Forced displacement

Experiments in measurement

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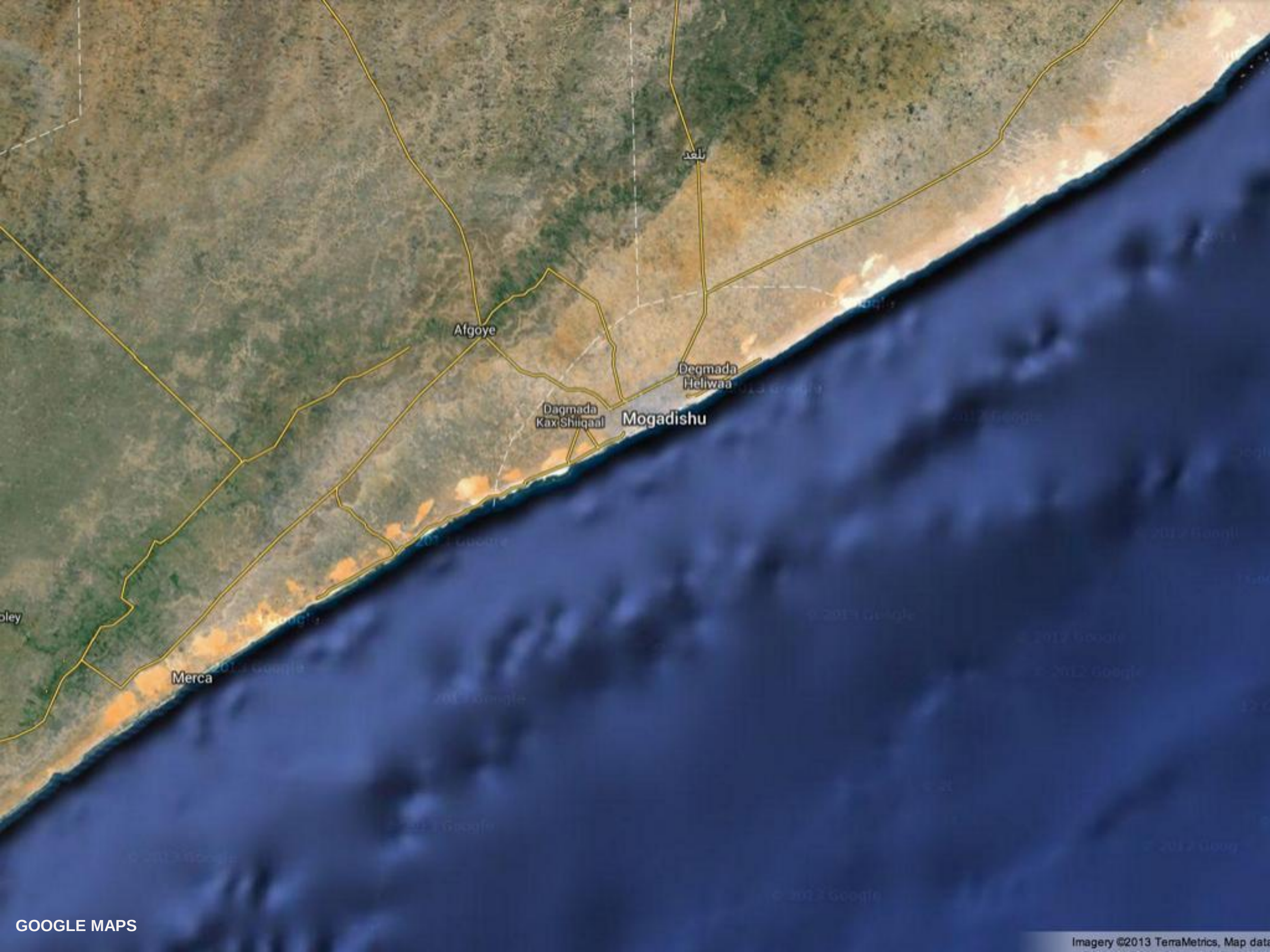
Overview

- Figures for the number of refugees or internally displaced persons are essential for planning and monitoring humanitarian response programmes.
- Obtaining and using quality figures is an interagency challenge
- Limitations to accuracy– political and practical

IDP Population Estimation Using Satellite Imagery (2010)

Estimating numbers of internally displaced persons in Somalia, using remote sensing techniques


Mek'ele
Ta'izz
Al Habilayn
Aden
Gulf of Aden
Gondar
Bahir Dar
Djibouti
Dessie
Bosaso
هيلان
Debre Markos
Berbera
Ceerigaabo
Fiche
Debre Birhan
Borama
Dire Dawa
Hargeisa
Burco
Jijiga
Nekemte
Ambo
Kolfe Keranio
Kebri Beyah
Ethiopia
Atnago
Jimma
Shashemene
Hawassa
Galkayo
Machi
Arba Minch
Finchawa
Beledweyne
Baidoa
Somalia
Mogadishu
Merca
Mbale
Kitale
Eldoret
Kenya
Dadaab
Jamaame
Kismayo
Kisumu
Nakuru
Nyeri
Meru
Garissa
Thika
Nairobi
Moshi
Malindi
Mombasa
Usangi
GOOGLE MAPS
Imagery ©2013 TerraMetrics, Map data ©2013 Goo


بلعد
Afgoye
Degmada
Heliwaa
Dagmada
Kax Shiiqaal
Mogadishu
Merca
GOOGLE MAPS
Imagery ©2013 TerraMetrics, Map data


BALCAD
CORRIDOR
AFGOOYE CORRIDOR
Afgoye
Degmada
Heliwaa
Dagmada
Xamar Jadiid
Dagmada
Yaaqshiid
Dagmada
Kaaraan
Dagmada
Wardhiiqleey
Dagmada
Hodon
Dagmada
Kax Shiiqaal
Dagmada
Dharkenleey
Mogadishu
Dagmada
Waaberi
Jaziira
GOOGLE MAPS

Objective

- To estimate the number of IDPs in the Afgooye corridor, and other settlements in the Mogadishu periphery
- Estimates from field surveys and humanitarian partners were impossible (2 million plus)

Background on Methodology

- A high resolution satellite image of the Afgooye corridor was taken on **10th July 2010**.

