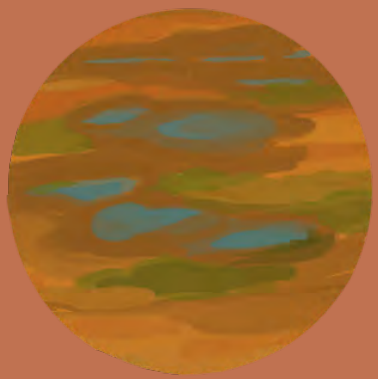




DHUSAMAREB
RESILIENCE PLAN

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Dhusamareb Resilience Plan
March 2021

UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME
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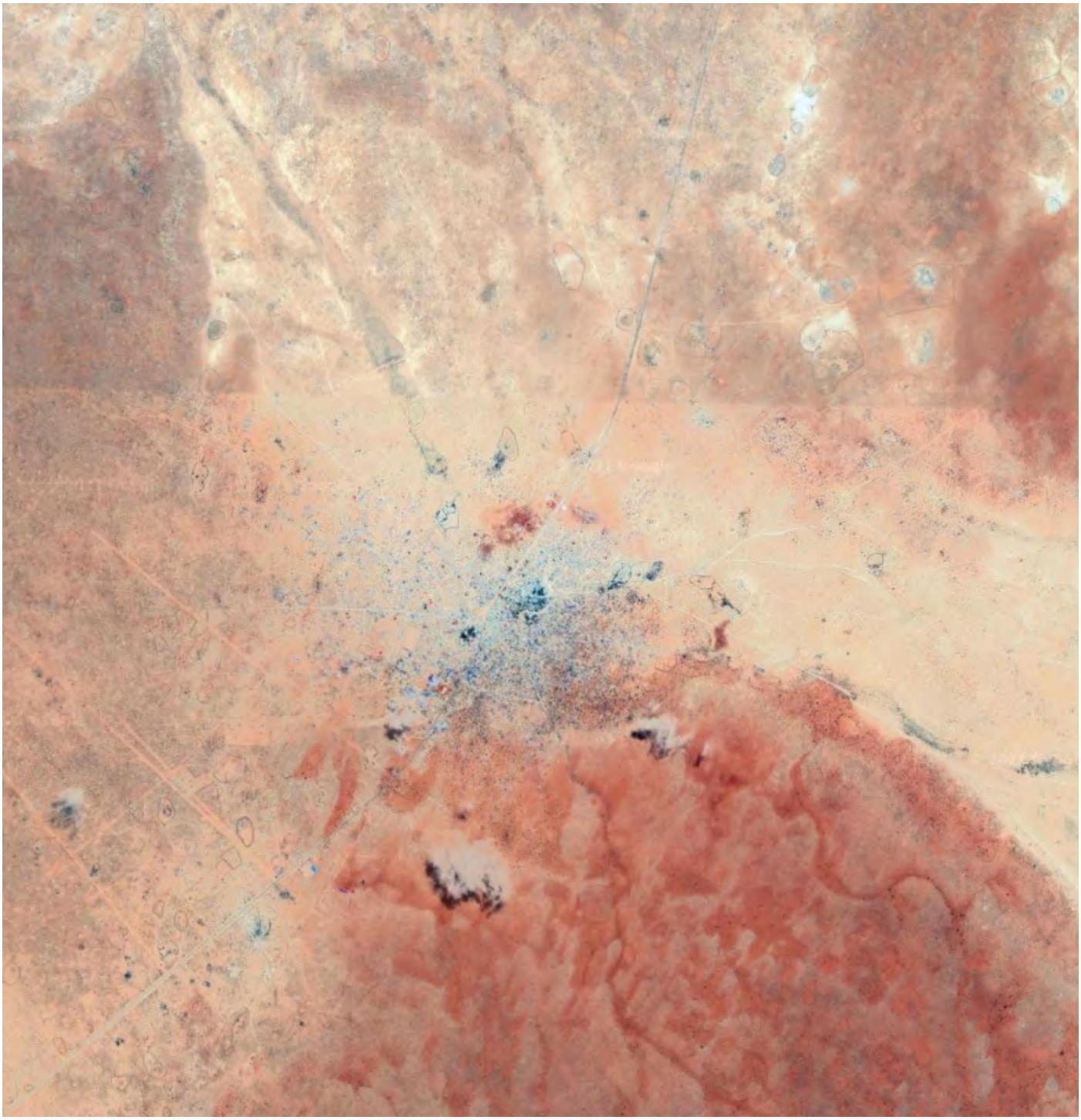


Contents

1 INTRODUCTION

The Dhusamareb Resilience Plan provides an overview of the main features related to resilience in the town and its surrounding landscape. It briefly analyses the current development challenges with a special focus on climate-related and environmental-related risks affecting vulnerable population.

It is a complementary technical document to several other planning studies and reports to shape the future of Dhusamareb in a more sustainable way, providing basic urban services to all communities and leaving no one behind.

This Resilience Plan provides an identification of the main existing processes currently taking place in Dhusamareb from a vulnerability perspective. The vision and example interventions are focused in reverting, at least partially, those processes.

Given the lack of available information from all spheres – social, environmental, economic, etc– it wasn't possible to develop a full scope document.

However, this document does propose a clear methodology that can be later applied and customized. Firstly, a regional and urban scale analysis identifies hazards, vulnerable areas and current resilience elements. With this information, an interdependence assessment is conducted through the problem tree analysis. This analysis identifies the process(es) that are in the root of the main hazards perceived across different scales. Once the processes have been identified, a complete vision can be proposed, focused on modifying the main damaging process(es) and not spending energy on solving side sympthoms. This method aims to reduce the hazards and vulnerabilities of the communities in Dhusamareb on the long run.

Responding to the environmental challenges is an endeavor that requires, in general, large-scale, long-term environmental strategic plans, which include continuous monitoring and evaluation from the local authorities. This document proposes examples of specific interventions that local and regional administrations and individuals can undertake to increase urban and regional resilience. These actions are chosen according to their simplicity and based on their effectiveness (drawn from scientific literature descriptions). It would be advisable to present alongside the interventions a monitoring and evaluation plan, so as to ensure their being effective.

UN-Habitat's mandate on the implementation for the sustainability agenda is making cities and urban settlements resilient, inclusive and sustainable under Sustainable Development Goal (SDG) 11. UN-Habitat has developed more comprehensive, local tools for resilience planning, such as the City Resilience Action Planning Tool (CityRAP Tool), that would be advisable to develop on the field involving local participatory processes. It would also be advisable to conduct a Vulnerability and Risk Analysis (VRA) on the field for a more complete vision of the current processes.

It is hoped that this working paper contributes to the necessary public discussion on Dhusamareb's future development and facilitates decision-making by local, regional, state and federal authorities.

Reference is being made to other studies and data updates undertaken by UN agencies and other international stakeholders, such as: SWALIM (Somalia Water and Land Information Management), World Bank-FAO, IOM and CCCM Cluster.

This Resilience Plan was drafted with support from the Dhusamareb Core Facilitation Team (CFT) of Midnimo II (Unity) project: "Support for the Attainment of Durable Solutions in Areas Impacted by Displacement and Returns in Galmudug and Hirshabelle States."

Midnimo II is jointly implemented by The United Nations Development Programme (UNDP), International Organization for Migration (IOM) and the United Nation Human Settlements Programme (UN-Habitat) and funded by United Nations Peacebuilding Fund.

HAZARDS

The first part of this resilience plan identifies hazards, based mainly on those related to environmental issues, such as soil degradation. This identification is twofold, taking place on both regional and urban scale.

