

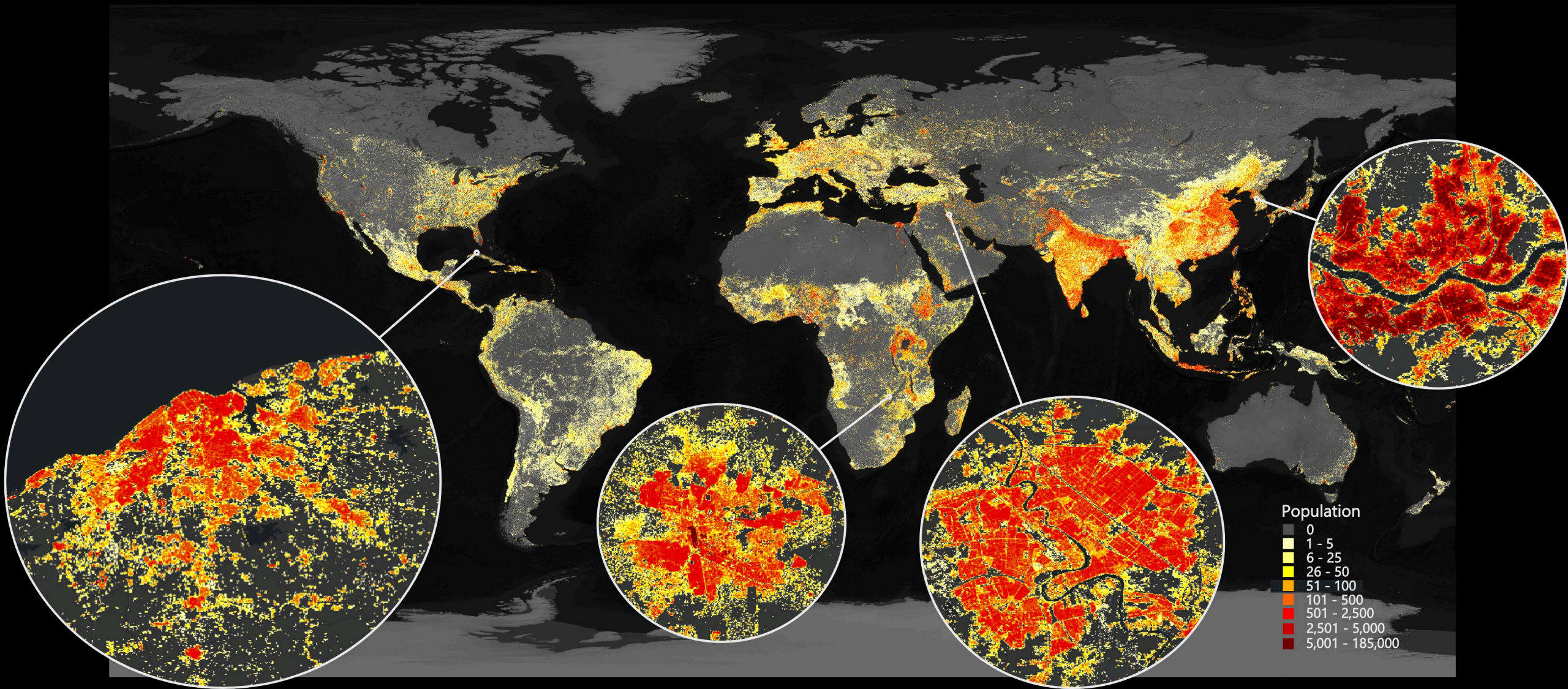
# LandScan: Capturing Dynamic Populations

Marie Urban

June 15, 2022

ORNL is managed by UT-Battelle, LLC for the US Department of Energy

# LandScan Global



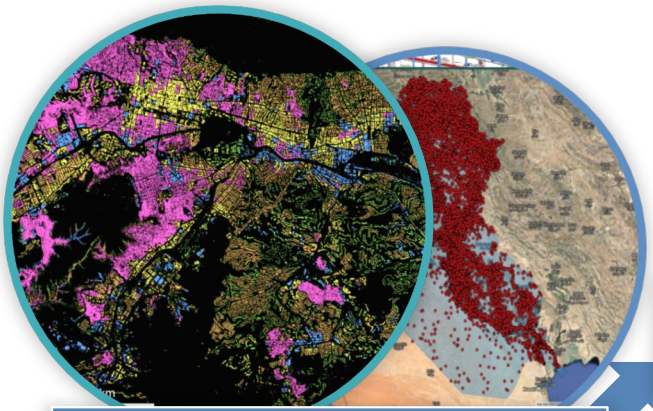
# LandScan Global Update: Annual Improvements to Population Distribution

ables Region, Age, C

	Male 2021	Female 2021
Total	2743101	2805140
0 - 4	124402	118888
5 - 9	150340	143812
10 - 14	160703	153649
15 - 19	154809	147886
20 - 24	157456	147810
25 - 29	180133	169118
30 - 34	186959	174551

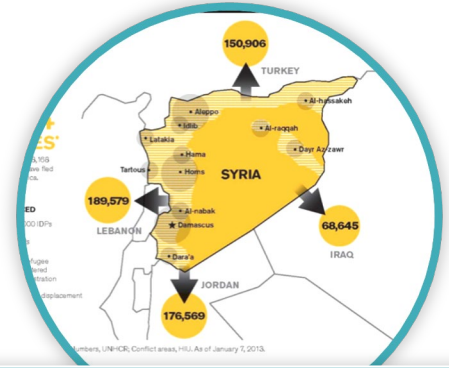
## Census

- Population Counts
- Administrative boundaries



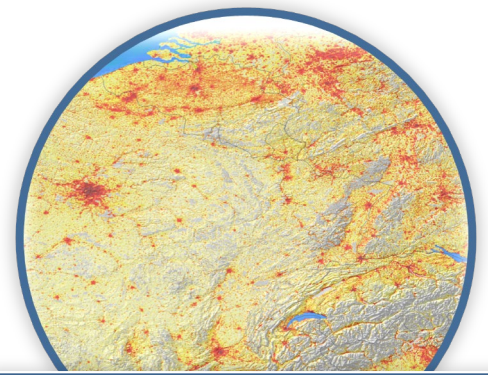
## Spatial refinement

- Buildings footprints and height
- Distance to roads
- Land use/cover
- OSM
- POI
- and more