- Afgooye was undergoing a process of urbanization so population figures were analyzed in two parts:

1. **People living in temporary shelters / buuls**

2. **People living in permanent/semi-permanent structures**

GeoEye images were taken on 10th July 2010

Afgooye Town

Bal’cad Corridor

Dayniile

Afgooye Corridor

Kax Shiiqaal

MOGADISHU

Coverage Area

Afgooye Town

Bal'cad Corridor

Dayniile

Afgooye Corridor

Kax Shiiqaal

MOGADISHU

Oct 2007

Comparison with Previous Imagery

October 2007 vs July 2010

Dramatic Rate of Change

Xaawo Cabdi / Ceelasha

Oct 2007

Xaawo Cabdi / Ceelasha

July 2010

Xaawo Cabdi / Ceelasha

Oct 2007

Ceelasha

July 2010

Ceelasha

Oct 2007

July 2010

Faculty of Agriculture

Oct 2007

July 2010

Mapping Shelter Points and Buildings

Xaawo Cabdi / Ceelasha

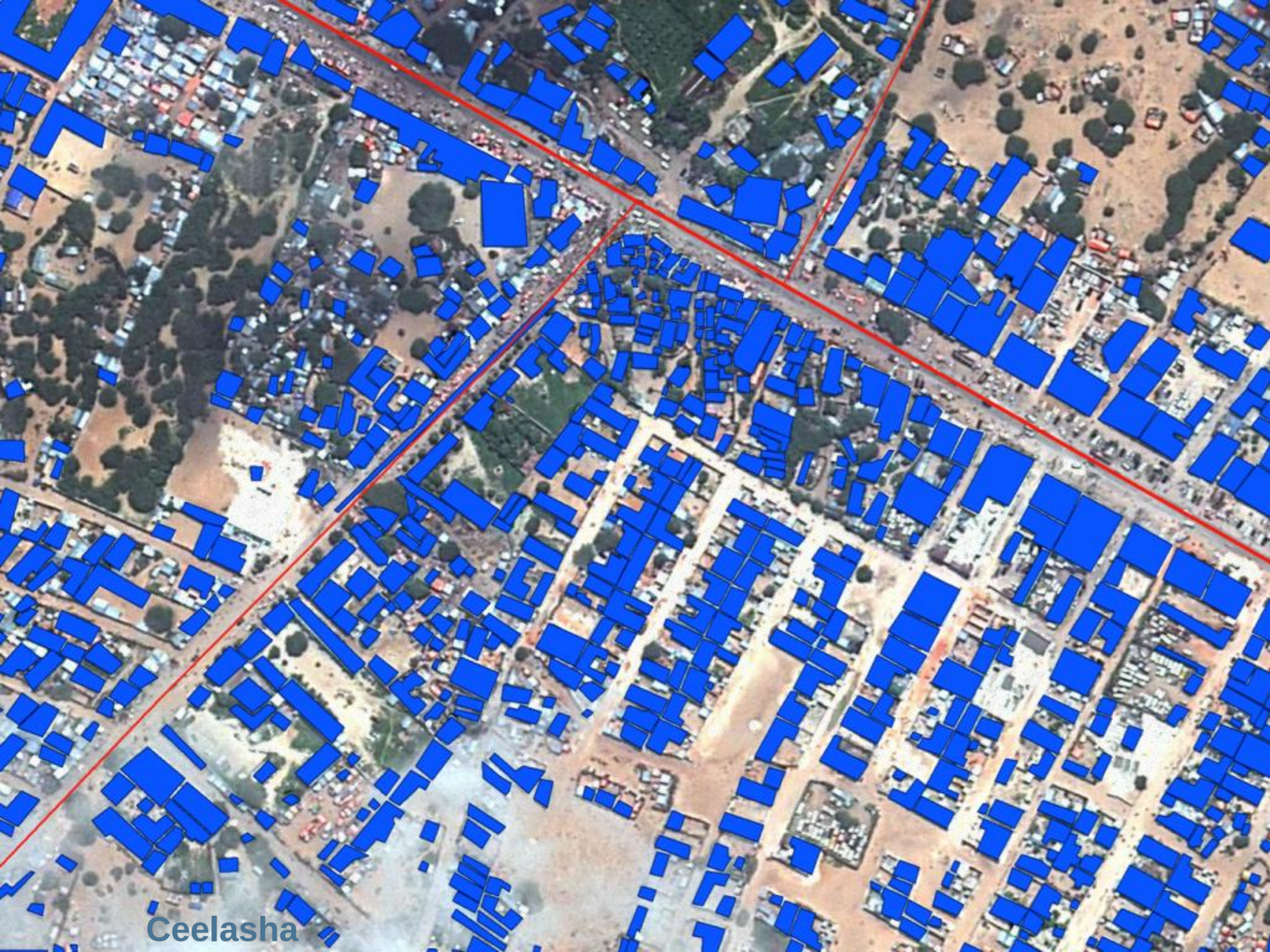
Buildings were mapped as

polygons

in order to establish building area

in meters squared

Ceelasha


Ceelasha

Shelters were mapped as points

Ceelasha


Ceelasha

Animation of Mapping Process

http://data.unhcr.org/portfolio/2011/09/satellite-analysis/

https://www.dropbox.com/sh/mh66wn3chfa89h4/c9fyBv3dol#lh:null-Animation%20-%20Mapping%20Buildings%20and%20Shelters.wmv

Total Number of Buildings and Shelters Counted

Breakdown by Area

Balcad Corridor
3,810 temporary shelter
524 buildings (36,562 m

Dayniile
11,537 temporary shelters
3,342 buildings (229,737 m2)

Afgooye Corridor
91,397 temporary shelters
15,495 buildings (1,472,561 m2)

MOGADISHU

Kax Shiiqaal
628 temporary shelters
850 buildings (69,860 m2)

Temporary Shelter

- Figures on the average number of people per temporary shelter were obtained from **two different sources**:

Applying Population Data to Mapped Points and Polygons

In December 2005 an assessment was carried out by **SAACID** in Lafole, Afgoye corridor. 660 randomly selected families in 55 temporary IDP settlements were surveyed regarding family size and the number of buul structures per family. The findings revealed an average family (household) size of 6.227 – the average number of temporary shelters per household was 1.94.

Average Number of People / Temporary Shelter

- Figures on the average number of people per **temporary shelter** were obtained from **two different sources**:
  - In **December 2009** an assessment was carried out in Lafoole, Afgooye corridor. The findings revealed an average family (household) size of 6.227 and the average number of temporary shelters per household was 1.94.
  - **An average of 3.2 people per temporary shelter**

Average Number of People / Temporary Shelter

- In the period **2004 to 2008**, **UN-HABITAT** conducted a detailed urban assessment of Hargeysa. In addition to permanent urban structures, the survey also examined IDP settlements within the area. UNHCR analyzed UN-HABITAT's data to establish the average number of people per buul.

