

M. KOLHUFUSHI TOWARDS

SUSTAINABILITY AND RESILIENCE

AN URBAN CONTEXTUAL STUDY AND STRATEGIC PROPOSALS





ABSTRACT

This booklet is an anthology of analysis of the Urban Contextual study & development intervention of the island M. Kolhufushi. The analysis for this study has been done from 27th of 2016 to 4th of March 2016 examining several aspects of the entire island.

This study is part of Architectural Design Project 5, which is to design a disaster relief project for sustainability.

Along with the local profile of the island of Kolhufushi, a previously tsunami hit low lying island of the Maldives, the booklet presents a local strategy map for the island that incorporates action plans for a sustainable and resilient community.



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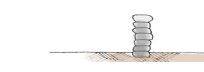
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KOLHUFUSHI AT A GLANCE

Small islands in a line, to where Kolhufushi lies peacefully.

A vast reef area surrounds protectively, yet how much did it help her in the Tsunami?

A buffer of lengthy thick line of palms, yet how much did it help her in the Tsunami?

Might the waters of Maldives be clear as crystal, yet kolhufushi harbour was denied of this blessing.

Traces of shelters, and watering holes that were once used ran along the harbour and western coast.

Now that we are on the island, those lengthy palms seen so thick from the boat split to west and east.

Traditional outdoor seats were set under the coconut palms to face where the sun would set.

The rain of the last two days ran from other areas of the island to forming a pool under the western coconut palm line stayed there forgotten to sink.

Muddy as the soil can be, crabs had rushed to make homes where ever they can find,

Narrow and long the island can be compared in shape to a banana, walk across in 5 minutes and walk along 5 times longer.

Key institutions concentrated in the mid of the island where almost no tree was fully grown, people lived their quiet lives on either sides where it was greener and cooler.

As we walked, women wove thatch and children merrily waved at us and rode their bicycles on the roads, at a distance we may hear a boom of a motor bike one in a while.

One wide mother road branched into a network of narrow roads letting a few roads to run across.

Concrete blocks sunk into the road gave away the fact of a sewerage system beneath, yet heavy rain floods many roads.

People dug and put coral stones and sizes of sand from nearby surrounding to minimise the effect of flooding in the roads.

The white sands fought the growth of plants yet along the boundary walls on roads people succeeded in planting "Copy Fai" or Maldivian cabbage and few other varieties of flowering plants.

Unoccupied land plots had turned into agricultural fields, filled with fruit bearing trees.

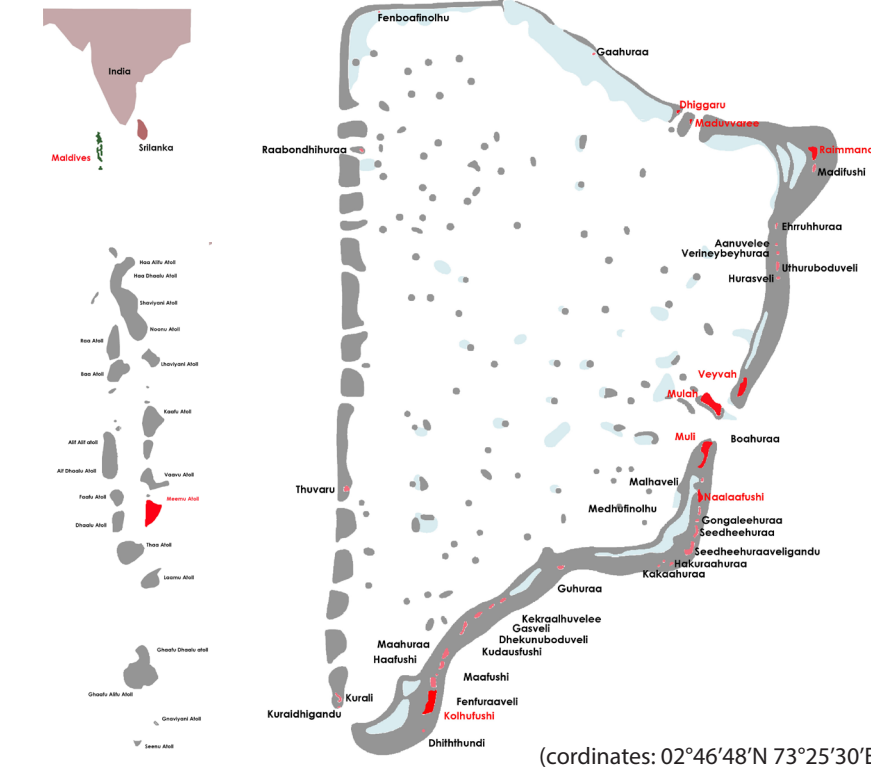
Likewise where people lived in fruit bearing trees and flowering trees were planted yet no care was given to beauty.

An astonishingly large number of similar houses of a modern model which seemed as if they did not fit in to the setting were scattered everywhere in the island in no pattern one could assess.

Around the houses were plants and outdoor seats scattered on the road and backyard, which gave hint to the residential fabric kneaded to that all around home.

Few houses gave away hint of a rich culture of ancient history, yet sadly they were no longer lived in.

Location



Located in one of the central atolls of the Maldives, M.Kolhufushi lies to the the eastern side of the country on the tip of the atoll.

The island lies 155 km away from the capital of the Maldives, Male'. It can reached within 2 and a half hours by speed boat.

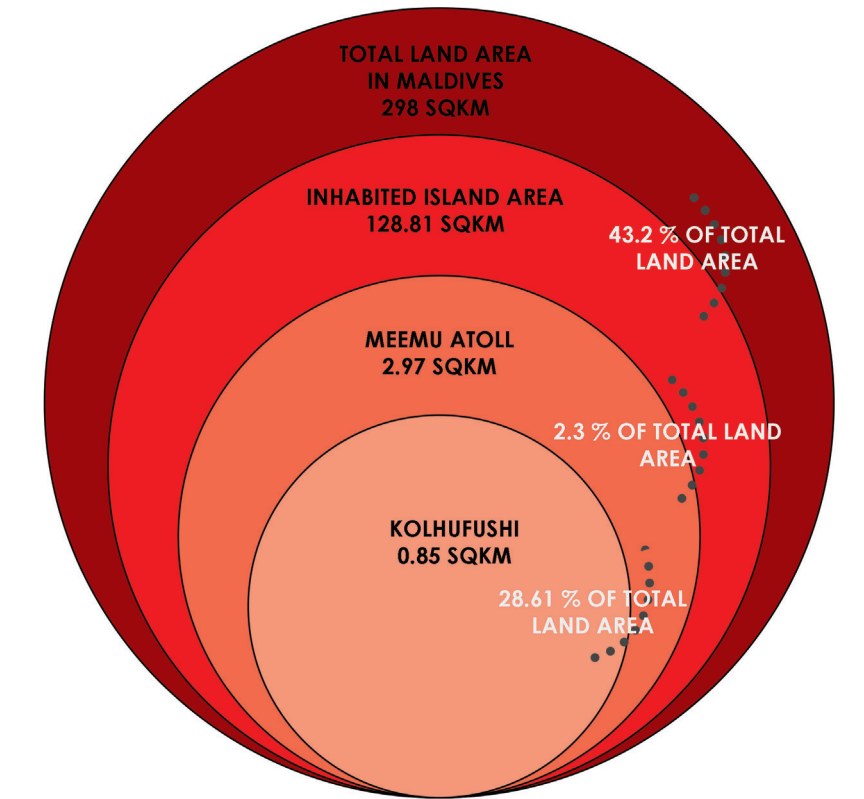
Kolhufushi is one of the eight inhabited island of in the atoll out a total of 34 islands. 2 of the islands are resorts and 24 islands are uninhabited. The island lies further away from other inhabited islands of the atoll.

The administrative capital of the atoll is Muli. The island has a population of 735 people and a local council of 5 members.

Kolhufushi was two separate islands before known as "Kolhufushi Vaar-eyafushi"

In 1961, January 10th, both islands were declared as one island and was named "Kolhufushi".

The two islands (Uthuru and Dhekunu) is still as two separate wards of the island.



IMPACT OF BOXING DAY TSUNAMI ON KOLHUFUSHI

The boxing day tsunami hit the Maldives on the 24th of December 2004 at 9:20 pm local time. The day started as any normal day. Since it was during the school holidays most of the people were sleeping, yet the regular activities of the morning were going on. Women were in the kitchens preparing food, fishermen had gone to fish with the rise of the sun and children played on the streets. Many young ladies were in the sports ground practicing for a "Bashi" tournament. An eye witness who saw the coming wave from the eastern side of the island related that when she saw the wave it towered above the coconut palms while on the reef of the island, as illustrated in the picture below. The tsunami hit the island with a height of 12 feet. After hitting for a first time the wave washed back to the east again at a height of 10 feet. The locals claim that this reaction was one of the reasons that minimised the damage that could have been caused by the tsunami. This is because the first wave carried many people off the island while the second wave took back them in to the island again.



An illustration of how the boxing day tsunami approached the island according to an eye witness

The wave hit the island carrying a lot of waste along with it. Most damage was caused due to this debris.

There were a total of 16 deaths in Kolhufushi which is 23% of the deaths of the total deaths in the Maldives which was 82. (NDMC,2005)

3 people were missing from the island. It is 11% of the total missing people in the country which was 26. (NDMC,2005)

Of all the houses in the island only two houses were untouched during the tsunami in addition to the two mosques. (NDMC,2005)

Communication and electricity were cut off. The first communications with another island came about the next day.

People were psychologically effected and slept in boats for 3 days straight. After that people stayed in school and tents. Temporary shelters came in 3 weeks later.

People lived in these shelters for 10 years straight. The fresh water lens of the island was effected and took 2-3 years to restore. A government distillation plant provided drinking water for 6 years.



Tsunami damages house

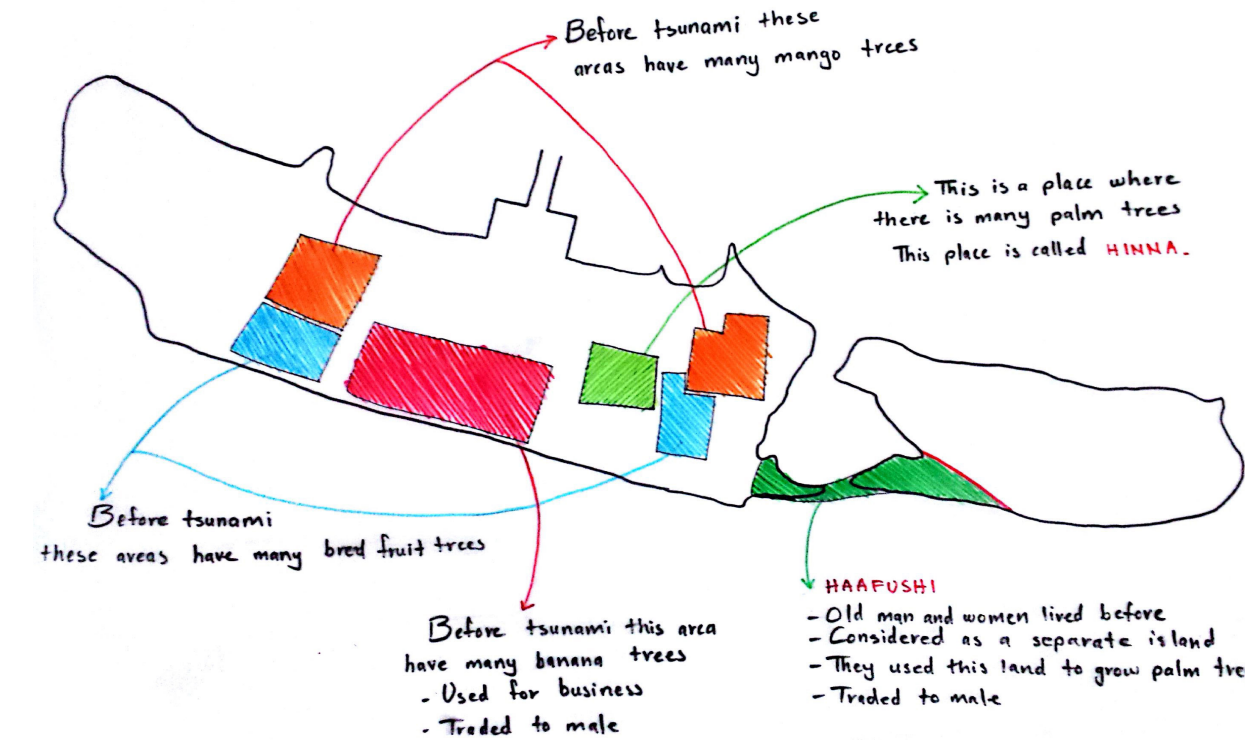


Household items completely destroyed

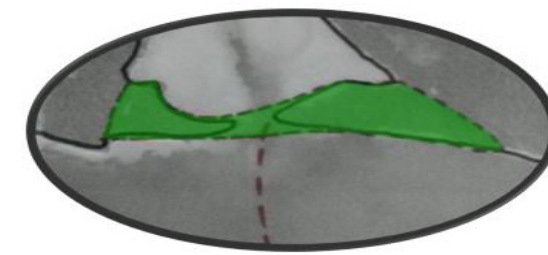


People cooking together in Shelter

An overall of island before Tsunami



Haafushi



- Before Tsunami
- Maintained by old couple during 1980's
 - Very green



- After Tsunami
- Area got separated
 - Couple migrated to Nalaafushi

Effects of Tsunami

CHANGE TO OVERALL ISLAND



Google earth satellite image of the year 2000



Google earth satellite image of the year 2005



Google earth satellite image of the year 2011



Google earth satellite image of the year 2013

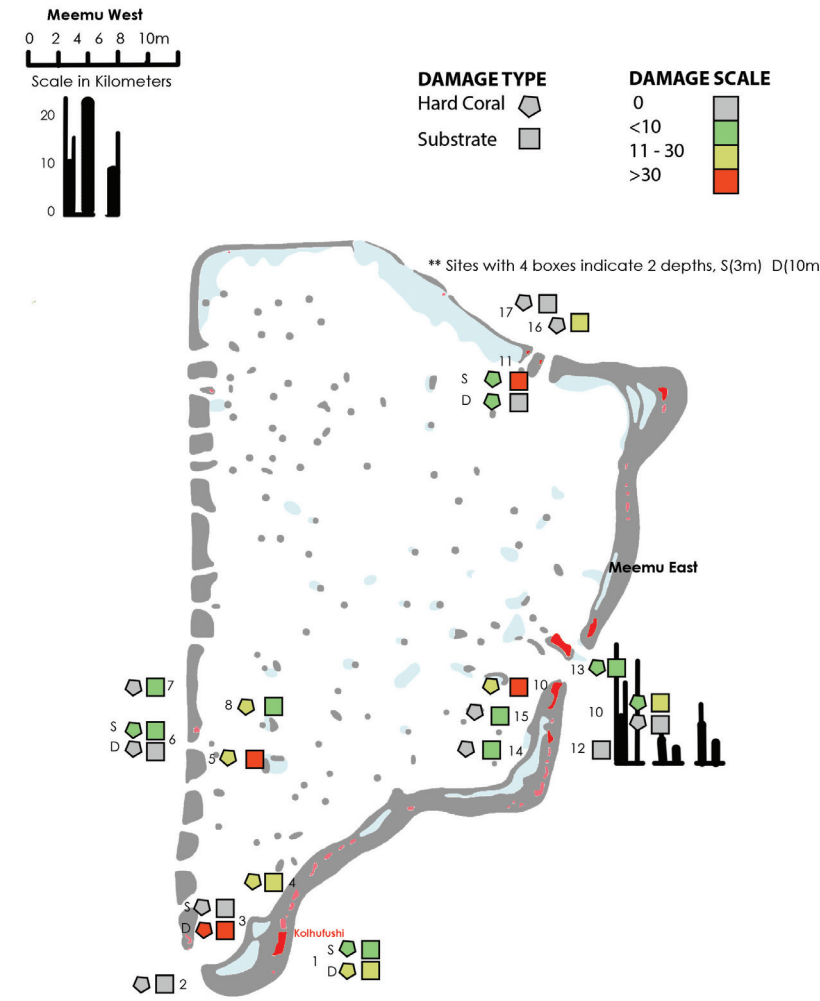
EFFECTS OF TSUNAMI

Kolhufushi was one of the most severly damaged islands in Maldives from the 2004 Boxing Day Tsunami.

The physical features of the Island changed drastically effecting the topography, land area and vegetation.

Infrastructure of the island also recieved major damages.

Reef Damage



REEF DAMAGE

With the 2004 Boxing Day Tsunami, the coral reefs of Maldives received damages, including Kolhufushi. The western and the eastern coral reefs were the direction that impacted most. With a damage scale of 30 (highest on scale), the hard coral up to a depth of 10 m was damaged on the Western side. However, the eastern side received fewer damages to its hard coral reef with a damage scale of 11-30.

HOUSING AND INFRASTRUCTURE AFTER TSUNAMI

Majority of the new houses built after tsunami were provided by the government, although some of the existing houses were renovated.

New housing units were provided by the government in two layouts, for the locals. The provided housing units are built much stronger with disaster resilient features including elevated floors and stronger foundations.

Some of the damaged houses are seen to be left abandoned due to the heavy damage cause by the Tsunami.

IMPACT



Partly damaged house renovated and used as Quran class now



Completely damaged house in tsunami demolished and new housing unit built

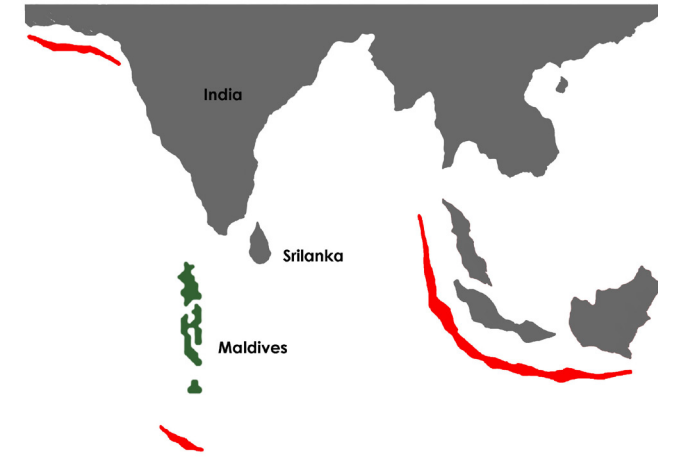


Boundary wall of this Mosque damaged during Tsunami rebuilt



Tsunami first hand witness showing the level of flood caused by the disaster.

Vulnerability of the island



The context of Kolhufushi is situated in Meemu atoll, in the eastern side of the Maldives; where it is known as the disaster prone zone area 5.

The zone is prone to 3 fault line of predicted tsunamis as shown on the figure on the left.

