Accessibility to sufficient and quality water in water-stressed areas in Libya

August 2022

Water scarcity assessment

Funded by:

European Union
Civil Protection
and Humanitarian Aid

In partnership with:

WASH Cluster
Water Sanitation Hygiene

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Water scarcity in Libya

Accessibility to sufficient and quality water in water-stressed areas

Structure

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   - Barriers to accessing sufficient and good-quality water sources
   - Coping strategies
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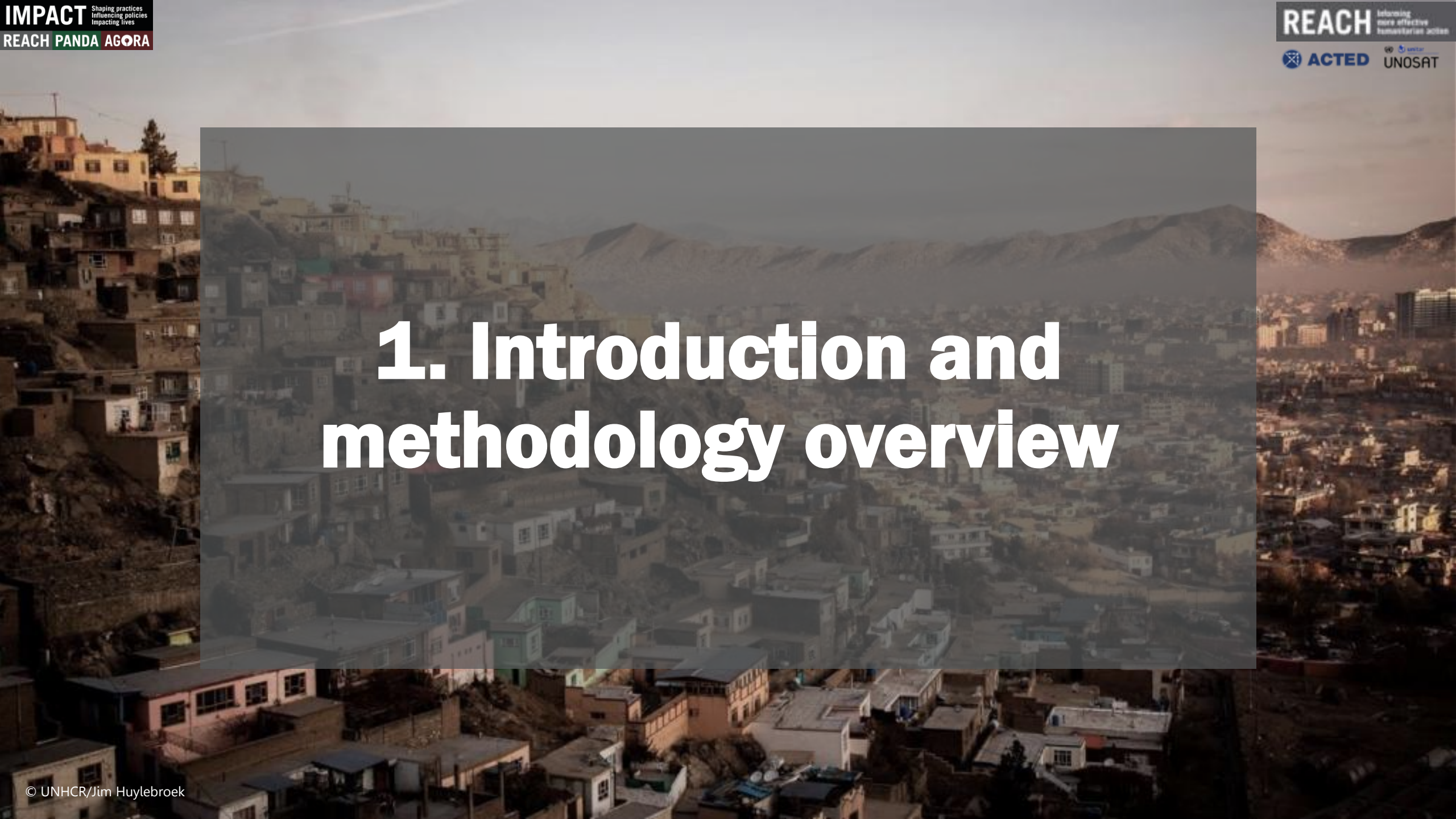
   - Public water infrastructure: challenges in a post-conflict context
   - Public water services
3. Six-month forecast
4. Key conclusions



1. Introduction and methodology overview

Overview

Target population:
Libyan population

Geographical scope:
Nationwide with a focus on Derna, Sirt and Sebha

Timeline:
March – July 2022

Objective:
Provide a comprehensive and updated overview of the water situation in Libya by exploring **water availability issues** at a national scale, the impact of **climate change** and the **human factors** causing **water scarcity**

Main research questions

Understanding Libya's water resources	• What are the main water sources in Libya? • What is the sustainability of the different water sources? • What climate factors affect water availability?
Understanding Libya's water infrastructure	• What is the state and sustainability of the various water infrastructure? • What has been the impact of conflict on infrastructure and has conflict directly affected people's ability to access water?
Understanding household access to water	• How do communities in diverse areas access water? What are the most reported problems to accessing water? • How does water scarcity impact communities? • Are households satisfied with the public water services?

Approach

Quantitative

Household surveys:

- Geographical scope: Interviews at municipal level (Derna, Sirt and Sebha)
- Target population: 301 households in Derna, Sirt and Sebha.
- Sampling: The sample sizes per Baladiyas are calculated using simple random sample calculations.

Qualitative

Secondary data review

- **Key informant interviews** (2 at national level and 6 at municipal level) with WASH experts and stakeholders involved in the development, monitoring and management of water resources in Libya.


2. Key findings
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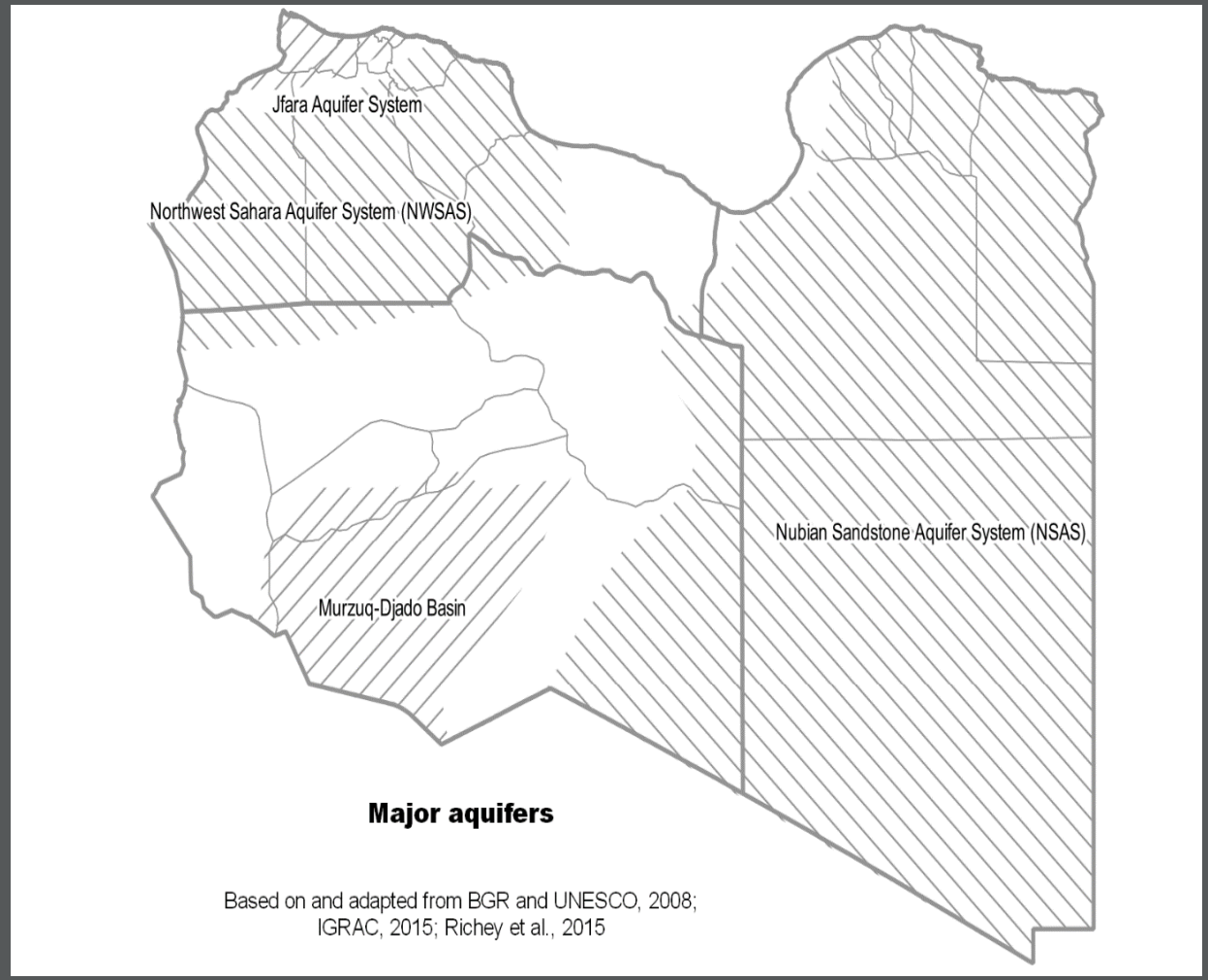
Overview of water resources in Libya

Groundwater: the primary water source in Libya

1. The Jfara Plain: shallow, renewable, coastal aquifer covering an area of about 45.000 km.
2. The Murzuq-Djado Basin Aquifer: Fossil aquifer covering an area of about 450.000 km.
3. North-Western Sahara Aquifer System: More than a million square km.
4. Nubian Sandstone Aquifer System: covers more than 2 million square km.

Four major aquifers in Libya



Alternative water resources

Desalination

- Since 1960s in the North of Libya.
- Over 400 desalination plants
- Only 8 plants currently working.

Wastewater treatment

- 75 wastewater treatment facilities in 2021
- Only 10 facilities partially operative.
- Functioning at 50% of their capacity.

Dams

- 16 major dams with a total capacity of 385 Mm^3. Aimed to harvest rainwater.
- Supply to irrigation channels for agricultural purposes.
- 20 more dams planned to increase storage by 45 Mm3.