- **An average of 3.36 people per temporary shelter**

- *While the context of Hargeysa could be argued to be different from the Afgooye corridor, the data was found to be highly consistent with the data collected by SAACID in Lafoole, Afgooye.*

Average Number of People / Temporary Shelter

- For the purposes of this assessment, an **average** is taken between the SAACID and UN-HABITAT figures.
  - UN-HABITAT data – **3.36 people / temporary shelter**
  - SAACID data – **3.2 people / temporary shelter**

Overall Average

3.28 people per each temporary shelter

Average Number of People / m^2 of (Semi) Permanent Building

- UN-HABITAT's data on urban environments in Somalia (2004 – 2008) was used to establish the average number of people per square meter, living in similar structure types.
- In Hargeysa, 39,273 buildings were surveyed amounting to a total surface area of 3,399,087 m^2. Within this area, there were found to be 252,898 residents.
  - According to this analysis, the average number of people per square meter of building is **0.0744 people / m^2.**

Overall Average

0.0744 people per m^2 in semi-permanent / permanent buildings

Population Figures

RESULTS

Bal'cad Corridor

Population in Shelters

12,500

Population in Buildings

2,700

15,200

Afgooye Corridor

Population in Shelters

299,780

Population in Buildings

109,560

409,340

Dayniile

Population in Shelters

37,840

Population in Buildings

17,090

54,930

Kax Shiiqaal

Population in Shelters

2,060

Population in Buildings

5,200

7,260

MOGADISHU

Population Figures

Afgooye Corridor

Population in Shelters

299,780

(303,200 previously)

Population in Buildings

109,560

(62,400 previously)

409,340

(366,000 previously)

Dayniile

Population in Shelters

37,840

Population in Buildings

17,090

54,930

Bal'cad Corridor

Population in Shelters

12,500

Population in Buildings

2,700

15,200

Kax Shiiqaal

Population in Shelters

2,060

Population in Buildings

5,200

7,260

MOGADISHU

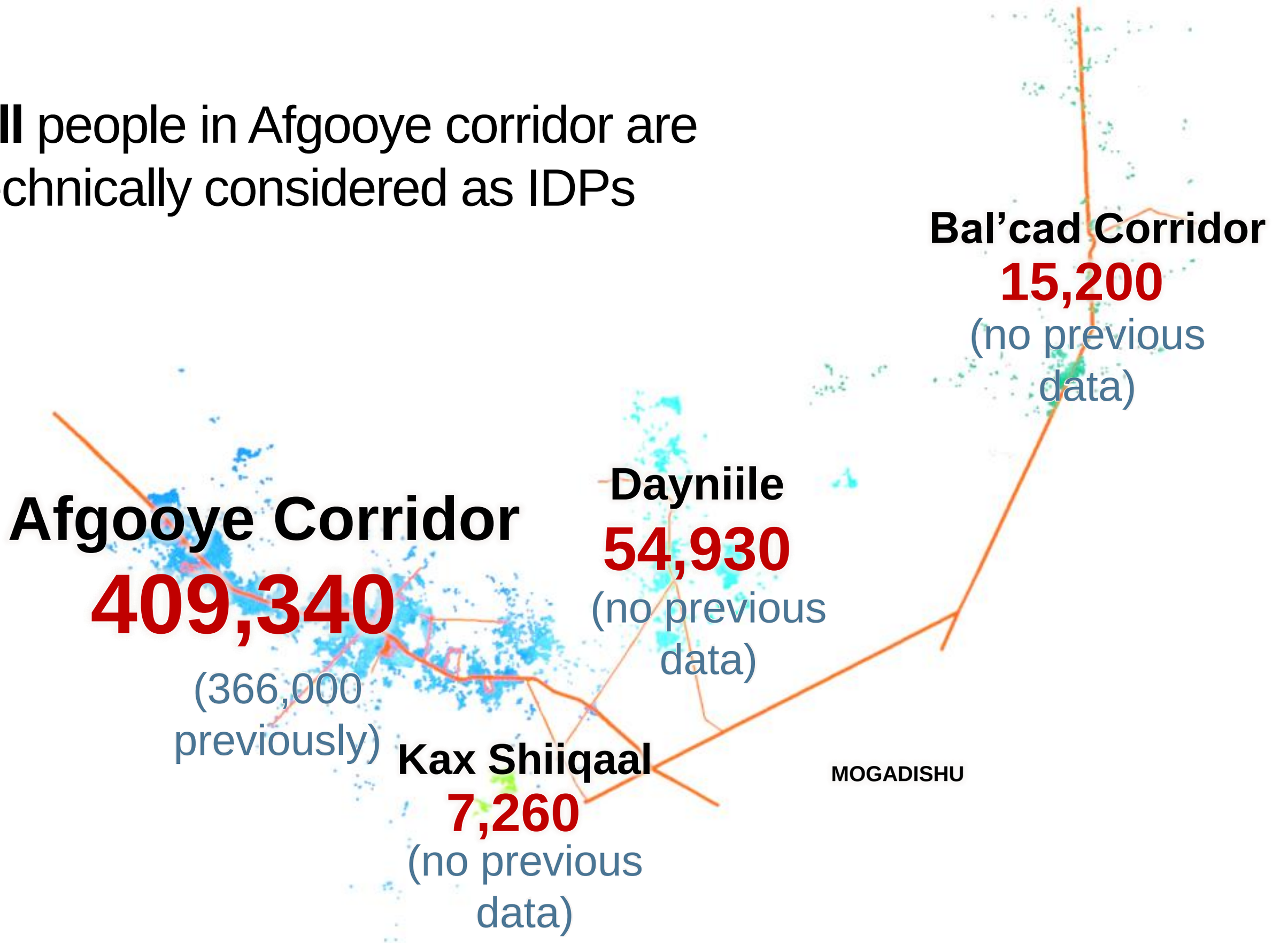
(no previous data for Kax Shiiqaal, Dayniile and Balcad Corridor)

Population Density

Temporary Shelter

Permanent/Semi-Permanent Buildings

All people in Afgooye corridor are technically considered as IDPs



Limitations and Assumptions

DData reliability

PPrevious assessments have failed due to inflated figures provided at the field level during data collection, attributed largely to inflated figures provided by individuals seeking to attract more humanitarian assistance.

Limitations and Assumptions

TThe margin of error with using UN-HABITAT data was likely to be smaller than figures gathered in relation to aid provision.

IIn the UN-HABITAT surveys of similar property types in Hargeysa, there was little or no interest in providing inflating figures.

Limitations and Assumptions

WWhat about fake camps? The possibility of fake settlements was not addressed in this assessment – it is assumed that all camps were genuine.

