriculture is reported to be used by local sovkhozes as early as 1947. For example, the Kyzylorda obkom's report to comrade Shayakhmetov, the secretary of the central committee of the Kazakhstan Communist Party reads:

> *The irrigation system in the Kyzylorda region is not equipped with the drainage systems, which leads to the elevation of ground water levels. Because of that a few sovkhozes suffer from soil salinization. Many areas cannot be cultivated due to soil salinity. The sovkhozes started employing a harmful practice of shifting agriculture.'*[1]

This strategy fits into the category of adaptation (as opposed to coping or transformative change) because although being relatively effective, it does not address the root causes of the low soil fertility and high soil salinity.

Although shifting agriculture is employed by both the rice corporations and the gardeners, there are some adaptive strategies used primarily by the rice corporations or the gardeners. For example, if the baqşa gardeners solely rely on shifting agriculture to adapt to low soil fertility, the rice growing corporations also employ soil fertilizers and crop rotation as additional strategies. While gardeners cannot afford fertilizers, they rely on local seeds and local varieties of crops that are adapted to growing on local soils. These differences in the adaptive strategies demonstrate that gardeners and rice corporations have different financial and economic 'barriers' or 'limits' to adaption (cf. Bryan et al. 2009, Hoque et al. 2018)

10.3.2. Crop rotation and use of fertilizers

Crop rotation and the use of fertilizers is an adaptive method used primarily by the rice corporations and very rarely by gardeners. Rice cultivation takes a heavy toll on the soil fertility and contributes a great deal to soil salinization. To ensure good yields, the rice corporations use chemical fertilizers such as ammonium nitrate. Because of general low fertility of soils, these fertilizers tend to be used extensively, which becomes another driver of soil salinization. Indeed, it is well-established that 'crop fertilization is one of the sources of salinization of soils.' (Machado and Serrlheiro, 2017, p. 6). Manure is not generally used as a fertilizer in the rice fields. It is only used by the gardeners in their home gardens and no fertilizers are used for the baqşa garden. Also manure is a good method to increase soil fertility, it also contributes to the soil salinity. The local livestock grazes on grass that grows in saline environment and as a result, even manure has high salt content. Thus, the fertilizers while improving soil fertility also can exacerbate the soil salinity.

Another strategy used for reducing soil salinity is **crop rotation**. Informants report that crop rotation was widely used during the Soviet times but after the collapse of the Soviet Union most of the fields were abandoned, while those still in use were under rice year after year. Since recently, rice corporations started re-introducing crop rotation. Alfalfa (*Medicago sativa*) is a major rotational crop and is praised by locals as a plant that enhances land fertility. When rice corporations do not have capacity to practice crop rotation or find particular plot to be too

[1] p. 219, GAOPIKO, 1948, F. 268, Op.1, D.3050. It is not mentioned clearly why such practice was labeled as 'harmful' in the archival source. However, from the context, I assume that it was considered 'harmful' because shifting agriculture lead to soil salinization on greater areas.

exhausted and salinized, this patch of land is abandoned and rice paddies are made elsewhere. Such land rotation can also be seen as a coping strategy because abandoned lands often get overgrown by reed (*Phragmites australis*), other weeds and various shrubs. Some years later these plots of land may be used for small-scale gardening or again for rice cultivation. For the gardens located next to their houses, shifting cultivation is not an option. In this case locals apply crop rotation by planting alfalfa.

> *Soil salinization is inevitable when you grow rice. Rice paddies are covered by water almost for 90 days a year, so it is not surprising that this land does not rest and gets saline. The land in Kazaly is such that no matter what you grow, eventually it gets salinized if you keep planting the same crop year after year. With rice the process [of salinization] happens much faster. Moreover, our land here has low fertility, so one must use fertilizers to have good yields. And fertilizers just exacerbate salinization. What we were doing back in Soviet times and what rice growers should do more now, is to rotate crops and plant alfalfa and clover on rice fields. Alfalfa is really good for soil. Nowadays, there are enough free land that corporations can just abandon plots if they get to salinized and move to another spot* (Arman, Alga, April 2017).

Recently, the large rice corporation started making a better use of crop rotation. RZA Agro, the biggest agricultural corporation in the district, came to Alga village in 2013 to use 600 hectares of village land to grow wheat, alfalfa and corn as forage for 2,000 dairy cattle, which RZA Agro imported from Europe to start a local dairy production. The alfalfa grown on rotational fields is used as a feed for the dairy cattle. The alfalfa may give up to 4 yields (2-3 yields on average) per growing season, which is very productive. As a main rotational crop, alfalfa is culturally appreciated by the local people as a ‘grass on which the prophet Muhammad sat.’ This allegory is used to explain why alfalfa improves soil and serves as a great feed for the livestock.

10.3.4. Local varieties of crops, planting strategies

The baqşa gardeners rely on local varieties of crops especially local varieties of melons and watermelons for cultivation. They explain that local varieties are best suited for local climatic conditions. Each gardener also has his own ‘secrets of trade’, which are manifested in planting strategies or choosing crops. For example, Tasqul, a renowned gardener from Kazaly town, told me that he liked growing potatoes:

> *I stopped gardening a few years ago. My back aches a lot, so I can t do it anymore. But when I was gardening, I would get the best potato harvests. Usually, people take their potatoes out of the storage and plant them straight away. As for me, I used to take out the potatoes out of the storage on March 3rd. I would put potatoes inside the house along the walls on the floor. Because of the warmth, the potatoes*

> *would awaken earlier. I would plant them in the garden on April 10th. Because I planted them that early, I would have a harvest very early (Petro, Kazaly, June 2016)*

Sakbolot, whose garden I visited a number of times also had few strategies. In the melon *taqta*, he plants corn every here and there. It gives some shade do the melons and allows having additional corn harvest. Such strategies resemble the Mayan farmers 'strategy of planting the 'three sisters' – that is corn, squash and beans together.

