

Jamhuuriyadda Somaliland
Hay'adda U Diyaargarowga Aafodiyinka

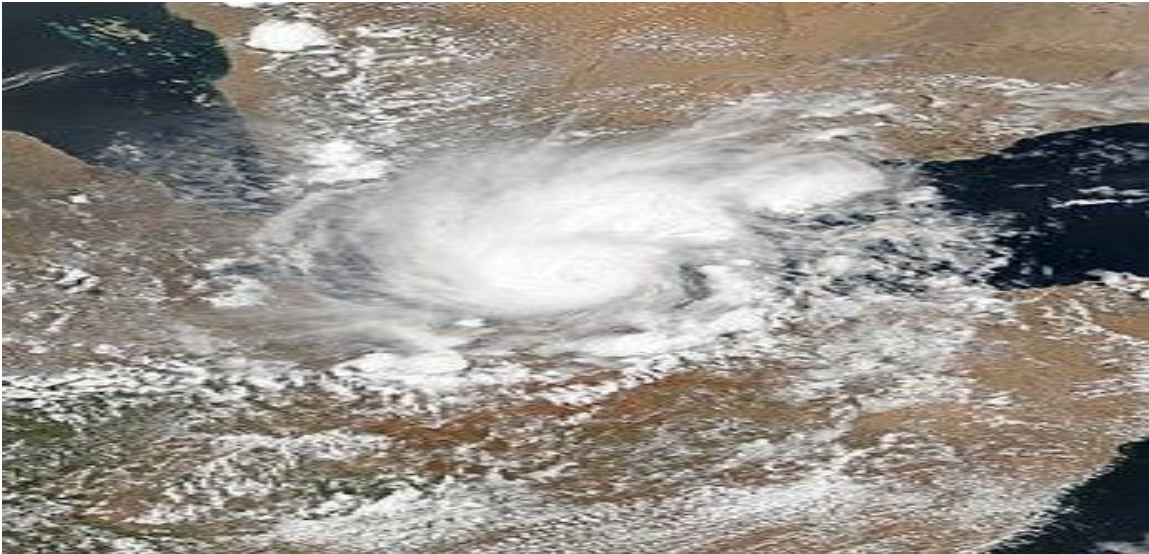
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Republic of Somaliland
National Disaster Preparedness and

Food Reserve Authority

SAGAR CYCLONE IN SOMALILAND:

DAMAGE, ECONOMIC LOSS, NECESSARY INTERVENTIONS, AND FINANCIAL NEEDS



**Hargeisa, Somaliland
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FORWARD

Sagar cyclone was considered as one of the largest and most severe disaster that Somaliland experienced. The severity of the cyclone was inflated by vulnerability of the people to disasters and fragile environment. It has caused destruction in the lives of the people, economy, education and environment at large. This timely report focuses the damages, economic losses and interventions that are needed to restore livelihood assets, social amenities and environment. The report will be an indication of consequences left by the cyclone and foundation of history that can help future generation to inquire insights on evolution and effects resulted by sagar cyclone.

Despite the fact that, in each challenge there is an opportunity, and one of the opportunities we came across during the emergency response, is how the entire community is united and cooperated together from President, vice president, ministries, authorities, local and international organization, and communities themselves to respond to cyclone and save the lives of the affected people. This created a sense of togetherness and self-reliance which can be sustained towards disaster risk management and sustainable development in Somaliland.

However, NADFOR felt the need to establish comprehensive report on effects, damages, and losses resulted by the cyclone, and necessary interventions in monetary value. Thus, I hail international and local organizations to adjust their recovery and resilience interventions with information indicated in this report. Donors and Government are required to jointly fund the necessary interventions revealed in the report to restore damaged livelihood assets, environment and other social amenities.

Lastly, I would like to acknowledge humanitarian assistances from local and international organizations, government and private sectors, universities, community based organizations, United Arab Emirate (UAE), and Djibouti which took a great role in saving the lives of thousands of people. Also would like to register thanks to government staffs/sectors that shared with the information collected from the areas affected by the cyclone in pursuit to their mandate which helped the production of this report. Special thanks are given to *Ahmed Mohamed Diriye, Sharmaarke Abdi Musse, Mohamed Abdalle Hussein, Mubarik Abdullahi Ibrahim, and Ismail Mohamed Ahmed* who put laborious work in producing this report.

With best Regards

**Commissioner of NADFOR
Faisal Ali Sh. Mohamed**

EXECUTIVE SUMMARY

Tropical cyclone Sagar which developed from the Gulf of Aden has made landfall in the coastal areas of Somaliland and left severe effect. This cyclone struck 9 districts, whilst, its torrential rains affected another 3 districts; and therefore, a total of 12 districts out of the 23 districts of Somaliland experienced the storm induced damage. In the local administrative units, 422 settlements were affected by the Sagar in different levels, which equivalent to a quarter of the total Somaliland settlements, including 27 settlements suffered from torrential rains¹.

Consequently, assessment teams were dispatched by the relevant governmental institutions and non-governmental organizations to report damages resulted by the cyclone and propose corresponding interventions necessary for recovery. A technical team from National Disaster Preparedness and Food Reserve Authority (NADFOR), National Displacement and Refugee Authority (NDRA) and Ministry of Planning and National development (MP&ND) have compiled assessment reports, collected relevant economic data, and conducted further data analysis to convert the damage into monetary value, estimate economic losses and financial needs. Finally, a validation meeting was organized with relevant stakeholders.

However, succinctly, the Sagar cyclone took the lives of 53 persons and caused enormous injuries, and affected the lives of about one million persons which equivalent to nearly quarter of the Somaliland population. The storm affected the lives of the people harshly through destruction of their livelihood assets, environmental resources, and infrastructure; and forced some of them towards displacement. Production sector, which is the key economic pillar in Somaliland suffered from the worst effect and sizable economic set back can be expected. In the **livestock damage**; the storm killed 310,000 heads of livestock, in which 2.3% were camels and cattle, in addition to few donkeys and horses as per table 1.0 below; whilst, the lost **crop production** was estimated at 128,000 metric tons; and the destruction of 18,000 hectares of cultivated land. Also, 10 fishing boats in which loss of 730 tons of fish production is expected within 12 months.

The worst damage was observed in the environmental sector where heavy flash flooding caused extensive soil erosion, formation of gullies, and clearance of forests which have changed the natural landscape by turning the hills into valleys, and valleys into hills. The natural beauty of the land is changed, experiencing denudation and expansion of aridity. A severe **deforestation** is encountered in the field whereby several forest species are uprooted and ultimately washed out. The vegetations in potential grazing areas were eroded. Also, the **top soil** that grown palatable trees were washed by the heavy floods and large deep gullies were formed which will negatively affect the future regeneration of the vegetation and trees. There was a large treeless plains with full of sand dunes that formed in the rangelands. The Sagar caused large scale **pasture degradation** which contributed to the existing repercussions of the prolonged drought and deforestation activities driven by the need for charcoal production, expansion of human settlement and overgrazing.

¹ Number of settlements affected by torrential rains is not available, but the minimum number of settlements affected by the cyclone in the Sagar belt is utilized

Table 1.0: Summary of the damage in natural units

Type of damage	Units
Number of affected districts	12
Number of affected settlements	422
Affected people	900,000
Human deaths in persons	53
Livestock in heads	310,000
Damaged land in hectares	6,000,000
Lost fodder in tons	36,600,000
Number of farms	8,973
Cultivated land in hectares	17,946
Number of irrigation engines	1,720
Crop production in metric tons	128,133
Fishing boats	10
Roads in (KM)	211
Number of schools	28
Health facilities	12
Wells	12
Pipelines in meters	15,018
Solar systems	12
Houses	1,459
Government offices	29

In **monetary value**, the total damage was estimated as \$785.4 million in which \$714 million is environmental destruction followed by \$60 million in livestock, crop production, and fishing sectors. Whilst, the **estimated economic loss** is almost one billion US dollars within a year as per table 2.0 below, in which decline of the production and economic outputs already started, and will continue until a full economic recovery and reconstruction is achieved. Although, disaster management capacity assessment is yet to be carried out; a number of capacity building interventions were recommended and their costs were estimated as USD 6.1 million. Setting mandatory evacuation, disaster risk reduction, early warning systems, and establishment of strategic reserves are considered as important strategic measures in improving the capacity of the country to manage disasters.

Nevertheless, a total financial need of USD 211 million was estimated for the necessary recovery interventions. Therefore, Somaliland is appealing financial assistance to invest in the replacement, reconstruction, and repair of the physical assets destroyed or damaged by the Sagar cyclone; as well as the indispensable basic service rehabilitation, restoration of the productive sector, and immediate reactivation of income sources.

Table 2.0 Sagar induced damage, economic losses, and financial needs in USD

Sector	Damage cost	Economic loss in one year	Interventions financial needs
Human deaths	2,650,000	31,180,000	-----
Live saving (extension of emergency assistance)	-----	-----	157,140,000
Livestock	39,550,000	29,469,000	16,833,000
Fishing	15,450,000	4,400,000	15,450,000
Crop production	4,310,000	187,780,000	4,310,000
Environment	714,015,000	714,015,000	4,038,000
Roads	2,140,000	8,280,000	2,140,000
Education	780,000	871,000	780,000
Health	97,000	-----	97,000
WASH	406,000	-----	406,000
Housing	2,929,000	-----	2,929,000
Energy and Telecommunication	-----	-----	737,250
Capacity building	-----		6,135,000
Total	782,327,000	975,995,000	210,995,250

1. INTRODUCTION

1.1. Introduction

Tropical cyclone Sagar which developed from the Gulf of Aden has made a landfall and left severe effect in the coastal areas of Somaliland. Due to the short early warning period, proper preparations were not made in advance. Humanitarian assistances from government, humanitarian and development organizations as well as private sector were provided to affected people to save their lives. As the humanitarian responses take place, teams representing from different sectors of government conducted assessments to evaluate and report on damages left by the cyclone, and necessary emergency response and recovery measures that can be up-scaled. Each ministry conducted an assessment on its respective mandate to evaluate the damages.

However, this report is been produced through combination, analyzing and calibration of different information collected by the government sectors on effects resulted by the cyclone. A technical team from NADFOR, MNP&D and NDRA has analyzed, scrutinized, and compiled on available information about effects of Sagar cyclone, and technically validated with consultation of respective stakeholders. The report indicates damages and losses attributable to the storm in all livelihood aspects of the affected people particularly livestock, agriculture, infrastructures and social services including education, health, shelter, water and sanitation facilities. These damages and losses are estimated in monetary value, and number of lives saved and recovery interventions is recommended to restore livelihood assets, environment and social amenities in areas affected by the cyclone.