IIt is considered that the error margin may be small for the following two reasons:

- G Given the frequency of recent IDP evictions and the seemingly high real-estate value of land in the corridor, it may not be economical to construct fake settlements
- S Some people move in and out of Mogadishu on a daily basis due to economic reasons – settlements may be abandoned only on a temporary basis.

Limitations and Assumptions

WWhat about commercial buildings?

IIn order to address this, it was assumed that the same ratio of commercial to residential buildings may exist in the Hargeysa urban environment.

GGiven the apparent urbanization process in the Afgooye corridor, there has been an increase in commercial activity. Large commercial and industrial structures are clearly identifiable on the satellite image.

Are all people living in the Afgooye corridor considered IDPs?

Technically, nearly all people living in the Afgooye corridor have been displaced from Mogadishu, and therefore qualify as IDPs.

However, the level of vulnerability may vary between those living in temporary shelters and semi-permanent/permanent buildings.

Counting Shelters Using Crowdsourcing

Pilot exercise in partnership with the SBTF to estimate IDPs using crowdsourcing

The Need

The previous assessment took 4 people around 3 weeks to count all the shelters and buildings

UNHCR needs timely data on refugee movements & populations

Who is SBTF?

- 700+ volunteers & 70+ countries (120+ on Satellite Team)
- Volunteers are humanitarian sector professionals, geographers, remote sensors, translators, writers, reporters, grad students - a virtually endless skill-set.
- UN experience (OCHA, UNHCR)

Process

- Volunteer force established
- Satellite imagery obtained through Digital Globe
- Leverage online platform for manual identification of IDP shelters (Tomnod)

tomnod Crisis Mapper

AFGOOYE

INSTRUCTIONS EXAMPLES MY HISTORY TOMNOD

ogin

Type 1

Type 2

Type 3

AFTER

BEFORE

NEXT MAP

tomnod Disaster Mapper

Login to Tomnod Crisis Mapper:
Somalia

e-mail*

password*

Login

- or -

Login with Facebook

sign up

0 10 100 m

patrick (logout) Map 3 (share)

permanent structure

temporary shelter

AFTER

BEFORE

NEXT MAP

Users are presented with random tiles. The user then maps any shelters in the tile area.

253,711: total number of shelters identified by 168 volunteers after processing 3,909 satellite images in just 5 days.

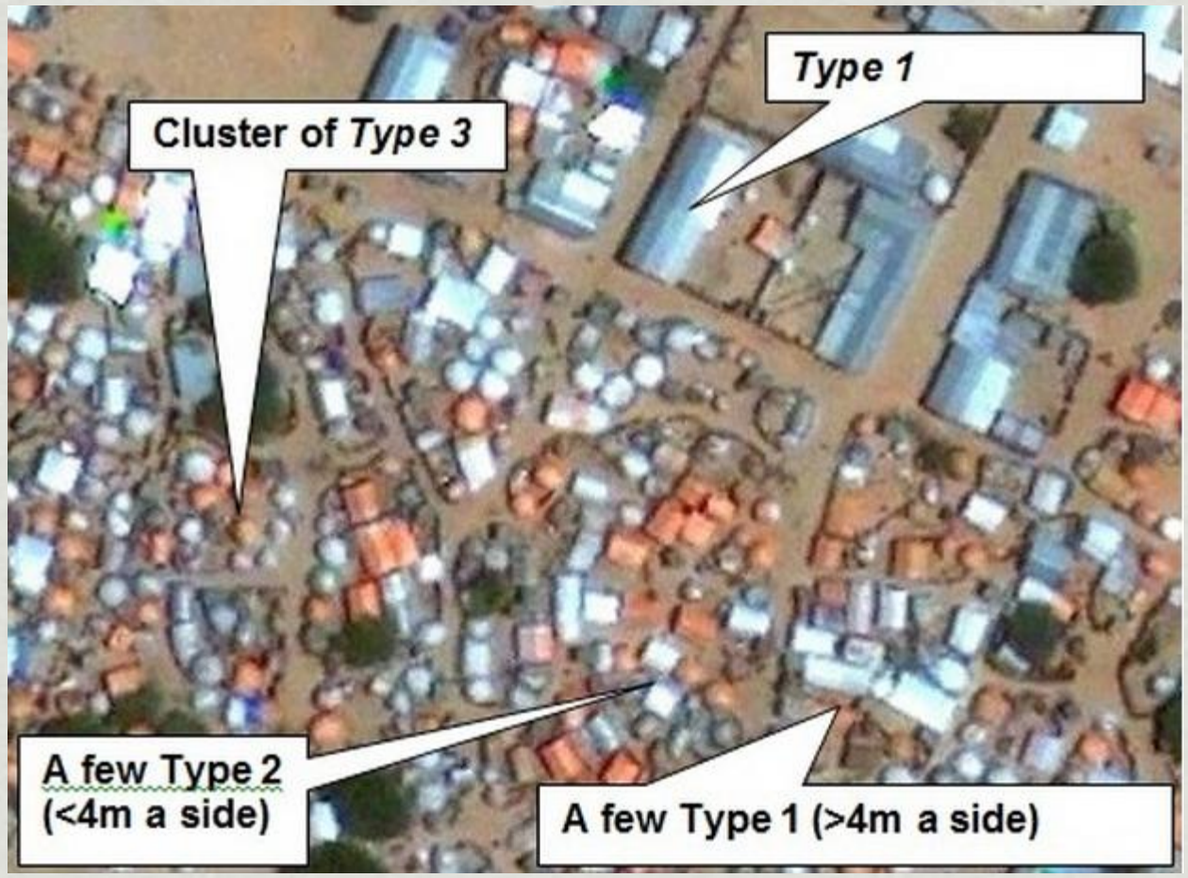
A quarter million shelters were identified in 120 hours.

http://iRevolution.net/2011/11/09/crowdsourcing-unhcr-somalia-latest-results

http://mapper.tomnod.com/afgooye

Shelter Type 1: Large Permanent structures

Shelter Type 3: Temporary structures without a metal roof



Shelter Type 2: Temporary structures with a metal roof

Limitations

TThe mapping was much faster, however there were data quality problems

TThe counting was much faster than the previous assessment, due to the human resources available through the volunteer community. However, there were problems at the data analysis stage – in conclusion, UNHCR was unable to use the data to estimate the number of buildings and shelters.

Limitations

Duplicates – Although a system was designed in order to validate and remove duplicates, removing duplicates proved to be very difficult. This was particularly a problem for buildings, which are large and are not uniform in shape or size – it is then difficult to define a radius to identify duplicate tags.

Missing tags – in the final dataset there were revealed to be shelters which had not been tagged.