As for the rice corporations use, they rely on Russian varieties of rice. Many corporations buy seeds from the Krasnodar region of Russia every few years. In late Soviet period, a rice institute in Kyzylorda developed a local variety of rice called Syr Marjany (lit. Pearl of the Syr Darya River). This variety was praised for its productivity and suitability to local conditions. But about 10-15 years ago, it got plagued by a fungi disease, which effectively took this variety out of cultivation. The rice institute in Kyzylorda has been working on developing new local varieties of rice but the rice corporations find them to be inferior to the Russian varieties.

10.4. Coping with soil salinity

> *Our soils are saline.[1] See the white stuff on the ground? It is all salt. The [Aral] Sea dried up, left all salt behind. When Russians launch rockets from Baikonur, it causes strong winds, which brings all the salt on our land. Before the [Aral] Sea started drying up, our land was good. There was some salt but it was considered to be a sign of soil fertility. Our fathers believed salt gave the land its strength and energy. Nowadays, there is too much salt. One can leach out the white salt but if it is a black salt – nothing will grow there!...' (Serik, Aqtas village, February 2016).*

> *If you come here in summer, you will see that everything will be covered in salt. The land will be white as if it was covered by snow in winter. A man walking outside would have salt all over his body and if one licks his own lips, they would be salty. It is so salty here that if we die, our bodies may not even deteriorate, they will be preserved like pickles'.* (Arman, Aqsu, March 2016)

Soil salinity is one of the major challenges for agriculture in the Syr Darya Delta.[2] The soil salinity and water logging was reported as a challenge as early as 1941.[3] The same sainity problems are typical for the Amu Darya Delta too (Conrad et al. 2013, Bezborodov et al. 2010, Pan et al. 2023).

[1] The local term for salinity is 'sor'. This term has been translated into English as 'salinity' or 'salt' but in original interviews the word 'sor' was used to refer to both.

[2] Soil salinity also featured at the "Playing with the scales in environmental history' workshop organizes at the University of Tuebingen by the Threatened orders - Societies under stress collaborative research center in 2018. To see the summary of the workshop, see Schönfelder and Sobisevich 2018.

[3] p. 8, GAOPIKO, 1941, F.268, Op.1, D.1226.

Both baqşa gardeners and the rice corporations have to take it into account while managing their crops. Soil salinity is not a new challenge for the region. During the Soviet times, rice growing collective farms (*sovkhoz*) used a number of strategies to mitigate soil salinity. At the same time, the former agronomists of those collective farms admit that the problem of soil salinity has never been solved or effectively reduced even during the Soviet Union. Besides conventional methods such as leaching, crop rotation, and enhancing of the drainage system, former sovkhoz workers reminisce that during Soviet times, the *sovkhoz s* tried to tackle soil salinity problem using advanced scientific methods such as applying zinc or gypsum on saline soils. The agricultural institutes would send students and researchers who developed and tested experimental methods of reducing soil salinity. However, none of them was effective enough to become a common practice.

> *As time passed, the soil salinity on rice paddies was increasing a great deal. Of course we were leaching out the salt, we were rotating crops. But it was obvious that more effective ways to reduce soil salinity were needed. In some of the agrarian institutes, scholars discovered that adding zinc to soil can reduce salinity. In our sovkhoz, we tried to use this method for a few years but it did not work. (Bahytjan aga, Pers. Comm, local villager, Sarytal village, 2016).*

> *Back in Soviet times, we would add gypsum into soil. This process was called gipsovanie' but now no one is using it. The most effective way by far is leaching. However, for effective leaching fields should have a drainage system but most of the fields here do not have it. Thus, we leach salt but it keeps coming back. (Anatoliy Kim, Pers.comm, local villager, Kyzyl Tuw village, 2016).*

Nowadays, some gardeners also try to come up with their own experimental methods to reduce salinity. For example, one gardener uses reed ashes to reduce soil salinity. The reed ashes are dumped on the saline patches of land and is mixed with it. Such a method is reported to be quite effective but only for small scale plots. Such 'innovative' and practical approaches to coping with soil salinity have been documented in other part of the world such as mulching in Central Asia (Bezborodov et al. 2010) and in Lebanon (Zaman et al. 2018), organic, microbial and phyto-remediation technics (Stavi et al. 2021).

Currently, the rice corporations and the local farmers employ only a few of soil salinity reduction methods out of those used in the Soviet times. Both baqşa gardeners and the rice corporations try to avoid saline lands to the greatest extend possible and select least saline lands for cultivation. Since it was almost impossible to find any sizable plots unaffected by soil salinity, both groups rely on leaching as a primary method to reduce salinity. Assessment of soil salinity levels are done by local gardeners and rice-corporation agronomists (who are usually also local villagers) based on local knowledge, which stipulates that there are two distinct types of soil salinization called 'black' and 'white' salt.

10.4.1. Local soil knowledge

Figure 10.1. Extremely salinized areas in the Syr Darya Delta

Soil salinity is one of the major challenges for agriculture in the Syr Darya Delta. Archival sources have explicitly highlighting soil salinity as early as 1948 (See the quote in Section 10.3.1.). While the official archival sources mostly talked about soil salinity as a result of land mismanagement (Figure 10.2.), the delta communities have developed their own body of local soil knowledge, which helped them navigate salinized soils.

Figure 10.2. Soil salinity narratives in the Kazakhstan's Water Ministry reports:

In 1965: An excerpt from an annual report on using irrigation systems read: 'There are 145 observation wells to monitor groundwater table on 77514 in Kyzylorda region. The main reasons for waterlogging and soil salinization are the geographic and soil conditions, lack of a proper drainage system, and excessive watering of crops. That is why the main measures to decrease water logging and soil salinization are building of drainage system, tightening the control of irrigation practices, leaching, and improvement of the irrigation system efficiency.[1]

In 1967: An excerpt from an annual report on using irrigation systems read: 'We observed the rising groundwater tables in all irrigation zones. There are different reasons in each case. In some places, there is no crop rotation and rice is sown for more than 3 years in a row. This leads to the rising water tables.'[2]

In 1968: An excerpt from an annual report on using irrigation systems read: 'We observed a rise in water table levels everywhere. There are different reasons in each case. Some rice sovkhozes do not employ crop rotation and sew the rice on the same spot for more than three years, which raises the groundwater levels. The water tables reach the highest points from June till September, that is during the vegetation period.'[3]