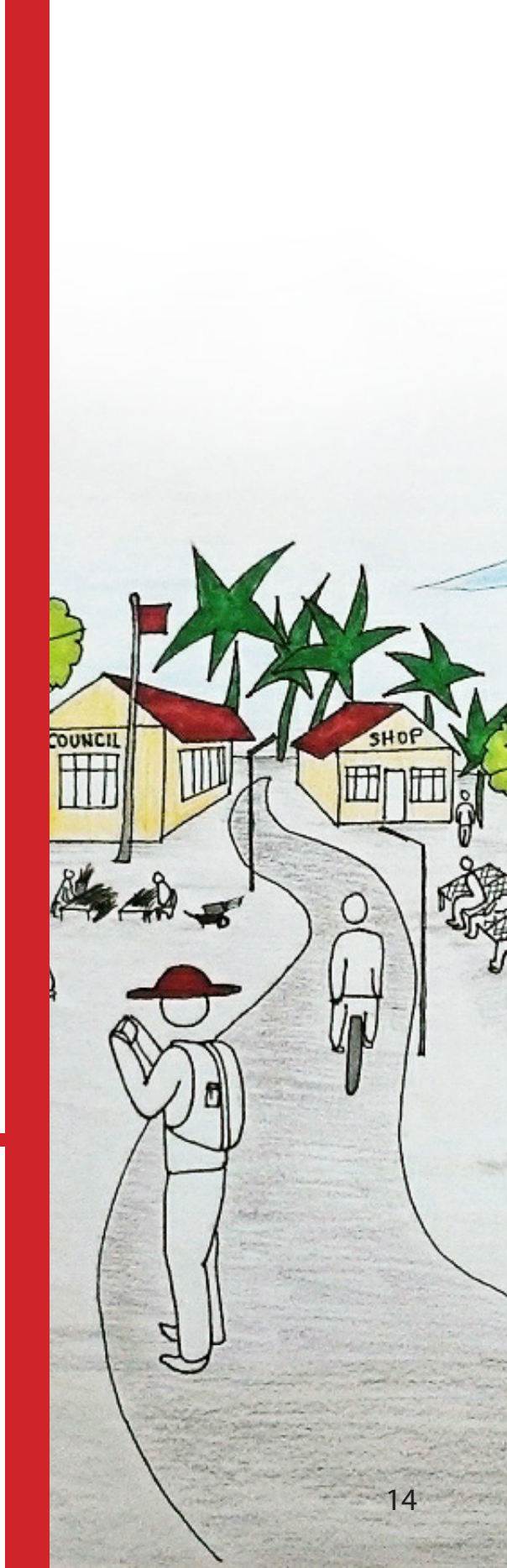


2004 tsunami direction.



LOCAL PROFILE

M. KOLHUFUSHI



PHYSICAL FEATURE, CLIMATE AND NATURAL RESOURCE MANAGEMENT



A. LOCATION

The context of Kolhufushi is situated in Meemu Atoll, in the Eastern side of Maldives; where it is known as the disaster prone zone area 5. Eastern side of island lacks efficient natural barriers against soil erosion and potential disasters. The small beach area in eastern side is already subjected to soil erosion.



B. TOPOGRAPHY

Topography of the soil (muddy sand) prevents drainage during rain causing flooding in several areas of the island thereby making it difficult to use the road for mobility. The areas marked on the map on the next page shows the areas which get flooded most. No proper drainage system integrated to address this issue.



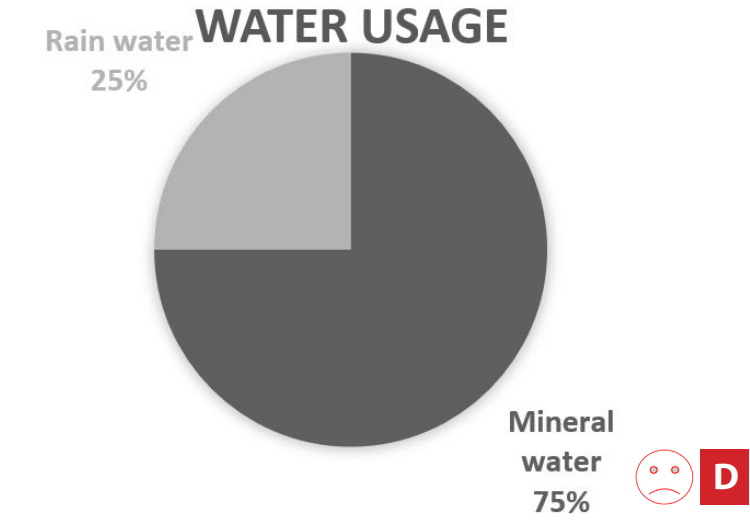
There are depressions in the island where most of the water settles in the island. The section on the opposite page illustrates these depressions.

C. COCONUT PALMS

The coconut palms which are densely grown in the island is one of the greatest assets of the island. Even now the fruits of these palms bear and their leaves are helping the locals to make a living and survive.



PERCENTAGE OF TYPE OF POTABLE WATER USAGE



D. WATER & "KULHI"

As all the islands of the Maldives the island has a fresh water lens. But now it is getting impurified and thus people drink bottled water

Main water feature of Island, 'Kulhi', which has the potential to provide potable water, is underutilized. 75% of potable water used is from purchased mineral water bottles. There is no waste water recycling methods or plans for better water management. Natural resource available from local palm trees are underutilized as resources for diverge uses - waste of natural resource. Zero use of renewable energy resources.

E. REEF SURROUNDING ISLAND

The reef around the island is one of the greatest assets of the island. It has the potential to enhance several economic activities that shall benefit the island financially.

The reef is subjected to damage due to climate change and improper waste management. The eastern reef side was damaged to a scale of 10-30 (Medium damage) and the western side was highly damaged with the scale above 30. (in text reference)

SOME LOCAL VEGETATION

Coconut Palms



A large sized single-stemmed tree with stout, straight or slightly, Curved trunk, rising from a swollen base surrounded by a mass of roots. Trunk is light greyish brown in colour, smooth and marked with ring of leaf scars.

Leaf size: Up to 6m long
1.5 - 2m wide

Banana plants



The banana plant is a large perennial herb with leaf sheaths that form trunk-like pseudostems. The plant has 8 - 12 leaves. Root development may be extensive in loose soil in some cases up to 30 ft laterally. Other plant descriptions vary, it depends on the variety.

Leaf size: 9 ft long 2 ft wide

Mango Trees



Mango trees are deep-rooted, symmetrical evergreens that attain heights of 90 feet and widths of 80 feet. Mango trees have simple alternate lanceolate leaves that are yellow-green, purple, or copper in color when young. Mature leaves are leathery, glossy, and deep green in color.

Leaf size: 2 - 16 inches

Chilly (githeyo mirus)



Capsicum Chinese, locally known as *Githeyo Mirus*, chilly which is a very hot chilly commonly grown in the Maldives. *Capsicum chinense*, commonly known as "yellow lantern chili", is a species of chili pepper native to the Americas. *C. chinense* varieties are well known for their exceptional heat and unique flavors

Beach Hibiscus (Dhigga)



A small to medium sized evergreen tree 3 to 10m in height, but is capable of growing to 20m tall. Canopy is usually much wider than the height of the tree. Truck is often short, with numerous crooked sprawling branches.

Leaf size: 8 - 15 cm

Sea lettuce (Magoo)



A low branching, spreading bushy shrub that grows up to 3m tall with soft wooded and crooked main stem. Slender branches are green in colour, somewhat succulent with soft spongy tissues inside (pith) and with clear leaf scar on the outside.

Leaf size: 15 - 30 cm long
8 - 10cm Wide

FLOWERING GARDEN PLANTS



RARE VEGETATION

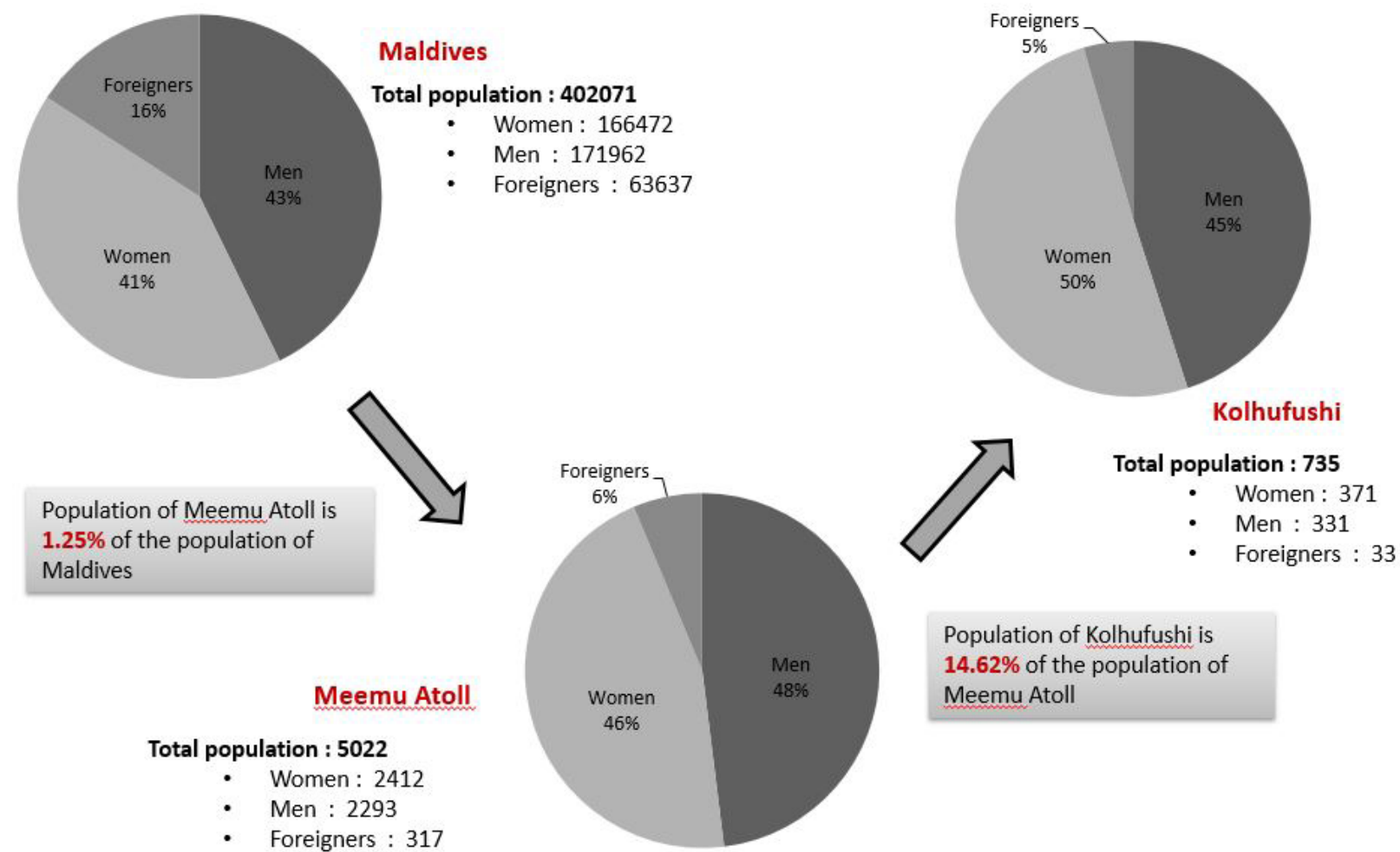
This is a tree which have grown in the island after tsunami. Assumed to be teak which is locally known as "hai vakaru" currently this is a rare treat to find in the Maldives.

According to the locals is assumed to have grown from a seed washed ashore during tsunami.



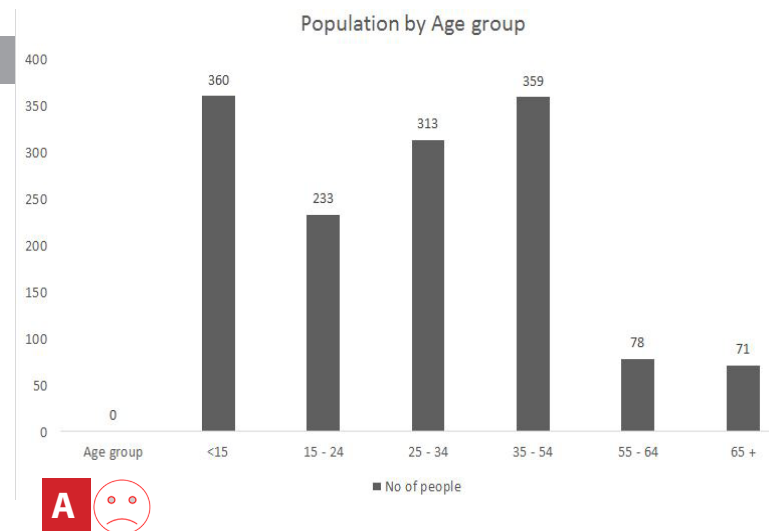
POPULATION AND HOUSING

The population of the island is 735 people (Census 2014). The population growth rate is smaller in Kolhufushi when compared to Meemu Atoll. There is a significant decrease in the youth population aged between 15 to 35 year and this is directly as a result of lack of community facilities and jobs. People change to Male' to reach such facilities including education and healthcare.



A. AGE GROUP

The diversity in the age group shows a significant drop in the youth population.



B. MIGRATION OF YOUTH

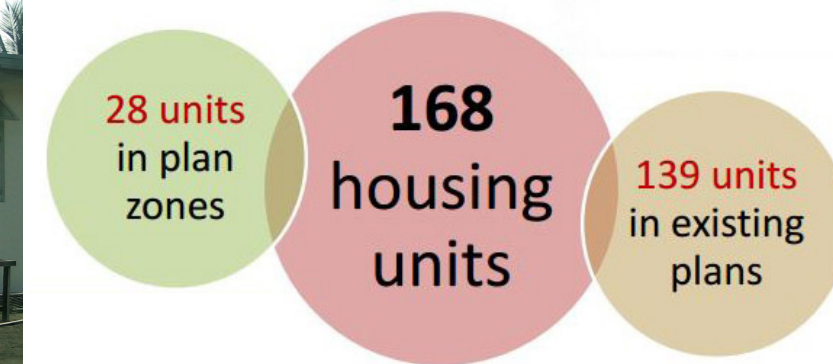
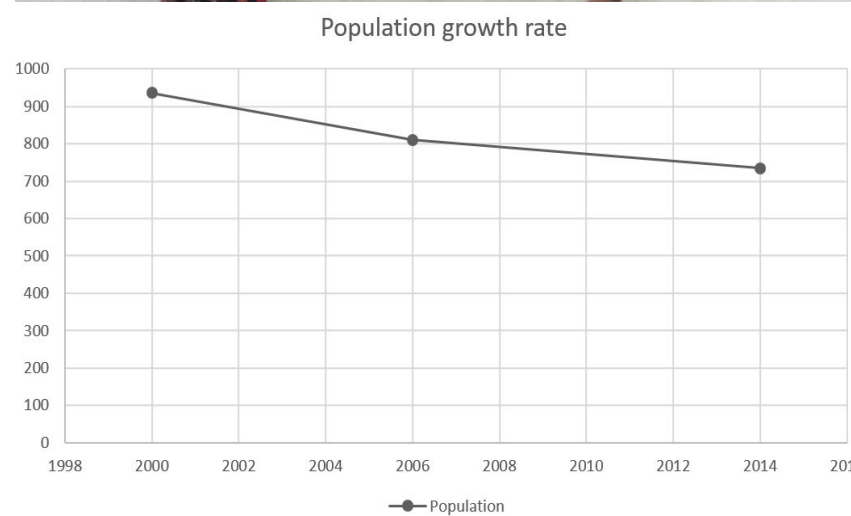
Migration of the young population of the country has been seen as a great threat to the development of the island.



C. GROWTH RATE

The population growth rate of the island has been noticed to fall down through out the years. This can be related to the fact that the youth population leaving the island slowly and settling in other islands.

According to the local council there is sufficient land in the island for the 50 years ahead.



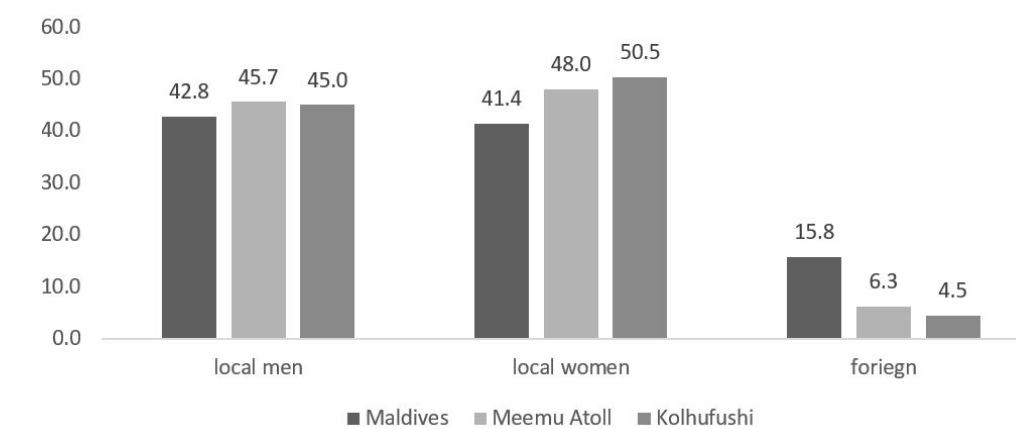
Government provided housing after Tsunami



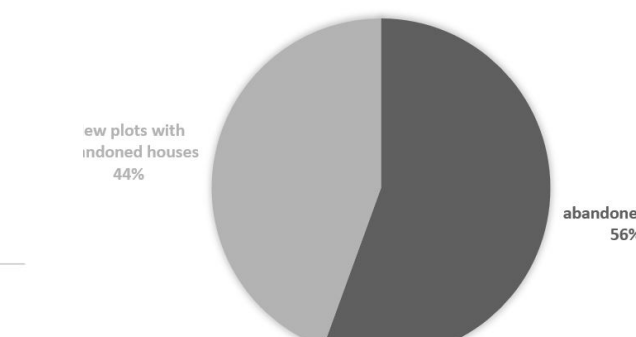
D. HOUSING

The types of housing in kolhufushi can be divided mainly into three categories. These types are the housing types that have been built by the government due to the aftermath of 2004 tsunami. The houses have been provided under a plan where a total of 168 housing units are to be provided; 28 in the planned zones and 139 in existing plots where residential houses have been destroyed completely by the tsunami. These houses have a modern look and are all prototypes. The housings provided by the government does not have flexibility to personalise the houses according to the taste of the owner neither does it have any translation of ancient maldivian architectural styles.

