AQABA | A RESILIENT **CITY THROUGH ITS NEIGHBORHOODS**

Friedrich Ebert Stiftung







AE Business Council

منتدى الأعمال الهندسي A/E Business Council

November 2021



Prepared by

Mohammad Alshafie Hadeel Ayed Omar Dahabreh Ahmad Elayan

Nashwa Suboh Firas Sweidan Hazem Zureiqat The Regional Energy and Climate Project in the Middle East and North Africa (MENA) of Friedrich-Ebert-Stiftung has Funded, commissioned, edited, and reviewed this study.

Published by A/E Business Council.

Year 2021

Not for sale.

All Rights Reserved. No Part of this publication may be printed, reproduced, or utilized in any form or by any means without prior written permission from publishers.

The views and opinions expressed in this publication are solely those of the original author. He does not necessarily represent those of the Friedrich-Ebert-Stiftung or the editor.

The Hashemite Kingdom of Jordan The Deposit Number at The National Library (6697/11/2021)

624.0956534

Aqaba: A Resilient City Through Its Neighborhoods / Mohammad Suliman AL-Shafie...[etc.al] .-Amman:A/E Business Council, 2021

(101) p. Deposit No.: 2021/11/6697 Descriptors: /Civil Engineering//Structural Engineering//Aqaba(Jordan)/ يتحمل المؤلف كامل المسؤولية القانونية عن محتوى مصنفه ولا يعبر هذا المصنف عن رأي دائرة المكتبة الوطنية أو أي جهة حكومية أخرى.

AQABA | A RESILIENT **CITY THROUGH ITS NEIGHBORHOODS**

Authors

Mohammad Alshafie Hadeel Ayed Omar Dahabreh Ahmad Elayan Nashwa Suboh Firas Sweidan Hazem Zureiqat

Graphic Design Hadeel Ayed Omar Dahabreh

Contributors

Sara Alawad Saifeddin Al Belbeisi Rana Al-Khatib Audai Hassouna Farah Zumot







منتدى الأعمال الهندسي A/E Business Council

ISBN NO.: 978-9923-9893-1-9

PREFACE

This study examines Aqaba's resiliency and sustainability through its neighborhoods. Hence, it analyzes the current situation and challenges that were brought to light during the pandemic as well as envisioning long-term strategies.

Using the transition management approach and showcasing several neighborhoods, the analysis focuses on environmental, planning, and mobility issues along with community engagement challenges. Based on the thorough analyses, a set of possible short- and long-term components are suggested to create sustainable and resilient neighborhoods that are equipped to deal with any future crisis.

The study is a result of a dynamic collaboration between multiple parties who collectively composed an intensive study of Aqaba's neighborhoods and came up with proposed solutions to address the pressing issues at hand.

A/E BUSINESS COUNCIL

The A/E Business Council is a membership and representational association offering professional services to architecture and engineering consulting companies based in the Hashemite Kingdom of Jordan. Its principal objectives are to promote quality, excellence, and competitive standards in the sector; and to facilitate trade through best practices both in Jordan and in overseas export markets.

The A/E Business Council is a not-for-profit association that supports its members through networking, consultation with government agencies concerning professional and regulatory issues, information sourcing, business training and education, and the promotion of international trading links.

The A/E Business Council is supported by, and works closely, with the Jordan Engineers Association (JEA), and the Engineering Offices Committee (EOC) through continuous dialogue and joint committees.

FRIEDRICH EBERT STIFTUNG

FES is a German non-profit political foundation based on the principles of social democracy. It was founded in 1925 to promote international cooperation, education, and research in Germany and abroad.

The activities of FES Amman focuses on promoting social democracy, sustainable economic growth, political participation, social justice, and gender equality as well as contributing to peace and security in the region and ecological sustainability through the Regional Climate & Energy Project.

The Regional Climate and Energy Project MENA advocates for an energy transition into renewable energy and energy efficiency. It continues to search for just transition solutions in the energy sector that ensure both, the protection of the planet and the people.

As the MENA region is one of the most affected areas by climate change, we contribute to policy advising, research, and advocacy in the areas of climate change policy, energy transition, and urban sustainability, with the support of research institutions, civil society organizations, and other partners in the region and in Europe.

CONTENTS

| 01 | INTR | | 4 |
|----|------|-------------------------------------|---|
| | 1.1 | Objective of the Study | 5 |
| | 1.2 | Impact of COVID-19 | 6 |
| | 1.3 | Characteristics of Urban Resilience | 7 |

02 THE CITY OF AQABA: AN OVERVIEW 10

| 2.1 | Urban Planning in Aqaba | 11 |
|-----|------------------------------|----|
| 2.2 | Mobility in Aqaba | 12 |
| 2.3 | Environment in Aqaba | 13 |
| 2.4 | Community Inclusion in Aqaba | 17 |

03 APPROACH & METHODOLOGY 18

| 3.1 | Tran | ion Management | | | | |
|-----|------|------------------------------------|----|--|--|--|
| | 3.2 | Methodology | 20 | | | |
| | 3.3 | Implementing Transition Management | 21 | | | |
| | 3.4 | Focusing on Neighborhoods | 22 | | | |

3.4.1 Focus Neighborhoods Selection Criteria 23

04 ANALYZING SELECTED NEIGHBORHOODS 24

| 4.1 | Selected Neighborhood | ds Analysis Criteria | . 25 |
|-----|-----------------------|----------------------|------|
| 12 | Pilot Najahbarbaad A | District 10 | 26 |

05 DESIGN & PLANNING SOLU

- 5.1 Recommendations
 - 5.1.1 Neighborhood Plannin
 - 5.1.2 Enhancing Sustainable
 - 5.1.3 Addressing Environme
 - 5.1.4 Ensuring Community
- 5.2 Pilot Neighborhood A Dis
- 5.3 Pilot Neighborhood B Dis

06 FUTURE WORK

- 6.1 Transition Experiments
 - 6.2 Scaling Up
 - 6.3 The Avoid-Shift-Improve Fra
 - 6.4 Conclusion

07 REFERENCES

| JTIONS | 57 |
|-------------------|----|
| | 58 |
| ng Considerations | 58 |
| e Mobility | 59 |
| ental Challenges | 61 |
| Inclusion | 63 |
| trict 10 | 64 |
| strict 7 | 74 |

| | | • | | • | • | | • | | • | | • | • | • • | | • | • | • | • • | • | • | | • | 9 | 1 |
|---|-----|-----|-----|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----|-----|----|-----|----|-----|---|---|
| • | •• | ••• | • | ••• | ••• | ••• | •• | ••• | ••• | • | ••• | • | ••• | • | ••• | • | • | ••• | •• | • | •• | •• | 9 | 2 |
| • | ••• | ••• | • | ••• | ••• | • | ••• | ••• | ••• | • | | • | ••• | • | ••• | • | • | •• | •• | • | •• | •• | 9 | 4 |
| ć | ar | n | e | <i>;</i> / | N | C | or | k | | | • | ••• | • | • • | • • | • | ••• | • | | ••• | • | ••• | 9 | 6 |
| | ••• | •• | ••• | • | •• | ••• | • | ••• | •• | ••• | • | ••• | • | ••• | • | • | ••• | • • | • | ••• | • | •• | 9 | 8 |
| | | | | | | | | | | | | | | | | | | | | | | | | |

| ••••• | 99 |
|-------|----|
|-------|----|

1. INTRODUCTION

1.1 OBJECTIVE OF THE STUDY

Aqaba is a growing city with a vibrant culture, a desirable investment climate, and one of Jordan's vital tourism attractions. As its sole coastal city, Aqaba plays a major role in the development of the country's economy.

Globally, increased rates of urbanization and industrialization have had very significant adverse impacts on climate and society including; CO₂ emissions, traffic casualties, local air quality, social inequity, and loss of street space. In the 21st century, global pressures that play out at a city scale – such as climate change, economic fluctuations, and disease pandemics – pose new challenges.

To overcome these challenges and to accommodate Aqaba's increasing population and economy, we must look to the future and consider how we can build resilient neighborhoods that reflect the city's identity and values. In addition to economic development, social and environmental dimensions of sustainability should also be considered in a city that should be known for its high quality of life and remarkable neighborhoods to live in.

This study aims to provide a framework for transformational change in Aqaba's neighborhoods in order to build towards a sustainable, resilient city with an improved environment, inclusive mobility, and increased social equity.



1.2 IMPACT OF COVID-19

Due to the ongoing spread of the coronavirus disease, COVID-19, Jordanian officials began implementing unprecedented lockdowns across the Kingdom. Under the measure in Aqaba, individuals were not permitted to enter or exit the city without special permits.

All schools, universities, public institutions, and businesses were closed, and only essential local stores were permitted to open when complying with strict health protocols. Citizens were permitted to go out during certain hours of the day, by foot, to meet their basic needs and buy essentials from stores available in their neighborhoods (UNDP, 2020).

The impact of COVID-19 and lockdown measures on society, the economy, and infrastructure has been significant. With this new lifestyle came a quick realization of the basic human needs of space, freedom, and nature; all things we quickly recognized were almost overwhelmingly lacking.

Movement restrictions also gave us a glimpse of what life could be like in cities and in our neighborhoods without high levels of traffic due to particularly high levels of individual car usage. As a result, air and noise pollution were also reduced; it became much easier for walking and cycling; and people were encouraged to support their local neighborhood stores. It could also be advocated that such trends and travel behaviors observed during the lockdown should be sustained after the pandemic, not just during emergencies.

PRE-COVID



AIR POLLUTION



TRAFFIC



DURING LOCKDOWN



BETTER AIR QUALITY



ACTIVE MODES OF TRAVEL



NEIGHBORHOOD STORES

1.3 CHARACTERISTICS OF URBAN RESILIENCE

RESILIENT CITIES

A resilient city is characterized by its capacity to withstand or absorb the impact of a hazard through resistance or adaptation, which enables it to maintain certain basic functions and structures during a crisis and bounce back or recover from an event (UNISDR,2007).

The COVID-19 pandemic provides an unprecedented opportunity to understand how cities might be affected by pandemics and what actions are needed to minimize the impacts and enhance urban resiliency. Cities must ensure that their recovery strategies and investment decisions, strengthen, rather than weaken, its resilience. A resilience-based approach can be useful in any planning opportunity but it can be especially useful now that cities need fresh new ideas to help them avoid similar crises.

This requires a transformational change in capacities from current stressful situations that challenge and deteriorate urban resilience to new states of higher resilience. Such transformation requires strengthening and connecting all inherent dimensions of urban resilience that consists of people (individual and communities); places (infrastructure and ecosystems); and governance (institutions, partnerships, policies, and laws) (Arup, 2014).

1. People's Resilience

People's resilience - also known as social resilience - is defined as their ability to self-organize and mobilize their skills and capabilities in order to source new opportunities and generate new forms of innovation, as well as their ability to act in solidarity in the aftermath of a disruption.

2. Places' Resilience

The appearance of cities and their landscape context have a significant impact on their ability to recover and persevere from stresses and shocks. Cities should work towards a sustainable environment which requires conserving natural resources and protecting ecosystems to support the well-being and quality of life in a city. Infrastructure should maintain function over time regardless of the stresses and shocks experienced and should remain adaptive to all social demands of today and the needs of future generations.

3. Governance Resilience

In building urban resilience, proactive leadership is paramount. It is also important to anticipate shocks and understand the long-standing vulnerabilities experienced due to urban stresses. Clear sustainabilityoriented goals should be set along with empowerment of citizens to co-design, co-create, and co-produce thus having a shared responsibility and accountability of the present and future of urban resilience. For political action to be backed up, proposed actions require a multi-actor partnership involving public, private, and civil actors.



RESILIENT NEIGHBORHOODS

Neighborhoods have a strong physical reality inside cities with distinctive physical, social, and economic characteristics. They are one of the main units that play an important role in the formation of cities and where people live and spend most of their time. Thus, planning and design of resilient neighborhoods as a significant geographic and social unit has a crucial role for creating a resilient city.