## Displaced populations

- Camps
- Border crossings
- Damaged infrastructure
- Nighttime lights



## LandScan Global

- Unwarned population
- 30 arc seconds resolution (~1 km)
- Ambient (over 24 hours)

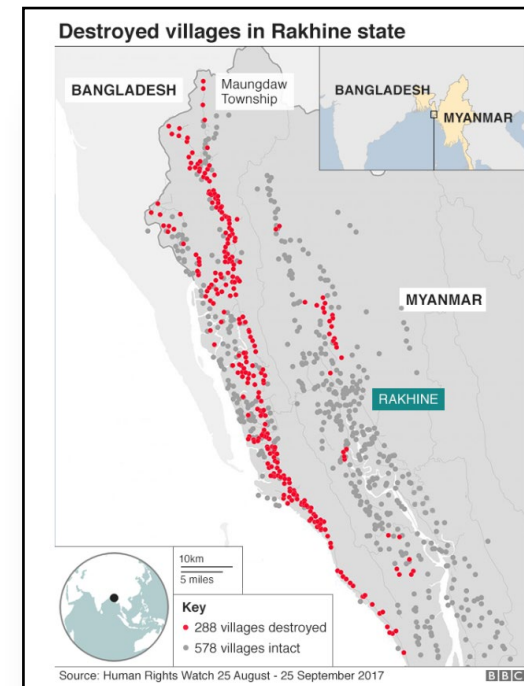
# What causes population displacement and resettlement?

- Short term events
  - Conflict or persecution
  - Social and political instability
  - Natural disasters
- Long term events
  - Food insecurity
  - Water stress
- Background migration

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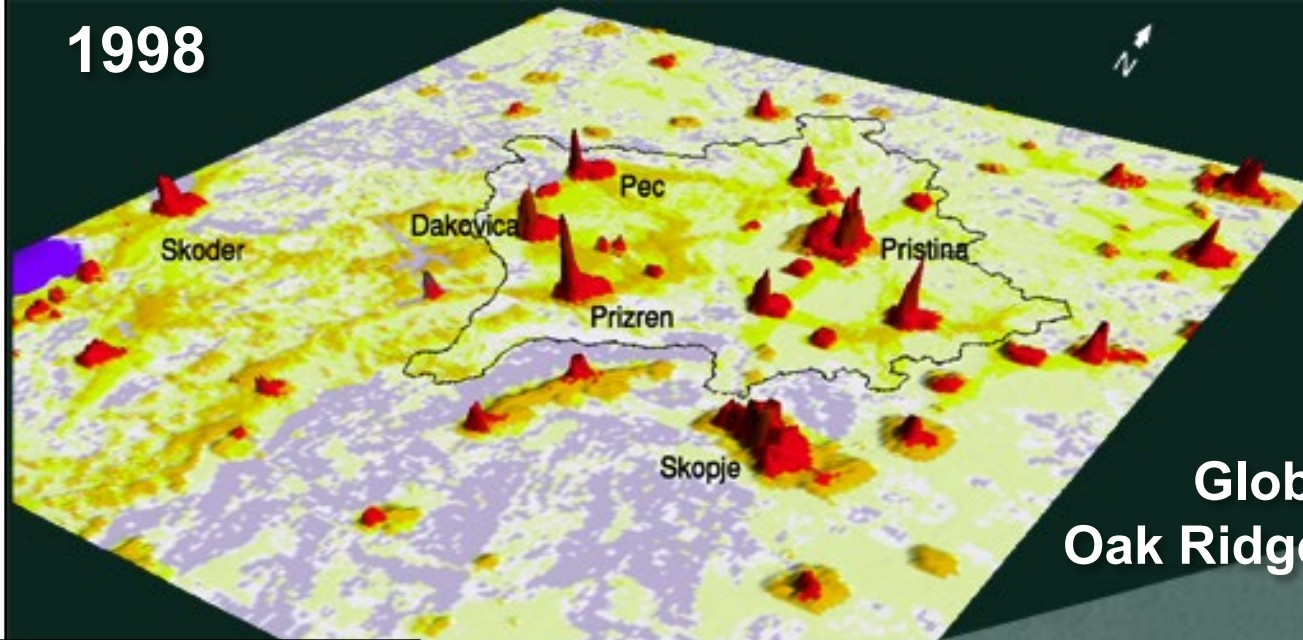
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<https://www.bbc.com/news/world-asia-41566561>

# Accounting for IDP and Refugees

1998



# Kosovo Refugee Crisis

LandScan  
Global Population Project  
Oak Ridge National Laboratory

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washingtonpost.com NEWS STYLE SPORTS CLASSIFIEDS MARKETPLACE  
PRINT EDITION TOP NEWS WORLD NATION POLITICS METRO BUSINESS & TECH HEALTH OPINION WEATHER

## Thousands of Refugees Flee Kosovo

By Peter Finn  
Washington Post Foreign Service  
Monday, March 29, 1999; Page A1