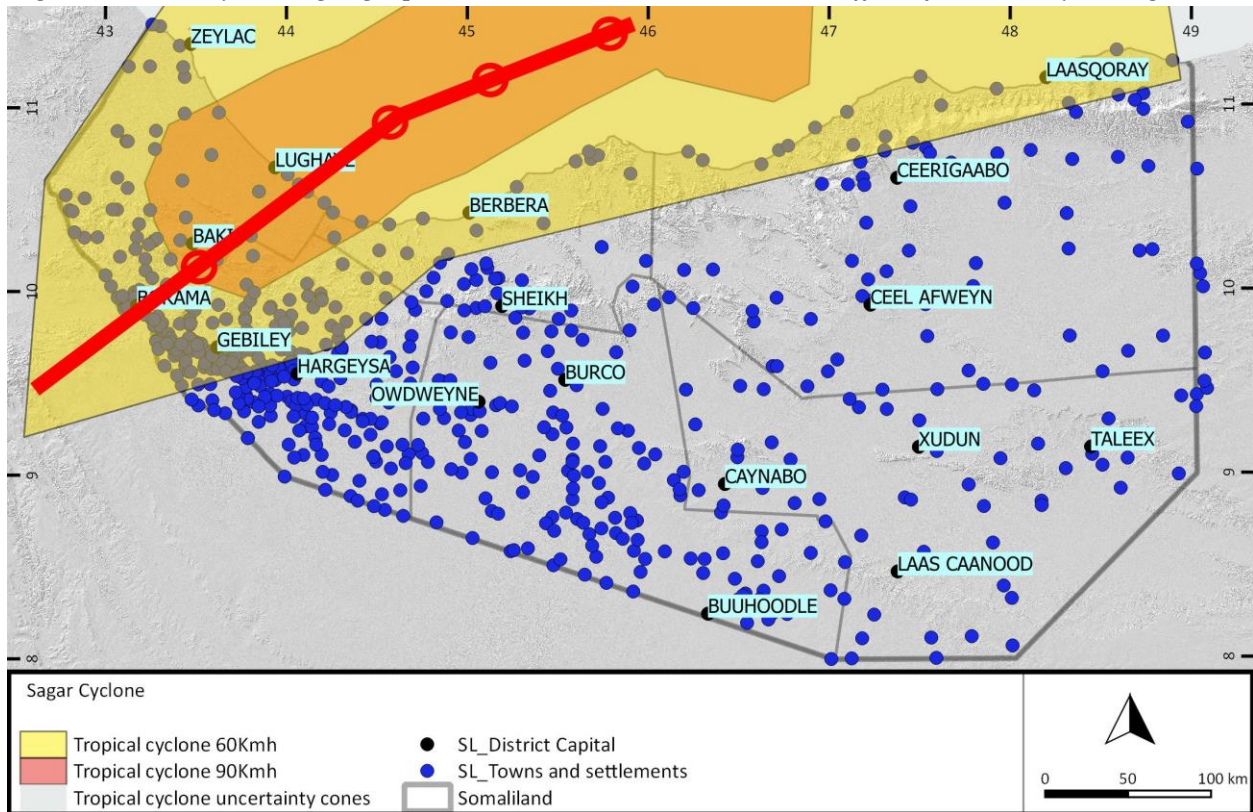
1.2 Situational Overview

As the meteorological reports indicate, the authentic formation of the cyclone started 14 May, turned to the west-southwest and traversed the entirety of the Gulf of Aden, gradually unfolding, and ultimately making landfall on Somaliland coastal regions on 18 May. It has dropped huge rainy water which is substantially corresponding to rains received yearly.

This cyclone is considered as one of the most severe cyclones ever recorded in Somaliland. It has resulted in huge floods in coast areas of Somaliland, causing destruction in human life, livelihood assets and environment. It also affected other countries in Horn of Africa, but harshly affected in Somaliland due to vulnerability of the country to disasters, and limited resources in preparedness of such disasters.

However, the cyclone is characterized with extreme rainfalls, strong winds and perilous flash floods that have lasted in days. The susceptibility of the region to natural changes and the inexperience in dealing such disasters are also contributory factors to the increase of the devastation resulted by the Sagar cyclone. Despite the cyclone was natural, some environmental factors such as growing climate change phenomenon could have an impact on its fleet prevalence across the regions (throughout Middle East to Horn of Africa) within short time of period.

Figure 1.2.1.0: Cyclone geographical belt (Red zone is the worst effect, followed by orange zone)



Source: NADFOR, 2018

1.3. Methodology

The methodology that was used is incorporation and collection of analytical methods, tools and techniques developed for post-disaster assessments and recovery planning, ensuring sector to sector comparability and homogeneity in the definition of basic concepts of damages, losses and post-disaster recovery needs. This methodology was previously applied by respective research institutions, UN and the World Bank bodies for post-disaster assessments and recovery planning. It provides a satisfactory framework for identifying and quantifying the social, economic and environmental impact of natural disaster, i.e. the Cyclone Sagar. Under this framework, damage estimates provide an initial indicator of reconstruction requirements, and losses represent the reduction or decline in economic activities at individual, household and national levels.

1.3.1. Quantification of the Effect, Impact, and Recovery Needs

The effects of the Cyclone Sagar on each sector have been assessed in terms of damages, losses, and recovery needs.

1.3.1.1. Effect

Effect is the damage caused by the storm defined as the total or partial destruction of physical assets existing in the cyclone belt. Damages occur during and immediately after the disaster are measured in physical units (i.e., number of damaged boreholes, head of livestock, hectares of land, fishing equipments lost, etc.). Then, the damage is expressed into monetary values based on the replacement costs, according to prices prevailing just before the event.

1.3.1.2. Impact

Impact is the economic losses, which is defined as the changes in economic flows arising from the disaster. They occur until full economic recovery and reconstruction is achieved; and in some cases lasting for several years. Typical losses include the decline in output in productive sectors (agriculture, livestock, and fisheries). Also, the losses are expressed into monetary values based on the local market price, in addition to the expected inflation rate. Therefore, economic losses are expressed through measuring the losses in natural units of the production and financial implications.

1.3.1.3. Recovery needs

Recovery needs is the list of the recommended interventions and the required financial resources to invest in the necessary replacement, reconstruction, and repair of the physical assets destroyed or damaged by the disaster. Another recovery needs is the estimated financial resources required for the rehabilitation of basic services, restoration of productive activities and immediate reactivation of household income.

Recovery needs also include capacity building of the community and relevant governmental institutions in regards to the operational costs and capacity for service delivery that are necessary for the implementation of interventions. Costing for recovery needs include differentials for building back better to consider quality improvements and disaster risk reduction (DRR) measures to be implemented to increase resilience against future disasters.

For the purpose of this assessment, recovery needs are classified into four levels based on the timeframe of the required interventions

- **Emergency humanitarian needs**, which are the immediate lifesaving interventions,
- **Short-term interventions**, i.e. within a year or so. These short-term recovery needs are distinct from the emergency humanitarian needs because they represent interventions of a developmental in nature that need to be implemented in the short-term to have quicker results and impact on the overall recovery program. An example would be an immediate improvement of the capacity of NADFOR in early warning and coordination of humanitarian assistances.
- **Medium-term interventions**, i.e. 2-3 years; and
- **Long-term based interventions**, i.e. 4 years and beyond.

Medium and long terms recovery needs, especially in the case of a slow-onset disaster, are typically and logically valued less than damages and losses, as the largest needs are represented in the humanitarian phase that can continue for an extended period of time. In addition, the cost of inputs required for recovery (such as livestock treatment or seeds) are typically less than the value of outputs lost due to drought (such as cattle mortality decreasing income from export, or crop failure decreasing the volume available for sale).

1.3.2. Data Collection and Validation

1.3.2.1. Data Collection

Both primary data and secondary information were utilized for the estimation of damages, losses, and recovery needs. **Primary data** was generated through field data collection conducted by the relevant governmental institutions by employing different data collection methods including direct observations on the affected areas, key informant interviews, and focus groups discussions with village heads and communities. Also existing and available **secondary information** were collected, and analyzed through desk review method.

1.3.2.2. Data Validation

Cross-checking on the available assessment reports, consulting with subject-matter specialists in the respective sectors and institutions, and technical validation meetings were used to validate data.

1.3.3. Classification of the Damage, Losses, and Recovery Needs

The damage (effect), losses (impact), and recovery interventions and financial needs are classified into the four major categories of population, economic, social service infrastructure, and governance pillars; which can be sub-divided into sub-categories as follows.

Affected Population Pillar

- o Size of the victims (deaths, injuries, and displaced people)
- o Size and the characteristics of the other affected population

Production sector

- o Livestock
- o Fishing
- o Crop production
- o Environment

Social service infrastructures

- o Housing
- o Education
- o Health
- o Water and sanitation
- o Roads and transportation

Governance

- o Law enforcement facilities (Prisons, police stations and courts)
- o Regional, district, and village level administrations facilities

However, aligning these categories and sub-categories to the pillars and sectors of the Somaliland National Development Plan (NDPII), 2017-2021 is imperative. Such arrangement will facilitate identifying responsible partners for each sector.

2. Affected Population, and Necessary Interventions

Although, the figures are rough estimations, table 2.1.0 contains satellite generated information labeled as Sagar belt and the areas affected by the aftermath torrential rains labeled as torrential rain belt. The cyclone struck 9 districts, whilst, the torrential rains 3 districts, which is a total of 12 out of the 23 districts in Somaliland. About 422 settlements were affected, which equivalent

to one out of four settlements. Among these settlements, 22 settlements suffered from the third degree level, in which experts labeled as RED ZONE, where the worst cyclone damage can be expected. The epic center location lies between Maame and Hajeenle settlements of Lughaya district. Whilst, 58 settlements experienced the second degree level or GREEN ZONE, and 315 by the first degree level labeled as YELLOW ZONE, in which the least relative damage can be expected. Finally; 27 settlements experienced damage caused by torrential rains³.

Table 2.1.0: Affected Districts and corresponding number of settlements by level of severity

Area	Region	District	Third Level	Second Level	First Level	Total	
Sagar struck area	Awdal	Baki	6	22	24	52	
		Borama	0	0	64	64	
		Lughaya	14	27	0	41	
		Zeila	0	0	29	29	
	Maroodi Jeeh	Berbera	Berbera	2	3	54	59
			Hargeisa	0	1	89	90
		Sanaag	Gebiley	0	0	27	27
			Eil Afwayn	0	0	9	9
			Ceerigaabo	0	0	24	24
Torrential rain belt	Maroodi Jeeh	Salahley				9	
	Sanaag	Las Qorei,				9	
		Caynabo				9	
Total						422	

Source: Ministry of Planning and National Development

Most of the 53 deaths were reported in Lughaya and Baki, specifically in Gargaara, Abdi-gedi, Tuurka, and Hadeyta villages; in addition to few deaths in Berbera and Sallahley. Also it has resulted formation of IDP's roughly 2,590 persons or 432 households, and also affected the existing IDP's. However, there is distinct variation between IDP's and destitute community.

2.1. Human Damage

The lives of nearly 900,000 persons was affected by the cyclone, including 53 deaths and enormous injuries, and about 168,000 people harshly affected by the cyclone through destruction of their livelihood assets, environmental resources, and infrastructure, which forced them towards displacement. Approximately another 700,000 people were indirectly affected by the cyclone as it tended to significantly impact on their livelihood systems.