Surface water

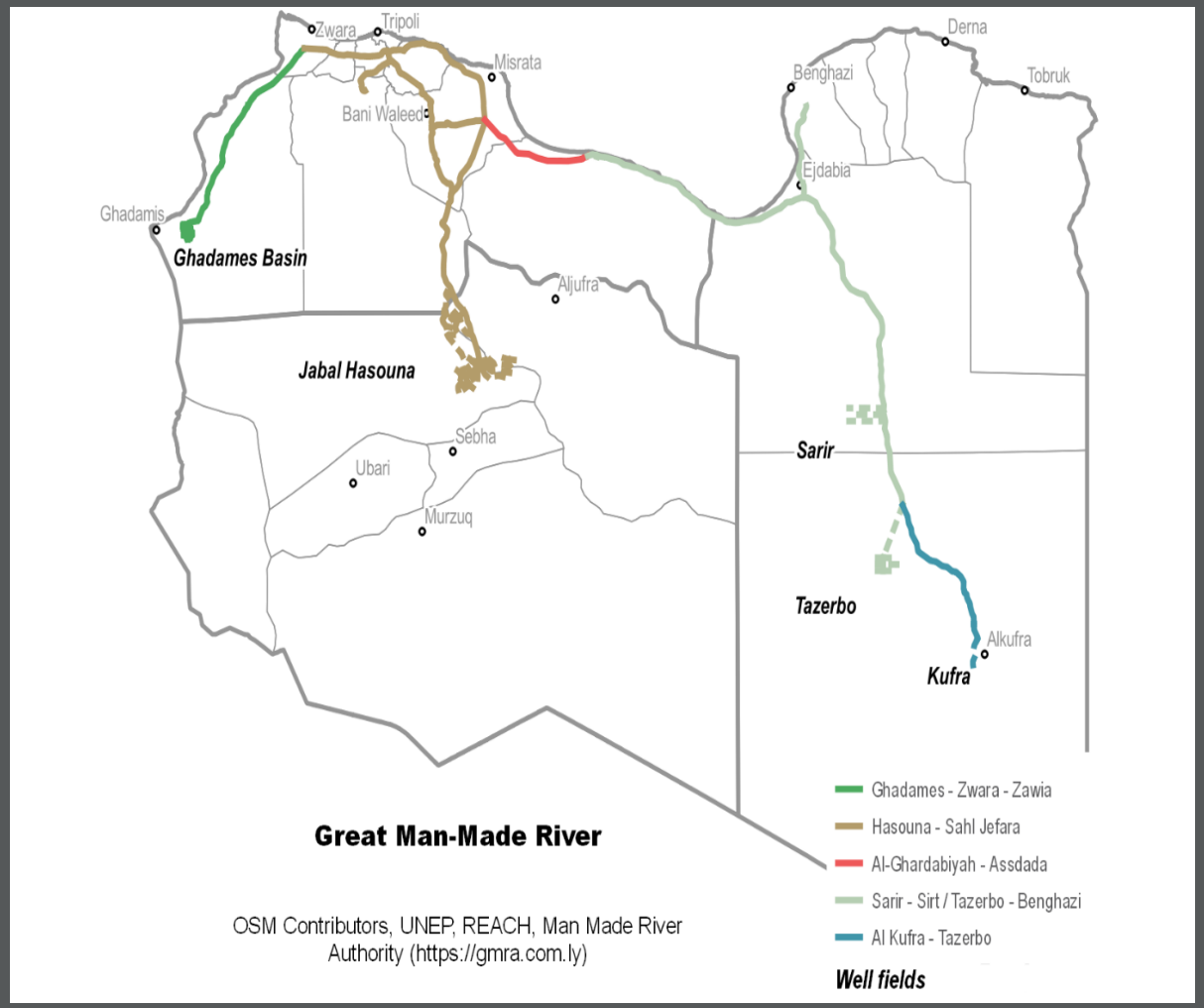
- 0,1 of the Libyan territory according data covering the 1984-2020 period.

Man-Made River Project (MMRP)

The main water supplier

- Currently includes over 4000km of pipeline, 16 pumping stations, balancing reservoirs and water treatment plants.
- Meets around 75% of Libya's annual water demand, including household use.

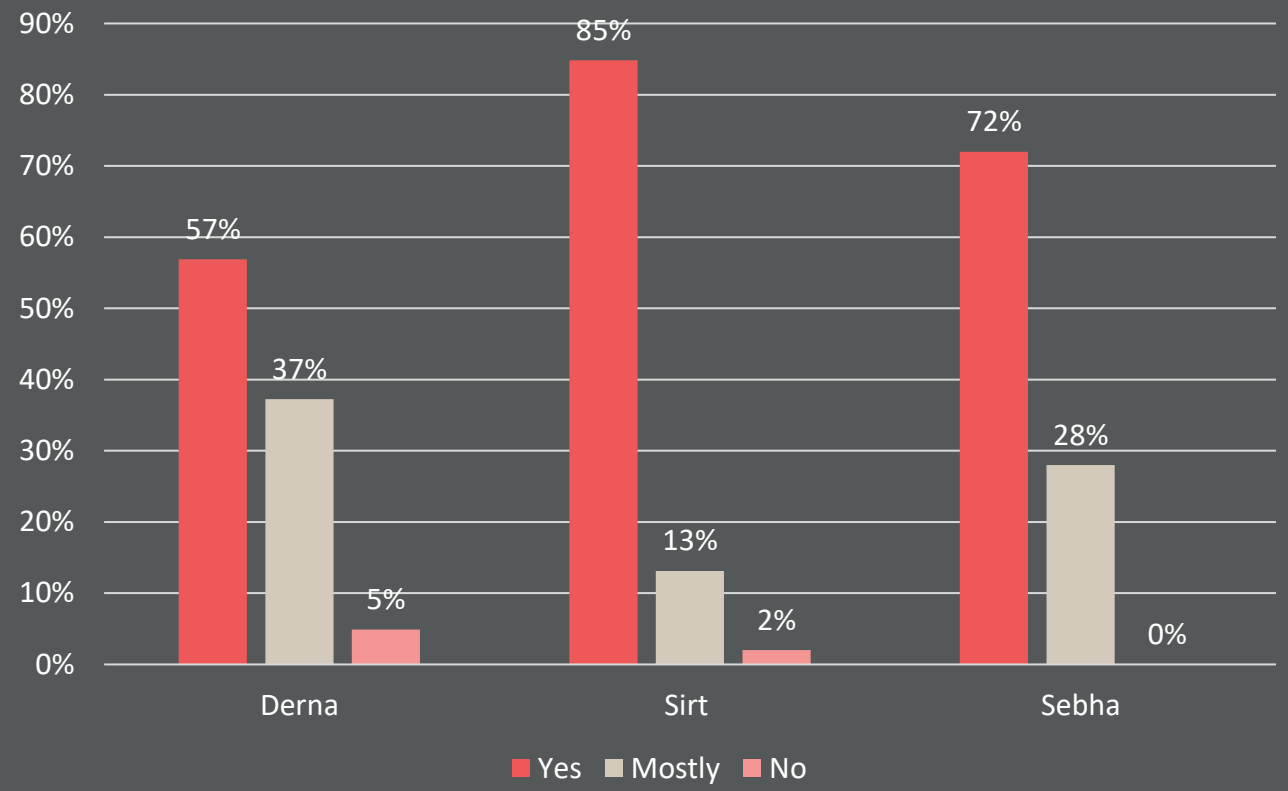
The MMRP network and pipelines



Household water needs

- A majority of respondents (73%) have enough water to meet their needs.
- Respondents in Derna were least likely to report that their water needs were being met in the 30 days prior to data collection.
- Drinking is the most frequently unmet need in Derna.
- In Sirt and Sebha water for hygiene purposes is more often reported to be lacking

Percentage of households not fully able to meet their water needs



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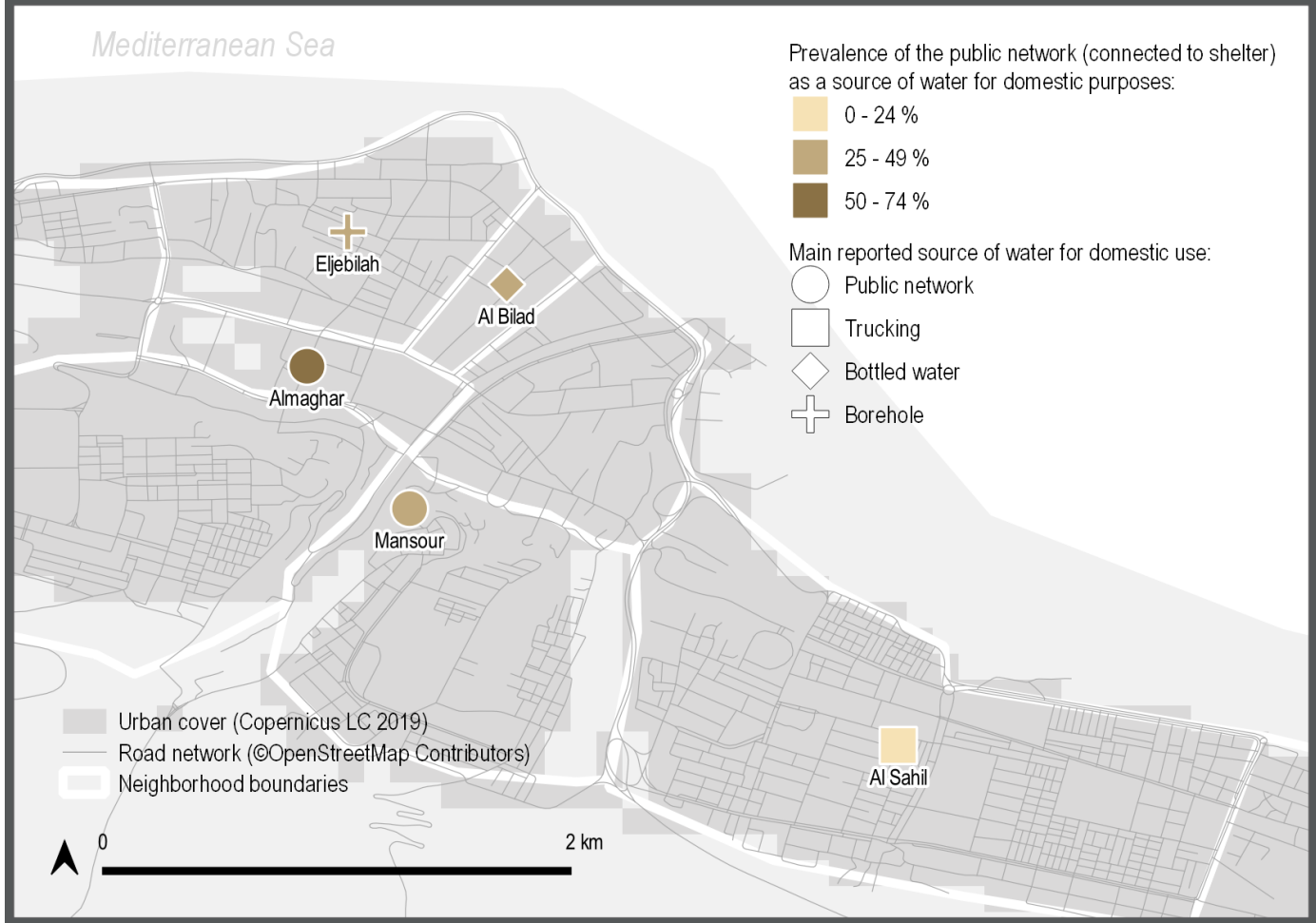
Water sources in Derna

- The most used water source for drinking and cooking purposes is bottled water.
- The most used water sources for hygiene, washing clothes and cleaning the house are water from the public network, borehole and water trucking.
- Some neighbourhoods have major difficulties accessing water from the public network.
- Considering the high costs of drilling wells but also the salinity of groundwater in some areas, households usually resort to using water trucking.