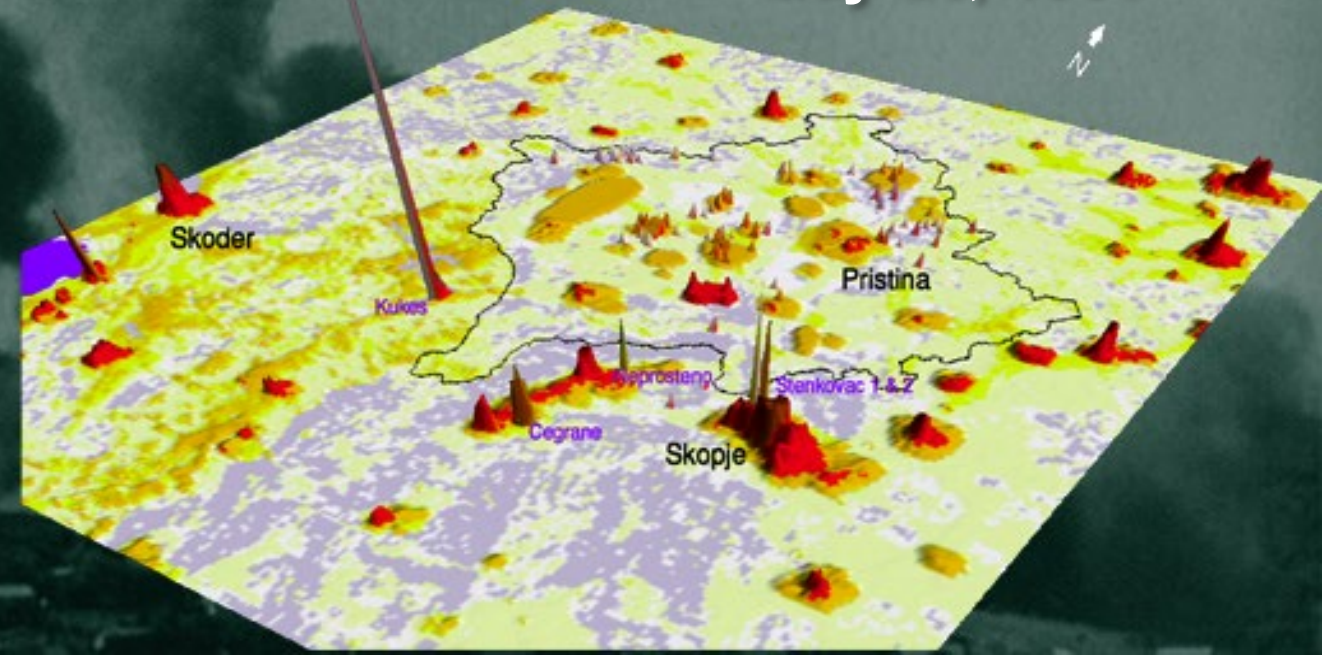
**Related Items**

On Our Site  
▪ [Balkans Special Report](#)

TIRANA, Albania, March 28 – Columns of refugees, mostly women and children with little more than the clothes on their backs, walked and drove out of Kosovo today as a campaign by Yugoslav forces to empty the province of ethnic Albanians provoked one of the largest forced exoduses in Europe since the end of World War II. (Reuters)

An Albanian officer helps an ethnic Albanian woman after she crossed the border from Serbia into Albania.

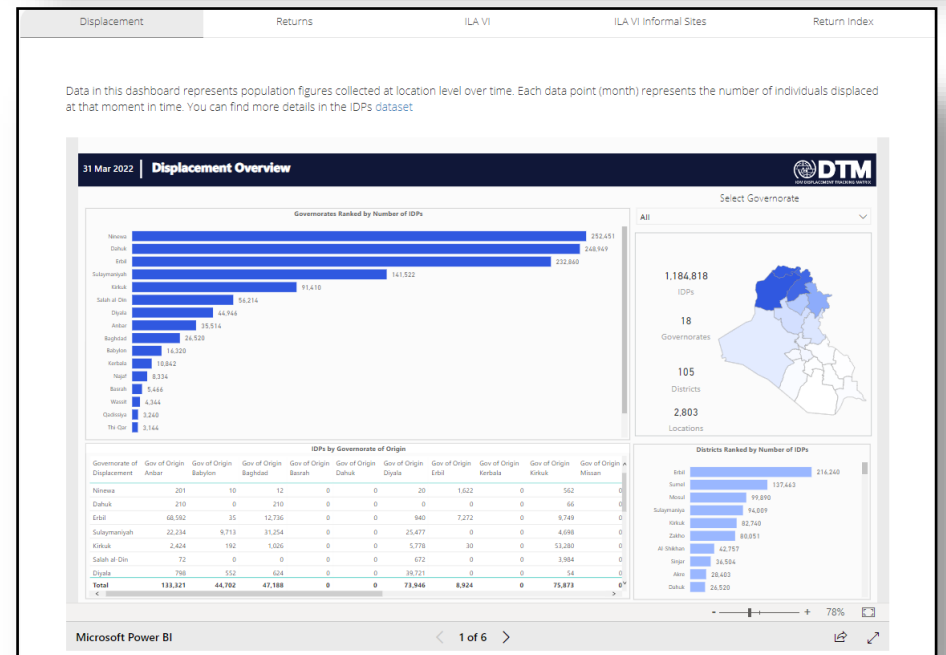
May 25, 1999



<https://www.washingtonpost.com/wp-srv/inatl/longterm/balkans/stories/albania29.htm>