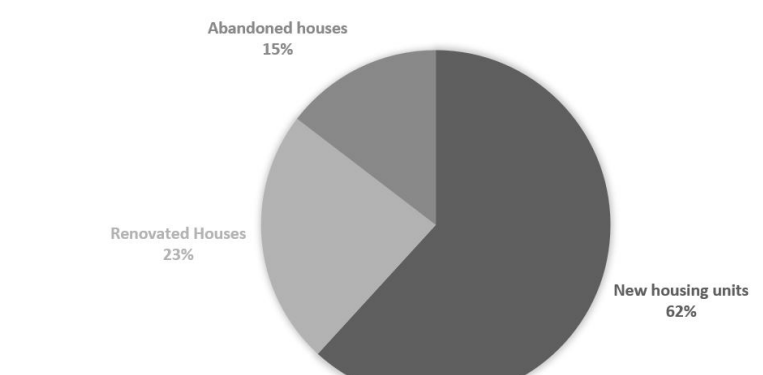
Population Characteristics Percentage



ABANDONED PLOTS AND HOUSES

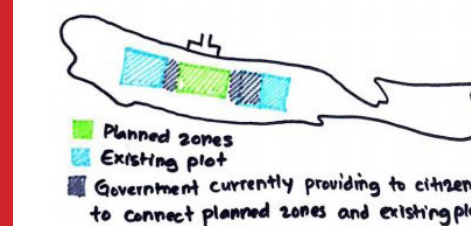


HOUSING TYPES



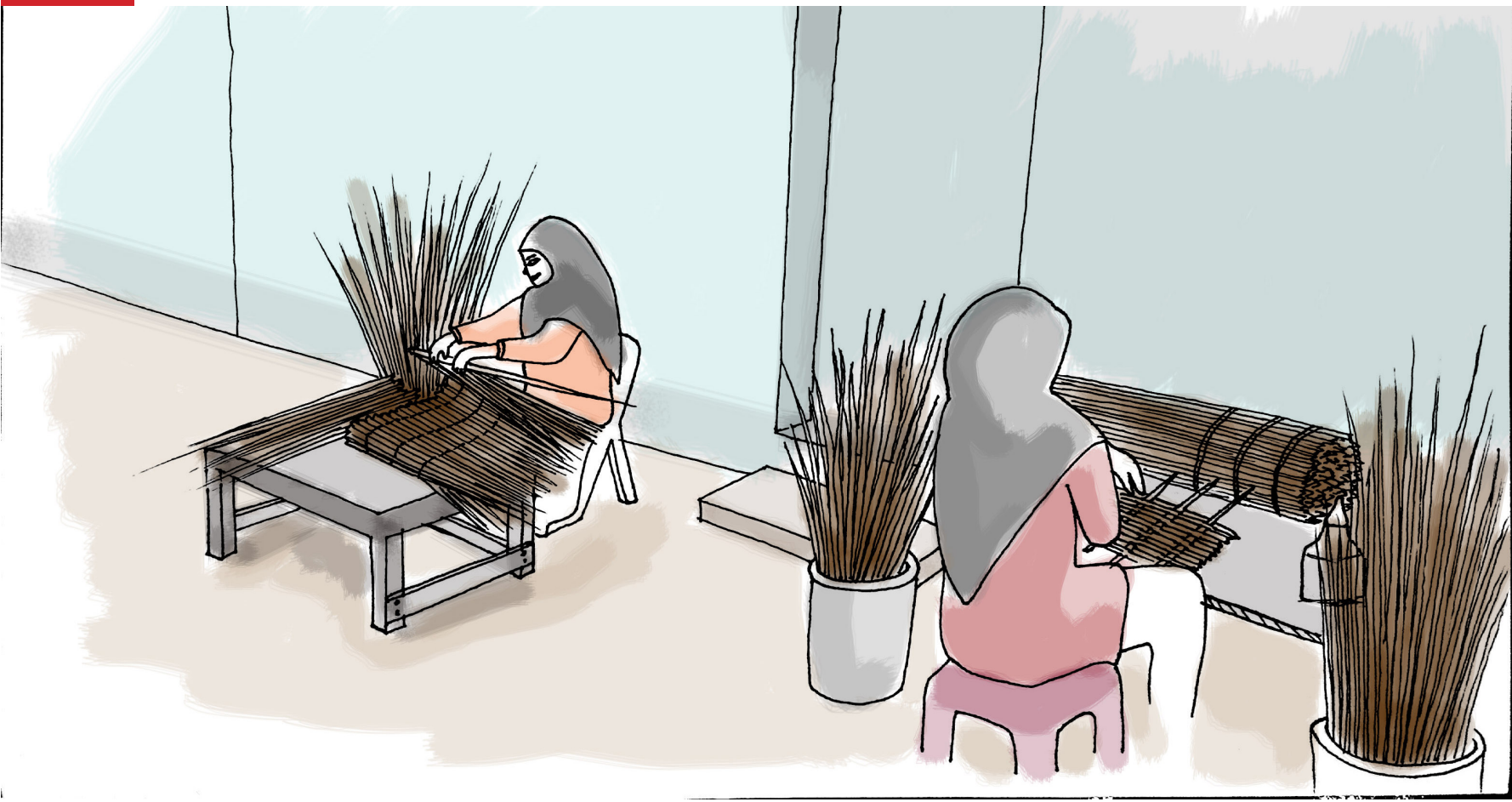
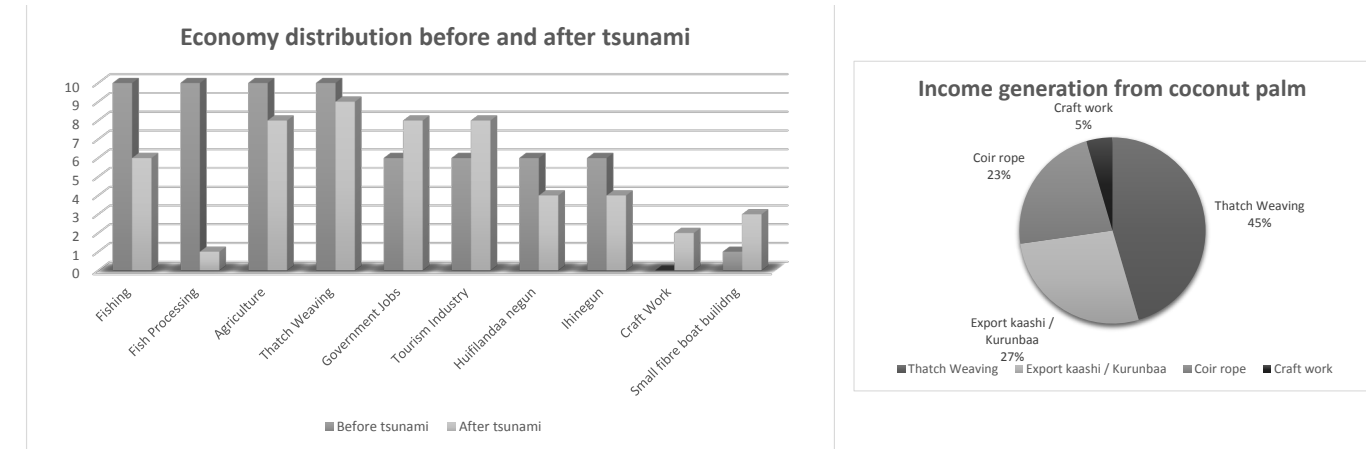
D. POPULATION DISTRIBUTION

Before the tsunami people lived on either sides of the island. After tsunami due to the immense distruction caused to the island the government built houses for the destroyed houses with financial aid from Abu-Dhaabi. This project started in 2010 and ended in 2013. This was implemented together with island planning where the central area was developed with residential housing.



3 ECONOMY AND EMPLOYMENT

The economy of the kolhufushi is mainly based on thatch weaving, fishing and agriculture, although there are other people who are occupied in other sectors as well.



A. THATCH WEAVING

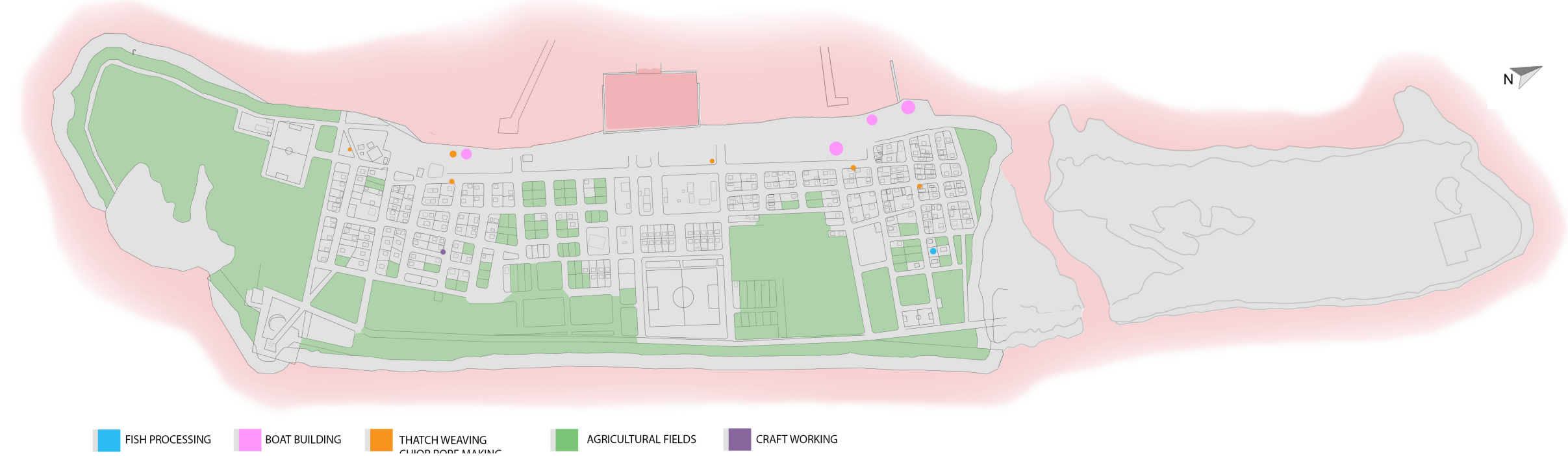
Thatch weaving is one of the base economy of the island. Thatch is woven normally by women although men also take part in this economic activity. Thatch weaving has become a fluent economic activity because of the many coconut palms in the island and the demand for it from resort islands. However no space is specially dedicated to this economic activity therefore people dry the woven tatches on roads.



B. AGRICULTURE

Agriculture was the main occupation of the island before 2004 tsunami. Infact the banana plantations which bore large bananas were what gave the island its identity in the past.

However the tsunami destroyed the banana plantations of the island. Now the muddy soil rich area where these were grown, which is the center of the island is no longer to be seen. The area has been refilled with white sand from the beach and planting trees in this area has become a difficult task.



C. FISHING

There are a total of 4 boats which fish for yellow fin tuna in which approximately 50 locals work. The tuna is generally sold to the island itself and sometimes even to the neighbouring islands. Yellow fin tuna is sold to Male'. Seasonally people go to fish for sea cucumbers and lobsters.

Before Tsunami, fishing was one of the major incomes of the island. Abandoned sites give hint to the fact that fish processing was carried out in this island earlier.

However, currently tuna processing is carried out by one individual of the island.

D. SMALL FIBRE BOAT BUILDING

The island also has a small boating building ware house. Here small fibre boats are built which are sold to other islands.

E. TOURISM AND CRAFT WORK

Tourism is one of the largest economy base of the country. Yet the island has little income coming in from the tourism sector. One local is involved in making local souvenirs from locally available materials in the island. The profit he is generating is relatively good.

RETAIL AND COMMERCIAL

There are a total of 7 retail shops in the island. This shops sell general good items which are in demand by the island. Even though a ferry system connects the islands weekly 3 days people do not visit other islands specially for shopping.

According to the local island council the retail services available in the island is sufficient for the island. Shops have adequate items in them that is in demand of the islander.



1

A. SHOPS

The types of good available in the shops are general household items.

There are two shops, on either ends of the island, in which sells flour, sugar and rice, the main food consumed by the maldivians.

Two of the shops sell clothes and dresses in addition to the general items.

A few shops sell hardware items but major construction hardware have to brought in from Male' during construction.

After the tsunami a great drop came in the retail and commercial business as all the shops were destroyed.



2

A



B

C

C

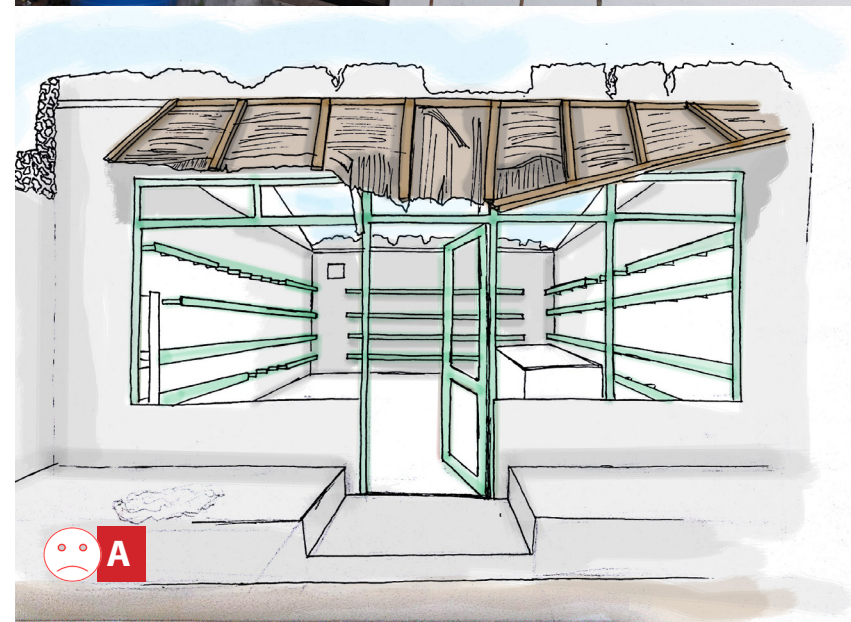


C



3

A



A



CAFE

SHOPS

B. TRANSPORT

The retailers claim they have lots of difficulties in bringing items to the island. The main reason is because the transportation ship is so small and cannot carry much good. This limits the conveying of goods to and from the island.

C. LOCAL TRADE

The people of Kolhufushi trade items produced in the island to nearby atolls and Male' for trade. These items include agricultural products such as Maldivian Cabbage (*copy Fai*), coconuts, tender coconuts, chillies and banana. Most of the items are taken to be sold in the local market of the Male'. Nevertheless a small portion is sold to other nearby islands as well.

In addition to agricultural products thatch (*fangi*) is sold to resorts in other atolls.

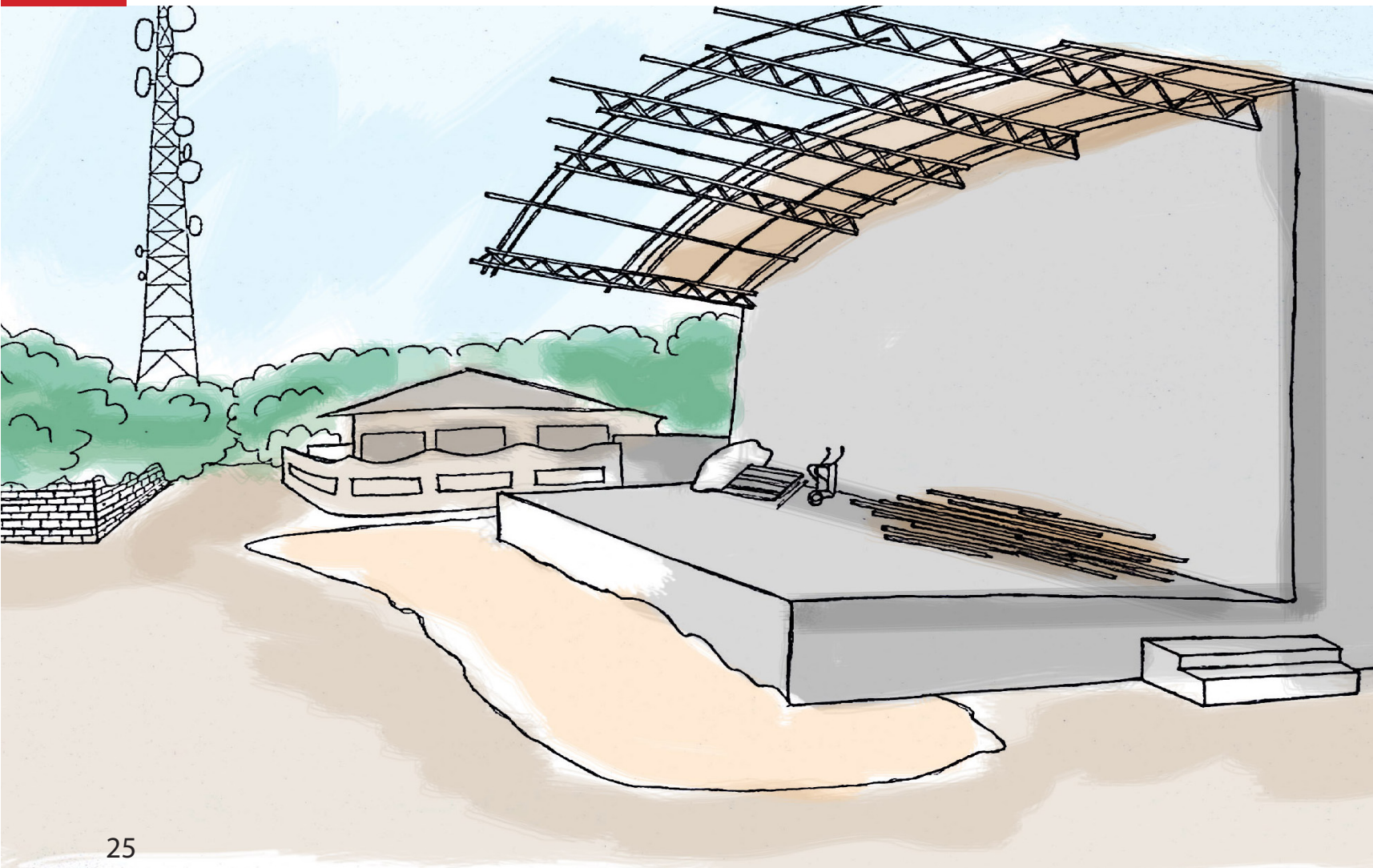
Fishing products including fresh reef fish, tuna and processed tuna is taken to be sold in the local market of Male'. Fresh fish is also taken to be sold to resorts.

Other items sold include fire wood and craft works.

However people are not satisfied by the income generated through these trade due to difficulty in transporting it efficiently to the customers.

5 RECREATION AND OPEN SPACE

Spaces for recreational activities and open spaces are an important aspect in the urban fabric to provide the community with breathing spaces enhancing the health of the social tissue. It is also a vital element in the overall happiness of the community.