Resilience is about strengthening our community's response and adaptation to big changes and deep challenges. We create a stronger, more connected community, where everyone's basic needs are met - balanced with the planet's needs. Building a greater sense of connection to the people and places where we live is important as we recognize and celebrate our interdependence and grow "local selfreliance".

Therefore, we define neighborhood resilience as a neighborhood's ability to adapt and act in proactive ways that ensures the lasting livelihood of a community and its ability to pivot in times of crisis (FES, 2020).

Dimensions of urban resilience.

CHARACTERISTICS OF RESILIENT NEIGHBORHOODS

In this study, we will attempt to provide a framework for transformational change in Aqaba's neighborhoods that targets 13 characteristics which aim for resilience in these neighborhoods.

These characteristics fall under four main categories: Urban Planning, Mobility, Environment, and Community Inclusion.



Efficient usage of any developed areas to make them as compact as possible.



Integrated variety and mix of parks and community spaces that are accessible and suitable to a range of ages and abilities.



Access to opportunities and services within a walkable distance.





Well-connected streets and trails that encourage active modes of travel.



Reliable high quality public transportation services that are safe and easily accessible by all residents.



Minimum environmental impact and low CO₂ emissions from motor vehicles.





Conservation of natural areas, existing ecologies, and biodiversity.



Efficient energy consumption, renewable energy, and low CO_2 emissions.



Sustainable stormwater management.



Sustainable waste management practices.





Equal opportunities for all genders.



Inclusive services for people with disabilities.



Community engagement in planning and decisionmaking processes.

9

2. THE CITY OF AQABA: AN OVERVIEW

2.1 URBAN PLANNING IN AQABA



Aqaba has a strategic location at Jordan's southernmost point, on the Gulf of Aqaba lying at the tip of the Red Sea and at the crossroads of the continents of Asia and Africa. The city had a population of 213,000 in 2020 and a land area of 375 square kilometers, covering a 27 km long sea front (Department of Statistics, 2020).

The Agaba Special Economic Zone (ASEZ) was established in 2001 as a developed investment zone with multiple economic activities that are characterized by customs and reduced consistent tax exemptions within the most important initiatives from the Government of the Hashemite Kingdom of Jordan to support the local economy in developmental motivations and increasing the national income (ASEZA, 2001).

This area is being administered under a single integrated government entity, the Agaba Special Economic Zone Authority (ASEZA), which is charged with coordinating the economic and social development of all the diverse activities and resources within the ASEZ as a special free trade economic zone.

The initial ASEZ Master Plan was adopted in 2001 and divides Agaba into five special areas for the promotion of urban, tourist, commercial, academic, and other investment sectors. The areas are Agaba town, the port areas, the coral coastal zone, the southern industrial zone, and the airport industrial zone (Oxford Business Group, 2018).



- Residential
- Civic Tourism
- Resorts
- Mixed Use
- Governmental/Institutional
- Light Industry
- Heavy Industry
- Airport/Seaport/Railroad
- Services
- Private Use
- Recreational/Open Space/Buffer
- Natural Reserves
- Historical
- **Development Reserve**
- Public Beach
- Logistics
- Canal
- Gulf of Aqaba

2.2 MOBILITY IN AQABA

Aqaba is characterized by mobility trends that are similar to those of other Jordanian cities. However, it does have its own unique challenges and potential opportunities that set it apart from other cities and towns in the Kingdom.

Transportation in the coastal town is dominated by the private car. This is not surprising in a country where car ownership has been increasing at over 6% per year (Jordan Strategy Forum, 2018) and where there has been little investment in public transport or other alternatives. The dominance of the private car has presented a whole host of challenges related to pressures on household expenditures, increasing energy demand and greenhouse gas emissions, economic losses due to traffic congestion, and the lack of equal access to employment and educational opportunities - especially for women. Many of these challenges have been previously highlighted in other FES studies (Attari et al., 2020) (Tarawneh et al., 2020).

Agaba specifically has a unique set of challenges. A recent study completed for the Agaba Development Corporation found that although Agaba may not generally suffer from traffic congestion due to high traffic volumes, it does have a number of problematic areas and intersections which present safety risks for drivers and pedestrians. The city's hot summer climate may also be viewed as a unique challenge as it may limit opportunities for non-motorized travel, at least in certain times of the year (Agaba Development Corporation, 2016).

On the other hand, there are several noteworthy opportunities to highlight in Agaba's current mobility system. Unlike the capital Amman, Aqaba has relatively flat terrain and its street network is more grid-like. These features, coupled with the relatively small population and low traffic volumes, place Aqaba in a unique position to invest in alternative, more sustainable modes of transport.

Unlike Amman, Aqaba's mobility system is also more balanced in terms of accommodating various road users. Many sidewalks are continuous; pedestrian crossings are more often respected by drivers; and the city's road network does not have the bridges, tunnels, and multi-level interchanges that have come to characterize the streets of Amman.

Finally, as a prime tourist destination and the only coastal city in Jordan, Agaba is also well-positioned to invest in public transport and micromobility solutions that are more tourist-friendly and can accommodate the influx of visitors during peak periods. Technologybased solutions such as ride-hailing apps have witnessed tremendous success in Amman. This can be replicated with similar services for bike-sharing or on-demand ride sharing services, for example, in Aqaba.



View of King Hussein Street (Corniche Street), Agaba.

2.3 ENVIRONMENT IN AQABA



The City of Aqaba is strategically important to Jordan as it is the country's only seaport city and an important import/export hub. In recent years, Aqaba has become a touristic destination well known for its diving and beach resort. Additionally, the city houses several industrial activities including being the medium for Jordan's phosphate exports and the main administrative center within the south of Jordan.

Aqaba is vulnerable to earthquakes, flash floods, sandstorms and industrial hazards. The northern parts of Aqaba are the most vulnerable regions for flash flood hazards. These areas contain the town's residential expansion area, the Aqaba International Industrial Estate, the King Hussein International Airport, and the Northern light industries and logistics areas.

Aqaba is also facing various environmental challenges resulting from decades of non-sustainable production and consumption patterns. In addition to the increase in produced waste quantities, Aqaba has been losing biodiversity, gaining air and water pollution, and suffering from land degradation which has led to an increase in pressure over local ecological systems.

GROUNDWATER

The long periods of daily sunshine, high temperatures year round, and little vegetation cover enhances the process of actual evaporation which makes direct recharge of groundwater rare. On the other hand; high infiltration rates; low soil field capacities; coarse textures (classified mainly as sands); the revealed weakness of structural zones as lineaments; active faults; and the shallow groundwater table allow good parts of precipitation to percolate down to the groundwater body, forming recharge.

CLIMATE

The wind is mostly directed from north to northwest and from south to southwest. Dust and sandy winds are rare with average wind speed ranging from 11.5 to 23 miles per hour which has a noticable role in dropping the humidity. South winds are also fairly rare.

Since the city crosses the hyper-arid area of Wadi Araba, it is very dry. While the relative humidity is high in winter time, it decreases during the hot summer months usually being between 28-30%. The sunlight is intense especially in the summer months with the highest sunshine hours registered in May, June, and July and the lowest in December, January, and February (Odat et al., 2018).

ECOLOGY

Despite the harsh environment, Aqaba hosts a unique ecosystem of rare plants and herbs. Some of the native plants include ziziphus spina-cristi, phoenix dactuylifera, hyphaene thebaica, and acacia tortilis which are known to be drought resistant. Most native plants are not widely used and not available commercially, nevertheless several other species have been modified and adapted to the Aqaba climate. These include various cacti and succulents; groundcovers and climbers; shrubs and grasses; and trees and palms which are all used in landscaping.

The Gulf of Aqaba is home to some of the finest marine life in the Middle East, while its coral reefs rival those found elsewhere in the world. The gulf is very narrow - at its northern end it is only five kilometers wide - and quite deep, ranging in depth from 1,000 to 1,800 meters. The depth of the gulf, combined with its isolation from sea currents, minimize turbulence and improve visibility.



Migrating birds at the Aqaba Bird Observatory.

On Aqaba's shorelines, one can find species such as the ghost crab, sandhoppers, and the mole crab. The sea waters, meanwhile, host a plethora of marine life including starfish, sea cucumbers, crabs, shrimps, sea urchins, many species of fish and several worms which burrow into the sandy sea bottom.

A variety of sea grasses can be found in more shallow waters, providing both food and shelter to the fish which inhabit the area. Several species of eel make their home in the gulf's grass beds, where one can also find seahorses and pipe fish (Department of Environment; UNDP, 2015).

In addition, Aqaba is identified as an important bird area. The manmade pools within many of the new developments throughout the city attract significant numbers of waders, ducks, and other birds on their annual migration. Raptor migration alone involves at least 100,000 birds per season (UNDP, 2015).

SOLID WASTE

Aqaba generates around 150 tons of solid waste daily which consists of organic waste, paper, plastic, metals, and others, as indicated in the figure below (EDAMA, 2018). It is also worth mentioning that no separation is done and all waste is disposed in the same mechanism. Municipal cleaning is done in partnership with the private sector through contract, with ASEZA as the contracting authority. Municipal Solid Waste (MSW) collection coverage is estimated at about 90%; about 50% of MSW is food waste and 35% is packaging waste that would be potentially be available for recovery. Most MSW ends up at dump sites and landfills, whereas only 7% is currently recovered informally in the city (UNDP, 2015).

Regulatory measures regarding plastics - and more specifically, plastic bags - are being introduced in Aqaba, where tourism is an important economic pillar disadvantaged by visible garbage and pollution to the sea and surrounding coral. However, the ASEZA intends to change the existing pattern of plastic bag consumption and disposal. It has developed a preventive waste and plastic bag management plan for the city entitled Aqaba Preventive Solid Waste Management or APreWaM. This management plan is based on the assessment of the current situation and sets out appropriate actions in order to reduce plastic bag consumption overall.



Composition of waste in Aqaba. Source: Ministry of Local Administration



FLASH FLOODS

Aqaba region is best described in term of its climate as arid; while maximum annual precipitation values do not exceed 50 mm in the best conditions and are restricted to the winter season. The potential pan evaporation is estimated 4100 mm/year, (MWI, 1995). These factors give the area the dryness character, and the soil its salinization. With that, thunderstorms can sweep the area in winter to create run off and then rapid surface flash floods. These are the responsible factors for the occurrence of recent wadi shapes within the deposits along the coastal area.

The figure below represents the size of the vast catchment area funneling to the gulf of Agaba. The large size of the catchment area combined with high and short intensity of rainfall, presents high potential for sudden runoff. This phenomenon is exacerbated by the steep nature of the catchment area, which increases runoff speed. Floods are also affected by the roughness of the terrains they cross.

Many developments in Aqaba City are taking place on alluvial fans of wadis. Although these areas remain moderately dry, they are extremely vulnerable to disasters when a flash flood occurs, especially in the northern parts of the city. Authorities in Aqaba are taking measures to mitigate damage caused by the rainy season, such as regulatory dams, drainage and sewage infrastructure, and early flood warning systems.



Hydrology map of the valleys surrounding Agaba (Farhan and Anaba, 2016).

AIR QUALITY

Air pollution has been an increasing concern in Agaba. The city is surrounded by many air pollution sources such as activities using fertilizers, electricity generation, waste water treatment, and crude oil activities. It is worth mentioning that heavy transportation activities such as the use of diesel vehicles may also cause negative effects on the city. Agaba is surrounded by high mountains which block the diffusion of pollutants generated in the city. The climate of the city is hyper-arid with a low atmospheric moisture regime which gives a unique characterization to pollution caused by chemical reactions with the gaseous constitution of the atmosphere.

Seven air pollutants (O₃, CO, H₂S, NH₃, NO_x, PM₁₀, SO₂) were observed over Aqaba at three monitoring stations distributed throughout the city. The diurnal variation of NO_{y} (NO + NO₂) concentration presents a peak during the early morning/evening hours while high levels of NH₂, SO_2 , H_2S , and PM_{10} are present at the southern and port areas of the city due to industrial activities. The diurnal variation of CO, NO_x, and PM₁₀ concentration also peak during the early morning/evening hours. These peak concentrations are linked to traffic intensity. The high levels of gaseous pollutants (SO₂, NH₃, H₂S, PM₁₀, and NO_x) which is recorded within Aqaba on hourly and daily averages, exceeds the limits specified in JS1140/2006 (Odat et al., 2018).