Actually, the intention of converting deaths into monetary value is NOT to propose as the cost of replacement intervention like the rest of the damages and losses caused by the Sagar. Instead the objective is to demonstrate the aggregate damage in monetary value.

However, there is no standard monetary value for the life of a human being even though the insurance companies in some countries set insurance on the basis of the personal value and social characteristics including demographic characteristics (age, marital status, and having under-age children), socioeconomic aspects (educational and income levels), and personal lifestyle (Smoking, alcohol, and drug addiction habits), etc.

³ Number of settlements affected by torrential rains is not available, but the minimum number of settlements affected by the cyclone in the Sagar belt is utilized

In Somaliland such valuation does not exist but the traditional blood price of a victim killed in a car accident or even murdered is 100 heads of camel, and the average price per head of camel is \$500.

Table 2.1.1.0: Human Loss in Monetary Value

Type of loss	Units	Unit description
Human deaths	53	Persons
Blood price per person	100	Heads of camel
Average price per head of camel	500	USD
Price per person	50,000	USD
Total loss	2,650,000	USD

2.2. Human Death Induced Economic Loss

Although, the demographic and socioeconomic characteristics such as income of the victims killed by the Sagar are not available, the economic losses as a result of the death of 53 victims can be estimated roughly. According to the available demographic data, the average life expectation is 57 years among Somalis, on one hand. On the other hand, among the rural residents, a child contributes to a household's income as young as age 7 by tending livestock and assisting parents in farming. Therefore, rural residents can be economically active for 50 years, but let us take half of that average active age, which is 25 years. Taking the average GDP per capita of \$444⁴ for 25 years; the total estimated economic loss is \$31,180,000. Based on the population growth rate of 2.9%⁵; the 53 human loss can be projected as 105 persons after 25 years, but this was not taking account to avoid double counting of the 53 deaths and the time based necessary eligibility in which the children to be produced by those victims need to grow before they become economically active.

Table 2.2.1.1: Human death related economic loss in USD

Type of loss	Units	Unit description
Human deaths	53	Persons
Life expectancy	57	Years
Average years in the labor force	50	Years
Half of the active age	25	Years
GDP per capita	444	USD
Total economic loss	31,180,000	USD

2.3. Life Saving Interventions and Required Financial Needs(extension of emergency assistance)

Although, the cyclone affected the lives of about one million persons, but lifesaving assistance is in demand for the 168,000 people harshly affected by the cyclone through destruction of their livelihood assets, which forced them towards displacement.

Based on poverty line of \$2 per person per day assistance; the need of these 168,000 persons is USD 336,000 per day for food and water, let alone medical services, educational cost, and other costs. Therefore, the necessary lifesaving interventions of those 168,000 are USD 122,640,000

⁴ World Bank, Somaliland Household Survey, 2013

⁵ www.unfpa.org/Somalia, 2017

for one year. In addition to food and water supply, latrines and house wares are another necessary emergency assistance. Based on the average household size of 7 persons; those 168,000 persons made 24,000 households; and therefore, estimated lump sum assistance cost per households of \$500 for latrine and \$1,000 for house ware and clothing will made required financial needs of \$12,000,000 and \$24,000,000 respectively. Accordingly, the total estimated cost for the emergency food and non-food assistance is \$157,140,000 as per table 2.3.1.0.

Table 2.3.1.0: Emergency interventions

Type of intervention	Cost in USD
Food and water assistance	122,640,000
Latrines	12,000,000
House ware and clothing	24,000,000
Total	158,640,000

3. Production Sector

When, the heavy rainfall, strong winds, and dangerous flash floods hit Somaliland; the result was loss of livestock and crops in which the floods washed away, and destruction of fishing boats, properties, and infrastructure. Specifically, the worst effect was reported in Awdal, Zalal, and Maroodi Jeeh, and Sahil regions. Therefore, huge economic loss is expected from the production sector during the next five years, and specifically in the next 12 months. Production and trade sectors which are the key economic pillars in Somaliland suffered from the worst effect of the recent Sagar cyclone; thus, sizable economic set back can be expected. These two sectors are responsible for 70% of the GDP. According to Somaliland National Development Plan, 2017-2021, the production contributes to the GDP by 43% – Livestock with 30%, agriculture (Crop and forestry) with 13%, and Fisheries with 0.2%; and trade sector claimed 27% of the GDP.

However, this section covers livestock, crop production, forestry (Environment), and fishing damage, loss, and interventions.

3.1. Livestock

The cyclone has killed thousands of livestock, and created economic destitution as the people affected by the cyclone was predominantly relying on livestock.

3.1.1. Livestock Damage

The storm killed 310,000 heads of livestock in which 2.3% were camel and cattle, in addition to few donkeys and horses. For simplification of the calculation, converting the value of the **7,000** non-shoat heads into shoats based on **20** heads of shoat per one head of camel and cattle is plausible; which equiavelnt to 443,000 heads of shoats. Although, the storm killed most of these animals in Baki, Lughaya, and Zeila; but most of the districts struck by the cyclone and torrential rains experienced livestock losses.

Fig 3.1.1.0: Livestock killed by cyclone in Osoli



In addition to killing hundreds of thousands of livestock heads, wildlife, and reptiles; huge devastation was experienced in grazing land due to heavy floods caused by torrential rains of the cyclone which lasted up to 36 hours continuously. Intense flooding in land territory that extended to distance of 800km from east to west and 150km from north to south, which equivalent to 120,000km square. Also the heavy floods wiped out the fauna and fodder of about 60,000km square, which equivalent to 6,000,000 hectares of grazing land⁶.

Fig 3.1.1.1: Gullies formed in rangeland



According to fodder experts⁷, one hectare of grazing land can produce 2 loads of fodder, which equivalent to 280 bundles of grass or 5,600kg. Based on this estimation, Somaliland might have lost about 36,600,000 tons of fodder due to cyclone.

⁶ Ahmed Warsame of Ministry of Environment and Rural Development

⁷ Ahmed Warsame of Ministry of Environment and Rural Development, and Dr. Abdi Abdalla (Shibiin)

Table 3.1.1.1 : Grazing land damage in hectares and fodder destruction in metric tons and loads

No	Type of damages	Number of units
1	Grazing land in hectares	6,000,000
2	Fodder production per hectare in tons	5.6
3	Total lost fodder production in tons	36,600,000
4	Fodder production per hectare in bundles	280
5	Lost fodder production in loads	120,000

This grazing land destruction caused a critical situation as livestock will suffer from loss of pasture and water due to denudation of both forest and rangelands, and destruction of water sources. In Somaliland, deforestation activities in coastal regions that reduced forest coverage led the floods to inundate more as the trees take an important role in counteracting flooding. In monetary value, the total livestock fodder damage is USD 39,550,000 based on the average market price of \$50 per head of shoat and \$145 per load of fodder (grass) as per table 3.1.1.2, below.

Table 3.1.1.2 : Livestock and grazing damage in monetary value

Type of damages	Units	Price/unit in USD	Total damage in USD
Livestock in heads	443,000	50	22,150,000
Lost fodder in loads	120,000	145	17,400,000
Total			39,550,000

3.1.2. Livestock Interventions and Financial Needs

Livestock experts proposed the following six major interventions for the livestock, fodder, and grazing land damage replacement. Re-stocking program should be implemented in above mentioned districts/villages that encountered severe livestock death toll. However, the proposed interventions are:-

1. Rangeland soils conservation by semi-circular bunds, where 9 bundles are required per destroyed hectare
2. Constructing 6 fodder banks
3. Establishing six seed nursery farms for fodder production
4. Creating none semi-circular soil conservation bunds in each destroyed hectare f grazing land
5. Buying about 500 collapsible water thanks, each capacity of 20 metric cubic of water
6. Mobilizing six veterinary services teams and dispatching to 6 regions to provide medical care to remaining livestock herds.

Livestock and fodder experts estimated a total financial need of \$17 million for the necessary interventions including re-restocking and grassland reclamation. Specifically, \$10 million for re-stocking program, \$1.7 million for rangeland soil conservation; \$1.5 million for fodder banks, \$0.6 million for seed nursery farms, and \$3 million for veterinary medical services program as per table 3.1.1.2.

Table 3.1.1.2 : Estimated cost of the livestock and grazing land recovery interventions in USD

No	Type of interventions necessary	Units	Price/unit	Total cost
1	Re-stocking of livestock in heads of shoats	443,000	Lump-sum	11,673,000
3	Fodder banking (Warehouses)	6	250,000	1,500,000
4	Seed nursery farms(for fodder production)	6	100,000	600,000

5	Collapsible water tanks	100	600	60,000
6	Veterinary disease control measures teams	6	500,000	3,000,000
	Total			16,833,000

3.1.3. Livestock Economic Loss

In line with 443,000 heads of shoats, the economic loss estimation is based on the expected decrease of the livestock export, local meat consumption, and milk production.

The aggregate consumption (For export and slaughter) rate of shoats is 34%, where each of the export and the local meat consumption⁸ claim 17% of the total shoats annually. According to Somaliland in Figures in 2015 (Table 9 on page 12 and table 38 and 39 on page 32), on one hand. On the other hand, the growth rate of goats and sheep population is 2.4% and 1.7%, respectively; which is an average growth rate of 2%. Therefore, the estimated kidding rate is 36% because the kidding rate of 36% less the consumption rate of 34% yields an average shoat growth rate of 2%. On average, a goat produces 80-100 kg of milk per lactation period, and sheep produces 35-40kg. Therefore, the lost milk is calculated based on multiplying the number of expected calves (from the kidding rate of 36%) by 80kg of milk per lactation.

The economic loss of livestock, export, meat, hides and skins, and milk was estimated based on the end user market price, including \$150 per export head, \$70 per slaughter shoat, and \$1 per kilogram of milk. Accordingly, the total estimated economic is USD 30 million (Rounded figure) within the first year, including \$11,250,000 from loss of export, \$5,460,000 of loss of local consumption (meat and skins), and \$12,750,000 due to depriving milk nutrition. However, the situation will continue to deteriorate as necessary interventions are delayed, where the economic losses will accumulate into \$153 million during the next five years.

Table 3.1.3.0 :Livestock production and economic loss in natural units and in USD

Loss in natural units	Units	Price/unit	Total economic loss
Livestock population in heads	443,000		
Expected livestock export in heads	75,000	150	11,250,000
Expected slaughter in heads	78,000	70	5,460,000
Milk in KG	12,759,000	1	12,759,000
Total			29,469,000

3.2. Fishing

3.2.1. Fishing Damage

The storm struck Somaliland coastline line, which is 850 kilometers that stretches from Elayo in the East to Lowya Addo in the West with heavy rain and strong wind. According to local authorities, scores of fishing boats went missing in the region and about 40 fishermen were at sea before the cyclone alert was announced. Somaliland Ministry of Livestock and Fishing Development has estimated at least 10 major fishing boats were destroyed. Most of these wiped out boats were Sri Lank model equipped with 8.5m valve and 30 horse power engine and also the fishermen lost their fishing gear, including fishing net and hooks. Also, 5 small fishing jetties were damaged in the east and west corners of the Somaliland coast.