VULNERABILITY

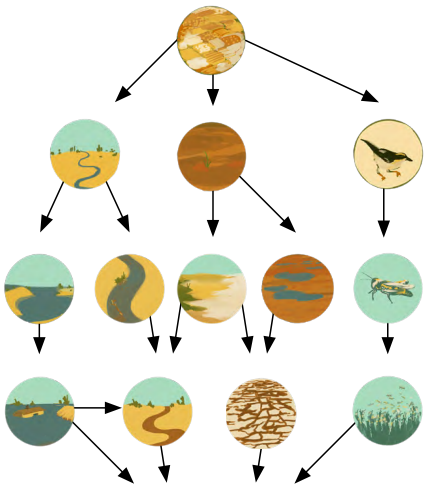
The second part of this resilience plan identifies vulnerable areas, such as IDP camps and public facilities, that would be endangered by their current exposure to extreme weather events.

RESILIENCE ELEMENTS

The third part of this resilience plan identifies the current elements that provide resilience, both on regional and urban scale.

SIMPLIFIED INTERDEPENDENCE ASSESSMENT

Using the problem tree analysis, hazards are presented (on a simplified format) with causal relations, providing a vision of the processes taking place currently in the city and its surrounding region. This method helps identify the root processes in the origin of the different hazards.



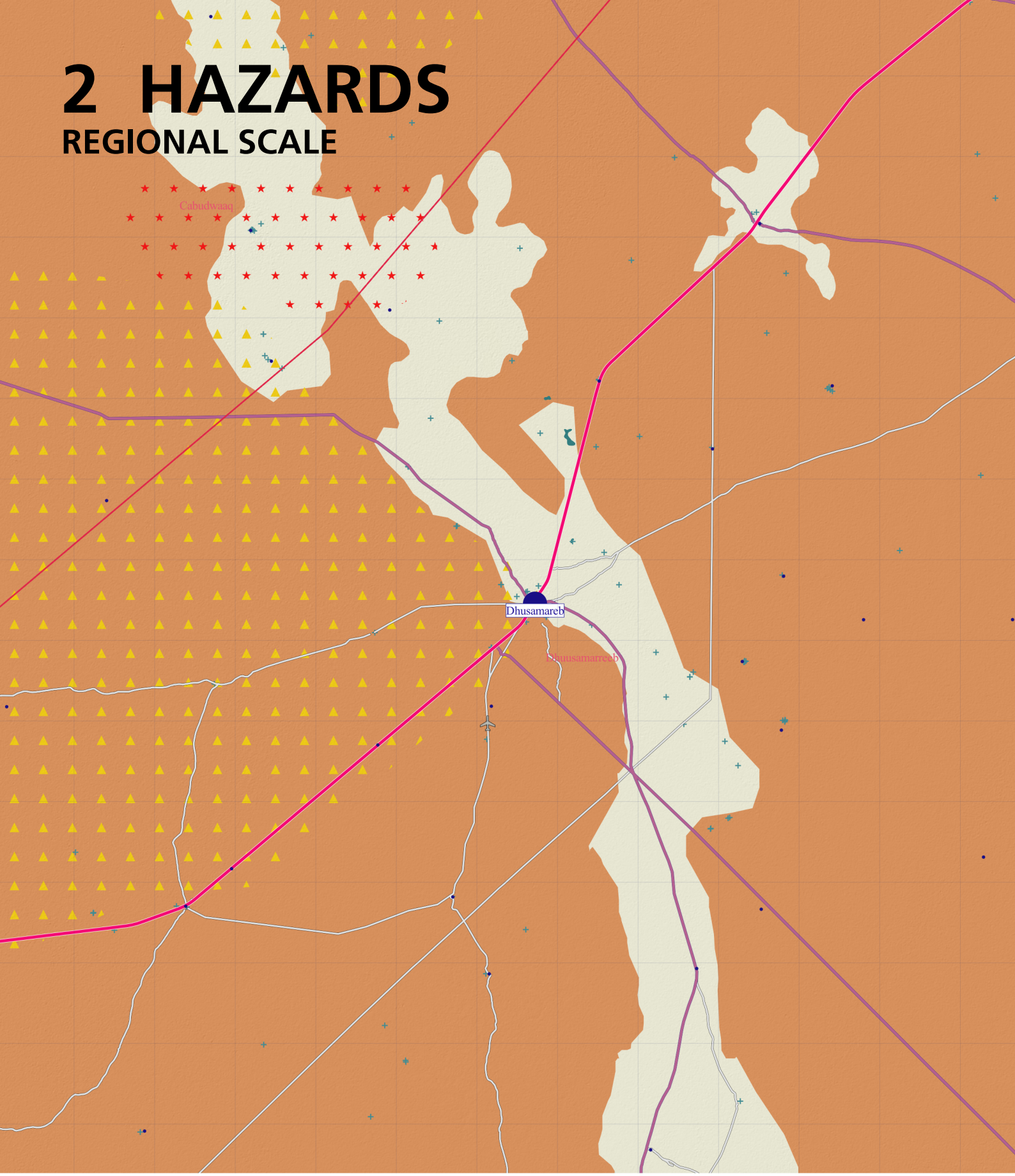
VISION

By reversing key elements previously identified on the problem tree, the causal relations between them are also reverted. This results on a vision for an improved future resilience that tackles the root elements of the damaging processes.

EXAMPLE INTERVENTIONS

Lastly, this resilience plan proposes tactical solutions and examples of specific interventions –bottom-up– that local administrations and individuals can undertake to increase urban and regional resilience. These actions are chosen according to their simplicity and based on their effectiveness (drawn from scientific literature descriptions). It would be advisable to present alongside the interventions a monitoring and evaluation plan, so as to ensure their being effective.

2 HAZARDS
REGIONAL SCALE



Hazards | Regional scale

Reported hazards

- Conflict area
- Fires

Land and soil degradation

- Rangelands | Shrublands or grasslands
- Sabkhas | Gypsiferous crust deposits with fluviolacustrine clays

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Projections under a low-mitigation **climate change** scenario for Somalia suggest temperatures may increase 3° to 4°C by 2080.[1] Global climate models for the region predict overall precipitation to increase in future decades.[2] Eight of the last ten years have seen chronic droughts in East Africa, including Somalia, and persistent droughts are likely to continue.[3] This will further threaten livelihoods and food security. Climate change could lead to loss of biodiversity and soil fertility, and increase the prevalence of pests and disease, threatening agriculture and human health and increasing rates of urban migration, thus exacerbating conflict in Somalia.[4] Climate change is a worsening factor in all hazards described below.

Soil degradation is the biggest hazard in the Dhusamareb region. Dhusamareb is situated on a great plain, part of which belongs to a lower, sabkha type of terrain. The other part constitutes a rangeland, with grass or shrubs. The characteristics and dynamics of these terrains must be taken into account in understanding soil degradation and possible derived desertification in the region, which includes loss of vegetation cover, loss of topsoil and soil erosion.[5] Climate is arid in Dhusamareb, with elevated temporal and spatial variability, and this should be taken into account too.