A. LANGIRI TRADITIONAL

“Langiri”, which is a traditional maldivian dance, is a celebrated activity which takes place in this island occasionally.



A 😊

B. FOOTBALL FIELD

Athere is football field in the island where men gather to play football every evening. This is a culture in almost all islands of the Maldives.



B 😊

C. VOLLEY BALL FIELD

Volley ball is not commonly played in other islands, yet Kolhufushi youth gather to play volley ball in the evenings. This sport is not only played by men but also by women.



C 😊



D 😊



E 😞



E 😞

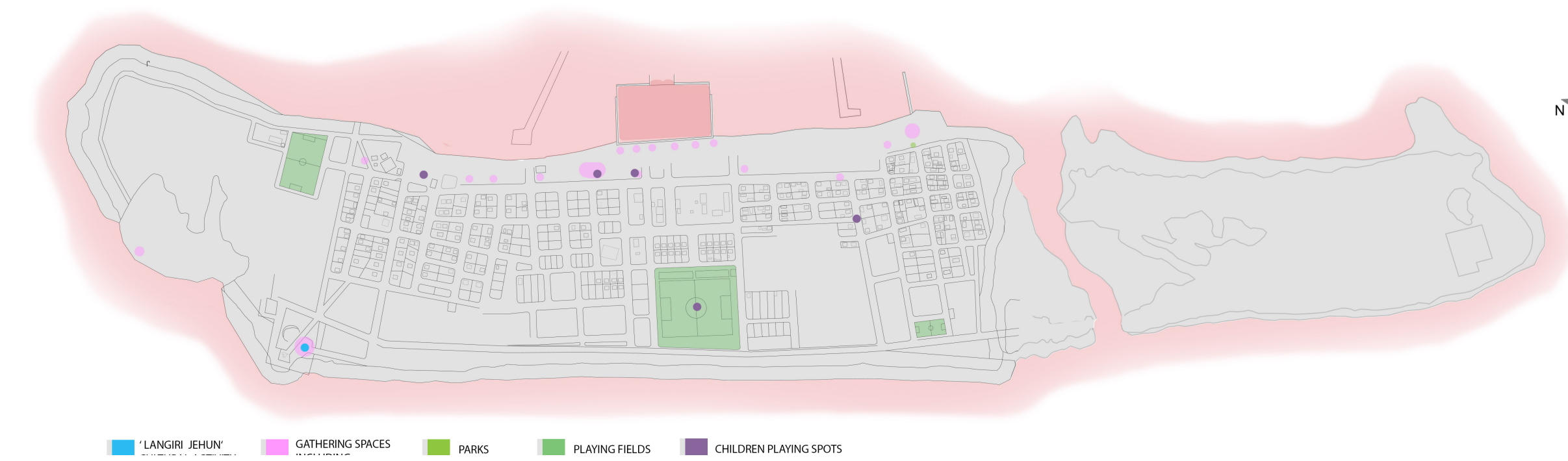
D. BASHI

“Bashi”, a traditional maldivian sport is a zealous recreational activity of the ladies. One field caters for this activity. Ladies gather here to play seasonally.

E. GATHERING POINTS

The island has gathering points which are points that are created by the overall culture of the island. These points are casual and not managed by any institution.

Nevertheless the island lacks social gathering spaces suitable for all ages. Eventhough there is a space specially dedicated as a children park, the space is underutilised. It is uninviting.



■ 'LANGIRI JEHUN' ■ GATHERING SPACES ■ PARKS ■ PLAYING FIELDS ■ CHILDREN PLAYING SPOTS

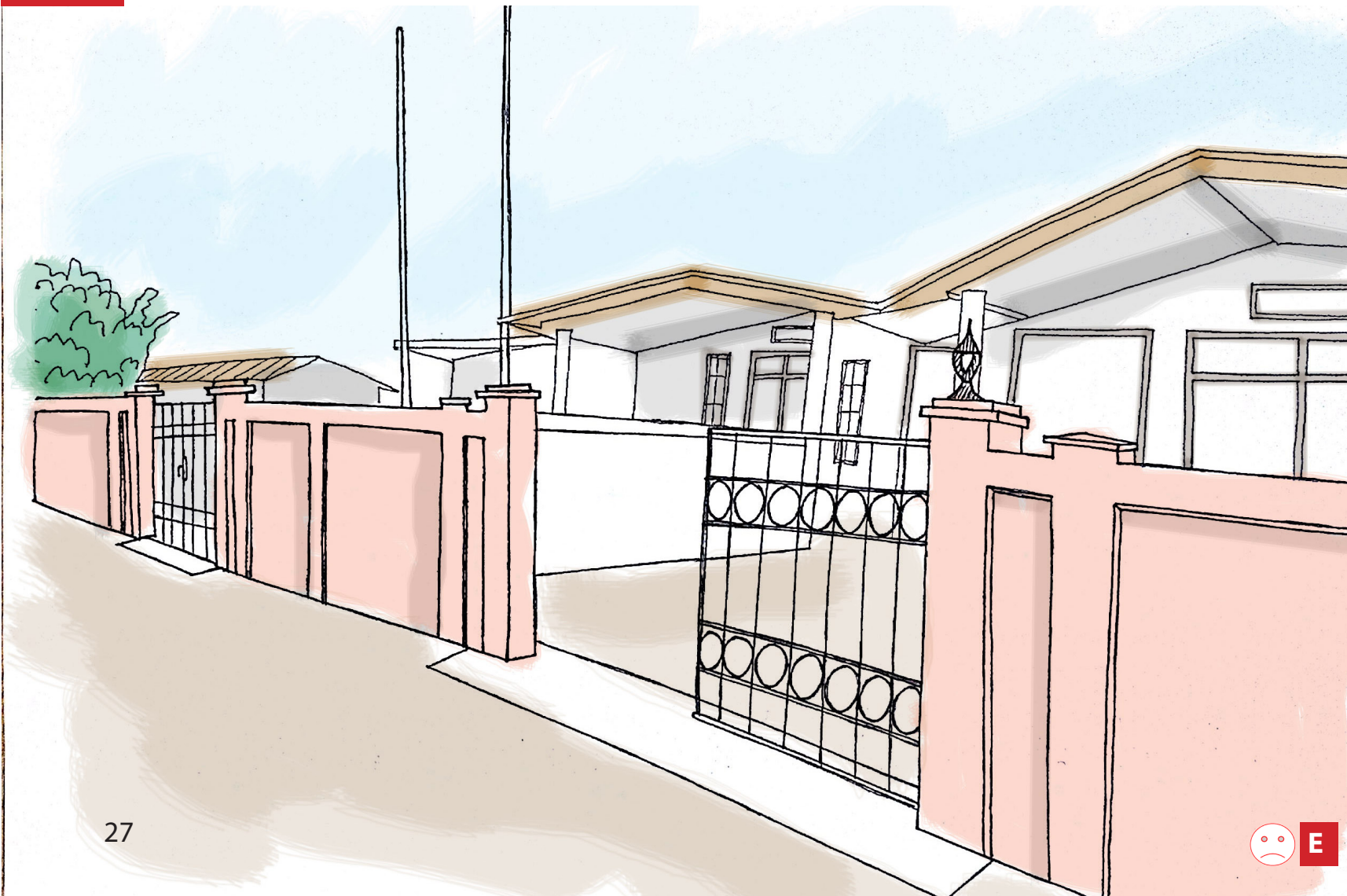
6 COMMUNITY FACILITIES

The island has the general community services available in most Maldivian islands. These include health facilities, educational facilities, house of worships, cemetery, local council, court, and waste disposal area. Nevertheless it can be noted that most facilities are not that efficient.

The island does not have proper banking services. To provide cash a boat called the "Bank Dhoni" visits here monthly.

In addition to this inefficiency has been noticed in social interaction due to lack of facilities that enhance the overall social tissue of the island.

An issue that should not go unaddressed is the fact that this island took a comparatively long period of time to recover from 2004 tsunami which is mostly because not enough measures were taken to tackle with psychological factors that may have been triggered by the disaster. Eventhough hit horribly by the 2004 tsunami it should also be noted that no activities are carried out to prepare for another such event.



E 😞

A. HEALTH CENTER

Kolhufushi Health Centre provides general health services from 8 am to 2 pm on week days. It operates with one medical officer and 2 nurses who are available on call during closed hours. The health centre has a ward with 6 bed capacity and a labour room, which is rarely used as the people prefer going to the Regional Hospital.



A 😞

B. MOSQUE & CEMETRY

As any island of the Maldives, which is a 100% muslim country, the island has a total of four Mosques or places of worship. One of these mosques has notable cultural significance. The island has one cemetery.



B 😊

C. EDUCATION

Meemu Atoll Madharusaa, the school of the island provides foundation stage education along with primary and secondary education. With a capacity of 10 classrooms and 26 teachers the school caters for about 200 students in two sessions along with a library and a computer laboratory. Regardless of this, other varieties of education is not locally available. There are no seats near the school for parents who walk a long distance to go and fetch their students.



C 😞



D 😊



D 😊



F 😞

D. POLICE STATION & MNDF

The police station of the island is run by a total of three policemen. According to the Police station the crime rate is extremely low and the type of crime that takes place is only robbery.

It is rare to find a post of the Maldivian National Defence Force in an island. Curiously enough kolhufushi has an MNDF post.

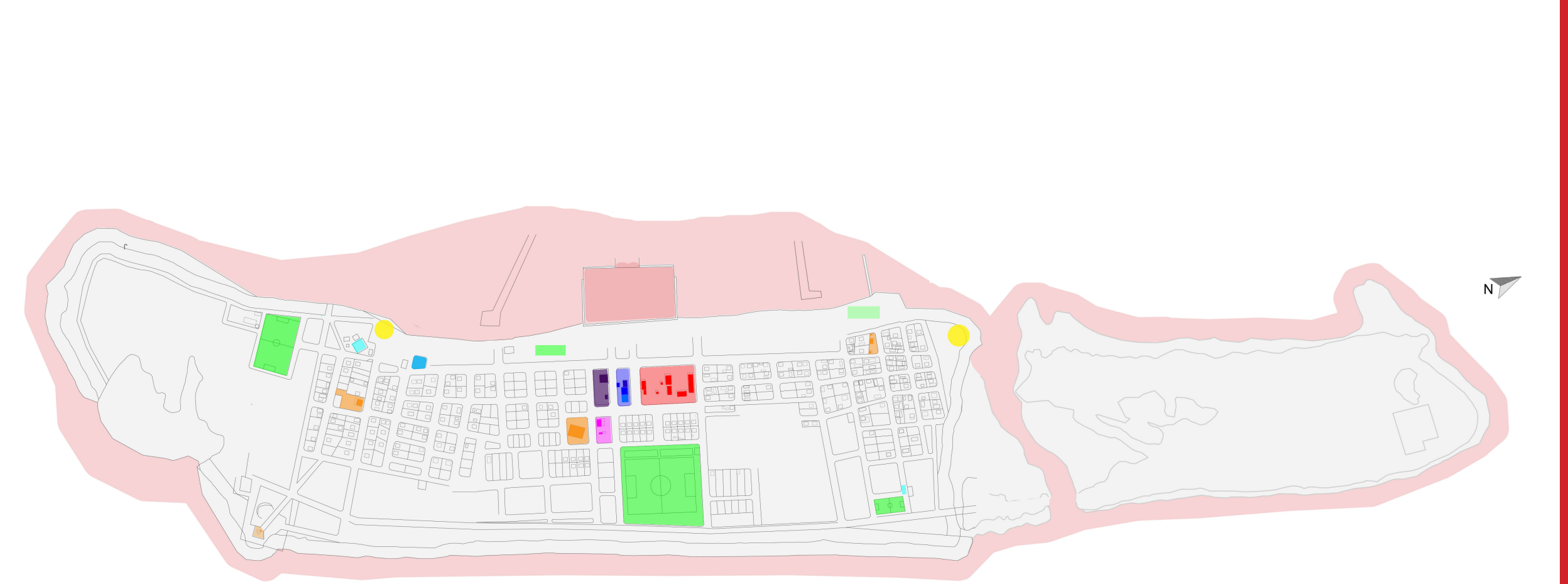
E. ISLAND COUNCIL & COURT

The local council of the island has 5 councillors who administrate the island development projects and activities through coordination between atoll council and local government authority.

The magistrate court of the island have been functioning since 1997. Being a peaceful community the most common types of cases taken care of by the court are only family cases.

F. WASTE DISPOSAL

The area dedicated to waste disposal has no proper waste disposal methods. The area stays unmonitored and unattended. Waste from this area gets swept away into the sea. The area being at one end of the island makes it a difficult task for residents of the far off area to go and dispose waste. Therefore some people prefer burning waste in their back yards.



- POLICE STATION
- PRE SCHOOL
- TELECOMMUNICATIONS
- WASTE MANAGEMENT POINTS
- HEALTH CENTER
- MNDF POST ISLAND OFFICE COURT
- M. ATOLL SCHOOL
- MOSQUES
- PLAYING GROUNDS

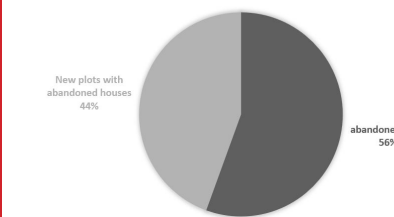
URBAN DESIGN AND HERITAGE

The urban fabric of the island demonstrated a wide gap in architectural styles of ancient Maldivian construction and modern construction. The streets of the island are in grid pattern and are unpaved as any Maldivian island. Two main types of housing were significantly noticed; prototypes of houses which was constructed by the government and traditional houses which were mostly abandoned. The houses were of single storey. One key factor to be noted is that amenities such as shops and cafe's are not within pedestrian reach surrounding residential areas creating the need for long routes.



A. ABANDONED PLOTS

It has been noted that many land plots which were once lived in has now been abandoned. In these plots sits houses that has been damaged during the tsunami. Some of these plots have turned out into agricultural fields as well.



B. MODERN HOUSES

Mainly the modern houses were the houses that has been built by the government in aid for the houses that were destroyed in 2004 tsunami. These houses do not show any translation of ancient building styles and no importance has been give to appreciate ancient vernacular architecture.

C. TRADITIONAL HOUSING STYLE

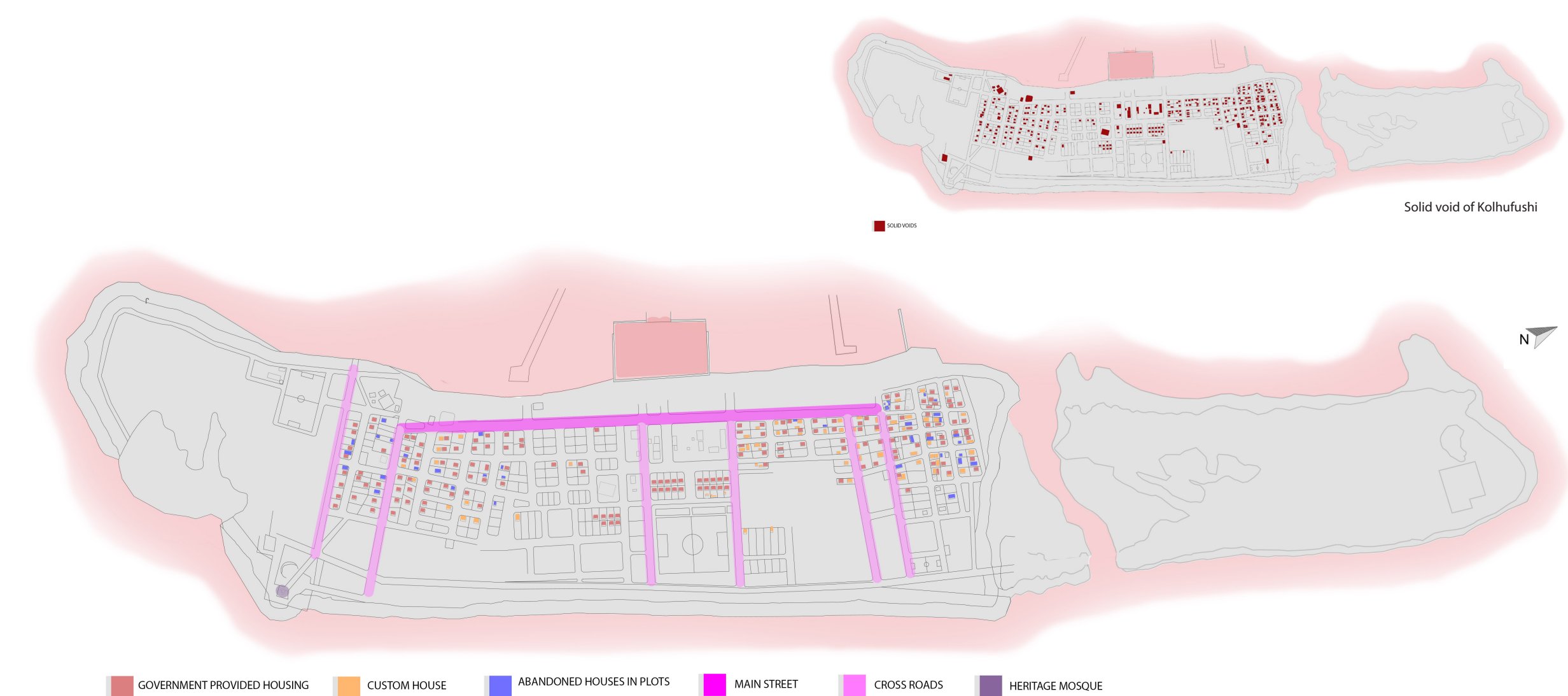
Houses which are built according to traditional architecture style are rarely lived in anymore. Let alone the fact that people have totally given up building to this style. This maybe due to the feeling of inferiority.