Overview of water sources used in Derna based on household survey data



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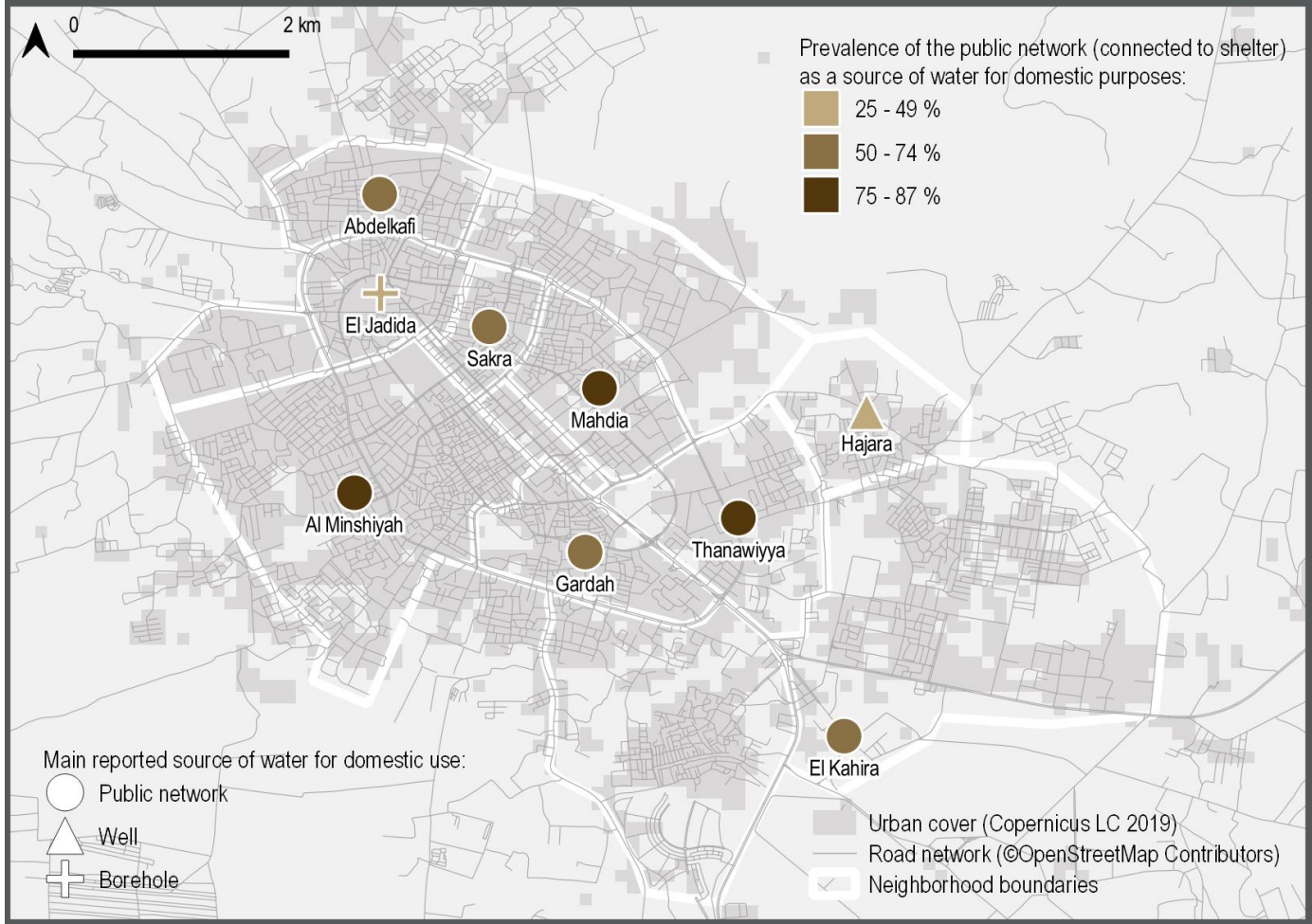
Water sources in Sebha

- The main reported water source is the public network.
- Bottled water consistently reported for drinking and cooking purposes.
- In Al Jadida and Hajara, households most often reported relying on boreholes and wells respectively.

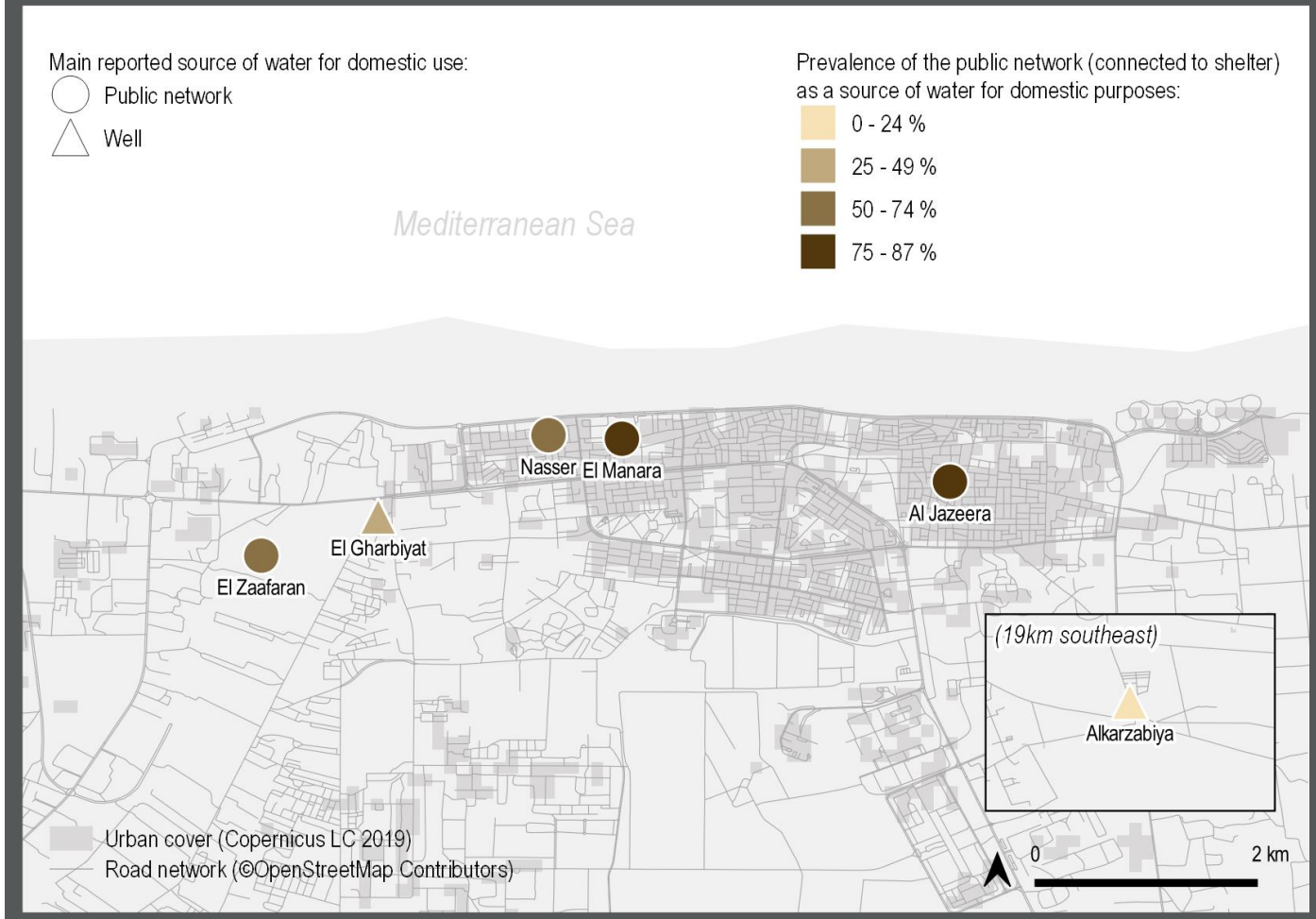
Overview of water sources used in Sebha as reported by surveyed households



Water sources in Sirt

- Primary sources for drinking are bottled water (47%) and water from the public network (37%).
- For other domestic purposes, the public network is the most common source.
- In El Gharbiyat and Alkarzabiya, wells are more common compared to the public network.

Overview of water sources used in Sirt based on household survey data



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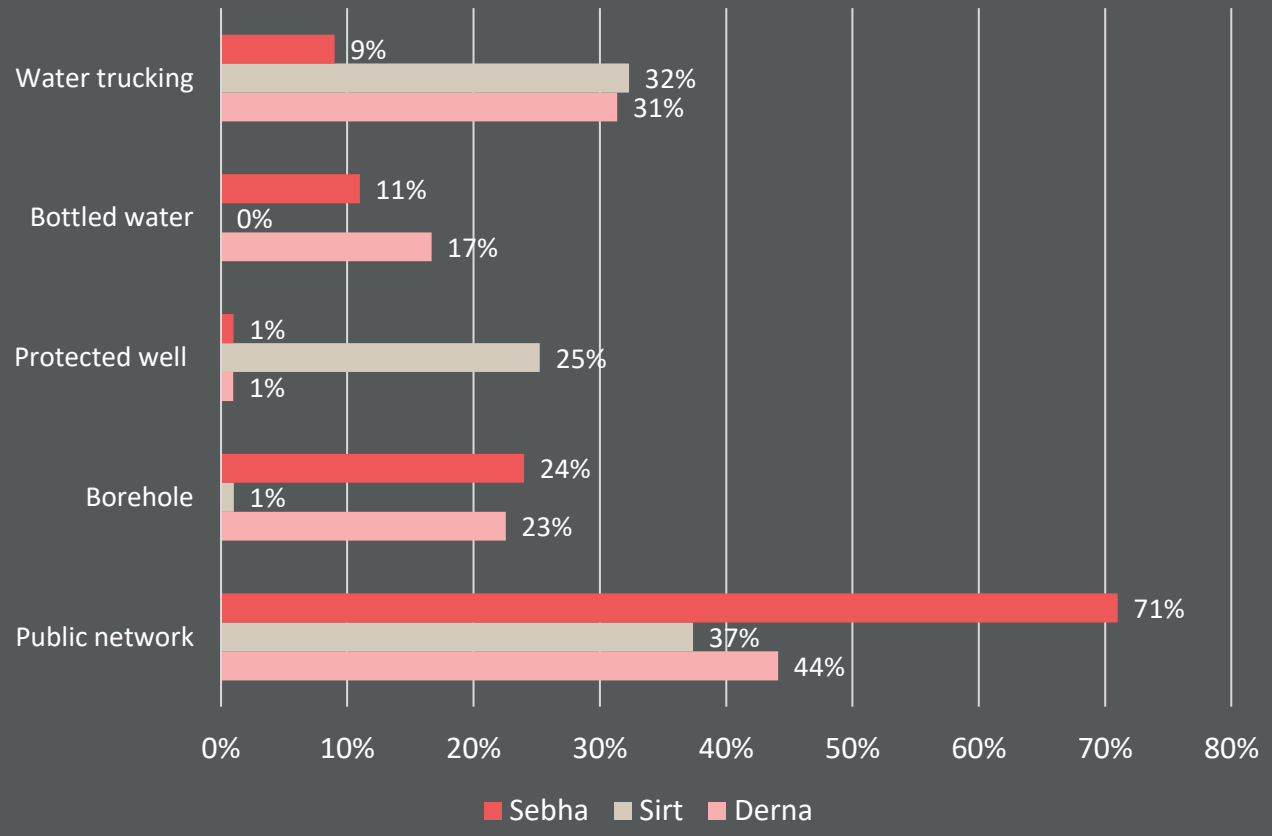
Water scarcity and livelihoods

- Most half of surveyed households reported regularly using water for their livelihood activities.
- The public network and water trucking were consistently reported as the main water source.

Main reported consequences of water shortages:

- Negative impact of the way they perform at work.
- Negative impact on the profit they can earn from their livelihood activity.
- Difficulties to keep their workplace sufficiently clean.

Water sources used for livelihood activities based on household survey data



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Barriers to accessing sufficient and good-quality water

- The main reported factors affecting the quality of water are:
  - Salinization
  - Inadequate wastewater treatment and run-down infrastructure.
- Some households consequently reported not being satisfied with the quality of water, especially in Derna and, to a lesser degree, in Sebha.

Picture taken in Al-Jadeed, Sebha, showing a street flooded with wastewater

Barriers to accessing sufficient and good-quality water

Inadequate wastewater treatment and run down infrastructure:

- Infrastructure have been reportedly severely affected since the **armed conflicts.**
- **According to UNICEF, only 45.5% of households in Libya are connected to the public sewage network.** The rest are connected to cesspits.

Derna:

- Lack of maintenance of key infrastructure reportedly caused **sewage overflowing and led to soil pollution and leaking to the aquifer**.

Sebha:

- Only one main sewage lifting station partially functioning, and a treatment plant that is not operational. **Sewage flooding** was declared an environmental emergency by the municipality in 2018.

