Hybrid patches of commoning

Unpacking influences of the hydrosocial cycle on commoning in a downstream desert reclamation area: case study in Youssef El Seddik, Egypt

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Abstract

Water stress is increasing globally, especially affecting arid regions of the world such as Egypt. Due to challenges related to intensifying effects of climate change and a rapidly growing population, the levels of and access to water is a continuous area of concern for the country – making it important to analyze how these water issues are managed. This study connects the hydrosocial cycle and commoning frameworks in analyzing how water is managed in a downstream, desert reclamation area in Fayoum, Egypt – and how this management, or lack thereof, affects the livelihoods of the people living there. In doing so, we examine how possible commoning practices are influenced by factors related to the hydrosocial cycle. Fieldwork has been conducted for this case study by holding participatory workshops, semi-structured interviews, and observations. Our findings imply that the hydrosocial cycle has shaped the management of water in our studied site, which has in turn affected the commoning practices that take place there. The low water levels and the saline quality of the water is what has created the prevalent forms of commoning that can be seen in the community. The presence of a local agricultural association has also influenced the commoning practices. The quality and levels of water in the area are in part managed by neighbors borrowing irrigation minutes from each other, and by collective olive harvest. To a lesser extent there are also instances of neighbors helping each other with agricultural work throughout the year, and sharing reservoirs. There are indications that these commoning practices play a part in sustaining livelihoods in the community. The commoning practices found in the studied site have emerged in a relatively new social context and can be characterized as context specific patches of commoning, occurring on the peripheries of hybrid institutions – that have largely been shaped by hydrosocial forces. As the hydrosocial cycle is ever-changing, these commoning practices will likely also come to change.

Keywords: water management, Egypt, hydrosocial network, commoning, irrigation, agriculture
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Introduction

Water stress currently affects more than two billion people globally, and water services are especially limited in arid regions. Water issues are complicated by factors such as urbanization, climate change and hydro-energy demands (UN-Water 2019). Egypt and the region surrounding it is characterized by water issues relating to factors such as climate change, water quality degradation, transboundary water management challenges, and urban expansion (FAO 2015, i). Within Egypt, water levels are expected to drop below the threshold for absolute water scarcity by 2030 (FAO 2016, 4; FAO 2014, 4). This study deals with how the hydrosocial cycle influences local water related commoning activities in a downstream, desert reclamation, small-scale farming community in Fayoum, Egypt – in part by highlighting experiences and perceptions of water issues among members of the agricultural community in question.

Egypt is densely populated with over 100 million inhabitants as of 2020 – and it is estimated that the population grows by approximately one million every six months (CAPMAS 2020). With urban expansion in some cases being a cause for water scarcity in the country, the population growth might be a factor placing further stress on the water situation – as water resources are sometimes disproportionately prioritized for urban consumption (Ghazouani et al. 2014, 2; 18). This means that farmers are often those that are affected first by water shortages (Shindo & Yamamoto 2017, 773). During the period of market liberalization beginning in the late 1980s, government control over crop choices was diminished, granting the private sector more control over the export processes and allowing the country’s farmers to decide freely what crops they would cultivate. Given this, many farmers turned to growing crops such as rice and sugarcane, which are water-intensive but yield greater profit on the markets (Chaaban et al. 2018, 5-6). During the same period, increased meat consumption among the wealthy brought about a switch from legumes and maize, to wheat and meat products – which require significantly larger volumes of cereals (Mitchell 1991, 21), and thus intensifies the water stress further. Land reclamation is also a factor that adds to the issue of water stress in the country (Barnes 2014, 189). The practice of land reclamation entails activities and projects aimed at cultivating desert land, desalinating soils to make them arable, and draining wetlands (Barnes 2012, 534). These practices have been conducted in Egypt for centuries – with the goal of extending agricultural expansion, into the desert (ibid., 517-518). While the term ‘desert reclamation’ implies that it is a reclamation of land that has previously been cultivated, the practice in reality transforms desert into new, agricultural land (ibid., 535). Through desert reclamation, the amount of cultivated land in Egypt has increased greatly over the years. The governments’ aim with the reclamation projects has been to expand farmland as well as increase production and employment. While farmers in these “new lands” are able to buy materials that will help make the soil arable, the water has to be pumped to reach and help cultivate these higher desert lands. This is done with “varying degrees of government authorization” (ibid., 517-518). Whether a desert reclamation project will be viable or not in Egypt is closely connected to other issues, such as the country’s limited water resources (Sims 2015, 117). Additionally, current projects of economic development undertaken throughout the region comes with contesting interests, not least regarding water resources – one current example being Ethiopia’s construction of the Grand Ethiopian Renaissance Dam (GERD) for hydropower purposes, which sparked a trilateral conflict between Ethiopia, Egypt and Sudan (Yihdego et
al. 2016, 503-504). Studies show that while water supply and power generation in Egypt would be significantly reduced if the filling of the dam were to occur during a sequence of dry years, the dam could also possibly mitigate future drought conditions caused by climate change (Tawfik 2016, 579). This henceforth highlights different effects on water access resulting from the dam construction, and how this relates to climate change.

Water, space and society make and remake themselves over time, all within a socio-natural process conceptualized as the hydrosocial cycle. One of the key ideas related to the concept of the hydrosocial cycle is “the idea that the need to manage water has an important effect on the organization of society, which in turn, affects the disposition of water, which gives rise to new forms of social organization and so on, in a cyclical process” (Linton & Budds 2014, 175). Given this, different social organizations for water management can emerge in situations where water resources are scarce or shifting. Shameem, Momtaz and Kiem (2015) illustrate that in such situations, caused by climate change, local responses can be varied and, in some cases, expressed in the form of adaptation measures at local levels (ibid., 254). A connection between risk perception and response is illustrated by the authors through an example displaying farmer’s adjusting aquaculture practices due to perceptions of risk related to climate change. The study does however also indicate that there is a disconnect between farmer’s concerns regarding climate change related risks, and their responses and adaptations – which the authors in part ascribe to social factors such as poverty, education and cultural values (ibid., 265). In Egypt, adaptation concerning water scarcity has entailed practices such as constructing collective irrigation rules, reusing drainage water, collective crop choices and practicing night irrigation (Ghazouani et al. 2014, 16-20). However, aside from responding to changing access and control over resources, there is also a need to respond to new regimes of knowledge – as highlighted by Eriksen, Nightingale and Eakin (2015, 523). The authors argue that “adaptation needs to be reframed as a socio-political process, taking place through struggles over authority, knowledges and subjectivities across scales by multiple actors” (ibid., 531). The authors highlight the importance of understanding how subjectivities, knowledges and authorities interact, in order to better address drivers of vulnerability.

Parsons and Chann (2019) utilize the hydrosocial cycle framework to analyze how local scale hydrology (including wells, canals and local hydro-geography) in Cambodia mediate the effects and perceptions of climate change, and how this in turn drives migration. The authors argue that local scale hydrosocial landscapes distribute the effects of climate change unequally, as well as shape how people perceive climate change. Therefore, hydrosocial structures function as mediators “between climate migrants and the geography in which they live […]” (ibid., 11). Given this, “it is possible to reframe climate response not as a unidirectional impulsion on humans by their environment, but as a dialogue between people, the resources they depend on and the contexts in which they are articulated” (ibid.). Barnes (2017) draws on analysis from long term ethnographic work in arguing that while small-scale Egyptian farmers do express concern regarding water scarcity, they do not perceive climate change as a major aspect of this. Causes for water scarcity are instead understood as local technopolitical occurrences – one example being “an engineer’s decision to direct (or not to direct) water into their section of the irrigation network or an upstream farmer’s decision to grow rice” (ibid., 8-9). Climate change will likely have adverse effects along the Nile basin, both through water availability and through increased temperature which affects crop yields. Impacts of climate change will be
varyingly distributed across the basin depending on differing vulnerability to various factors ranging from physical water stress to poverty (ibid., 8). However, climate change is not the only factor determining the hydrological present and future of the Nile basin – other important components are also the building of dams, changing land use, water right conflicts and multi-scalar management decisions (i.e. decisions at national, regional as well as local levels). As Barnes puts it: “The future of the Nile will be shaped, therefore, not just by greenhouse gases, rainfall changes, and temperature trends, but by irrigation engineers and farmers, diplomats and policy makers” (ibid., 1-2). In another article, Barnes (2014) applies a hydrosocial perspective to Egypt by analyzing the reuse of agricultural drainage water. The study shows that farmers and engineers constantly block, release, route, and diverge water – making the flow of the Nile ever-changing, which in turn results in everyday political struggle for both the quality and quantity of the water. This political struggle is constantly “shaping the terrain of power relations” (ibid., 190). Wealth and social connections play an important part in where the water flows, as well as the amount and quality of the water – with salinity being the primary factor determining quality. However, there is also a power aspect to how technology – such as pumps and pipes – is constituted, as well as how it is geographically arranged, for example the distance to drainage water. The reuse of drainage water is practiced through both official and unofficial methods. Herein, differing knowledges regarding water quality – at different scales – determine actors' judgment of how to use water (ibid.).

Rap and Jaskolski (2019) study the issue of common pool resources in the Nile delta through a feminist political ecology lens. The authors focus specifically on analyzing how the distribution of resources is enabled, formed or restrained by the intersections of gender, class and culture. Applying to this a commoning framework, the authors state that “[...] commoning practices are culturally and spatially specific and shaped by pre-existing resource access” (ibid., 101). Commoning is, according to Linebaugh (2008) an activity centered around practicing collective, mutual and shared use of resources (ibid., 103). Turner (2017) argues that commoning can be seen as a set of constantly changing social relations (ibid., 800). By applying a commoning framework, one can analyze how resources, such as water, can be arranged under social organizations that differ from organizations that are under government or private control (ibid., 796).

As it pertains to the study by Rap and Jaskolski (2019), it is argued that while access to resources tends to be unequally distributed along the lines of intersecting power dynamics, one example did show that factors such as community and gender identity as well as culturally cohesive experiences created a foundation for commoning practices. The study also showed that farmers at a canal’s water stressed tail end together sourced money for the purpose of building a common waterway – something that the authors imply indicates “a cultural response of resilience” (ibid., 99). However, Rap and Jaskolski also found that attaching different meanings to the same water common could pose a hindrance for commoning among different groups (ibid.). Thus, the authors argue that commoning can be hindered or facilitated due to intersections between different categories. The authors conclude that intersections such as class boundaries “may generate commodified exchange instead of commoning practices”. By contrast, cultural bonds or shared experiences of resource scarcity can instead “open up spaces for commoning” (ibid., 100).
The studies presented above illustrate the hydrosocial cycle as a constantly shifting process involving social as well as natural factors that shape and organize society as well as water management. Given this, there is some evidence that commoning practices have a tendency to arise in situations of water stress and that they can be a way to mitigate harmful effects experienced by vulnerable groups. Previous studies have been vague about how pressure on limited water resources impacts local livelihoods in Egypt, and documentation of how farmers operate within constrained environments has been limited (Ghazouani et al. 2014, 1). In addition to this, there is a need for further studies in the field in order to gain understandings of the reasoning and responses regarding climate change (Barnes 2017, 13), which is one component of the water issues in Egypt. The Fayoum region, being located towards the downstream end of the Nile system, is significantly exposed to water challenges, affecting vulnerable Egyptian livelihoods at a local level (Barnes 2014, 183). At the so called “extreme west” of Fayoum, the irrigation water is even more scarce – one affected community being Youssef El Seddik, as we have learned by key informants during the fieldwork. This is a downstream, desert reclamation area approximately three hours southwest of Cairo. As the area is located at the end of the Bahr Qarun irrigation canal, the farmers in this community face great challenges.

Following these introductory pages, purpose and research questions will be presented. After this, the conceptual framework applied in the study will be relayed in closer detail, outlining previous contributions to the hydrosocial cycle and commoning frameworks. Thereafter, the methodology and ethics of the study will be described, followed by an introduction to the case study setting. After this, the results are presented, followed by analysis, a discussion and lastly a finishing section offering some pertinent conclusions.

Purpose and research questions

Our purpose is to expand on the hydrosocial cycle framework, to examine and analyze how the hydrosocial cycle influences possible commoning practices and local livelihoods in a downstream, desert reclamation, small-scale agricultural community in Fayoum, Egypt. Given the examples relayed above by Ghazouani et. al (2014) and by Rap and Jaskolski (2019), detailing different ways to manage water through commoning in Egypt, there is reason to presuppose that there is a possibility that commoning occurs in our studied site as well. We will examine and analyze this through a case study conducted in Youssef El Seddik – by conducting workshops utilizing participatory tools, semi-structured interviews and an informal direct observation. In doing so, we further aim to gain insight into how the hydrosocial cycle of the Nile is experienced and acted upon – in turn shedding light on how it is made, and re-made.

- How does the hydrosocial cycle influence possible commoning practices and local livelihoods in the downstream, desert reclamation, small-scale farming community of Youssef El Seddik in Fayoum, Egypt?
Conceptual framework

As we are conducting a study utilizing hydrosocial cycle perspectives, we have gathered appropriate material regarding different aspects of the theory in order to build our conceptual framework. According to Linton and Budds (2014), the hydrosocial cycle has evolved as a critique towards the idea of the hydrologic cycle, within which the “natural circulation of water” has been described as taking place “independently of human involvement” (171). In contrast to this, the hydrosocial cycle is, according to Linton and Budds (2014) a socio-natural process, meaning that over time and space, water and society make and remake themselves.

Three key ideas can be found in their analysis regarding the hydrosocial cycle:

- [...] the idea that the need to manage water has an important effect on the organization of society, which in turn, affects the disposition of water, which gives rise to new forms of social organization and so on, in a cyclical process; [...] the idea that by virtue of this relationship, water and society are related internally, which means that particular kinds of social relations produce different kinds of water, and vice versa; [...] the idea that despite this production of water, and despite the social construction of representations of water, the material properties of water play an active role in the hydrosocial process, sometimes structuring social relations and sometimes disrupting them (as in the case of a major flood) (Linton & Budds 2014, 175).

It is important to note that using the term cycle is a slight simplification, as the concept of the hydrosocial cycle entails more complexity, comprising “a dialectical relation between water and society, whereby interventions in the hydrologic cycle will produce changes in society, and so on” (ibid., 175). Within the hydrosocial cycle framework, the authors further argue that the ontological question of “what water is” and the epistemological question of “how water is made known” are required. This gives rise to perspectives on how water is related to power relations, social structures and technologies (ibid., 178) – in effect meaning how cultural values, norms and motives are incorporated in a society or group through learning and socialization. Hydraulic developments can also cause shifts in political landscapes, and hydrosocial relations are often altered by events such as hydraulic interventions (ibid., 178-179). Swyngedouw (2009) presents descriptions and analysis of the hydrosocial cycle while drawing on separate factors of the phenomenon such as “hydraulic environments” – described as actively and historically constructed through social as well as biophysical processes. Given this reasoning, there is in fact nothing “unnatural” about constructing dams or irrigation systems. However, while these constructions might improve both social and physical conditions regarding the environment in some places and for some people – the opposite is often true for other places and people. This disparity results in the sustainability of some social groups and environments, at the expense of others, who are instead subjected to unstable or disordered conditions (ibid., 56-57). When viewing the hydrosocial process through a political-ecological lens, the conflicts connected to socio-environmental change become evident. Applying this lens also highlights the conflicts that induce socio-environmental change. Social power relations causing conflicts regarding hydrosocial transformations can be material, economic, political or cultural. This entails power struggles related to factors such as class, gender, ethnicity or otherwise – as well as the discourses and arguments used to legitimize certain strategies. These struggles will be exacerbated by environmental changes (ibid., 57). Another aspect of the hydrosocial cycle is the “hydrosocial territory”, which Boelens et al. (2016) conceptualize as:
the contested imaginary and socio-environmental materialization of a spatially bound multi-scalar network in which humans, water flows, ecological relations, hydraulic infrastructure, financial means, legal-administrative arrangements and cultural institutions and practices are interactively defined, aligned and mobilized through epistemological belief systems, political hierarchies and naturalizing discourses (Boelens et al. 2016, 2).

Hydrosocial territories are formed through *hydrosocial networks* consisting of relations surrounding water and its use. These relations can take place between human and non-human things; water, society, people, technologies and nature. Every element of a hydrosocial network is mutually determining and inherently interrelated (ibid., 3-4). The authors go on to describe the process of creating environmental knowledge systems as being shaped by historical, cultural and political contexts. These contexts are made up of ideologies, knowledge and socio-economic and political power. In order to analyze how hydrosocial territories are constituted and reconstituted, one must not revert to dichotomizing by separating nature from society – but instead view these as hybrids (ibid., 3).