The degree of severity of pollution episodes are highly dependent on wind direction; where southerly winds carry local transportation pollution (i.e., ship, trucks, etc.) and possibly some industrial emissions towards the north end of the Red Sea; northerly winds are associated with the transport of regional O₂. Under the prevailing northerly wind flows (90% of the time), the quality of air is relatively good for all primary pollutants except for O_3 , which was elevated. This is indicative of downwind regional transport of this secondary pollutant from the Mediterranean coast. However, during days with southerly air flow, air quality was significantly deteriorated with elevated levels of sulfur dioxide (SO₂) and nitrogen oxides (NO₂).

RESPONSE TO CLIMATE CHANGE

ASEZA has adopted a number of policies associated with the control, management, and protection of the natural environment. The environmental policy requires preservation and protection of the environment and the sustained development of the Zone's natural resources. Moreover, the energy conservation policy promotes the provision of adequate energy to consumers at the least possible cost while attempting to achieve sustainable development of the energy sector and meeting the needs of socioeconomic development in the ASEZ.

ASEZA has also committed to a 14% reduction of the municipality's greenhouse gas (GHG) emissions as well as an adaptation of climate change in line with national commitments for 2030. The involvement of all citizens and stakeholders of the municipality is considered crucial for achieving set targets and are considered the most important resource for the city, especially regarding its GHG saving targets. The overall reduction target of the ASEZ region is 85,122.87 tn of CO₂, up to 2030 compared with the Business As Usual scenario. This amount regards the 14% reduction target according to the Intended Nationally Determined Contribution supported by GIZ (CES-MED, 2012). Respective total emissions for the baseline year - including emissions from waste management - equal 339,676 tn of CO₂ and are presented in the following chart;

ENERGY CONSUMPTION

The energy balance for ASEZA, or its Baseline Emissions Inventory, has been developed in line with the Covenant of Mayors for Climate and Energy Reporting Guidelines and utilizing the Intergovernmental Panel on Climate Change emission factor approach for all compulsory sectors and one optional sector, namely:

- Municipal Buildings, Equipment and Facilities;
- Municipal Public Lighting;
- Residential Buildings;
- Tertiary Buildings, Equipment and Facilities;
- Transport (Municipal/Public/Private);
- Solid Waste Management.

The highest energy consumer is the Tertiary sector, followed by the Private Transport and Residential sectors while the Municipal sector's consumption is the lowest. The Authority, including the Municipal Buildings, Public Lighting, and Municipal fleet consumes 36,887 MWh of energy, with this consumption having almost equally balanced its contribution. Regarding total energy consumption, all sectors in the ASEZ consume 740,292 MWh with each sector's contribution presented in the following pie chart - noting ASEZA's share includes Municipal Buildings, Public Lighting, and Municipal fleet (CES-MED, 2012);



Total CO₂ emissions per sector and per fuel source (CES-MED, 2012).



Energy consumption allocation per sector (CES-MED, 2012).

Private & Commercial transport Public transport Residential buildings Tertiary (non municipal buildings) ASEZA

2.4 COMMUNITY INCLUSION IN AQABA

Creating cohesive cities involves both social and physical aspects. Reinforcing local identity and culture fosters strong interpersonal relationships while strengthening their collective power to enhance the environment in which they live, work, create, and play. These relationships are sustained by several practices including; social networks and community organizations; artistic expression; and the preservation of cultural heritage, including religion, language, and traditions. Ideally, these practices are reinforced by spatial interventions that shape the places where communities develop and connect. Provision of communal facilities, public spaces, and physical accessibility can help to strengthen community cohesion and avoid isolation.

Despite progress in certain areas much of Aqaba's infrastructure is not designed in an inclusive way; creating unnecessary barriers for a lot of its citizens, especially females and people with disabilities. Female labor force participation in Jordan remains low at 14 per cent, compared to 54 per cent for males, according to 2019 figures issued by the Department of Statistics (DoS) (DoS, 2019). A 2018 DoS report estimated the gender pay gap in the public sector at 18 per cent and in the private sector at 14.1 per cent (DoS, 2018). The national estimate of unemployment for Jordanian women in the third quarter of 2020 was 33.6 per cent, compared to 21.2 per cent for men (DoS, 2020).

Infrastructure, if designed and implemented correctly, can also empower people to be part of societal and economic development. Aqaba has a great opportunity to strengthen its community cohesion through its neighborhood committees that were created and configured by the Neighborhoods Development Department in ASEZA. The Department aims at increasing the participation of citizens in decision-making regarding their needs and working with them as partners to meet these needs; as well as building their abilities and skills in order to benefit from the growing opportunities in the ASEZ and to work with them as effective partners to improve their economic, social, and cultural reality (ASEZA, 2021).



Community inclusion workshop, August 2021.

3. APPROACH & METHODOLOGY

3.1 TRANSITION MANAGEMENT

WHAT IS TRANSITION MANAGEMENT IN AN URBAN **CONTEXT?**

Transition Management is an approach designed to enable, facilitate, and guide the social, technical, and political transformations toward sustainability.

In its application in an urban context, the Transition Management approach provides a framework to bring together multiple stakeholders with different perspectives and approaches in a 'Transition Arena' - which in this project is residential neighborhoods in Aqaba. All stakeholders involved are encouraged to structure their shared challenges with the current system and develop a shared vision and goals towards sustainable solutions (DRIFT, 2014).

Implementing a Transition Management approach has the prospect of resulting in three key outcomes:

A sense of direction

Proposing a strategic future perspective which addresses the fundamental changes needed to reach a sustainable future.

An impulse for local change

Inspiring new and enhancing existing initiatives that contribute to the envisioned future.

Collective empowerment

Enabling actors in the city to tackle challenges and seize opportunities for a sustainable city.





1. Setting the scene

2. Exploring local dynamics





4. Envisioning a sustainable city

5. Reconnecting long- and short-term







3. Framing the transition challenge





3.2 METHODOLOGY



change agents elaborate transition pathways indicating fundamental changes and corresponding actions needed to reach the envisioned future.

the transition study public and give others a chance to adopt and adapt it

and relate it to their own agenda and

practices.

Transition experiments, in line with the transition pathway, are initiated or adapted. More actors become engaged. Insights from these experiments can be taken to a more strategic level.



Envisioning a sustainable city

Subsequently, they exchange and elaborate perspectives on a possible future, thereby creating visionary images for the future of the city.

1. Setting the scene for Transition Management

Our Transition Management team consists of a climate and energy expert, an environmental and sustainability consultant, a transportation planning and policy consultant, urban planning consultants, an architect, project manager, and researcher who work in cooperation with ASEZA's Directorate of Studies and Planning, Environment Directorate, Neighborhoods Development Department, Directorate of Public Works, and City Commissioner.

2. Exploring local dynamics

The first few months of the Transition Management process in Aqaba were dedicated to conducting meetings with ASEZA's officials, the selection of pilot neighborhoods, site visits, data collection, and analysis - taking into account an assessment of environmental, planning, mobility, and social aspects. See analysis in Chapter 4.

3. Framing the challenges

The analysis resulted in identifying issues and challenges in infrastructure, services, traveling behaviors, and their environmental impact. A dedicated workshop was conducted to engage the community in identifying their challenges and needs in regards to planning, the environment, and mobility in the neighborhoods; along with involving them in providing recommendations and proposals that address their challenges with the aim of reaching sustainable and resilient neighborhoods. See challenges and workshop outcomes in Chapter 4.

4. Envisioning a resilient city

The Transition Management team agreed on four guiding principles that would allow the city to be resilient through its neighborhoods: 1 - Aqaba as a well-designed and an attractive city to visit and live in; 2 - Aqaba as an accessible city that encourages active modes of travel; 3 - Aqaba as an energy efficient and eco-friendly city; and 4 - Aqaba as a socially cohesive city. For each guiding principle, designs and recommendations were created from a combination of experiences and ideas of the project team, which together embody a vision that describes the features of sustainable, resilient neighborhoods. See recommendations in Chapter 5.

5. Reconnecting long- and short-term

To bridge the gap between the vision of the future and the present, the team engaged in several meetings to develop a pathway that includes goals and action ideas for the short-, mid-, and long-term. In addition, the team came together with recommendations and considerations for the city to scale. See Chapter 6.

6. Engaging and anchoring

Once the transition study is consolidated, it will be time to engage with a wider audience. The transition study provides a starting point for a wider group of people, organizations, and initiatives to adopt ambitions for a sustainable future and relate this to their own agendas and practices. A first step in this direction could be a kick-off event, where the team would present the transition pathway to all stakeholders involved. The goal is to have a lasting impact, though this does not automatically imply that the transition team has to stay intact or that its meetings need to continue. Activities are undertaken to strengthen initiatives that contribute to the visualized goals and to challenge actors to play their part in the transition dynamics. ASEZA and other organizations may put the agenda into practice or adopt and adapt it.

7. Getting into action

Transition experiments are short-term actions through which alternative structures, cultures, and practices are explored to catalyze long-term change and encourage community participation. The activities, when successful, serve to demonstrate that the envisioned future is attainable. The transition study provides direction for the long-term and inspires actions for the short-term. As a follow-up to the study, some of the proposed transition experiments can be elaborated and realized by ASEZA and newly involved actors. Also, other ongoing, planned, and newly emerging activities can be linked to the study thus reinforcing these activities by making them more sustainable and resilient.

3.4 FOCUSING ON NEIGHBORHOODS

Neighborhoods are an integral part of cities. Thus, the resilience of a city can be measured through the resilience of its neighborhoods. The clear district divisions in Aqaba's Master Plan allow for a more focused look into each district when studying the resilience of Aqaba's neighborhoods.

In order to maximize the impact of this study, it is more effective to narrow down the scale of work into a defined set of neighborhoods. Selected neighborhoods can turn into pilot case studies that set an example for strategies that can be easily replicated accross similar areas.

The selection process for the study neighborhoods focuses on the importance of covering Aqaba's diversity in terms of demographics, socioeconomic status, density, etc., so as to be able to come up with a set of solutions that can be implemented in the majority of Aqaba's neighborhoods based on each of their unique characteristics.

The five neighborhoods that were initially considered included:

- District 5 Neighborhood
- District 7 Neighborhood
- District 10 Neighborhood
- Al-Shalaleh Neighborhood
- King Hussein Street (Corniche Street)



Neighborhoods of Aqaba.

3.4.1 FOCUS NEIGHBORHOODS SELECTION CRITERIA

After meeting with the City Commissioner at ASEZA, the target areas for comprehensive analysis were narrowed down to two neighborhoods with a 300-600m radius. The focus neighborhoods selected are:

- The western area of the District 10 neighborhood
- The District 7 neighborhood

The selection of the two neighborhoods was based on the following criteria:

Replicability

The selected neighborhoods include a set of typical conditions that are mirrored accross a large number of neighborhoods in Aqaba, such as street typologies, peripheral green areas and buffer zones, services, etc. This allows for the study to have a larger impact by replicating the outcomes across the largest area possible, rather than cater for highly specific or unique conditions.

Potential for Implementation

Both of the selected neighborhoods include (or are adjacent to) urban upgrading projects that are currently on ASEZA's desktop. This presents an opportunity to accelerate the incorporation of the study outcomes within the conceptual development of these projects.

Socioeconomic Diversity

It is crucial to include neighborhoods with high socioeconomic diversity. They should not be exclusive to one social class, race, or ethnic background. This allows the analysis to be inclusive and address the needs of the greater majority rather than a selected few.

Accessibility and Services Availability

The selected neighborhoods take into consideration the availability of services within the set boundaries. It is important for the study that these neighborhoods are not on either extremities of containing an abundance of services that are easily accessible or areas that are isolated and lack any kind of service. Therefore, moderate availability of both elements is key.

General Land Use

Studying neighborhoods that mainly include residential zones.



Western area of the District 10 neighborhood.