Large dataset – the web based TomNod platform had difficulty in handling the sheer number of points.

Counting Shelters Using Raster Analysis

Counting shelters automatically using raster analysis

Findings

eCognition, ArcGis Raster Calculator and Envi 4.5 software have been used to semi-automatically identify shelter points, following which the data was cleaned manually, with erroneous points being removed.

IIn practice, there was a margin of error resulting in more points being mapped than there actually are.

Way Forward

TTo further develop and explore automated raster analysis and feature extraction, to rapidly identify shelter points

CCombine automated feature extraction with human verification methods

Population Movement Tracking (PMT)

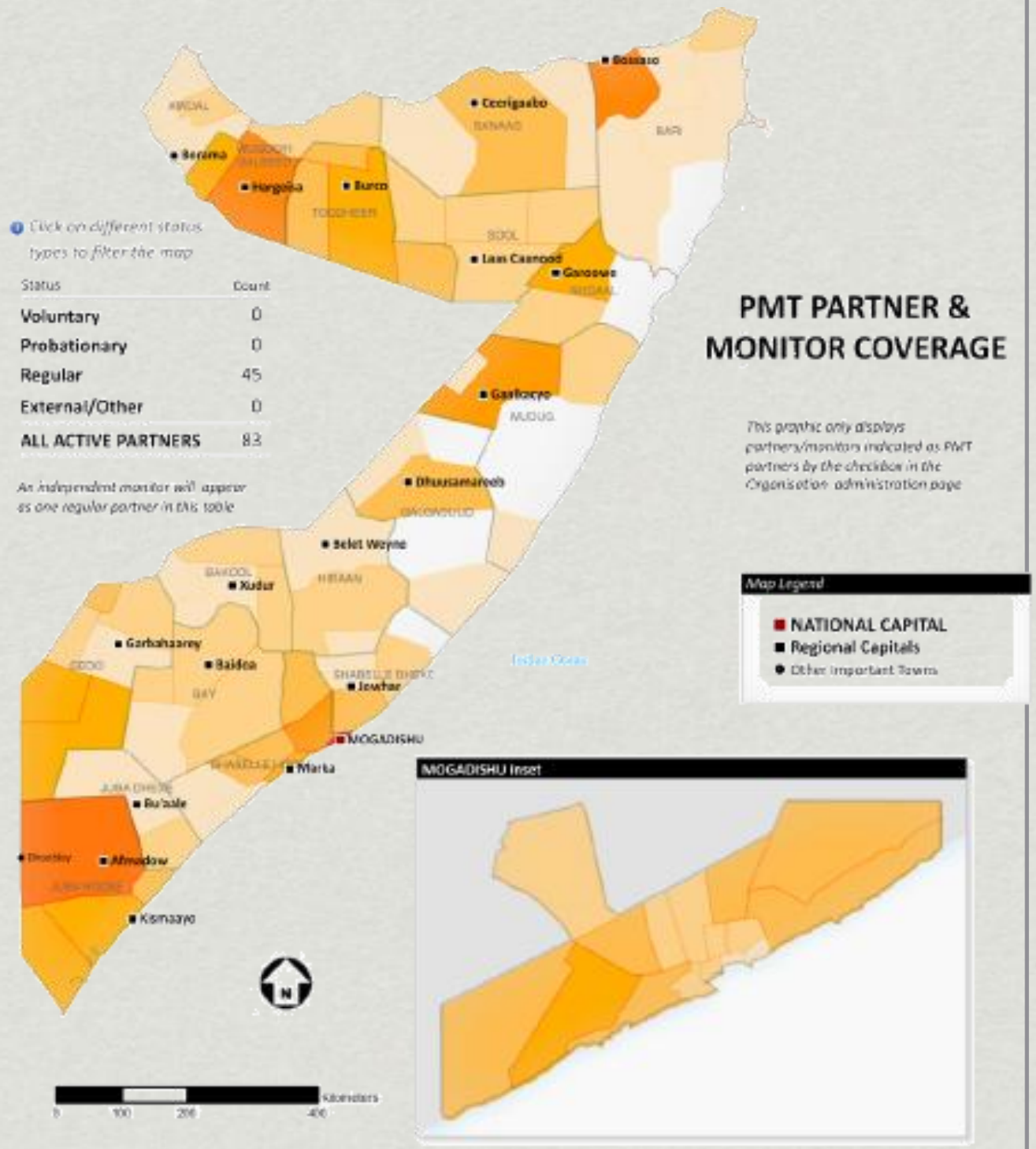
Movement of internally displaced persons (IDPS) within Somalia

Functional Uses

- Provide figures on IDP movement trends
- Number of people moving from A to B and why?
- Planning figures for distribution of shelter and other forms of assistance
- Early warning system for refugee arrivals in neighboring countries
- Advocacy