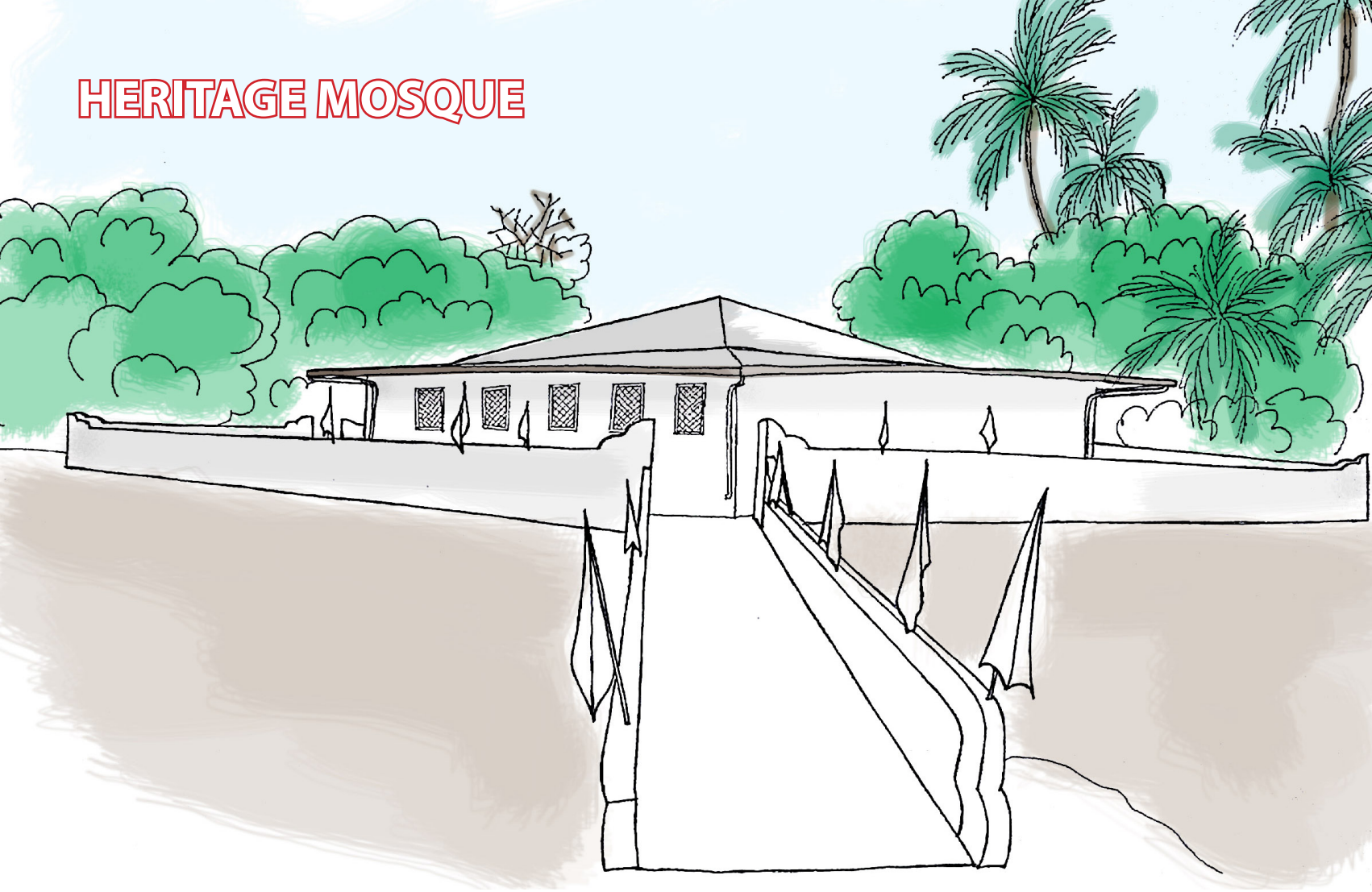
D. STREETS

The streets of the island are unpaved as any other island of the Maldives. We have noticed that the streets are generally clean, this is due to their culture in sweeping the streets clean early in the morning.

However some of the streets are quite uninviting and have an uncomfortable vibe to them due to overgrown vegetations in abandoned plots. Moreover during night time some streets are dark and difficult for mobility.



HERITAGE MOSQUE



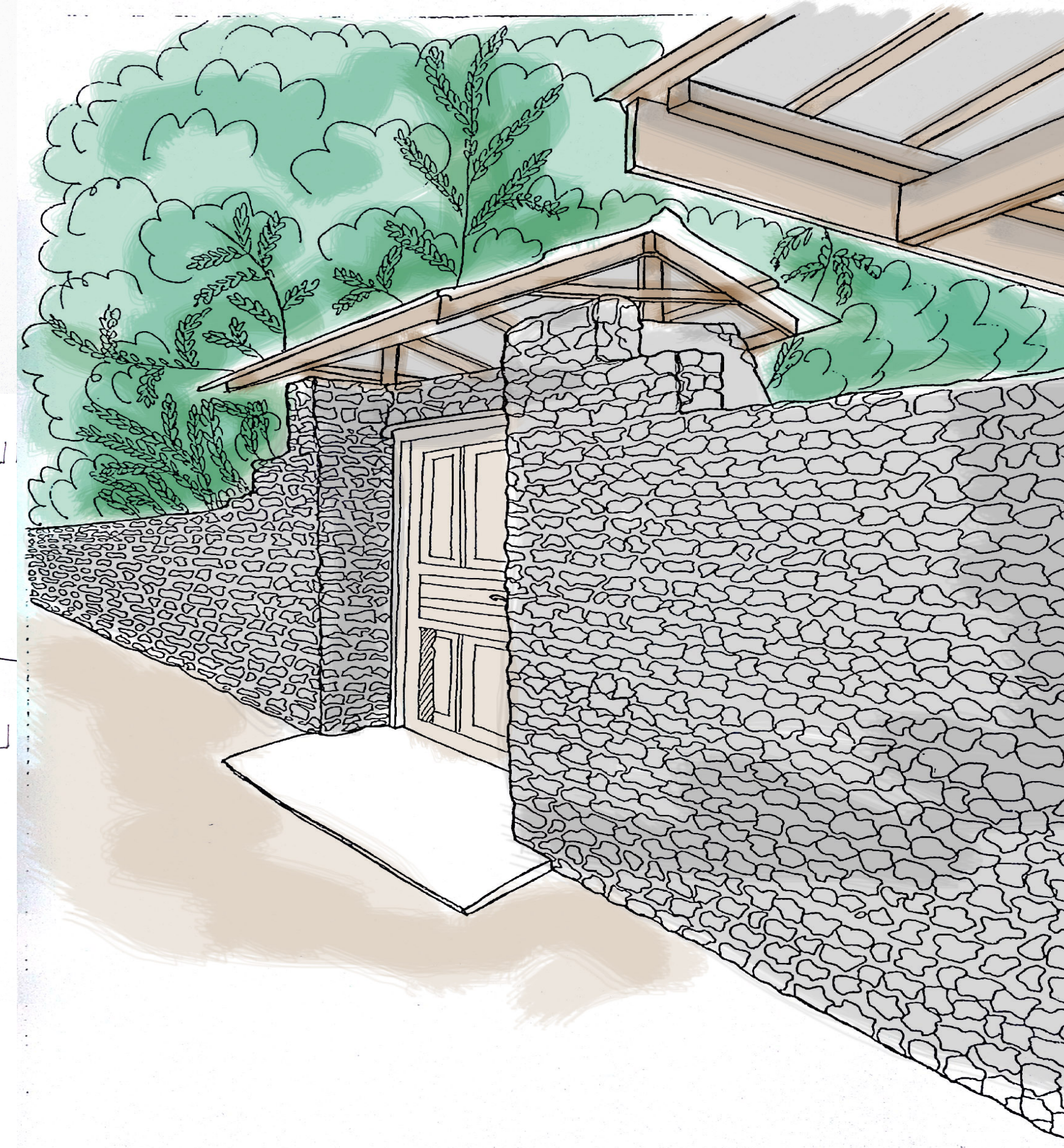
GHAAZEE MOSQUE

The island has a mosque which is important cultural significance in the Maldives. This mosque has been built by the Maldivian Hero Bodu Thakuru Faanu, who was travelling back to Male' from Huvadhu Atoll in his famous boat called "Kalhu Oh funmi". The complexity of the reef around Mulaku Atoll caused the boat to crash into Dhih' Thudee falhu of the atoll.

The national hero built the mosque with the wood of the this famous boat on the south eastern coast of the island. According to the people of the island the sword with which the Hero fought so bravely to defend the country has been in the mosque until the late 80's. Nevertheless due to its great value and importance the sword has been taken to the capital of the country, Male', to be kept safe in the national museum.

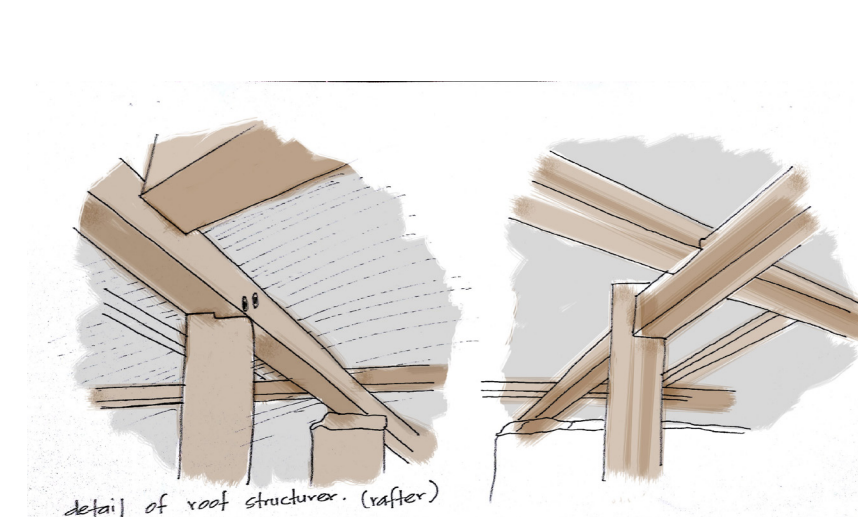
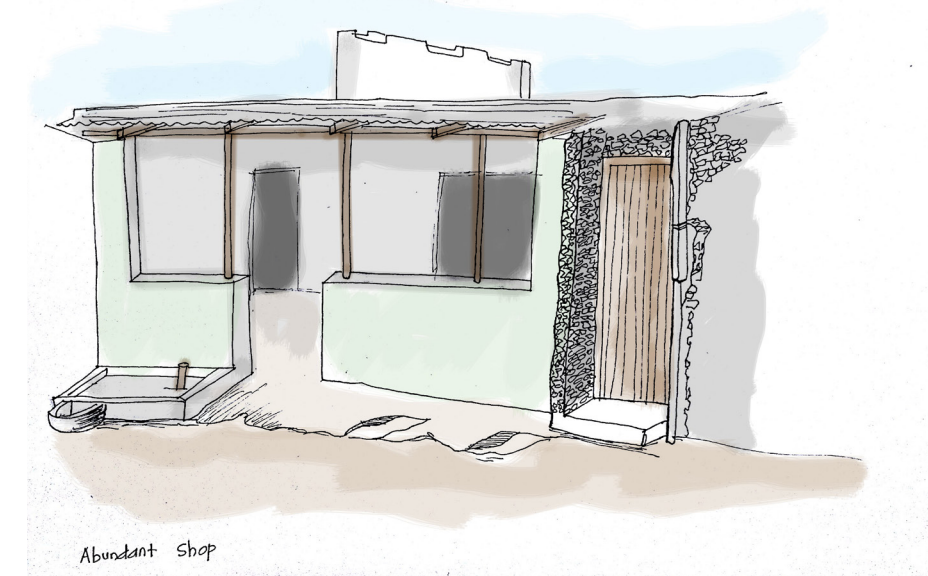
Half of this mosque was said to be destroyed in a fire. During reconstruction islanders found coral stones with a drawing of the boat, "Kalhu Oh Fummi" buried underneath.

During tsunami while a large tree near the mosque with a trunk diameter of 6 feet was uprooted and carried more than 100 feet in land the mosque stayed untouched.



TRADITIONAL BUILDING METHODS

Traditional building methods were seen from many abandoned houses. Yet people do not practice these methods any longer. People have moved on to conventional masonry block construction with less ventilation.



Remains of the uprooted Kinbi tree which was uprooted in tsunami

Location of mosque

BLOCK AND PLOT LAYOUT STUDY

This is a study carried out to understand the general block and plot layout of the island. Importance was given to select a block with plots with all the different housing types in it. The plot we chose to study is Athireege which is an old house selected from the area where people started settling first. The plots in the block were large in size compared to the plots now, and many varieties of fruit bearing trees were planted.



Location of the block with Athireege

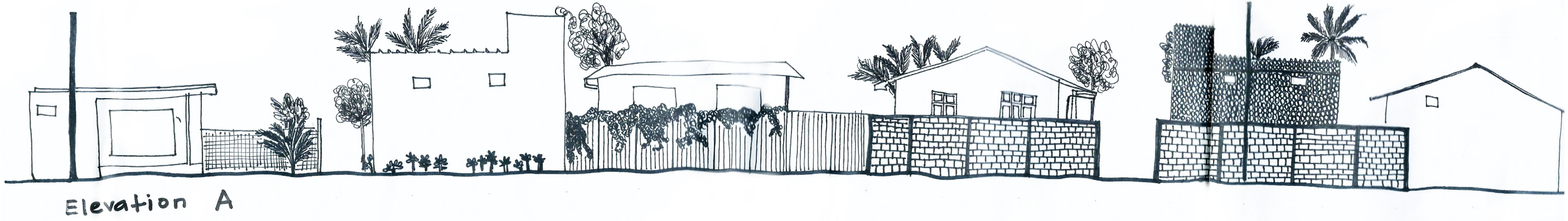


Plot layout



Block layout

- * SHOP (GENERAL GOODS)
- ENTIRE TSUNAMI HOUSE
- SQUARE HOUSES
- HOUSES BUILT BY PEOPLE
- HOUSES STILL USED AFTER TSUNAMI WITHOUT RENOVATION



Elevation A



Exterior view of Athireege



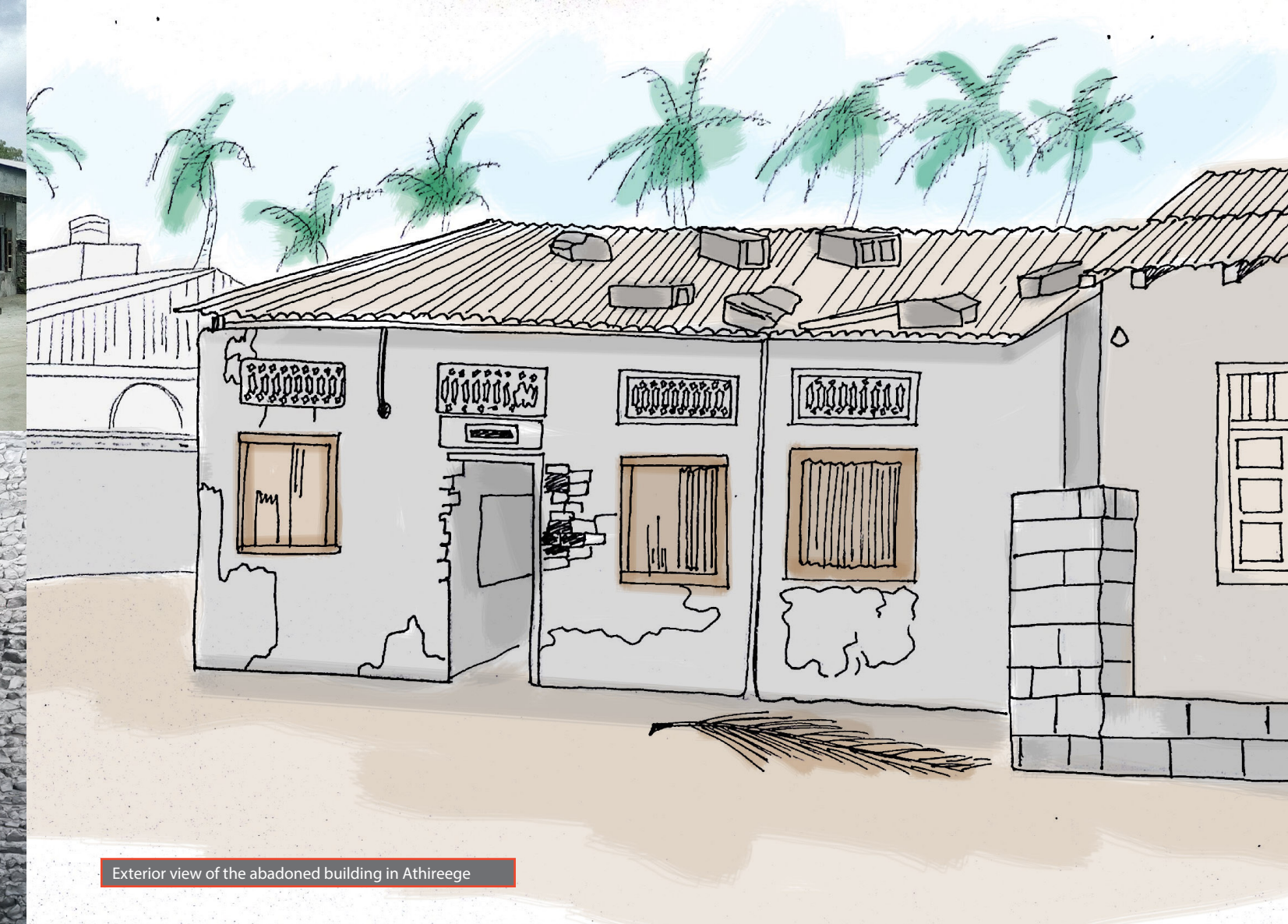
Interior view of Athireege



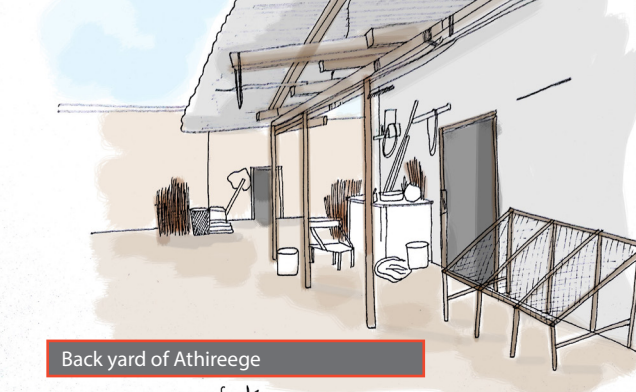
Within the boundaries of the plot



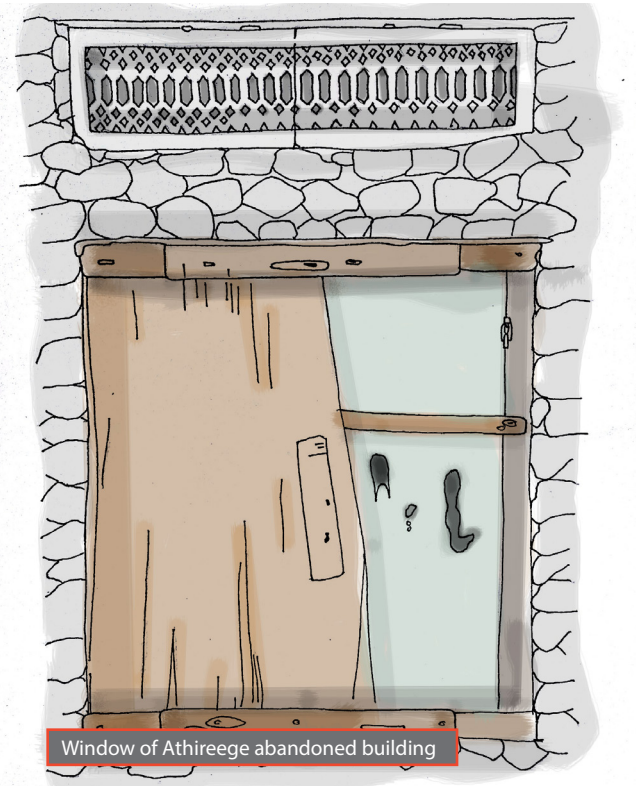
Level of tsunami flood



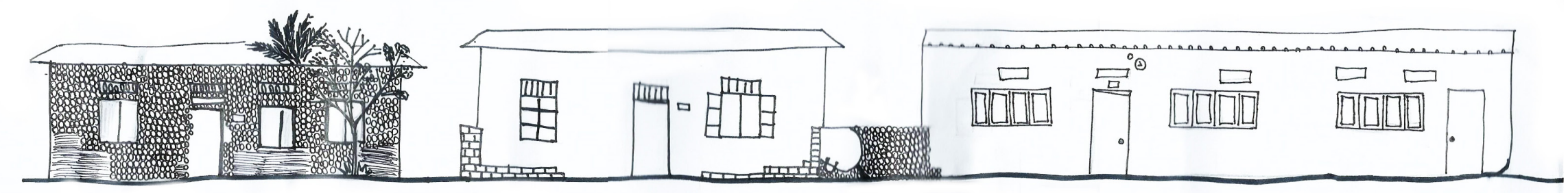
Exterior view of the abandoned building in Athireege



Back yard of Athireege



Window of Athireege abandoned building



Elevation B

PLOT LAYOUT

During this we have noticed that houses are not built to a certain plan or layout. Due to this fact the plot had no arrangements and therefore was uninviting.