District 7 neighborhood.

4. ANALYZING SELECTED NEIGHBORHOODS

4.1 SELECTED NEIGHBORHOODS ANALYSIS CRITERIA



Vacancy | Solid and Void

Level of density within the residential area and the availability of open spaces or parks.

Existing Land Use

The distribution of land and services within the neighborhood where focus is on the level of privacy for inhabitants and the amount of undesirable car traffic within dense residential areas.

Access to Services

Essential public services and proper infrastructure insuring residents' access to all essential services resulting in an improved quality of life. Such services mainly include infrastructure networks and public facilities (mosques, schools, health centers, shops, etc.).



Road and Pedestrian Networks

Analysis of road hierarchy as well as road accesses to all land plots within a neighborhood. In addition, analysis of pedestrian networks.

Accessibility

Ease of accessibility for residents to services and green open spaces, either using vehicles or on foot and the level of safety and security of pedestrians accessing these services.

Public Transportation Networks

Tracing public transportation routes and designated stops within the neighborhood.



Topography

Effect on walkability and natural storm water drainage patterns.

Site Greenery

The availability of open public spaces and public sports fields with safe pedestrian access.

Waste Sorting

Study of waste sorting systems within neighborhoods.

Energy Efficiency and

Renewable Energy (EE/RE) Energy efficiency measures within buildings and neighborhoods as well as utilization of renewable energy.

Sustainable Water and Stormwater Management

Water saving practices and use of water saving devices within buildings and neighborhoods examining the possibility of rainwater management through utilization of permeable surfaces as well as rain water harvesting and reuse for gardening/ landscaping.



COMMUNITY INCLUSION

Accessibility for Persons with Disabilities

It is important to assess whether existing mobility networks and infrastructure accommodate persons with disabilities including wheelchair accessible ramps and aid for the visually impaired.

Outcomes of Participatory Community Workshops

Workshops involving a diverse array of community stakeholders are a great tool to get insight on the community's needs, priorities, and challenges.

4.2 PILOT NEIGHBORHOOD A - DISTRICT 10

OVERVIEW | 3D

| District | 10 |
|------------|------------------------|
| Study Area | 478,908 m ² |
| Population | Approx. 14,900 |

District 10 is split into two areas - those east and west of Prince Hasan Street. The study focuses on the western area and its connection to surrounding services and green areas, capturing a catchment radius of approximately 600m. The Al-Farouq Highway creates the neighborhood's western and northern borders with Ayla to the west and vacant land to the north. Al-Kuwait Street borders the neighborhood's southern edge.





SITE LOCATION

Al-Farouk St.

VACANCY | SOLID AND VOID

Solid and Void Vacancy represents the building density level within the cluster, where the dark gray hatched shapes represent the plots with constructed buildings while the white voids represent the empty plots.

Kuwait St.

This figure shows that most of the residential plots are constructed forming around 80% of the total residential plots.





Three FloorsTwo Floors

EXISTING LAND USE



The planned residential area forms around 54% of the total area with an allowance of three floor buildings according to the regulations. The area has a full capacity of approximately 3,654 apartments and 14,900 inhabitants. In addition, the area has schools, a mosque, a commercial block on Prince Hasan Street and planned green areas that are currently not utilized.





Hypermarket / Neighborhood Stores

Pharmacy



ENTRANCES

ROAD HIERARCHY



The neighborhood has 6 entrance/exit points leading to a main internal ring road that loops within the neighborhood. The majority of neighborhood entrances are located on surrounding collector roads (two on Prince Hasan Street and two on Kuwait Street), while two entrances connect to the Al-Farouk Highway.



- Arterial Road 40m
- Collector Road 30m
- Main Neighborhood Road 20m
- Local Road 14m
- Local Road 12m

TRAFFIC DIRECTION







Two-way Traffic Traffic Light at Intersection

All streets within the study area include two-way traffic directions, regardless of street width. There is only one traffic light within the study area, located at the intersection of Prince Hasan Street and Kuwait Street.

Bus Route





PEDESTRIAN NETWORK



- ••••• Pedestrian Footpath
- ••••• Sidewalk

Zebra crossings are provided at all neighborhood entrances, however, they are mostly missing from internal neighbohood intersections. Sidewalks are missing at vacant plots. Though infrastructure elements for pedestrian mobility exist in numerous locations, they do not form a continuous network and are hardly ever accessible to people with disabilities. PARKING



- On-street/Curb-side Parking
- Cul de Sac Parking
- Designated / Recessed Parking

On-street, curb-side parking was observed on all neighborhood roads. However, designated parking areas are located near commercial and service plots and residential cul de sacs.



WASTE DISPOSAL

Litter Bin

Dumpsters and litter bins in the area are not sorted by material. No measures for recycling waste were observed.



Contour Interval = 2m

TOPOGRAPHY

The site's topography is relatively perceived as flat with an average slope of 1.6%. The ground level descends from a maximum altitude of 48m in the east to 32m in the west. The natural stormwater drainage path is along Wadi Al-Haswah, as shown on the map.

VEGETATION AND GREEN AREAS



A linear buffer zone with native plants separates the neighborhood from the Al-Farouk Highway on the northern and northwestern side. In addition, plans are currently in the works for a linear park across the northern edge of the Al-Farouk Highway.

Land use plans show planned green areas at the center of the neighborhood and within the market block on Prince Hasan Street. However, the first plot is currently undeveloped while the second is used for vehicle parking.

- Green Areas according to land use plan, currently unutilized
- Buffer Zones
- Planned Linear Park by ASEZA

DISTRICT 10 - PHOTO DOCUMENTATION

VEGETATION

Street trees and shrubs adhering to Aqaba's guidelines and landsape palette for highway approaches are observed on main roads surrounding the neighborhood including Farouk Street and Kuwait Street (refer to map on previous page). These trees include street shading trees such as ponciana and jacaranda species and date palm trees on medians. Shrubs and vines include pennisetum, lantana camara, and bougainvillea vines planted along fences on both sides of Al-Farouk Street. Wild and native plant species are observed within buffer zones.

However, as shown in the map on the previous page, sidewalk plantation within the neighborhood itself becomes much less consistent, less dense, and more random as plants are selected by the residents of each plot. For this reason, most sidewalks within the neighborhood lack any amount of shade for the majority of the day in addition to the use of plant species that hinder pedestrian movement.

SHRUBS AND VINES



STREET TREES



NATIVE TREES AND SHRUBS WITHIN BUFFER ZONES














STREETS



40m Street (Al-Farouk Street)

40m Street (Al-Farouk Street)



30m Street (Prince Hasan Street)



30m Street (Kuwait Street)





12-14 local street adjacent to buffer zone

20m Street (Neighborhood Loop)

OPEN SPACES

Gatherings were observed on the service road opposite from the commercial block on Prince Hasan Street. Residents would purchase snacks and gather in the evening at that location due to a lack of public open spaces. The planned green area shown on land use plans within the commercial block is completely used for parking in reality. Buffer zones contain native plant species but lack any kind of public space amenities.



OBSERVED BEHAVIOR ON PRINCE HASAN STREET



Gatherings on service road.





Pop-up retailers.

VACANT LANDS AND GREEN BUFFER ZONES



Buffer zone adjacent to Farouk Street.

Cul-de-sac adjacent to buffer zone.

Pedestrian path within vacant land.



District 10 commercial block parking.



Pedestrian shortcut path within vacant land.

ACCESSIBILITY FOR PEDESTRIANS AND BICYCLISTS

Several forms of obstacles for pedestrian movement were observed. These include improper placement of sidewalk planters, wrong choice of trees, parked cars, and placement of furniture on sidewalks. Pedestrian footpaths are often inaccessible to persons due to lack of proper access ramps and no amenities for bicyclists were observed. In addition, the vast majority of sidewalks and pedestrian footpaths use impermeable surface materials such as concrete tiles.





Sidewalk furniture placement.



Parking within sidewalks.



Planter taking over sidewalk.





Planters at center of sidewalk.

PEDESTRIAN FOOTPATHS



Pedestrian footpath.

.





Entrance to footpath. Entrance to footpath.

Entrance to footpath.



Planters obstructing continuity.



Lack of designated bicycle parking.

4.3 PILOT NEIGHBORHOOD B - DISTRICT 7

OVERVIEW | 3D

| District | 7 |
|------------|---------------|
| Study Area | 350,463 m² |
| Population | Approx. 6,550 |

District 7 is a residential cluster bordered by Al-Abdaleyah and Al-Herafeyah Districts to the southeast; Hay Al-Aaamal Al-Jadeedah to the northeast; District 8, Al-Zahraa, and Al-Faihaa to the north; and District 9 to the west. The residential cluster has a triangular shape - the western side of the triangle (Basman Street) forms the longest edge with 1147m length and 752m on the northeastern side (Jordan Valley Highway), and 784m from the southeastern side (Sharif Al-Hussein Bin Ali Street).



SITE LOCATION



VACANCY | SOLID & VOID

Makka S

Solid and Void Vacancy represents the building density level within the neighborhood; where the dark hatched shapes represent the plots with constructed buildings while the white voids represent empty plots.

This figure shows that most of the residential plots are constructed forming around 75% of the total residential plots.

BUILDING HEIGHT



some distributed buildings on the western side of the district are four-floor buildings.

EXISTING LAND USE

Total Number of Residential Plots 208

The residential planned area forms around 48% of the total area with an allowance of three floor buildings, according to the regulations.

The area has a full capacity of approximately 1,260 apartments and 6,550 inhabitants. In addition, the area has schools, a mosque, a commercial area, and green areas as shown.





EXISTING SERVICES NEIGHBORHOOD CATCHMENT RADIUS

The study area has a variety of services including a kindergarten, two secondary schools, a mosque, two public parking areas, and a commercial complex in the center of the district that contains a pharmacy, supermarket, restaurant, men's barbershop, vegetable shop, etc.

Although the location of the services is off-center toward the northen part of the neighborhood, the maximum walking distance to reach the services is around 500 m - which is acceptable.





- Falafel Restaurant
- Men's Barbershop (Salon)
- Supermarket
- Fruit and Vegetable Shop
- Shisha Shop

ENTRANCES

ROAD HIERARCHY





Existing Entrances

As shown in the map above, the neighborhood has only two entrances located on Basman Street (western side), an issue which was highlighted by residents during the community workshop.

- Arterial Road 35m 45m
- Collector Road 20m
- Local Road 12m
- Pedestrian Pathway 4m

STREET DIRECTION

PUBLIC TRANSPORTATION



All streets in the study area have two-way direction despite the street section and width. In order to provide a proper pedestrian network and bicycle lanes, the street movement directions will be revisited as shown in the next chapter.



Bus Route (II) Bus Stop

Public transportation lines pass by the main roads around the area. There are 5 bus stops on Basman Street.

PEDESTRIAN NETWORK

PARKING





Sidewalk Pedestrian Footpath

The pedestrian network is formed by the sidewalks in front of constructed plots only, a minimal number of pedestrian pathways, and without crossing areas. This leads to disconnected and insufficient pedestrian movement. In addition, pedestrian paths need rehabilitation due to tiling problems, lack of lighting, and a lot of obstacles (such as electrical poles, plants, etc.) in front of pathways.

There are 4 parking lots in the neighborhood as shown on the map above. The total parking area is 2,000 m².

TOPOGRAPHY







The morphology of the site is characterized by a gentle topography with an average slope of 5.5% in which elevations descend from the southeast with an altitude of 108m above sea level to the lowest altitude of 72m above sea level at the northern edge.

The percentage of green spaces in the district constitutes 8% of the total area. The green areas contain walkways (linear parks) on the northeastern and western borders in addition to empty land on the southwestern corner which is supposed to be a small park.

Most of the street sidewalks in the district are planted with trees, hence, not all trees allow pedestrians to use the sidewalks due to their location.

VEGETATION

The plantation within the area doesn't have any theme or a particular plant palette. Sometimes the used plants hinder pedestrian movement on the sidewalk due to their location.







SIDEWALK

The sidewalks in the study area range in width from 0.8m to 5.5m, taking into consideration that the unconstructed plots don't have sidewalks.