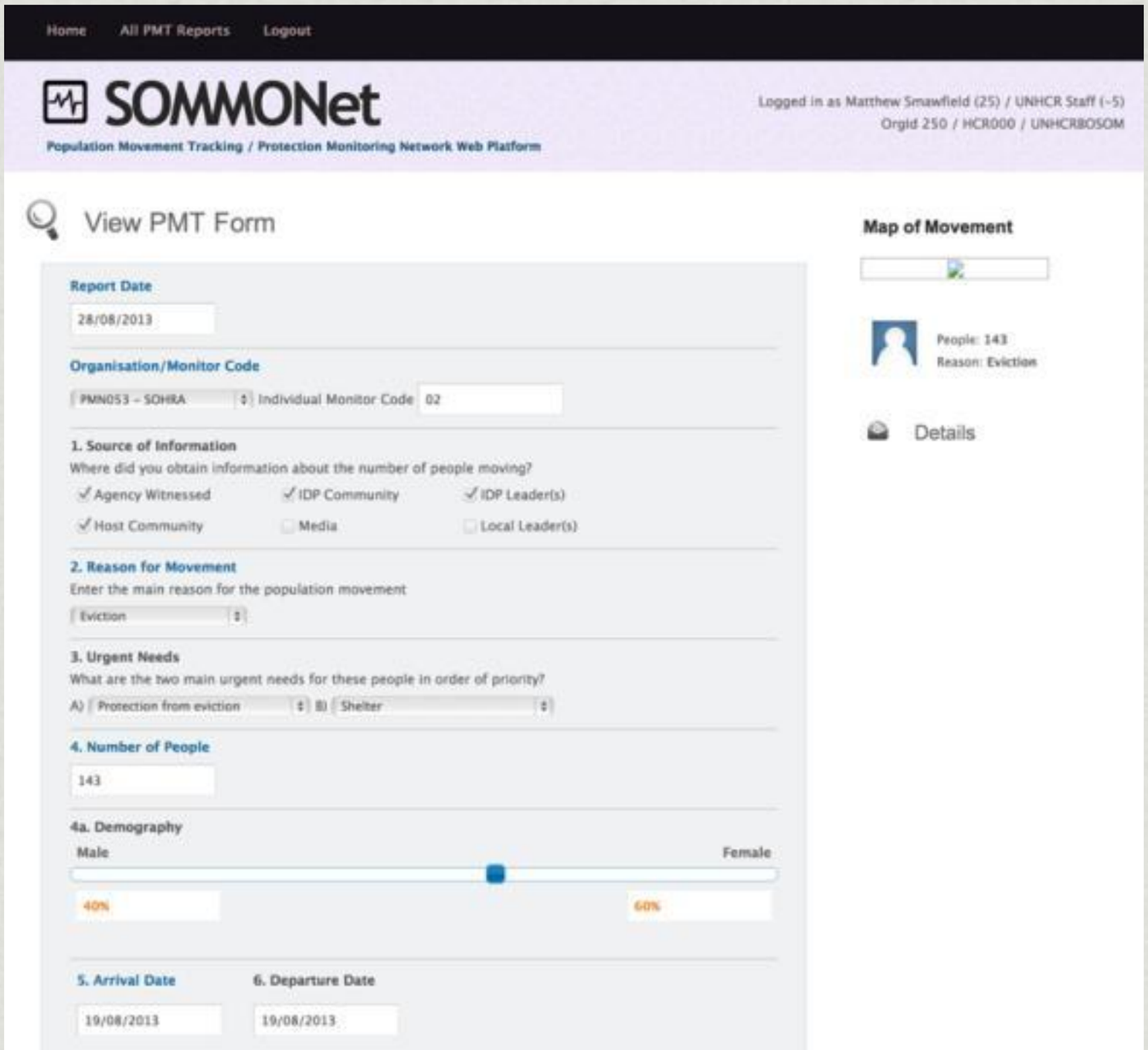
Network of Partners

- Consists of around 40 local NGO partners, with 80 monitors
- Monitors collect data on IDP movements and submit to UNHCR

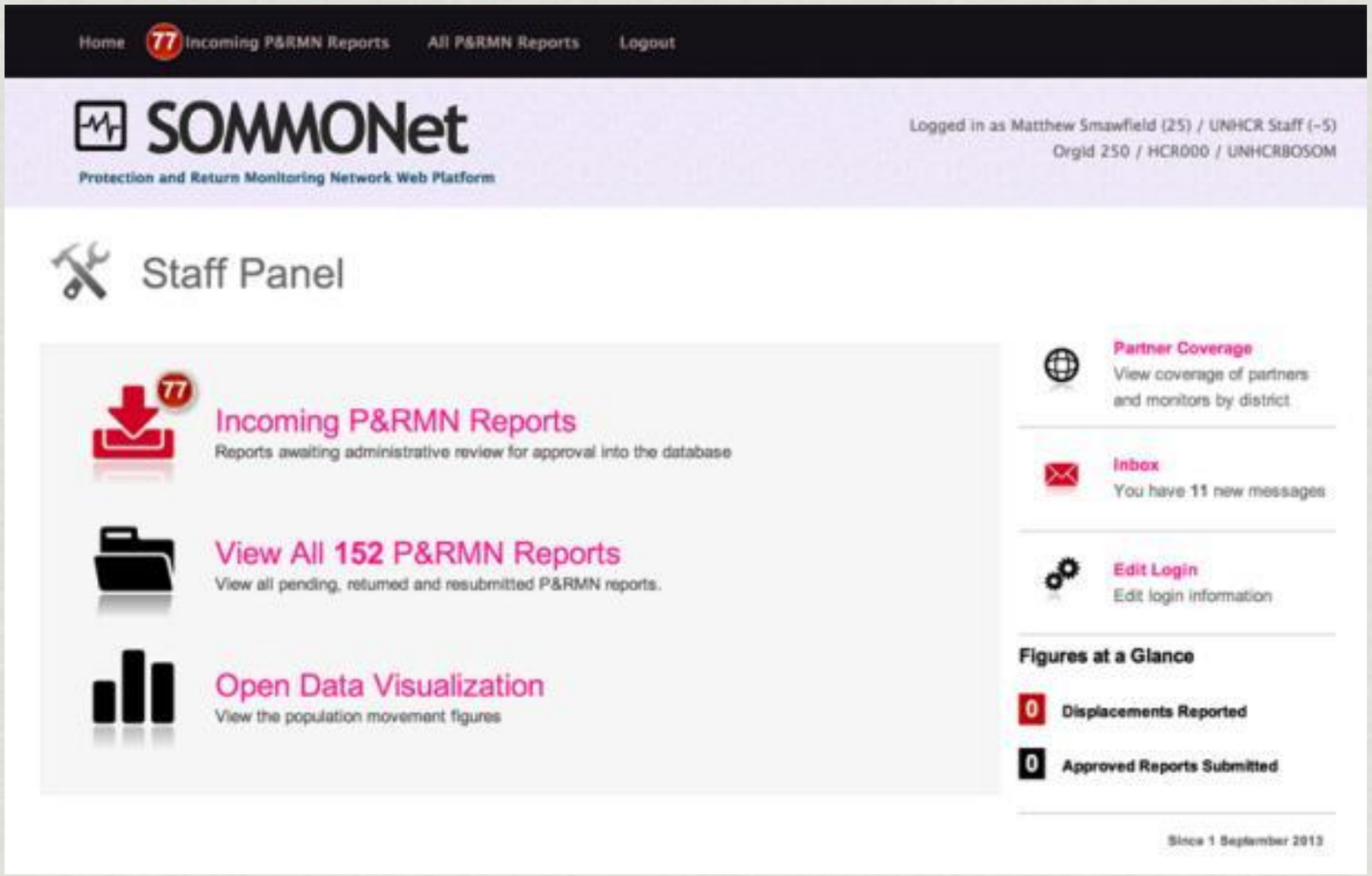


Data Collection

- Partners submit movements through a web-based platform.
- Number of people moving from A to B?
- When did they move? Reasons for movement?