# Accounting for displaced populations

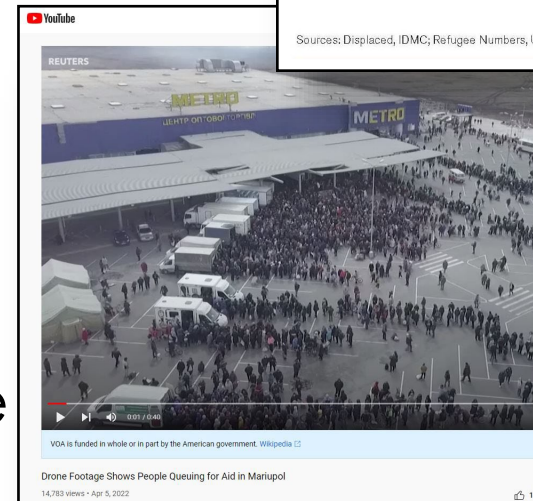
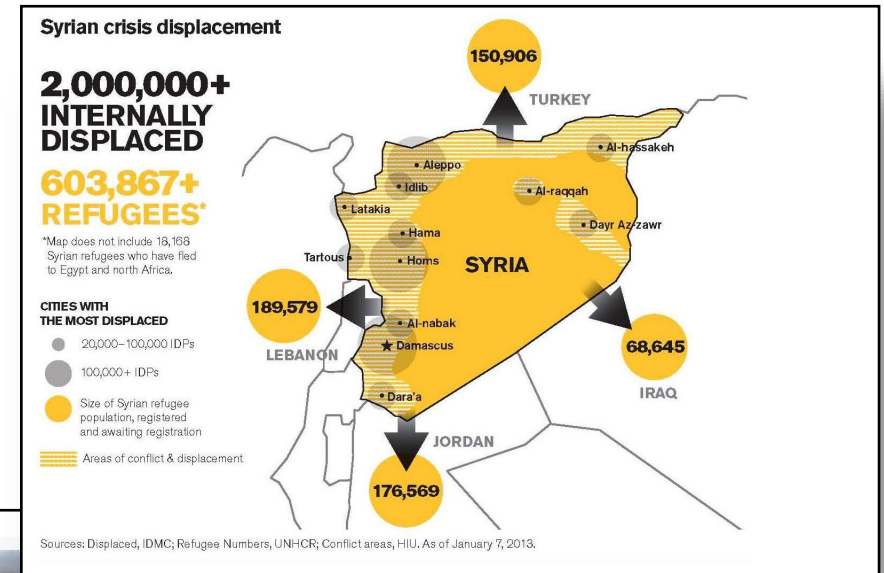
- Rapidly evolving situations
- Temporal lag in reporting displacements
- No single authoritative reporting source
- Less reporting on resettlement
- Reports and EO are often misaligned



<https://iraqdtm.iom.int/Dashboard>

# Qualitative Data Sources

- Unaccounted Refugees
  - Cultural practices of offers to refugees or IDPs to stay with local families
  - Anecdotal reporting
  - Displacement location to/from
- Behavioral Surveys
- Camps
  - Detect and monitor growth/decline
- Changes in building use
- Destroyed infrastructure or inhabitable buildings



<https://www.youtube.com/watch?v=qBfBCuJIXfQ>



Rescuers remove debris from a residential building damaged by an airstrike, as Russia's attack on Ukraine continues, in Kharkiv, Ukraine March 15, 2022. REUTERS/Vitalii Hnidy

LVIV, Ukraine March 15 (Reuters) - More than 600 buildings have been destroyed in Kharkiv, Ukraine's second city in the east of the country, since the start of Russia's invasion, Mayor Ihor Terekhov said in a televised interview on Tuesday.

"Schools, nurseries, hospitals, clinics have been destroyed. The Russian army is constantly shelling (us) from the ground and the air," he said.

<https://www.reuters.com/world/europe/over-600-buildings-destroyed-ukrainian-city-kharkiv-mayor-says-2022-03-15/>

# Quantitative Reporting

- Collect reported open source and media population estimates and movements
- Humanitarian organizations and NGOs report
  - registered camp populations
  - Estimates of refugees/idps
- Imagery exploitation

**Roraima site profiling**  
**Jardim Floresta**  
 Boa Vista, Roraima State, Brazil  
 Lat. 2°49'48.63"N Long. 60°42'22.86"W  
 September 2018

**Summary** Economic instability and civil unrest have led to the displacement of Venezuelans to neighbouring countries, with more than 50,000 currently living in Brazil. This profile provides an overview of conditions in Jardim Floresta site. Population figures reported are based on registration data provided by UNHCR. Additional information collected through key informant interviews (KIs) with actors working on the site has been used to supplement findings.

**Site overview** # of individuals: 693  
 # of households: 239  
 Avg household size: 3  
 Date opened: 21/03/2018  
 Planned capacity: 594

**Demographics** 48% male / 52% female  
 1% Over 60+  
 24% 18 - 59  
 6% 12 - 17  
 7% 5 - 11  
 10% 0 - 4

**Location map**

**Who is doing what?**

Sector	Agency
Management	NRC (UNHCR partner)
Safety and Security	Armed Forces
WASH*	Armed Forces, NRC
Shelter	UNHCR
Protection	NRC, UNFPA, UNHCR
Food Assistance	Armed Forces
Nutrition	None
Health	Armed Forces
ITC**	NRC, TSF
Information Management	REACH

\* Water, sanitation and hygiene  
 \*\* Information Technology and Communications

**Site infrastructure**

Perimeter	Education facility	Latrine container - women (24)
Infrastructure	Distribution area	Latrine inaccessible - men
Zones	Storage	Latrine disabled
UNHCR tent	Community space	Mixed latrine (administration)
Army office	Latrine container - men (24)	Laundry
NGO office	Shower container - men (12/1)	Potable water
Army accommodation	Latrine - women (45)	Entrance/Exit
Health facility	Shower - women (11/1)	

Note: Latrine and Shower (Functional/Total # stalls)

**Sectoral overview**

	Target	Last round	Current round	Achievement
<b>Education</b>				
% of children aged 6-14 enrolled in school	100%	No information	No information	
% of children aged 15-17 enrolled in school	100%	No information	No information	
% of individuals fully vaccinated*	100%	41%	44%	
% of pregnant women accessing pre-natal care	100%	No information	No information	
<b>WASH</b>				
# of persons per functional latrine	Max. 20	39	14	
Frequency of solid waste disposal	Min. weekly	7/week	7/week	
<b>Shelter</b>				
Average covered area per person	Min. 3.5m <sup>2</sup>	3.5m <sup>2</sup>	3.2m <sup>2</sup>	
% site overcrowding*	≤5%	12%	17%	
<b>Protection</b>				
Presence of child-friendly spaces	Yes	No	No	
Community groups established	Yes	Yes	Yes	

Targets based on minimum standards agreed with UNHCR, Brazil. \* Target achieved \*\* Target partially achieved \*\*\* Target not achieved  
 \* Percentages of individuals recorded at follow-ups. \*\* Total visit success (MIR) and Dipterre, based on available data. \*\*\* Calculated based on the planned capacity of the site.