STREETS

Most of the streets in the study area are in fairly good condition although some streets have problems such as potholes and surface irregularity.







SERVICES

The neighborhood's central services include commercial activities across the street from a mosque. Adjacent to the mosque is a large parking lot.





4.4 COMMUNITY INCLUSION WORKSHOP

OBJECTIVE

A workshop was held in August 2021 to involve residents and stakeholders in identifying the main challenges facing their neighborhoods from their perspective.

PARTICIPANTS SELECTION CRITERIA

The participants were selected from both focus neighborhoods in an inclusive manner based on the following criteria:

- Equal representation of all genders;
- Including participants from various age groups;
- Employment status; including employed, unemployed, stay-at-home mothers and retired individuals;
- Including persons with disabilities.

WORKSHOP PROCEEDINGS

Several tools were utilized to engage the participants in identifying the challenges they face within their neighborhoods under specifically addressed topics.

Interactive polls

Participants were asked a series of questions related to planning, mobility, environment and effects of the COVID-19 pandemic on their daily lives. The poll results were displayed in real-time to trigger discussions and interactions.

Categorizing challenges

Four boards were dedicated to list general challenges under each different topic.

Mapping common daily routes and challenges

Each participant was handed a map of their neighborhood to indicate their most commonly used routes (whether on foot, by car, or by bicycle). In addition, participants identified specific locations with obstacles or challenges on the map.





ANSWERS TO MOBILITY RELATED POLL QUESTIONS



WHY DO YOU WALK WITHIN YOUR NEIGHBORHOOD?

- PRAYER
- EXERCISE
- SHOPPING
- VISITS
- TO REACH WORK
- TO REACH PUBLIC TRANSPORTATION

MODE OF TRANSPORATION



- BICYCLE
- BUS
- TAXI
- WALKING

CATEGORIZING CHALLENGES FOR DISTRICT 10



URBAN PLANNING

- Lack of commercial services within the northern edges of the neighborhoods.
- Congestion around the commercial block at the center of Prince Hasan Street and insufficient parking.
- Lack of a nearby health center.
- Lack of amenities within public open spaces.



MOBILITY

- Insufficient number of bus stops and a lack of seating and shading amenities at existing stops.
- Limited pedestrian mobility due to lack of proper shaded routes and sidewalk obstacles.
- Lack of safe routes for bicycles and improper detailing for drainage trenches causing safety hazards for bicyclists.



ENVIRONMENT

- Improper disposal of waste causing the gathering of pests and rodents.
- Insufficient stormwater drainage and the formation of swamps within buffer zones and vacant lands.
- Lack of green picnic areas, trails, and playgrounds within public spaces and buffer zones.
- Delays in waste collection.



COMMUNITY INCLUSION

- Pedestrian crossings and sidewalks do not take the needs of people with disabilities into consideration, curbs are too high and lack proper ramps for wheelchairs or any form of aid for the visually impaired.
- Buffer zones are unsafe due to lack of sufficient lighting.
- Lack of clear signage.





MAPPING COMMON DAILY ROUTES AND CHALLENGES BY RESIDENTS OF DISTRICT 10



Buffer zones feel unsafe and unutilized to allow people to enjoy the oudoors and excercise.

.....

Fires due to lack of safe designated barbecue locations.

Formation of swamps that gather pests and rodents.

Vacant lands are used as dumpsites for construction waste and trash.

CATEGORIZING CHALLENGES FOR DISTRICT 7



URBAN PLANNING

- Lack of main and subsidiary entrances to the neighborhood.
- Cars often use sidewalks as parking spaces.
- Narrow streets.
- There is no bakery or vegetable store.
- Dumping construction waste in empty plots.
- Monitoring the cleanliness and the lighting of internal streets.
- Lack of health care center and commercial markets.
- Lack of public school.
- Traffic congestion near the school due to the lack of entrances.
- Poor street lighting.



ENVIRONMENT

- Lack of mega shops.
- The need of public playgrounds and parks.
- Lack of parking spaces.
- Lack of places designated for families.
- A lot of stray dogs in area.



MOBILITY

- Insufficient number of bus stops and lack of seating and shading amenities at existing stops.
- Lack of safe routes for bicycles and improper detailing for drainage trenches causing safety hazards for bicyclists.



- Pedestrian crossings and sidewalks do not take the needs of people with disabilities into consideration; curbs are too high and lack proper ramps for wheelchairs or any form of aid for the visually impaired.
- Lack of places for outdoor activities.
- Lack of clear signage.





MAPPING COMMON DAILY ROUTES AND CHALLENGES BY RESIDENTS OF DISTRICT 7



4.5 FRAMING CHALLENGES

The following is a summary of overlapping challenges to be addressed based on neighborhood analysis and community input:



Accessibilty for Persons with Disabilities

Inadequate detailing for crossings
Ramps at crossings do not follow standards
Sidewalk obstacles
No tactile paving for the visually impaired

COMMUNITY INCLUSION

Safety

Inadequate lighting in public spacesLack of clear signage for pedestrian safety

5. DESIGN & PLANNING SOLUTIONS

5.1 RECOMMENDATIONS

5.1.1 NEIGHBORHOOD PLANNING CONSIDERATIONS



Enhance Access to Services

Evenly distributed neighborhood nodes for essential services for commercial, greenspace, healthcare, community, or educational facilities should be provided. Neighborhood nodes should typically fall within a continuous pedestrian accessibility network as they should be easily accessible by foot, bicycle, car, or bus.

Minimizing the travel distance to basic services promotes the use of zero energy transportation methods which reduce energy consumption and CO_2 emmissions within the neighborhoods.



Public Open Space

Various public space typologies within neighborhoods should be activated to offer oppotunities for recreation, physical exercise, social gatherings, and temporary community events. Public spaces should be accessible and suitable for a range of ages and abilities.

The two focus neighborhoods provide opportunities for various typologies of open space that can be improved and activated differently such as paved plazas for social gatherings, central neighborhood parks for family gatherings and children play areas, and linear parks along buffer zones for nature outings and recreational activities.

In addition to their social benefits, public open spaces can have impactful environmental benefits through improving air quality, enhancing microclimate conditions, and biodiversity.



Re-claiming public spaces to include greenery and amenities.

5.1.2 ENHANCING SUSTAINABLE MOBILITY



Walkability

The ability to travel on foot to access basic services in the neighborhood, or simply for leisure, should be facilitated. Continious sidewalks of an appropriate width should be provided, with no obstacles. Safe, clearly marked pedestrian crossings should also be provided at appropriate intervals to allow for pedestrians to cross at these areas, rather than at random locations (which may pose a safety risk to them and to other road users).

In addition to public services, the pedestrian network should also provide access to other modes, such as public transportation (safe pedestrian access to bus stops), cycling (bicycle rental/parking stations, if introduced in Aqaba), and also the private car (on-street and offstreet parking facilities).

Improving the pedestrian environment in the two neighborhoods will encourage taking short trips by foot which, in turn, will have benefits in terms of reducing congestion levels, enhancing air quality, and improving the health and well being of residents.



Cycling

In addition to walking, other light non-motorized transport modes (micromobility) should be encouraged. There is a unique opportunity to promote cycling in Aqaba given the conditions described in Chapter 2 and the feedback from residents provided during the workshop.

Cycling lanes have been proposed in the two neighborhoods as part of the design solutions. These lanes should be enforced and respected by pedestrians and car drivers in order to encourage the adoption of cycling. Appropriate parking locations for bicycles should also be provided. Cardactivated bicycle sharing stations are also proposed.

As mentioned above for walkability, active mobility in general can offer substantial benefits in congestion reduction, air quality, and health and wellbeing of residents.



Minimum bicycle lane dimensions.



Electric Mobility

Changes are required at the national level in Jordan to scale up the adoption of electric mobility; however, there are still actions that can be taken at the local level in Aqaba. The provision of public charging stations in some locations could encourage residents to purchase electric vehicles. Aqaba could also introduce a pilot passenger transport service that runs on electric vehicles (either a bus or a smaller vehicle).

With climate change and the detrimental impact of fossil fuels on the environment, global mobility trends are shifting to electric vehicles both on the private and public transport sides. Jordan has seen a relatively high adoption of private electric vehicles but this has slowed down in recent years due to changing tax/customs regulations and limitations in the charging infrastructure.

The opportunities for electrification and decarbonization of transport extend beyond passenger cars and buses into lighter modes (micromobility). Aqaba could serve as a pilot for the introduction of electric bikes or scooters at the city level. This study includes proposals for cycling lanes, which can be used not only by conventional bicycles, but also by electric lightweight vehicles.



Traffic Calming

Encouraging active mobility (walking and cycling) should be coupled with measures that ensure the safety of all road users. Among these are traffic calming measures, which reduce the speed of vehicles by various means (hard infrastructure elements, speed limits, and stricter enforcement).

Traffic calming is essential for the safety of pedestrians, cyclists, and also drivers, especially in a country that has long been dominated by private car transport.



Public Transportation

Jordan has been making notable and much-needed investments in improving the state of public transport. The country is in dire need of safe, affordable public transport services and Aqaba is no exception.

There are measures that can be taken in the medium- and long-terms to improve the state of public transport in Aqaba. These will not be presented in this study. However, there are certain shorter-term measures that can be taken at the neighborhood level to improve access to public transport services. These include providing safe bus shelters and waiting areas, safe access to these bus stops (as described above under "Walkability"), and appropriate signage and bus maps to encourage the use of public transport where possible.



Re-designing streets with shaded sidewalks, protected bicycle lanes, and accessible crossings.

5.1.3 ADDRESSING ENVIRONMENTAL CHALLENGES



Microclimate Adaptation

Enhancing microclimate is key to enhancing walkability within neighborhoods. To date, a great number of scientific studies have evaluated the impact of different mitigation strategies towards the improvement of the urban thermal environment and its implicit effects. The most effective strategies include: urban greenery, use of cool materials, and water-based mitigation techniques such as sprinklers, ponds, and fountains. These methods will be further discussed below.



Maximizing Urban Greenery

Finding the maximum number of opportunities for the application of urban greenery within neighborhoods will have a major role in microclimate mitigation through evapotranspiration and shading of the adjacent ground and building surfaces by tree foliage. This contributes to lower amounts of solar energy absorbed and stored urban surfaces and, consequently, to lower convective and radiative heat fluxes.

Apart from evaporative cooling and radiation management, urban greenery also highly enhances the aesthetics of the urban districts and contributes to pollutant, airflow, and noise control.

In addition, shrubs planted within sunken rain gardens and bioswales provide a nature-based solution to manage storm water runoff, by supporting existing drainage infrastructure which reduces the risk of flash floods and surface water pollution.

Opportunities to maximize urban greenery within neighborhoods include street canopy trees, shrubs, and trellises along pedestrian footpaths; densifying vegetation within parks; and the application of green roofs.



Cool and Permeable Surface Materials

Cool materials have been broadly examined as an adaption strategy towards the improvement of the microclimate of urban areas. The materials that are characterized as "cool" should absorb and store lower amounts of solar radiation, compared to conventional materials, so as to maintain reduced surface temperatures. The longwave radiation flux emitted towards the surrounding environment is thus considerably reduced; leading to lower ambient temperatures. Cool pavement surfaces can be achieved by different techniques:

- · Changes in the solar reflectance (albedo) and infrared emittance. This category contains the so-called "highly reflective" and "thermochromic" pavements.
- Changes in heat storage of pavements. This category involves paving materials embedded with phase change materials (PCM).
- Changes in the evaporation rates. This cluster involves the porous, pervious, and water retaining pavements.

Using porous and permeable materials such as bound gravel and interlocking tiles on pavements reduces stomwater runoff by allowing water to naturally drain into the ground, rendering it as a resource instead of waste. In addition, porous floors soak up rain water to the underlying layers of rock and soil, filtering it from pollutants before reaching nearby shores.

Impermeable surfaces within neighborhoods such as asphalt and concrete pavers need to be replaced with alternative materials wherever possible. Surface areas where cool and permeable materials can be implemented include sidewalks, cul de sacs, paved plazas, parking locations, pedestrian footpaths and walking trails within green areas.