⁸ Based on the number of exported hides and skins, which can represent the number of slaughtered shoats

Table 3.2.1.0. Fishing damage estimates in number of boats and fishing gears

No	Description of the damage	Number of units
1	Sri Lank model fishing boats equipped with 30 horse power engine	10
2	Fishing gears, i.e. fishing nets and hooks	10

3.2.2. Fishing Interventions and Financial Needs

Monetary value of the fishing damage, which is based on the cost of the interventions necessary to replace the damage can be estimated as \$15.5 million. Following are the specific major interventions necessary to replace fishing sector's damage.

1. Supplying 10 fishing boats to the fishermen
2. Providing 10 fishing gears to the fishermen
3. Repairing the fishing jetties in Elayo, Las Qorei, Maid, Hees, and Lughaya

Each of the lost 10 boats costs \$35,000 and the price of one fishing gear is \$10,000; therefore, total monetary value of the lost fishing boats is \$450,000, on one hand. On the other hand, each of the damaged fishing jetties could cost up to \$3 million, which equivalent to \$15 million. Therefore, the total financial need of the fishing interventions is \$15.5 million.

Table 3.2.2.0: Fishing Intervention cost in USD

No	Damage in natural units	Units	Unit cost in USD	Total cost
1	Supplying fishing boats	10	35,000	350,000
2	Providing fishing gears	10	10,000	100,000
3	Repairing fishing jetties	5	3,000,000	15,000,000
	Total			15,450,000

3.2.3. Fishing Economic Losses

Although, fishing contribute to the GDP only by 0.2%; still it is one of the major source of income of the coastal area residents among which the Sagar cyclone struck the hardest and one of the main food dishes in the major cities and towns. Therefore, estimating its economic loss is crucial for the prioritization of the interventions and for future disaster management. Based on that 10 fishing boats were destroyed and the daily production capacity is 200kg of fish; the daily production loss was estimated at 2 tons of fish, which can be accumulated to 730 tons annually, and 3,643 tons of fish in five years. In the **economic loss**, the multiplication of the above-stated fish production by the local market price of \$6 per kilogram of fish, the daily loss is \$12,000, which can sum up into USD 4.4 million in a year, and \$22 million in five years.

Table 3.2.3.0: Fishing production losses in tons and economic loss in USD

Production loss in metric tons	Number of units
Daily	2
Yearly	729.5
Five years	3,643
Economic Loss in millions of USD	
Daily	0.12
Yearly	4.4
Five years	21.9

3.3. Crop Production

Agricultural production has faced severe effect, including farm land destruction, irrigation implement damage, and loss of crop production.

Aggregately, the Sagar storm affected 8,823 farms with 17,646 hectares of cultivated land, 1,720 irrigation engines and 5,160 meters of irrigation pipes and canals. In production terms, about 123 thousand metric ton of crop production was lost, which costs Somaliland about USD 187 million annually; and USD 937 million for the next 5 years. When incorporated the total estimated cost for the proposed interventions as destruction replacement; the economic loss accumulated to USD190 million in the 12 months following the storm date; and USD 940 million during the next 5 years.

3.3.1. Crop Production Damage

About 2,823 irrigation farms were affected by the storm, among which 1,151 were completely wiped out and 1,672 were partially damaged as per table 3.3.1.0, below. These irrigation farms suffered from destruction of both farming lands and the farming implements as the result of the strong winds and floods mete out by the Sagar cyclone.

However, the data collection teams visited only 3 districts and 20 settlements out of 10 districts and 400 settlements struck by the storm. Therefore, the crop production damage of the rest 280 settlements hit by the cyclone was estimated based on the averages of the 4 rain fed farms visited by the data collection teams in Gabiley district (See table 3.3.1.3, below).

According to local agricultural research experts, the average size of a farm is 4 hectares in Somaliland, in which about half of the land (2 hectares) is usually under cultivation, whilst, the agro-pastoralist households reserve the other half of their farm for the grazing of their livestock. Based on that the portion of the farm land adjacent with springs, shallow well, and the low land, which is usually under cultivation; the assumption is that each of the 2,823 completely wiped out and partially damaged farms lost at least 2 hectares of cultivated land. Therefore, the *Sagar* destroyed a total cultivated land of 5,646 hectares.

Table 3.3.1.0: Number of Sagar destroyed irrigational farms by district and settlement

District	Settlement	Completely destroyed	Partially damaged	Total Irrigation farms
Baki	1. Ruqi	169	81	250
	2. Baki	228	122	350
	3. Xeeego	13	37	50
	4. Xamarta	80	35	115
	5. Xoorey	165	75	240
	6. Carrowayn	20	50	70
	Total	675	400	1,075
Lughaya	1. Tuurka	100	400	500
	2. Balleyga	400	0	400
	3. Waraabe Dareeray	143	57	200
	4. Hul-xudhuunle	150	30	180
	5. Qundhaanjaale Galbeed	33	37	70
	6. Qudhaanjaale Bari	27	23	50

	7. Garbo	27	23	50
	8. Habar –dugaag	95	70	165
	9. Damasha	7	3	10
	10. Gol-caydheed	15	15	30
	Total	658	997	1,655
Gabiley	1. Agabar	0	38	38
	2. Caada	0	25	25
	3. Af-weyne	0	20	20
	4. Ceel-bardaale	0	10	10
	Total	0	93	93
Somaliland	All	1,333	1,490	2,823

Table 3.3.1.1: Total destroyed cultivated land in hectares

District	Total affected farms	Destroyed cultivated land in hectares
Column 1	Column 2	Column 3 = Column 2 x 2 hectares
Baki	1,075	2,150
Lughaya	1,655	3,310
Gabiley	93	186
Total	2,823	5,646

In addition to the destruction of the irrigation farms, the cyclone destroyed the production of the rain fed farms of the 10 affected districts; even though, the destruction of the land is at the minimal in the highland areas. However, out of the 422 settlements affected by the storm, the data collection teams visited only 4 settlements in Gabiley, among which the destruction of the harvest of 61 rain-fed farms were recorded in those 4 settlements. In average; each of those 4 settlements lost the harvest of 15 rain fed farms.

Assuming that all of the 422 settlements lost the harvest of 15 rain fed farms; the Sagar affected 6,150 rain fed farms. By utilizing the factor of that 2 hectares are usually under-cultivation in each farm; it can be estimated that the harvest of 12,300 rain fed hectares was also lost to the storm, in addition to the harvest of 5, 646 irrigational hectares (See table 3.3.1.1, above)

Table 3.3.1.2. Destroyed cultivated irrigation and rain fed farms and land in hectares

District	Settlements	Rain fed farms	Rain fed land in hectares
Column 1	Column 2	Column 3 = column 2 x 15	Column 4 = column 3 x 2
Baki	52	780	1,560
Borama	64	960	1,920
Lughaya	41	615	1,230
Zeila	29	435	870
Berbera	59	885	1,770
Hargeisa	90	1,350	2,700
Gebiley	27	405	810
Sallahley	5	75	150
Eil Afwayn	9	135	270
Ceerigaabo	24	360	720
Las Qorey	5	75	150
Caynabo	5	75	150
Total	422	6,150	12,300



Farms wiped out by floods in Ruqi

Based on the above stated assumptions and calculations; the cyclone destroyed harvest of a total 8,973 farms, which equivalent to the expected production of 17,946 hectares.

Table 3.3.1.3: Total affected under-cultivation irrigation and rain fed farm land

Column 1	Irrigation farm land		Rain fed farm land		Total cultivated farm land	
	No of farms	Cultivated land in hectares	No of farms	Cultivated land in hectares	No of farms	Cultivated land in hectares
Baki	1,075	2,150	780	1,560	1,855	3,710
Borama	-	-	960	1,920	960	1,920
Lughaya	1,655	3,310	615	1,230	2,270	4,540
Zeila	-	-	435	870	435	870
Berbera	-	-	885	1,770	885	1,770
Hargeisa	-	-	1,350	2,700	1,350	2,700
Gebiley	93	186	405	810	498	996
Sallahley	-	-	75	150	75	150
Eil Afwayn	-	-	135	270	135	270
Ceerigaabo	-	-	360	720	360	720
Las Qorey	-	-	75	150	75	150
Caynabo	-	-	75	150	75	150
Total	2,823	5,646	6,150	12,300	8,973	17,946

The cyclone didn't only affect crops and the land, but it also destroyed most of the farming implements and irrigation supporting systems. As per table 3.2.1.4; the storm wiped out 1,720 irrigation engines and destroyed 5,160m of irrigation pipes.

Table 3.3.1.4.: Total destroyed cultivated irrigational land in hectares

District	Number of engines lost (Pcs)	Number of pipes wiped out (m)
Baki	650	1,950
Lughaya	1,070	3,210
Total	1,720	5,160

3.3.2. Crop Production Interventions and Financial Needs

Expressing the damage into monetary values based on the replacement costs of the proposed interventions is the plausible for the disaster, according to prices prevailing just before the event. Following are the proposed interventions, which are necessary for the recovery for the crop production.

1. Assisting farmers in land reclamation for future production
2. Rehabilitating the damaged shallow wells and other water sources
3. Providing water pumping engines and pipes to store irrigational systems.
4. Reconstructing damaged water canals
5. Offering tractor ploughing hours to re-establish production system
6. Providing seeds

According to the experts of the Somaliland Ministry of Agriculture⁹, the performance of a tractor to plough a piece of land is 0.25 hectares per hour, and therefore, one hectare needs 4 hours of tractor work, on one hand. On the other hand, the average cost of tractor work is \$15 per hour in Somaliland, including the food of the driver which equivalent to that the cost of land reclamation or ploughing one hectare is \$60. Therefore, the estimated cost for land reclamation and ploughing interventions is \$1.4 million; whilst, the total estimated cost for farm implement is \$1.9 million.

In another perspective, based on that each of the orange, mango, and guava covered about 707 hectares in the 5,646 cultivated irrigational hectares, and that one hectare can host 150 trees of guava or 100 trees of orange or 25 trees of mango; about 195,000 mature and productive trees were destroyed, and replacing them could take up to 5-6 years. Among these productive trees are 106,050 guava trees, 70,700 orange trees, and 17,675 mango trees. Even though, the loss of production of these destroyed production trees is demonstrated under the next section; estimating the replacing cost is belong to this section. Based on the local market, the price of one year old productive trees varies from one type to another, but an average cost is \$5; which will cost about a one million US dollars. The total estimated replacement cost of the crop production is \$4.3 million.

However, two potential data related issues needs to be taken into account during intervention and investment decision making. On one hand, the existing shortage of sufficient data could underestimate the damage, interventions, and losses; and related financial estimations. On the other hand, some of the respondents might overestimate these dimensions to lure internal assistance and external aid.