Per what is previously stated by Linton & Budds (2014) herein, changes in the hydrosocial cycle can “give rise to new forms of social organization” (ibid., 175), one of which can be commoning. The concept of commoning is derived from the idea of *commons*, which can be considered as “clearly-defined social groups [which] self-organize to effectively manage circumscribed sets of resources” (Turner 2017, 796; 800). Turner additionally argues that commons can be seen as a set of constantly changing social relations, making it possible to view *commoning* as a practice (ibid., 800). Further, as Linebaugh (2008) puts it, “the commons is an activity” – meaning that the word therefore ought to be used as a verb rather than a noun (ibid., 279). Commoning centers around practicing collective, mutual and shared use of resources, which is in turn also what constitutes its appeal (ibid., 103). The idea of the commons then counters the idea that property or resource management as well as social organizations can only prosper if regulated by government control or privatization (Turner 2017, 796). Turner highlights the importance of analyzing the commons as something that is not “pure”, but rather takes on “mixed or hybrid forms” – meaning that commoning can take place in a setting where government or private control is also present at the same time. As commons can be seen as consisting of not only social institutions, but also of interactions – the possible benefits derived from them are not only produced but also maintained. This dynamic conceptualization of commons is, in effect, what instead makes it a practice in and of itself: commoning. Hence, ideology as well as political power both play into how the mixed institutional forms related to commoning can be understood (ibid., 799-800).

Noterman (2016) argues that as emerging tendencies of commoning are rooted in specific and shifting geographical, temporal and social contexts, “the socio-spatial relations that co-constitute the commons are in constant flux” (ibid., 448). The author further highlights that commoning can occur and be sustained among people with different hierarchical positions, who “engage with shared resources and each other in differing ways and [to] varying degrees” (ibid., 445; 436). According to Noterman, it is important to acknowledge how differences among those sharing a resource shapes “how they relate to [the] resource and to each other” (ibid., 445). Commoning practices of this kind can take form either within or on the periphery of the collective management of shared resources (ibid., 448).
Methodology and ethics

This study can be defined as qualitative instrumental case study utilizing participatory tools, semi-structured interviews as well as observations during a seven week field study. Instrumental here implies that a specific issue has been selected as the focus for examination and analysis, after which a case has been chosen to illustrate the issue in question (Creswell & Poth 2018, 98-99). The aim of the study and the research questions have mainly necessitated conducting activities such as workshops utilizing participatory tools, as well as holding semi-structured interviews in groups or individually. An informal direct observation was also conducted. As questions of hydrosocial structures and networks as well as commoning practices taking place in relation to limited water supplies are context specific and complex in nature, there was a particular need for conducting fieldwork entailing data collection methods utilizing participatory tools. The use of participatory tools as well as interviews with knowledgeable individuals or groups in the field also allowed for the perspectives and experiences of those affected to be highlighted to an extent that might prove difficult to attain by merely conducting a literary study or using secondary sources. Further, the participatory tools facilitated for those affected to themselves define, prioritize and identify what they perceive as problems, causes, effects, solutions and connections in relation to the issue of water. Using participatory tools helped guide us away from researcher bias, to instead highlight “whose local priorities” were of importance (Mayoux 2006, 117-119).

The site of our field study, the town of Youssef El Seddik in the west of Fayoum, was determined partially through our preparational research, and partially through correspondence with our contact person in the field, Dr. Mahmoud Shendi of the Agricultural Faculty at Fayoum University, due to its relevance as a study site given our research topic and questions. The population of interest for the study was a small-scale farming community, making our sampling unit adult members of the agricultural community of Youssef El Seddik, separated into groups of men and women with whom we held workshops and group interviews. There have also been semi-structured interviews with other key informants outside of the sampling unit consisting of the farming community members – such as university faculty members, an agricultural engineer and an additional key informant from within the studied community. We have applied purposive sampling to recruit appropriate informants and participants for the aim of our study and research questions. The sampling for our workshops was facilitated through the agricultural association in Youssef El Seddik, an association in which all farmers in the community are members. The local representative for the association would be given a time and date for the workshops and then call different members to see who would be able to participate at the time in question. Five workshops were conducted in total, two sessions with a group of the same 12 women, and three sessions with a group of the same 10 men – the last of which was an extra session held due to time constraints and clarification purposes.

The demographic data that was collected about participants was location, gender and membership in the agricultural community. During the course of the fieldwork we also learned that all of our male participants and none of our female participants were graduates. While it might have been valuable for the study to collect more demographic data, to highlight different factors and occurrences, we did not consider it fully ethical to collect lists of data regarding specific persons – as it was important for us to secure the participant’s trust in us protecting the
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anonymity of their information. Utilizing participatory tools and semi-structured interviews, we also wanted to safeguard the participants’ freedom to only share the information that they wanted and felt comfortable with.

**Participatory workshops**

Each participatory tool activity is explained and motivated for the purpose of the study in Table 1. The activity *Problem tree* was in study rephrased as the *Problem palm*. Here, participants were asked to draw the shape of a palm tree, and thereafter define and prioritize what they viewed as the main issue regarding water for them, which was written on the stem of the tree. Causes were defined and written at the roots of the tree, and the effects were written on the palm leaves at the top. Following this activity, was the *Solution palm*, where the same participants were asked to think of possibilities and solutions related to the water related problems that they had previously defined, by reversing the problem into a positive (e.g. “shortage of irrigation water” turned into “sufficient irrigation water”) – and thereafter think in different steps about how this could be achieved. This provided perspective on local ideas about how issues might be resolved, and which actors are responsible for different actions or steps.

The remaining workshop activities were inspired by those described by Beazly and Ennew (2006, 194-195). *Resource mapping* allowed participants to present in visual ways where important resources in the community are located, such as pumping stations, important irrigation canals, farmlands, community institutions, etc. Using *social network diagrams* provided insight into different networks and relations present in the community. The activity of *Seasonal and social calendars* was conducted in a larger group, engaging all participants present in the session at once. During this activity, we drew up a calendar dividing the year into months on one axis, and fluctuation levels of factors that the participants brought up, ranging from one to five on the other axis. After finishing each activity, the items on each model, map or drawing that had been made by the participants were explained or detailed by each small group – in some cases with the assistance of a translator – with some follow up-questions posed by us when something particularly interesting was brought up.

Each workshop session ended with an *Evaluation wheel* adapted from Pretty et al. (1995, 212) – where participants were able to grade their experiences of the workshop by marking levels ranging from zero to ten after being asked questions regarding the categories *understanding, relevance, priorities, format, and rewarding*. The questions were designed to allow participants to express opinions and experiences as well as allow us as facilitators to gain insight into how we could improve future workshops. These questions can be found in Appendix 1. The evaluation was sometimes done with the entire group, sometimes per cultivation basin, and sometimes individually. After the evaluation wheel activity, facilitators also opened up for further comments, questions or concerns, which however seldom garnered much further information from participants. Regardless of whether the evaluations were done in larger or smaller groups, the scores tended to be rather high, however this might not correctly represent the true experiences of all participants. It is important to bear in mind that participants might not be sure or feel confident in what to ask of a workshop session if they have not participated in something similar before, and that there might be some barriers to truthfulness due to the differing roles between facilitators and participants. However, some of the comments
# Participatory tools

<table>
<thead>
<tr>
<th>Tools</th>
<th>Process</th>
<th>Purpose/Outcome</th>
</tr>
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<tbody>
<tr>
<td><strong>Problem palm</strong></td>
<td>Participants are allowed to define what they perceive as the main problem regarding water in their context, as well as define what they see as causes for and effects of this</td>
<td>This highlights perceptions of what the main problem is, why it occurs and what the results are, as well as who is affected. It can also show how the effects on their livelihoods are experienced. It can provide additional insight into the hydrosocial cycle as well as facilitators or hindrances for commoning.</td>
</tr>
<tr>
<td><strong>Solution palm</strong></td>
<td>By reversing what they defined as a problem into something positive (e.g. “shortage of irrigation water” into “sufficient irrigation water”) participants are allowed to analyze what some possible solutions to the problem might be, how these can be achieved and who is responsible.</td>
<td>This sheds light on what the participants’ hopes are for outcomes that could improve their situations, and how they view the roles of different actors as well as their own.</td>
</tr>
<tr>
<td><strong>Resource mapping</strong></td>
<td>Participants can present, in visual ways, where important resources in the community are located, such as water pumps, wells, canals, farmland etc.</td>
<td>To understand how their hydrosocial network is constituted. We as well as participants can gain perspective by seeing each other’s mental maps of how the community is structured.</td>
</tr>
<tr>
<td><strong>Social network diagrams</strong></td>
<td>Participants are able to elaborate on the social networks in which they engage, and whether commoning practices occur herein – allowing us to map the networks and activities that are present.</td>
<td>Focus on collaborations taking place, and gain insight and understanding of the commoning practices in the hydrosocial networks in the community.</td>
</tr>
<tr>
<td><strong>Seasonal and social calendars</strong></td>
<td>Facilitators draw up a calendar, marking the months of the year and levels of fluctuation. All present participants form a large group and collectively agree on important aspects and events that take place and fluctuate during different times of the year, including water levels, production events, cultural events, etc.</td>
<td>Provides insight into the changes in water flow during the year, as well as various occurrences of importance that might take place outside the time frame of our fieldwork. Shows how production looks during the year, highlight commoning practices at different times of the year.</td>
</tr>
<tr>
<td><strong>Evaluation wheel</strong></td>
<td>Participants are allowed to evaluate the session by grading their experiences of the workshop with the help of five questions designed to facilitate feedback on the efficacy, relevance and format of the session.</td>
<td>This gives valuable insight to facilitators on how future workshops can be shaped in order to achieve as fruitful results as possible, in part by securing that participants feel that the process is worthwhile.</td>
</tr>
</tbody>
</table>

Table 1. Participatory tools for workshops (Altered from: Mayoux 2006, 117-119; Pretty et al. 1995)
from the participants showed positivity towards the format of the sessions, and several participants from different workshop groups expressly stated that the topics felt highly relevant to their everyday concerns. The scores did differ from session to session, presumably a result of different participants’ views on different activities, as well as other factors affecting the sessions such as the translators present.

The workshops were guided by principles of collaboration, facilitation and participation as an attempt to ensure a process that would be as ethical as possible. While parts of the design phase as well as general outlines did take place prior to the arrival at the location of the fieldwork – adjustments were made throughout the process, allowing for input from the experiences of participants present at the workshops, as well as interviewees. As a way to ensure ethical application of the fieldwork, informed consent has consistently been a priority during data collection – meaning that participants were allowed to decide whether they wanted to take part of the sessions or not after having heard the aim of the study, and that they and their answers would be anonymous. Participants and interviewees were also able to consent to sound being recorded during the sessions. Another part of the ethical considerations of the fieldwork conducted for this study was to remain mindful and sensitive regarding present power relations between people in different contexts and settings. Given the relatively short amount of time we had in the field, it was naturally not possible for us to fully grasp the full extent and all nuances of the different power structures and relations in the studied community (Brydon 2006, 26-28). The issue of positionality is one aspect of this, which needs to be considered at all times – it is important to continuously reflect upon how we personally ought to relate to the studied community, with regard to our roles as students conducting fieldwork, as well as different gender roles (Binns 2006, 19). It has also been, and continues to be, important to consider the status of the local intermediaries that have aided our research, and how this has possibly had some effect on the findings (Brydon 2006, 27-28), one example being the presence of interpreters at workshops and interviews. Some of the interpretation was done by our contact person in the field, Dr. Mahmoud Shendi of the Water and Soils Department at the Faculty of Agriculture at Fayoum University. The primary valuable aspects of this have been that Dr. Shendi’s first language is Arabic, allowing him to speak freely and understand different dialectal variations as well as subtext, codes or rhetoric that might otherwise go unnoticed (Bujra 2006, 175), and that his many years of experience, work and research regarding environmental topics including water and soil in and around the communities in the Fayoum region, provided additional insight into how to phrase certain questions as well as what different answers could mean in a more detailed sense. However, it might also be important to consider that Dr. Shendi’s status as a professor and doctor at a higher academic facility might have influenced answers given by participants, as different power structures or interests might be highlighted in this interaction.

As this study has been conducted by two students, assignments of the project such as facilitating different parts of workshops, transcribing, modeling results, conducting interviews with groups or individuals, reading previous research, and analyzing material has been shared, as a continuous collaboration. This has allowed us to split up tasks such as leading workshops, transcribing and analyzing material – and in doing so enrich the learning experience as we have interchangeably taken on different roles and responsibilities during different parts of the field study. During the observation that we conducted, it was also valuable for credibility purposes
to have two pairs of eyes viewing the same process. This cooperation and our complementary perspectives and capacities have made for a, hopefully, more thorough and well-rounded study and analysis.

For the purpose of the study, and also in order to design proper activities and interviews for the fieldwork, a literature review was conducted prior to the fieldwork, consisting of relevant research and studies relating to the hydrosocial cycle framework, the concept of commoning, as well as applications of these in previous fieldwork. Research regarding topics such as water and agriculture in Egypt, adaptation and resilience were also included in the literature review in order to frame the case study and gain a wider understanding of the positions of other researchers with regard to the chosen topics. The articles included in the literature review were collected through database searches using the keywords: hydrosocial, commoning, commons, water management, responses to water scarcity, agriculture Egypt, water Egypt, and adaptation. We gained an understanding of which authors have been prominent within the fields and topics of interest to the thesis, in part by looking up authors cited in other articles that we obtained through the keyword searches, as well as looking at the most highly cited articles relating to the study topics. Conducting the literature review provided not only contextual background, but also a conceptual focus to adequately frame the study. This in turn allowed for operationalization of the conceptual framework, to make the topics of the research questions applicable in the field.

**Interviews**
The use of semi-structured interviews generally allows interviewees more freedom to convey what they themselves perceive as most important or telling – given a specific event, scenario or pattern. Semi-structured interviews are usually conducted with the help of an interview guide, specifying the topics of interest to be discussed (Bryman 2012, 471). This was an appropriate choice of method given the aim of our study, as we were intent on allowing local voices, albeit of differing positions and professions, holding knowledge about the issues and questions at hand to be heard. Five semi-structured interviews were held as part of our fieldwork, four with individuals and one with a group. All interviews were conducted in person, except for one that was conducted via email. We selected our interviewees based on their expertise and experience regarding the area of research for this study, and regarding the studied community and surrounding area – as well as, of course, on the basis of the availability of knowledgeable individuals. The interview guides used for the semi-structured interviews can be found as appendices. In addition to these interviews, informal conversations sometimes also garnered information of interest, the important findings from which are detailed in the section Field notes.

**Informal direct observation**
While various informal observations providing valuable general context took place throughout the course of our fieldwork, one informal direct observation was carried out through an excursion accompanied by a key informant from the agricultural association from our studied community. As stated by Yin (2018), observational evidence can be valuable for the purpose of collecting complementary data that might not become apparent during workshops or interviews. An observation that is aimed at observing proceedings rather than specific
individuals or groups, can be defined as an informal direct observation (ibid., 166). The observation that we conducted was executed with the purpose of viewing the irrigation procedure and water flows in the agricultural lands of Youssef El Seddik. Due to the informal nature of the observation, the exact events that would come to be observed were not completely planned out in advance. For example, the key informant accompanying the excursion brought us to the land where a farmer happened to be working during that time, which is why this specific farmer and his work were described in the transcript recounting the findings from the observation. The key findings from this informal direct observation were retrieved through visual observation and clarifying conversation with the key informant – which one of us translated from Arabic, and the other one wrote down, during the process. Throughout the excursion, a few pictures were taken by us to be able to reference and clarify certain findings from the observation during the transcription stage. After the observation was finished, we talked through the findings to achieve coherence between us regarding what we had observed, and later transcribed it. According to Yin (2018), having multiple observers observing the same things can “increase the reliability of observational evidence” (ibid.).

Analysis of empirical data
Given the type of data collection practices utilized in this study – namely, workshops and semi-structured interviews that have been translated from Arabic to English – our analysis method of the empirical data has included the process of coding as described by Bryman (2012, 575-577). The concepts of commoning and the hydrosocial cycle were used to construct specific categories that worked as code headings, to create code structures for commoning as well as the hydrosocial cycle. While initial codes constructed for the analysis of the data are based on from the theoretical framework of the study, some codes were also constructed at a later stage, based on recurring themes detected in the findings. Some findings were placed under more than one code heading.

The analysis method for this study has therefore been to first go over the findings after each workshop or interview, then transcribing and cross checking with recordings (depending on whether the session was recorded or not), to make sure that the translations are correct and that nothing important has been left out. During this step, the findings were also written as bullets under each code category – and some visual models were made at an early stage to facilitate comparison of findings, highlighting patterns or inconsistencies. Transcriptions and visuals were then evaluated more thoroughly in order to establish themes and patterns to be placed under different codes within the code structure previously mentioned. The themes and patterns that emerged, were structured under different headings of the analysis, where the findings were then analyzed elaborated upon with the incorporation of our theoretical framework.

Trustworthiness and the use of reliability, validity and generalizability
The relevance of reliability and validity within qualitative research is widely discussed. These concepts are primarily applied within quantitative research in order to assess measurements and reproducibility of data, and while there are certain ways to adapt the concepts for qualitative research (for example by speaking of internal reliability) – we have instead mainly applied alternative criteria suited for evaluating qualitative research. We focus on the concept of
trustworthiness, which allows for reviewing the study in a way that does not presume that there is one absolute truth or version of the social world. Within this concept, we further apply the concepts of credibility and transferability (Bryman 2012, 389-390).