Sabkhas are endorheic lake areas. They are described as saline flats or salt-crusted depressions based on silt and clay. In sabkhas, underground water is close to the surface, with very interconnected networks.[6] Sabkha soil has a loose, sandy and gritty texture. The encrusted surface is composed usually of hygroscopic salts[7] and it usually presents gypsophile (gypsum-resistant) and/or halophile (salt-resistant) vegetation. Shallow pools form easily in rainy seasons, and this water takes a long time to absorb, sometimes evaporating rather than filtering in. Sabkhas have soft, poorly cemented, impermeable floors, due to periodic flooding and evaporation. Currently, many roads and pathways go across the sabkhas and it is likely that pastoralism is also taking place there.[5]

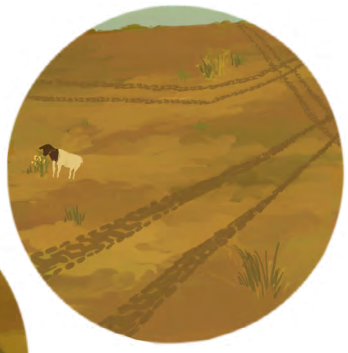
Rangelands are extensive plain areas of land occupied by native herbaceous or shrubby vegetation, where domestic or wild herbivores graze. These spaces are inherently related to pastoralism. It is likely that they have been modified in the last years due to different processes –armed conflict, fence building, sendentary lifestyle, increase of intensive production, etc.[8] These processes may have had negative effects upon rangeland productivity[8] and have contributed to soil degradation. Some documents consider that the biggest threat to rangelands is overgrazing[5], however, other theories suggest otherwise. Ian Scoones[8] considers these kinds of rangelands as "non-equilibrium environments" where the biggest threat derives mainly from climate. Recent scientific litterature suggests that soil degradation may be related to poor livestock management[9].

Drought is a major hazard on the region[10], greatly amplified by climate change and worsened by soil degradation. It causes critical problems of water access, affecting health and sanitation.

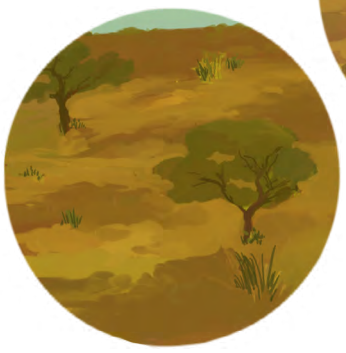
Wind is an important shaper in the morphology of the region. Once soil is degraded, wind causes aeolian erosion. **Strong winds** can grow into sand and dust storms, creating a threat to health and production. At a regional scale, blowouts can be observed on aerial view: Geomorphological processes caused by the removal of sediments by the wind.[11]

Wildfires pose a hazard to lives and to the landscape, according to local autorities.[10] Fires may be caused by natural dynamics, by extreme weather events or by human conflicts.

climate change



sabkha degradation

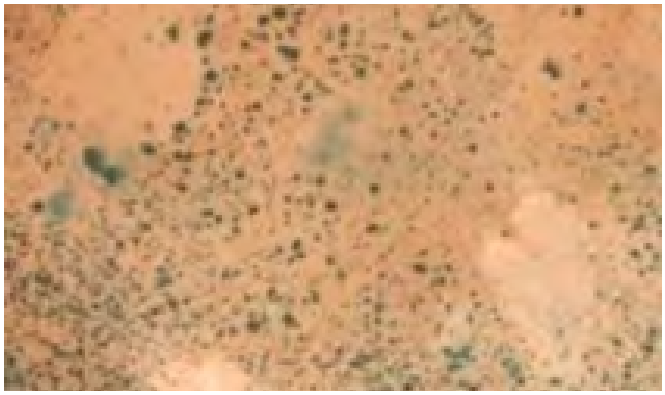


rangeland degradation

drought

strong winds

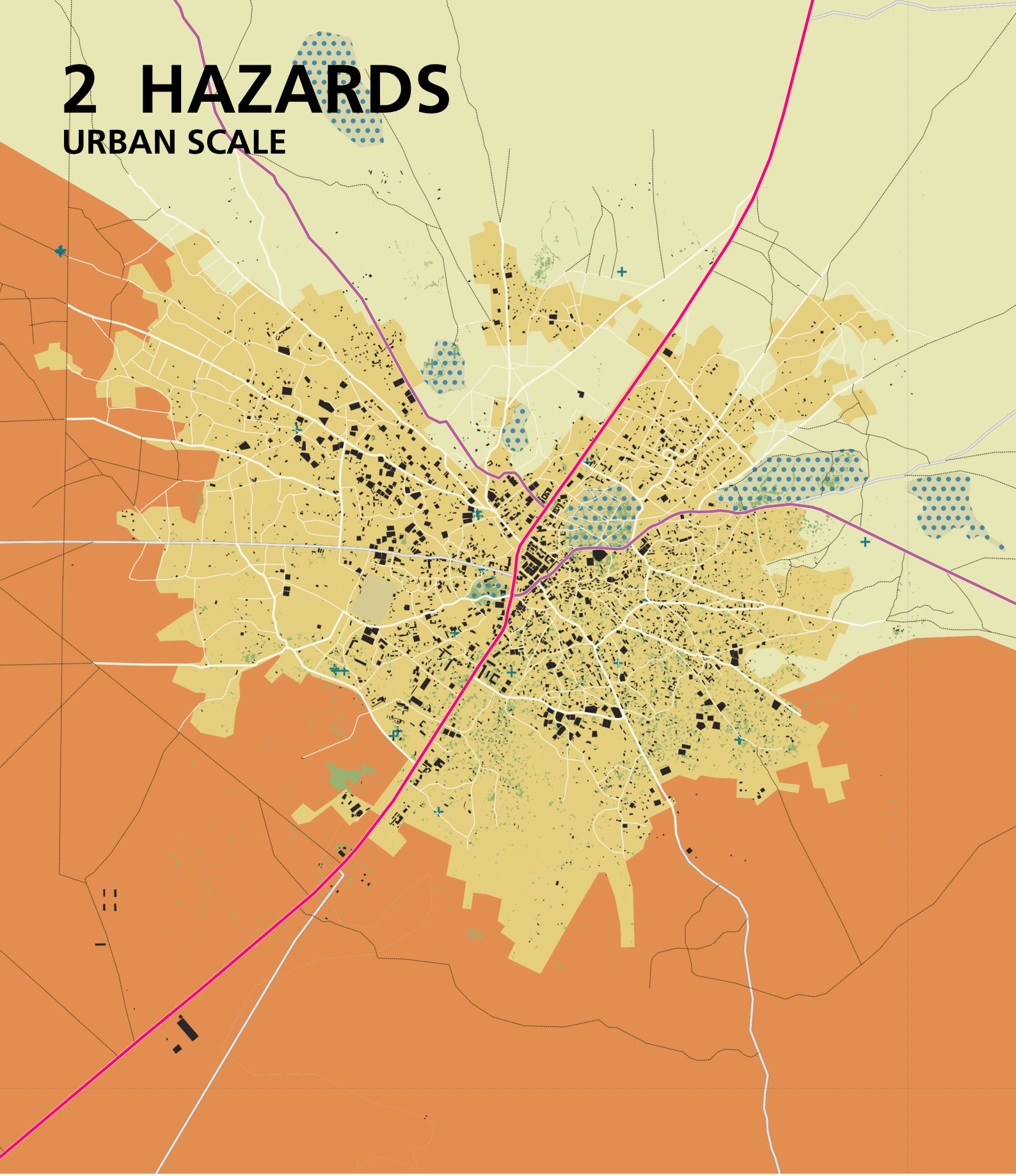
wildfires



Aerial view suggests blowout identification in the Dhusamareb region

1. World Bank-FAO Future Climate Predictions, 2019 http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_future_climate&ThisRegion=Africa&ThisCcode=SOM
2. IPCC 2013; World Bank-FAO Future Climate Predictions, 2019
3. Carty, Oxfam: A Climate in Crisis: How climate change is making drought and humanitarian disaster worse in East Africa, 2017
4. Federal Republic of Somalia: Ministry of Natural Resources, Somalia National Adaptation Programme of Action to Climate Change, 2013. http://unfccc.int/resource/docs/napa/som01.pdf
5. SWALIM Land Degradation Assessment and a Monitoring Framework in Somalia, Project Report No L-14. 2009
6. Abu Taleb, G.M. and Egeli, I. (1981) Some Geotechnical Problems in the Eastern Province of Saudi Arabia. In: Proceedings of the Symposium on Geotechnical Problems in Saudi Arabia, Vol.2, King Saud University, Riyadh, 799-811
7. Abduljawad, S.N., Bayomi, F., Al-Sheikh, A.K. and Al-Amoudi, O.S.B. (1994) Influence of Geotextiles on Performance of Saline Sabkhas Soils. ASCE Journal of Geotechnical Engineering, 120, 1939-1959. https://doi.org/10.1061/(ASCE)0733-9410(1994)120:11(1939)
8. Ian Scoones, Retehinking range ecology: some implications. Living with Uncertainty: New Directions in Pastoral Development in Africa, 1995
9. Gosnell H, Charnley S, Stanley P. (2020) Climate change mitigation as a co-benefit of regenerative ranching: insights from Australia and the United States. Interface Focus 10: 20200027. http://dx.doi.org/10.1098/rsfs.2020.0027
10. UN-Habitat Field Questionnaire, February 2021
11. Hesp, Patrick. "Foredunes and Blowouts: Initiation, Geomorphology and Dynamics." Geomorphology, 48.1 (2002): 245-268.