Table 3.3.2.0: Total Crop Production Damage in USD

No	Interventions	No of items	Units	Cost/item	Total(USD)
	Reclamation and plough				1,415,529
1	Land reclamation	5,646	Hectares	60	338,769
2	Ploughing	17,946	Hectares	60	1,076,760
	Farm implements				1,922,400
3	Rehabilitation of wells	1,720	Pieces	300	516,000
4	Water pumping engines	1,720	Pieces	500	860,000

⁹ Mohamed Dahir, Agricultural Expert(Ministry of Agricultural development)

5	Pipes and canals	5,160	Meters	50	258,000
6	Seeds for sowing	5,768	Hectares	50	288,400
	Lost productive trees				972,125
7	Orange	70,700	Trees	5	353,500
8	Mango	17,675	Trees	5	88,375
9	Guava	106,050	Trees	5	530,250
	Total				4,310,045

3.3.3. Crop Production Economic Loss

Economic loss is the estimated costs caused by the changes in economic flows arising from the disaster, which will continue until full economic recovery and reconstruction is achieved. These losses, which might last for several years are the decline of the crop production and the expected value added.

As the first step of the economic loss calculation, Ministry of Agricultural Development stated that the major crops grown in the areas affected by the cyclone are the following types

- **Fruits:** mango, orange, guava, date palm, water melon, and melon
- **Vegetables:** tomato, cabbage, hot paper(chili), and muskmelon, and
- **Cereals and Legumes:** maize, sorghum, lentils, and bean.

As per agricultural expert, out one cultivated hectares of irrigation farm, 0.375 hectare is usually covered by mango, orange, and guava; and another 0.375 hectare is covered by tomato, melon, water melon, etc; Whilst, 0.125 hectare is covered by maize and sorghum and the other 0.125 hectare by some other crops. However, in the rain fed farms, cereal is the major crop.

Based on the above stated estimates provided by the Ministry of Agricultural Development; this economic loss calculation is based on that each of orange, mango, guava, water melon, melon, and tomato covered 0.125 per hectare or 707 hectares of the total cultivated irrigation land of 5,646 hectares destroyed by the Sagar storm, which is a total of 4,242 hectares.

According to crop production expert, the production of one hectare of irrigational farm can produce 50,000kg of orange or 25,000kg of mango or 33,750kg of guava or 12,000kg of water melon or 1,600kg of melon or 15,000kg of tomato. If so, the Sagar cyclone destroyed 90,036 metric ton of fruits and vegetable production. Based on the local market price, the total economic loss in monetary value is \$167 million in one year due to the production loss of fruits and vegetables. However, recovery age of the lost mango, orange, and guava trees is 6 years, which will cost additional \$768,862,500 for the next 5 years.

In the cereal production, let us assume that the rest of 13,704 hectares of the affected farm land, including 1,404 hectares of irrigational farms and 12,300 hectares of rain fed farms were covered by cereal; among which 3,015 hectares is for maize and 10,689 hectares for sorghum¹⁰. According to the Somaliland in Figures published by the Ministry of Planning and National Development (MPND) in 2015 (Table 13 on page 14), the average production per hectare of maize is 2 metric tons; and 3 metric tons for sorghum. Therefore, the total lost production is 38,097 metric ton; and the total economic loss per year is \$20,857,500.

¹⁰ This is based on that 22% is for maize, and the rest for sorghum, according to the Somaliland in Figures published by the Ministry of Planning and National Development in 2015, table 13 on page 14

Aggregately, the Sagar devastated a total of 18 thousand hectares of cultivated land, 123 thousand metric ton of crop production, which will cost Somaliland about USD 188 million annually; and USD 939 million for the next 5 years. When incorporated the total estimated cost of USD 4,292,045 for the proposed interventions as destruction replacement; the loss of the crop production is accumulated to USD200 million in the 12 months following the storm date; and one billion USD in the next 5 years.

Table 3.3.3.0: Estimated economic loss due to the destroyed crop production

Fruit and vegetables	Cultivated land per crop in hectares	Production per hectare per year in KG	Total production in a year in metric ton	Price per Unit in USD	Total lost revenue per year in USD	Total lost revenue in 5 years in USD
Orange	707	50,000	35,350	2,000	70,700,000	353,500,000
Mango	707	25,000	17,675	2,000	35,350,000	176,750,000
Guava	707	33,750	23,861	2,000	47,722,500	238,612,500
Water melon	707	12,000	8,484	1,000	8,484,000	42,420,000
Melon	707	1,600	1,131	1,000	1,131,200	5,656,000
Tomato	707	5,000	3,535	1,000	3,535,000	17,675,000
Sub-total	4,242		90,036		166,922,700	834,613,500
Cereals						
Maize	3,015	2,000	6,030	800	4,824,000	24,120,000
Sorghum	10,689	3,000	32,067	500	16,033,500	80,167,500
Sub-total	13,704		38,097		20,857,500	104,287,500
Total	17,946		128,133		187,780,200	938,901,000

3.4. Environment

One of the worst devastation caused by the cyclone is potential ecosystem disruption in which environmental repercussions can be expected due to the loss of enormous wild animals, reptiles, and insects as well as the soil erosion and deforestation¹¹.

3.4.1. Environmental Damage

The heavy flash flooding caused extensive soil erosion, formation of gullies, and clearance of forests, which have changed the natural landscape by turning the hills into valleys, and valleys into hills. The natural beauty of the land is changed, experiencing denudation, and expansion of aridity.

A severe **deforestation** is encountered in the field whereby several forest species are uprooted and ultimately washed out. The vegetations in potential grazing areas were eroded. Also, the **top soil** that grown palatable trees was washed by the heavy floods and large deep gullies were formed; which will negatively affect the future regeneration of the vegetation and trees. There was a large treeless plains with full of sand dunes that formed in the rangelands.

In the **pasture destruction** that we already mentioned under section 3.1.1 (Above); previously the pasture condition was not good due to prolonged drought and deforestation activities driven

¹¹ Ahmed Ibrahim of the Ministry of Environment and Rural Development

by the need for charcoal production, expansion of human settlement and overgrazing. However, the potential pasture was drastically washed out by the cyclone, turning the land denuded

Fig 3.4.1.0. Land erosion caused by the Sagar storm in Karuure, Lughaya district



Also, the floods have formed **large gullies** and this will contribute to the formation of semi-permanent loss of land, and will adversely affect to human life, livestock and their environment.

Quantitatively, about 50 dry rivers (Tog in Somaliland) were enlarged by 50m or so with increase depth of 1m. The average length of a tog is 30km in Somaliland, and therefore, the total damage is 7,500,000 metric cubic of land.

Table 3.4.1.0: Damage of dry rivers in KM

Dimension of damage dry rivers	Units
Number of dry rivers	50
Average length of dry river in meters (30 km)	30,000
Average width increase per dry river in meters	5
Average depth increase per dry river	1
Total damage in metric cubic	7,500,000
Land degradation damage cost per metric cubic in USD	95
Total land degradation damage in USD	712,500,000

Fig 3.4.1.1: Garba-dadar, Baki area



Fig 3.4.1.1: Trees cleared by cyclone in Gargaara



Most of the **wild animals** lived in the areas affected by the cyclone storms were died due to the effects of the cold, strong wind and flash floods resulted by cyclone. Habitat loss is been encountered in these areas, and this exacerbated the number of wildlife species that were lost. Tremendous carcass of different wildlife species were scattered in the flood affected areas and sea shores. Community elders ascertained that they have seen the carcasses of the many wildlife species including Geranug, spekes gazela, sumaring gazela, ostrich, fox, spotted hyena, tortuous, and many more, let alone the washed away reptiles.

3.4.2. Necessary Environmental Interventions and Financial Needs

Following urgent interventions were proposed and table 3.4.2.0 provided the estimated replacement cost of the damaged dry rivers. Proposed interventions:

1. Establishing barriers in the damaged dry rivers
2. Carry out awareness on sustainable use of the remaining natural resource including wildlife and combat against the charcoal production activities.
3. Tree planting in coastal villages to reduce future flooding

Table 3.4.2.0: Magnitude of damage and the cost of the proposed interventions

No	Interventions	Units	Unit description	Cost/Unit	Total cost
1	Range land improvement through execution of soil and water conservation activities	54,000	Number	32	1,728,000
2	Construction of Gully control measures by using Gabion wire	10,000	Metric cubic	95	950,000
3	Awareness rising programs on environmental conservation	15	Number	8,000	120,000
4	Reforestation programs per sites	5	Number	50,000	250,000
5	Sustainable fodder production sites	4	Number	60,000	240,000
5	Wild life conservation programs	5	Number	150,000	750,000
5	TOTAL REPLACEMENT COST				4,038,000

4. Social Service Infrastructure

In addition to the production sector damage, the cyclone severely affected the social service infrastructure, including education, health, water, and road infrastructure.

4.1. Roads

4.1.1. Road Damage

The roads presented on table 4.1.1.0 were found blocked, badly damaged or destroyed; and accessibility to the affected areas is extremely difficult and impossible in some of the areas. As a result, the humanitarian aid supplies to the affected areas faced accessibility constraints to meet the dire need for food, water, medicine, clothes and other lifesaving necessities.

The assessment found that most of the roads in affected areas were blocked. Much of them turned into gullies, filled with landslides and fallen big trees. Also the storms formed long edges and holes. Aggregately, 202km of roads was destroyed, including 182km of paved roads and 20km of tarmac road.

Table 4.1.1.0: Type and distance of the roads damaged by the cyclone

NO	Road name	Type of road	Distance in KM
1	New Baki –Ali Haid	Paved	65
2	New Baki-Old Baki	Paved	9
3	New Baki-Hamarta	Paved	18
4	Hungari mountain	Paved	12
5	Garbo Dadar Valley	Paved	1
6	Garbo dadar- Warabe darerey	Paved	0.6
7	Waraabe Dareeray- Tuurka	Paved	1.5
8	Tuurka- garagara	Paved	0.2
9	Garagara- hulka	Paved	3
10	Gargaara-Lugahaya	Paved	50
11	Gargaara-Osoli	Paved	19
12	Qabri baxar valley	Paved	4
13	Waraqa dhigta	Paved	0.2
14	Burao to Tukaraq tarmac road	Tarmac	20
15	Turki	Paved	4
16	Kadar	Paved	5
	Total		211



Fig 4.1.1.0: Garagara to Lughaya road



Fig 4.1.1.2: Turka road changed into valley.

4.1.2. Road Interventions and Financial Needs

Civil engineers proposed following road reconstruction interventions

- To survey and construct new roads distant from dry rivers and water streams
- To manage water flows into roads of Maregalay to Xooray villages
- Gamoosinalka mountains need road cleaning exercise with Bulldozers and other heavy machineries
- To manage the widening dry rivers by using Gabion wires
- To form drainages and water passages in the mountainous areas to sustain roads

- To build Swiss bridges in some of the dry rivers which carry big volume of water and susceptible to floods

The cost for reconstruction and maintained of the roads damaged by the cyclone based on \$30,000 per one kilometer of tarmac road and \$8,000 for one kilometer of paved road was estimated as \$2.1 million; even the assessment covered only Awdal and Sool regions.