Utilizing participatory tools allows for quick cross-checking of information and statements, as several voices can be heard during the same session – which in turn facilitates collective discussion. However, the information that surfaces depends on who is participating and the power dynamics of the group (Mayoux 2006, 121-122). We aimed to mitigate risks of this affecting the credibility of the findings, by dividing workshop groups into smaller sub-groups – with all groups conducting the same activities as the others – as well as holding separate sessions for women in order to counteract the effect of certain power dynamics related to gender. However, it is important to note that the procedure and instructions given were not exactly identical in every session. This was a result of us updating, reassessing and reprioritizing workshops and their instructions after each session, after finding out what worked and what did not work. Additionally, different workshop groups have different dynamics, making it hard to follow a fixed order of proceedings. However, the overall themes and essences of the workshops did not change between sessions. While it was necessary to reshape some aspects of the workshops to better suit the groups and research questions, this might have affected the credibility of the data in the sense that triangulation of the findings from the workshops between sessions became more difficult. Further, applying the Seasonal and social calendars activity during our workshops helped mitigate a so called “dry season bias”, or in our case “wet season bias” – as this provided the study with a seasonal perspective, which in turn strengthened the credibility.

The workshops conducted during the fieldwork were all based on well-established participatory tools – although somewhat altered to fit our research question and case. Adjusting the participatory tools to the context of our study allowed for the collection of more credible data from the workshops, compared to what we might have been able to gather had we just applied the tools in the exact way they were described in the instructions, or if we had developed completely new and untested tools.

For the sake of transparency, it is important to note that we compensated the workshop participants with 50 EGP (32 SEK) per person in order to cover for their transportation to the facility, and loss of work time in the field – as is reasonable when asking for time out of the participants’ day. This was also according to our contact person a common practice when asking members of the farming community to participate in workshops. It is however important to consider how this could have introduced certain biases, given that this factor might have affected who chose to participate in the workshops.

The farmers that participated in our workshops worked in different cultivation basins, and the farmer that additionally works as the area’s irrigation supervisor also participated. The sampling of farmers for workshops was conducted by the local representative for the agricultural association – he contacted farmers and the ones that were available during a given date and time, participated. This type of sampling might make some of the data less credible, partly because it is not possible for us to surely conclude how the sampling was done – which can create the risk for certain biases, such as gatekeeper bias, in the results as the sampling was done by the local representative for the agricultural association. This might have had an effect on which local voices, from different positions, that were heard in our study. However, this was
the only sampling that we were able obtain. The risk of reduced credibility that comes with this, is something that we have kept in mind and done our best to mitigate during our analysis, through consistent triangulation (Bryman 2012, 390) and cross checking of our workshop findings against our other data – such as findings from in-depth interviews with key informants – and other research.

Our intention was to further strengthen the credibility of our data through respondent validation – meaning that we would present initial findings to the participants and informants at the end of the fieldwork, and allow them to provide feedback, confirm or deny (Bryman 2012, 390). However, as it became difficult to arrange meetings towards the end of our stay, and we had to cut our stay in the field short, we were not able to do this. Had we been able to receive feedback from the participants and informants, the credibility of our findings might have been stronger. Lack of more extensive demographic data also creates certain issues regarding the credibility of the findings, as this lack makes it difficult to know what patterns might have been uncovered had we focused more on demographic factors and differences.

During one workshop, issues of miscommunication arose due to difficulties in translation by a stand-in interpreter. This made the data from the workshop in question less trustworthy and less credible. Some of these concerns were however later mitigated by double-checking sound recordings, and translating, interpreting and transcribing the group presentations that had been done on paper – as well as some clarifications being made during a follow-up interview with the same participants at a later time.

Internal reliability is used to describe the process of multiple researchers within a project attempting to achieve cohesiveness regarding the findings, to “agree about what they see and hear” (Bryman 2012, 390). During our fieldwork, we conducted an observation accompanied by a key informant, during which one of us held conversation and asked questions in Arabic, and the other was able to take thorough notes of both information and direct observations. The internal reliability of the observation we conducted was strengthened due to both of us being present, which allowed for a cohesive interpretation of the findings. After the observation, we were able to discuss, elaborate and reach agreements on the findings, which reduced the risk of biased interpretations of the data.

As our case study consists of a relatively small sample of participants and is conducted in an area of a very specific context that will likely shift, the transferability of our findings to another context, or to the same context during a later time, is presumably low. What is however recommended within qualitative work, and what we have attempted to do, is to provide “thick descriptions” related to our research questions, that could serve as a “database for making judgements about the possible transferability of findings to other milieux” (Bryman 2012, 392). The transferability of our study might also have been additionally affected by the fact that we did not collect demographic data aside from gender, location and membership in the agricultural community of the area. However, while our findings may be context-bound and specific, the conceptual framework of this study is possible to apply in many different settings and contexts – increasing the theoretical and conceptual transferability.

**Limitations of the study**

In order to make the study as thorough and refined as possible, we would have likely needed more than seven weeks’ time in the field to get as adequately acquainted to the site and its
community members as possible, as well as allow for more time for reflection and initial analysis between workshop sessions and interviews – to better process results and decide what complementary information would be important to try to retrieve during coming sessions. The time aspect also played a part in the scheduling of data collection activities, as the participants’ schedules would not always match up with ours.

Another limitation for the study is related to the transparency aspect, which might have affected our access to certain parts of the community and unbiased information.\footnote{Because of the covid-19 pandemic quickly spreading across the world during the time of the fieldwork, our time in the field was cut short by a week – it was initially supposed to be eight weeks – in addition to making it difficult to arrange meetings with our informants during the last few weeks in the field. Interviews were held via email instead of in person, and workshop activities were cancelled. Cancellation by local informants in Youssef El Seddik might have occurred due to worries regarding the spread of the novel coronavirus – as our contact person explained to us that the common perception among the local population was that the virus was primarily spread by foreigners – but the cancellations might also have been related to the transparency issues mentioned above.} It is important to note that the fieldwork that we conducted could only take place under planned forms, and that more or less spontaneous or unaccompanied activities were not always possible or easily achieved. The transparency from the community might also have been negatively affected due to one workshop session aided by a stand-in translator, which unfortunately resulted in a few miscommunications between us and the participants. In this sense, a certain level of skepticism on their part might be considered valid. The fact that the sampling was essentially conducted by a local representative from the agricultural association – following some general directives from us, of course – might have also affected the results that the study has garnered. While we had hoped to be able to speak to a larger number of participants, it proved more time consuming than we had anticipated to arrange meetings and workshops.

Prior to arriving in the field, we had also been informed that we would only have two hours per session at our disposal, as the farmers could not be absent from their agricultural work for too long. During the work we quickly discovered that this time frame made it difficult to fit in the activities we had scheduled, necessitating a re-prioritization of which activities to conduct during each session. The strained time frame might have affected the quality of each workshop, as it did not leave as much room for detail as we would have preferred. We did our best to make up for this through interviews and clarifications. As our contact person was only available for translation during one session per week, and was sometimes occupied with other engagements, we held some of the workshops without a translator as one of us knows Arabic. The use of local dialect and specific agricultural terminology made the translation somewhat difficult, but this was amended by listening back to the sound recordings and also asking for clarifications retroactively if there were words or concepts that remained unclear.
The setting: Youssef El Seddik

General information about the case study site, Youssef El Seddik, has been gathered throughout the course of the fieldwork by interactions, interviews and workshops with key informants knowledgeable about the area, its origins and its challenges. Youssef El Seddik is a desert reclamation area in the west of Fayoum, Egypt – as can be seen in Figure 1. Fayoum governorate is located downstream in the Nile system, making this area particularly vulnerable to issues relating to water shortages and salinity caused by mixage with drainage water. According to the information we have received during the fieldwork, the town of Youssef El Seddik arose between 1994 and 1996, instituted by the government as a desert reclamation area. Farmlands were reclaimed and given by the government to university graduates after an application process. Some graduates would then either cultivate the land themselves, or sell or rent it out to others that would cultivate it. Initially all landowners in the area were men, but currently some widows own land in Youssef El Seddik, that they have inherited from their husbands. The common practice for widows is to rent out their farmland.

The area is made up of five different cultivation basins divided into numbers: 1, 3, 4, 5 and 6. Most graduates were given five feddan (2.1 hectares) each – which is considered a relatively large amount seeing as farmers in Egypt generally have less than one feddan each. In desert reclamation areas, also known as “new lands”, it is however common that each farmer’s land is larger than it would be in so called “old lands”. The farmers in Youssef El Seddik are allowed three minutes irrigation time per feddan.

An agricultural association was instituted in the town by the government in 2000, as a way to facilitate cooperation between the farmers and encourage adherence to regulations regarding irrigation. Currently, the estimated number of households in the town is around 1,500 (amounting to around 4,500 inhabitants) and the number of farmers in the community is 800, all of which are members in the agricultural association. Membership in the association is based
on ownership or renting of the land, meaning that for example wives of farmers that are members in the association, might participate in parts of the agricultural work, but do not themselves hold an individual membership.

Aside from Youssef El Seddik being located downstream of the downstream, in the west of Fayoum, the fact that it is a desert reclamation area places further challenges on the agricultural operations as well as livelihoods in the area. Using mixed water – fresh water that is mixed with drainage water – is practiced at large in Youssef El Seddik, as all of the water circulating in the area is already mixed due to the downstream location. This creates further pressures on small-scale agriculture in the area, because the increasing salinity of the water makes it more difficult to cultivate, which has in turn necessitated crop shifts from vegetables to trees.

However, the coarse sand texture of the area’s soil makes the salinity somewhat more manageable, and also creates good conditions for modern irrigation techniques such as drip irrigation. The area was initially irrigated by sprinkler – however this system broke down after a few years, prompting the farmers to shift the irrigation towards traditional methods instead. Today, half the area is currently irrigated by traditional gravity immersion irrigation, and the other half by drip irrigation. Drip irrigation uses a pump to lift water from a reservoir to tubes that are strategically placed in the fields, that then drip out the needed amount of water depending on the crops, through small holes in the tubes. While the community is hopeful that the entire area will eventually be irrigated by drip, farmers are facing financial obstacles in this regard.
Results

Participatory workshops
The participatory work consisted of five workshops with a total of 22 participants, the same 10 men and 12 women, with whom we met on three and two occasions respectively. During each session, the groups were divided into smaller groups depending on which cultivation basin they belong to and work in.

Problem palm
The first activity conducted with each group was the Problem palm. Participants were given the task of defining what they perceive as the main issue regarding water for them, as well as the causes and effects of these issues. The results from each cultivation basin are illustrated in Table 2, however certain details from the activity are recounted below.

Most participants from both sessions defined main issues related to shortage of irrigation water and salinity. During the session with the male participants, three out of four cultivation basin groups mentioned the difficulty to cover the cost of fertilizers from the association, resulting in debt. When asked about their perceptions of why the discharge reaching farmers in Youssef El Seddik was low, some male participants stated that one reason is that farmers upstream steal water, making the amount that reaches Youssef El Seddik lower. The issue of unemployment was also discussed, and youth unemployment in particular – one group highlighting that the loss of agricultural work causes young people to simply “sit at home” or work with other things. A few of the men also stated that the percentage of unemployment among farmers is even “increasing”. The women also spoke about the issue of unemployment, some saying that many even leave agricultural work when it is no longer possible to cultivate, to look for other work. According to some participants, people sometimes travel abroad for manual labor, often in other Arab countries.

One recurring effect that all male participants mentioned was that the area had been forced to reduce its cultivation of vegetables due to water shortage and salinity issues, resulting in most of the area instead cultivating olive trees – a crop that can withstand dryness and salinity. Women from cultivation basin #6 mentioned that part of their soil is clay, which has different drainage conditions and characteristics than sandy soil. This also caused many olive trees in this area to die, as they grow well in sand but not in clay.

One group of male participants mentioned that half his area suffers from desertification, further reducing the amount of land that can be cultivated. When speaking of water shortage issues, two out of the three groups of women also mentioned that alternative (modern) irrigation methods such as drip irrigation are very costly. Another aspect of this, as mentioned by some of the women, is that drip irrigation needs water daily, which might require building a reservoir for storing water to then distribute via the drip system – which will in turn also be a cost.

Regarding causes for water shortage issues, our contact person – who was present during one of the workshops with the women – further mentioned aspects such as broken cement lining in the canals and the dumping of garbage in the canals possibly hindering the flow, which all of the female participants agreed with as being additional causes.
### Problem palm

<table>
<thead>
<tr>
<th>Cultivation basin</th>
<th>Problem</th>
<th>Roots, causes</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 (Men)</td>
<td>Shortage of irrigation water</td>
<td>Low water flow from Nile; Downstream location in irrigation canal; Low discharge from pumping station; Increasing salinity in irrigation water; Broken lining of the irrigation canal</td>
<td>Desertification of half the area; Cannot cultivate in summer; Inability to pay off debts to agricultural association; Low plant productivity; Cultivation shift from vegetables to olive trees; Unemployment among farmers</td>
</tr>
<tr>
<td>#3 (Men)</td>
<td>Shortage of irrigation water</td>
<td>Downstream location in irrigation canal; Low discharge from pumping station; High salinity due to mixing with drainage water; Broken lining of the irrigation canal</td>
<td>Low productivity; Inability to pay off debts to agricultural association; Increasing unemployment; Part of soil is barren; cultivation only in winter; Cultivation shift from vegetables to olive trees; Impacts the families</td>
</tr>
<tr>
<td>#3 (Women)</td>
<td>Shortage of water in the irrigation canal</td>
<td>The land is far from the water source (the Nile); Downstream location in irrigation canal; The nature of the soil (sandy) consumes too much water and is poor in nutrients</td>
<td>Low productivity; Soil salinity; Low water discharge; Alternative irrigation methods affect soil and living costs (drip requires daily irrigation and might require building a reservoir for storing water)</td>
</tr>
<tr>
<td>#5 (Women)</td>
<td>Shortage of water</td>
<td>The nature of the soil (sandy) consumes too much water; Low number of pumping stations; Low pressure and discharge from the pumping station; Downstream location in irrigation canal (last two points caused by long distance between the pump station and the Nile); The area of the land is far from the main pumping station</td>
<td>Low productivity; Affects the education level; Alternatives irrigation methods are costly (e.g. drip irrigation); Some farmers migrate for other work/sources for money due to inability to cultivate; Low living standard</td>
</tr>
<tr>
<td>#5 (Men)</td>
<td>Increased salinity</td>
<td>Irrigation water mixed with drainage; Low discharge from pumping station; Weeds in irrigation canal, Broken lining of irrigation canal</td>
<td>Low productivity; Low income; Most of the soil is not cultivated; Inability to pay off debts to agricultural association; No cultivation in summer (only in winter); Unemployment + youth unemployment; Cultivation shift from vegetables to olive trees; Some crops die; Disease in crops increases due to mixed water; Increased weeds in soil because of mixed water</td>
</tr>
<tr>
<td>#6 (Men)</td>
<td>Increased salinity in soil (and water)</td>
<td>Shortage of irrigation water due to downstream location on irrigation canal; Irrigation water is mixed with drainage water</td>
<td>Yellow and falling leaves; Low productivity; Cultivation shift from vegetables to olive trees</td>
</tr>
<tr>
<td>#6 (Women)</td>
<td>The land itself</td>
<td>Saline irrigation water; Salinity of the soil; Low potentiality (lack of equipment and money); Low possibility to clean or leach the salinity; Not all the soil is sand, some parts are clay with low drainage conditions</td>
<td>Low income for families; Low land productivity; Low crop/production quality; People leave the land in search of other jobs in the area (some travel abroad for manual labor, usually other Arab countries)</td>
</tr>
</tbody>
</table>

**Table 2.** Results from the workshop activity *Problem palm.*
Solution palm

When conducting the activity Solution palm, the participants were presented with the Problem palm they had previously made and asked to think of possible solutions. The results from this activity are illustrated in Figure 2 and Figure 3, and a more specific account is provided below.

All groups except for one defined the solution as something related to increased water supply: Increased water, More water, Sufficient water or Sufficient irrigation water – in Figure 2 comprised as Sufficient irrigation water. The remaining group, from the workshop with the women, defined the solution as Good, fertile soil, as can be seen in Figure 3. Two groups of male participants defined Increased water as the solution despite having stated during the Problem palm activity that the main problem was increased salinity in soil and water, rather than shortage of irrigation water. They explained the reason for the solution being water focused rather than soil focused by saying: “This [increased water] is connected to the salinity – if there is more water, the salinity will decrease”. One group of male participants argued that sufficient irrigation water could be achieved by increasing the volume of the water source itself by increasing Egypt’s share of the Nile water. However, this was not elaborated upon in terms of how it could be achieved or whose responsibility it would be.