2 HAZARDS
URBAN SCALE



Hazards | Urban scale

City urban soil
- Soil compaction and soil pollution
- Unregulated pathways

Land and soil degradation
- Rangelands | Shrublands or grasslands
- Sabkhas | Gypsiferous crust deposits with fluviolacustrine clays

Flood areas
- Low-land waterlogging areas related to sanitation problems

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As stated before, projections for **climate change** suggest a rise of global temperatures, while climate models for the region predict overall precipitation to increase in future decades.[12,13] Higher air temperatures will increase transpiration from soil, tree canopies, and water bodies, affecting urban areas especially and increasing the heat island effect. The increment of temperature combined with current drought trends are likely to become a chronic feature of the region. The effects of those risks will further threaten livelihood, food security, biodiversity and soil fertility, enhancing the prevalence of pests and water-borne diseases. Climate change is a worsening factor in all hazards described below.

climate change

According to UN-Habitat field questionnaire, after torrential rains, **water concentrates in low-land areas**[14]. This may be caused by the fact that low land areas are impervious and often unable to drain rainwater, or to the fact that the water table is close to the surface and arises in these points. Low lands that have been incorporated into the urban area can cause disruption of traffic when pools form there, cutting off whole sections of the city from others. Cartography suggests that low-land waterlogging areas coincide with the sections of the city settled upon sabkha terrain.

flooded low-land areas

Lack of waste management including burning solid waste, waste accumulation and lack of sewage systems, may be responsible for potential pollution in water. Infiltration of pollutants into the particularly close-to-the-surface underground water network of sabkha terrains can cause great damage to the population. In that sense, low-land areas can also be responsible for the deterioration of health conditions owing to waterborne diseases. In Dhusamareb, soil pollution may be a critical element to address so as to ensure healthy water access to the population.

lack of waste management

Burning of solid waste and dust particles from eroded landscape areas make for a poor air quality, creating **urban pollution.**

urban pollution

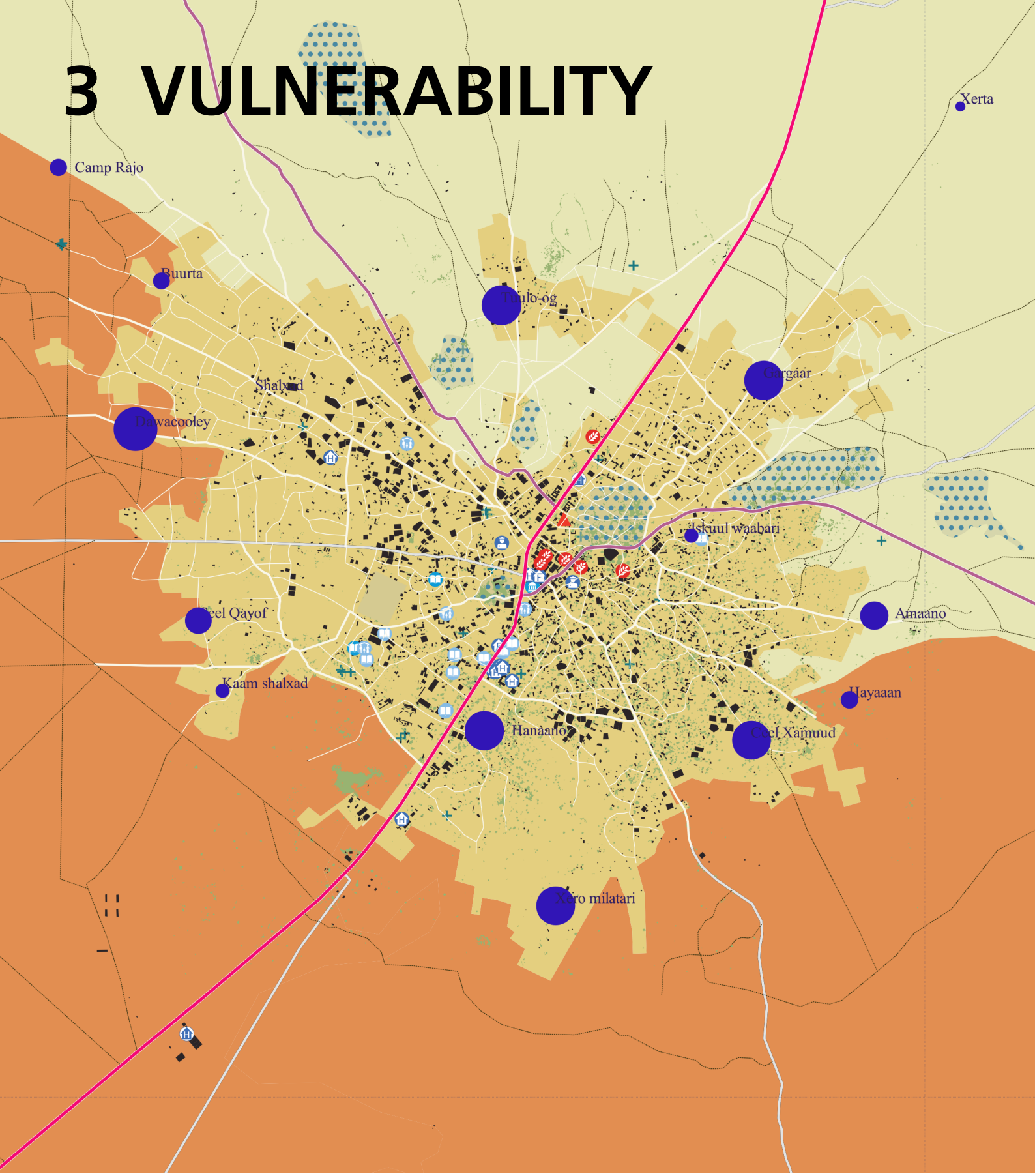
Heatwaves often affect urban areas more severely, as they have a bigger proportion of artificial surfaces, creating the so called "heat island effect". Pharmacies and other medical supplier pose a high risk from heatwave damage.[14] Heatwaves also trigger an increase of wildfire frequency and severity, and higher presence of airbone dust, which contributes to a low air quality in town.

heatwaves

These hazards affect Dhusamareb on an urban scale bringing high impacts to vulnerable zones: Disruption of livelihoods, dependence on outside resources and destabilization of the basic means for survival.