In this particular plot that we studied there was an abandoned house, a renovated house a new house built by the government and a shop which is run by the residents of the house.

The abandoned house was aligned in particular direction. When inquired why this was done so the owner said that he had aligned it in the direction of "Kaaba", the Islamic Holy mosque in Mecca. In addition to this traditional style latices were fixed to the top of wall to let hot air out increasing the ventilation. This particular architectural factor is no longer used in conventional building in the island.

There was no attention given to set back between houses.

The facade of the houses on ameenee magu shows different types of construction methods and materials used in the island currently. This is illustrated on the elevation below.

TRAFFIC, TRANSPORT AND INFRASTRUCTURE

The island is accessible by sea transport through ferry, boats and launch services. There are not many automobiles in the island.

Telecommunication is provided within the island by Dhiraagu and Ooredhoo.

FENAKAA, a government company provides services for sewerage and electricity.

Waste management of the island is managed by the local council, and is seen as inefficient and threat to the environment.



A. MOTOR VEHICLES

The island does not have that many auto mobiles
Motorbikes: 45 - 50
1 Ambulance, 1 Van, 1 Pickup



B. HARBOUR

The island has a harbour area which enables easy access to the island via sea transport vessels.



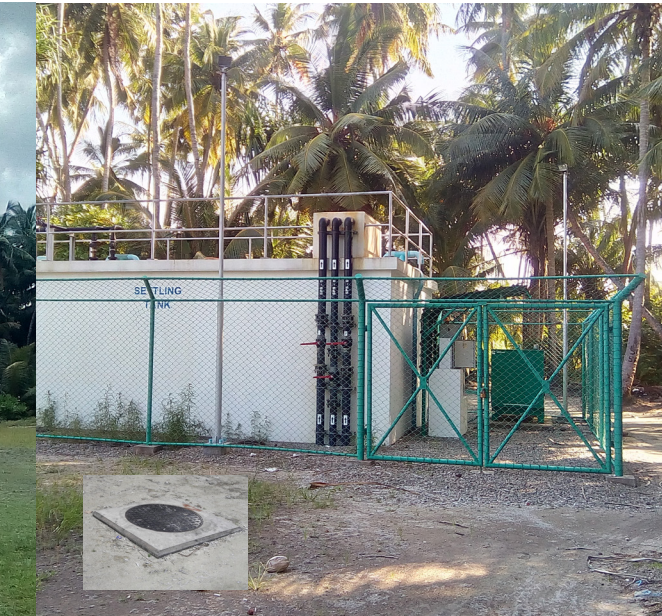
C. PUBLIC TRANSPORT

The only type of public transport system available in the island is the ferry system which is operated by MTCC. This ferry operates taking two turns within a week to travel between islands and the capital of the atoll.
2 Atoll ferries
2 Island boats (cargo)



D. TELECOMMUNICATION

Telecommunication is provided in the island by the two service providers of the country, Dhiraagu and Ooredoo.



D. ELECTRICITY

Electricity is provided by the government company FENAKA which provides the electricity to local islands of the Maldives.

During night time the many streets of the island are very dark making mobility on the streets difficult. The smaller map on the left shows the areas which are generally noted to be dark.

E. SEWERAGE

After tsunami, the sewerage lines were established by the government in this island.

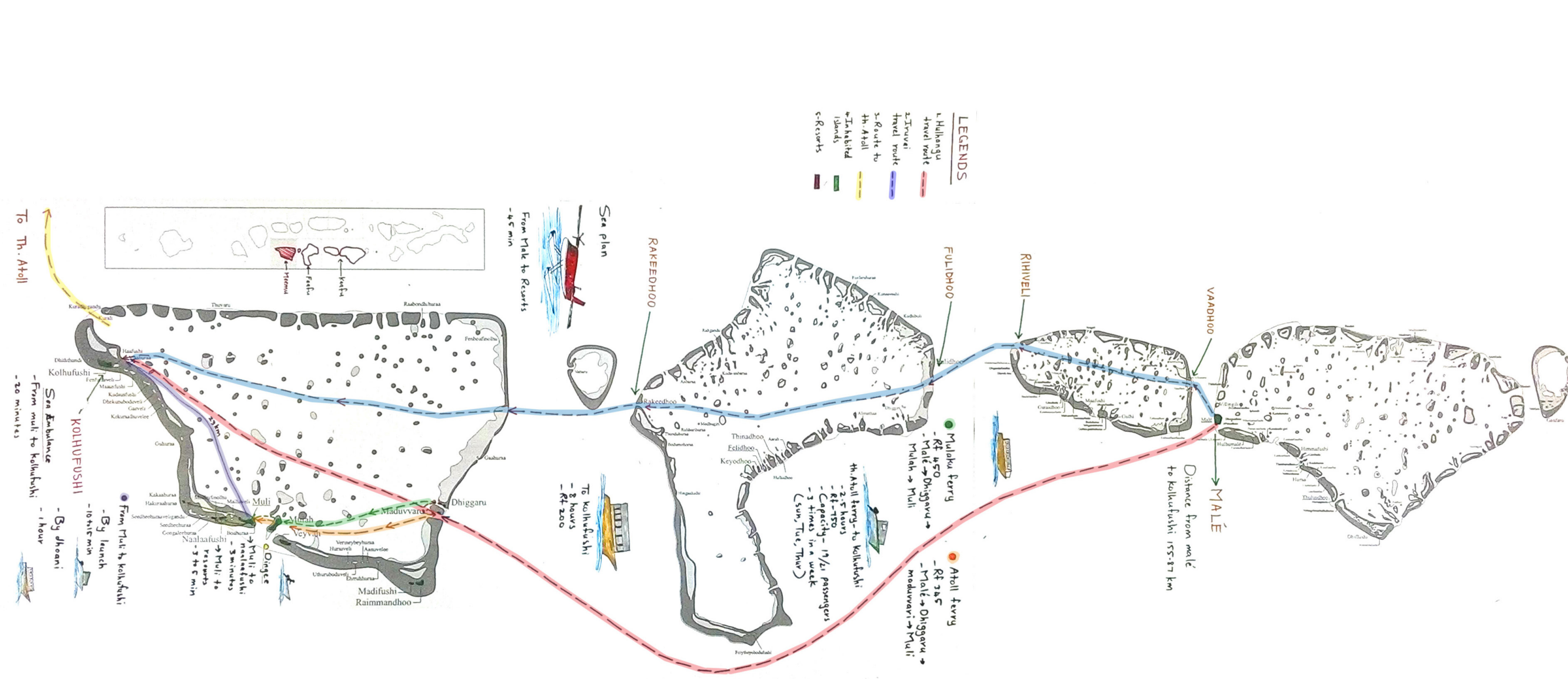
Pumping stations are established in various points within the island with efficient linking systems. There are a total of 4 pumping stations

F. WASTE MANAGEMENT

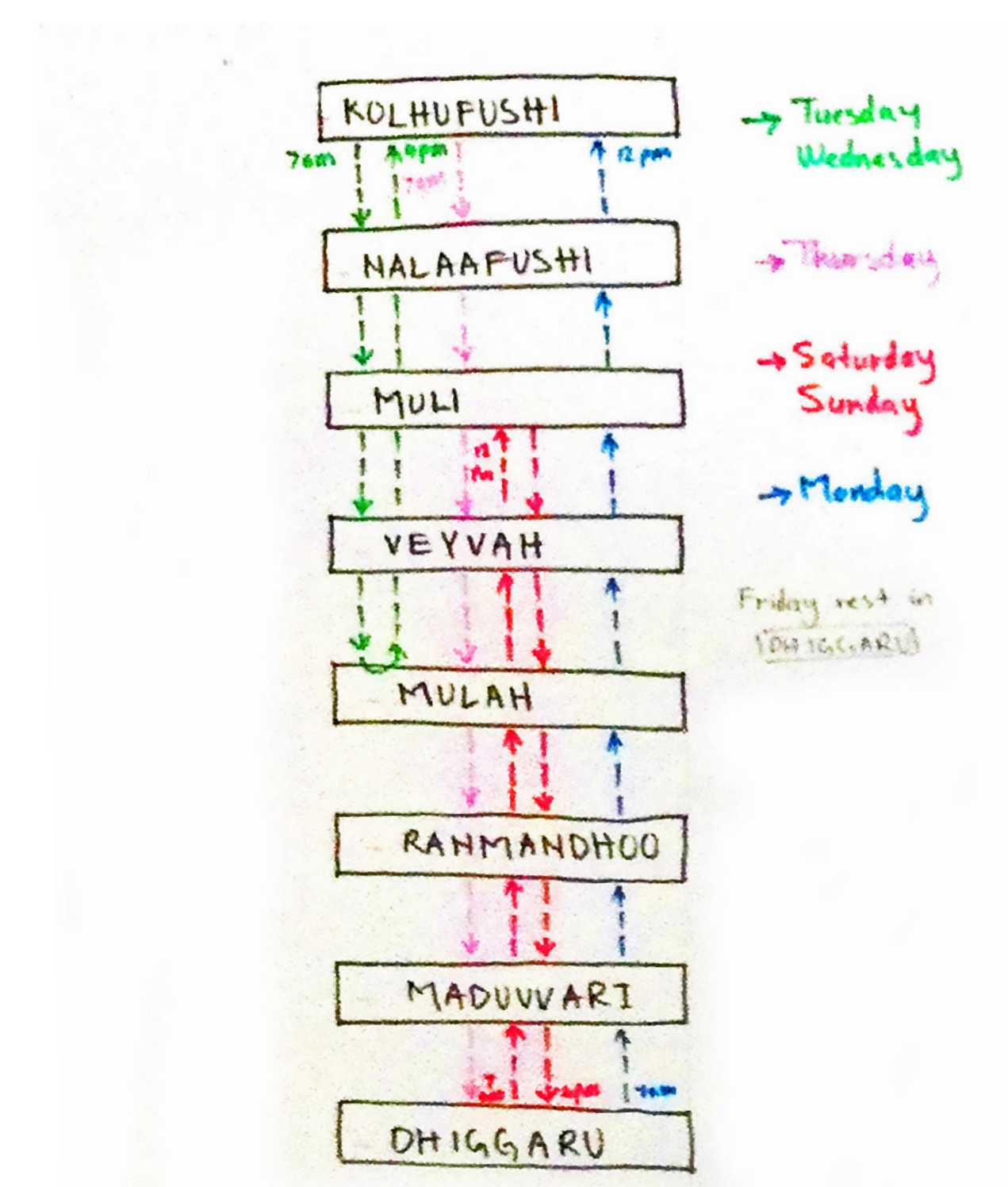
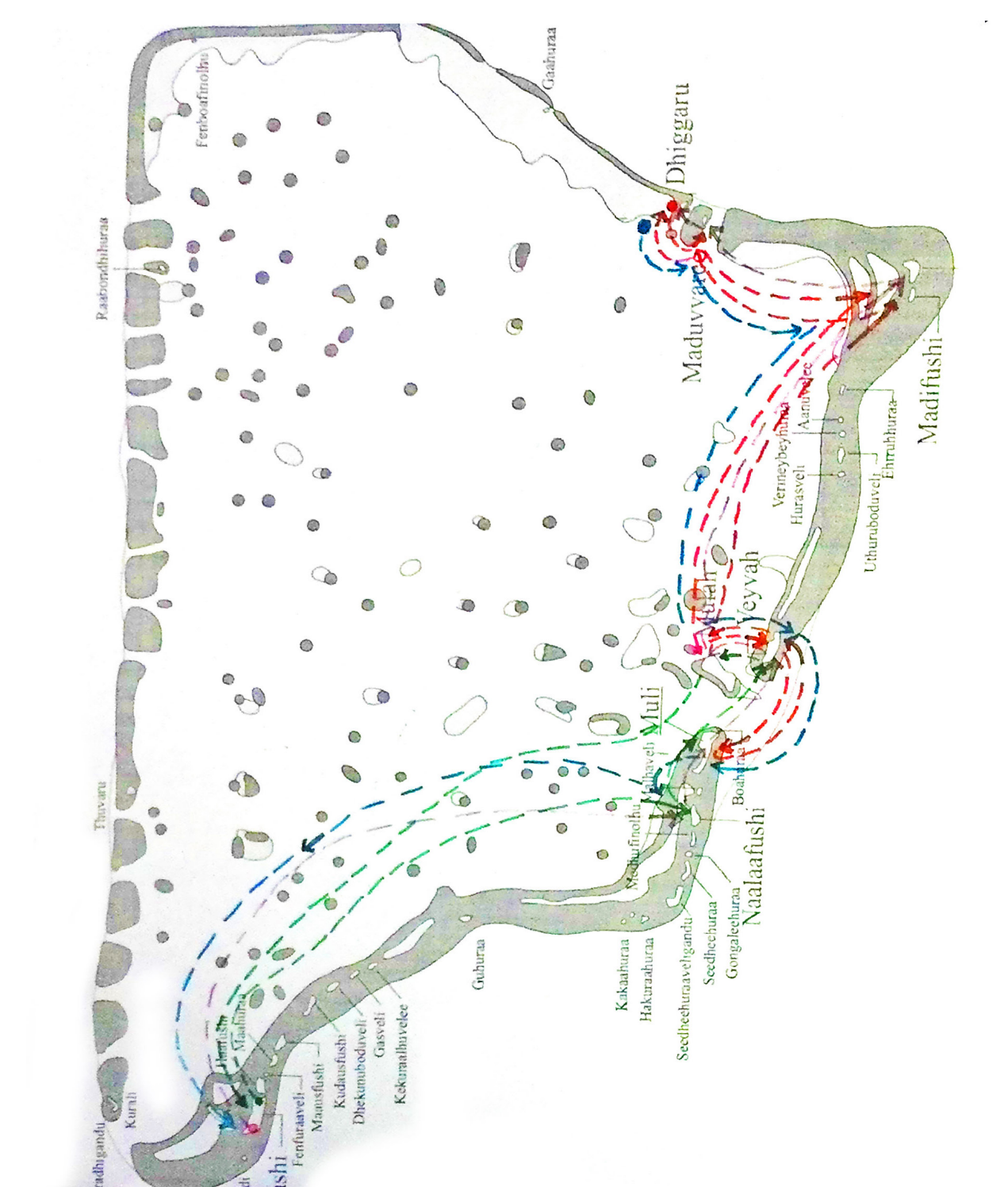
Waste collection points in two areas of the island, which are not properly managed. The location of waste collection points are not suitable for waste management, resulting in pollution of the environment and sceneries.



INTER-ATOLL TRANSPORT ROUTES TO KOLHUFUSHI



TRANSPORT ROUTES TO KOLHUFUSHI WITHIN MEEMU ATOLL



PROPOSED STRATEGIES & ACTIONS

LAND USE PLAN



1 PHYSICAL FEATURES, CLIMATE AND NATURAL RESOURCE MANAGEMENT

CHALLENGE 1.A

Lack of protection on the eastern side of the Island

STRATEGY

To protect the eastern side of the island from potential disasters

1 Introduce a green belt by planting native shrubs to eastern beach side area and maintain through join project with community



Priority | High Action Officer | Local Council

2 Introduce beach gabions to the eastern beach side to minimize soil erosion.



Priority | High Action Officer | Local Council

CHALLENGE 1.B

Poor drainage patterns, causing flooding and muddy roads

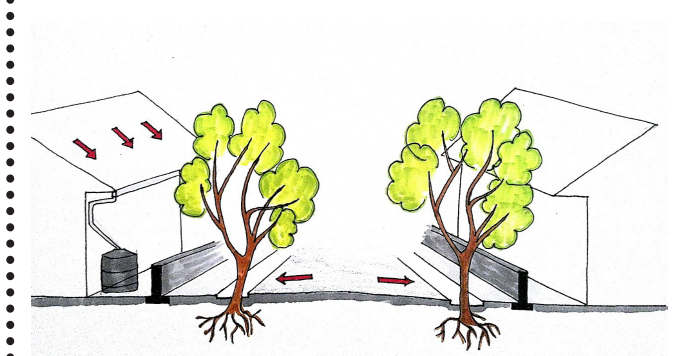
STRATEGY

Provide strategies for efficient and sustainable drainage systems

1 Introduce safer island drainage system to western side of Ameenee magu

Priority | High Action Officer | Ministry of Housing and Infrastructure

2 Introduce plants to road sides with slopes to main roads parallel to Ameenee Magu (kendi magu, mushtharee magu, nooraany magu, dhanburuh magu, rahdhebai magu, chanbeylee magu, feddhih magu, fareedhee magu)



Priority | Medium Action Officer | Local Council and Road orporation

CHALLENGE 1.C

Poor management of natural resources

STRATEGY

Promote sustainable water and natural resource management

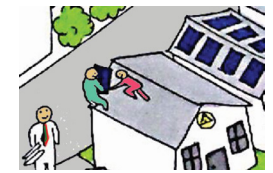
1 Introduce underground water reservoir tanks systems in each safe house available for public to use as potable water

Priority | Medium Action Officer | Relevant bodies, Atoll and Local Council

2 Impliment the use of under water reservoir tanks in future housing developments

Priority | High Action Officer | Relevant bodies, Atoll and Local Council

3 Impliment use of natural energy resources via solar panels in main institutions



Priority | Medium Action Officer | Relevant bodies, Atoll and Local Council

4 Impliment the use of aquaculture of coral to strengthen existing reef in eastern and western side



Priority | Medium Action Officer | Relevant bodies, Atoll and Local Council

CHALLENGE 1.D

Absence of protection and management of "Kulhi"

STRATEGY

Protect, conserve and make best use of "Kulhi"

1 Appoint 'kulhi' as conserved wetland and include community input in protecting via green buffer zones around Kulhi



Priority | medium Action Officer | Heritage Department of the Maldives

2 On-site water management strategies to collect fresh water from 'kulhi'

Priority | Low Action Officer | Relevant bodies, Atoll and Local Council

2 POPULATON AND HOUSING

CHALLENGE 2.A

Structurally insecure housing conditions

STRATEGY

Build secure housing conditions for residents



1 Enforce the use of boundry walls in every house with durable materials and a minimum height of 1.5- 1.8 m by law and monitring

Priority | High Action Officer | Housing Ministry and Local Council

2 Enforce the use of strong durable materials in houses and boundry walls by law and monitring

Priority | High Action Officer | Housing Ministry and Local Council

3 Provide guidelines on safe construction methods with giving importance to raised floor levels and strong construction joints

Priority | High Action Officer | Housing Ministry and Local Council

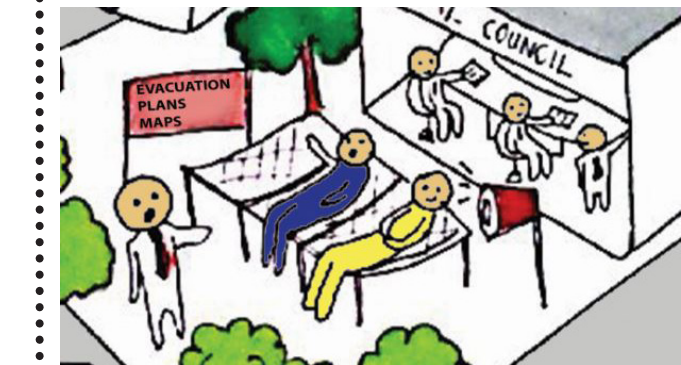
CHALLENGE 2.B

No proper evacuation plan and "Safer house" in case of disaster

STRATEGY

Provide evacuation plans strategies and "Safer houses" for an event of a disaster

1 Plan evacuation routes and impliment safety evacuation plans with the imput of community. Provide readily available information on evacuation procedure and routes through public display.