Incoming Reports



- Incoming reports are verified/approved by UNHCR focal points.
- Once approved, new figures are reflected in an interactive online data visualization

Refugees in the Horn of Africa: Somali Displacement Crisis

Information Sharing Portal

UNHCR The UN Refugee Agency

SOMALIA Population Movement Trends

Total Movements Reported 24,000

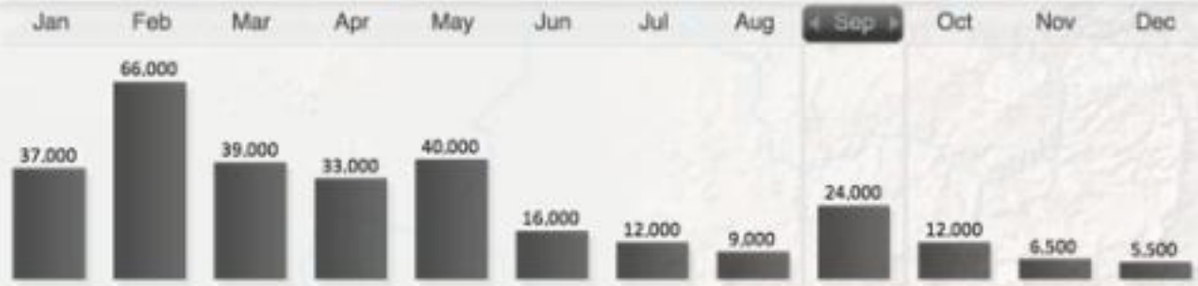
September 2012

FULL SCREEN

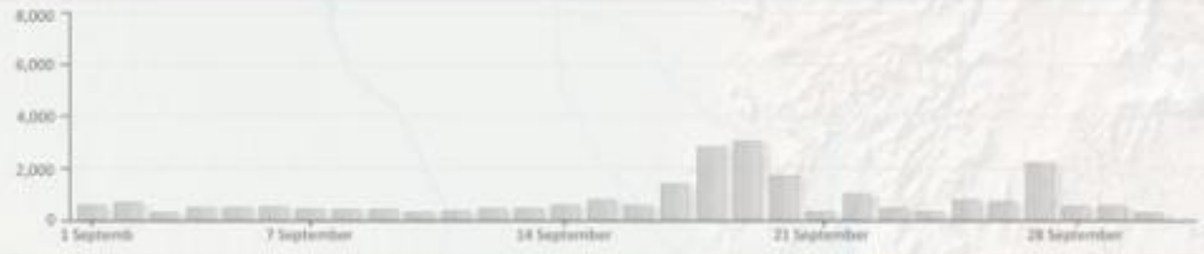
Select Year ◀ 2012 ▶

Displacement by Month

Click on different months or use the slider to filter the map and figures for the period selected



Displacement by Day



Reasons for Movement

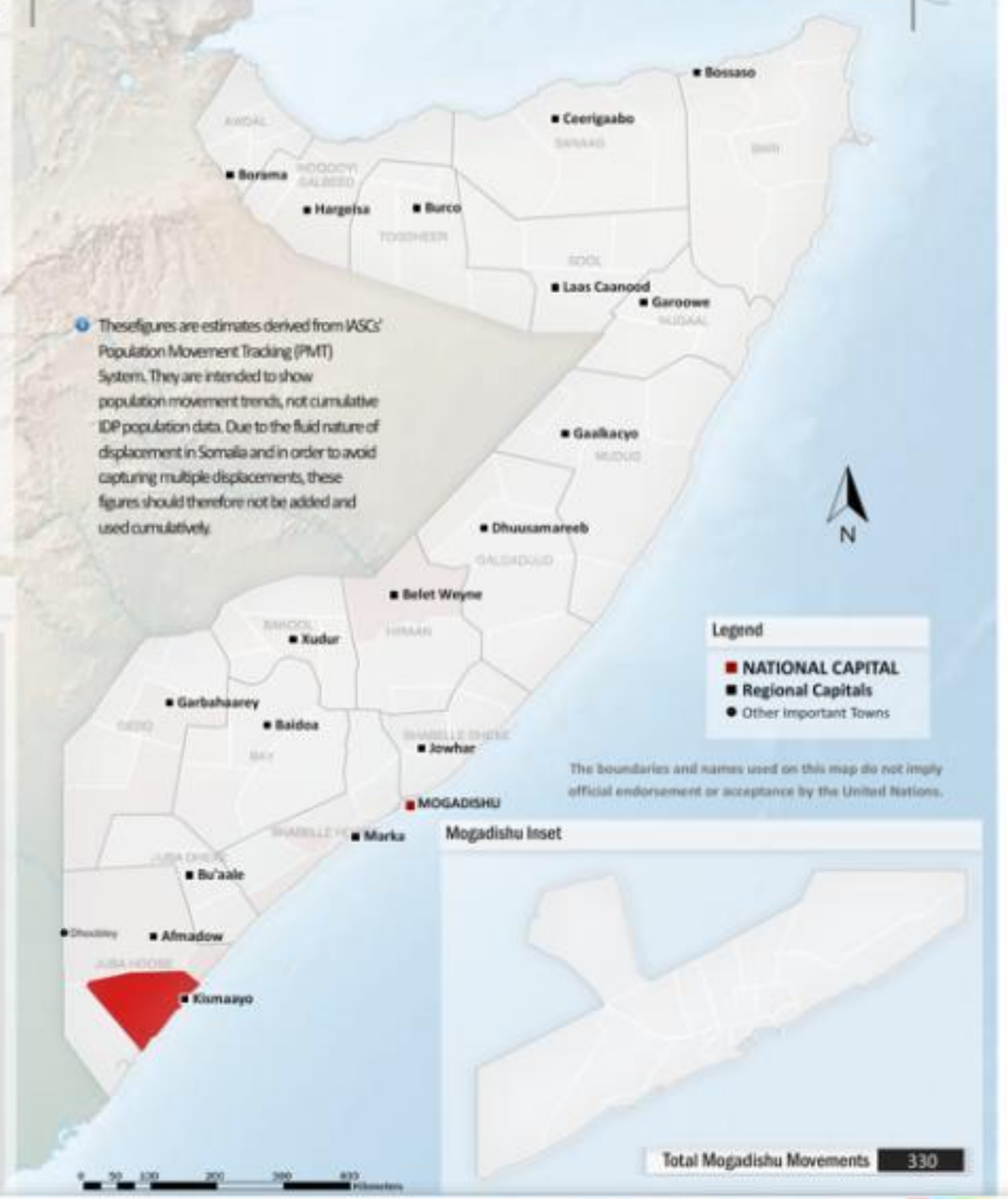
Click on different reasons to filter the map and figures.

Monthly Highlights

• On the 16th of September, Al-Shabaab used radio communication in Kismayo to mobilize the city's population in advance of the AMISOM/SNF advance of the city. As a result, a surge of displacement from Kismayo resulted. Most people went to Jilib, Jamame and Afmadow districts. Some went to other villages in other parts of Kismayo district. Most of those displaced said they intended to do for a short term and return to Kismayo as soon as the situation stabilises.