12. World Bank-FAO Future Climate Predictions, 2019 http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_future_climate&ThisRegion=Africa&ThisCcode=SOM
13. IPCC 2013; World Bank-FAO Future Climate Predictions, 2019
14. UN-Habitat Field Questionnaire, February 2021

3 VULNERABILITY



Vulnerability | Urban scale

Sensitive areas

- IDP Camps
- 500 individuals
- 1500 individuals
- 2500 individuals
- 3500 individuals

Facilities

- Educational
- Educational | School
- Health | Health care centre
- Health | Hospital
- Health | Pharmacy
- Local government centre
- Police Station
- Social | Community centre
- Tertiary | Market

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Vulnerability is identified according to two factors: Sensitivity (structural risk) and Exposure (proximity to hazard).

As far as sensitivity, **IDP camps** are identified as one of the most vulnerable structures, given their lack of physical sturdiness and general sanitation issues.

IDP camps have been studied to understand their vulnerability in terms of poor sanitation and health conditions. The health concerns are mainly water-borne diseases, caused by poor water and waste management. There is available information on the following IDP camps in Dhusamareb[15]:

Name	Number of families	Population	Health issues
Buurta	150	740	cholera; AWD (Acute watery diarrhoea), malaria
Laandheer	200	1200	malaria
Tuulo-og	685	4110	cholera; AWD, malaria
Xero milatari	831	3929	cholera, AWD, malaria, diphtheria
Xerta	43	258	cholera, AWD, malaria
Ceel Xamuud	980	3920	cholera, AWD, malaria
Ceel Qayof	350	2100	malaria
Dawacooley	1070	5000	cholera, AWD, malaria
Gargaar	671	4026	cholera, AWD, malaria
Hanano	838	3595	cholera, AWD, malaria, diphtheria
Hayaaan	300	800	malaria
Iskuul waabari	170	520	cholera, AWD, malaria
Kaam shalxad	170	510	cholera, AWD

IDP camps are very exposed to strong winds and air dust as they are located on the outskirts of the city. UN-Habitat field questionnaire mentions that some IDPs are affected by stagnant water, as they are located in low-land areas in the city. However, the existing cartography does not identify any IDP camp located in the low-lands.

IDP structures are often overcrowded and lacking proper site plans, such as elevated latrines. In this area, it is particularly important to pay attention to sanitation in order to avoid pollution of water sources. Health issues in IDP Camps are mainly waterborne diseases.

Other vulnerable elements are public facilities, of which many are concentrated around the main road . These structures are sensitive elements that play an essential role during hazards. As they are mainly located in the center of the city, they seem less exposed to winds, but this location also makes them more exposed to heatwaves.

15. CCCM Cluster, 2020

Ceel Haamud IDP camp. Photo Hassan Ali, CISP, August 2017

4 RESILIENCE ELEMENTS

REGIONAL SCALE

Resilience elements | Regional scale

Natural resources that must be preserved in order to continue functioning as drought mitigators

+ Watersources

Ecosystems that need to be managed in order to assure a resilient landscape

Rangelands | Shrubland or grasslands

Sabkhas | Gypsiferous crust deposits with fluviolacustrine clays

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Flooded lowland area in the Dhusamareb region, with local trees and shrubs. Photo Cumar Hilowle via Googlemaps, October 2017

Flooded lowland area in the Dhusamareb region. Photo Hussein Mohamed Ali via GoogleEarth, November 2020

Rangeland view, with local grass, trees and shrubs. Photo Cumar Hilowle via Googlemaps, October 2017

Goats in the rangelands of Dhusamareb. Photo Mahdi Yare Mohamed via Google Earth, August 2016

The main resilience element in this area are the **rangelands**. Rangelands currently uphold the main economic source in Somalia. Pastoralism is the support system for most families, and it constitutes a dynamic and flexible activity suited to the climate. While generally speaking these ecosystems are underrated, recent scientific literature provides evidence in claiming the importance of rangelands.[16] When compared with ranching, in the same climate, pastoral production systems (based on livestock movement) can be 10 times more productive and highly resilient.[17]

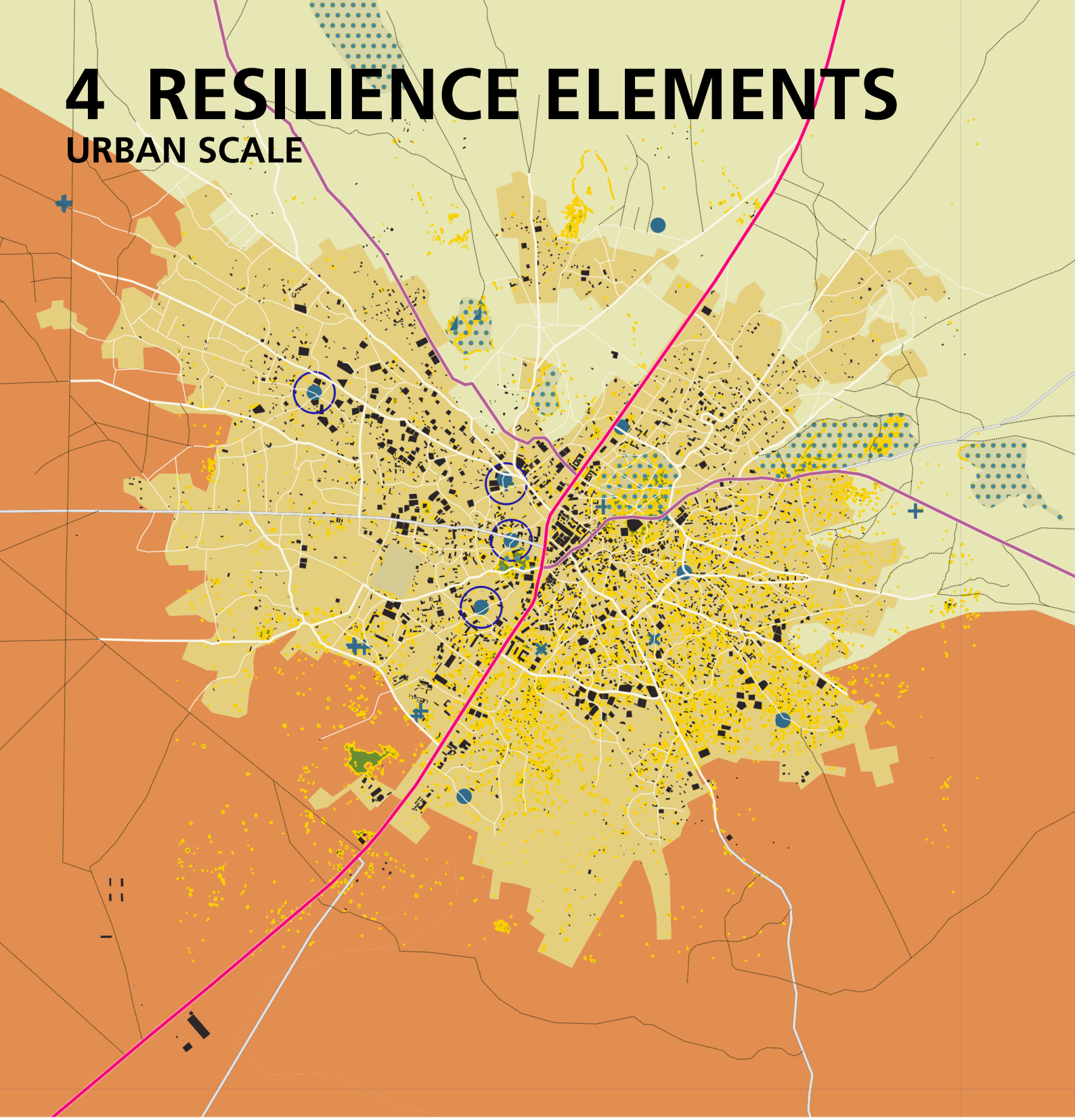
On the more gypsum-saturated deposit areas grows a specific vegetation called **gypsophyte**, unique to this environment.[18,19] It would be advisable to develop a field study with the goal of researching the sabkhas, their composition and mineralogy, as well as cataloguing the existing gypsophytes. As a first approach, it would be advisable to protect this vegetation by minimizing the number of roads and pathways on these areas, and making clear boundaries around them. Reducing foot and livestock damage and developing further conservation strategies in gypsophyte areas may be key in guaranteeing the availability of good quality water in the city.