[1] p.97. TsGA, 1965, F.1626, Op.3, D.591.
[2] p. 98. 1967, F.1626, Op.3, D.635
[3] p. 79. 1968, F.1626, Op.3, D.735

In 1972: Despite all this progress, many irrigation canals are not reinforced by the hydrological infrastructure and are not made into an engineered systems. Current condition of irrigated lands prevent introducing the crop rotation and the use of lands with irrigation ditches. Lack of the drainage system leads to water-logging and soil salinity and forces the kolkhozes and sovkhozes to employ shifting agriculture 'nomadic' agriculture. [1]

Black vs white salt: a local typology of soil salinity

Figure 10.3. Black salinity

'So what is white and black salt?' was a question I kept asking gardeners and rice corporation workers in many villages. It was clearly not a 'scientific' distinction. Although the local distinction between 'white' and 'black' salt is considered common knowledge, I discovered that this dichotomy has several layers of meaning. For example, when distinguishing between 'white' and 'black' salt, locals may be referring to the causes and sources of soil salinity, its severity, and effects on plant growth, or whether a particular plot is suitable for cultivation.

On a most superficial level, there is a visual difference between areas affected by 'white salinity' and 'black salinity.' Some areas have patches with a thin layer of salt on them and these areas are called 'white salinity' areas because the top layer of salt is obviously white. Other areas, which are muddy and dark in color or have a hard dark crust on the surface, are called 'black salinity' areas. In everyday communication, the distinction between white and black salinity may also refer to the

[1] p.5, TsGA, 1972, F.1626, Op.3, D.929.

severity of salinity rather than the color of crust. If an area has a thick layer of white-colored salt on it, it is called a 'black salinity' area, even though visually the salt is white.

Another visual indicator to distinguish 'white' and 'black' salinity is vegetation. Often this idea is communicated by locals as '*plants can grow on white salt and nothing can grow on black salt.*' The statement about nothing growing on the black salt is not always literal. Although some areas with black salinity indeed have no vegetation on them, quite a few have scarce salinity-tolerant vegetation. Thus, 'nothing grows on black salt' does not always mean no vegetation whatsoever but rather means that 'no cultivated plants grow there.'

The 'black' and 'white' salt distinction may also mean that the area affected by the 'white' salinity is 'manageable' meaning that one can cultivate it, whereas the areas plagued by 'black salinity' are considered 'not manageable.' Although both gardeners and rice corporations strive to use not saline plots, often times all the available areas are affected by soil salinity. In this context, white salinity means the areas, which can be viable to cultivate, whereas black-salinity areas are not worth the effort. Areas affected by 'white salinity' can be leached and made suitable for cultivation, while leaching will not be effective in the areas affected by 'black salinity.' Thus, the salinized areas that are currently suitable for cultivation or the areas where soil salinity can be reduced to make it suitable for cultivation are usually labeled as 'white salinity' areas. If the saline areas are not suitable for cultivation in their current state or it is not possible to reduce their salinity using available methods, the area is labeled as a 'black salinity' area.

The 'white' and 'black' salinity areas can be also distinguished by the salinity's effect on plants. 'White' salt forms a crust at the surface of the soil. White salinity is only dangerous at the beginning of the plants 'growth cycle because constant contact with salt deteriorates the plant's stem and leaves. When days get warmer, the salt crystals on the surface accumulate sun heat and 'burn' newly emerging sprouts. If a farmer manages to get rid of this layer of salinity on the surface (e.g. by leaching or physically removing it with a hoe), then plants can grow normally there. When the plants grow bigger and their stems thicken, surface-level salt (salinity) has little effect on them and that is why white salinity is no longer considered dangerous for plants. On the other hand, black salt is not present only at the top layer of the soil (like white salinity that forms a crust) but rather is mixed with soil on all levels. The excess of salt in the soil traps moisture and keeps the soil muddy, which leads to rotting of crops.

The white and black salinity are believed to emerge for different reasons. The white salinity is believed to be the residual salt from Aral Sea blown over to Kazaly by winds. This view is congruent with the scientific observations of the Aral Sea disaster. For example, Micklin (2007, p.55) found that:

> *Strong winds blow sand, salt, and dust from the dried bottom of the Aral Sea, large portions of which are a barren desert, onto surrounding lands. Since the mid 1970s, satellite images have revealed major salt/dust plumes extending as far as*

> *500 km down wind that drop dust and salt over a considerable area adjacent to the sea in Uzbekistan, Kazakhstan, and to a lesser degree Turkmenistan.*

Black salinity is described to come from soil's lower levels and caused by highly mineralized ground water that seeps up to the surface. The ramified networks of canals used for irrigating rice fields and gardens is suspected to raise groundwater levels, thus creating areas with black salinity. Because of their respective origins, if white salinity can be mitigated by leaching, while leaching would just exacerbate the black salinity.

While tracing the origins of the black and white salinity, I stumbled upon interesting connections that local people draw between salinity and other entities in the region. For example, water from the Syr Darya River is understood as both a reason for and a remedy for salinization. First of all, water from the river makes it possible to wash away salt and grow something even on saline land. At the same time, too greedy diversion of water from the river resulted in the drying up of the Aral Sea from where the white salt is coming. And the ramified networks of canals that deliver water to the fields push up the underground water table, thus causing emergence of areas with black salinity.

Another unexpected link that local make is the link between the soil salinity and the Baikonur Rocket Launching Base. According to local observations, rocket launches exacerbate the winds that bring more salt from Aral Sea's dry seabed to the lands of the Kazaly district. Local people also claim that such an 'bad' location of Kazaly district between the Aral Sea and the Baikonur make Kazaly a region most adversely affected by environmental degradation caused by these two stressors [meaning the Aral Sea and the Baikonur].