Table 4.1.2.0: Required cost for the roads damaged by the cyclone

NO	Road name	Type	KM	Cost/Km	Total cost
1	New Baki –Ali Haid	Paved	65	8,000	520,000
2	New Baki-Old Baki	Paved	9	8,000	72,000
3	New Baki-Hamarta	Paved	18	8,000	144,000
4	Hungari mountain	Paved	12	8,000	96,000
5	Garbo Dadar Valley	Paved	1	8,000	8,000
6	Garbo dadar- Warabe darerey	Paved	0.6	8,000	4,800
7	Waraabe Dareeray- Tuurka	Paved	~1.5	8,000	12,000
8	Tuurka- garagara	Paved	0.2	8,000	1,600
9	Garagara- hulka	Paved	3	8,000	24,000
10	Gargaara-Lugahaya	Paved	50	8,000	400,000
11	Gargaara-Osoli	Paved	19	8,000	152,000
12	Qabri baxar valley	Paved	4	8,000	32,000
13	Waraqa dhigta	Paved	0.2	8,000	1,600
14	Burao to Tularaq tarmac road	Tarmac	20	30,000	600,000
15	Turki	Paved	4	8000	32,000
16	Kadar	Paved	5	8000	40,000
	Total		202		2,140,000

4.1.3. Road Damage Economic Loss

The economic loss caused by the road damage can be estimated by the shortage of goods and services, and consequently, inflation of the those commodities. The price of the goods produced from the areas affected by the cyclone has increased 33.33% according to the local retails interviewed by the media. Therefore, one third of the cost of the necessary interventions is plausible indicator, which is \$690,000 as per table 4.1.3. Although, this amount of economic loss can be per day, using it as monthly loss is more practical to avoid exaggeration. If so, then, the economic loss for 12 months can be estimated as USD 8,280,000.

Table 4.1.3.0: Road damage related economic loss in USD

Type of cost	Amount
Intervention cost	2,068,000
Monthly economic loss in one year	690,000
Yearly economic loss	8,280,000
Economic loss in five years	41,400,000

4.2. Education

The Cyclone Sagar affected the education sector severely. In Somaliland history, it is the first natural disaster that has harshly damaged the educational sector, specifically schools at once. It mainly affected the education facilities of 12 districts; but the damaged schools located in 8 districts.

4.2.1. Educational Infrastructure Damage

Number of assessments carried out by the Ministry of Education and some of the international nongovernmental organizations (INGO), including Save the Children International (SCI), Norwegian Refugee Council (NRC), and UNICEF covered 40 schools in the districts affected by the Sagar and torrential rains. About 9,670 students were attending at those 40 schools; in which the assessments provided both the magnitude of the damage and the estimated cost for the necessary interventions.



4.2.2. Educational Interventions and Financial Needs

Reconstruction and rehabilitation of schools, and school water supply and latrines are the major proposed interventions, in addition to purchasing class furniture, teaching and learning materials, textbooks, psychosocial trainings for teachers and community educational committees (CECs), go-back to schools campaigns, and incentive for unpaid teachers

Although, different assessments reported 40 schools affected by the Sagar; the cost of the necessary reconstruction and rehabilitation interventions of 28 schools was estimated as \$780,178. About \$272,298 is required for school reconstruction, \$210,180 for teaching materials and text books, \$138,000 for school water and latrine needs, and \$70,000 for school furniture (See table 4.2.2.0).

Table 4.2.2.0: Estimated school reconstruction and rehabilitation cost in USD

Priority intervention	Units	Description	Cost/Unit	Total cost
Reconstruction and rehabilitation of schools	28	Schools		272,298
Construction & Rehabilitation of water sources	15	Berkeds	5,000	75,000
Latrine facilities	25	Latrines	2,500	62,500
Furniture of Schools (70 Classes * 15 Sets)	70,000	Sets	1,000	70,000
TLM and Textbooks	7,256	Text books	20	210,180
Psychosocial teachers and CEC trainings	4	Trainings	5,000	\$20,000
Incentive for 60 unpaid teachers for 6 months	360	Person months	600	52,200
Go-back to Schools campaigns	6	Campaigns	3,000	18,000
Total cost of the 28 assessed schools				780,000

As of today, financing 14 out of those 28 schools in which the cost was provided is pledged by three international organizations- namely; NRC (\$64,575), SCI (\$59,775), and UNICEF (\$22,587), which is a total of \$146,973. Whilst, financing the rest of 14 schools, which is \$145,325 is yet to be pledged as per table 4.2.2.1, below.

Table 4.2.2.1: Estimated school reconstruction cost in USD

District	No	School	Cost in USD	Responsible partner
Lughaya	1	Sheed-dheer	7,774	SCI
	2	Balayga	7,939	SCI
	3	Gargaara	22,587	UNICEF
	4	Osoli	8,153	SCI
	5	Kalowle	7,585	SCI
	6	Lughaya Primary	13,138	NRC
	7	Ido Cadeys	7,997	SCI
Baki	8	Daad Ka Boodka	2,650	SCI
	9	Dhabiga Cad	2,948	NRC
G/Adag	10	G/Adag Secondary	6,889	Financing is yet to be pledged
Erigavo	11	Lanqiciye	5,459	Financing is yet to be pledged
	12	Booca	3,550	Financing is yet to be pledged
Caynabo	13	Wadaamo Goo	15,338	Financing is yet to be pledged
Berbera	14	Imam Shafi's Primary	28,762	NRC
	15	A/Azis Girls Primary	3,556	SCI
	16	Bursade Sec	14,121	SCI
	17	Gugux Primary	7,827	Financing is yet to be pledged
	18	Ximan Primary	9,413	Financing is yet to be pledged
	19	Huguf primary	25,000	Financing is yet to be pledged
	20	Ceel Sheik Primary	6,500	NRC
Hargeisa	21	Abdi Geedi	13,227	NRC
	22	Kaam Gaas Primary	8,059	Financing is yet to be pledged
	23	Ballay Siciid Primary	9,406	Financing is yet to be pledged
	24	Dhaboolaq	7,639	Financing is yet to be pledged
	25	Horyaal	3,890	Financing is yet to be pledged
Sallahley	26	Hassan Awale	9,597	Financing is yet to be pledged
	27	Sallahley Primary	21,151	Financing is yet to be pledged
	28	Sallahley Secondary	14,729	Financing is yet to be pledged
All		Total	292,298	
		Financed	146,973	
		Gap	145,325	
		Total students	7,256	

4.2.3. Educational Economic Loss

Converting the lost educational opportunities in monetary value is practical gauge of the educational damage related economic loss; but there is no standard price unit per person days.

However, this report utilizing the average monthly school fee of \$10 per students¹² and the total number of affected students of 7,256. In another perspective, teachers, principals, and other schools staff members will not get paid if those schools remained closed.

Based on these assumptions and averages; the total economic loss related to the educational infrastructure damage is USD 72,560 per month and USD 870,720 **in 12 months**. If those necessary interventions are delayed, the economic loss caused by the educational infrastructure damage could be increased to USD 4, 353,600 **for the next five years**.

Table 4.2.3.0. School damage related economic loss in USD for 12 months

Economic loss descriptions	Number
Students	7,246
Cost per month in USD	10
Economic loss per months in USD	72,560
Economic loss for one year in USD	870,720
Economic loss for five years in USD	4,353,600

4.3 Health Sector

About 10 health facilities were affected by the Sagar, including 5 badly affected health facilities and 5 partially affected health infrastructures; in addition to one health facility affected by the torrential rain. Loss of functionality status by these public health facilities in those locations will have negative influence on health services availability and access to these poor communities.

In post-cyclone days, Diarrhea and Malaria cases have been reported in all the districts especially in displaced communities as 120 cases and 21 others were confirmed respectively. Mosquito populations increased in Zeila and Lughaya districts and Sahil region, which poses a risk for Malaria disease transmission. So far, three cases of Malaria were confirmed in Berbera town. Prevalence of stagnant water along the coastal areas left by the cyclone can lead to poor sanitation and disease spread.

Ministry of health development has started emergency interventions by conducting full-blown assessment of health situation in the affected areas as well as dispatching Rapid Response Teams with medical supplies to serve temporarily those communities. Resource mobilization was started among partners of the ministry by organizing meetings. Ministry of health identified there is also a dire need for proper sanitation facilities. Restoration and repairing of health facilities is also high priority areas of concern. As repair of health facilities should take a while, emergency Rapid Response Teams assistance will continue for the affected people to cover up to 3 months of medical assistance (cases management), referral of cases and social mobilization (prevention of water-borne diseases) and Distribution of LLINs (prevention of Malaria).

¹² Monthly school fee is \$15 at the primary level and \$30 among the secondary schools, but the primary public schools are free

4.3.1. Health Infrastructure Damage

Public hospitals in Lughaya and Zeila district headquarters and MCHs in Gargaara, Eil Sheikh, and Lughaya were damaged badly. Two other MCHs and three health posts were also affected by the rains in the two districts

Table 4.3.1.0; Damaged Health Facilities by District and Level of Severity

District	No	Health facility	Level of damage
Lughaya	1	Lughaya public hospital	Severely
	2	Lughaya MCHs	Partially
	3	Gargaara MCH	Severely
	4	Eil Sheikh MCH	Severely
	5	Health post	Partially
	6	Health post	Partially
Zeila	7	Zeila public hospital	Severely
	8	Zeila MCH	Severely
	9	Health post	Partially
	10	Health post	Partially

Table 4.3.1.1: Details of the health infrastructure damages by district

SN	District	Description of the Damage and Loss
1	Lughaya	<p>The following damages were observed.</p> <ul style="list-style-type: none"> Lughaya district was extremely affected by the Cyclone with a death toll of 40, dozens of injuries and 7 missing people. All key health infrastructures were badly affected as Lughaya hospital and health center, Lughaya HC were destroyed. Health equipment's worth more than 200K dollars were damaged by the rain in Lughaya hospital Acute watery diarrhea cases reported has increased ever since the post-cyclone days. Cases with skin rashes and excessive itching have also been reported by health workers in affected areas in Baki and Lughaya districts. Unusual excessive cases with conjunctivitis was reported by the health workers There is also high density of mosquitos' population in all areas with stagnant water bodies\ Ceel-sheekh health post was destructed. There is increase of the mosquito population and the need for mosquito nets. Almost all the houses/huts were destroyed and families are homeless in this hot and in this critical situation There are no latrines in the town and people are practicing open defecation so sanitary kits are urgently required. There is a shortage of food because the floods has taken all their food stuff