Enhancing Ecosystems and Biodiversity

Urban biodiversity provides functioning ecosystems that supply oxygen, clean air and water, pollination of plants, pest control, wastewater treatment, and many ecosystem services. As cities grow in population and size, more natural areas disappear. Restoring nature and enhancing biodiversity is essential for making communities, native plants and wildlife species resilient to the climate crisis (Zari MP, 2018).

Agaba is home to many local and migrant bird species. Identifying natural areas, species to be protected, and other opportunities for ecosystem enhancement is a key step for protecting biodiversity in urban settings. In addition to natural land, opportunities could also include smaller interventions such as green roofs, trellises, and green walls.

The two selected neighborhoods feature green buffer zones near highways and stormwater infrastructure that are currently unutilized and contain native trees and shrubs. By densifying existing native plant species and introducing bioswales and rain gardens, these buffer landscapes can perform vital environmental functions such as providing bird habitats, flood protection, filtering water runoff, improving air quality, and much more as mentioned above.



Sustainable Waste Management

Sustainable waste management is a key concept of the circular economy and offers many opportunities and benefits to the economy, the society, and the environment. Sustainable waste management involves collecting, sorting, treating, and recycling and when properly facilitated, provides a source of energy and resources. It therefore, creates jobs, improves waste management methods, and lessens the impact of human activities on the environment thereby improving air and water quality. It also reduces food wastage, keeps heavy environmental costs at bay, and prevents some human health conditions improving overall quality of life.



Energy Efficiency and Renewable Energy

The way neighborhoods are designed have an impact on energy efficiency and consumption. On the one hand, residents behavior can also contribute to this goal by reducing the amount of energy consumed inside homes through adopting energy saving behaviors, ensuring proper insulation and using energy efficient appliances, etc. On the other hand, proper neighborhood planning also results in energy efficiency through improving pedestrian and cyclist infrastructure, providing access to public transit, designing climate responsive buildings, building a more compact development and increasing renewable energy supply, among other things.

Increasing the amount of energy from renewable and low carbon technologies will help to make sure Agaba has a secure energy supply, reduce greenhouse gas emissions to slow down climate change, and stimulate investment in new jobs and businesses.



Re-designing pedestrian pathways with porous pavement, bioswales and shading trellises.

5.1.4 ENSURING COMMUNITY INCLUSION



Access for People with Disabilities

In all of the recommendations presented above, interventions should be taken such that they are accessible to persons with disabilities (mobility, visual, or hearing disabilities). Sidewalk ramps and tactile paving at intersections and crossings; wheelchair access on at least some public transport vehicles; audio announcements on bus stops; and clear signage using large fonts and appropriate color schemes are all relatively small measures that can go a long way in making the mobility system in Agaba more inclusive.



Gender Sensitive Design and Safety

In all previous recommendations, special considerations should be taken into account to ensure that public spaces and mobility networks are safe for women and young girls. Ensuring safety for women in mobility networks improves women's chances and access to employment and education opportunities, therefore enhancing their economic status. Considerations in gender sensitive design include (UN-Habitat et al., 2012):

- Easy access to and from the location, and easy movement within it.
- Good lighting so that users can see and be seen.
- Security cameras, if needed.
- Easy-to-read signs to help users find their way.
- Clear, well-kept paths where users can easily see each other.
- · General visibility of the entire space, free from hiding places where a person could wait unseen.
- Inclusion of mixed uses many places to hang out, walk, play, eat, exercise, etc. for diverse user groups at different times of day.
- Provisions for young children and the elderly (because women are often caretakers), e.g. this could mean low, wide sidewalks for strollers, wheelchairs, and walkers.
- Access to clean, secure, easily accessible toilet facilities in public spaces with dedicated areas for nursing and diaper changing.



Participatory Activities and Community Responsibility Campaigns

Adopting a participatory approach in planning public spaces is an important tool for understanding communities' needs and expectations as direct stakeholders. Participatory design activities can give voices to marginalized groups to ensure that proposed designs are inclusive for women, girls, person with disabilities and elderly citizens.

In addition, community members can have a role in sustaining public spaces through awareness and responsibility campaigns in topics such as recycling, plantation, safety, vandalism, and hygiene, etc. Community organizations that can take an active role in these campaigns include schools, clubs, civil society, and community-based organizations.



All pedestrian crossings should include accessible ramps and tactile paving.

5.2 PILOT NEIGHBORHOOD A - DISTRICT 10

PROPOSED BICYCLE NETWORK



Two-way Bicycle Lane

ক্ৰ

Proposed Bicycle Sharing Station

Two-way bicycle lanes on one side of the road are introduced along the Al-Farouq Highway, collector roads, and the main 20m-wide road that loops within the neighborhood and its main entrances. The maximum radius for blocks without proposed bicycle lanes is 150m. This layout was chosen to serve the majority of the neighborhood without changing car traffic direction on local roads and only requiring sidewalk adjustments on one side for main roads.

SERVICE NODES



Mixed Use Area
 Healthcare Center

A mixed use service node is proposed to encourage walking to services on the northwestern block of the neighborhood. A healthcare center is proposed within a central District 10 service plot on Prince Hasan Street. Additional public space amenities such as jogging trails, outdoor gyms, playgrounds, and space for athletic activities are proposed in existing green areas and buffer zones.

PROPOSED GREEN NETWORK



- Urban Biodiversity Parks
- Shading Canopy Street Trees/Porous Pavement
 - Bioswales and Trellis Shaded Pathways

Sidewalks and pedestrian footpaths should be designed with a greater permeability to capture and slowly release stormwater into the ground using vegetation and/or porous pavement. In addition, vegetation along sidewalks and pedestrian paths can provide shade to improve walkability and enhance microclimatic conditions. Public green areas should be fully utilized to protect biodiversity and support various outdoor activities.

PROPOSED PEDESTRIAN NETWORK



Pedestrian CrossingPedestrian FootpathSidewalk

Ensuring the continuity of safe pedestrian routes is a top priority. Crossings are proposed at street intersections and should align with existing pedestrian footpaths. Both crossings and footpaths should always be accessible to persons with disabilities.

PROPOSED STREET SECTIONS

40M WIDTH STREET



EXISTING CONDITION

- Three lanes in each direction.
- Parallel parking on one side.
- Wide sidewalks with shading trees and lush bogainvillea-covered fences.
- Wide central median with palm trees and pennisetum shrubs.

PROPOSED CONDITION

- Three lanes in each direction.
- Parallel parking on one side.
- Two-way bicycle lane on one side (adjacent to planned linear park by ASEZA).

PROPOSED STREET SECTIONS

30M WIDTH STREET



EXISTING CONDITION

- Two lanes in each direction.
- Parallel parking on both sides.
- Wide sidewalks that lack consistent shading trees.
- Central median with poinciana trees.

PROPOSED CONDITION

- Two lanes in each direction.
- Parallel parking on both sides.
- A consistent array of shading canopy street trees are proposed on sidewalks.
- Two-way bicycle lane on one side (median width was slightly reduced to
- allow for bicycle lanes without narrowing down road width).

rees are proposed on sidewalks. idth was slightly reduced to n road width).

PROPOSED STREET SECTIONS

20M WIDTH STREET



EXISTING CONDITION

- One lane in each direction.
- Parallel parking on both sides.
- Wide sidewalks that lack proper sidewalk shading trees. Choice of

unsuitable plant species (such as palm trees) and centering planter locations is often obstructive to pedestrian movement without providing shade.

PROPOSED CONDITION

- One lane in each direction.
- Parallel parking on both sides.

- Two-way bicycle lane added on one side within width of existing sidewalk. - Planting appropriate canopy trees at the outer edge of sidewalks only, in order to provide shade for sidewalks and bicycle lanes without obstructing pedestrian movement.

PROPOSED STREET SECTIONS

12-14M WIDTH STREET



EXISTING CONDITION

- One lane in each direction but mostly obstructed by parking; leaving one lane only.

- Parallel parking on both sides.
- Wide sidewalks that lack consistent shading trees.

PROPOSED CONDITION

- Planting appropriate canopy trees at the outer edge of sidewalks only, in order to provide shade for sidewalks without obstructing pedestrian movement.

- No bicycle lanes were proposed due to narrow street width and need for parallel parking.

DISTRICT 10 - CLOSE-UP A

The commercial block on Prince Hasan Street is a busy node that invites a lot of vehicular and pedestrian traffic. Gatherings were observed on the service road across the street indicating the need for a public plaza. A paved plaza is proposed with seating and shading trees. The proposal also focuses on re-configuring the parking layout at the commercial block around a linear service lane with porous paving. This will allow for the green area shown in land use regulations at the center of the block to be reclaimed.


DISTRICT 10 - CLOSE-UP A

Introduce a charging station for electric vehicles.



Service road and extended linear parking to reduce congestion near commercial block with porous interlock paving.



All crossings should be continuous with accessible ramps and tactile paving.



Service road re-configured as a multi-purpose plaza to cater for observed residents behavior in the evening. The plaza is provided with porous interlock paving, sidewalk benches, and trees.



Shaded pedestrian pathways with bougainvillea trellises, bioswales, and porous pavement.



Green area shown in land use regulations within commercial block is reclaimed and utilized.



Shaded bus stops.



Bicycle sharing station.



Consistent planting of shading canopy trees along outer edges of sidewalks to enhance walkability and microclimate.

DISTRICT 10 - CLOSE-UP B

The generous buffer zone along the Al-Farouk Highway offers an opportunity for creating rich green areas with native species to promote biodiversity and become an integral part of a green network that ties into the planned linear across the street. The buffer zone can include porous walking trails and shaded pedestrian pathways connecting the neighborhoods to the linear park. This close-up view focuses on the intersection of the Al-Farouk Highway and Prince Hasan Street as an example.



DISTRICT 10 - CLOSE-UP B





All crossings should be continuous with accessible ramps and tactile paving.



Pedestrian nature trails for walking or jogging with porous materials and lighting.



Shaded bus stops.



Bicycle sharing station.



Shaded pedestrian pathways introduced to connect cul de sacs to the linear park across the buffer zone.

5.3 PILOT NEIGHBORHOOD B - DISTRICT 7

PROPOSED STREET DIRECTION

PROPOSED ENTRANCES



All 12m streets were converted from two-way direction to one-way direction.



Existing Entrances
 Proposed Entrances

An additional entrance is proposed on the Jordan Valley Highway which will reduce traffic congestion on the existing entrances.

EXISTING INTERSECTION AND DEAD END

King Faysal St. Basman St. Jordan Valley Highway

The map above shows the existing condition at the intersection between Airport Street and Basman Street near a local street dead end within the neighborhood. The land plots adjacent to the dead end from the South side are currently owned by ASEZA.

PROPOSED ENTRANCE CONFIGURATION



A new connection is suggested on Basman Street to connect the Jordan Valley Highway with District 7, creating a new entrance to the neighborhood away from schools and congested areas. A new location for a roundabout is proposed as shown on the map; at the intersection of Basman Street and King Faysal Street, connecting to the current dead end street. This proposal is suggested based on a previous study that was conducted in 2017 (Assessment of Traffic on the Main Roads of Aqaba, Tender No. 35/A/2016. Aqaba/Aqaba Development Corporation).

PROPOSED BICYCLE NETWORK

PROPOSED SERVICES





One-way Bicycle Lane

Two-way Bicycle Lane

Bicycle Sharing Station AB

A bicycle network in the neighborhood is suggested with one-way and twoway lanes according to the street section. In addition, automated bicycle rental and sharing stations are proposed in different locations to encourage bicycle usage.

The existing services locations are sufficient and the available shops are suitable for the inhabitants without additions. The two proposed parks shown on the map should be utilized and properly designed to be used by residents (Based on ASEZA'S land use plan).

PROPOSED PEDESTRIAN NETWORK



In order to have a sufficient pedestrian network, the following interventions are proposed:

- Tiled sidewalks around all streets whether the plots around them are utilized or not.