> *Everyone thinks that the harshest environmental problems are in Aral district. But the situation in Kazaly is worse than in Aral. We are suffering more than people in Aral. Look at them, they drink shubat (fermented camel milk) the whole year and they look healthy and white. Wind brings salt from Aral onto our land. On the other side, we have Baikonur. The government does not say anything? about the adverse effects of Baikonur. But it is definitely causing us harm' (*Tagal, Sarytal village, a former brigadier of Agro Urken rice growing corporation*).*

The distinction between the white and black salinity can also go along obvious/tricky, visible/invisible lines. The key feature of white salinity is that it is always visible and lays on the top of the soil in a form of crust. Because the black salinity is mixed with the soil, one cannot always easily detect it. Sakbolot whose garden I visited a number of times told me that if a gardener does not see a crust of white salt on the surface and obvious signs of black salinity on a certain patch, it does not mean that the soil is not affected by salinity. He said that 'the? land may trick people' meaning that a certain plot of land may look like 'good 'land on first sight. But then after the first watering, salt may come up to the surface:

> ‘*Last year, the land tricked me and salt came up after I planted all vegetables. As a result, I did not get as much yield as I expected. With soils like ours, a gardener is never guaranteed to have good harvest*’ (Sakbolot, Pers. Comm. March, 2016).

Since telling whether a particular plot is salinized can be tricky at times, local gardeners and rice cultivators have developed a few strategies to determine soil salinity of the areas where to obvious signs are present. For example, gardeners water the area in question or visit a particular plot right after rain. If the soil absorbs water well, it is a sign of a good, not saline land. If the plot turns muddy and develops a glittery surface, it means that it is salinized. The gardeners claim that the glitter comes from salt crystals reflecting the sunlight, which can be noticed by an experienced eye. Another strategy is to observe the prospective plot at dawn or sunset in autumn. The areas, which are salinized, ‘puke out water/moisture’ meaning that some areas of land secrete water (i.e. water comes from beneath the soil and makes it wet) on its surface whereas the land around it is dry. The ‘puking land’ is a clear sign that the area has a hidden salinity and that is why it is bad for baqşa gardening and rice cultivation.

Another way of accessing soil salinity is by looking at plants that grow on it, e.g. *jantak* (camel thorn (*Alhagi*)) grows on saline land and *eshek mia* (licorice (*Glycyrrhiza glabra*)) grows on fertile, not saline land. Small-scale gardeners named several more plants that signal high salinity levels (e.g. *it siigek (Anabasis salsa), shagyr (Bergenia), ajyryk (Aeluropus lagopoides),* and *teke sakal (Dodartia orientalis), barkyn* and *kara barkyn*[1]*).*

The ‘black’ and ‘white’ soil dichotomy is sometimes elaborated by some gardeners. For example, Jasylbek, a gardener from Sarytup village distinguishes three types of salinization (Pers. Comm. 2016):

> *The first type is a white salt. It is the least dangerous type. One can see it as a white outline on the soil after watering the garden. The second type is yellow and it resembles rust. The worst type is black salinity. It accumulates heat from the sunshine and burns the plants. To fight salination in my garden, I dug a one-meter deep drainage trench. Then, I flooded his plot so that salt got dissolved in water and then slowly let the water out through the drainage trench. I also noticed that building a fence around your plot or planting bushes slows down the salt transported by wind from the Aral Sea.*

Although Jasylbek’s classification distinguishes three colors of salinity, it is not a generally accepted typology and rather is a reflection of his own gardening experience. It shows that local soil knowledge related to salinity evolves and changes. Another example of the change in local

[1] Unfortunately, available dictionaries have no translations of these two plants into Russian or English. And botanical knowledge of the author was insufficient to determine these species of plants.

soil knowledge comes from the change in attitude towards salinity. Both types of salinity are considered detrimental for agriculture. However, the negative attitude to soil salinity seemed to have evolved together with the spread of irrigated agriculture during the Soviet times. Some elders told me that back in the day, in the time of their fathers (which is roughly 70-90 years ago) salt was considered a sign of land's fertility (kaz. '*sor – jerdin qunary*' lit. salinity is land's fertility).

Thus, local soil knowledge has quite a complex body of knowledge related to the soil salinity. Being in harsh environment where almost all areas of land are affected by soil salinity to a varying degree (Karlykhanov and Toktaganova 2016), the local classification of white and black salinity serves the purpose of avoiding more salinized lands and selecting less salinized lands for cultivation. Although the terms 'black' and 'white' salinity may carry slightly different meanings in different contexts, 'black' salinity is unanimously considered 'worse', 'more detrimental' and/or 'more dangerous' than 'white 'salinity.

10.4.2. Leaching

Leaching is a method of reducing soil salinity by flooding a plot so that salts on the surface and in the soil get dissolved in water and flushed away (CAWATER-Info n.d.). Leaching is by far the most widely-used strategy for reducing soil salinity used by both rice corporations and small-scale gardeners. Leaching is widely used because it is quite effective and because of low prices of water 0.2 KZT per cubic meter (ca 0.0005 Euro as of 2015[1]), half of which is subsidized by the government. After the discount, rice corporations pay 0.1 KZT per cubic meter of water (Table 4). The 50% water fee discount for rice production was stipulated by Kazakhstan's Governmental Decree #237 signed on April 4, 2006. This decree was annulled by Decree #224 signed on April 15, 2016. Since 2016, the 50% discount for rice production is prolonged annually by respective Instructions of the Ministry of Agriculture. The same Instructions sets the base water fee.

The subsidies for irrigation water existed in the Syr Darya Delta for a long time. In order to create the financial incentives to conserve irrigation water, the USSR Sovmin issued Decree #1720 on 29.04.1949 obliging the water users to pay a fee of 0.75 kopeks for each cubic meter of irrigation water supplied by the state canals. This Decree was endorsed by the Order of the Ministry of Agriculture of the USSR #410 (May 4, 1949), the Decree of the KazSSR Sovmin #384 (May 19, 1949), and the Decree of the Kyzylorda Ispolkom (August 12, 1949).[2] After the fee for water use was introduced most of the kolkhozes could not pay it so that in 1955 the Kyzylorda Obkom reached out to the KazSSR Sovmin to reduce the fee for the rice-growing kolkhozes to 0.05 kopeks per cubic meter. In turn, the Kaz Sovmin reached out to the USSR Sovmin asking to reduce the

[1] In 2019, it is ca 0.00043 Euro per cubic meter. For comparison in Europe prices for irrigation water also vary within and between the countries. E.g. Greece: 0.054–0.645 €/m3 and France: 0.23–1.50 €/m3 (Giannakis et al. 2016). The irrigation water fee in Kazakhstan is about 100 times (and 200 times after subsidies) cheaper than the cheapest water fee in Greece.