Most male participants brought up the need to modernize the irrigation systems, for which one group stated that loans with beneficial terms were needed to achieve this, and that banks were the ones responsible for supplying them. Another group placed responsibility for the modernization on the farmers themselves, stating that what was needed to achieve it would be: “We, ourselves and our own work”, with another group highlighting the role of the agricultural association in the process towards modernization of irrigation systems in the area.

Many of the participants, both male and female, also mentioned that maintaining the irrigation canals and the gates was needed to achieve the solution, and that some of the things needed for this maintenance could be to line bigger irrigation canals as well as mesqa’s (smaller canals for each cultivation basin) with concrete, or fix the lining where needed. According to one group, the gates also need to be maintained in order to keep the water running in its place, instead of going “here and there”. Another group also mentioned that this necessitated government support as well as local support, as those responsible for achieving the maintenance were the government but also the farmers themselves. The farmer’s own role in this could be to fix the broken lining, as one male participant stated: “Sometimes we fix them together”. A group of female participants also stated that maintenance of the canals necessitates cooperation among farmers, as they in that case would source money for the lining and build it together. It was not clarified by this group if this was already a common practice, or if it was something they viewed as a possible practice for the future. According to the group in question, those responsible for this aspect would be the farmers themselves within their basin unions – which they elaborated upon by explaining that there is a union for each mesqa. These unions were established by the agricultural association, in part to confirm that each basin would be aware of their irrigation minutes. These unions meet monthly to discuss needs for the canals, such as cleaning or increased amount of water.
Figure 2. Compiled and interpreted results from Solution palm. The M stands for Male and the F for Female, followed by the number of the cultivation basin that has subscribed to the statement.
Maintenance and reparation of the main pumping station was brought up by all participants, male as well as female, as an important aspect. Some groups among the male participants mentioned the occurrence of occasional power outs, which results in the water flow being cut until the problem is fixed – one participant stating that the problem is sometimes not fixed quickly enough, leaving the farmers without water until it is. The groups in question placed responsibility for this on governmental departments. Female participants stated that in order to maintain the station, issues need to be reported to the pumping station engineer. They placed responsibility mainly on the engineer himself, who is responsible for doing the maintenance, as well as on the farmers, who are responsible for reporting.

Two out of the three groups of female participants placed focus on the need to keep the irrigation canal clean, in part by ceasing the throwing of garbage in the canal. One group specified that cooperation between farmers was needed to achieve this, by for example making announcements about it in the agricultural association, and increasing farmer’s knowledge on the matter. The groups in question also mentioned that the cleaning of the canal could be achieved through cooperation among farmers where they would source money amongst themselves to hire a digging machine to clean the canal.

One group of female participants stated that building a pumping station near their land could increase the possibility for them to have sufficient irrigation water, and that this was something that could be brought up to the agricultural association which would in turn suggest it to the irrigation engineer. Another group during the workshop with the women building more or bigger reservoirs to store water in as a way to get sufficient irrigation water, and that the farmers
themselves would be responsible for this. They also mentioned crop shift to less water intensive crops as a needed step, also under the responsibility of the farmers themselves. Additionally, the use of organic fertilizer was mentioned: “Because the organic matter can hold the water in the soil”. This organic fertilizer would come from the farmers’ own animals. The use of organic fertilizer from the manure of their animals was also brought up by the one group that defined a solution directly related to the soil. This group also brought up the need to build reservoirs to store water in, in order to then be able to distribute it to the soil. They stated that, because some neighbors share reservoirs, cooperation among farmers would be necessary to pay the workers that would build the reservoirs. However, the group also mentioned that sourcing money is “a challenge”, due to farmer’s insufficient funds. As the group further brought up the need to increase the potentiality for agricultural work and soil, they proposed that by looking for other sources of income, they hope to increase the money they can spend on their agriculture and soil. One example they posed as an alternative income source, was to prepare birds such as chicken or ducks at home, to be able to sell eggs and meat.

**Resource mapping**

Due to time limitations prompting the prioritization of other activities, the Resource mapping activity was conducted only with the group of male farmers. An illustration of the results from this workshop can be seen in Figures 4 and 5. The participants asked to draw up a map depicting what they viewed as important resources related to water and agriculture in their area. When this activity was conducted, some of the participants from one cultivation basin had to leave the workshop early as their irrigation time was about to start and this was the first day in which they had received water in an extended amount of time. For this reason, a few participants from

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**Figure 4.** Compiled simplified visualization of all resource maps. The letters symbolize different plots of the same basin.
another cultivation basin offered to assist the remaining participants from the group in question with the drawing of the resource map, which might have resulted in some similarities between those maps. The participants were asked to mark the town of Youssef El Seddik relatively centered on the map, and thereafter mark out their important resources around this area. Most cultivation basins marked out the agricultural association, the community development association and the local sporting club within the town center. Around this, essentially all basins drew the water flow stemming from Bahr Qarun canal, to the main pumping station which supplies water to the main irrigation canal for the farmlands in the area via underground pipes. The water then reaches each cultivation basin by way of different gates and smaller pumping stations between the basins. In interviews with other key informants, we were able to clarify that Bahr Qarun comes from a bigger canal called Bahr El-Banat, and that the mixing of water with drainage starts partially in Bahr El-Banat.

A main difference between the basins' different maps was that basins #1 and #6 drew their own farmlands quite small and on the sides of the maps, with resources such as water sources, pumping stations and canals taking precedence, while #3 and #5 drew their farmlands very large

**Figure 5.** Compilation and interpretation of water resource system surrounding Youssef El Seddik, derived from workshops and interviews.
and centered. This can possibly in part be explained by the fact that basins #1 and #6 are located further away from the town itself, than basins #3 and #5.

A participant from basin #6 detailed that he grows trees because of the water shortage: “Olive trees, because they can withstand thirst”. Participants from another group stated that they also mainly grow olives, but also onion, wheat, clover for animals, and medical plants such as artemisia. They further stated that the crops are mixed on the plots, meaning that different crops are not split up and grown on any specific plot.

**Social network diagrams**

During the social network diagrams activity, the groups were asked to describe the networks and relationships present between themselves as farmers, and other actors and institutions. The participants were asked to define these relationships based on three categories: public/governmental relationships (such as governmental support), money-based relationships (involving payments or money transactions), and collaborative relationships (specifically collaboration where no money is exchanged). The results from this activity are visualized in Figure 6, and details are relayed below. The findings from the session with the male participants were somewhat compromised due to the misunderstandings caused by incorrect translation during this workshop. However, we were able to clear up some of the misunderstandings from this workshop during a follow-up group interview with the male participants.

When this activity was conducted with the male participants, they were initially asked a few general questions regarding the population of Youssef El Seidik, in an attempt to determine whether there are specific networks present between different ethnic, religious or gender-based groups. The participants stated that there are both Muslims and Christians living in the area, side by side with neighboring houses and neighboring farmland. They stated that collaborations take place between neighbors, rather than on the basis of religious affiliation. When asked about specific networks between women, the group responded that there is no agricultural collaboration amongst women in the area: “Women sometimes work together with household work, but not in the land. In the land, they work with their own family.” Although these questions were asked merely as a way to get an overview of the town’s population and make out if there might be collaborations or commoning practices based on a sense of community between minorities or people sharing beliefs or facing similar challenges, it was later made clear to us that we should avoid posing this type of questions as the topics were sensitive to inquire about.

**Public/governmental and associations relationships**

Regarding public relationships, essentially all participants from both sessions mentioned the relationship between themselves as farmers and the agricultural association (hereafter: the association), which is closely connected to and facilitated by the government – meaning that the relationships that the farmers have with the association and with the government are in many ways interconnected. When asked if there are direct links between the farmers and governmental departments, a group of female participants responded that all communication between them and the government is facilitated through the association.
All participants stated that the main function of the farmer’s relationship with the association is that the farmers are able to purchase fertilizers from the association at subsidized prices. These fertilizers are in turn provided by the government to the association, making the price point cheaper than if the farmers would buy them from the black market. Some participants stated that in addition to fertilizers, chemicals and pesticides are also provided by the government via the association at subsidized prices. Further, one of the male participants explained that with the use of modern drip irrigation systems, they can control the amount of chemicals being spread on the land so that it does not by extension then affect the irrigation water as much. He further mentioned that courses regarding modern irrigation practices had been held via the

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**Figure 6.** Compilation of results from social network diagrams

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agricultural association, in collaboration with aid agencies such as FAO (Food and Agriculture Organization of the United Nation). The participants agreed that there is a big difference between the irrigation methods, and stated that half their area utilizes drip irrigation while the rest is traditional gravity irrigation. According to these participants, the solutions for farmers in Youssef El Seddik is modern irrigation and knowledge about chemicals that can counteract salinity.

Most participants did also define a relationship between them as farmers and the government itself. Participants stated that if they need something related to their agriculture, they can request help from the government: “If I need something, I can tell them. For example, the broken lining of the canal is still not fixed – this is the responsibility of the government”. Several participants confirmed that issues related to irrigation and agriculture are the government’s concern, and that the government can, for example, assist the farmers in the form of money. There is also a relationship between the farmers and the engineer – hired by the Ministry of Water Resources and Irrigation – who is responsible for the main pumping station. A female participant stated: “The farmers tell the engineer what problems they are having, for example if there is not enough water, or if maintenance is needed”. Aside from this, a number of female participants stated that the role of the government is also to maintain the relationships and security between and among the farmers. The participants also explained how the relationship between the farmers and the government has changed over the years, and that it was initially more direct, as Youssef El Seddik is a desert reclamation area established by the government. In the beginning, the government would support the area’s farmers in more direct ways, by providing them with food and water so that they would be able to start their lives and production in the area. Initially, the government would also trade with the farmers of Youssef El Seddik, and buy their crops and produce at what the participants deemed as “reasonable” prices. After about five years, the direct support from the government was withdrawn to an extent, giving the farmers more independence. According to some of the participants, this resulted in middlemen such as merchants gaining increased power over the prices and the market. One participant stated: “In the beginning, the government would pay the highest price for the products. Today, the merchants reduce prices, making it a financial loss for us to trade with them”.

Money-based relationships

The merchants were mentioned by all 22 participants as the main money-based relationship with farmers in the area. One participant stated: “The merchants control the market” – something that in most participants’ view was the result of the withdrawal of government support and trade. The merchants are usually from outside the community of Youssef El Seddik, as the main crop grown there is olive trees and, as one male participant put it: “The entire country wants the olives”. The female participants highlighted that the merchant’s role has become crucial due to the state of the area’s farmland, one participant stating: “Because of the water situation we cannot grow produce worth exporting ourselves” – and even if they could, the main issue according to participants is that there are no wholesale markets in the area. She further stated: “There is no direct market for the farmer but there is a merchant, who can take produce from us and bring it to the market, which means that a large ‘chunk’ of the farmer’s income goes to the merchant”.

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Another money-based relationship mentioned by most participants is that between farmers in the area. They described that if a farmer needs help with the labor in his farmland, he compensates other farmers with money or with food to help him. One participant who has a side profession as a house painter mentioned that he will always pay other farmers money for helping him with agricultural work rather than conducting an exchange of services: “Otherwise they will want me to ‘pay them back’ by painting their houses, which is more expensive than doing agricultural work!” If one farmer has seeds and another does not, they can also buy these from each other. If they do not have money at that time, participants explained that they can pay back after they have grown the crops from the seeds and sold them. They can also exchange different types of crops of the same value with each other, and buy fodder and fertilizer from each other – the latter always paid for with money, never an exchange.

**Collaborative relationships**

Regarding collaborative relationships, participants confirmed a statement made by one of our other key informants, regarding the practice of farmers borrowing irrigation time from each other, if one of them is in particular need of more water at some point. This practice always consists of an exchange of irrigation time, never money. One participant stated: “If my neighbor needs more irrigation time, I can give him an extra hour of irrigation out of my own time, and then I will get an hour back from him at another time”. When asked about whether crops are chosen collectively as a way to manage the water, male participants stated that there is no practice of collective crop choice among the farmers in the community. However, most farmers in the area do mostly grow the same crops, regardless of outspoken crop rules. Participants did also mention that they sometimes work in each other's lands as a collaborative practice and not only in exchange for money, one female participant stating: “If they have any work with the land, they help each other out – one can go to the other after he finishes his own work and vice versa”. The female participants also mentioned that neighbors collaborate by sharing water, getting each other's advice or opinions on agricultural matters or other things, and sourcing money together if something regarding the land needs to be fixed. This cooperation also occurs across different cultivation basins if something more extensive needs to be fixed in the area, such as building lining for drain or canal: “These are things that are costly to us, and that cause the land to dry when they do not work”. Both male and female participants stated that women in the area do not collaborate with each other across cultivation basins in any agricultural regard, but that they do work with their families on their own farmland. The female participants mentioned that most of the labor related to irrigation was done by the men. They stated that there are also women that have knowledge about modern irrigation systems and soil, for example, but that “if the man is not present, the woman cannot do the irrigation, that is difficult”.

Additional information that was brought up during this activity, is that while the engineer hired by the government is responsible for the main pumping station, there is also a locally appointed supervisor whose role is to oversee the irrigation flow in Youssef El Seddik as it enters each basin. Additionally, some male participants mentioned that different cultivation basins congregate regularly to discuss water related issues, for example whether one area has a lot of water while another does not have enough. They stated that they usually meet at the
sporting club, but sometimes also at the agricultural association or the community development association, to discuss the agricultural work.

Some female participants highlighted that the situation for women in the area differs from the men’s: “We are sitting at home, our work is with the children. Even if we have land, we mostly sit at home. We would like any work”. Another important aspect to note is that the female participants expressed that there was no place for them to congregate, that the meetings at the agricultural association and community development association were only for the men, and that the sporting club was also frequented only by men. They expressed a desire for some project or means for them to meet across cultivation basin groupings, so they could socialize and exchange knowledge about sewing, cooking or baking: “We would like to meet and sew together, we would like something that gathers us”.

Seasonal and social calendars

This activity was conducted with the groups as a whole, without dividing participants by cultivation basins, due to the time factor and complexity of the activity. A visualization of the results from both sessions can be seen in Figure 7.

Water level was the first variable brought up. The male and female participants defined high and low points of the water levels somewhat differently – presumably due to a slight misunderstanding occurring when the activity was initially explained to the group of female participants. In the visualization, however, we have adjusted the levels after reaching a conclusion that the discrepancies between male and female participants regarding water levels was the result of a communication issue rather than an actual perception held by the participants. This conclusion and adjustment were based on other interviews and general knowledge about the water levels during the year. When adjusted, the female participants and male participants' perceptions of the water level are quite similar. When viewed at once, one can make out that the month when water levels are the lowest are between May and September, and the highest between November and March.

Production level for olive trees was defined by male participants as a variable separate from that of vegetable production, initially following the patterns of the water level, but remaining steady during the dry months of the year, instead of going down like the vegetable production. The female participants did not define the production level for olive trees as a fluctuating variable, but instead focused on variables showing the harvest time for different crops – showing that the olive tree harvest takes place during the time of the year when water levels are at their lowest. Both male and female participants stated that Collaboration levels were at their highest during the same time as the olive harvest. The male participants explained that during the months of the olive harvest, all farmers collaborate as they all need help with the harvest during the same period of time. They collaborate with the olive harvest across cultivation basins, to finish the harvest in one farmer's land, after which they move on to the next farmer’s land, and so on until all olives in the area are harvested. They further stated that there is a lower level of collaboration taking place other times of the year, when the farmers assist each other with agricultural work in each other's lands. According to male participants, Income levels follow the water levels in the beginning of the year, and then become consistent with the fluctuations of production level for olive trees – indicating that their incomes do not necessarily
Figure 7. Results from Seasonal and social calendars workshops. Water levels from workshop with female participants have been adjusted.
become lower during the time of the year when they are “only” able to produce and sell olives as opposed to both olives and vegetables. The female participants defined income as being at its highest during the olive harvest, to then slowly decrease to its lowest point just before next season’s olive harvest. Female participants further indicated that Labor intensity is higher during harvest periods and low in between these periods, which indicates consistency between levels of labor intensity, collaboration and olive tree harvest, stated by the women. The labor intensity level stated by male participants, however, did not match the levels of collaboration that they had marked out. It is unclear if this was an error due to miscommunication, as they had previously stated that collaboration levels and olive production levels are consistent with each other. An explanation might be that the men considered the variable of labor intensity before considering the collaboration variable.

Participants stated that during Muslim holidays, barely anyone is found working in the land, as most people would be visiting family at this time. Christian holidays were not elaborated upon – perhaps because all present participants were Muslim.

**Informal direct observation**

**Site/area:** Cultivation basin #5, Youssef El Seddik

The observation took place during the time of irrigation for cultivation basin #5, and was facilitated through the agricultural association. We were accompanied by Mr. E.2, a local key informant from the agricultural association in the case study site.