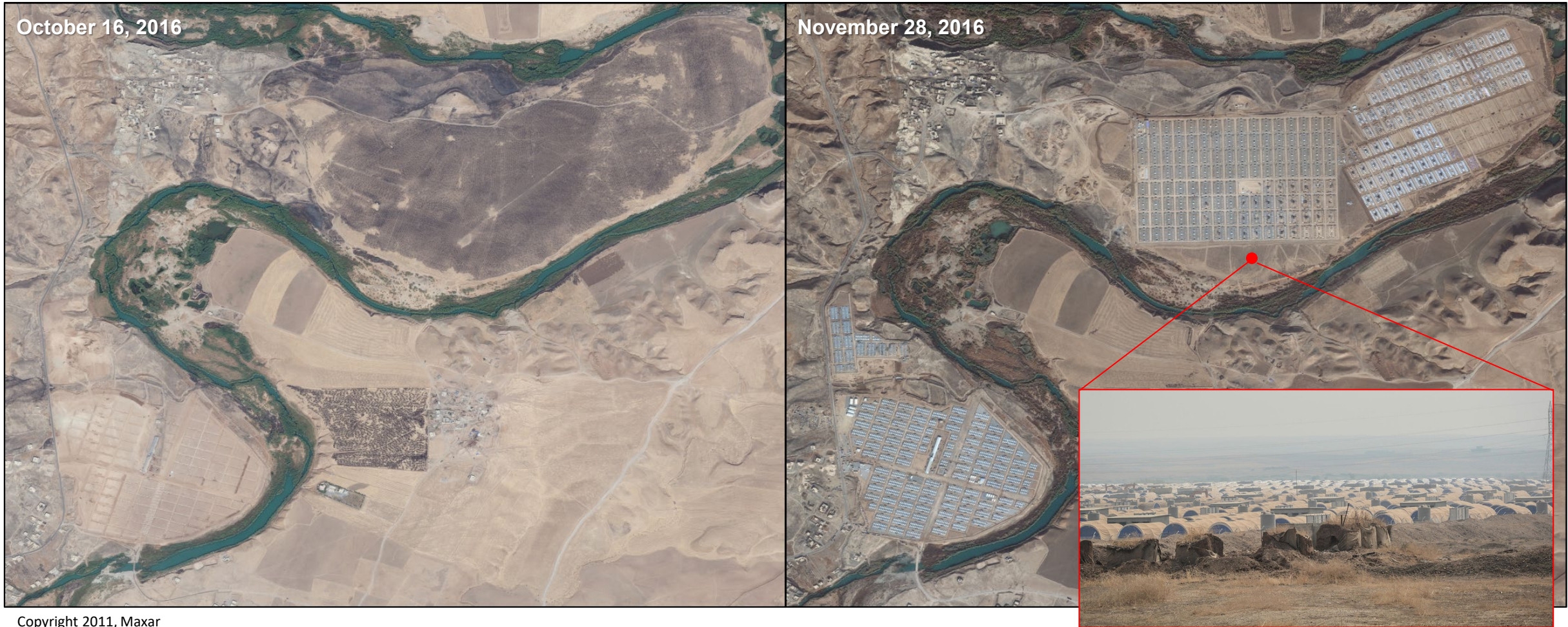
**REACH** Informing more effective humanitarian action



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	H	I	J	K	L	M	N	O	P						
		13,145,567	5,582,761		6,150,005	674,364	383,969	335,892							
AdminName_En		PRM_2018	Acute_PRM_2018	Inter_sector_severity	IDPs_estimates_Aug_2017	Returnees_estimates_Aug_2017	Newly_displaced(Aug_July_Jun_2017)	IDPs_in_camps_sites_Aug_2017	Access_status_September_2017						
1	Damascus	SY0100	Damascus	SY010000	Damascus	C1001	Damascus-City	1,408,344	725,327	4	630,582	4,706	6,860	-	Accessible
2	Damascus	SY0100	Damascus	SY010000	Damascus	C1001	Damascus (Joubar)	300	300	6	-	-	-	-	Besieged
3	Damascus	SY0100	Damascus	SY010000	Damascus	C1001	Damascus (Al Assali, Qadam Sharq)	1,800	1,800	6	2,000	-	-	-	HTR (military encircled)
5	5603	Damascus	SY0100	Damascus	SY010000	Damascus	C1001	Damascus (Barza Al Balad)	19,500	3	13,500	-	-	-	HTR (other)
7	5604	Damascus	SY0100	Damascus	SY010000	Damascus	C1001	Damascus (Qaboun)	2,500	2,500	6	-	-	-	Besieged
9	5605	Damascus	SY0100	Damascus	SY010000	Damascus	C1001	Damascus (Tadamon)	248	248	6	275	-	-	HTR (military encircled)
4	Damascus	SY0100	Damascus	SY010000	Damascus	C1002	Yarmuk	12,520	12,520	6	1,245	11	40	-	Besieged
0	5	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1003	Musallamiyeh	-	2	-	-	-	-	Accessible
6	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1004	Esan	269	2	-	-	-	-	-	Accessible
7	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1005	Thabiyeh	390	2	110	-	-	-	-	Accessible
8	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1006	Saqlya	338	2	-	-	-	-	-	Accessible
4	11	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1007	Aleppo city (Sheikh Maqsoud)	14,869	3	-	6,048	-	-	HTR (other)
5	5609	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1007	Aleppo city	1,008,842	3	313,699	238,250	2,485	-	Accessible
12	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1008	Tal Shaghib	30	2	-	-	-	-	-	Accessible
13	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1009	Abtin	416	2	-	-	-	-	-	Accessible
14	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1010	Haddadin	77	2	-	-	-	-	-	Accessible
15	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1011	Tal Sheer Simaan	-	2	-	-	-	-	-	HTR (other)
16	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1012	Hreibel	108	2	-	-	5	-	-	Accessible
17	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1013	Wdeihl	1,244	2	-	-	540	-	-	Accessible
18	Aleppo	SY0200	Jebel Saman	SY020000	Jebel Saman	C1014	Hilan	-	2	-	-	-	-	-	Accessible