[2] p. 15, GAOPIKO, 1950, F.268, Op.1, D.3785.

water fee to 0.15 kopeks arguing that under the current water fee the rice-growing kolkhozes have to pay 210 rubles per hectare, which 5 times as much as a water fee for 1 hectare of other crops.[1]

Figure 10. 4. Water used for irrigation by the rice growing corporations in 2013-2015

	Rice corporation	Actual water consumption			Hectares		
		Overall volume million m^3			Total area watered		
		2013	2014	2015	2013	2014	2015
1	RZA-Agro	126784	126784	124486	5965	6355	5680
2	Syr marjany	70257	83386	86750	2550	3036	3672
3	Jalangtös batyr	25313	27996	26038	1235	1160	1530
4	Agro-Örken	31039	20292	23112	1232	792	1077
5	Aqmarjan	13863	14146	14257	515	515	565
6	Merei	18163	20056	16600	760	705	690
7	Alshyn	9603	11039	11347	360	370	410
8	Aimakhanov	4278	4366	4450	127	147	150

All rice producers acknowledge that the government subsidies are crucial for rice production in Kazaly. baqşa gardeners also second this opinion and claim that if the water fee was not as cheap as it is now, it would have been too expensive to do gardening. Without subsidized water for the rice corporation and not-subsidized yet cheap water for the gardeners, the agriculture seems to be economically unfeasible in the region.

[1] p. 99-101, APRK, 1955, F.708, Op.28, D.317

Leaching is such a widely-used method that locals state that water scarcity is much bigger threat than soil salinity. The general shared opinion is that ‘if there is water, one can always deal with soil salinity.‘ Besides leaching, the characteristic features of local agriculture also contribute to soil salinity. For example, rice growing requires paddies, which means water constantly floods the paddies, which is believed to contribute to soil salinity by raising groundwater levels. The Kyzylorda Rice Institute has developed some rice varieties that do not require paddies, however, they are not as robust and productive as the rice varieties used currently. Local irrigation practices used by baqşa gardeners (i.e. using very deep irrigation furrows) are also considered ‘ineffective’ because a lot of water is used to irrigate small plots. These excessive use of irrigation water also contributes to the rising water table, which in turn is a driving force of secondary salimization. Thus, leaching as a primary method of reducing soil salinity is also one of the drivers that exacerbate the problem. However, according to locals leaching should not exacerbate soil salinity when there are adequate conditions for it: a) a proper drainage system and b) good quality of irrigation water. However, both of these conditions are not in place in Kazaly. To start with, the drainage system was not been developed to a full scale during the Soviet times. Moreover, the drainage system built during the Soviet times has not been properly maintained afterwards due to large investments needed for maintenance. The local rice cultivators and the baqşa gardeners also complain about the general pollution of the Syr Darya waters, which are used for irrigation. By the time it reaches Kazaly, it seems to be heavily polluted by settlements and farms upstream.[1]

10.5. Local irrigation practices

This section is related primarily to the baqşa gardeners, who employ several adaptive strategies to make gardening viable. As a large scale adaptation, the baqşa gardeners capitalize on rice corporations ’capacity to ‘bring water into canals. ’The rice corporations are the largest irrigation water consumers in the district. After the collapse of the Union, most of the canals have been neglected and water is not diverted into them nowadays. The rice corporations have a capacity to clean the canals that bring water to their rice paddies, which means that canals leading to the rice fields will always have water in them. That is why baqşa gardeners select their plots near the irrigation canals that take water to the rice fields.

Such arrangement is also beneficial for the Kazvodhoz, the entity that is in charge of delivering water to the water users. Technically, the baqşa gardeners can request Kazvodhoz to divert water into any canal and agree to pay for it. However, due to poor condition of irrigation canals some 50-70% of irrigation water is lost due to filtration until it reaches the water users.

[1] Usually blame goes to the other rice-growing districts in the Kyzylorda province as well as Baikonur City, which purportedly dumps its sewage waters into the river. Quite often the Turkestan region is also blamed for polluting the waters. Last but not least, Uzbekistan and their cotton growing industry is also blamed for excessive use of pesticides and fertilizers, which pollutes the water in the river.

> *baqşa gardeners pay their water use fees to the Kazvodhoz. It makes sense that they settle close to the main canals to where we are already diverting water for other users such as rice corporations. For example, imagine a few gardeners decided to make a garden at the end of the canal, which is not being used by anyone else this year. So they place an order for let s say100 cubic meters and they pay for it. So in order to deliver those 100 m^3 to them, we have to divert more than 200 m^3 into that canal. So from the perspective of a rational [meaning sustainable] water usage, it does not make sense. We can ask those hypothetical gardeners to pay for the 200 m^3, however, they will not be able to afford it. They can barely pay their current irrigation water bills. In fact, the gardeners use much more water than they are paying for. We just make a rough estimate and charge them according to this low estimate. If they were paying for every liter they used at a current price, no one would be doing gardening. But I think eventually, we will come to the point when the gardeners and other users will have to pay precisely for all the irrigation water they are using (Samir, Kazaly, Kazvokhoz, May. 2016).*

Although this adaptive strategy is a win-win solution both for the gardeners and the Kazvodhoz, it backfires on the baqşa gardeners during the water-scarce years. Rice corporations as the primary water consumers often take most of the water to irrigate their fields, so that baqşa gardeners receive only a fraction of water they need or not at all. In 2017, the gardeners in Satyp village stopped receiving any water in June because the local rice corporation has been taking all water. The gardeners tried to put pressure on the rice corporation through the local government, however, the process of settling the dispute took several weeks during which gardeners received no water. Thus, this adaptive strategy is a double-edged sword for the baqşa gardeners.

Another local adaptive practice is arranging irrigation ditches within a plot in a particular way. Deep irrigation furrows are called qaryq and divide the plot into smaller squares to make sure that each square is on the same level. Depending on a crop, these squares can be of two types. Some have more *qaryq* (deep furrows) in them and form a *taqta*. Taqta are used for growing melons, watermelons, and potatoes. Whereas other plots are made into an even square called *atyz* (for alfalfa, wheat, barley, and few other crops). When growing corn the *atyz* squares have shallow furrows (called *jüiek* or *joia*).