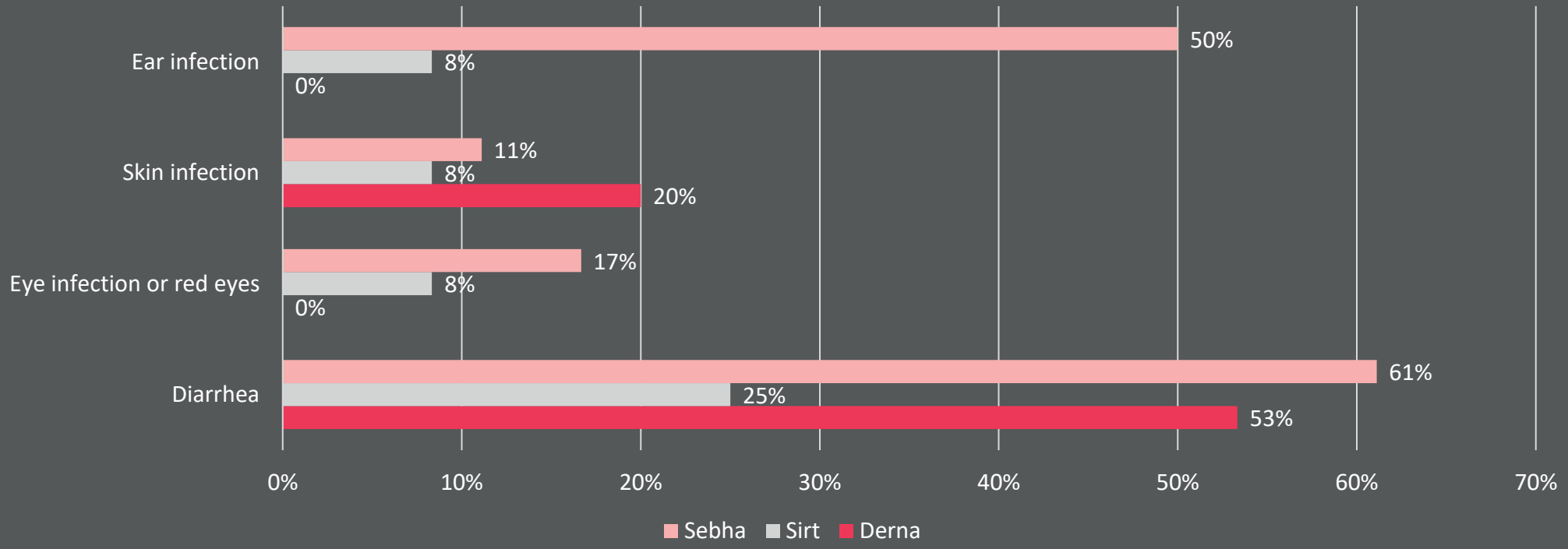
Barriers to accessing sufficient and good-quality water

Seawater intrusion:

- The intensive extraction of groundwater from coastal aquifers causes groundwater contamination in the form of seawater intrusion.
- According to some KIs in Derna, water coming from wells is not safe to drink or to use for cooking because of the high-water salinity rates.
- Since 2005, a loss of 75% in well production in the Nubian Sandstone Aquifer has been observed. This can be an indicator of the degradation and salinization of groundwater resources.

Public health issues as a result of poor water quality:

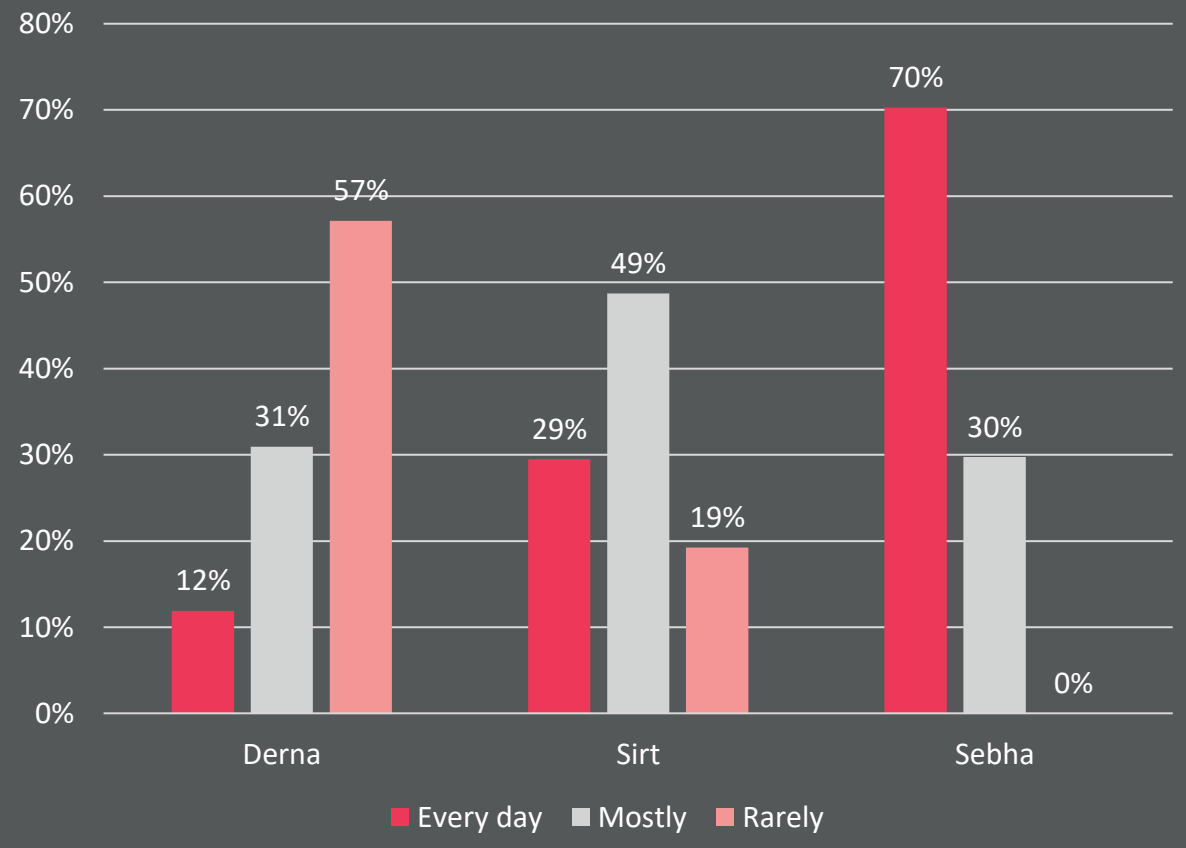
Symptoms of water related illnesses amongst children under 5-years-old as reported by surveyed households



Frequency of access to water from the public network:

- In Derna, 57% rarely have access to sufficient and good-quality water.
- In Derna, some neighborhoods do not have any access to water resources from the public network and the supply is very limited in others.
- In Sirt, regular access to the public network is also problematic.

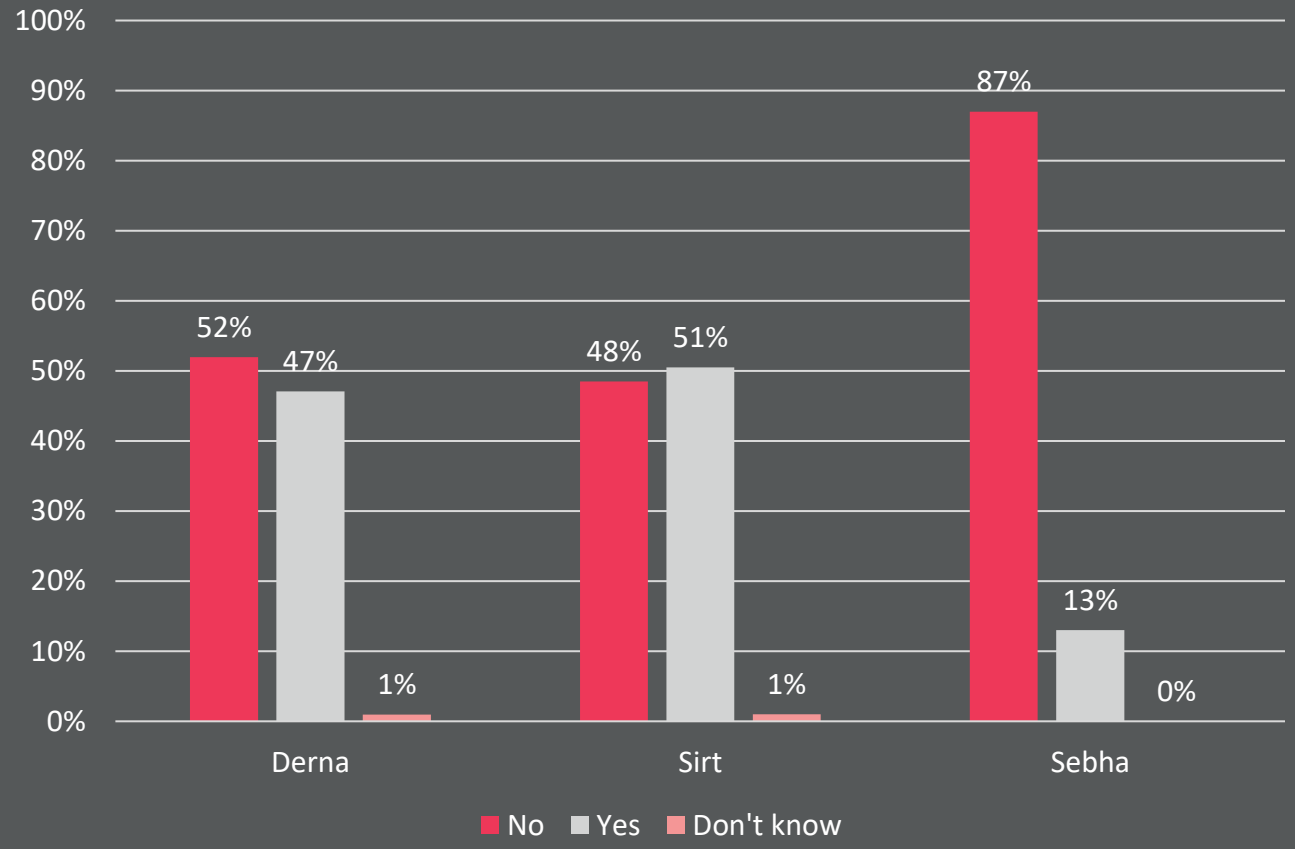
Frequency of access to water from the public network as reported by interviewed households



Water expenditures becoming an important economic burden to households

- In Derna and Sirt, households frequently reported that water expenditures are affecting their savings.
- In these cities, residents rely more on bottled water and trucked water.
- In Sebha, more people rely on the public network and are therefore less affected.

Household savings affected by water expenditures according to surveyed households



Weak electricity provision

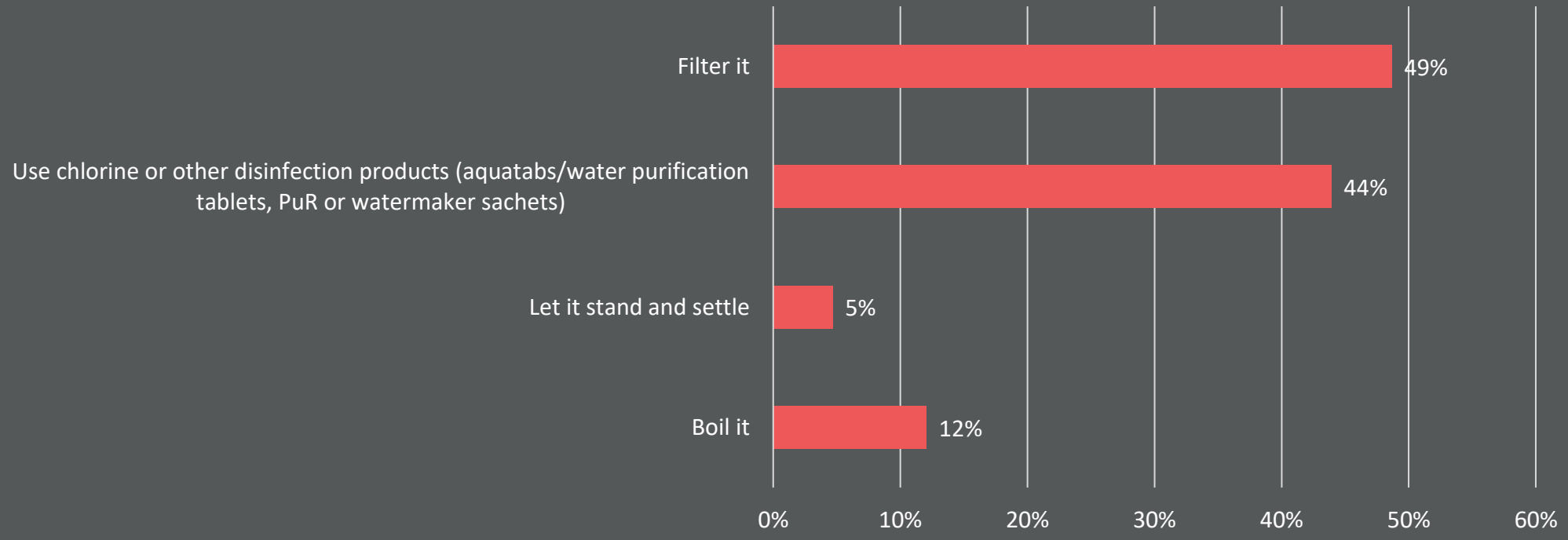
- Electricity issues are inimical to residents' water access, with power outages shutting down well pumps, or low voltage electricity damaging those pumps.