In order to conserve the sabkha in its best state, it would be necessary to consider alternative economic activities to be developed elsewhere and compensate the conservation effort. The ecological value of preserving the sabkha and the surrounding environment could eventually suppose a tourism source of income, as the Abu Dhabi Sabkha (written as tentative UNESCO heritage site) case suggests.[20]Additionally, sepiolites are frequently found in sabkhas. These high-absorbing clays are somewhat rare and can reach a high demand for commercial use. Sepiolites seem to be located near Ceel Buur. Closer to Dushamareb, calcretes with carnolite may have industrial uses as well but are often less productive than sepiolite.

16. Bond, William. Ancient grasslands at risk. Highly biodiverse tropical grassland are at risk form forest-planting efforts. Science mag.
17. Ian Scoones, Retehinking range ecology: some implications. Living with Uncertainty: New Directions in Pastoral Development in Africa, 1995
18. Romão, Roberto & Escudero, Adrián. (2005). Gypsum Physical Soil Crusts and the Existence of Gypsophytes in Semi-arid Central Spain. Plant Ecology. 181. 127-137. 10.1007/s11258-005-5321-x.
19. Rabizadeh, F., Zare-Maivan, H. and Kazempour, S. (2018), Endemic gypsophytes composition delimitated by soil properties and altitude: From calciphytes to halophytes in the south–central Alborz Ranges. Nordic Journal of Botany, 36: e01568. https://doi.org/10.1111/njb.01568
20.UNESCO Tentative Lists of States Parties: Abu Dhabi Sabkha https://whc.unesco.org/en/tentativelists/6352/

4 RESILIENCE ELEMENTS

URBAN SCALE



Resilience elements | Urban scale

Natural resources that must be preserved in order to continue functioning as drought mitigators

Water availability

- Berkad
- Borehole
- Dam
- Dug Well
- Not classified
- Other

Most used water sources

Urban spaces that may be connected to water resources

- Barkhads

Urban elements that may be functioning as heatwave mitigators

- Trees
- Barkhads

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In Dhusamareb, the continuous presence of drinking water even during droughts, through urban boreholes and wells, is a highlight.[21] In this sense, studying and learning about the geological processes that enable the presence of water in town is essential to guarantee the city's resilience.

Another important element in Dhusamareb are endorheic (closed) water ponds. Defining boundaries around these areas in order to protect them and avoiding constructions in their vicinity would be an efficient way to control the drainage areas of town. This would also avoid having flooded areas in unpredicted places, it could serve as a leisure zone, and it can help mitigate the heat island effect.

In order to ensure their health, it is indispensable to avoid polluting these spaces. It would be necessary to keep them clean and far away from sources of pollutants (latrines, urban waste points, etc.)

The systematic incorporation of vegetation in the city –native species adapted to salt environments such as halophiles–, is a form of protecting the urban environment against wind and extreme temperatures that is already being promoted in Dhusamareb. This urban strategy improves the resilience of the city against certain extreme weather events and protects it from the wind. Giving it continuity by planting native vegetation in dispersed open areas of the city contributes to creating shadow areas that avoid extreme urban temperatures, trapping wind and sand and providing leisure zones.

21. FIMM, Fragility Index and Maturity Model, 2020.

A view of Dhusamareb urban area. Photo Abdalla Abdi via Googlemaps, June 2020

5 INTERDEPENDENCE ASSESSMENT

INTERDEPENDENCE ASSESSMENT:
REGIONAL + URBAN SCALE

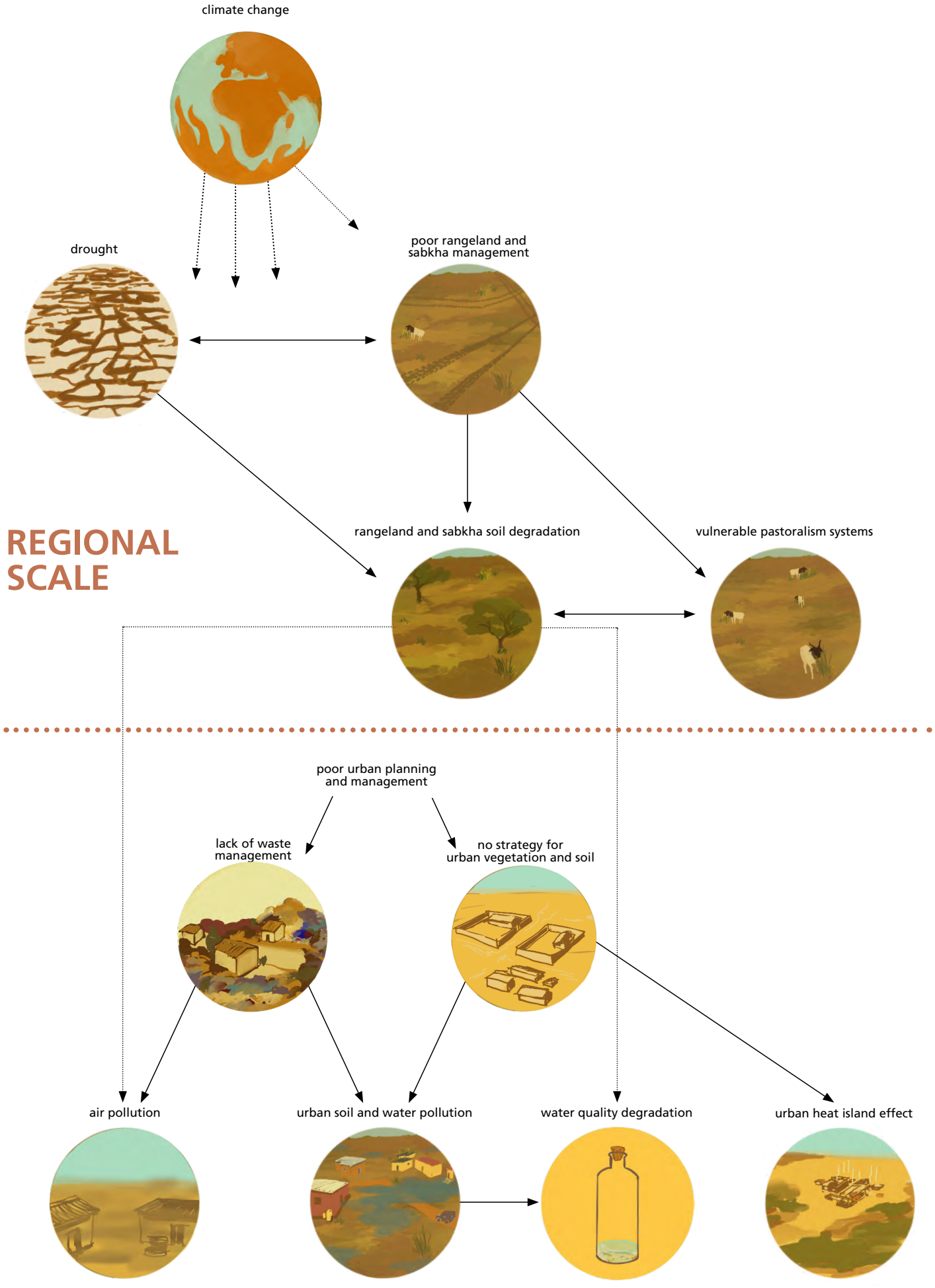
The interdependence assessment provides information about the causality relation between key elements that create environmental vulnerability in a regional scale. Different hazards are inter-related and derive from different causes that may not be considered as threats themselves, but that have a considerable effect on landscape resilience.