Since the baqşa gardeners do not grow crops suitable for *atyz*, they use deep irrigation furrows (40-50 cm) that make up *taqta*'s. The seeds are planted in the nests at the edges of the irrigation furrows. When watering the plot, these deep furrows are filled almost all the way up reaching the mark of 2-3 cm below the nest level. The deep furrows are needed to keep the moist in the soil. It is not desired to have water on the surface of the nest, where the seedlings grow because due to the heat and the soil structure, the surface solidifies and turns into a thick crust. Even though such irrigation methods seem quite ineffective, gardeners claim that such watering technique is the only

suitable watering technique for local saline soils. Such deep furrows are common only in the river delta area. Other districts in the Qyzlyorda province located upstream have shallower irrigation furrows.

> *When guests come to Kazaly from other districts, they are often surprised by how deep our irrigation furrows are. They think we waste so much water. Sometimes officials come and tell us to use drip irrigation. But none of these methods works in our local conditions. For example, the drip irrigation delivers water as close to the plants root as possible. If you try it here and pour water on top of the soil, due to our heat which reaches +50 sometimes, this wet soil turns into a chunk of clay as hard as cement. We know that in comparison with other regions we use more water. But out method of irrigation is the only possible one for our conditions (Bazake aga, pers.comm., July 2016).*

During the extremely hot days, when the temperature can be in high 40s, the local gardeners use a watering method called *taldyrtky (kaz. Талдыртқы).* Local claim that this is a local version of drip irrigation. The essence of this method is in diverting a minimal amount of water to the furrows to keep them wet. The *taldyrtky* method is believed to be essential for the survival of the crops in extremely hot weather. baqşa gardeners also time their watering sessions to be during the time when the water quality is acceptable in the river. In late summer, the water quality is believed to get worse and that is why gardeners desist from watering their crops after July.

> *The quality of water is not right. One can tell that because one cannot store the melons for long nowadays. Melons do not last for long and go bad quickly. If you water your garden at the beginning of August and onwards, this water will damage your melons. Because those living upstream release water from their rice fields. I think that is the reason why the quality of water is bad (Argen, Targyn village, July 2016).*

> *Uzbekistan dumps used water from cotton to Shardara and then it comes to us. You can see when these waters come because the color water turns yellow as if it was full of puss. Closer to fall (in August) one should not water the garden. If you do, you will ruin your crops. The water brings to us all the pesticides and waste from upstream (Sakbolot, August, 2016, Aqtas).*

Moreover, water scarcity in Kazaly also means scarcity of good quality water. The water discharges from agricultural lands upstream pollute the irrigation water until it reaches Kazaly (UKGU 2014). That is one of the reason why baqşa gardeners stop watering their crops after July. The local experience showed that after July water in the river becomes so polluted that it ruins crops. In late summer, the colours of water in the river indeed changes from brown to yellowish.

Local gardeners see it as a sign of pollution although there have been no chemical test s to ascertan? it.

10.6. Pests and pest control

In this section, I talk about the pests for baqşa gardens and how the gardeners deal with them. There are several pests for garden plants such as domestic livestock, various rodents such as yellow ground squirell (*Spermophilus fulvus*), badgers, crows, and other animals. Even jackals have been observed eating ripe melons. To protect the garden from wandering livestock, the gardeners put up a fence. It is quite effective in keeping the livestock out but not as effective against wild animals. Gardeners do not take any particular actions against the wild pests because it is too labor intensive. At the same time, gardeners stop weeding their gardens closer to the harvest time because rapidly growing weeds cover up the melon and watermelon fruits, thus making it invisible for the crows. The location of several gardens next to one another helps to dissipate the harvest lost among many gardeners, thus a percentage of harvest lost to pests is not great for every individual gardener. The gardeners believe that wild creatures are entitled to their share of the harvest and accept the loss with a philosophic understanding.

In 2016, there was an outbreak of a new pest, the melon fly (*Bactrocera cucurbitae*). There is no clear evidence of where the melon fly came from but it is likely that it came from the Turkestan region of Kazakhstan. It could have come with seeds[1] or with infested melon fruits[2]. Since it was a new pest, local gardeners did not know how to deal with it. Many gardeners started observing it and noticed that melon fly larvae eats the melon from inside out. The local theory was that the melon fly lays eggs on the flowering plants and the larvae makes its way into the fruit-bud. Larvae grow and mature with the melon fruit and than eat their way out of the melon.

Since nobody knew for sure where this pest came from, some gardeners started telling hypothesis that bordered with conspiracy theories. For example, some gardeners claimed that it was the Chinese who deliberately infested local melons because they were afraid that if melons from Kazaly make it to the external market, the chinese melons would lose comptetition because local melons are ‘much more delicious and natural.’ The deliberate Chinese infestation hypothesis somewhat coincided with the general anti-chinese sentiment in the region and the country at large[3]. Thus, since 2016 the melon fly (*Bactrocera cucurbitae*) has been a new pest for the melon crops.

[1] That year the local Government started encouraging the local gardeners to buy seeds from Turkestan and plant the melon varieties ‘suitable for export.’ Some gardeners speculate that the melon fly could have come with those seeds.

[2] Kazaly is located on the major railroad. Many trains go through Kazaly including ones coming from Uzbekistan (where melon fly is a long lasting pest), Almaty, Turkestan, and Tashkent. The train passengers could have bought an infested melon on one of the stations and dispose of it in Kazaly.

[3] In the spring of 2016, there was a series of demonstrations against the law that allowed a long-term land lease to foreigners. People feared that Chinese immigrants would use this law to lease big areas of agricultural land. Due to protests all over the country, including Kazaly, the President of Kazakhstan signed a moratorium on implementing this law.

The gardeners started using pesticides to fight this new pest.