# Rapid camp establishment and growth

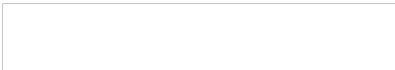
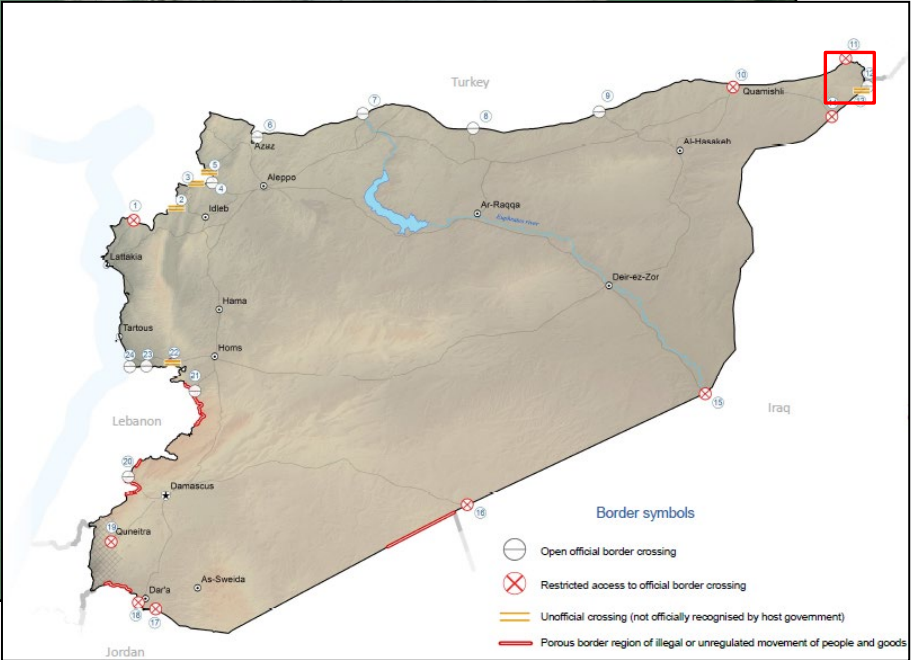


Rapid construction of IDP camps to accommodate Mosul exodus

# Syrian Influx to Iraq Near Peshkhabour



17AUG13 WorldView 2©



# Impromptu Facility Use



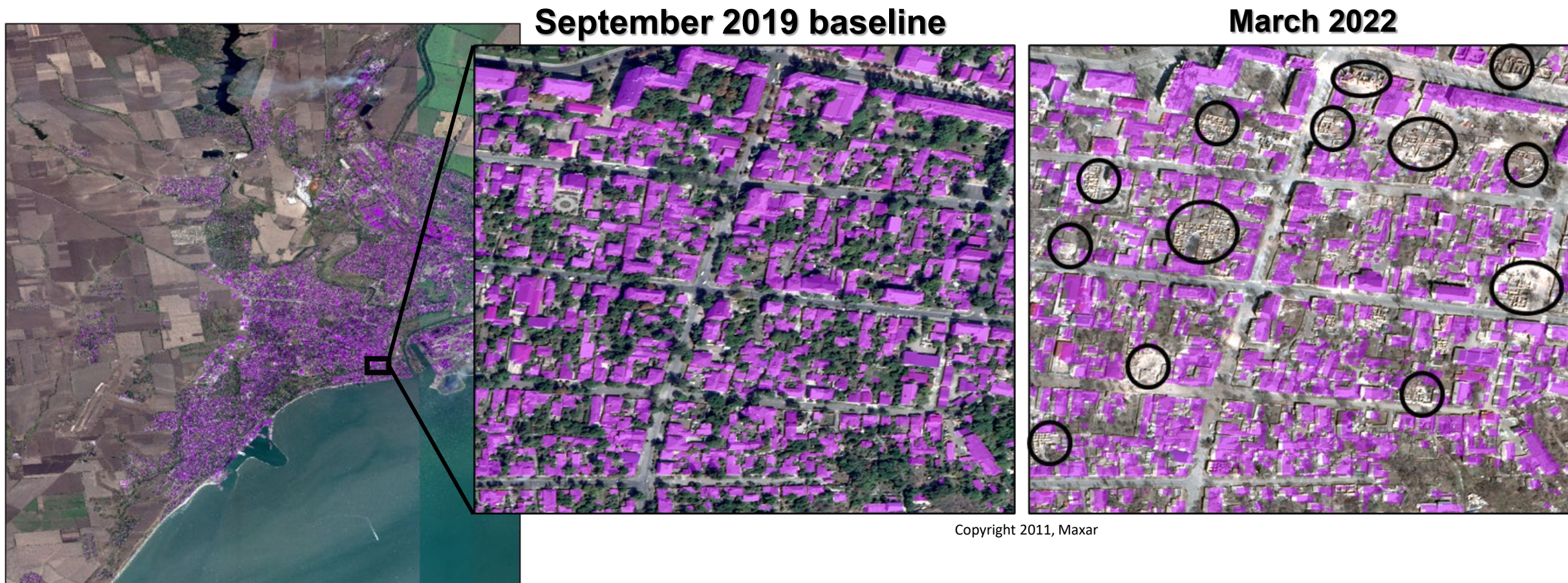
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**Gathering crowds**