This methodology, the problem tree, is chosen in this case as an available approach to process the information at hand. It would be advisable to conduct a more complete field analysis with local participation and updated data, such as the aforementioned Vulnerability and Risk Analysis (VRA) or CityRAP tool.

At regional and urban scale concerning Dhusamareb, it is considered that droughts and poor land management present a major threat to the city area. If climate change predictions are correct, the next decades can be devastating for this region. Droughts are likely to be having major negative impact on soil health. This in turn triggers cascading effects on pastoral systems and rangelands –which may already be negatively affected by armed conflicts, limited mobility and internationally-promoted ranching. Droughts may increase pressure on low-productive areas such as sabkhas and increase the occurrence of wildfires. Other factors, such as road development, may also be having negative effects on soil health. In conclusion, it is crucial in Dhusamareb to carry out mitigation efforts through land management strategies. It is important to note that there is, at the moment, little scientific research on rangelands and sabkha management and a complete absence of site-specific scientific evidence for the terrains in this area.

On an urban scale, poor urban planning and management, which leads to a lack of waste management –both lack of sewage network and solid waste management– may be polluting underground water networks and causing health problems. This element, when related to the lack of soil strategy, may be amplifying soil pollution and urban heat island effects.

These processes seem to be favoring a highly vulnerable region, exposed to the previously identified hazards. Climate change amplifies those processes and their derived impact.


climate change
drought
poor rangeland and sabkha management
REGIONAL SCALE
rangeland and sabkha soil degradation
vulnerable pastoralism systems
poor urban planning and management
lack of waste management
no strategy for urban vegetation and soil
air pollution
urban soil and water pollution
water quality degradation
urban heat island effect
URBAN SCALE

6 VISION
REGIONAL + URBAN SCALE

Vulnerability mitigation is achieved through an inversal of the conditions, by reversing key factors of the causal tree. In the regional scale, this could mean create a proper adaptative land management strategy both for rangelands and sabhkas. In the urban scale, the reversal could mean improving urban governance. The combined cascading effect of those changes has the potential to increase the overall resilience of the town and its surroundings, mitigating the damaging impacts.

While hard infrastructures may be effective against certain threats, hazard management policies are increasingly more focused on ecosystem functions[31], considering sustainable management as a form of invisible infrastructure.

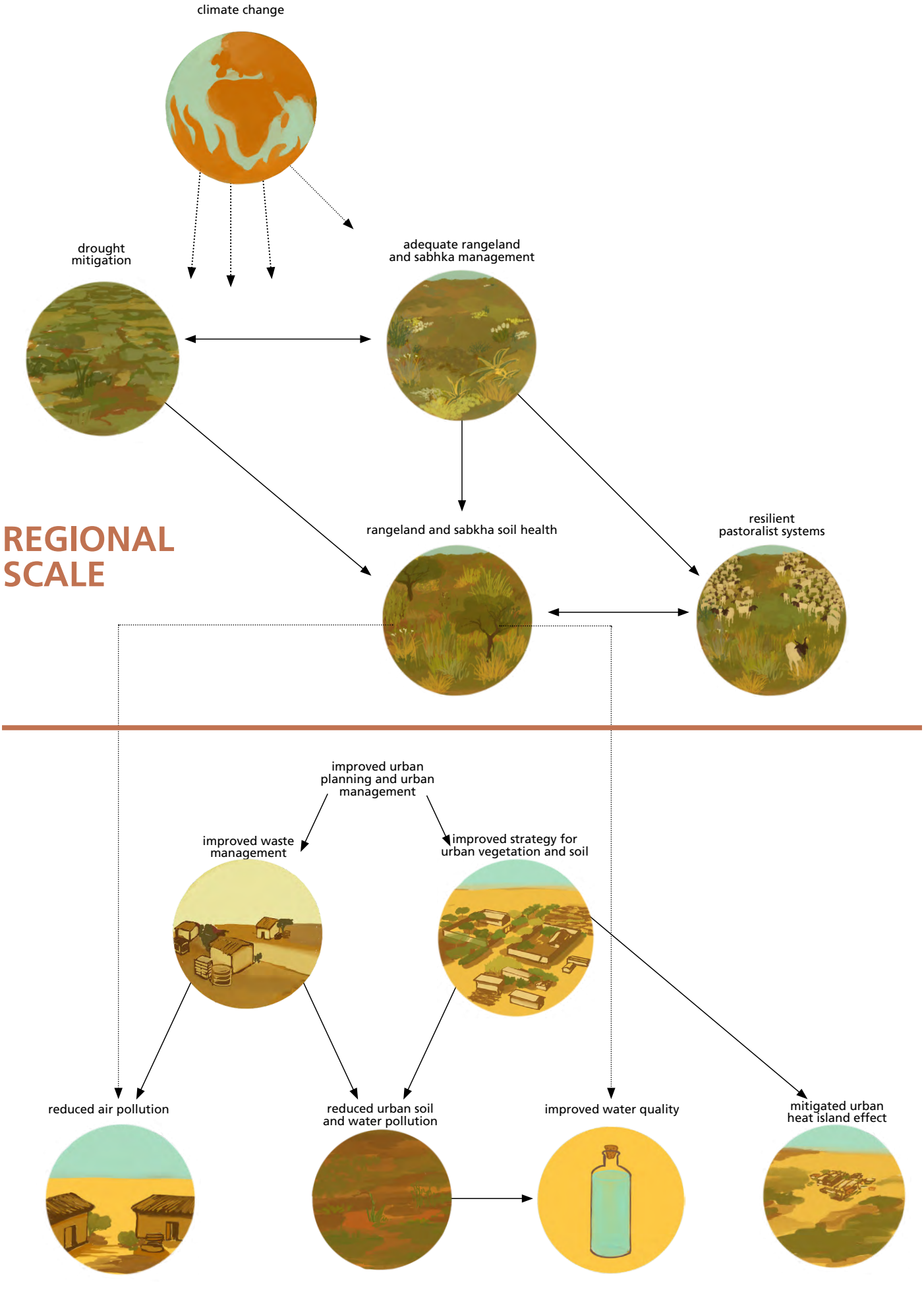
The proposed vision suggests, on a regional scale, putting environmental conservation and restoration at the forefront of interventions. Environmental restoration strongly improves the multifunctionality of the landscape and causes win–win situations, enhancing the ecosystem services supplied such as regulation, maintenance, cultural, and provisioning services.[22] In this case, there are different approaches to rangeland management and rangeland conservation throough pastoralism.

On an urban scale, it suggests creating decentralized infrastructural systems that do not require costly inversions. It would be advisable to direct the city's growth so it does not invade the sabkha formation northeast of town, as construction could be problematic due to capillary salinization. This would avoid additional urban threats related to building on sabkhas.

The complexity of management in both scales, with highly dynamic ecosystems and long-term socio-economic pressures, requires holistic approaches in which scientific evidence and expert knowledge are operationalised for policy needs[23]. This document only proposes an overview on such needs.

This document proposes some tactical solutions and examples of specific interventions that local administrations and individuals can undertake to increase urban and regional resilience. Complete implementation plans are not suggested here.