		<ul style="list-style-type: none"> • The town is surrounded by water which can facilitate the breeding of mosquito.
2	Baki	<ul style="list-style-type: none"> • Baki district was extremely affected by the Cyclone with a death toll of 8 and 3 injuries • Health facilities were spared in this district • Stagnant water was available in every place which poses many health risks to the surrounding communities • Malnutrition is also on high alert as communities encountered severe food insecurity by losing their socioeconomic status. • Water sources have collapsed and people were drinking unclean water which can post health problems • Latrines have been destroyed by the floods
3	Zeila District	<ul style="list-style-type: none"> • Zeila district was also affected by the Cyclone with a death toll of 5 people reported and two injuries • Zeila hospital has been damaged by the storm partially and Zeila MCH is also affected • Health and nutrition services are provided in the health center only which is facing somr problems including hot climate, lack of drugs, issues with referral of complicated cases etc • The rest of the hospital infrastructure is going to collapse if not rehabilitated soon because of heavy rains damaged the roofs, walls and floor which are soaked.
4	Berbera	<ul style="list-style-type: none"> • Stagnant water could be seen along the coastal areas of Berbera town which can lead to poor sanitation and disease spread • Mosquito populations increased in Berbera, which poses a risk for malaria disease transmission • Three cases of Malaria were confirmed in Berbera town • One death was reported from Berbera town which was caused by collapsed house due to storms and heavy rainfall • As a result of the storm, the population movement has affected the incidences of several diseases which have increased, such as pneumonia, diarrhea, whooping cough and febrile illnesses. • There was a widespread food insecurity in the whole district • Water sources have collapsed and people were drinking unclean water. • Latrines has been destroyed by the floods • Carcasses were seen everywhere in Bulahar and this can create health problems <p>There were numerous waterlogged areas in the town and this may facilitate mosquito breeding which can result malaria outbreak.</p>

4.3.2. Health Interventions and Financial Needs

Following are the proposed interventions of the Health sector

- Rehabilitation of major health infrastructure in the affected areas (Repair and reconstruct all affected health facilities (hospitals, Health centres, health posts)
- Distribution of aqua-tab for water treatment and water containers
- Provision of adequate health emergency supplies to the affected areas
- Distribution of mosquito nets (LLINs) to the affected communities
- Distribution of sufficient sanitation and hygiene kits
- Health and nutrition support is quite needed as these communities have lost all their functional health facilities
- Mobile teams to continue provision of health and nutrition services as all non-functional health facilities were restored to their functional status.
- Distribution of NFI kits (Shelter) to Gargaara Bari IDP, Ceel-shekh and Zeila districts
- To continue community awareness campaigns in order to prevent AWD/ Cholera, Malaria and other communicable diseases
- To assist communities burn carcasses and other dead bodies near water sources and valleys
- Preposition of Adequate health emergency supplies to the affected regional warehouses
- Additional integrated Health and nutrition teams (Rapid Response Teams) to be deployed to the most Cyclone affected villages.
- Repair of collapsed water points, boreholes, well etc and Chlorination of the existing and functional ones

Table 4.3.1.1: Estimated health intervention costs in USD

District	No	Health facility	Reconstruction	Supply	Total cost
Lughaya	1	Lughaya public hospital	15,000	10,000	25,000
	2	Lughaya MCHs	5,000	2,000	8,000
	3	Gargaara MCH	8,000	5,000	13,000
	4	Eil Sheikh MCH	8,000	5,000	13,000
Zeila	5	Zeila public hospital	15,000	10,000	25,000
	6	Zeila MCH	8,000	5,000	13,000
Total					97,000

4.4 Water and Sanitation

The water and sanitation (WAH) facilities were damaged by the cyclone. It destroyed almost all water systems in the affected areas and caused serious hygiene and sanitation problems.

4.4.1. Water and Sanitation Damage

The Sagar cyclone and the floods wiped out 12 wells (2 boreholes and 10 shallow wells), about 10,000 meters of water distribution pipelines, 12 solar systems (Including cables and operator rooms, 12 animal watering troughs, 6 water kiosks, and 3 water reservoirs as per table 4.4.2.0.

Table 4.4.1.0: WASH proposed interventions

Type of damage	Unit	Unit description
Bore holes	2	Number
Shallow wells	10	Number
Pipeline	9,858	meters
Reservoir	3	Number
Solar system	12	Number
Kiosks	6	Number
Troughs	12	Number
Rooms	7	Number
Pumps	5	Number
Total		

Hereunder, damages in water and sanitation and hygiene facilities are summarized.

Table 4.4.1.1: Damages, losses and proposed interventions of WASH sector

SN	Area	Description of the Damage and Loss
1	Lughaya	<p>The solar system and the boreholes were not damaged and the borehole was operating during the visit of the team, however the following damages were observed.</p> <ul style="list-style-type: none"> • The floods wiped away 7KMs of the transmission pipeline mainly the parts near the town directions • The 4 water kiosks inside the town were destroyed by the winds, the floods filled with dirties and mud on the control champers near the water kiosks • The over flow pipe of the elevated water reservoir near the borehole is not there and water are flushing out from the water tanks • The old generator room has totally collapsed • Animal troughs are damaged.
2	Gargaara	<ul style="list-style-type: none"> • The floods wiped away the operator/solar room as the operator was among the dead people. • The distribution network and the water reservoir are not badly damaged • The shallow well was wiped away by the huge floods • The solar system was also wiped away by floods • The pump and the cable wires are not in place • The operator room was wiped away by the floods
2	Garbo-Dadar	<ul style="list-style-type: none"> • The floods wiped away the operator/solar room. • The distribution network and the water reservoir are not badly damaged.

		<ul style="list-style-type: none"> • The shallow well was wiped away by the huge floods • The solar system was also wiped away by floods • The pump and the cable wires are not in place • The operator room was wiped away by the floods <p>The distribution pipe line has small damages</p>
3	Hadayta	<ul style="list-style-type: none"> • The distribution network and the water reservoir are not badly damaged • The shallow well was wiped away by the huge floods • The solar system was also wiped away by floods • The pump and the cable wires are not in place • The operator room was wiped away by the floods • The distribution pipe line has slightly been damaged • The floods had isolated the entire village and the possibility the village to have access to water system again is very difficult. People have arranged new settlement and the only option now is water trucking and then survey of new water sources and system
4	Cali-xaydh	<ul style="list-style-type: none"> • The distribution network and the water reservoir are not badly damaged. • The shallow well was wiped away by the huge floods • The solar system was also wiped away by floods • The pump and the cable wires are not in place • The operator room was wiped away by the floods • The distribution pipe line has small damages
5	Baki	<ul style="list-style-type: none"> • The distribution network and the water sources, solar system and the other infrastructure are not badly damaged, however there runoff water were only few meters from the water source and the similar rainfall can wipe it away if not protected from the floods • There still small rehabilitation works needed such as flood protection by putting gabion baskets along the river bank
6	Fadhixun	<ul style="list-style-type: none"> • The distribution network and the water sources, solar system and the other infrastructure are not badly damaged. However there runoff water were only few meters from the water source and the similar rainfall can wipe it away if not protected from the floods • There still small rehabilitation works needed such as flood protection by putting gabion baskets along the river bank
7	Xamarta	<ul style="list-style-type: none"> • The water source distribution network and the water reservoir are not damaged. However the following damages were observed • The transmission pipe line has small damages • Small damage to the cable wire
8	Lawyacaddo	<ul style="list-style-type: none"> • The distribution network and the water reservoir are damaged by the floods. The water reservoir is leaking and nor sufficient to the town water supply

		<ul style="list-style-type: none"> • The generator was damaged by the floods • The pump and the cable wires are not in place • Transmission pipe 2000m is damaged • Operator room has some damages • The distribution pipe line was badly damaged • Solar system is not available
9	Zeila	<ul style="list-style-type: none"> • The floods are still stagnant inside the town and the dirties may inter inside the pipes during the system break. • The transmission pipeline, i.e. 2,800m is damaged by the floods • The distribution pipe line was also badly damaged
10	Jidhi Borehole	<ul style="list-style-type: none"> • The system and the borehole are working, however there are small damages and renovations needed • The distribution network and the water reservoir are not badly damaged. • The solar system is not functioning and needs total change • The riser pipe and the distribution pipelines are very small, i.e. one and half • The operator room was damaged by the floods
11	Damasha	<ul style="list-style-type: none"> • The distribution network and the water reservoir are not damaged. • The shallow well was wiped away by the huge floods • The solar system was also wiped away by floods • The pump and the cable wires are not in place • 300 meters of the transmission pipes are not in place
12	Cabdi-geeddi	<ul style="list-style-type: none"> • The water system and the borehole is functioning. However there was damage to the solar system and people cannot afford to pay the fuel costs
13	Xeego	<ul style="list-style-type: none"> • The small and unprotected shallow well was totally damaged by the floods
14	Weeraarta	<ul style="list-style-type: none"> • The cyclone and floods has destroyed some of the temporary traditional houses and people are complaining about availability of water as there are no water sources near the village
15	Sheikh Aware	<ul style="list-style-type: none"> • The cyclone and floods has destroyed some of the temporary traditional houses and people are complaining about availability of water as there are no water sources near the village
16	Fiqi Adan	<ul style="list-style-type: none"> • The small and unprotected shallow well was totally damaged by the floods new system
17	Daba-dilaac	<ul style="list-style-type: none"> • The small and unprotected shallow well was totally damaged by the floods new system
18	Toqoshi	<ul style="list-style-type: none"> • The water system is connected to Zeila water system and the floods damaged the branch which is providing water to Toqoshi village.
19	Asha Ado	<ul style="list-style-type: none"> • The floods damaged the water sources as well as the solar system which has not operated for long time

20	Badanbad	<ul style="list-style-type: none"> • The small and unprotected shallow well was totally damaged by the floods
21	Dhabolaq	<ul style="list-style-type: none"> • The shallow well as well as the solar system are not operating
22	Habashawacle village	<ul style="list-style-type: none"> • The community depends on the earth dam of the rain fed. Due to the effect of the cyclone the dam can't store the water for long time. The community reported that they don't have any other water storage other than the dam. • Few rural shallow wells which were located at the banks of the dry rivers have been damaged and destroyed by the Cyclone storms. Those areas include Geelwayte and Waqdariya
23	Lasqoray	<ul style="list-style-type: none"> • Lasqoray water system is affected by the storms and require improvement as certain parts of town have no access to water due to scarce water tanks for water supply
24	Jamaan Caduur Shimirale-four shallow wells	<ul style="list-style-type: none"> • Shallow wells have been partially damaged/ destroyed as result of Cyclone Sagar
25	Berbera	<ul style="list-style-type: none"> • Berbera water supply systems were flooded and most of the water supply pipeline chambers protects damaged with possible contaminated water infiltrated into the system. • Public Sanitation facilities were also damaged. One toilet including the septic tank is collapsed in Berbera Hospital.
26	Ceel-Sheikh	<ul style="list-style-type: none"> • The communities have a number of unprotected brackish shallow wells that provide water throughout the year. This water quality measuring at 7,000Ms is well above the recommend human consumption limit. The village is still between disturbed coastal line and huge amount of fresh water damped by the cyclone. • There are reports of increasing numbers of AWD cases and complains of large amount of mosquitoes with few malaria suspected cases. •

Figure 4.4.1.0 flooded and contaminated water supply chambers.