• After the river Shabelle burst its banks, displacement and loss of life was reported in Belet Weyne, Hiraan region. Residents evacuated to villages on higher ground.

Areas Receiving IDPs | **Source of Displacement**



These figures are estimates derived from IASC's Population Movement Tracking (PMT) System. They are intended to show population movement trends, not cumulative IDP population data. Due to the fluid nature of displacement in Somalia and in order to avoid capturing multiple displacements, these figures should therefore not be added and used cumulatively.

Legend

- NATIONAL CAPITAL
- Regional Capitals
- Other Important Towns

The boundaries and names used on this map do not imply official endorsement or acceptance by the United Nations.

Mogadishu Inset

Total Mogadishu Movements 330

Concluding remarks

When access is challenging for security reasons, it is particularly challenging to acquire population figures.

Satellite imagery does not yield its human data easily – it is no magic window on to the world.

With effort and error margin it can be a useful tool when used in conjunction with other sources.

UNHCR Statistical data

- Population Statistical Reference data base
http://popstats.unhcr.org/PSQ_TMS.aspx

- Data visualisation
http://data.unhcr.org/dataviz/

UNHCR Historical Refugee Data

UNHCR The UN Refugee Agency

Total Population 10,500,234

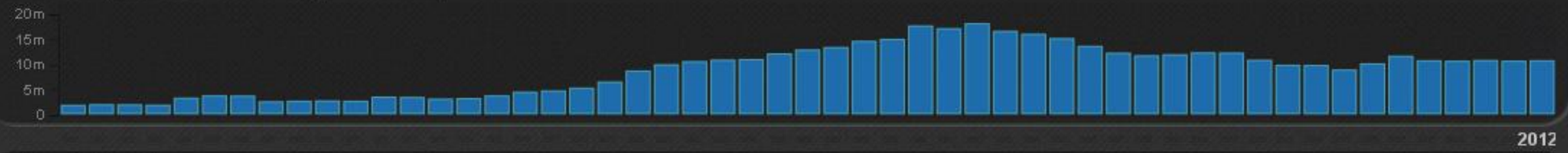
Population Increases Compared to previous year ▲ 1,865,023

Population Decreases Compared to previous year ▼ 1,767,581

Year ◄ 2012 ►

Total Population

Click on the graphs to select a year.



Population Change

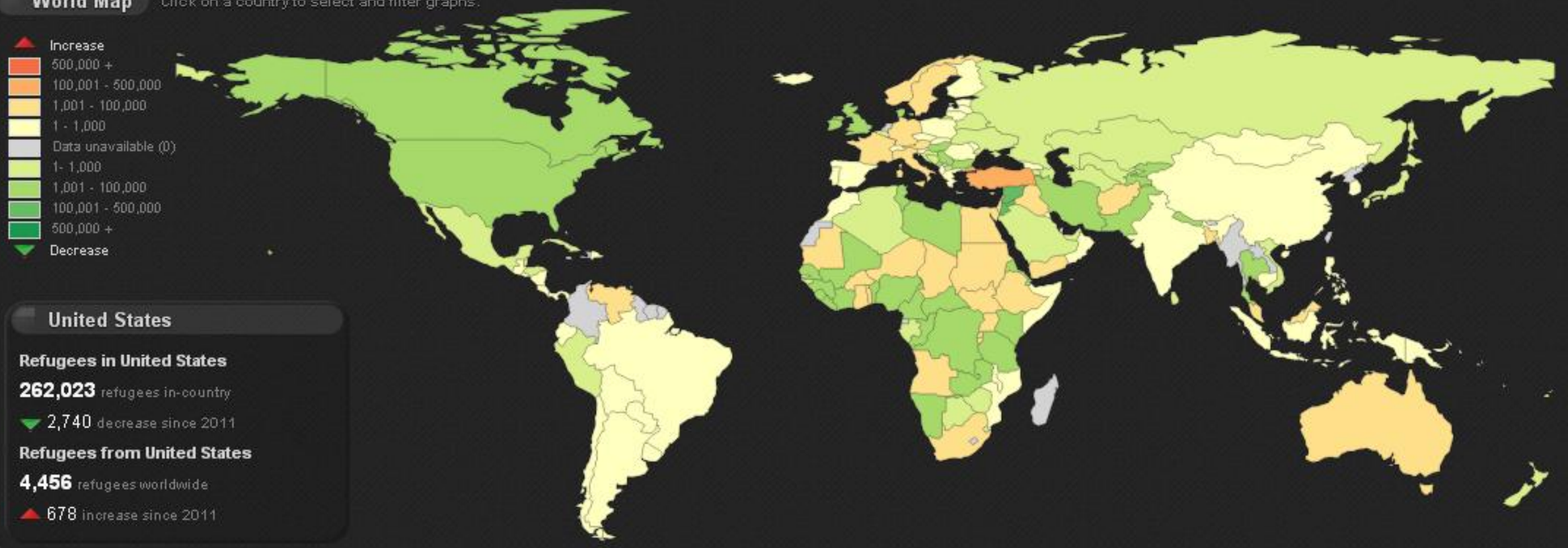
Compared to previous year.

Country of Asylum | Country of Origin

Selected Country World

World Map

Click on a country to select and filter graphs.



United States

Refugees in United States

262,023 refugees in-country

▼ 2,740 decrease since 2011

Refugees from United States

4,456 refugees worldwide

▲ 678 increase since 2011

Developed by the UNHCR Field Information and Coordination Support Section (FICSS) Email FICSS -- DISCLAIMER -- The borders and country names on this map do not imply official endorsement by the United Nations. Data may be unavailable for some locations during certain time periods. The historical country borders were adapted from CShapes - Weidmann, Nils B., Doreen Kuse, and Kristian Skrede Gleditsch. 2010. The Geography of the International System: The CShapes Dataset. International

UNHCR Population Statistics | Overview | Time Series | Demographics | Asylum Seekers | Quick Queries

Selection criteria

Date range: 2012 to 2012

Country / territory of residence

All countries / territories
Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Aruba

Origin / Returned from

All origins
Afghanistan
Albania
Algeria
Andorra
Angola
Antigua and Barbuda
Argentina

Population type

- [x] Refugees
- [x] Asylum seekers
- [x] Returned refugees
- [x] Internally displaced persons
- [x] Returned IDPs
- [x] Stateless persons
- [x] Others of concern

Data items to display

- [x] Country / territory of residence
- [x] Origin / Returned from
- [x] Population type

Submit

Thank you

Kimberly Roberson
UNHCR