Tangible consequences:

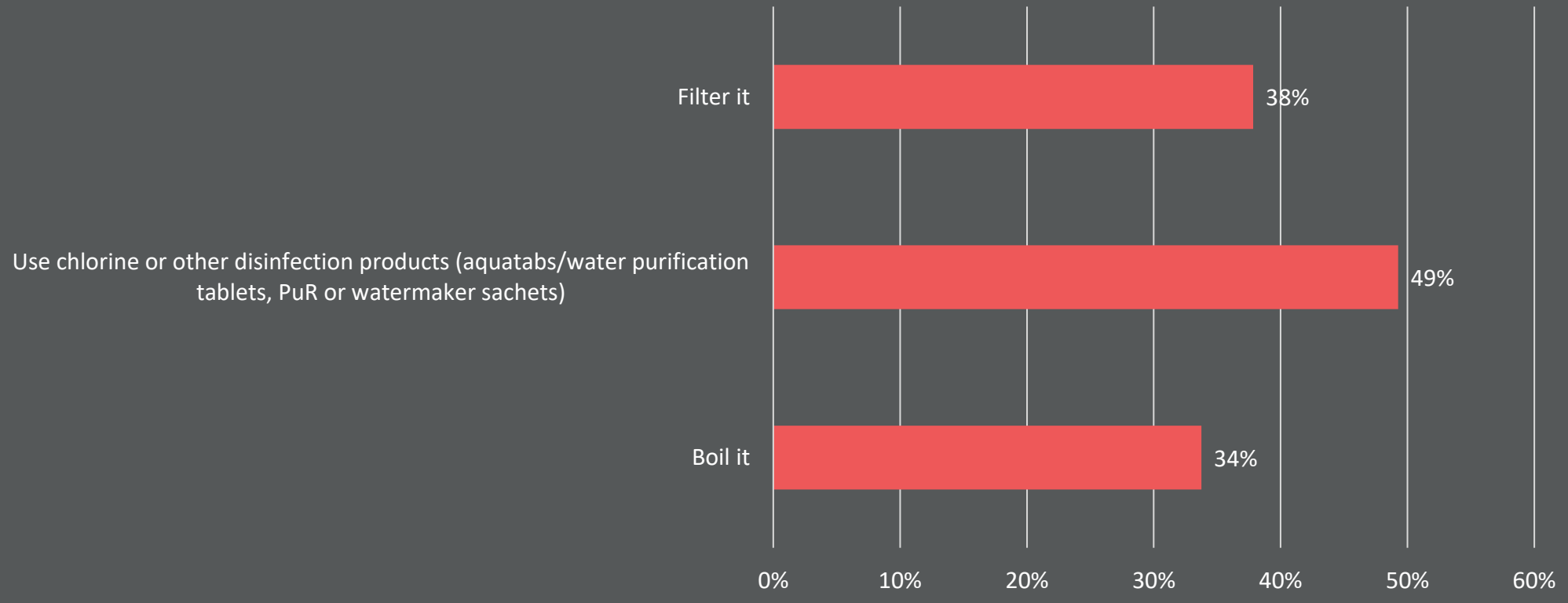
- Long water cuts caused by power outages:
- Some vital infrastructure cannot function, and key public services can be suspended:

Coping strategies

Water treatment techniques before drinking according to the surveyed households



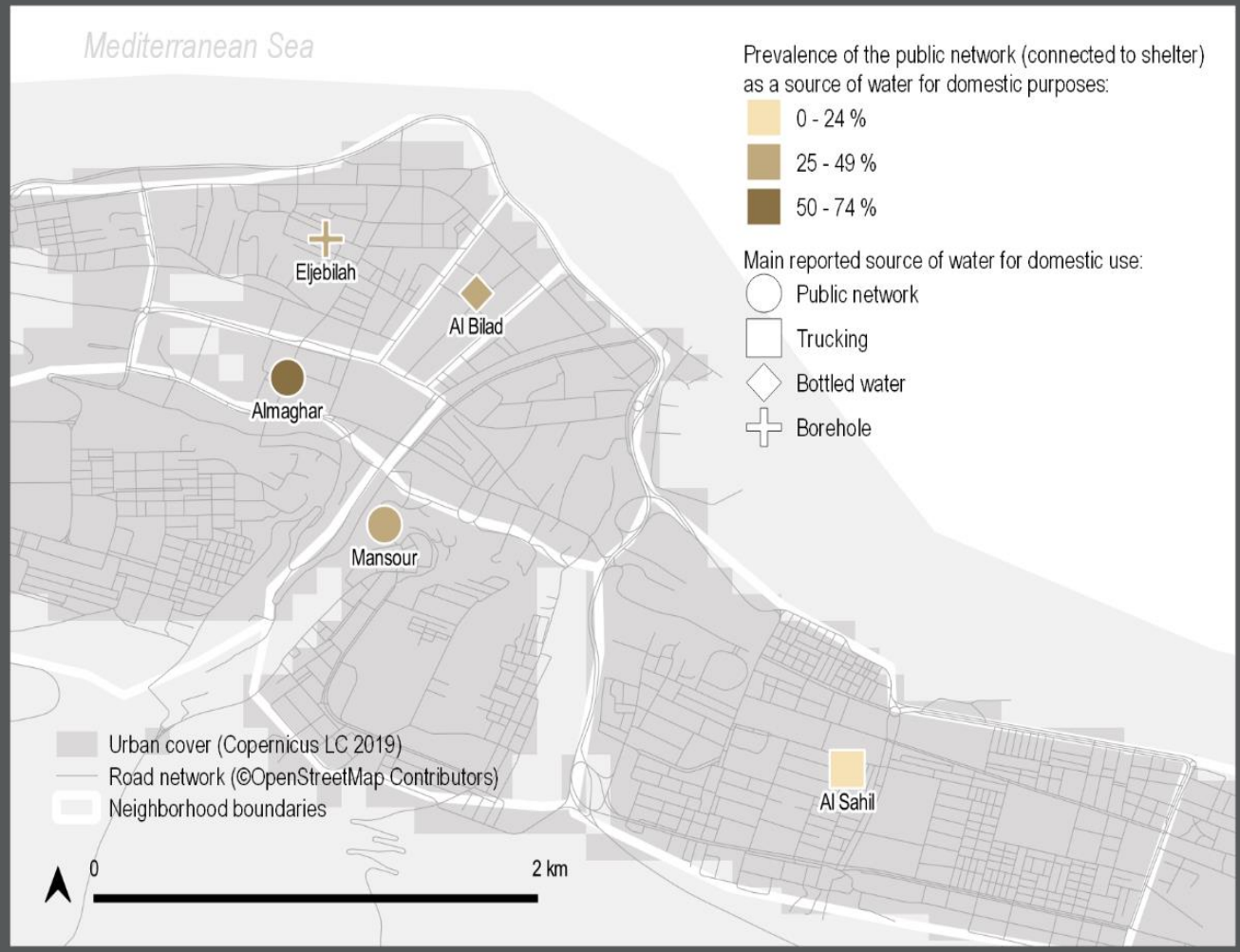
Water treatment techniques before cooking according to the surveyed households



Use of alternative water sources

- Use of the public network is particularly low in Derna.
- Within Derna, particularly neighbourhoods like Eljebilah, Al Bilad and El Sahil Al Sharqi do not use the public network.
- Bottled water is the primary source for drinking AND cooking in Derna.
- Bottled water is the primary source for drinking water in Sirt.

Water sources used in Derna and prevalence of the use of water from the public network by neighbourhood

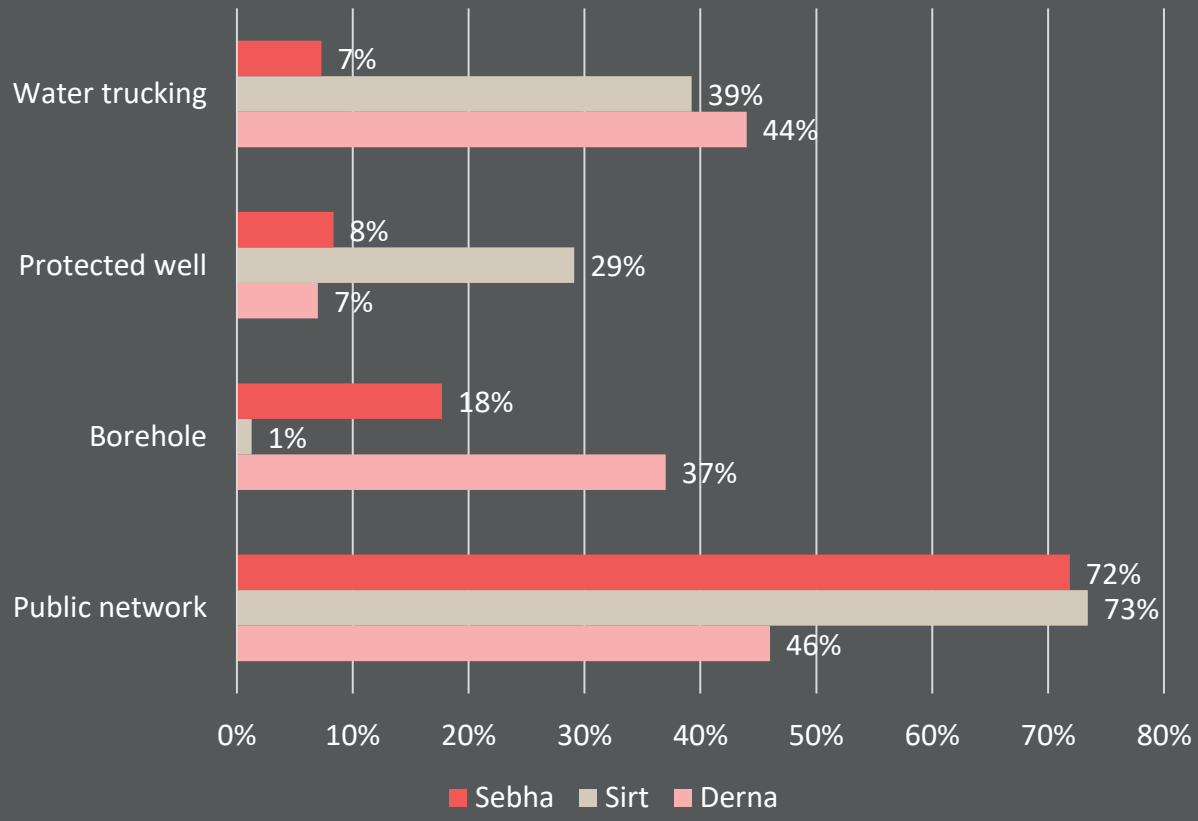


Water storage techniques

Use of water tanks

- Almost all interviewed households resort to using water conservation techniques.
- 92% of households reported that they have (a) water tank(s) (either private or shared).
- The average number of people sharing a water tank is around 8.
- The average number of litres a water tank holds is 5,823L.
- Water trucking to fill water tanks is very common in Sirt and Derna.