During the observation we walked along a canal with running irrigation water, stopping to observe and ask questions at different points. First, we observed several greenhouses, owned by the head of the agricultural association. Here, crops such as tomatoes and grapes were cultivated by drip irrigation. Next to one of the greenhouses was an irrigation water reservoir lined with concrete. We were informed that the owner of the greenhouses had several employees working with the cultivation in the basin, and one of them was present at the time of the observation, overseeing the irrigation. Further ahead, in the same land, there was a bigger reservoir which has been built by digging a hole in the ground and diverting water there. Several pumps lined one corner of the reservoir, some driven by solar power and others by petrol. The reservoir also served as a fish farm. Further, we learned that the landowner in question cultivates olive trees by gravity immersion irrigation, where passages are dug in the sand to open up waterways by making canals or small walls where the sand diverts the water to different parts of the field.

During the observation we learned that it is very common for graduates to rent out their land to someone (a farmer) for a yearly fee. According to Mr. E., the renter will receive the profit from selling the crops he has cultivated. When moving from the first plot to another one further ahead, we observed a male farmer – who we learned was a renter – in the middle of the laborious and heavy process of manually diverting water in his onion field. Nearby, next to the field, his wife was sitting on a blanket making tea. Mr. E. explained that she was there to assist her husband, in part by tending to the animals that were grazing close to the farmland. We were

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2 The names of key informants and interviewees have been changed within this study for the sake of preserving anonymity.
able to speak to the renting farmer for a little bit. He stated that they receive water two times a week, and every 15 days the onion and olives are irrigated. We were told by Mr. E. that the irrigation times are decided by the Ministry of Irrigation and the local agricultural association. A schedule is made so that the farmers know when the irrigation water will arrive. When the irrigation time for one farmer is finished, the water is diverted to the farmer next in line. All farmers keep track of their own irrigation time.

Beside the plot where the renting farmer was working, we observed a drainage canal which drained into a reservoir located close to the irrigation canal that enters the plot in question. From this reservoir, the drainage water was being pumped with a petrol driven pump and mixed with the “fresh” irrigation water to increase the amount that would reach and irrigate the field. Mr. E. stated that “there are no limits on how much drainage water one can use” and that “farmers know from experience how much drainage water they should take”. He further explained that several farmers in the same branch share this reservoir, and that all farmers have access to a system similar to the one we were observing. He however also explained that some farmers have their own reservoirs, and others share. For example, we walked past one reservoir that Mr. E. stated was shared by four farmers, and that they agreed amongst themselves on how much water each person can take. Mr. E. also stated that “the drainage water is not inferior to water from the Nile” and that mixing drainage with fresh water is a common practice in areas where water is scare.

Further, we observed olive trees being cultivated among wheat crops, in the same field. Mr. E. explained that this is a practice applied to ensure that the field will not be completely barren during the summer months. When leaving the cultivation plot, we saw a vehicle equipped with refrigeration. Mr. E. stated that this vehicle is owned by the agricultural association, and that it is used to collectively transport crops from different cultivation basins to markets.

Field notes
During the two months we spent in the field, residing in the village Tunis, a 15 minute car ride away from Youssef El Seddik, the area was twice hit by intense storms of rain and hail. The storms affected big parts of the country, and with no infrastructure in place to handle heavy rainfall, the streets of Cairo and many other places in Egypt were flooded, with cars and public transportation swimming in water, roofs collapsing in apartment buildings, and entire houses being submerged in water in the area surrounding Tunis and Youssef El Seddik. Electricity was also affected in large parts of the country, even causing fatalities on bridges in bigger cities. Locals said that this was a very rare occurrence, and many of them had never experienced the sheer capacity of these storms before. They stated that it would usually only rain once a year, relatively lightly. Many local residents argued that this was a clear sign of the climate shifting, and while we were there some households in the village began to reconstruct their roofs in order to keep the rain at bay next time.

Interviews

The role of associations
Two interviews were conducted with academic faculty members in Fayoum, Dr. A. and Dr. B., both of whom have long experience of research regarding water related topics such as
agricultural extension, irrigation and water user’s associations. The latter, sometimes also referred to as agricultural associations, emerged to us during the fieldwork as a significant part of water management in the area. As confirmed by both of these interviewees, the water associations in Fayoum were initially instituted as a way to counteract practices that violate water rights. Dr. A. stated that upstream farmers could sometimes open their gates and steal water, which has caused conflicts throughout the years.

You receive what you have the right to, and stay there to oversee it, and then I receive it from you. And the irrigation is going on 24 hours, even in the night, so the farmer always has to receive his water, and then go and open for the one who is after him. It is all according to the clock, every farmer keeps track of the clock. So, they take what is theirs, and pass it on to the one who is next. Otherwise problems will arise.

She also stated that there are instances where upstream farmers violate rulings by breaking canal openings so that more water flows through, or place suction pumps underground that draw water from the irrigation canal by illegal means. Hence, the associations’ main objective is to solve problems of this kind by, according to Dr. B., “organizing and controlling water shifts between farmers as well as monitoring the irrigation openings on the main canals and monitoring any infringements or thefts of water”. In addition to this, the associations were also meant to manage the lack of irrigation water in the area. Elaborating on the role of the associations, Dr. A. stated the following:

[They hold] meetings between the farmers, discussing what problems are present, and the association might be able to help them resolve this. They might hold courses so [farmers] can practice modern irrigation, capacity building, [...]. Also field visits, for example from entities concerned with human development, who can learn about the issues that these farming populations face.

Dr. A. explained that in the 1990s, a foreign project in collaboration with the Ministry of Water Resources and Irrigation as well as the Ministry of Agriculture in Egypt was carried out to establish the presence of water associations for each canal in Fayoum:

Associations with groups of farmers were established to manage and systematize the circulation of water between them, concerned with everything related to protecting the water. For example: collecting money together and building new canals, buying pumps to conserve water and reduce water loss, or fixing linings of the canal [...], distributing the irrigation together, irrigating in organized times – and counteracting issues that would arise from gate to gate. There used to be big conflicts where people would get into fights or even try to kill each other. So the associations were also in place to help them solve these issues so that there would not be conflicts of this kind.

Additionally, Dr. B. explained that the idea of establishing water associations has been promoted by the Directorate of Irrigation in Fayoum governorate, by holding elections at the level of each village and then every major canal – where the associations in question organize and control water shifts. The associations consist of different levels, as stated by Dr. B.: village level, main canal level, district level, and governorate level. He goes on to state that “the leaders are chosen through elections by the members at any level of associations: village, main canal, district, or governorate.” These elections are however problematized by Dr. A., in stating the following:
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The board of directors are not elected in a proper way, instead of electing the person that can actually provide the service, people are elected because of closeness or contacts. So the board of directors, the administration, is weak.

Dr. B. argued that members of the associations are “totally independent in deciding the administrative structure and making rules for the association”. This statement is however somewhat countered by Dr. A. who claimed that while members are able to make requests to the board if they wish to make changes, the board constellations at a higher level cannot be changed because the government is involved in them. Elaborating on the level structure of the associations, Dr. B. stated the following:

These levels are connected together by coordination between irrigation directorates and irrigation engineers responsible for these associations with the Ministry of Irrigation. [The roles of the water associations is] the coordination between the presidency of water associations (at the level of each major canal), the directorates of irrigation, and the water engineers in the district [and] meeting with the representatives of the association at the village level to urge them to cooperate with each other and adhere to the shifts regime for water inside the village, and not to break or violate the roles of the main canal.

Both interviewees did state that the functionality of the associations appears to have weakened. Aside from mentioning that the improper elections of board members affect the quality of services provided to farmers within the associations, Dr. A. further stated:

Before the capitalization, around 30 years ago, the people and farmers had a vision for the association to do something. It used to provide the seeds, credits, all of the inputs. [...] With better support from the associations, or projects to improve the role of the associations [...], better services and assistance could be provided to the farmers, which will of course help their production.

According to Dr. B, the cooperation within the associations used to be “fruitful, and the rights of others to water were not violated. Maintenance of the main openings of the canal was carried out, and the farmers were obligated to [water] shifts and applied the law to violators”. However, he stated that there are also more recent events that have affected the functionality of the associations:

Unfortunately, these associations do not work well today as a result of the lawlessness after the revolution of January 25, 2011, and [their] role has not yet been restored and some people have started again to encroach and steal the water from the main canals.

Dr. B. further argued that the Ministry of Water Resources and Irrigation is “trying hard to revive” the role of the associations, and that there are different factors that determine if an association functions well or not, such as the budget, canal cleaning services and coordination between different levels. According to Dr. B., what facilitates cooperation within the associations is mainly farmers’ trust in the leaderships that handle the affairs of each association, arguing that this “leads to commitment and non-infringement on the rights of others and access of water to those who need it equally”.

Dr. B. stated that while it is not mandatory for farmers to be a member of the association, it does entail benefits for them:

It is a good thing for a farmer to be a member of these associations to take full advantage of their services. Note that, in the past, farmers were eager to join these associations
because it had a prominent and effective role in managing water resources in the governorate.

During a group interview that was held with the male workshop participants, we learned that all 800 farmers in Youssef El Seddik are members of the agricultural association in their community. Dr. C., another key informant and academic faculty member working in Fayoum with expertise within soil and water issues, stated that there are no membership fees for the farmers in the agricultural association of Youssef El Seddik, but that they do pay for services such as transportation of their products to markets. On the topic of membership in the associations, Dr. A. mentioned that people that were members of the associations were shown to be more positive and have a better attitude towards rationalizing water consumption, compared to those that were not members. Farmers that are not connected to an association will themselves be responsible for the entire process regarding irrigation flow and time between themselves and their neighbors, likely resulting in conflicts if some farmers take more than their share. Dr. A. mentioned that these issues have been so prominent in Fayoum, that there is even a specific “irrigation police” in the governorate. Dr. B. also stated the following:

Without the association, unfortunately, many farmers infringe on water openings, break them and do not commit to water shifts. While many also do cooperate with each other, it is not like [the cooperation] that existed when those associations were active a few years ago.

Agriculture and irrigation in Fayoum and Youssef El Seddik

A pilot interview was conducted with Mr. D., a key informant identified as a private farmer with a lot of knowledge about the area and its agriculture. He has a background as an agricultural engineer, having worked within several NGO-projects as well as having established an agricultural association for women in the area.

Speaking about the water and irrigation situation surrounding Youssef El Seddik, Mr. D. stated that while water was abundant in winter, in summer, people would be fighting over it:

In summer, it is per minute. For example: my area has only 35 minutes [irrigation time], for two feddan. 35 minutes after [the irrigation supervisor] has opened the canal to me, he closes it because another farmer takes it after me. He does not leave one minute for me, and I do not leave one minute for him. Except if we make some agreement between me and him: “Okay, this week, I take your irrigation water and mine together, for my land, because I need this water. And the second week, I give my water to you.” I make some relation between him and me.

When asked if these collaborative water relations or networks are present at a larger scale among the farmers, Mr. D. responded that it is only between neighbors, and unofficial. He also stated that in the summer, this collaborative practice might be difficult as some may decline to “lend out” irrigation minutes if they do not have enough water for themselves. Mr. D. further stated that while there is an irrigation supervisor present during the irrigation time, in the summer the farmers will also oversee the irrigation themselves: “In summer, all people sit like foxes in water. You cannot leave it, but in winter, everything is okay, they have a lot of water”.

While Mr. D. mentioned that for his land, he has 17,5 minutes irrigation time per feddan, he did state that the amount of irrigation minutes differs from one area to the other – something that was confirmed by Dr. B. as well as Dr. C. According to Dr. C., the differing irrigation minutes
can be related to the irrigation canal dimensions and discharge method in each area, stating that an area with gravity irrigation could necessitate more irrigation minutes per feddan than an area in which the water is lifted through a pumping station – which is the case in Youssef El Seddik where the farmers have three minutes per feddan.

Regardless of the discharge method, many areas in Egypt still predominantly use traditional gravity irrigation methods, which were considered ineffective by many of the interviewees. In Youssef El Seddik however, as stated by participants during the workshops, the farmers irrigate half their land by drip irrigation, and the other half by traditional gravity irrigation. During the group interview, the male participants explained:

We had about 5-6 years with sprinkler irrigation. After that, the sprinklers started to break and that is when people started to change irrigation methods. We started to change to [gravity fed] immersion irrigation, and when the water decreased, the immersion irrigation did not work well. We then started to change to drip irrigation, and to growing trees that can handle thirst, such as olive trees.

During this interview, it was also confirmed that most farmers have access to a reservoir for storing water, or access to a drainage canal, that they are then able to draw water from and mix with the irrigation water. In an interview with a local key informant from the agricultural association in the case study site, Mr. E., we further learned that reservoirs are usually built and used by each individual farmer, but that they can also sometimes be built and shared by neighbors. This is however rare, according to Mr. E., and it is more common that neighbors share the drainage water between the plots, which they can draw using pumps and mix with irrigation water. Mr. E. stated that there is no limit for the quantity that can be taken from the drainage canal. However, not all farmers own a pump, but they can access one by borrowing or renting it from a neighbor. When asked about drainage water reuse, Dr. C. mentioned that as Youssef El Seddik is located in the far downstream, restrictions regarding drainage reuse are minimized. He further stated that because all water in Youssef El Seddik is essentially drainage, there is not a big difference in quality: “The majority is already drainage. So to use the drainage water again, it is not such a big difference”. Dr. C. further explained that while drainage water is expected from gravity irrigated areas, the same cannot be said for an area using drip irrigation, as these systems only add very small amounts of water. In these areas “you will not find water in a drainage canal – you will not find a drainage canal at all”.

The switch to modern irrigation methods such as drip irrigation, is by several key informants, including workshop participants, seen as a solution to water issues. As Mr. E. stated: “Drip saves water, chemicals and clean handling”. When asked if the implementation of modern irrigation systems might change the dynamic of farming communities, Dr. B. stated that he does not think the dynamic will be affected with the implementation itself, but that “if the implementation of modern irrigation methods leads to an increase in crop productivity and an increase in farm income, this would help in moving a farmer to a higher social class”. Mr. E. expressed hope that all farmlands in Youssef El Seddik will eventually be entirely irrigated by drip irrigation: “It is considered modern agriculture, and [the farmers] want to practice modern agriculture. And we hope that all will practice modern farming, because [this] will bring more robust business than immersion irrigation”. Dr. A. argued that if upstream farmers would use modern irrigation methods, this would have fewer negative effects for downstream farmers:
Upstream farmers take more than their quota. They plant seeds that require a lot of water, they use traditional irrigation, they do not use modern irrigation like drip or sprinkler, which would have helped downstream farmers to utilize their land because there would be more water left. So the [downstream] lands are left uncultivated all through the summer months.

Dr. B. provided a similar argument, while also problematizing the possibilities for modern irrigation in Fayoum, stating:

In my opinion, use of modern irrigation will lead to less water use from upstream farmers, which will save energy for them and provide more water for downstream farmers. [However], this case can’t be implemented in Fayoum where most of the land is old land that uses traditional irrigation methods due to the nature of the topography of the lands, the fragmentation and the inability of farmers to finance such modern systems.

The argument for modern irrigation methods necessitating the right conditions in order to succeed was also made by Dr. C., although with respect to soil conditions. He stated that drip irrigation systems are applied in Youssef El Seddik as this area has sandy soil which is suitable for these systems: “The sand should be permeable, with good drainage conditions. Texture may be loamy or sandy. But when it is heavy clay and permeability is low, the system will not succeed”.

While the above mentioned is related to technical necessities for agricultural success, there is also the question of whether different socioeconomic factors affect the possibility for a farmer to succeed. Dr. A. and Dr. B. both mentioned education level and income level as some of the main factors determining the success of a farmer. They both also highlighted the farmer’s level of openness and progressiveness – the will and ability to understand and adapt to new methods quickly – as a determinant for success. During the group interview with the male workshop participants, they stated that since all landowners there are educated graduates, they have all the qualifications and are easily able to acquire knowledge about drip irrigation systems and how to install them: “We get the materials and install [it] ourselves. The farmer himself has knowledge and responsibility for adjustment and development, and installs the system”. The main difficulty with implementing drip irrigation systems, according to the participants, is lacking financial support from the banks, as all farmers have to pay the cost for material and installation out of their own pockets.