Figure 10.5. Which challenge is targeted by each adaptive strategy

	Shifting agriculture	Soil knowledge	Leaching	Local irrigation practices	Crop rotation	Fertilizers	Local crops
Fertility	x				x	x	x
Salinity	x	x	x	x	x		
Water scarcity	x			x			x

10.7. Conclusion

The chapter described in detail the main geophysical challenges such as soil salinity, low soil fertility and water scarcity that make doing agriculture in the Syr Darya Delta difficult. The array of adaptation strategies used by baqşa gardeners and rice corporations addresses all of these challenges to a certain extent, however, most of the strategies deal with soil salinity and low soil fertility (Figure 10.5). Interestingly, the abovementioned three challenges seem to be perceived as carrying different level of urgency, severity or importance. Low soil fertility has the lowest profile because naturally all soils in the region have a low organic content. Soil salinity and water scarcity are considered more ‘dangerous ’because they need to be directly addressed in order to ensure the yields. Out of these two, water scarcity is considered more ‘dangerous ’because the problem of soil salinity can be solved if there is enough water. Since water availability is a crucial part of the solution for the soil salinity, local people worried much more about it. Moreover, another reason for water having a higher profile than soil salinity may be the fact that local communities have no effective adaptive strategies to deal with water shortage.

Although the main overarching adaptation strategies are used by both the baqşa gardeners and the rice corporations such as shifting agriculture, use of local soil knowledge and leaching, these two groups also have different strategies stipulated by a difference in their capacities. For example, rice corporations are capable of using a wider range of strategies (e.g. crop rotation and use of fertilizers) because they have better access to less saline lands, fertilizers and governmental subsidizes for water, fertilizers and seeds, whereas small-scale gardeners receive no governmental support. This difference in a capacity to adapt may be explained by the difference in financial barriers for adaptation (Hoque et al. 2018) between rice corporations and small-scale gardeners. Thus, when thinking of the adaptive capacity of local communities one must be cautious not to overlook that different groups within a given community may have different adaptive capacities.

Moreover, the baqşa gardeners have to capitalize on the ability of the rice corporations to bring water into canals, which in water scarce-years makes the gardeners vulnerable. These observations feed into an adaptation literature that highlights that different actors ’capacity is restricted by a

number of ‘barriers’ or ‘limits’ (Antwi-Agyei et al. 2015, Shackleton et al. 2015). At the same time, it should be noted that the patterns of shifting agriculture employed by both the baqşa gardeners and the rice corporations are influenced by the local irrigation and drainage infrastructure. The rice corporations try have their rice paddies in areas with good irrigation and drainage infrastructure. In turn, the rice corporations ’decisions on where to have rice paddies shapes where the baqşa gardens emerge every given year. Thus, this chapter makes a contribution to the adaptation literature by highlighting infrastructure as a barrier in addition to financial or economic (Bryan et al. 2009, Hoque et al. 2018), natural (Sallu et al. 2010), socio-cultural (Curry et al. 2015), institutional (Quinn et al. 2011) and psychological (Gifford 2011) barriers.

The strategies used by both rice corporations and the small-scale gardeners can be seen as incremental adaptations (Adger and Jordan 2009, Fedele et al. 2019) because: a) the local communities anticipate the adverse effects of the soil salinization, low soil fertility and water scarcity, b) are able to predict it with a certain level of confidence and c) their strategies mitigate the adverse effects of these challenges to make gardening and rice cultivation viable in the area. These strategies are not coping strategies because the local strategies are not immediate responses (Biermann et al. 2012) to these challenges, rather soil salinization, low soil fertility and water scarcity are problems with a long history in the area. These strategies cannot be called transformative (Olsson et al. 2014) because these do not tackle the root causes of those challenges. For example, in case of soil salinity local practices and adaptive strategies do make gardening and rice cultivation viable but at the same time exacerbate the soil salinity. For example, rice paddies must remain covered in water for 80-90 days, which exacerbates waterlogging and secondary salinization. Reliance on deep furrow for local watering techniques and leaching of salt as without adequate drainage system exacerbates soil salinity in the long run (Qadir et al. 2009, 2014). Thus, current strategies do not address the root causes of soil salinity but rather offset the immediate effects of it.

11. Conclusion

In this thesis, I set out to explore the Syr Darya Delta inhabitants 'livelihoods and adaptive strategies in the environment, which has officially been a Zone of Ecological Catastrophe for more than 30 years. Besides the environmental change, which manifested itself in the dwindling of water flow in the Syr Darya River, desiccation of the Aral Sea, and increasing soil salinity, the delta inhabitants also experienced a significant social change, manifested by the collapse of the Soviet Union and a transition to the market economy. Thus, the question that guided my research and this thesis was 'how did local communities cope with and adapt to the social and environmental change in the Syr Delta?' To answer this question, I gave detailed accounts of local river-dependent livelihoods such as reed harvesting, shifting agriculture, herding, and small-scale fishing and engaged with the bodies of literature on commons; and adaptive strategies. I use this final chapter to sum up my major claims and point out some directions for future research.

11.1. Insight for the environmental change narrative

While the environmental change in the Syr Darya Delta is often framed around the Aral Sea disaster (Micklin 2007), the Syr Darya Delta is rarely foregrounded in understanding the environmental change in the Syr Darya Delta-Aral Sea region. This can be due to the fact that defining what is delta can be quite challenging (Collins 2015, Krause and Harris 2021) as I discussed in Section 3.1.