Priority | High Action Officer | Local Council

2 Construct safe houses within 500 meter radius with disaster resistant features i.e elevated floors with space underneath (stilt houses)

Priority | Medium Action Officer | Local Council

CHALLENGE 2.C

An alarming rate of decrease in residen- tial population of youth

STRATEGY

Increase the youth population within island

1 Introduce youth attracting trainee pro- grams targeting the young. Improve education facilities for youth development; update the existing.

Priority | High Action Officer | NGOs / Local Council

2 Provide job opportunities by introducing tourism through joint venture projects with the local governance of Kolhufushi and Investors



Priority | High Action Officer | Local Council

CHALLENGE 2.D

No sustainable plan for providing hous- ing for predicted population

STRATEGY

Provide different housing types af- fordable to all budgets

1 Introduce apartment flats.

Priority | High Action Officer | Housing Ministry and Local Council

2 Introduce row houses and land plots that can be bought and sold under contract.



Priority | Medium Action Officer | Housing Ministry and Local Council

3 ECONOMY AND EMPLOYMENT

CHALLENGE 3.A

Elimination of existing agricultural resources

STRATEGY

Protect existing agricultural resources

1 Identify existing agricultural fields and enhance their uses.



Priority | High Action Officer | Relevant bodies, Atoll and Local Council

2 Take preventional measures to not to contaminate Agricultural fields /rich soil areas

Priority | High Action Officer | Relevant bodies, Atoll and Local Council

CHALLENGE 3.B

Lack of efficient use of existing natural resources that can be used for economic activity

STRATEGY

Promote use of available resources

1 Lease "Fenfuraaveli" to an investor to be developed as a tourist resort under contract.



Priority | High Action Officer | Local Council

2 Give allowance for existing resources like reefs, heritage mosque, the mangrove "kulhi", local identity and nearby surfing point to manifest economy by introducing local rural tourism.

Priority | Medium Action Officer | Atoll and Local Council

CHALLENGE 3.C

Insecure vulnerable community

STRATEGY

Insure communities and provide knowledge to increase confidence

1 Conduct inter-atoll economic activity information sharing workshops on the diverse use of natural resources available locally to enhance inspiration and minimise the use of natural resources due to lack of knowledge.

Priority | High Action Officer | Atoll and Local Council

2 Provide information abouts benefits of insuring throught posters, leaflets and by conducting information community level forums with the aid of relevent bodies

Priority | High Action Officer | Local Council and Insurance partners

3 Appoint individual initiatives within community that can establish links between Insurance Companies and locals

Priority | High Action Officer | Insurance partners and Community

CHALLENGE 3.D

Underutilised economic opportunities with potential to provide jobs

STRATEGY

To encourage and facilitate economic development

1 Conduct training programs within the island to familiarize the public of hydroponic system and provide equipments from island budget to willing locals.

Priority | High Action Officer | Local Council and NGOs

2 Allocate abandoned plots that can be invested by small local business. Eg: small scale agriculture / tailors shop / Tution classes / Café



Priority | low Action Officer | Local Council

4 RETAIL AND COMMERCIAL

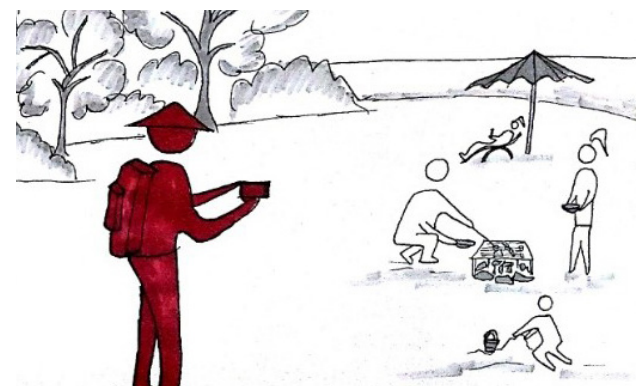
CHALLENGE 4.A

Limited opportunities for increase in retail businesses

STRATEGY

Manufacture demand for retail business

1 Create an attraction to the island that will bring in more visitors and thereby creating a need for retail business



Priority | Medium Action Officer | Relevant bodies, Atoll and Local Council

2 Provide opportunities for a growth in population with wealth, by creating job opportunities.

Priority | High Action Officer | Relevant bodies, Atoll and Local Council

CHALLENGE 4.B

No wholesale distribution within island

STRATEGY

Establish a wholesale distribution

1 Provide a local distribution centre that shall provide opportunities for local buinessmen to invest in local distribution at low initial investments



Priority | Medium Action Officer | Relevant bodies, Atoll and Local Council

2 Provide a local distribution centre in the atoll that gives the service to the island

Priority | Medium Action Officer | Relevant bodies, Atoll and Local Council

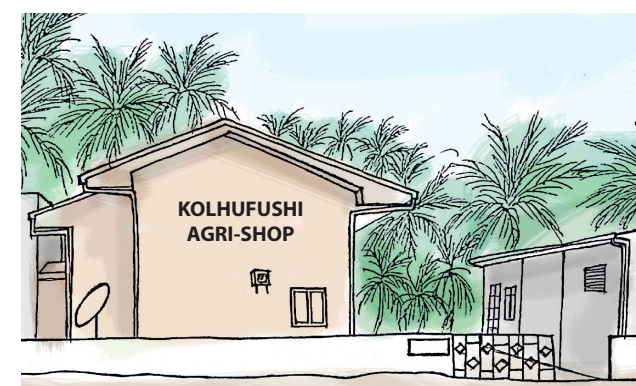
CHALLENGE 4.C

Lack of shops for specific goods

STRATEGY

Specialised shops for specific type of goods

1 Introduce an agriculture markets to trade locally produced vegetable and fruits



Priority | High Action Officer | Relevant bodies

2 Introduce shops which specifically sells a certain type product; products which are locally manufactured, eg: crafts.

Priority | High Action Officer | Relevant bodies, Atoll and Local Council

CHALLENGE 4.D

Difficulty in cargo transport

STRATEGY

Provide means of cargo transport

1 Manufacture demand for cargo importing through population increasing strategies



Priority | High Action Officer | Local Council

2 Introduce a local shipping liner that operates within country

Priority | Medium Action Officer | Local Council

5 RECREATION AND OPEN SPACE

CHALLENGE 5.A

Absence of public parks and inadequate recreational facilities for alternative groups

STRATEGY

To allocate public parks for diverse age groups with appropriate facilities

1 Allocate children park near the school, that provide a wide range of activities for children including outdoor sports, playing fields, toddlers playing areas with swings, slides that encourage their mental and physical development and social interaction.

Priority | Medium **Action Officer** | Local Council

2 Allocate public parks by making use of in the central zone that offers a combination of recreation facilities and seating arrangements with diverse settings for different age groups including jogging tracks, outdoor gym equipment and exercise equipment for diverse ages.

Priority | High **Action Officer** | Local Council

3 Allocate Youth Centres with latest and wide range of recreational activities

Priority | Medium **Action Officer** | Relevant bodies, Atoll and Local Council

CHALLENGE 5.B

Lack of appropriate amenities in existing open spaces

STRATEGY

To enhance the existing open spaces



1 Enhance existing open space by providing comfortable seating arrangements with better shading and offering variety of local games

Priority | High **Action Officer** | Local Council

2 Specialise some existing open spaces for groups of a particular economic activity, eg, space for thatch weavers to conduct related activities and provide the space with related facilities.

Priority | High **Action Officer** | Local Council

CHALLENGE 5.C

No appropriate open spaces/ green spaces provided in neighbourhoods specially in planned zone

STRATEGY

To allocate green spaces/ open spaces in neighborhood zones to encourage social interaction

1 Convert some of the abandoned plots in neighborhoods to public parks with children's play spaces (swings, slides) and seating arrangements. Create walking pathways within the plots to the road(s) to be used as shortcuts

Priority | Medium **Action Officer** | Housing ministry & local council

2 Convert "Rani goalhi" in planned zone to a green space /open space with seating arrangements and a narrow walking path

Priority | Medium **Action Officer** | Local Council

3 Provide frequent seating arrangements with natural shading in Ameenee Magu for children and parents to rest while going to and coming back from school

Priority | Medium **Action Officer** | Local Council and School

CHALLENGE 5.D

No facilities provided for Beachside activities and no specialised area marked for those activities

STRATEGY

Allocate a specific beach area for recreational activities / picnic

1 Allocate a specific zone/ area for beach activities and provide shelter points, BBQ facilities, water services, beach volleyball courts



Priority | High **Action Officer** | Local Council, NGOs

2 Create and maintain a safe pathway to reach the beach area with proper lighting and means for easy luggage carry

Priority | Medium **Action Officer** | Local Council

6 COMMUNITY FACILITIES

CHALLENGE 6.A

Insufficiency in existing community facilities

STRATEGY

Upgrade and provide services and facilities for community

1 Create outdoor learning spaces near agricultural fields for on-site learning experiences



Priority | High **Action Officer** | Educational institute

2 Schedule frequent visiting doctors to kolhufushi health center from regional hospitals, with special importance given to gynecologists

Priority | Medium **Action Officer** | Health Institute

3 Appoint more local representatives with links to main banks to establish easy banking services

Priority | Medium **Action Officer** | Relevant bodies, Atoll and Local Council

CHALLENGE 6.B

No opportunity for higher education

STRATEGY

Create opportunities for education within the island



1 Introduce an agriculture research center through joint projects with local individual initiatives and relevant bodies

Priority | High **Action Officer** | Local Council & Educational Institutes

2 Conduct short term training programs (certificate level courses) suitable for different age groups

Priority | Medium **Action Officer** | Local Council & Educational Institutes

CHALLENGE 6.C

Slow progress in recovery of 2004 tsunami

STRATEGY

To aim for a aware and prepared community

1 Conduct tsunami awareness workshops/ drill in every 2 years through joint projects with NDMC and local council

Priority | High **Action Officer** | Local Council

2 Form a community support service group within community to tackle with the trauma caused by Tsunami, with joint projects with care society and local council

Priority | High **Action Officer** | Local Council & Counselling Bodies

3 Conduct disaster / emergency awareness programs in school levels with the help of NDMC and Education Ministry every year

Priority | Medium **Action Officer** | Local Council & School

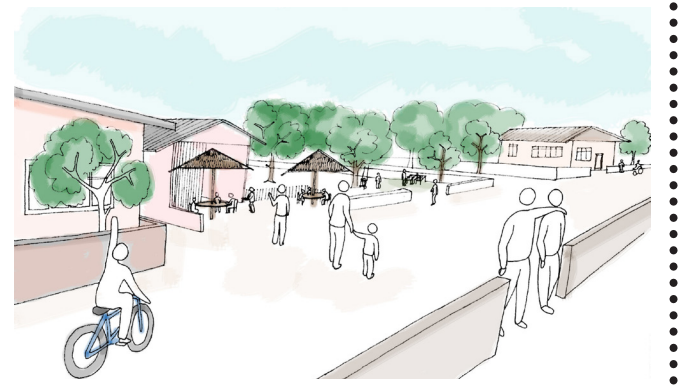
CHALLENGE 6.D

Lack of appropriate community socialising centres and spaces for residents

STRATEGY

Promote and provide a range of easy accessible community facilities for social interaction

1 Additional family friendly cafés to be introduced within neighborhoods (abandoned plots to be invested to provide this facility)



Priority | Medium **Action Officer** | Local Council Planning Body

2 Provide community seatings (joli and ashi) in green spaces to promote public interaction

Priority | Medium **Action Officer** | Local Council & NGOs

7 URBAN DESIGN AND HERITAGE

CHALLENGE 7.A

Abandoned houses and plots left vacant

STRATEGY

Use abandoned plots for island development

1 Convert abandoned spaces in between houses to green spaces to promote social interaction



Priority | High Action Officer | Relevant bodies, Atoll and Local Council

2 Abandoned plots to be made public to use for mixed use development; for economical activities and agricultural development

Priority | High Action Officer | Ministry of Housing and Local Council

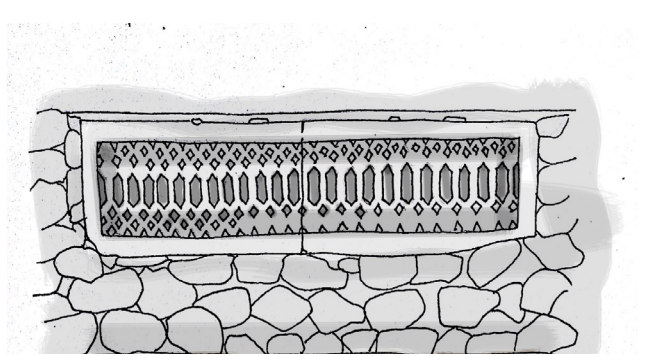
CHALLENGE 7.B

Post tsunami housing units with no appreciation of traditional architectural styles

STRATEGY

To maintain and preserve local traditional building methods

1 Use traditional building styles in key institutions



Priority | High Action Officer | Local Council

2 Develop the local building code with guidelines that preserve valuable traditional values and protect old mosque legally.

Priority | High Action Officer | Housing Ministry

CHALLENGE 7.C

Aesthetically uninviting streets within the urban fabric

STRATEGY

To improve aesthetics of street scapes and public open spaces to achieve a more inviting sight.

1 Identify the need for street furniture like joali and provide materials like street-lights and an aesthetically pleasing plan for placing them.



Priority | Medium Action Officer | Local Council

2 Establish a reward for best kept streets, with contribution to flora and fauna, an award that shall be displayed as street signage.

Priority | Medium Action Officer | Local Council

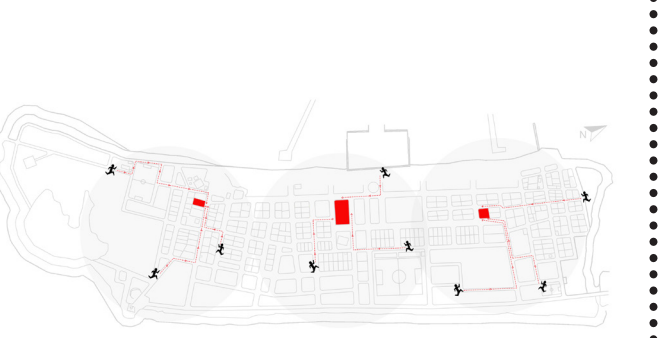
CHALLENGE 7.D

Basic amenities such as shops and cafes out of reach of residential areas

STRATEGY

To provide community services within pedestrian circles

1 Incorporate guidelines into local urban designing code that requires community facilities within walking distance radius



Priority | High Action Officer | Housing Ministry and Local Council

2 Enforce the implementation of the Land Use Plan by monitoring and control

Priority | High Action Officer | Local Council

8 TRAFFIC, TRANSPORT AND INFRASTRUCTURE

CHALLENGE 8.A

Lack of protection on the eastern side of the Island

STRATEGY

To enhance the Road condition and introduce Drainage system

1 Level the ground and out slope the road

Priority | Medium Action Officer | Road corporation

2 Introduce drainage points by planting trees at the sides of the roads (more drainage points to frequently flooded areas) and maintain on a regular basis



Priority | High Action Officer | Local Council & Road corporation

CHALLENGE 8.B

Lack of protection on the eastern side of the Island

STRATEGY

Enhance the inter atoll transport system and reduce the no. of automobiles used in future

1 Make use of economical activity lines of inter-atoll transportation

Priority | Medium Action Officer | Local Council

2 Control the no. of vehicles in to the island by introducing a limited no. of parking zones for each district and impose fine for parking outside the marked zones

Priority | Medium Action Officer | Local Council

3 Introduce public bicycle system at two different areas in each neighborhood to encourage community to switch to eco-friendly inland transportation. NGOs can provide funds for investment through sponsor.

Priority | Medium Action Officer | Local Council

4 Allow only bicycles and restrict other vehicles to the roads which the width is narrower than 2 meters.

Priority | Low Action Officer | Local Council

CHALLENGE 8.C

No appropriate street lighting at night

STRATEGY

To provide appropriate lighting to promote security and safety of pedestrians and drivers

1 Provide more street lights (via solar panels) to frequently used areas including main routes to the shops, schools, health centres



Priority | High Action Officer | Local Council

2 Make a regulation (set a standard) to have an exterior light in main gate in each and every household and monitor & maintain.