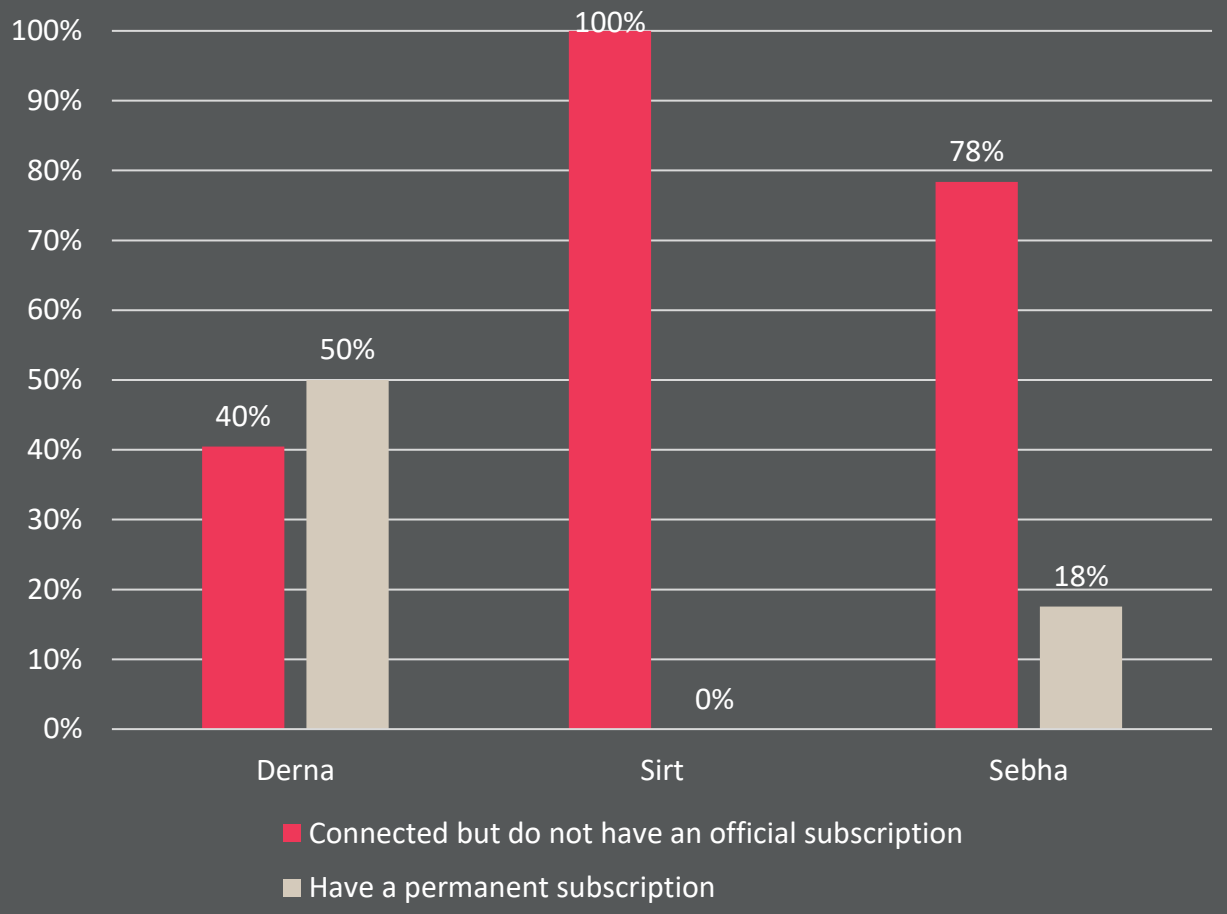
Water sources used to fill household water tanks according to surveyed households



Connection process to the public network

- Overall, 82% of surveyed households are connected to the public network without a permanent subscription.
- In Derna, proportions of respondents with and without an official subscription are nearly equal. In Sirt and in Sebha, most respondents are connected but do not have an official subscription.

Reported modalities of access to the public network according to surveyed households



Water fees from the public network

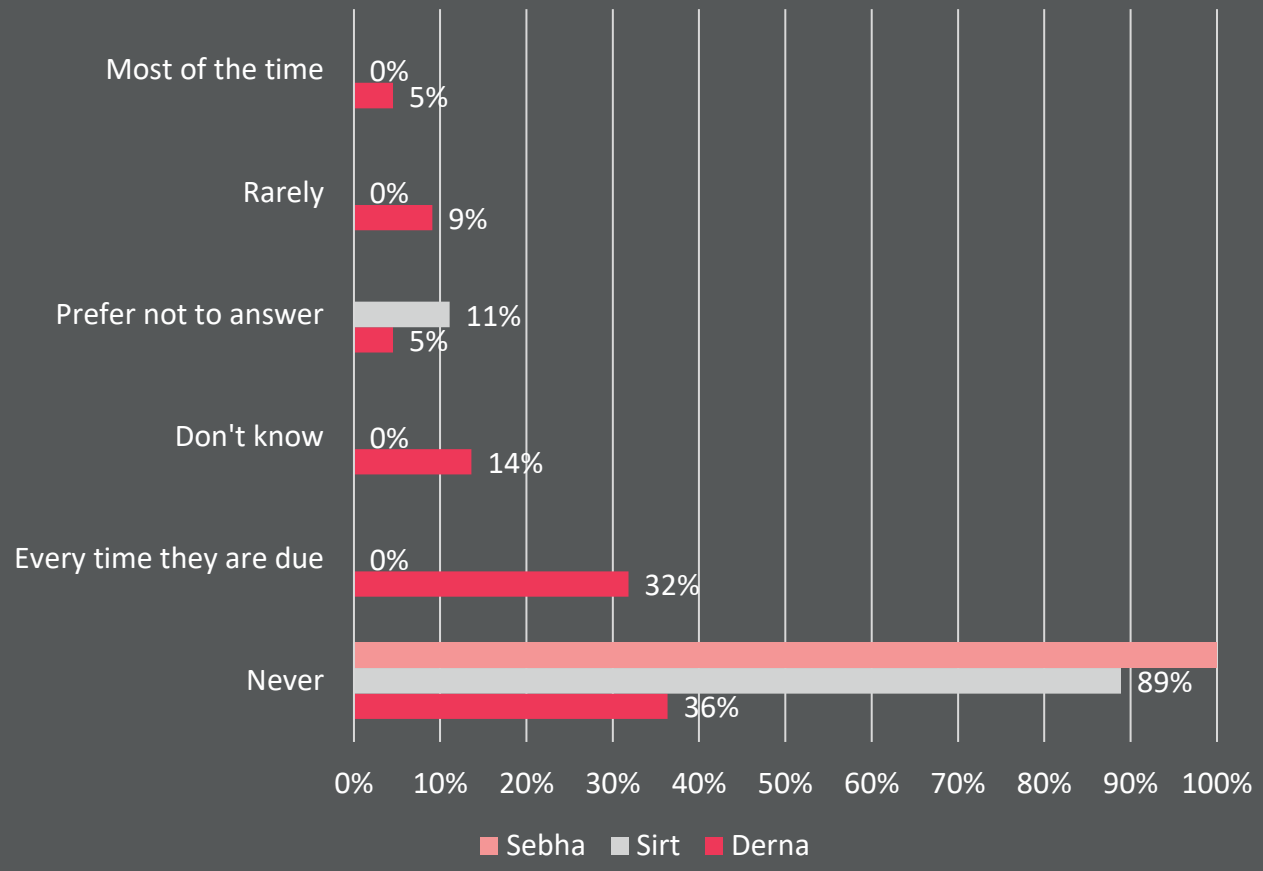
- 86% of respondents who use the public network as their main water source indicated that they never pay water fees.
- In Derna, almost 1/3 of this group pay water fees every time they are due.

Reasons for not or rarely paying:

  - Never asked to pay (69%) or that
  - The government has a responsibility to provide free water (26%).

- In Derna, 50% of households relying on the public network think that the price is lower than the service provided.
- 88% are willing to pay more for the subscription if the service was improved.

Reported regularity of water fee payment according to surveyed households



Informal and free connections to the public network, water as a human right:

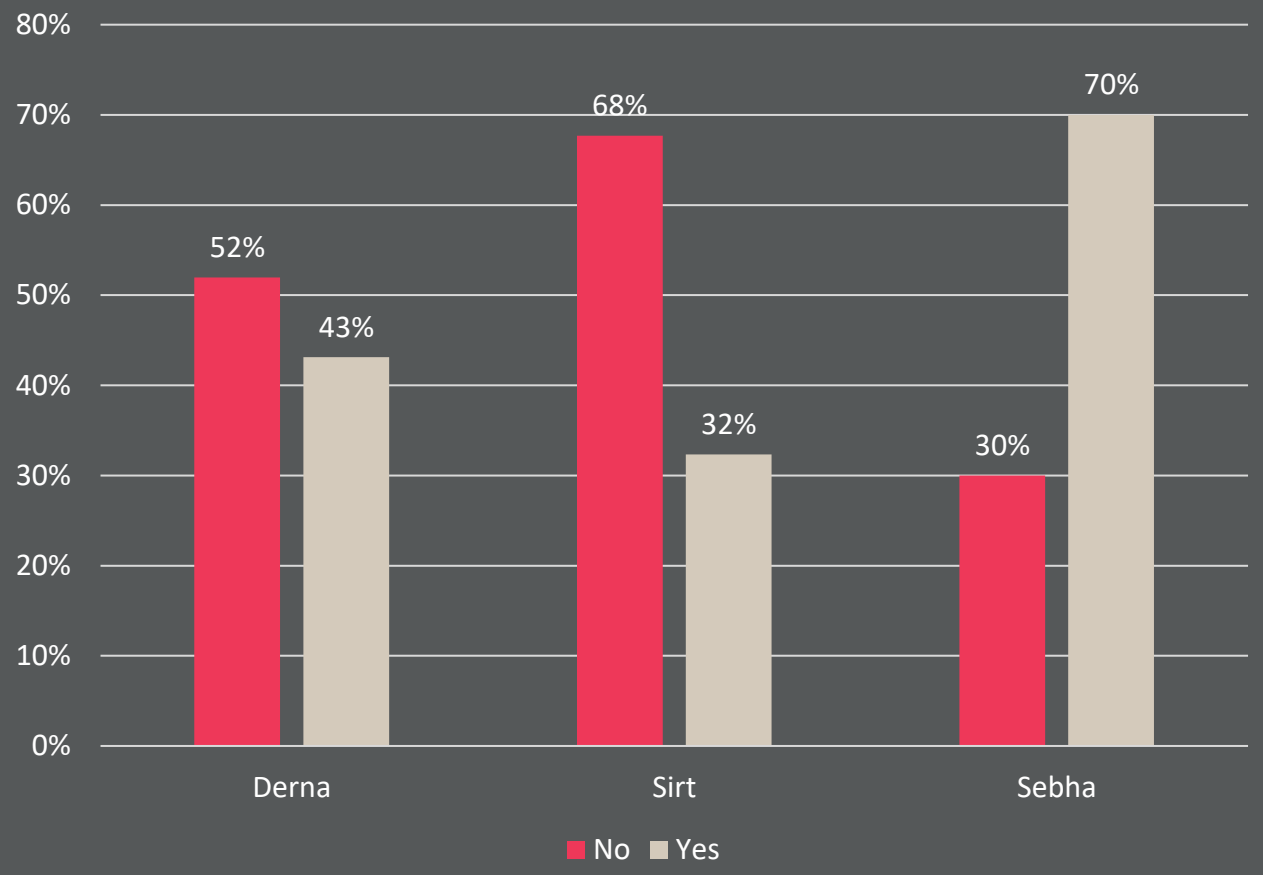
- Informal connections are reportedly connections to the public network done without any supervision or legal permission.
- Informal connections are an alternative to formal service provision.
- Informal connections show the residents' resilience.
- Not perceived as illegal; water as a given and free resource.
- Informal connections cause damage to pipelines provoking leaks and putting existing water infrastructure at risk.
- "Informal connections are difficult to track as they are abundant because of the citizens' lack of awareness of the danger of these connections".