When asked about how gender plays into the success of farmers, Dr. A. stated: “Here in Fayoum, it is the man who is usually successful as a farmer”. However, she did also point out that the agricultural profession in Fayoum consists of many activities aside from farming, such as animal production which the women in Fayoum are usually responsible for and skilled at. This can entail taking care of cows or raising chickens and ducks, for example. Dr. C. stated that widows that have inherited land from their husbands can sometimes bring in renting farmers to help them with cultivation or irrigation – but that there are also women that handle the agricultural operation by themselves. The practice of bringing in renters is not uncommon in our studied site – as most landowners in Youssef El Seddik are graduates, according to Dr. C. they will sometimes sell or rent out the land to a farmer:

This is the way to succeed sometimes, the new graduates sometimes do not have enough time or ability to reclaim the soil or to cultivate a new land. And the farmer has more ability or solutions on how [the cultivation] can bear the environment, and so on.
Analyzing intersections between the hydrosocial cycle and commoning

The making of Youssef El Seddik

An integral part of the hydrosocial cycle framework, as relayed in this thesis, is the argument that “over time and space, water and society make and remake themselves” and that “the need to manage water has an important effect on the organization of society” (Linton & Budds 2014, 175). Considering the fact that Youssef El Seddik was established as a desert reclamation graduate-project instituted by the government – meaning that the farmland was offered to university graduates that applied for land – the area can be defined as an example of a case where a choice regarding the management of water has affected the overall organization of society. Since water is what creates the possibility of a farming community to be established in a desert, the community and agricultural operation of Youssef El Seddik arose as water was diverted to this area and people were offered to live and work there. The presence of water pumps is, according to Barnes (2012), the determining factor that enables this process of desert reclamation. In the case of Youssef El Seddik specifically, the Ministry of Water Resources and Irrigation installed a large pumping station that would irrigate the reclaimed area. However, Barnes also argues that a pump, while it holds the power to create and strengthen communities and the activities within them, can also cause the disintegration of other communities (ibid., 527). One example of this is the perception expressed by some of our workshop participants, stressing that water levels are insufficient in Youssef El Seddik partially because of upstream farmers stealing water or taking more than their quota. However, as Barnes points out, Youssef El Seddik is in turn located upstream of another area – this area then being negatively affected by the pumping activity in Youssef El Seddik. This means that while the pump operating in Youssef El Seddik maintains the community and agricultural operation within Youssef El Seddik, this same pump harms agricultural communities downstream (ibid.). The phenomenon of water related constructions benefiting one community while simultaneously harming another, is theorized upon by Swyngedouw (2009) in saying that while water related constructions might improve both social and physical conditions regarding the environment in some places and for some people – the opposite is often true for other places and people (ibid., 56-57). The making of Youssef El Seddik, and the process that this entails, sheds light on how different societies are impacted – made and remade – by the hydrosocial cycle.

Perspectives on hydrosocial problems

During the course of the fieldwork, key informants and workshop participants highlighted a number of factors that they perceive as causes for water issues in Youssef El Seddik. A number of workshop participants indicated that they perceive the low water flow from the Nile as one of the main problems affecting the amount of water that reaches them in Youssef El Seddik. Some participants saw the reason for this being that Egypt’s share of the Nile water is not large enough. As argued by some of the academic interviewees, this share can be said to have diminished because of Ethiopia’s construction of the Grand Ethiopian Renaissance Dam (GERD) as well as issues regarding climate change. Academic interviewees further argued that other main factors causing water issues in the area were upstream/downstream conflicts and the use of inefficient traditional irrigation practices. One interviewee argued that the storing
capacity of the lake is the main challenge regarding water management in the area – something
that he stated that the farmers themselves were unlikely to bring up as knowledge about the
issue is limited among farmers in the community. As we would later learn ourselves, the
workshop participants did indeed not bring up this issue. Instead, most participants claimed that
some of the main issues for them were caused by upstream farmers taking too much water, that
the discharge from the main pumping station is too low and the farmlands too far from the
pumping stations – some further away than others. Participants also highlighted that
maintenance of the pumping station is needed from time to time, due to electric power outages
that affect the functionality of the station – as the pumping of water is powered by electricity
the farmers lose valuable water time if the issue is not taken care of quickly enough. The broken
linings of the main canal and weeds hindering and consuming water flow in the canal were
brought up as problems by the vast majority of the workshop participants. The coarse sand
texture of the soil was also considered problematic by many workshop participants as it
consumes too much water and is poor in nutrients. We learned during workshops that one
cultivation basin has part clay soil as well, which poses different challenges regarding crops
and irrigation. Essentially all workshop participants also mentioned that the mixed state of the
water – as all water in the area is already mixed, and that the farmers reuse drainage water for
irrigation – places further stress on the water, soil and ultimately on the production.

The workshop participants and the academic interviewees did state a few of the same factors
as main causes for water related problems in Youssef El Seddik – namely the
upstream/downstream conflicts and the use of traditional irrigation techniques – but aside from
this, the workshop participants named more locally related factors while the academic faculty
members held a broader focus. These differing perceptions and definitions of the problems
might be a result of the fact that the workshop participants are members of the agricultural
community of Youssef El Seddik and therefore have a local perspective of what affects them
in their daily operations, while the faculty interviewees – while knowledgeable and experienced
regarding the topics as well as the area – have a different perspective as they are not participants
in the agricultural life and operations at the most local level.

**Behind the perspectives and the role of the hydrosocial network**
The difference in the prioritization and definition of factors causing water related issues can be
said to shed light on different ontological and epistemological perspectives on water – which is
in turn connected to factors related to power, technology and social structures (Linton & Budds
2014, 178). Linton and Budds argue that the relationship where water affects the organization
of society, which affects the disposition of water, which in turn creates new forms of social
organization – in effect means that water and society are internally related, meaning that
“particular kinds of social relations produce different kinds of water, and vice versa”. Further,
the authors argue that ontological and epistemological perspectives of water play a part in how
water relates to “power relations, social structures and technologies” (ibid., 175). In addition
to this, there are arguments by Boelens et al. (2016) stating that within a hydrosocial network,
factors such as “humans, water flows, ecological relations, hydraulic infrastructure, financial
means, legal-administrative arrangements and cultural institutions and practices” are
“interactively defined, aligned and mobilized through epistemological belief systems, political
hierarchies and naturalizing discourses” (ibid., 2). Considering this, one might further argue
that the various factors making up the hydrosocial network influences the perspectives that humans within the networks have on water, and vice versa in that the perspectives on water held by these humans influences the factors that make up the network.

The members of the agricultural community of Youssef El Seddik understand and perceive their water related problems through their *hydrosocial networks*, given the present *hydraulic infrastructure* where water of a certain quality flows or does not flow – the most central part of which is the main pumping station. This pumping station is an integral part of the hydrosocial network of Youssef El Seddik – it is the determinant of the community’s existence and it shapes the community members’ perceptions of water and challenges surrounding water in their area, as it determines the *span* and *durability* of their *hydrosocial territory*. Span and durability as defined by Bolding (2004), are two main defining aspects of a hydrosocial network. Span refers to the “*geographical, social, material and institutional coverage*” of a hydrosocial network (ibid., 17-18). Given this understanding, Youssef El Seddik is connected to a larger span that extends across Egypt, all the way to the highlands of Ethiopia. This is an argument that can be connected to statements by Linton and Budds (2014) regarding hydraulic developments affecting political landscapes (ibid., 178), which one of our interviewees touched upon in naming the Grand Ethiopian Renaissance Dam as one of the reasons for reduced water levels in Egypt. Locally, however, the main pumping station makes up an important boundary for the span of Youssef El Seddik – it was brought up by essentially all workshop participants when speaking of problems, solutions and important facilities and actors in the area. For example, when conducting the *Resource mapping* activity, all participants marked out the main pumping station as the first important resource in the community. Further, when speaking of solutions during the *Solution palm* activity, participants mentioned the irrigation engineer working at the main pumping station as an important actor regarding maintenance and reparation of the station – which could salvage certain water issues.

The main pumping station further holds significance for the span of the studied site because it determines the durability of the community. This concept is by Bolding (2004) defined as the *stability* of a hydrosocial network over time (ibid., 17-18). It can be argued that the stability of Youssef El Seddik as a community and its agricultural operation partially depends on the government’s interest in maintaining it. The practice of land reclamation in Egypt dates back centuries, with the purpose of increasing and extending the country’s arable and cultivated land (Barnes 2012, 517-518). While Youssef El Seddik was established as a reclamation project in the late 1990’s, the long history of practicing land reclamation in the country could imply that the government interest in maintaining areas such as our studied site will not fade within the foreseeable future. Further, Barnes (2012) states that the main pump in Youssef El Seddik is a factor providing stability to the community and its activities, compared to the informal pumps in the communities surrounding the area in general, and downstream communities in particular (ibid., 525-527). In our analysis, this could be explained by the government involvement regarding the construction of the pump in Youssef El Seddik – an involvement that is absent in some of the surrounding communities. The way in which water related constructions bear the possibility of improving some communities while simultaneously running the risk of negatively impacting others, reconnects to the previously relayed arguments by Swyngedouw (2009) in stating that these imbalances result in the sustainability of some societies, and the instability or disruption of others (ibid., 56-57). While Youssef El Seddik has a relatively substantial
pumping station benefiting from some governmentally aided maintenance support, it is important to keep in mind that the community is still affected by problems resulting from upstream water use. This is highlighted by the concerns expressed by our workshop participants – some even indicating that there are local downstream issues within Youssef El Seddik, in stating that some cultivation plots are further away from the pumps than others, and that the number of smaller pumps between basins is too low. One of our academic interviewees also detailed ways in which water is stolen by upstream farmers. Barnes (2012) additionally emphasizes the difficulties for governmental systems to control the diversion of water in reclaimed upstream areas (ibid., 525). Further, the durability of Youssef El Seddik is likely affected by the electric power outages of the main pumping station that occur from time to time – which according to our workshop participants results in the farmers being left without water until the power is back on.

The community members’ perceptions of the water related challenges are further shaped by their financial means – as some participants have debts placing financial strains on their livelihoods, making it more difficult for them to implement the expensive modern irrigation systems. By contrast, other participants with sufficient finances are able to limit their vulnerability to the water issues and production shortages by building drip irrigation systems, or solid concrete reservoirs for storing water, as well as buying fertilizers without being put in debt.

The legal-administrative arrangements of the area also play a role in how the water situation is experienced and perceived by the members of the studied community. The Ministry of Water Resources and Irrigation along with the agricultural association of Youssef El Seddik have established irrigation water regulations that all members of the association (which in this case entails all farmers in the community) must comply with. This includes an irrigation schedule that all farmers have the responsibility of adhering to, with set irrigation times for each farmer. None of the workshop participants brought up that the amount of irrigation time – three minutes per feddan – was something that affected them negatively. This might imply that the irrigation time in and of itself is not generally regarded within the community as something that is up for discussion, or to be considered an issue to be resolved. Further, this possibly implies that a regulation has, in this case, shaped a general perception and attitude regarding water in the community. Statements made by academic interviewees saying that in some places, legal measures can be taken against those that violate the water regulations, and that there is a specific “irrigation police” in Fayoum governorate dealing with these issues, further adds to the possible ways in which a norm might have been created. Another explanation for the workshop participants not bringing up their irrigation time as a problem, might be what Barnes (2012) brings up in stating that graduates in Youssef El Seddik sometimes bribe the operators of the pumping station to keep it on for longer than the set times (ibid., 527). This argument is however difficult to analyze within the scope of our study, as this was not something that was found during our fieldwork. It is also possible that this practice, if it has taken place, has since ended. Another example of how legal-administrative arrangements influence perspectives, is that Youssef El Seddik is relieved from certain restrictions regarding drainage water reuse, as one of our key informants explained that these restrictions are minimized in Youssef El Seddik and other areas that are located far downstream. This has likely influenced the ways and extent to which the farmers of the area utilize drainage water.
In Youssef El Seddik, the cultural institutions that make up another aspect of the hydrosocial network, are partially in place to facilitate management and discussions regarding water. Additionally, these cultural institutions can be said to influence the organization of the society of our studied site. Participants stated that they attend meetings within the agricultural association or at the sporting club to discuss matters relating to the agricultural operation and water in the area. There is also a community development association in the town center, where participants mentioned that they also sometimes meet. These meetings constitute situations where a collective understanding of the local issues might be shaped. It is however important to note that these institutions do not include women, in the sense that it is only men that take part in the meetings and boards of the associations. Women that are not registered as owners of farmland in the area, for example the wives of farmers, do not themselves hold membership in the agricultural association – despite the fact that they do take part in some of the agricultural work. The female participants of the workshops stated that there is in fact no place for them to congregate, even though they wish to. This imbalance can be said to play a part in the perceptions that are shaped and the interventions that are implemented regarding water challenges in the community – which can be reconnected to how Linton and Budds (2014) theorize regarding power relations and social structures being connected to how water is conceived (ibid., 178). Further, Swyngedouw (2009) argues that “hydrosocial transformations are embedded in and infused by class, gender, ethnic or other power struggles” (ibid., 57). In our view, this strengthens the argument that these gender imbalances possibly affect local hydrosocial processes, having likely done so already. Swyngedouw additionally states that “these struggles will undoubtedly intensify in the near future as environmental change accelerates” (ibid.).

The influence of the hydrosocial cycle on the local material reality of water

As stated by Linton and Budds (2014), the management of water affects the organization of society “which in turn, affects the disposition of water, which gives rise to new forms of social organization [...] in a cyclical process” (ibid., 175). This further means that water and society are “related internally, which means that particular kinds of social relations produce different kinds of water, and vice versa”. However, the hydrosocial cycle framework does also pose that “the material properties of water play an active role in the hydrosocial process” (ibid.). We would argue that considering the concept of span can provide different nuances to the material properties of water. As stated above, given our frame of analysis, the span of the studied locality can be determined by the main pumping station of the community. Within the context of the span of this particular hydrosocial network, the material properties of the water are that it is low in terms of water levels, and that it is mixed and saline – in effect making this the material reality of the water for the community members in Youssef El Seddik. Essentially all workshop participants brought up salinity as one of the main concerns for them regarding their irrigation and agriculture, and stated that the salinity had substantially affected their crop choices. Further, one of our interviewees explained that the mixing of the water that reaches our studied site begins in Bahr El-Banat – the bigger canal that leads to the irrigation canal of Youssef El Seddik. Hence, these properties have not been created locally, but by larger social processes.
and constructions that exceed the local – the society is locally structured and handled given the local material reality at hand. This ties into further arguments by Linton and Budds, stating that:

[...] the hydrosocial cycle represents the process by which alteration or manipulation of water flows and quality affect social relations and structure, which in turn affect further alteration or manipulation of water. As a cycle, there is no necessary beginning or end to this process (Linton & Budds 2014, 175).

The authors go on to state that within the process where “water and society make and remake each other over space and time [...] water’s materiality [...] intervenes in the process, perchance stabilizing, perchance disrupting society” (Linton & Budds 2014, 176). Considering this in relation to the material properties of the water within the span of Youssef El Seddik’s hydrosocial network, our results indicate that the local material reality of the water – in this case being that the levels are low, and that it is mixed and saline – has affected society. Some workshop participants stated that the low water levels had led to half of their farmland suffering from desertification. Other participants stated that parts of farmland in Youssef El Seddik are left completely uncultivated during the summer due to lack of sufficient water levels – which according to many participants has resulted in increasing unemployment among members of the agricultural community of Youssef El Seddik, and even in migration – mainly to other Arab countries, usually for manual labor. Workshop participants also mentioned that some – usually women – might raise ducks and chicken in the household in order to sell meat and eggs as a way to make up for lacking income from the agricultural operations. Further, many of the participants mentioned that they have debts to the agricultural association, from which they purchase fertilizers. This is a cyclical process: the farmers need to buy fertilizer in order to grow their crops, but because of the material properties of the water in Youssef El Seddik, there is not enough irrigation water to cultivate or produce enough, and the value of the products that are actually sold is cut short by the market middlemen. This results in the inability of farmers to pay for the fertilizer, which puts them in debt. While the above mentioned dire and unfortunate aspects are important to note, the challenges posed by the local material properties of the water in Youssef El Seddik have also given rise to new forms of water management – in the form of new agricultural practices related to water within the community. This is of great significance for the commoning aspect of this analysis.

The hydrosocial cycle giving rise to new forms of commoning

Commoning has, in the context of what has been analyzed by Turner (2017) emerged from the idea that commons are to be considered as “clearly-defined social groups [which] self-organize to effectively manage circumscribed sets of resources” (ibid., 796). However, while commons refer to commonly held resources, they are not fixed but seen as a set of constantly changing social relations. Commoning is less likely to occur in “pure” forms, and more likely to take on “hybrid” forms consisting of interactions as well as social institutions – which allows the benefits from commoning to not only be produced but also maintained (ibid., 799), making it an activity where collective, mutual and shared use of resources is practiced (Linebaugh 2008, 279). Considering this, commoning then poses an alternative to the idea that resource management or social organizations can only prosper under the regulation of government or privatization (Turner 2017, 796).
While Youssef El Seddik might not consist of a clearly defined social group, one might draw on the concept of span in arguing that the hydrosocial network of Youssef El Seddik, determined by the main pumping station, does create a somewhat defined social group operating in the community. The agricultural association of Youssef El Seddik can also be seen as a factor creating a defined social group. The association is also one of the main facilitators for the forms of water management that are practiced in Youssef El Seddik, and can therefore act as a starting point for the analysis of the hybridity and self-organizing effect of commoning in our studied site.