# Automated Change Detection

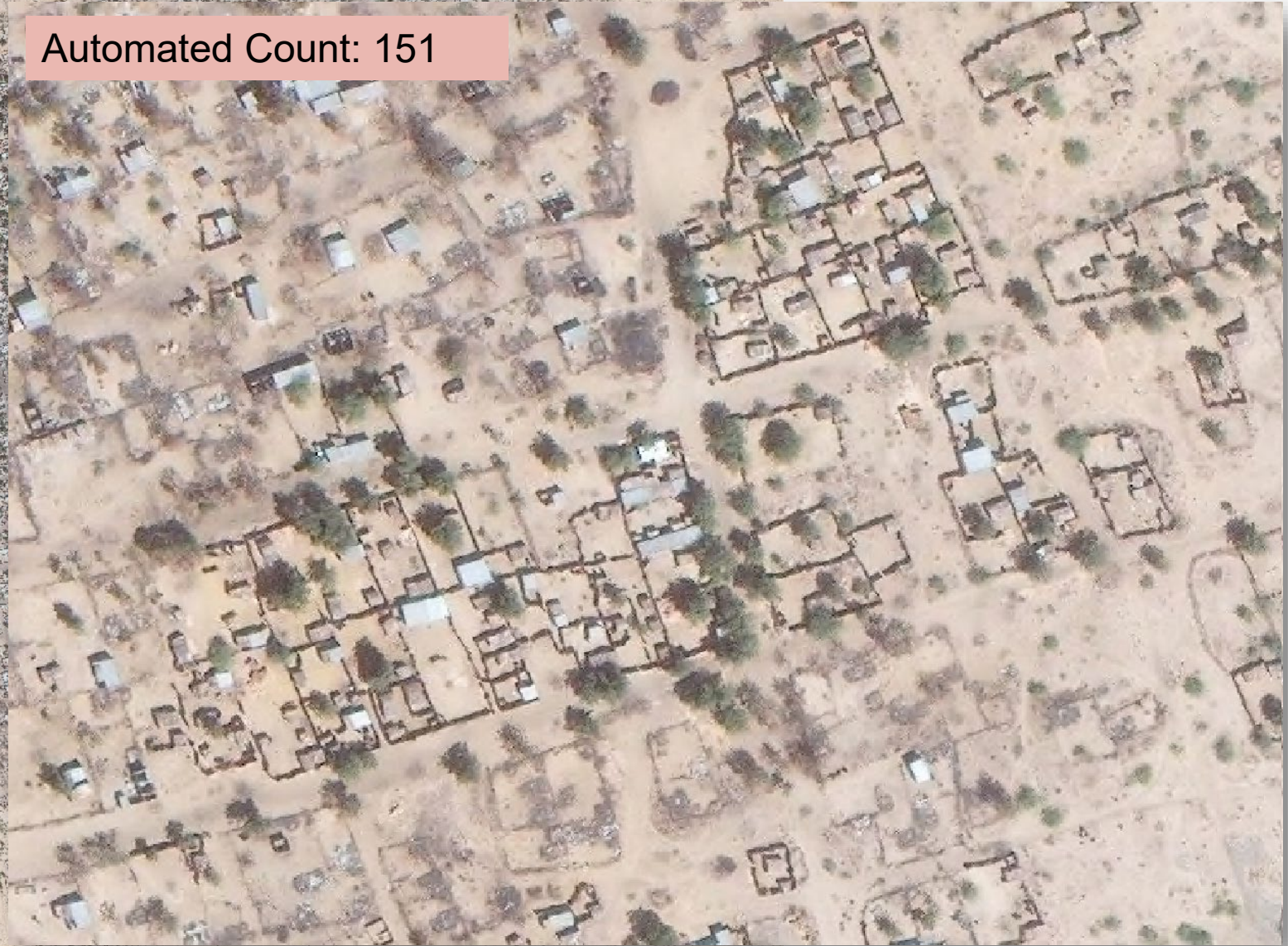
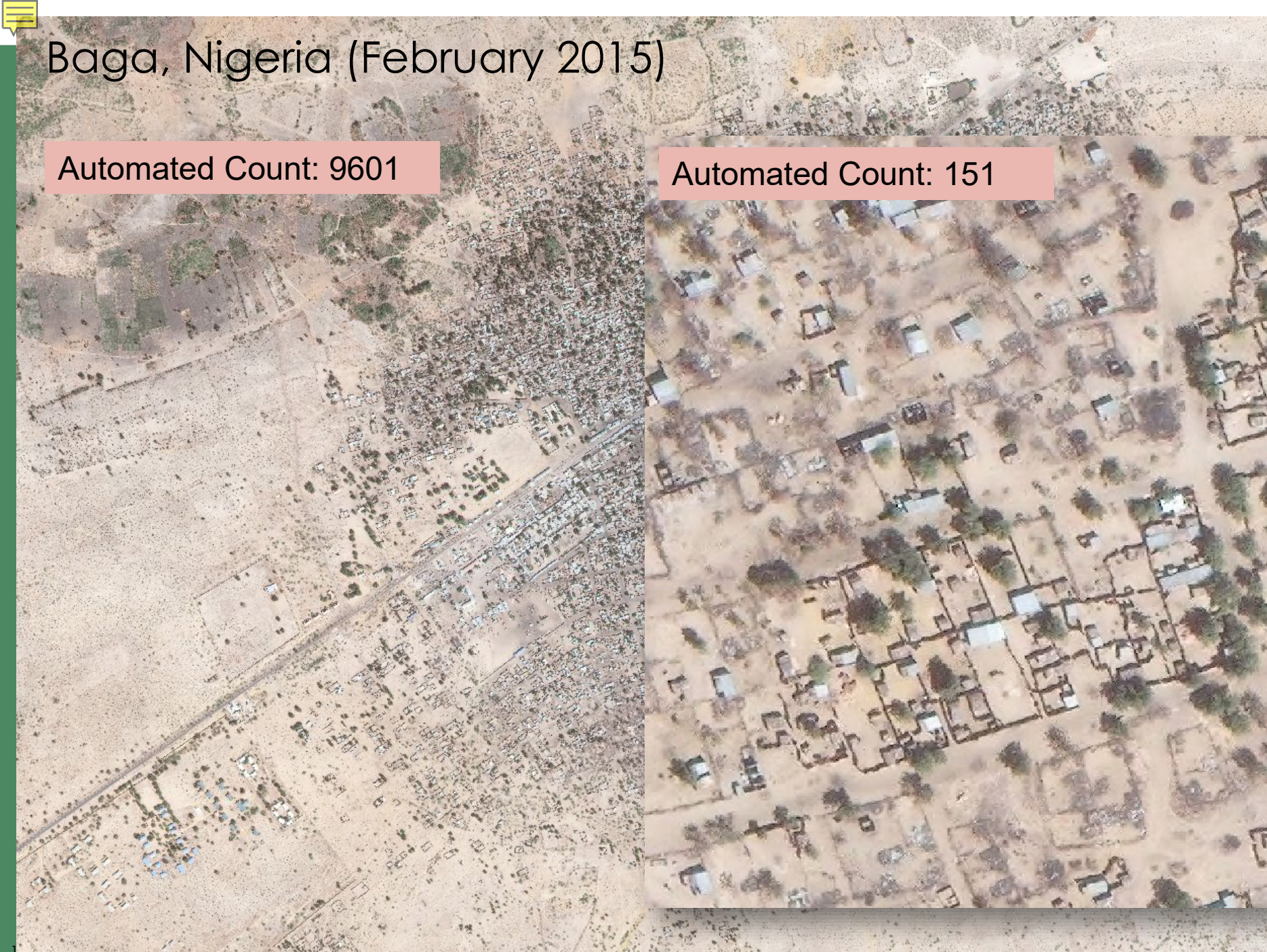