Public water infrastructure

Maintenance issues

- Lack of timely and effective maintenance of water infrastructures as one of the issues causing water outages (KIs).
- 54% of households encountered problems with their main source of water.
- The most regular complaints raised by households are that the water supply network is often broken or leaking (36%).
- 47% of the surveyed households also reported that they noticed leaks in the public water supply system. It is considerably more frequent in Sebha.

Percentage of households reporting noticing leaks from the public network



Public water infrastructure

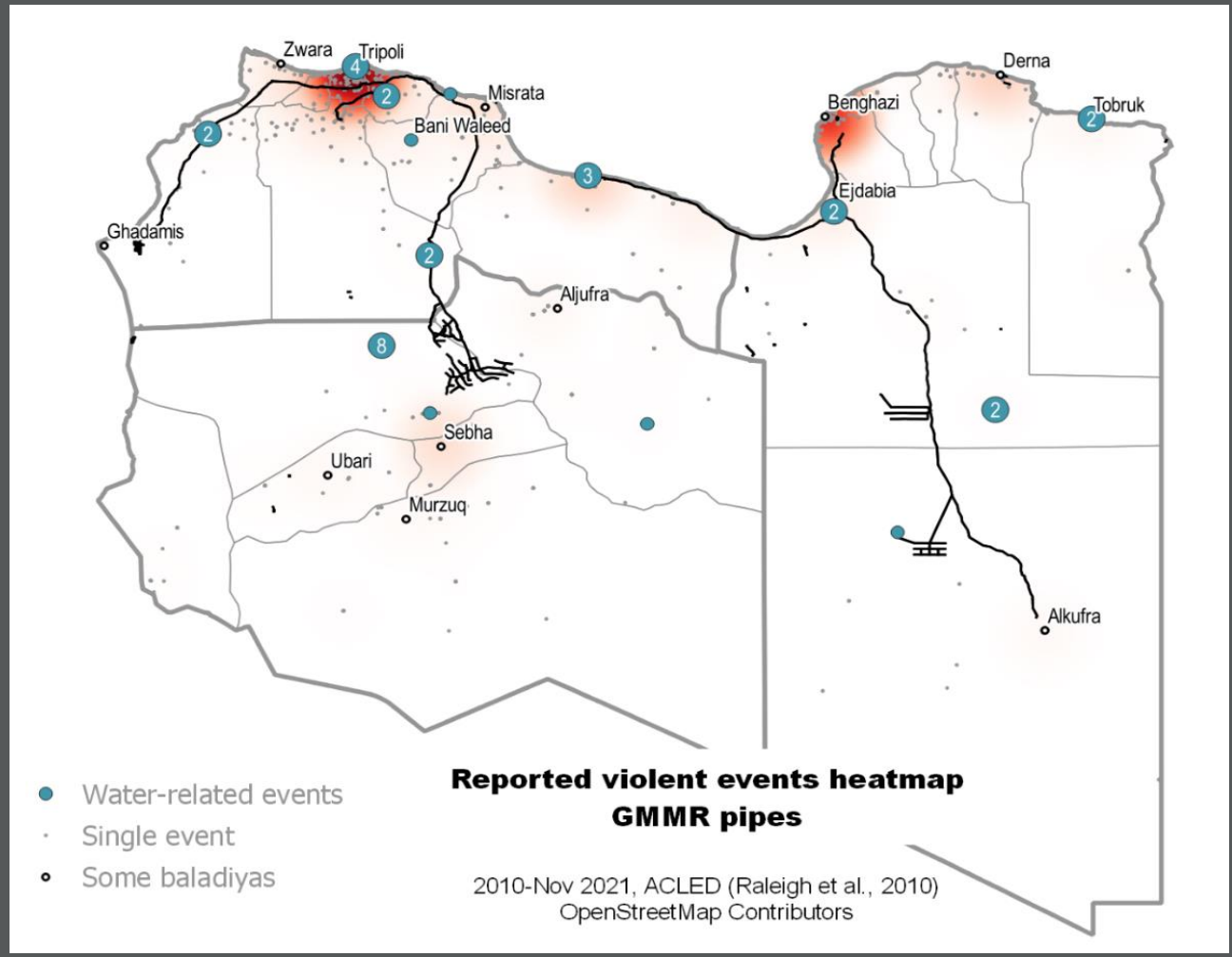
Maintenance issues of the desalination plant in Derna

- Neighbourhoods relying on desalinated water are the most affected (Al Sahel Al Sharqi or Al Sayyida Khadija)
- **Maintenance works on the desalination plant have been ongoing for several months, causing suspension of operation and severe water shortages.**
- As specified by REACH in the Derna Rapid Situation Overview, the desalination plant located near the Karsah gate, was already targeted by security incidents in 2018 causing its suspension and putting its staff at risk.

Security incidents and effects on infrastructure

- Water has been used as weapon of conflict fueling the political division and fragmentation between the Eastern and Western factions.
- The drinkable water supply in Libya has decreased from approximately 149 to 101 water distribution canals because of their destruction
- 33 security incidents affecting WASH infrastructures were identified for the 2011-2021 period.
- The highest number of security incidents affecting the water infrastructure was recorded in 2018.

Occurrence of security incidents on water infrastructures (ACLED Data)



Security incidents targeting water infrastructure

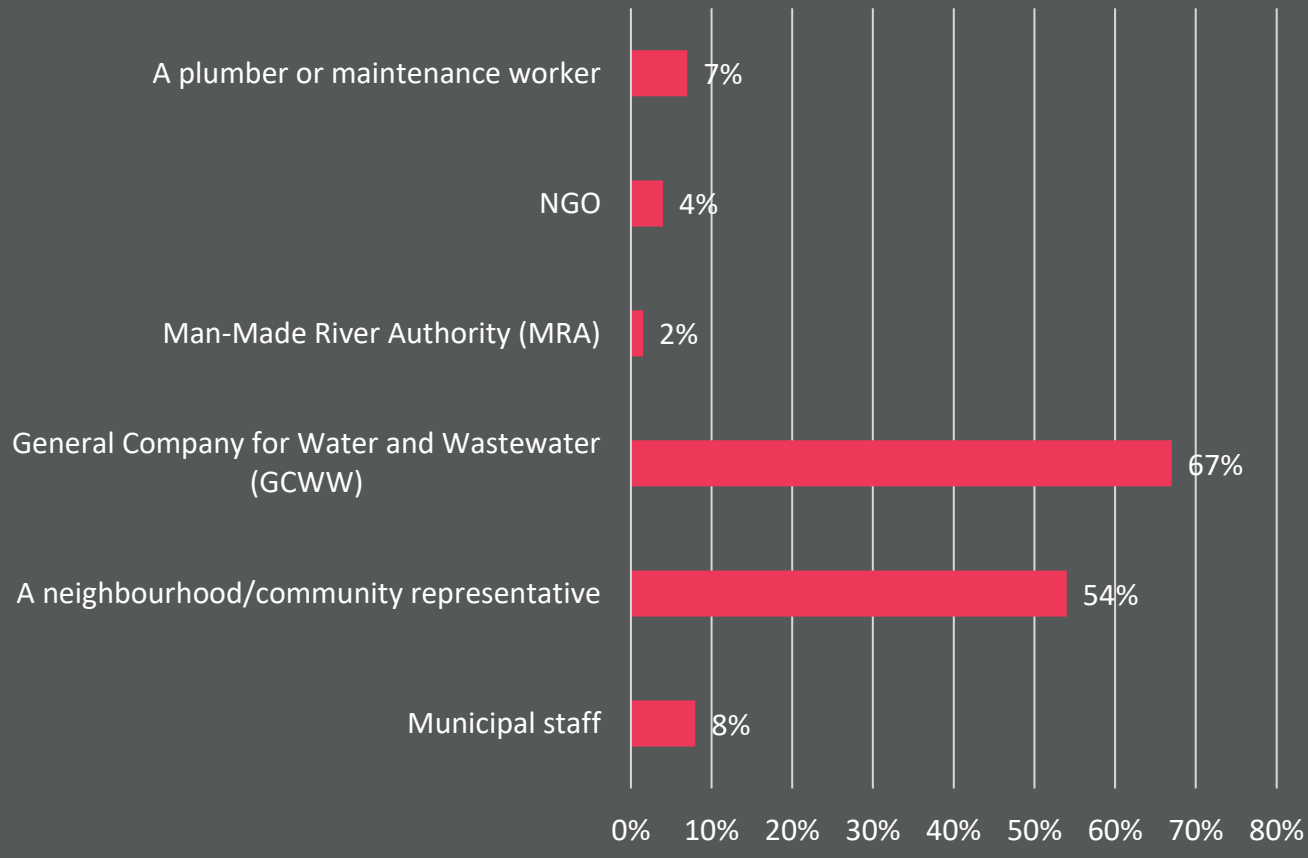
- Security incidents are reportedly more frequent in Sebha compared to Derna and Sirt.
- Type of infrastructures targeted in Sebha: Electricity infrastructures, water pipelines and sewage network.
- The most frequently reported security incidents consist in the theft of equipment from water infrastructures (pumps, electrical cables, vehicles, etc.):
- Vital infrastructures have been targeted in the three assessed municipalities

Public water services

Main actors involved

- The General Company for Water and Wastewater is the main institution responsible for the maintenance of water infrastructure and repairs.
- 56% contacted the GCWW.
- 31% approached a community representative
- 22% contacted the municipality.
- In Sebha, community leaders are often the first contact point to report issues to.