- appropriate

| > | Sidewalk |
|---|---------------------|
| > | Pedestrian Footpath |
| > | Pedestrian Crossing |

Rehabilitation of pedestrian pathways.
Pedestrian crossings must be implemented.
The needs of people with disabilities must be implemented where

PROPOSED STREET SECTIONS

AL-HUSSEIN BIN ALI STREET

The existing section is suitable for the road's function as an arterial. No changes are proposed.



PEDESTRIAN PATHWAY SECTIONS

4M WIDE PEDESTRIAN PATHWAY



EXISTING CONDITION

- Pathways lack shade.
- Pathway tiling surface is a non-permeable cement block.
- Pathways sometimes lack accessible ramps.



PROPOSED CONDITION

Proposed design of pedestrian pathways with porous pavement, bioswales, and planted trees on the sides that creates natural shading. This should encourage walkability, improve microclimatic conditions, and perform other environmental functions.



PROPOSED STREET SECTIONS

12M WIDTH STREET





EXISTING CONDITION

- One lane in each direction (two-way traffic) but the street is mostly obstructed by parking, leaving one lane only.

- Parallel parking on both sides.
- Sidewalks either lack planting or contain planters at the center of the sidewalk with unsuitable plant species that obstruct pedestrian movement.



PROPOSED CONDITION A

- One-way traffic direction.
- Parallel parking on one side.
- One-way bicycle lane added on one side.
- Planting appropriate canopy trees at the outer edge of sidewalks.





PROPOSED STREET SECTIONS

12M WIDTH STREET



| ž | 12m | |
|--------------------------|-----|--------------------------|
| ∫ 2m ↓ ^{1,5m} ∤ | 5m | ↓ ^{1,5} m↓ 2m ↓ |
| t 1 i | | 1 1 t |
| ∣≚∣≌∣ | ne | ≙ ≚ |
| | Ľ | |
| Bike | Ca | Bike |



PROPOSED CONDITION B

- One-way traffic direction.
- One-way bicycle lane added on both sides.
- Planting appropriate canopy trees at the outer edge of sidewalks.



PROPOSED CONDITION C

- One-way traffic direction.
- Parallel parking on both sides.
- Planting appropriate canopy trees at the outer edge of sidewalks.





PROPOSED STREET SECTIONS

20M WIDTH STREET



EXISTING CONDITION

- One lane in each direction.
- Parallel parking on both sides.
- Wide sidewalks that lack shading trees.



PROPOSED CONDITION

- One lane in each direction.
- Parallel parking on both sides.
- One-way bicycle lanes added on both sides within width of existing sidewalk.
- Planting appropriate canopy trees at the outer edge of sidewalks.

3D VIEW OF PROPOSAL 20M WIDTH STREET





PROPOSED STREET SECTIONS

BASMAN STREET



Parking Lan ● Bike Lane Sidewalk ICar Lane Car Lane Car Lane Car Lane

EXISTING CONDITION

PROPOSED CONDITION



PROPOSED STREET SECTIONS

JORDAN VALLEY HIGHWAY AND WADI T STORMWATER CHANNEL



EXISTING CONDITION



PROPOSED CONDITION

DISTRICT 7 - CLOSE-UP A

BASMAN STREET WALKWAY

The proposed design of the pedestrian path and green area along Basman Street provides potential opportunities to encourage active travel and increase the amenity of the space.

Planting these green areas with appropriate trees, such as canopy trees and native plants, would promote biodiversity and enhance air quality and temperature while providing natural shading for pedestrians.



DISTRICT 7 - CLOSE-UP B

JORDAN VALLEY HIGHWAY AND WADI T STORMWATER CHANNEL

Wadi T, which flows through central east Aqaba, originates in the Edom Mountains east of the city. The flow of stormwater running through this valley has been directed to an open channel that forms part of the stormwater drainage network which was established in Aqaba protect the city after recent flooding events.

This channel passes through district 7, parallel to Jordan Valley highway. Based on the Final Flood Protection Master Plan done by USAID in 2011 (USAID, 2011); The channel needs constant maintenance, as excess stormwater sometimes leads to overbank flooding that enters the urban development adjacent to the channel. This issue was also reported by the residents during the workshop held in August 2021 for this study. It is critical to reanalyze the design and efficiency of the channel and provide better solutions.

It is necessary to maintain the safe buffer zone (20m - 30m) around the water channel by prohibiting any building activity within that area. The proposed design suggests intensifying the landscape within this buffer zone by planting suitable shrubs and trees that preserve the soil. Introducing landscape berms with stabilized slopes using gravel or other porous materials can have a vital impact in protecting nearby plots. Berms form a barrier that blocks the overflow of excess stormwater in the case of a flash flood.

In addition to reducing flood risk, cultivating the buffer zone with appropriate vegetation can enhance biodiversity, improve air quality and microclimatic conditions, as well as provide beautiful views.



DISTRICT 7 - CLOSE-UP C

PARK ON BASMAN STREET INTERSECTION

The corner of District 7 - where Basman Street meets Al-Shareef Al-Husayn Bin Ali Street - is classified as a green area in land use plans but is currently vacant. The proposed design of a public park would offer neighborhood residents opportunities for recreational activities, physical exercise, and social gatherings and mark an entrance to the Basman Street walkway.



DISTRICT 7 - CLOSE-UP D

PARK WITHIN THE NEIGHBORHOOD CENTRAL BLOCK

A proposed park in the center of the neighborhood that is accessible by all residents would be a great asset to the general environment and for social interaction. In addition, the park would support local shops surrounding it and create potential opportunities for various activities.





DISTRICT 7 - 3D VIEWS OF PROPOSAL



Proposal for Basman Street.



Park on Basman Street intersection.



Park on Basman Street intersection.



Park within the neighborhood's central block.

6. FUTURE WORK

6.1 TRANSITION EXPERIMENTS

Tactical Urbanism and Transition Experiments are approaches to community development using short-term, low-cost, and scalable projects intended to catalyze long-term change. Tactical Urbanism experiments can be an effective tool for testing new solutions to improve neighborhood resilience by:

- Fostering neighborhood interaction;
- Encouraging and promoting non-motorized transportation;
- Encouraging pedestrian safety and activity;
- Reimagining the potential of city streets and land use;
- Supporting local businesses.

Different examples of interventions can be applied in Aqaba's neighborhoods to engage residents in specifically addressed topics:

Intersection Safety Improvements

Paint and markings can be used on some streets and intersections to widen sidewalks and create more safe open areas for pedestrians.

Pop-up Bicycle Lanes

Temporary lanes marked by cones or painting to encourage and increase demand on cycling which could lead to permanent solutions.

Parklets

Convert curbside parking spaces into vibrant community space.

Pavement to Plaza

Convert an existing parking space or street into an open space and encourage pop-up local shops and vibrant community activities. This allows people to temporarily reclaim streets and parking areas.

Collective Planting Activities

Raise awareness in regards to the importance of urban greenery and choosing the right type of species in accordance to appropriate planting palettes. Engaging community members in planting activities and urban farming can also enhance their sense of ownership and belonging.



Pedestrian crossing (Jersey City, USA).



Intersection safety intervention (India).



Pop-up bicycle lane (Sydney, Australia).



Parklets (Texas, USA).



Street turned into temporary plaza (Vancouver, Canada).



Collective planting activities (New York City, USA).

6.2 SCALING UP

Resilience ensures that development progress is not lost by the first natural or man-made disaster, and it limits the impact of shocks and stresses on people, infrastructure, and processes. Scaling up successful solutions is the main challenge for a city's resilience transition.

Sustainable practices must scale up within sectors and scale out across geographies and industries. Upscaling increases the impact of environmental change for obvious reasons. The more broadly sustainability measures are applied, the greater their impact.

However, upscaling requires coalitions of public, private, and civil society actors who align their motivations. Pathways to upscaling may involve leveraging a dominant player's market power; integrating successful initiatives into public policy; or reinforcing government-led change with private efforts. Various actors agree to collaborate to take advantage of their complementary capabilities.

In working towards sustainability and ensuring the city's resilience, it is essential to assess Aqaba's strategies and plans. It is important to integrate the neighborhood level recommendations (provided in Chapter 5) into wider and larger scale strategies that combine the whole city to maximize impact. Local participation and the creation of strategies and processes encourages sustainable living.

The activities that we can reach and the life that we can develop are all dependent, in part, on the built environment that we shape. The adverse impacts of growth - in economic, environmental, and social terms - are ruining the quality of life in our cities and our global climate. For instance, although many individuals may enjoy travelling by car, or aspire to own a car, there are huge problems if a large number of people choose to do this. A city with too many cars, motorcycles, or polluting vehicles can be very difficult to live within. Innovation, replication opportunities, and lessons learned should be explicitly considered in program development management and review - at the city of Aqaba level - so that results achieved from the interventions proposed in this study at the neighborhood level can be sustained over the long-term. Scaling-up strategies are an essential aspect of ensuring better coverage and impact of the smaller scale development innovations proposed at the neighborhood level.

Together, with emphasis on sustainable results, this will not just mean designing successful projects to operate on a larger scale at the Aqaba city level but also strengthening - in parallel - national, regional, and sub-regional policies, skills base, financing strategies, and institutional capacities.

It is essential to elaborate on scaling-up in connection with specific areas of engagement, including to test and scale-up public-private initiatives that can increase employment and livelihoods opportunities using production technologies that are sustainable and markets that are inclusive. These initiatives include scaling-up inclusive marketbased solutions to achieving city wide affordable and clean energy access; especially to off-grid sources of renewable energy and to finance the scaling-up of promising ideas.

UNDP's Guidance Note (UNDP, 2013) on scaling-up, posted in January 2013, provides an excellent introduction and high-level guidance for how to apply a scaling-up approach in UNDP programs. In connection with, and based on, the Guidance Note, UNDP also issued a two-page pamphlet for use by UNDP country teams entitled "Program Design Questions for Scaling-Up". This pamphlet contains a definition of scaling-up for the UNDP, a set of useful guiding questions for program design, and a helpful list of references.

Based on this approach, the study developed a set of initiatives and interventions stemming from the resilient city pillars adopted throughout this study.

URBAN PLANNING

高♠

Deliver sustainable and best practice greening opportunities for parks and sidewalks.

Provide regulations and landscape palettes that promote bio-diversity and native eco-systems within green buffer zones.

Incentivize application of green building codes.

Protect natural areas and buffer zones from urbanization through strict regulations, especially safety zones near drainage infrastructure for their vital role in mitigating flood risk as environmentally functional landscapes.

Forming a transition team at ASEZA to oversee and support the work towards sustainability and resilience.

MOBILITY

ᡒᢩ᠂

Reduce travel distances and catchment areas for major activity nodes.

Increase the operational efficiency and infrastructure of public transport.

Design for safety and for active transport.

Enhance subsidies and establish sufficient charging infrastructure to incentivize the public to adopt electric vehicles.

ENVIRONMENT



Create a team responsible for an Aqaba climate change portfolio.

Network and collaborate with international agencies on climate change.

Identify and implement energy saving solutions for neighborhoods (buildings, streets, public spaces, etc.).

Increase use of solar power PV cells.

Green building and energy efficiency retrofitting.

Deliver rainwater harvesting plan at city level.

Implement greywater recycling and reuse at city level.

Implement organic waste composting at city level.

Implement waste separation at source and enable recycling activities on the city level.

COMMUNITY INCLUSION

Support the development of public private partnerships.

Increase public participation in greening initiatives.

Develop public awareness campaigns relating to green building solutions and technologies.

Develop codes and regulations for integrating accessibility guidelines for persons with disabilities in public spaces, sidewalks, and streets.

Ensure women's security by designing open public areas with visibility, lighting, and CCTV camera systems. Recognize sexual harassment and gender-based violence as criminal offences and develop reliable reporting mechanisms.

Empower women in public and transport sectors by reducing entrance barriers to employment for women at all levels (drivers, managers, entrepreneurs, decisionmakers, etc.).

6.3 THE AVOID-SHIFT-IMPROVE FRAMEWORK

Many attempts have been made in recent years to manage Jordan's cities development in a more sustainable manner. Despite the fact that there is a continually expanding selection of very promising initiatives and projects; good practice remains unaccomplished.