Priority | High Action Officer | Local Council

CHALLENGE 8.D

No proper waste management system

STRATEGY

Introduce a efficient and sustainable waste management system

1 Reuse rubble as gabions to prevent soil erosion which results in beach growth

Priority | Medium Action Officer | Community

2 Recycle natural waste from plants such as coconut husk chips and dry leaves to be used as fertilizers, by allocating the agricultural areas to collect them

Priority | High Action Officer | Council & Waste Management Body

3 Place separate garbage bins for different types of waste in specific points and make a routine collection.



Priority | Medium Action Officer | Council & Waste Management Body

4 Transport the recyclable waste like plastic bottles/tins to parties in need.

Priority | Low Action Officer | Waste Management Body

LEGAL FRAMEWORK

Strategic Action: 2.B, 6.C,7.B

- National Disaster Management Centre (NDMC): objective is to build resilience of the nation and the island communities to disasters.
- National Disaster Management Act 28/2015 (6th Sep 2015, Sunday), Will come into force in 6th April 2016.

The new act will give the power to the National Disaster Management Authority to act as a regulating body.

National Disaster Management Act 28/2015, Section 2:

- Responsibilities of the regulation Body (Disaster Management Authority) under the Law:

Response to disasters, Mitigate disaster risks, Make Disaster Evacuation plans, Building resilient communities, Make use of all types of institutions and community NGOs while making plans and while in action

- Responsibility of the Community under the Law:

Be a Disaster prepared community, Corporate the regulation bodies and deployment as per the plans, Be prepared for Pre and Post disaster mitigation, Help others and contribute to the coordination bodies

Strategic Action: 1.A, 1.B, 1.C,1.D,2.A,2.D,3(A,B,C,D), 4(A,B,C), 5(A,B,C,D), 6(A,B,C,D),7(A,B,C,D),8(A,B,C,D)

- Decentralization Act (7/2010) provides for three types of local authorities in the Maldives namely; (a) Atoll's Councils (section 6), (b) Island's Council (section 21) and (c) City's Council (section 39).

Under the section 151 of the desentralisation Act, the island Councils have the right to make rules and regulations for the island in corporation with Local government Authority (LGA).

Strategic Action: 8.D

- Waste Management Regulation, M.kolhufushi: R-18/2016 (20th March 2016)
Under this regulation, the waste management areas should be located far from residential zones and impact on the environment should be taken in account. (Fine is imposed for those who violate this regulation under section:11)
- Waste management Regulation: R-58/2013 (05th August 2013)Ministry of environment and energy

This regulation provides the power to the Ministry to make and implement rules for waste management in corporation with other bodies such as atoll/island councils. Under this Regulation, there must be a specific zone to dispose the waste in every island and it is prohibited to dispose garbage to anywhere else. Under Section 2.15 and section3 of this regulation allow private parties (to gain their own benefit) by managing waste(re-use/re-cycle).

As per this regulation, if a private party is managing the waste in Kolhufushi island, that party shall pay the island council a fee of RF.30 per month (as the regulation states fee for the islands with population between 1000 and 1500 as RF.30)

Strategic Action: 1.D,2.D,3.A,5(A,C,D),7.D,8.B,8.D

- Maldivian Land Act :1/2002 (right to develop proper land use plan)
- The regulations for planning and implementing of a Land use plan (islands of Maldives): Ministry of Housing and Infrastructure

Under this regulation:

The plan should allocate separate zones for commercial activities, industrial activities, agricultural lands, residential activities, recreational spaces, environmental protected areas and reserve lands for the future. Mixed zones are also allowed with special rules such as:

- The distance between the residential area and commercial area should be 150m to 350m.
- There must be a minimum of 100ft between boatyards and the residential areas.
Open space/ Parks must be available within 200m radius of every residential zone.
There shall be a vegetation line (a green belt) of 20m width around the island. Any residential unit shall be built inwards from this vegetation line. And this green belt is served as an environmental protected zone.

In this regulation, the island Kolhufushi is under the category C. The islands which are in this category shall be planned by the atoll and island council.

Evacuation centres and routes



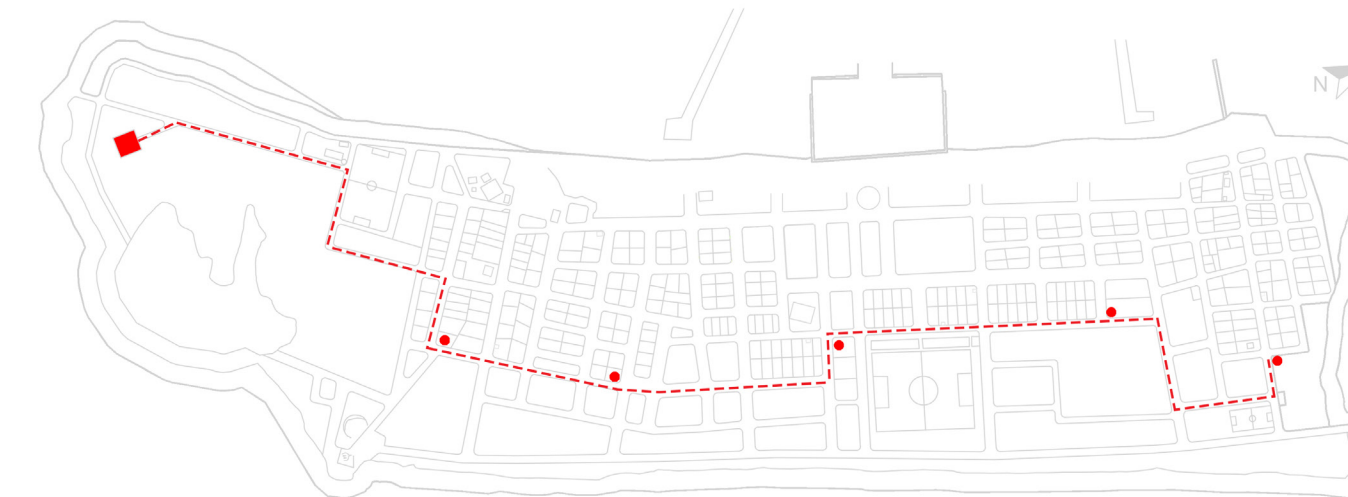
Evacuation centres have been proposed in three areas of the island. The centres has been zoned in a radius with great consideration given to allow people to reach the centres within shortest period of time on foot. The evacuation centre located in the middle is a youth centre and that on either sides are community centres.

Green corridors



Green corridors have been incorporated to allow a good natural drainage system within the island.

Waste collecting points and route



The above map show the route for collecting waste from certain points in the island. The waste collection points have been located in points where it can be easily reached by the people of that area. The garbage disposal centre have been located in an area further away from residential areas.

Gathering spaces



● Gathering spaces in the island currently
● Gathering spaces proposed by our strategy

LOCAL TOURISM PROPOSAL

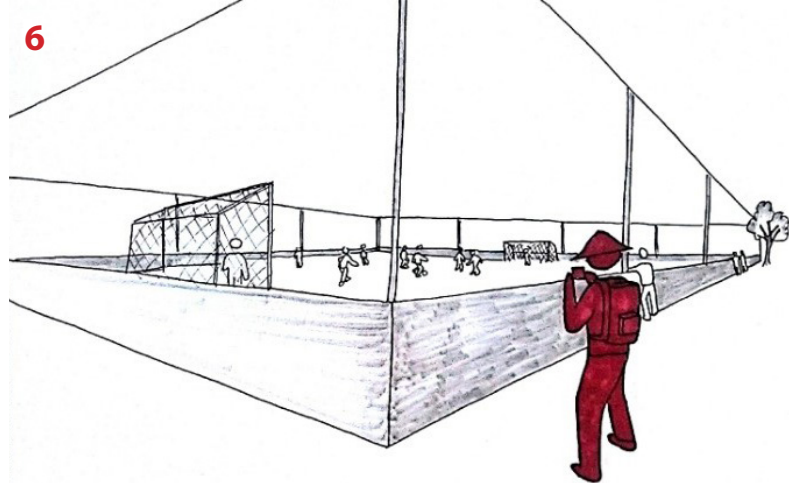
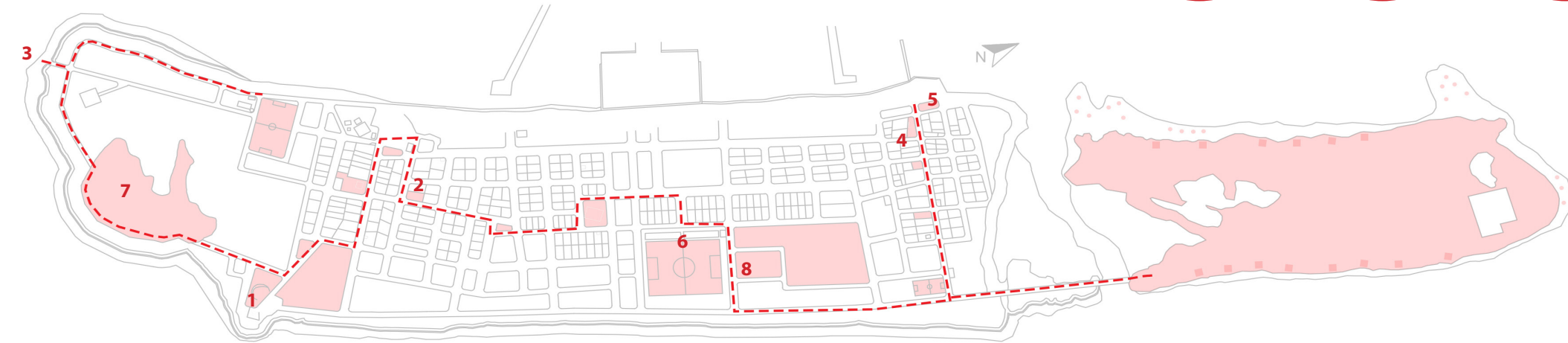
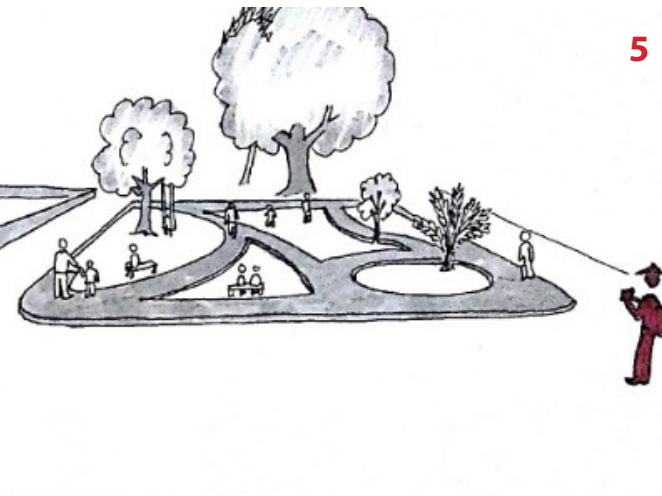
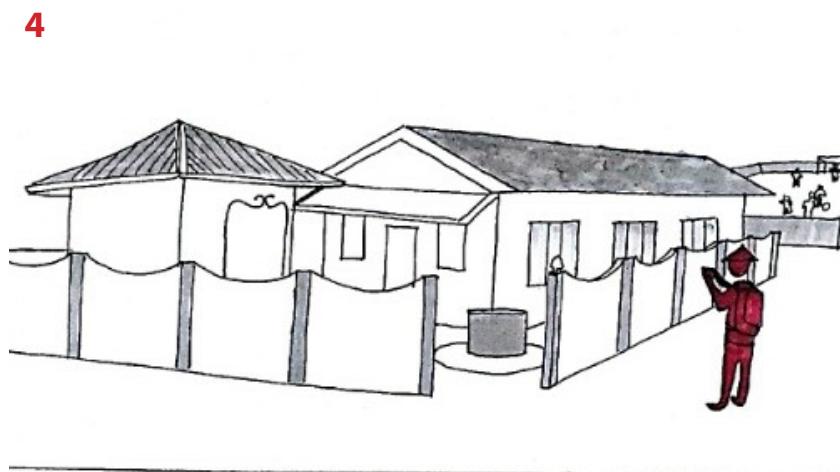
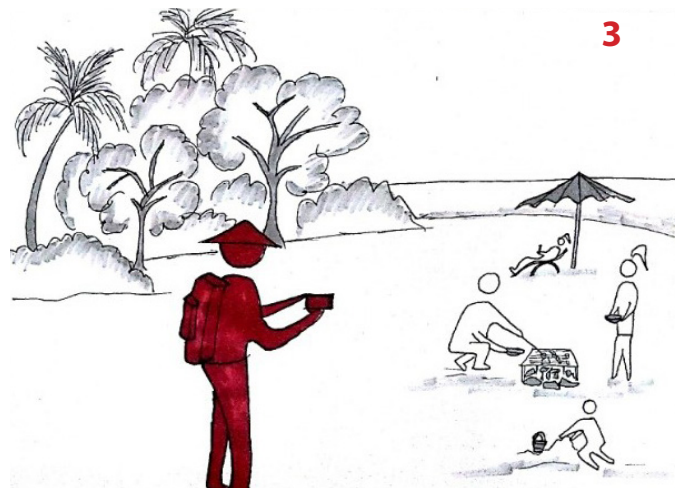
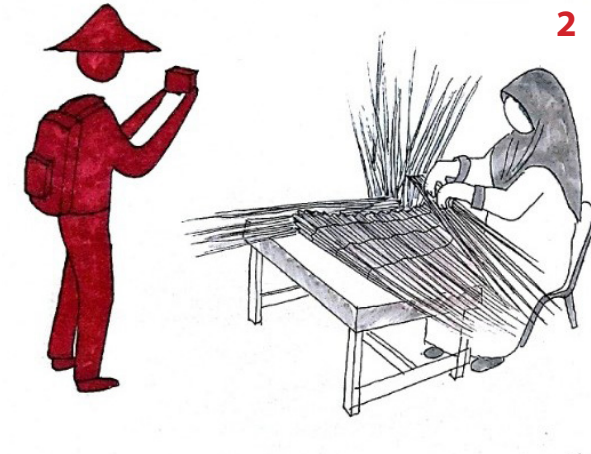
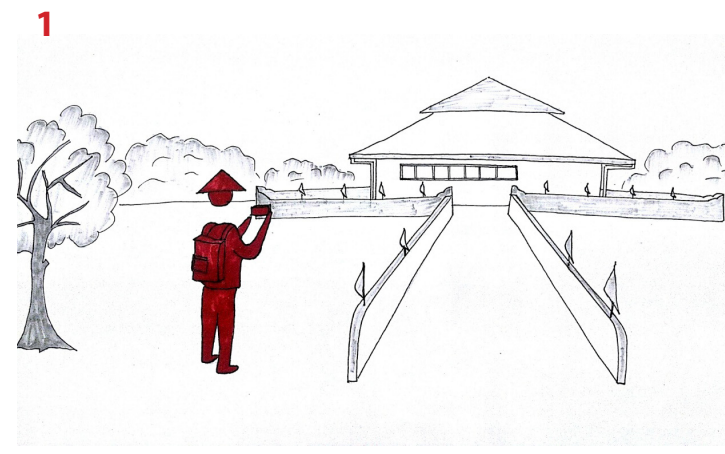
CONCEPT



RURAL TOURISM PROPOSAL FOR KOLHUFUFUSHI

Introducing tourism to the island will benefit the island by generating money for the local council itself, as this proposal suggests to lease "Fenfuraaveli" under decentralized local governance, to invest on other projects that will be beneficial to the people. Further more it will generate money for individuals as well.

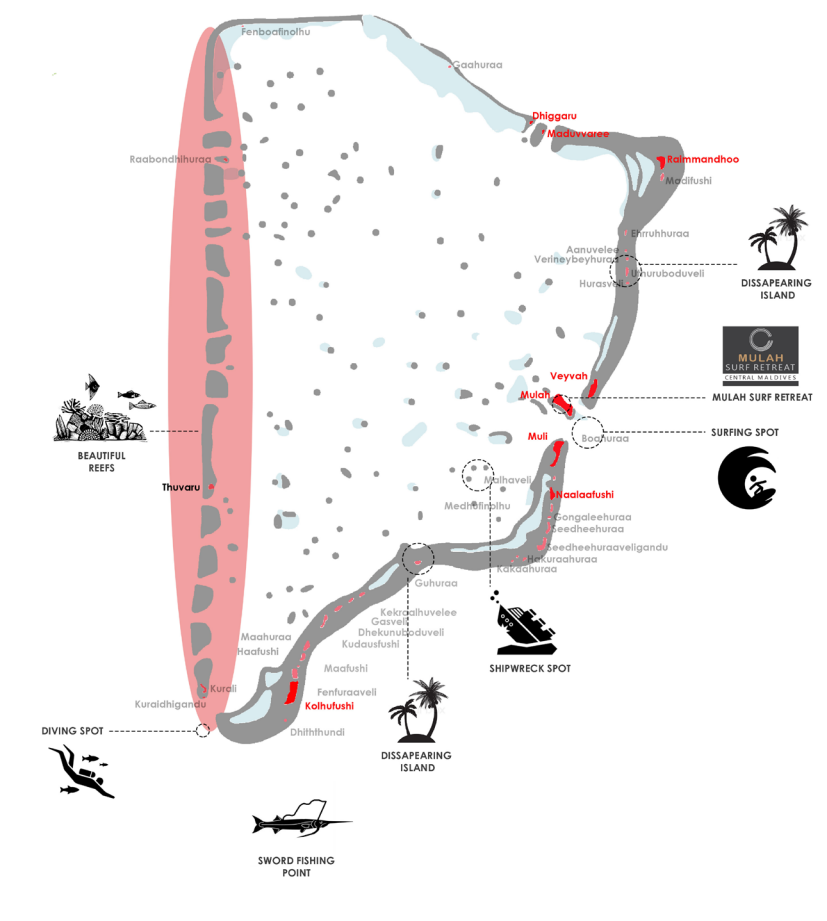
The proposal has green route (marked on the map with red dotted line) through the kolhufushi island that shows off local identity and experience of the island.



FENFURAVELI PROPOSAL



TOURISM ATTRACTIVE FEATURES IN ATOLL



D. ELECTRICITY

One of the most the most evident things about this atoll are its enormous reefs. There are blessed diving points.

Reef fisheries is rich in the area due to the good fishing points

This atoll is blessed with one of the best surf points in the country; the Mulah surf Retreat. There is a special villa dedicated to surfing a few minutes away from the surf break by the an australian surf association called Line Up.

In addition to this a feature that should not go without experiencing is the walking on the reef to go to all the other islands of the when the tide goes out.



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Mulaku Atoll Office
M.Kolhufushi Institutions
Island Council
Health Centre
Magistrate Court
Police station
MNDF post
Atoll Education Centre
Kolhushi Community
Naalaafsuhi Island Council
Ministry of Housing and Infrastructure

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PRODUCTION TEAM

This is one of the two booklets produced for the design project by students of 5th semester, carried out under the Bachelor of Architectural Design Course conducted under the Maldivian National University in term one of 2016.

The project was assigned to two different groups. The team on the right are the production team members of this booklet.



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