Figure 4.4.1.1: School and water supply facilities damaged in Ceelsheikh



Fig 4.4.1.2. Children fetching water from dam in Xabaasha Wacle villages in Lasqoray district



Figure 4.4.1.3: Control chambers for the kiosks filled with dirt and mud in Lughaya transmission pipe wiped away by the floods



Figure 4.4.1.4: Garbodadar shallow well and solar system wiped away by the floods

4.4.2. Water Sector Interventions and Financial Needs

The total estimated costs of the proposed WAH interventions is \$405,896, including \$80,000 for wells, \$120,000 for the distribution pipelines, and \$60,000 for the replacement of each of the damaged reservoirs and pumps; and around \$40,000 for the destroyed solar systems.

Table 4.4.2.0: The cost of proposed interventions by type of damage in USD

Type of damage	Unit	Unit description	Cost/unit	Total
Bore holes	2	Number	25,000	50,000
Shallow wells	10	Number	3,000	30,000
Pipeline	9,858	Meters	12	118,296
Reservoir	3	Number	20,000	60,000
Solar system	12	Number	3,000	36,000
Kiosks	6	Number	1,200	7,200
Troughs	12	Number	900	10,800
Rooms	7	Number	4,800	33,600
Pumps	5	Number	12,000	60,000
Total				405,896

Table 4.4.2.1: estimated cost of the proposed interventions in USD by settlement

No	Settlement	Required financial cost
1	Alihaydh	30,045
2	Baki	30,045
3	Fadhi xun	30,106
4	Garbo dadar	29,700
5	Gargaara	30,045
6	Hadayta	30,045
7	Jidhi	23,417
8	Lawyacaddo	32,943
9	Lughaya	101,506
10	Xeego	48,181
11	Zaila	19,861
	Total	405,894

4.5 Housing Infrastructure

Housing assessment covered only 4 out of the 12 districts struck by the Sagar cyclone and the torrential rains; and only 21 settlements out of the 422 settlements; which is one of the weakness of the assessments as stated in the introductions section.

In addition, the assessment recorded **ONLY** the permanent structures, including dwelling and governance buildings destroyed or damaged by the cyclone, but not the temporary structures, such as *aqal* Somali and tents (bus in Somali), which are the major dwelling housing structures in the rural and nomad areas.

Even, a sizable proportion of the disadvantaged urban residents live in such temporary dwelling structures. As a prove' in Hargeisa city, 5% of the residents live temporary dwelling structures¹³. Therefore, only household sample survey could estimate the actual housing damage.

4.5.1. Housing damage

A total of 1,488 buildings were destroyed or partially damaged (See annex 2 for the details of the damage), including 1,459 houses and 29 government buildings as per table 4.5.1.0 below.

Out of the 1,459 reported damaged houses, 988 were recorded in Lughaya districts, and similarly, 22 out of the 29 government building are in this district.

Possibly; absence of the necessary regulatory system, including building codes and effective implementation mechanisms turned the residential decision making into chaos; where local residents usually settle; whenever they choose regardless the suitability. Therefore, many households live near water passages and drainages; and consequently; flooding can easily damage the housed and might endanger the residents in both urban and rural areas..

¹³ Diirye, Ahmed; Hargeisa Market Research for Ilotango Company, 2017

Table 4.5.1.0: Dwelling and governance structures damaged by the Sagar by district

District	Settlement	Dwelling buildings	Governance buildings	Total Buildings
Berbera	1.Geerri	6	0	6
	2.Bulahaar	32	1	33
Lughaya	1.Eil Sheikh	36	1	37
	2.Abdi geedi	146		146
	3.Heeti	96	3	99
	4.Gargaara Bari	62	3	65
	5.Garbo Dadar	180	3	183
	6.Warabe Darera	65	2	67
	7.Tuurka	162	2	164
	8.Biyo Garaaca	16	4	20
	9.Lughaya	225	4	229
Zeila	1.Harirad	146	6	152
	2.Fuquho	28		28
	3.Hamarta Ogeda	100		100
	4.Jidhi	13		13
	5.Habaas	48		48
	6.Abdiqadir	33		33
Baki	1.Ali Haydh	22		22
	2.Ruqi	13		13
	3.Madah Dadley	5		5
	4.Old Baki	25		25
	Total	1,459	29	1,488

4.5.2. Necessary interventions and Financial Needs for Housing Damage

The total financial needs is USD 3 million for the reconstruction of the 1,500 destroyed or damaged housing and office buildings, in addition to producing building code and enforcing in the 23 districts in Somaliland as per table 4.5.1.0; whilst the cost break down by settlement and distinct can be seen on table 4.5.1.1. below.

Table 4.5.1.0: Interventions and estimated costs in USD

Intervention	Units	Unit description	Cost in USD
Housing maintenance	1,459	Dwelling units	1,533,894.40
Office maintenance	29	Government buildings	245,440.80
Producing building codes	23	Districts	1,150,000
Total costs			2,929,335.20

Table 4.5.1.1: Dwelling and governance structures damaged by the Sagar by district

District	Settlement	Housing cost	Office cost	Total costs
Berbera	Geerri	4,200.00	0	4,200.00
	Bulahaar	10,400.00	2,500.00	12,900.00
Lughaya	Eil Sheikh	19,800.00	5,250.00	25,050.00
	Abdi geedi	68,800.00		68,800.00
	Heeti	28,800.00	60,800.00	89,600.00
	Gargaara Bari	51,140.80	42,500.00	93,640.80
	Garbo Dadar	86,500.00	28,700.00	115,200.00
	Warabe Dareray	19,500.00	31,128.00	50,628.00
	Tuurka	49,741.60	4,440.00	54,181.60
	Biyo Garaaca	9,056.00	24,195.00	33,251.00
	Lughaya	169,450.00	28,627.80	198,077.80
Zeila	Harirad	102,700	17,300.00	120,000.00
	Fuquho	14,000.00		14,000.00
	Hamarta Ogeda	20,000.00		20,000.00
	Jidhi	9,100.00		9,100.00
	Habaas	48,508.80		48,508.80
	Abdiqadir	19,700.00		19,700.00
Baki	Ali Haydh	17,600.00		17,600.00
	Ruqi	15,200.00		15,200.00
	Madah Dadley	3,500.00		3,500.00
	Old Baki	766,197.20		766,197.20
	Total	1,533,894.40	245,440.80	1,779,335.20

4.6. Electricity and Telecommunication

The cyclone damaged about 35,000 meters of electricity wires, 345 electricity pillars, and 15 telecommunication towers; which led many households and business entities into total blackout and without communication services for certain period of time. In monetary value; the damage was estimated as USD 737,250 roughly.

Table 4.6.10.: Electricity and telecommunication damage in natural units and monetary value

Type of damage	Units	Cost in USD
Electricity wires in meters	35,000	276,000
Number of electricity pillars	345	86,250
Number of telecommunication towers	15	375,000
Total		737,250

Based on the reality of that the weak infrastructure regulation structure is in place, inappropriate electricity installation system exist; let emergency arrangements alone; endangerment of the safety of the people and properties is imminent from such electricity wire damage. However, some of these damages were already maintained by the private sector and the services were restored.

5. Disaster Management Capacity

Disaster management capacity of the country needs to be strengthened, and due to limited financial capacity has impeded the National Disaster Preparedness and Food Reserve authority (NADFOR) to face challenges to effectively execute its mandate as far as disaster risk management is concerned. Meanwhile, early warning system of the country towards disaster risks reduction is poor, and needs to be improved at local, district and national level to effectively manage disasters. Thus there is high need to build the capacity of NADFOR to improve country's capacity in managing disaster and sustaining the development since the disaster impacts on development of the country.

5.1. Disaster Manage Capacity Building Interventions

Following capacity building interventions were recommended and their costs were estimated as per table 5.1.1.0. Setting mandatory evacuation and early warning systems are the proposed interventions, in addition to establishing clear institutional mandates in the disaster management. However, conducting households' survey is crucial before above-stated interventions to collect sufficient and reliable data through structured interview, focus group discussions, and in-depth interview to identify

- Determinants of the damage, i.e. why some households suffered more than others
 - Public perception based early warning system and coordination of the necessary assistance
- According, the total estimated capacity building costs in \$6.1 million as per table 5.1.1.0.

Table 5.1.1.0: Disaster management capacity building interventions and required costs in USD

Intervention	Units	Unit description	Cost in USD
Mandatory evacuation act	1	Act and policy	70,000
Establishing early warning system	23	Districts	2,300,000
Disaster information management	1	-----	150,000
Strengthening emergency response capacity of NADFOR	1	Transport and communication facilities	1,500,000
NADFOR capacity building	1	Staffing/construction of head-quarter, equipping	750,000
Establishment of strategic reserves	7	5 warehouses and 2 Natural food reserves	1,500,000
Total costs			6,135,000

ANNEXES

Annex 1: Additional Educational Damage

Although, the estimated cost is available for 28 schools; there are another 12 schools, in which the Ministry of Education was reported, but the required costs are yet to be estimated as can be seen on table 1 below.

Table 1: Descriptions of the other 12 schools

District	No	School	Students	Damage
Lughaya	1	Waraabe Dareeray	106	Moderate
	2	Waraqa Dhigta	70	Moderate
	3	Tuurka	90	Slightly
Garadg	4	Dabablehe Public Sch	70	Severely
Erigavo	5	Taageer Public Sch	150	Severely
	6	Sh. Dalmar	94	Moderate
	7	El-Shilaale	45	Moderate
Caynabo	8	Barde Haahle	502	Severely
	9	Caynabo	806	Moderate
Berbera	10	M Handule Primary	294	Severely
	11	Dawdama Primary	65	Severely
	12	Bulaxaar Primary	122	Slightly
All		Total	2,414	

By taking the average necessary cost of \$27,864 among those 28 schools; the cost of the other 12 schools can be estimated as \$334,362. Therefore, the total estimated cost required for the interventions of the 40 schools struck by the Sagar is \$1,115,000; in which \$389,000 is required for the reconstruction of the schools, \$300,000 for the teaching and learning (TLM) materials, and \$196,000 for the school water supply and sanitation as per table 2.

Table 2: Estimated school reconstruction n rehabilitation cost in USD

Priority intervention	Total cost
Reconstruction	389,000
Construction & Rehabilitation of water sources	107,000
Latrine facilities	89,000
Furniture of Schools	100,000
Teaching and learning materials (TLM)	300,000
Psychosocial teachers and CEC trainings	29,000
Incentive for unpaid teachers	75,000
Go-back to Schools campaigns	26,000
Total estimated cost of the 40 schools	1,115,000

Annex2: List of core technical team produced the report

No	Name	Institution
1	Ahmed M. Diriye	NADFOR
2	Sharmaarke Abdi Musse	NADFOR
3	Mohamed Abdalle Hussein	NADFOR
4	Mubarik Abdullahi Ibrahim	Ministry of Planning and National Development
5	Ismail Mohamed Ahmed	NDRA

Annex3: List of institutions participated in the production of the report

NO	INSTITUTION
1	Ministry of Environment and Rural Development
2	Ministry of Livestock and Fishing
3	Ministry of Agricultural development
4	Ministry of Health development
5	Ministry of water development
6	Somaliland Road Authority
7	Ministry of Education
8	Ministry of Land, Housing and Public affairs
9	National Displacement and Refugee agency