Main actors reported to have attended to household complaints

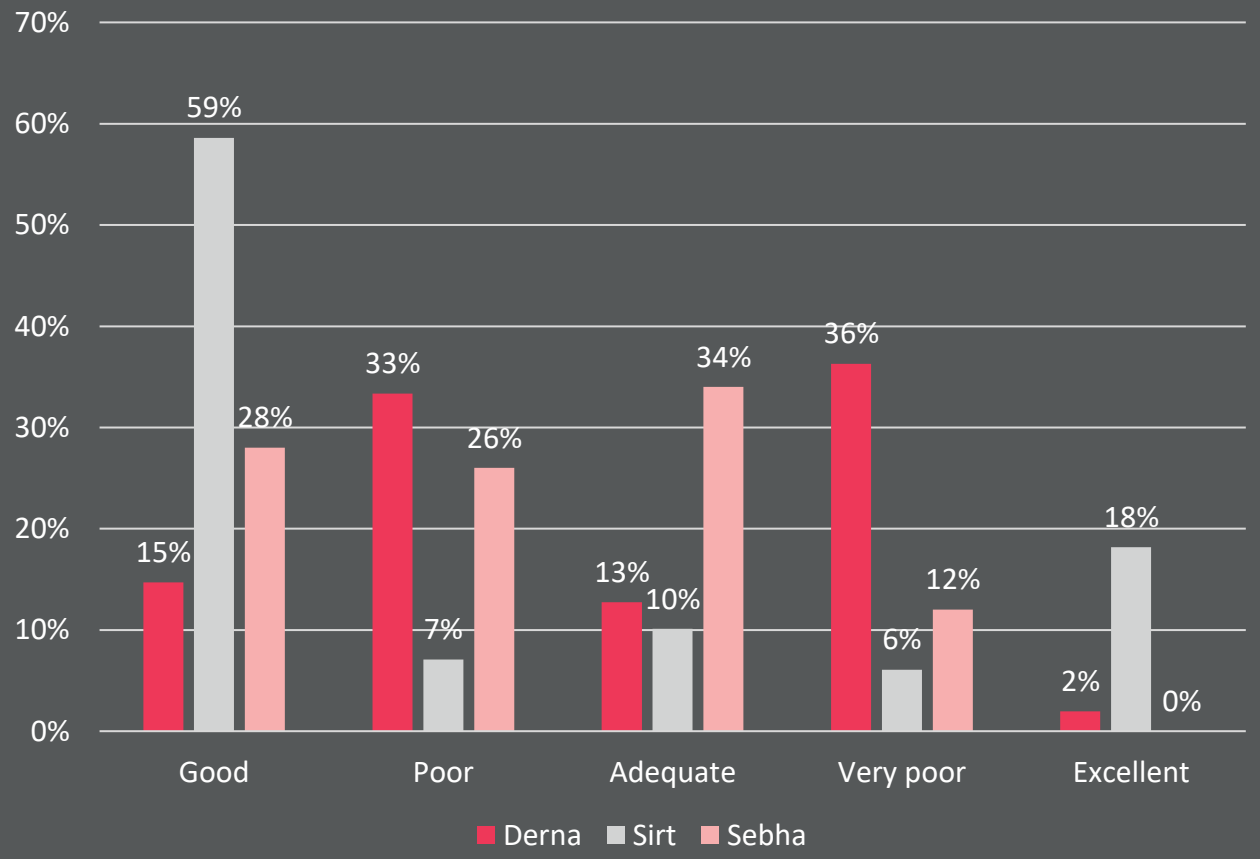


Public water services

Households' satisfaction

- Household satisfaction towards the level of the service provided to maintain and ensure an adequate water supply is moderated.
- In Derna, more than half of respondents reported that public services provided to maintain infrastructures and ensure a regular water supply are mostly poor (and very poor) as shown in the graph.

Reported level of service from the public water supply system

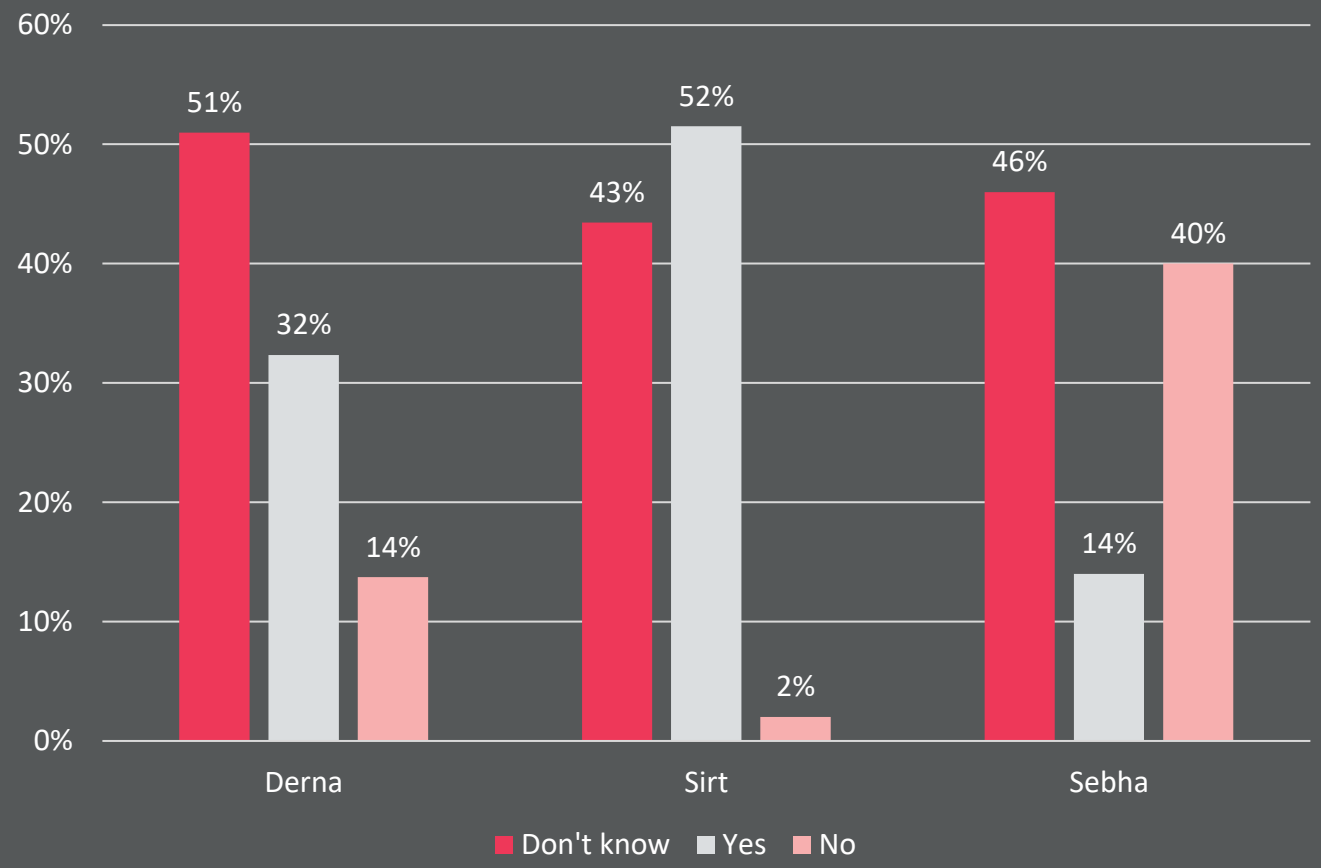


Public water services

Household satisfaction

- 46% remain uncertain regarding public institutions' willingness to try to improve the water supply services
- 34% of households across the 3 Baladiyas trust the institutions responsible for the local water supply management.
- In Sebha, surveyed households are the least confident.
- The main suggestion from users to public stakeholders to improve the water supply service is to improve the existing infrastructure of the water supply system.

Reported household trust in public institutions to try to improve the water supply services



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Overview of the factors that can affect the water supply in the next six months: (KIIs)

DERNA

- **Increasing prices of water delivered by trucks** (or cars) due to frequent cuts from the public network.
- **Lower groundwater levels** and **saline** water in coastal aquifers.
- Lack of resources to ensure **the maintenance of infrastructures** that "could collapse if not renovated"
- The lack of **citizens' awareness** connecting to the public network in an **informal way** causing damage to the pipelines and leakages.

SIRT

- **Security incidents** may occur and affect the functionality of water infrastructures.
- Climate factors **(rising temperatures / reduced rainfall)** can affect the availability of water in shallow aquifers.
- The **increase of water prices** (water trucking).

SEBHA

- **Power outages** that directly affect the water supply.
- **Security incidents** as an important element threatening the functionality and sustainability of infrastructures.
- Development of **alternative sources of energy**, such as wind and solar energies as positive factors that can improve the water supply.
- Development of **research activities** can positively trigger the implementation of sustainable policies.

4. Key conclusions

Key conclusions

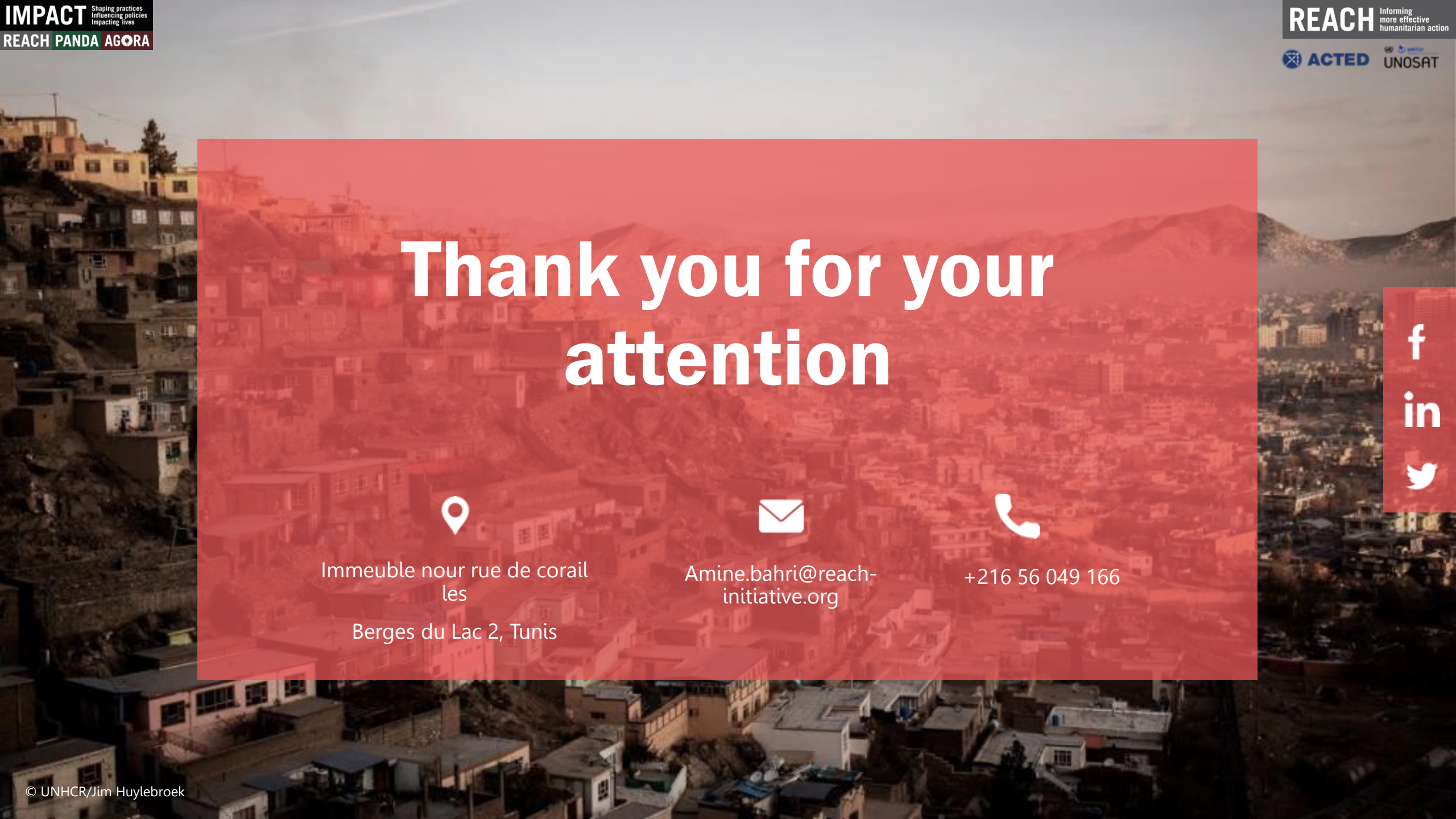
Issues affecting water supply in Libya:

- Over-exploitation and reliance on groundwater → Depletion of groundwater – Seawater intrusion.
- Electricity crisis affecting the regularity of water supplies and causing environmental damage.
- Security incidents (related to conflicts or to the social instability) affecting the functionality of water infrastructure.
- Lack of public resources to ensure a regular, timely, and efficient maintenance of key water infrastructure.
- Lack of awareness on responsible water consumption and on the impact of informal ways of connecting to the public water and sewage network.

Key conclusions

Potential solutions to ensure a better water supply

- Develop alternative water sources (other than groundwater): Desalination technology, wastewater treatment facilities, etc.
- Develop research and capacities of key institutions to explore and implement alternative sources of energy (wind or solar) to be used for the water supply.
- Provide assistance to households relying on non sustainable and costly water sources for basic needs such as water trucking.
- Explore and provide sustainable water treatment techniques.
- Develop management capacities of key public institutions responsible for the development, management and monitoring of water resources.
- Install water meters and improve the management of subscriptions to the GCWW: this will enable a better monitoring of households water consumption and improve the financial sustainability of the GCWW.



Thank you for your attention

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