22. Schindler et al, 2014 Understanding the Science Behind Riparian Forest Buffers: Benefits to Communities and Landowners
23. European Environment Agency, Flood risks and environmental vulnerability, 2016 ISSN: 1977-8449


climate change
drought mitigation
adequate rangeland and sabhka management
REGIONAL SCALE
rangeland and sabkha soil health
resilient pastoralist systems
improved urban planning and urban management
improved waste management
improved strategy for urban vegetation and soil
reduced air pollution
reduced urban soil and water pollution
improved water quality
mitigated urban heat island effect
URBAN SCALE

7 PRIORITY STRATEGY

RANGELAND MANAGEMENT and PASTORALISM

It is important to note that there are different approaches to rangeland management, and in many cases the strategies contradict each other. Rangelands in arid climates suffer from a lack of scientific research. The impact of livestock on greenhouse gas emissions is a debated point with conflicting views[24]. Nevertheless, pastoralism represents a critical pillar of food security and poverty alleviation in dryland areas[25]. In Dhusamareb, it is the main economic activity and food availability depends on it.

In the 1980s, the most conventional approaches to livestock production in arid climates proposed mixed farming systems, conventional ranching or intensive livestock farming, considering nomadic pastoralism as a system to be avoided. These systems were promoted by different institutions such as USAID, ILCA (International Livestock Centre for Africa) for some years until they were progressively abandoned[26] for not fulfilling the expected results. In addition to direct outcomes, neglecting pastoralism can have other consequences such as: reduced food production potential, increased insecurity, increased competition and conflict over limited viable land for sedentary farming, loss of livehoods and displacement, loss of valuable animal genetic resources for aptive and sustainable resources.[25]

Among the most recent approaches –both in the scientific world and in professional practice–, there are different perspectives for livestock production related to rangeland management, and some are still contradictory propositions. Some perspectives focus on seeking forms of pastoralism that maximize benefits to locals and minimize negative impact –Innovative pastoralism[25], Sustainable livestock management[27]–, while others present livestock management as a strategy for rangeland conservation and climate change mitigation –Regenerative ranching related to Holistic management[28], among others. This last strategy seems to be promising given its positive environmental and social impacts[28].

Some globally accepted points in promoting quality rangeland management are:
-Developing adaptive management projects that integrate flexible responses, able to respond to high climate variability[26,28]
-Avoiding global solutions, and instead giving voice to existing livestock keepers in designing rangeland management strategies[25,26]
-Tracking costs and benefits[27].

Given the lack of available information on pastoralism for the Dhusamareb region, it is currently difficult to assess the matter fully. It would be essential to develop more comprehensive studies and field research in order to propose a detailed rangeland management and pastoralism strategy.

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8 EXAMPLE INTERVENTIONS

WASTE MINIMISATION

Where:
Consumption points, shops, markets, households.

What:
Promoting the 5 Rs –Rethink, Reduce, Reuse, Recycle and Refuse the use of single-use items, to derive maximum value from waste.

How to*:
Promoting returnable packaging, Home composting, Community composting and other waste management good practices.

**It would be advisable to include this intervention within a complete strategic plan, including monitoring and evaluation. Waste Wise Cities Tool provides a methodology for this purpose.*

SUSTAINABLE URBAN DRAINAGE NETWORK (SUDs)

Where:
Open spaces around the city.

What:
Ditches, Detention basins, Retention ponds, Water tanks for roof runoff water harvesting. The goal is to increase global permeability of urban surfaces with different techniques.

How to*:
Building ditches, detention basins, retention ponts and water tanks to encourage infiltration and evapotranspiration.

Main ecosystem services provided:
-Flood control
-Habitat for fauna and flora
-Aesthetic and recreational services

**It would be advisable to include this intervention within a complete strategic plan, including monitoring and evaluation.*
***Image below may not be illustrative of the studied city, but rather shows a possible structure for SUDs.*

GREEN URBAN AREAS

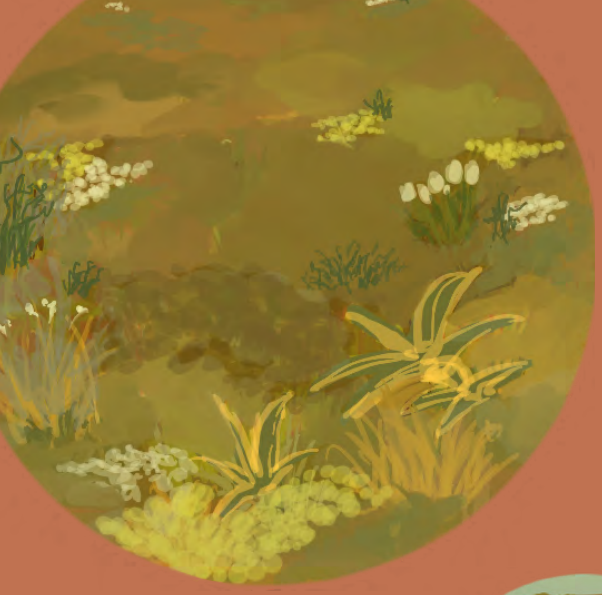
Where:
Dispersed open spaces all around the city, preferably spaces that reach high temperatures and gather crowds.

What:
Creation of shadow areas that avoid extreme urban temperatures. The goal is to increasingly prevent high temperatures and create leisure areas.

How to*:
Promoting vegetation in different streets and open areas in order to multiply shadow areas.

Main ecosystem services provided:
-Temperature control
-Habitat for fauna and flora
-Aesthetic and recreational services

**It would be advisable to include this intervention within a complete strategic plan, including monitoring and evaluation. It can developed together with the SUDs strategy.*



Your comments to consolidate this paper are highly appreciated. Please send us your feedback.

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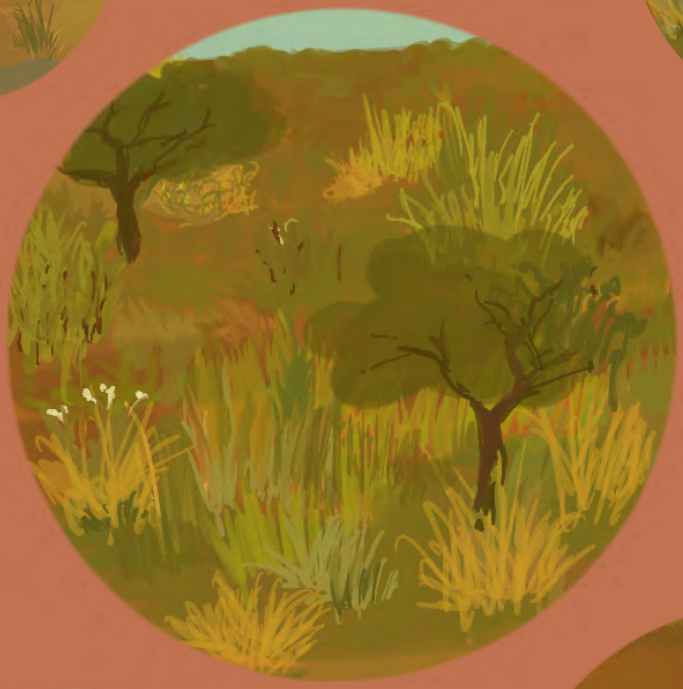
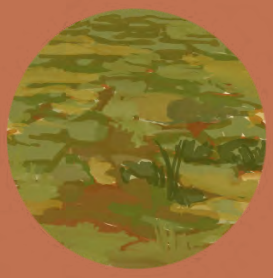
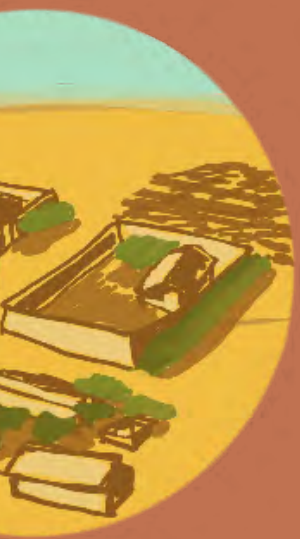
unhabitat-som@un.org







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