The agricultural association (hereafter referred to as the association) of Youssef El Seddik was instituted by the government a few years after the establishment of the community. Associations of this kind were part of a number of donor-funded (in part by the World Bank) initiatives across Egypt starting from the 1980’s, aimed at managing water at a local level and improving infrastructure and water use, to then in turn increase farmer income (Shindo & Yamamoto 2017, 774-775). Key informants for our study stated that the water associations in Fayoum were put in place to decrease violations of water rights among farmers, and to increase and secure farmers’ compliance with regulations regarding irrigation water in each canal, as well as manage shortages of irrigation water in different areas. Further, our key informants detailed the role of the associations as holding meetings for farmers to allow discussions regarding problems related to water and agriculture and ways in which the association can help. Our workshop participants confirmed that this is, in fact, the role and process of the agricultural association in Youssef El Seddik as well. The association in our studied site has, in accordance with the Ministry of Water Resources and Irrigation, issued an irrigation schedule which details the exact time that every farmer will receive irrigation water, and how much time the farmer is entitled to. This is something that all farmers in the association are to comply with. Further, the workshop participants stated that the role of the association in their community is mainly to provide fertilizers at subsidized prices – which appears to be a generally appreciated service. Some participants stated that the association is also there to maintain the relationships and the security between farmers.

While we did learn that all 800 farmers in Youssef El Seddik are members of the agricultural association, there is a question of whether it is mandatory for the farmers to become members. This was something that we were unable to fully clarify during the fieldwork – however it did seem as if it might be a necessity for farmers to be members in order to secure their irrigation time and make sure that nobody infringes on it. The access to subsidized fertilizers might also be a factor making membership in the association alluring to farmers. One of our academic interviewees did state that membership in the associations is generally voluntary – which has sometimes led to associations disintegrating. This implies that even if the initiative to establish an association comes from the government level, there needs to be interest from – and perhaps also incentives for – the local level in order for the associations to be viable. The apparent interest among farmers in Youssef El Seddik to become members of the association, paired with statements from workshop participants saying that farmers also congregate in other places aside from the association’s facilities, might indicate that a self-organizing effect has emerged. Workshop participants also mentioned that there are canal unions where members of each cultivation basin congregate monthly to discuss their specific water and agricultural issues, which further strengthens the argument that self-organization is present in the community.
It is important to also consider factors that can hinder the self-organizing effect. In cases where the election of leaders for the associations is somehow negatively influenced or corrupted, the consequential self-organizing effect is likely diminished, which in turn might have adverse effects on the viability of commoning. While we do not know how leaders and officials of the association are chosen in Youssef El Seddik in particular, we did during the fieldwork receive different statements from interviewees regarding the election of the board officials and administrators of the associations in general – some merely stating that these are elected by the members, and others claiming that they are elected based on their connections. In the case of Youssef El Seddik, we learned that the head of the association as well as the local representative for the board of directors both reside and are also active as farmers in Youssef El Seddik. Further, our interviewees stated that the members of the association are generally able to influence the administrative structure and rules for the association, but that this might be easier to achieve at a local level than a higher one.

The establishment of the agricultural association from above (government and international level) and the self-organization from below (local level) highlights a hybridity of social institutions, management and practices in Youssef El Seddik – which in turn connects to the idea of a hybrid, rather than “pure”, commoning consisting of interactions as well as social institutions (Turner 2017, 799). While the agricultural association of Youssef El Seddik was initially instituted by the government, it is not necessarily regulated by it on a day-to-day basis – instead, one can detect a hybridity of government involvement and local self-organizing, resulting in a hybridity of commoning. This hybridity might make the handling of resources, in this case mainly water, more effective and viable than it might have been had it been completely regulated by government or privatization, as the local incentives to practice commoning would then likely have been weaker. One of our interviewees stated that facilitating collaboration between the farmers is one of the aims of the agricultural association – which might then play a role in the emerging commoning practices in the study site, as the agricultural association is a part of the institutional hybridity in Youssef El Seddik.

The market also plays a part in this hybridity, in the form of merchants that collect products from Youssef El Seddik and sell them on the wholesale markets. Initially, the government had more direct contact with the farmers in Youssef El Seddik, facilitating a lot of the trade in the area and often buying their products at proper prices. This connection diminished after a few years, making the trade more market controlled. When discussing this during a workshop, one workshop participant stated: “The merchants control the market”. It became apparent during the workshops where the market was brought up, that there is a significant financial interaction between the farmers and the merchants in which the merchants make large profits due to the absence of wholesale markets close to Youssef El Seddik. One academic interviewee did state that there is a system in place for collectively transporting products from the community to markets, and that this transportation service is something that the members of the agricultural association can take part in by paying a fee for transportation. This was not something stated by the workshop participants themselves, however some of them did mention that transportation of products to markets could be more costly for a farmer whose land was located far away. They added that it is sometimes not even worth it for them to transport their products, as their quantity is not large enough for the process to be profitable. As the possible benefits of commoning are produced and maintained by social institutions as well as interactions (Turner 2017, 799), one
might consider that in this case, the benefits of commoning in the sense of collective transportation, are perhaps not strong enough to maintain this practice. Reconnecting to arguments of the hydrosocial cycle framework, the inability to grow enough products to be transported to markets can be related to how the hydrosocial cycle influences local conditions that shape organization and management.

When speaking of the market and merchants, workshop participants also stated that most merchants that collect and sell products from our studied site are from outside the community, since the majority of the agricultural area of Youssef El Seddik grows olives and, as one participant stated: “The entire country wants the olives”. During the fieldwork, we learned that the majority of farmers in the area have in fact shifted their cultivation from vegetables to olive trees “because they can withstand thirst”, as one participant put it, with other participants confirming and adding: “And salinity”. This way to manage the water can be reconnected to how the hydrosocial cycle has affected the local material reality of the community’s water – making it, as previously stated, saline, mixed and low in levels. As we discovered during the fieldwork, the olive harvest is one particularly significant practice related to commoning in the area. While the workshop participants did state that the practice of neighboring farmers helping each other with agricultural work in each other’s lands was not uncommon – although usually compensated in some way – the olive harvest is different. This is instead an occurrence where essentially all farmers come together, across cultivation basins and without compensation, to assist with the harvest in one farmer’s land, to then all move on to another farmer’s land to help out with the harvest there, and so on until all olives in Youssef El Seddik have been harvested collectively. Additionally, as can be seen in the Seasonal and social calendars (Figure 7), this practice occurs during a time of the year when the water levels are at their lowest – which is also, according to some of our interviewees, the time when there are generally the most water related conflicts. More importantly, in viewing these calendars, the olives seem to provide a financial buffer for the people in the community throughout the year – meaning that the process of growing and collectively harvesting olives has a positive impact on livelihoods in Youssef El Seddik. As we previously mentioned that collective transportation of products to markets might not be a widespread practice in Youssef El Seddik due to lacking benefits of this practice – the opposite could possibly be said for the growing of olives and the commoning regarding the olive harvest. In this case, it is likely that the benefits derived from growing this crop and the farmers’ collaboration are favorable enough for the commoning practice to be maintained by the farmers themselves.

Interactions creating context specific socio-spatial commoning

As Noterman (2016) states, it is important to note that every occurrence of commoning is context specific, and entails different socio-spatial relations (ibid., 435). This relates to further arguments by Noterman, stating that it is important to acknowledge commoning that occurs outside of fixed organizational structures, as commoning can take place within or on the periphery of the collective management of shared resources – and that the commoning activities that are practiced may change and take on different variations over time (ibid., 448). We would argue that one aspect that influences these commoning variations in the case of Youssef El Seddik is the hydrosocial cycle – as the hydrosocial cycle itself varies and changes within different contexts, from local to global levels. As stated by Linton and Budds (2014): “The
Hydrosocial cycle [...] is a dynamic historical and geographical process, meaning that the assemblage that gives rise to a particular kind of water and a particular socio-political configuration is always changing” (ibid., 176). This process has resulted partially in one of the local material properties of the water in Youssef El Seddik being low water levels, which might have necessitated certain ways to manage the water flow among farmers. As relayed to us by workshop participants and other key informants, one commoning activity widely practiced in Youssef El Seddik, is that of neighboring farmers borrowing irrigation time from each other. As explained by our informants, if one farmer is in dire need of water, he may negotiate with his neighbor to receive some of the neighbor’s time – and then give back the exact same amount of time at a later date. This practice and its process was something that was confirmed by all workshop participants – who also stressed that this practice always consists of an exchange of time, never money. Another commoning activity likely prompted by the hydrosocial cycle, but not as widespread as the borrowing of irrigation time, is that of neighboring farmers within the same cultivation basin using reservoirs collectively. As explained to us by a key informant, four farmers might use the water from one shared reservoir, and they will agree amongst themselves on how much water each person can take.

As commoning practices are context specific, with practices shifting due to changing contexts, we would argue that the reduced levels of irrigation water in the area might have created a new context in which most farmers switched to cultivation of olive trees – which in turn shaped a commoning practice specific to this context, namely the collective olive harvest. Similar arguments could be made for the use of shared reservoirs, or the borrowing of irrigation minutes. The commoning regarding borrowing irrigation minutes among neighboring farmers has likely been shaped by the context that Youssef El Seddik is a downstream desert reclamation area receiving low water levels – therefore necessitating the presence of a collaborative system between farmers in order for them to get enough water for their crops. And as highlighted by the hydrosocial cycle, the context of an area is ever-changing – meaning that the practices that we have observed and learned about during the fieldwork may very well change over time. Further, every occurrence of commoning changes depending on differing socio-spatial relations. An example of how spatiality plays a part in the commoning of Youssef El Seddik is the fact that the majority of the commoning occurs between neighbors: the help with each other's agricultural work throughout the year, the borrowing of irrigation time, the sharing of reservoirs. The social aspect is highlighted by looking at the example of how one farmer who also works as a house painter chose not to participate in certain instances of commoning that were otherwise widespread in the community. He explained that if he were to help out with the agricultural work in a neighbor’s land “they would want me to pay them back by painting their houses, which is more expensive than doing agricultural work!” . He would, however, participate in the specific commoning practice of the olive harvest. This highlights that the individual context plays a part in determining which commoning activities are practiced, and by whom, as having additional professions aside from farming could evidently hinder certain commoning practices that could be perceived as an unequal exchange of collaboration, because different professions bear different values.

As we learned during the fieldwork, half of the agricultural area of Youssef El Seddik is irrigated by drip irrigation, and the other half by traditional, immersion fed gravity irrigation. Workshop participants and interviewees did however state that the goal is to eventually irrigate
the entirety of the studied area by drip irrigation – something that is partially hindered by financial factors, as workshop participants stated that the drip irrigation systems are expensive and that it is difficult to get loans from the banks. While some valuable benefits of drip irrigation would be conservation of water and reduced salinity, one academic interviewee also explained that the absence of traditional irrigation would reduce or even erase the presence of drainage canals or drainage reservoirs altogether. This would likely change the context and therefore also the commoning practices of the area, as many farmers now depend on drainage water from canals, or from shared reservoirs filled with drainage water, for sufficient irrigation of their lands. With an extended use of drip, there is however a possibility for extensive commoning to occur regarding the use of shared reservoirs from which water can be drawn for the drip irrigation systems. As stated by a key informant, while there are currently reservoirs being shared by some farmers in the area, it is not very common – the reason for which was not elaborated upon further. It was not clear to us whether farmers in the studied site currently share reservoirs for their drip irrigation systems. The general attitude towards commoning among workshop participants regarding some of these aspects did however appear positive. When conducting the Solution palm activity, many participants brought up possible solutions that would entail or even necessitate cooperation and commoning among the farmers in the area – which indicated that the idea of commoning to achieve certain solutions for all farmers in the area is not something they appear to be opposed to. Some participants mentioned that in order to clean the irrigation canal, farmers need to cooperate in part by making announcements in the agricultural association and increasing farmer’s knowledge on the matter. They also stated that cleaning the canal would necessitate the farmers sourcing money together to hire a digging machine. Cooperation in terms of labor and sourcing money was also brought up when some participants mentioned the need to line the mesqa’s, the small irrigation canals, with concrete.

**Concluding the analysis – hybridity and context**

Turner (2017) argues that a lot of the literature and analysis regarding commoning has focused on displaying existing and strong commons that act as a force countering enclosure or neoliberal globalization (ibid., 796). As Noterman (2016) states, this then often fails to highlight occurrences where commoning takes place “outside a self-identified, politicized activist milieu” (ibid. 435). Additionally, instances where commoning emerges within a given shifting geographical, temporal and social context, are sometimes not highlighted (ibid., 448). This further leads to the downplaying of commoning that takes place within hybrid institutional forms (Turner 2017, 796). As shown in this study, the case of Youssef El Seddik displays a few different characteristics and instances of context specific commoning occurring in a hybrid institutional setting, influenced by hydrosocial forces. In our studied case, it is not a question of old commons that have survived enclosure, neither is it new, pure commons that have arisen. Rather, this is a case where a desert reclamation project initiated in the 1990s has created a new social context within which commoning practices have emerged. The commoning in Youssef El Seddik then takes place in an environment that is not “self-identified” or “politicized” – terms that would imply the presence of a particular political collective objective among the people living there – but rather in a setting where people are residing and working as a result of a state-issued desert reclamation graduate-program – something that has a separate, national aim.
Connecting to wider perspectives

The hydrosocial cycle has influenced the community in terms of financial means, legal-administrative institutions, and cultural institutions – which have in turn shaped how water is managed within Youssef El Seddik. For the farmers, this mainly means that their irrigation water is regulated by certain irrigation times, and that the crops they are able to cultivate are more or less determined by the state and amount of the water available to them. These factors along with the prevailing organizational structure of their society, has resulted in the farmers practicing some forms of commoning in order to get enough irrigation water, by borrowing irrigation minutes from each other, and in order to manage their harvest – as farmers collaborate as a community with the harvest of the main crop of Youssef El Seddik: olives. This commoning takes place during a time of the year when water levels are particularly low, and conflicts surrounding water generally more prominent. These findings are important as they display how the hydrosocial cycle influences commoning in part by hindering some commoning practices while necessitating or facilitating others. This provides insight into the effect that management of water and the underlying factors related to this, has on how, or whether, farmers in a desert reclamation area cooperate along the lines of commoning practices – which in some cases has a significant effect on their livelihoods as well. The way in which the olives provide an income level for the farmers that allows them to stay financially afloat throughout the year, sheds light on how a commoning practice such as collective olive harvest influences livelihoods in the community. As our findings show, the hydrosocial cycle also impacts major factors such as unemployment resulting in migration – which the commoning to some extent might be able to mitigate. It is important to consider different implications that the results displayed in our study might come to have for various actors, with regard to water levels and water quality. As the goal is to eventually irrigate all agricultural lands in Youssef El Seddik by drip irrigation, farmers with insufficient financial means might be affected by exacerbated poverty in the long run in the event that they seek loans for drip irrigation systems, which they are then not able to repay if their incomes do not increase accordingly – resulting in debt. Further, continuously low water levels might increase the level of migration among those farmers whose lands are difficult to cultivate – to upstream communities, to other parts of Egypt, or to other Arab countries.

Relating our findings to similar studies, Parsons and Chann (2019) present findings, utilizing the hydrosocial cycle framework, indicating that local hydrology such as canals, wells and local hydro-geography mediates the effects and perceptions of climate change which ultimately then drives migration (ibid., 11). While our study does not look at the issue of migration and its drivers in particular, our results do show that the farmers themselves make a clear connection between the unemployment resulting from inability to cultivate – which in turn is caused by insufficient water levels – and the migration that follows. This might indicate that there are similarities between the results from the studies. Further, Barnes (2017) states that her long term ethnographic work showed that small-scale Egyptian farmers generally did not view climate change as a major aspect affecting the water scarcity that they experienced – but that they instead named local techno-political occurrences as causes, such as an engineer directing or not directing water to their plots of land, and upstream farmers using too much water (ibid., 8-9). During our fieldwork, as shown by our results, we also found that no farmers expressed that climate change was a cause for their lack of water – it was never mentioned by them during
the workshop activities where causes for water issues were discussed at length. They instead mentioned, similarly to the farmers in Barnes’ study, the responsibility of the irrigation engineer at the main pumping station, and excessive upstream water use. Results presented by Rap and Jaskolski (2019) show that factors such as community, gender and culturally cohesive experiences can provide a foundation for commoning practices, and that cultural bonds or shared experiences of resource scarcity can “open up spaces for commoning” (ibid., 99-100).

In the case of our studied site, this is likely applicable in the sense that all farmers belong to the same community and therefore more or less face the same water related challenges. It is therefore in everyone’s interest to engage in certain forms of commoning. Additionally, while Rap & Jaskolski analyzed commoning amongst women specifically, our results clearly showed that the commoning in Youssef El Seddik takes place amongst men, as women are effectively excluded from the majority of the agricultural work and also from the decision-making regarding agriculture and water. Rap and Jaskolski further present an argument regarding intersections between factors such as class, perhaps creating instances of “commodified exchange instead of commoning practices” (ibid., 100). Our results indicate something similar to this, in that farmers with additional professions aside from farming would pay for help from other farmers rather than practicing commoning. As one farmer who also worked as a house painter stated, the others would often ask him to help them with painting in exchange for their assistance with agricultural work – which according to him would make the exchange of collaboration unequal.