Jordanian cities face significant challenges in policy, planning, governance, and implementation. Development plans are frequently closer to wishlists than to feasible, budgeted, and prioritized strategies. Policies are frequently left unimplemented or only partially implemented. When investment does occur, little is known about impacts relative to aspirations. Projects are rarely evaluated to discover if they were effective and implementation lessons are rarely learnt. Projects are prone to time and cost overruns with little builtin resilience and adaptation to uncertain futures. Technical advice is sometimes ignored in political decisions and participation in decisionmaking is typically quite minimal. There is insufficient knowledge transfer, benchmarking of practice, risk analysis and management, and performance evaluation. As a result, sustainable behaviors are not being widely adopted.

Aqaba has a great opportunity to turn this around and regain its competitive edge, minimize its environmental impacts, become a more attractive city to live and work, and develop strong senses of character and identity.

Mobility, environment, and urbanization are all critical facets of Aqaba's future livability and resilience. The imperative of climate change adds a greater impetus for action, with the window of opportunity closing more each year. It is crucial to integrate these aspects into master plans and climate change actionables. Therefore, planners should develop, implement, and communicate comprehensive sustainable urban mobility, environment, and urban planning plans and appoint respective advisors in ASEZA.

It is important to develop Aqaba to reflect local needs and aspirations - specific to local aspirations but consistent with global sustainability objectives. A successful climate change strategy in transport requires the adoption of a comprehensive and coherent approach centered on humans instead of cars.

This is where the Avoid-Shift-Improve (ASI) Framework can help. This approach - known as ASI from Avoid/Reduce, Shift/Maintain, Improve - seeks to achieve significant GHG emission reductions, reduced energy consumption, and less congestion with the final objective to create more livable cities.

The ASI Framework has three key dimensions and different modes make contributions across the dimensions. There is 1) Avoid measures which avoid or reduce the need to travel, for example, or the production of unnecessary quantities of waste. 2- Shift measures which seek to shift to more energy efficient and environmentally acceptable modes. And 3 - Improve measures which take the residual effect (past avoid and shift measures) and seek to improve the efficiency through sustainable technologies. Accordingly, any remaining vehicular travel is made efficient by low emissions or being alternatively fueled (GIZ-SUTP, 2019).



Enhancing electronic services, facilitating the establishment of home-based businesses. and providing flexibility to work from home can help avoid making certain trips.

Furthermore, by implementing an integrated land use planning policy and fine-grained urban fabric (high density and mixed land use areas), travel distances can be reduced. Issues to be considered include the following:

- Trend towards online shopping.
- Transit oriented development (TOD) - development concentration around transport hubs and vice versa.
- Expanding transportation network into neighborhoods and suburbs.
- Well-linked and permeable new developments.

Short travel distances can be more easily undertaken by active transport or public transport. By increasing the operational efficiency and infrastructure of public transport, as well as safety, design and infrastructure for active transport, the individual may regard these modes as more convenient for the daily trips. Interventions to be considered include the following:

- Travel Demand Management (TDM)
- Car parking restrictions and Speed limits
- Availability, affordability, and quality of public transport options
- New pedestrian links to create a network of convenient routes
- better footways (paving, landscaping, lighting, street furniture)
- Streets and public areas that create interest for pedestrians (building frontages, signs, and advertisements scaled for the pedestrian rather than the vehicle)
- The provision of a fully segregated cycle network alongside facilities within the main road and footpath network
- Bike parking and storage facilities that are secure and conveniently located.

the transport sector.

Subsidies, an appropriate, widely available, charging infrastructure, and financial incentives can encourage people to use the electric version of a vehicle. Interventions to be considered include the following:

- clean fuels.

Individual Motorized Transport

Car, Taxi, Motorcycle

Improve efficiency through vehicle technology

In the medium-/long-term the individual may consider reducing car size or using vehicles with improved energy and carbon efficiency. Innovations in transport information systems, priority schemes for public transport (BRT/LRT), electrical bicycles, or car sharing will further improve

· Charging stations and infrastructure for • Tax/customs regulations. Vehicle sharing options.

6.4 CONCLUSION

RESILIENT AQABA: IMPROVED LOCAL ECONOMY, LIVELIHOODS, AND TOURISM

Achieving sustainable and resilient development in Agaba contributes to boosting tourism, the local economy, and livelihoods in a sustainable manner and enhances residents' overall quality of life. Tourism is one of Jordan's fastest growing industries and an important source of foreign exchange and employment while being closely linked to the social, economic, and environmental well-being of Agaba. Maritime or ocean-related tourism (as well as coastal tourism) are vital sectors of the economy in Aqaba. As a resort and a port city, with tourism a major industry, Agaba is undergoing major expansion with new luxury neighborhoods, attractions, and hotels opening frequently. As such, a resilient Agaba is essential towards achieving sustainable tourism which can be defined as "tourism that takes full account of its current and future economic, social, and environmental impacts; addressing the needs of visitors, the industry, the environment, and host communities." The importance of sustainable tourism is also highlighted in SDG Target 12b, which aims to "develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products."

In the context of this study, achieving sustainable mobility promotes sustainable tourism in Aqaba. Utilizing public transport or active travel allows the traveler to immerse themselves in the beauty of Aqaba and experience authentic local culture and heritage without the pressures of operating their own vehicle. Improving accessibility will benefit local shops and boost Aqaba's attractiveness and competitiveness. It also enhances the city's resilience rather than experiencing great stresses on the natural and social environment during high seasons of tourism. In conclusion, this study "Aqaba: A Resilient City Through Its Neighborhoods" in its totality - the designed interventions on the neighborhood level as well as the scaling-up initiatives presented make up the backbone of potential support to sustainable tourism activities and essential capacity-building activities. It is these activities that can promote environmental awareness; conserve and protect the environment; create respect for wildlife, flora, biodiversity, ecosystems and cultural diversity; and improve the welfare and livelihoods of Aqaba's local communities by supporting their local economies and both the human and natural environment of the city as a whole.

7. REFERENCES

REFERENCES

UNISDR, How To Make Cities More Resilient: A Handbook For Local Government Leaders - A Contribution to the Global Campaign 2010-2020 Making, 2007

.....

The Rockefeller Foundation | Arup, 2014. City Resilience Framework -The Rockefeller Foundation | Arup

.....

UNDP, 2020. COVID 19 Impact on Households in Jordan

.....

Zureiqat, H., Lattouf, F., Ghannam, T., Aldhami, R., Ureiqat, B., Tahhan, S., Suboh, N., Sweidan, F., 2020. Neighbourhoods of Amman - A/E Business Council & The Regional Energy and Climate Project in the Middle East and North Africa (MENA) of Friedrich-Ebert

ASEZA. (2001). Aqaba Special Economic Zone Authority. https://aseza. jo/Pages/viewpage.aspx?pageID=1

.....

Department of Statistics. (2020). Directorate of Family and Population Surveys Estimated Population of the Kingdom by Governorate, Locality, Sex, and Households, 2020

.....

MP ASEZA. (2001). Aqaba Special Economic Zone Master Plan, Design Guidelines

Oxford Business Group. (2018). Jordan's growing coastal city Agaba continues to attract investment | Jordan 2018 | Oxford Business Group. The Report: Jordan 2018. https://oxfordbusinessgroup.com/overview/ growing-coastal-city-continues-attract-investment-forward-momentum

Agaba Development Corporation, n.d. Assessment of Traffic on the Main Roads of Aqaba, Tender No. 35/A/2016. Aqaba

Attari, A., Schiffer, R., Hegazy, M., Zureiqat, H., Semaan, R., Abu-Eisheh, S., 2020. The Mobility Transition in the MENA Region Comparative Policy Perspectives. Amman

.....

Jordan Strategy Forum, 2018. Vehicle Ownership in Jordan | Jordan Strategy Forum (2018) [WWW Document]. Jordan Strategy Forum. URL http://www.jsf.org/en/content/vehicle-ownership-jordan

.....

Tarawneh, D., Zeyad, A., Schiffer, R., 2020. Urban Mobility and Spatial Justice of Amman: A Brief Handbook on Urban Intersectionality

CES-MED, 2012. Jordan Sustainable Energy and Climate Action Plan for Agaba Special Economic Zone Authority

Department of Environment. The Hashemite Kingdom of Jordan. NATIONAL ENVIRONMENT STRATEGY FOR JORDAN: A Resource Book of Information and Guidelines for Action, Ministry of Municipal & Rural Affairs & the Environment, Department of Environment, IUCN -The World Conservation Union

.....

EDAMA, 2018. Policy Paper Solid Waste Collection Scheme in Aqaba -EDAMA Association for Energy, Water, and Environment

Farhan, Y., Anaba, O., 2016. Flash Flood Risk Estimation of Wadi Yutum (Southern Jordan) Watershed Using GIS Based Morphometric Analysis and Remote Sensing Techniques. Open Journal of Modern Hydrology 06, 79-100. https://doi.org/10.4236/ojmh.2016.62008

.....

Odat, S., Abu-Allaban, M., AL-Trawneh, B., 2018. Study on the Impact of Weather on Air Quality at Agaba Nature Environment and Pollution Technology, An International Quarterly Scientific Journal, Open Access 17,359-366

.....

UNDP, 2015. State of the Coast Environment, Report for Agaba - UNDP

.....

ASEZA, 2021. Neighbourhoods Development Department [WWW Document]. URL https://aseza.jo/Pages/viewpage.aspx?pageID=80

Department of Statistics, 2020. Jordan Statistical Yearbook 2020 -Department of Statistics [WWW Document]. URL http://dosweb.dos. gov.jo/products/jordan-statistical-yearbook-2020/

Department of Statistics, 2019. Jordan Statistical Yearbook 2019 -Department of Statistics [WWW Document]. URL http://dosweb.dos. gov.jo/products/statistical-year_book2019/

.....

Department of Statistics, 2018. Jordan Statistical Yearbook 2018 -Department of Statistics

.....

DRIFT. (2014). Roorda, C., Wittmayer, J., Henneman, P, Steenbergen, F. van, Frantzeskaki, N., Loorbach, D., Transition Management in the Urban Context: Guidance Manual. DRIFT, Erasmus University Rotterdam, Rotterdam, 2014. www.drift.eur.nl

.....

USAID. (2011). Improved Drainage and Flood Control for the Agaba Special Economic Zone Authority (ASEZA) Volume 1: Final Flood Protection Master Plan for Wadi Yutum and Adjacent Coastal Wadis.

Zari, M. P. (2018). The Importance of Urban Biodiversity – An Ecosystem Services Approach. Biodiversity International Journal, 2(4), 357-360. https://doi.org/10.15406/bij.2018.02.00087

.....

UN-HABITAT, Adebanjo, M., Khosla, P., Snyder, V., & UN-Habitat Gender Coordination and Support Unit. (2012). GENDER ISSUE GUIDE URBAN PLANNING AND DESIGN

UNDP. (2013). Guidance Note: Scaling Up Development Programmes

GIZ-SUTP, TUMI, Bongardt, D., Stiller, L., Swart, A., & Wagner, A. (2019). ASI_TUMI_SUTP_iNUA_April-2019

.....

.....

.....

The Regional Energy and Climate Project in the Middle East and North Africa (MENA) of Friedrich-Ebert-Stiftung has Funded, commissioned, edited, and reviewed this study.

Published by A/E Business Council.

Year 2021

Not for sale.

All Rights Reserved. No Part of this publication may be printed, reproduced, or utilized in any form or by any means without prior written permission from publishers.

The views and opinions expressed in this publication are solely those of the original author. He does not necessarily represent those of the Friedrich-Ebert-Stiftung or the editor.

Responsible:

Sarah Hepp Head of the Regional Climate and Energy Project MENA

Contact:

amman@fes.de Friedrich-Ebert-Stiftung Amman Office P.O. Box 941876 Amman 11194- Jordan info@aeb-council.org A/E Business Council Amman P.O. Box 930786 Amman 11193- Jordan

ISBN NO. : 978-9923-9893-1-9