Nonetheless, by foregrounding the Syr Darya Delta in understanding environmental change in that region, I managed to bring the local 'vernacular/perceptual' perspectives on the river delta (Davidson and Paradise 2015) into the spotlight. Thus, I framed the local perceptions of the Syr Darya Delta as two 'iconic places' (Féaux de la Croix 2011) called Syr and Qyr, which are immediately recognizable to people beyond the Syr Darya Delta. Moreover, I further built on the concept of the 'iconic places,' and demonstrated that those iconic places are not empty spaces. Instead, the iconic places are inhabited and shaped by 'iconic species' (such as rice in the Syr Darya Delta) and 'iconic forces' (such as floods and water scarcity), which are species and forces that '*matter, that one will have an opinion on and a relationship with'* (c.f. Féaux de la Croix 2011, p. 25). I further demonstrated that rice (as an 'iconic species'), floods and water scarcity (as iconic forces) shaped and motivated modification and change of the Syr Darya Delta through building irrigation infrastructure during the Soviet era. Moreover, this riparian infrastructure mediated the the expansion of 'Syr' iconic place into 'Qyr' and vice versa. These iconic places and interactions between them are reminiscent of terrestrial and amphibious delta ontologies in Thailand described by Morita and Jensen (2017). Thus, from the ontological perspective the environmental change in the Syr Darya Delta can be seen as an expansion of Syr into Qyr via development of irrigation infrastructure necessitated by the need to water rice (an iconic species) and control the iconic forces

in the river delta such as water scarcity and floods. At the same time, as the irrigation infrastructure deteriorates, the shrinkage of irrigated areas can be seen as Qyr expanding into the Syr. These ontological aspects are likely to gain importance in light of climate change scenarios for Central Asia that foresee significant changes in water availability and precipitation patterns across the region. In Part 1 of this thesis, I attempted to draw the reader's attention to the Syr Darya Delta (as opposed to the Aral Sea), which are often ignored in the public and scholarly narratives (e.g., see the opening vignette in Part 2).

Yet, my picture of iconic places, species, and forces are incomplete. Future research on iconic species of Syr and Qyr can help paint a more accurate picture of the environmental history of the Syr Darya Delta. Moreover, the further exploration of the 'iconic species' concept may contribute to an interdisciplinary investigation of the Syr Darya Delta by weaving together ecological, social, cultural, and spiritual dimensions of the environmental change.

11.2. Commons and commoning

In Part 3 of this thesis, I demonstrated that reed beds, pastures, land for gardens, and fish stocks form the basis of rural livelihoods in the Syr Darya Delta and are run as common-pool resources. At first sight, the local resource-abundance discourses coupled with an often-proclaimed rule that 'anyone can take as many resources as one can' seemed like an ideal recipe for the tragedy of the commons (Hardin 1968). However, the Syr Darya River Delta communities managed to avoid the tragedy of the commons. In Chapter 6, I highlighted several (not mutually exclusive) reasons why the tragedy of the commons did not occur.

Moreover, my analysis of the common-pool resources in the Syr Darya Delta provided some insights into the popular body of institutionalist literature on commons. For example, my findings suggest that commons in the Syr Darya Delta are dependent to a certain extent on non-commons such as privately-owned rice corporations. My finding also concurs with Bresnihan's (2016) and my claim (Samakov 2016) to take into consideration more-than-human beings when analyzing commons.

While the institutionalist design principles have been one of the most popular theoretical approaches to analyzing common-pool resources (Van Laerhoven et al. 2020), in the case of the commons in the Syr Darya Delta the concept 'commoning' lends itself well to understanding the dynamic relations of sharing the pastures, reed beds, fishing grounds, and agricultural lands in the delta. Social networks such as kinship, friendship, and neighbor-ship circles as well as local rituals such as tasattyq (Chapter 8) are the local practices that enable commoning.

Moreover, my evidence suggests that the process of cooperation is not uniform but its intensity and type rather varies at the different stages of commoning. Thus, I argue that commoning as a process is not homogenous but rather has its ups and downs. I also demonstrate that cooperation

and collective action often goes hand in hand with competition. For example, Sakbolot's example of teaming up with his neighbors in the previous year and then teaming up with his cousins in the following year showcased that Syr Darya Delta inhabitants organize themselves in small groups to share commons. Moreover, the same example also highlighted that in the case of the Syr Darya Delta commons cooperation within the small groups as well as the competition between those small groups happen simultaneously.

11.3. Commonization, adaptation, and transformative change

The commonization (as well as decommonization) of resources have been documented as an adaptation strategy in many parts of the world (cf. Nayak 2021). My contribution to the commonization literature is my finding that the commons do not emerge out of nowhere but rather emerge only in the areas where there is an enabling infrastructure for them. For example, pastures, reed beds, fishing grounds, and agricultural lands were used as common in marginal areas during the Soviet era. After the collapse of the Soviet Union, former lands owned by the sovkhozes turned into a patchwork of rice fields (privately owned or leased by the rice corporations) and commons. My finding about the commonization of resources is a refreshing contribution to the existing decollectivization literature. As Galdini (2023, p. 147) notes:

> *For three decades, the literature on transition has dominated the academic debate on the transformation of the independent republics that emerged from the collapse of the Union of Soviet Socialist Republics (USSR) in 1991. While vast and diverse, at its most fundamental, this body of scholarly work agrees that a standard reform package of privatization, (price and trade) liberalization, and macroeconomic stabilization represented the only way for these republics to "transition" from the failed Soviet command economy to free market capitalism.*

In other words, my findings showcase that comonnization of resources took place parallel to the state-backed privatization (Zareckaya 2003). The commonization of resources by the households has been a primary overarching adaptation strategy for the social-ecological change in the river delta, whereas the case of rice corporations shows that some resources and livelihood activities, i.e., rice cultivation got privatized.

The radical-activist school of commons claims that commons, commoning, and commonization can drive the transformative change needed to address the current environmental crisis (Hardt and Negri 2009). The case study from the Syr Darya Delta commons demonstrated that radical activist scholars' neat separation between commons and capitalist subjectivities and values is not so clear on the ground. Indeed, the Syr Darya Delta commoners quite harmoniously carry both the elements of commoning thinking and capitalist values. That is why the radical activist scholars, who claim that commoning and commonization ARE the transformative change that humanity needs, should

provide more grounded and empirical examples of commons, commoning, and commonization cases that exemplify such a transformative change.

Since my study focused on river-dependent rural livelihoods, I only looked at the fraction of the greater pool livelihoods. In other words, the river-dependent livelihoods were not the only source of rural livelihoods in the Syr Darya Delta. That is why future studies can take a more holistic view on livelihoods and consider the role of other livelihoods (i.e. the livelihoods that do not depend on the Syr Darya River) in the adaptation to the rapid social-ecological change in the Syr Darya Delta. Possible points of entry include but are not limited to the assessment of the railroad and automobile infrastructure, the impacts of governmental subsidies, and remittances on the adaptive strategies employed by the Syr Darya Delta communities.

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