Results from the study by Ghazouani et al. (2014) show that some ways in which farmers in Egypt manage water is by practicing drainage water reuse, collective irrigation rules, collective crop choice and night irrigation (ibid., 20). Drawing a connection to these findings, our results from Youssef El Seddik do imply a prevalence of drainage water reuse being practiced in our studied community. Further, no collective irrigation rules are prevalent in Youssef El Seddik as a whole, however there is collaboration regarding irrigation amongst neighbors. While collective crop choice is not practiced in our studied community, the majority of farmers do grow the same crops regardless – given the water and soil conditions – and the olive harvest is done collectively. Pertaining to night irrigation, this is not practiced as a specific way to manage water recourses in Youssef El Seddik, but rather occurs from time to time simply depending on the irrigation schedule for each plot – which is decided by the government and the local agricultural association.

Another point of discussion brought up within our study is the power aspect of water technology. Our workshop participants mentioned various factors related to how the water technology of the community is constituted and geographically arranged. For example: some farmers have access to reservoirs or pumps for drainage water while others do not, some work in cultivation areas further away from the main pumping station than others, and some have enough money to install drip irrigation while others either do not. Those that do not, might have to take loans to afford it – which might then put them in debt. While no workshop participants defined in clear terms that these are factors related to power, the statements do pose a similarity to Barnes’ (2014) argument of technology being a determinant influencing “different people’s power to obtain different kinds of water” (ibid., 190) – as participants did mention that the access to some of these technologies is determined by money, which in and of itself constitutes a power aspect.
As mentioned in the field notes, during our time in Fayoum we experienced two major rainstorms that affected the entire country in extreme ways, with flooding of streets, destruction of buildings and disruption of everyday life. These were rainstorms of a magnitude that many members of the local population as well as people residing in Cairo stated was very much out of the ordinary. Many even stated themselves that this must be a sign of the country’s climate beginning to change in major ways. Some local residents began the process of reconstructing the roofs of their houses to hold off water, as they felt sure that these rainstorms would begin to take place more and more frequently. During our interviews, key informants also brought up climate change as a main reason for why the water levels had become lower and more issues had ensued across the country because of water shortages. Barnes (2017) states that the impacts of climate change will be distributed in varying degrees across the Nile basin depending on different vulnerabilities to various factors ranging from physical water stress to poverty (ibid., 8). It is important to consider the implications of continued climate change for different actors affected by the water issues – at a local level as well as at a larger level. Given our analysis regarding the hydrosocial cycle and its effects shifting as context changes, one might conclude that as the climate continues to change, water access will likely become more strained in the world in general – and also in our studied site in particular, as this is a desert reclamation area where water levels are already low. It is therefore likely that climate change is one major factor that will impact the hydrosocial cycle and therein also the commoning practices taking place in Youssef El Seddik – since it might require the farmers in the community to change the way they manage water and agriculture as the context in which their agricultural operations take place will likely change. Additionally, Egypt as a whole faces looming challenges resulting from the uncertainty regarding the filling of the Grand Ethiopian Renaissance Dam (GERD) (Tawfik 2016, 579). It remains to be seen what agreement will finally be reached regarding the filling scheme of the dam, and what implications this will have for Egypt at large as well as for smaller communities within Egypt such as Youssef El Seddik, where implications might be more severe given that it is a desert reclamation area, where access to sufficient water is already strained. While the GERD was not brought up by our workshop participants or interviewees as a factor affecting Youssef El Seddik specifically, some participants did mention that part of their water challenges stemmed from the Nile water reaching their community being too low, and that a possible way to mitigate this might be to increase Egypt’s share of the Nile water. Regardless, it is important to note that there are studies showing that the GERD might possibly alleviate future effects of climate change in Egypt (Tawfik 2016, 579). What is somewhat certain is that whatever agreement is made, it will likely result in Egypt losing some degree of control and power over its Nile water. The impacts of the GERD, for both countries, likely depends on how well the two countries will be able to cooperate.

To our knowledge, connecting the hydrosocial cycle to commoning in the way that we have in this study, has not previously been done. Having researched previous publications regarding both commoning and the hydrosocial cycle extensively, we have not discovered research in which the two are explicitly studied as connected concepts. Further research regarding the ways in which they are connected could prove rewarding, as it provides a specific focus on how

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3 During the process of writing this paper, different statements were made by the representatives and governments of both Egypt and Ethiopia almost weekly – each time an agreement seemed to have been reached, it was disrupted shortly thereafter (El-Bey 2020).
commoning practices and management of water resources are connected to a larger, ever-changing water related context. While the commoning practices made clear by our results are context specific to Youssef El Seddik, the need to manage water is universal – making the theoretical template for this study possible to apply, in appropriately adjusted forms, in many different settings.
Conclusions

The aim of this study has been to examine and analyze how the hydrosocial cycle influences commoning practices in desert reclamation areas of Egypt. The case study site has been Youssef El Seddik, and the methods applied to conduct the fieldwork have been workshops utilizing participatory tools, semi-structured interviews and observations. As the hydrosocial cycle has resulted in low-level and saline water in Youssef El Seddik, the main findings of our study are that this has in turn created patches of commoning on the peripheries of the hybrid institutions making up the social organizational form created by the hydrosocial cycle.

The results from the field study imply that some commoning practices are in fact present in our studied community. As the hydrosocial cycle provides context to how “over time and space, water and society make and remake themselves” (Linton & Budds 2014, 175), our study has provided insight into the connections between water, the management of water, and the organization and structuring of Youssef El Seddik as a society and agricultural community. The notion that the hydrosocial cycle – and the way it influences social structure and organization – is ever-changing depending on the environment, social and political context in which it takes place, further relates to which commoning practices it may give rise to. This has throughout the study become evident in the case of Youssef El Seddik, as we have been able to make certain interpretations regarding the hydrosocial cycle and the way Youssef El Seddik is organized surrounding water management, in part through the presence of a local agricultural association – and how this in turn has influenced the commoning practices that take place in the community. Further, the commoning practices of Youssef El Seddik have emerged in a relatively new social context, given the fact that the establishment of the area and its agricultural operations was part of a desert reclamation project initiated by the government in the 1990s. The hydrosocial cycle has influenced the management of water that initially established Youssef El Seddik as a desert reclamation project and community, and the hydrosocial network that arose in Youssef El Seddik as a result of this has then likely shaped perspectives on water in the area among its community members. Further, the hydrosocial cycle has resulted in the water of the area being saline and low in levels. These factors combined might, according to our interpretation, have influenced the commoning practices that have emerged in the community – namely collective olive harvest and a system of neighbors borrowing irrigation time from each other. There are also a few less widespread practices of neighbors sharing reservoirs of drainage water to be reused, and farmers helping each other out with agricultural work in each other’s lands. The ways in which commoning regarding water management is practiced in the community, appear to be a result of the way in which water is viewed and managed due to the hydrosocial cycle and the hydrosocial network of Youssef El Seddik.

With regard to the question of livelihoods, we have seen indications of commoning alleviating the strain on living standards and livelihoods in the area. For example, the commoning practices where irrigation water is borrowed or shared allows for farmers to better sustain their crops, and the growing of olives as well as the collective olive harvest seems to make income levels in the area livable throughout the year for essentially all farmers, as this creates a financial buffer during times of the year when production and crop yield is low.

Rounding off, the case of Youssef El Seddik highlights context specific, loosely established commoning which is to a high degree shaped by hydrosocial forces – and which takes place
within hybrid institutional settings. Hence, the forms of commoning occurring on the edges of the institutional water management in Youssef El Seddik are not particularly widespread or prominent in the area, but rather what we would call *hybrid patches of commoning.*
References


Appendixes

Appendix 1: Guide for Evaluation wheel

- Now at the end of the session, there will be an evaluation, where you can express opinions and experiences of the workshop content and process. This gives us valuable insight into how future workshops can be shaped.
- Demonstration of the evaluation wheel, scale depicting good-bad or yes-no. Handing out small papers.

1. Was it easy to understand our instructions and the exercises? (UNDERSTANDING)
2. Did the questions and the exercises feel relevant to the topic? (RELEVANCE)
3. Do you feel like you got to address the things that are most important to you within this topic? (PRIORITIES)
4. What did you think of the format? (Workshop, drawing) (FORMAT)
5. Did the activities feel rewarding to you? (REWARDING)

- Opinions, suggestions, etc: on post-its next to each heading of the wheel.
Appendix 2: Interview guide, Dr. A.

- We have learned that there are different levels of water organization: Branch Canal Water Users’ Associations (BCWUAs); District Water Boards (DWBs); Water Users’ Associations (WUAs). How do these systems work?
- Are these systems well established and working in Fayoum?
- How much independence do members have in for example deciding governance structures or making rules etc?
- Is it mandatory for farmers to be part of a WUA?
- Are there other unions related to water or to different groups?
- What social and economic factors determine the success of farmers, and how does this relate to gender? Do female headed/widow households face different challenges?
- What types of cooperation between farmers to manage water have you seen? What are some facilitators and hindrances?
- What drives conflicts? How has this changed during the years?
- What do you consider to be the main cause for water issues here? (Supply/quality, storage capacity?)
- How do modern irrigation systems such as drip irrigation change the dynamic of farming communities? (Power structures)
- Do the farmers upstream get more irrigation minutes per feddan? Or higher quantity of water?
- What are the drivers for migration of farmers? Which jobs? Which countries?
- How does information/knowledge/new technology reach small-scale farmers?
- How do financial means affect the management of water? For small-scale farmers, large-scale farmers, associations etc?
- Are there any specific economic/social issues/factors affecting desert reclamation areas?
- Since the liberalization of the 1990s, has there been a change in how water is managed? In the industry sector/public/government, etc. Have there been changes regarding governing of water?
Appendix 3: Interview guide, Dr. B.

- Could you tell us a bit about the system for how the water associations work, and how they emerged?
- What are the roles of the water associations in Egypt/Fayoum?
- Are there different levels of water associations, and how are these levels connected?
- Are the associations well-functioning today?
- Have they functioned better/less well in the past compared to the present, and what factors determine if an association functions well or not?
- Is it mandatory for a farmer to be a member of some water related association?
- How much independence do the members have in deciding the administrative structure and making rules for the association?
- Are the leaders of the associations chosen by the members, or decided from above?
- What types of cooperation to manage water have you seen between farmers with the help of the association (inside the association)?
- What types of cooperation to manage water have you seen between farmers without the association?
- What facilitates cooperation between farmers?
- What hinders cooperation between farmers?
- What social and economic factors determine the success of a farmer? Is gender an aspect of this?
- How does implementing modern irrigation systems (such as drip irrigation) impact/change the dynamic of farming communities? (Example: If one farmer has more knowledge about the modern system than others, does that change his position in the community to a higher position? Etc)
- Are there any specific economic and social issues in desert reclamation areas (new lands)? Compared to “old lands”.
- Are there specific water rights for farmers? Does every legal farmer have the right to 3 minutes irrigation time per feddan?
- How are agricultural and domestic water users respectively affected by water shortages in Egypt? Is one more affected than the other?
- Some say that the use of modern irrigation will lead to less water use, which means that more water will reach downstream farmers. Others contradict this by saying that modern irrigation can instead lead to increased production and therefore more water use. What is your opinion on the effects that modern irrigation systems can have for small-scale agricultural water users upstream and downstream respectively? (With regard to factors such as: economy, energy saving, water saving, production level…)
Appendix 4: Guide for interview and clarifications, Dr. C.

- Do the farmers we have met and talked to in the workshops collaborate with renters?
- Does the olive harvest occur mainly in September? Or is it between July and September?
- During the olive harvest the farmers have said that neighbors/other farmers collaborate together to help with the harvest. Do they also bring in hired help from outside, that they pay for? Or is it only other farmers from the area that help?
- How is the board of the agricultural association selected?
- We heard that the village itself of Youssef El Seddik started in 1996, but some have also said 1994. Which year is correct?
- Were all graduates in Youssef El Seddik given 5 feddan, or were some given more, or less, than that? Do some people have more or less land today than what they originally received? (If they have bought more land for example.)
- We would like to confirm that we have understood the following correctly: “Participants in the workshops have described the initial relationship between the government and the farmers in the area as good, the government would trade with the farmers and buy produce from them, however after about five years the government’s direct support was reduced, which shifted the situation towards middlemen and merchants having more power over the trade.”
- The population in all of Youssef El Seddik is around 1500, but is this the number of households or the amount of all the people?
- There are 5 cultivation basins in the area: 1, 3, 4, 5 and 6. Is this correct?
- All water circulating in Youssef El Seddik is mixed due to the area’s downstream location, is that correct?
- The water for this area comes from Bahr Qarun, via Bahr El-Banat, is that correct? In that case, is the water in Bahr El-Banat also mixed?
- As we understood it, their location is too far and their products too few for them to be able to bring them to a wholesale market, it will be too expensive. Is this why there is a need for the middleman?
- As we understood it, farmers feel that they lose money in the interaction with the middlemen/merchants, is this correct?
- Another interviewee told us that a widow will normally bring in a renter to grow her land, and a man (perhaps a neighbor) will assist her in receiving the irrigation water, and if the irrigation water is in the nighttime he will go instead of her. Is this common also in Youssef El Seddik? We understood this assistance with the irrigation as a social norm, and not something that is usually paid for necessarily.
- Some of the male farmers mentioned to us that one obstacle for making their entire area drip irrigation is the difficulty to get loans from the banks. Is this the case, to your knowledge?
- Some of the women stated that material for a drip irrigation system costs 20,000 EGP per feddan. Is this number something that can be confirmed with other sources?
- Electric power outages have been mentioned as part of the problem, does this affect the main pumping station?
• Is it true that, if the farmers in Youssef El Seddik pump drainage water from the drainage canal, they can use however much they want? Is there no limit?
• When they want to reuse the drainage water, do they need to have pumps?
• Is there a completely different water source for the water for households in the area (for domestic water use)?
• Why do you think the farmers do not mention the storing capacity of the lake as a cause for water challenges?
Appendix 5: Interview guide, Mr. D.

- How would you define a problem related to water and agriculture in this area?
- What would you describe some of the causes of the problem?
- Who is affected by problems related to limited water or poor water quality? Is it for example primarily farmers, poorer farmers, or primarily women?
- Are water issues here resolved by collaboration? Or is there no collaboration?
- Are there any networks regarding water among all the farmers? Is it only between neighbors, or is there a bigger network where they collaborate with water?
- Do you think there is lack of collaboration between the farmers regarding water, or a lack of appropriate techniques – for example you have drip irrigation but not everybody uses this technique?
- Is it common that the women participate in the agriculture in this area, or is it mostly men?
- Do you manage your irrigation time by yourself or does someone else come in to do this?
- What techniques do people use instead of drip irrigation?
- Why do you think others do not use modern irrigation techniques? Because they have not learned, or because that they do not have possibility to learn? Or the price?
- What would you say are the effects of the limited water, for the farmers?
- Was this entire area desert before?
Appendix 6: Guide for interview and clarifications, Mr. E.

- For the method section of our paper: have you simply chosen the farmers that are available that day to participate in our workshops, or what does the sampling process look like?
- How did the association appear? Where did the initiative come from?
- Does the funding come from the government, or from members fees?
- How many farmers are there (approximately) in Youssef El Seddik and how many of them are members in the association?
- Is every farmer here *obliged* to be a member in the association? Otherwise nobody would supervise the irrigation of their land?
- Where do you meet when you have meetings with the agricultural association? Which facilities?
- What is the role of the Community Development association? Can you tell us a bit about how it works?
Appendix 7: Guide for interview and clarifications, Group of male participants

- Is the aim to make the whole area drip irrigation?
- Which are some main difficulties with implementing this? Who installs the systems? Where do you buy the material for these?
- Who/how many farmers have knowledge about how this system works?
- How long has drip irrigation been in place/used in Youssef El Seddik?
- Was the entire area sprinkler irrigation in the beginning?
- Does every cultivation basin have 50% drip and 50% gravity?
- Do farmers apply collective crop choices? In every basin or the whole association?
- Does every farmer have his own reservoir, or are these shared by the cultivation basin? How have these been financed/built and who supervises them?
- Is drainage water reused locally?
- When farmers here switch to other jobs/cannot cultivate, what are some examples of the work that they switch to? Do many farmers have another profession on the side, that they can maybe work with in the summer when they cannot cultivate the soil?
- Do some of the farmers here have greenhouses?
- When we were talking about the relationships with government, you mentioned that if you need something, you can tell the government. Do these requests go through the association, or directly to some government contact?
- When you did the social and seasonal calendars, you started the collaboration variable at level 2 – did you mean it was a level 2 because you normally help each other out with labor on each other’s lands?
- The price of fertilizer on the seasonal and social calendars, is it the price on the black market?
- This area is founded by graduates, which education level did they graduate from? University or gymnasium?
- You mentioned that the merchants control the market – are these private entrepreneurs or companies?