Mariupol, Ukraine

# Baga, Nigeria (February 2015)

Automated Count: 9601

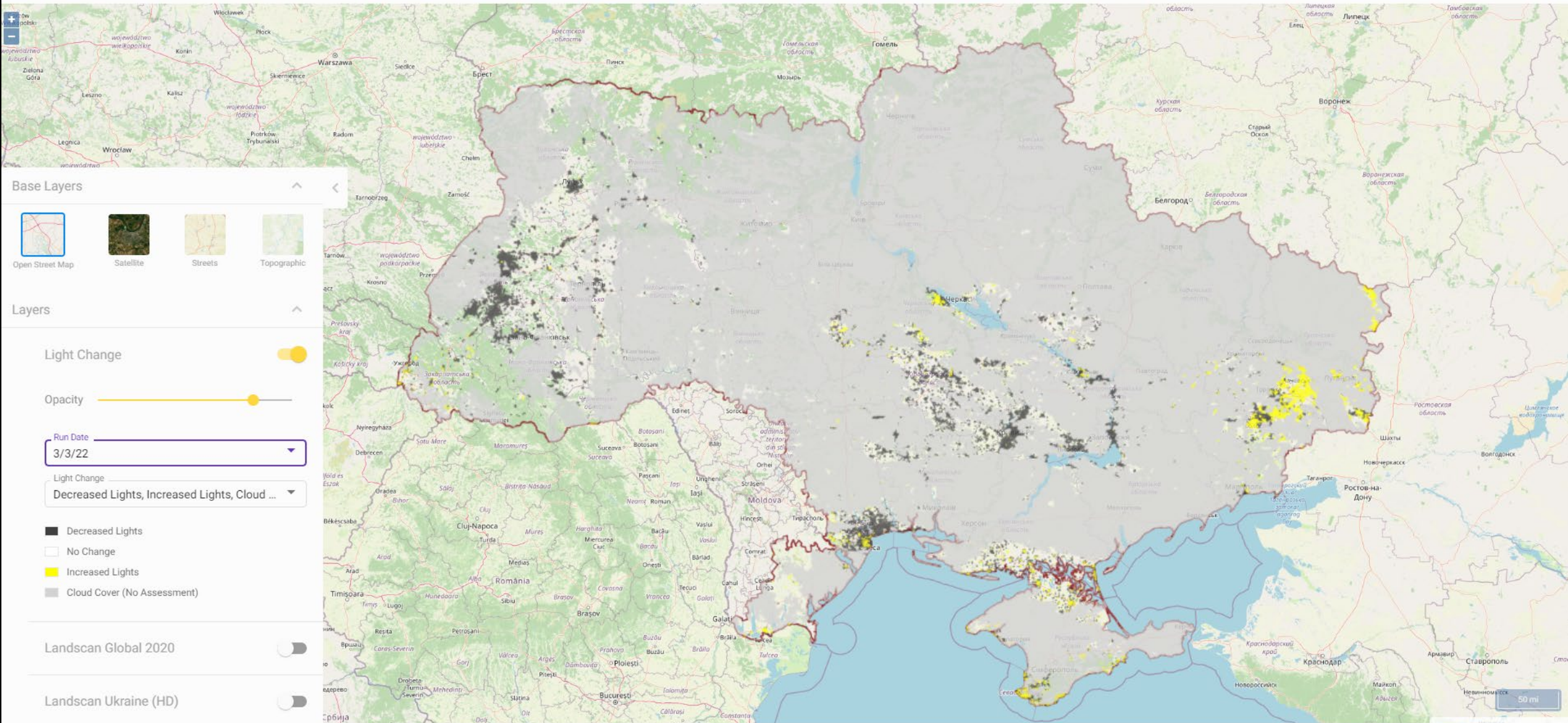
Automated Count: 151



# VIIRS Nighttime Lights Change Detection



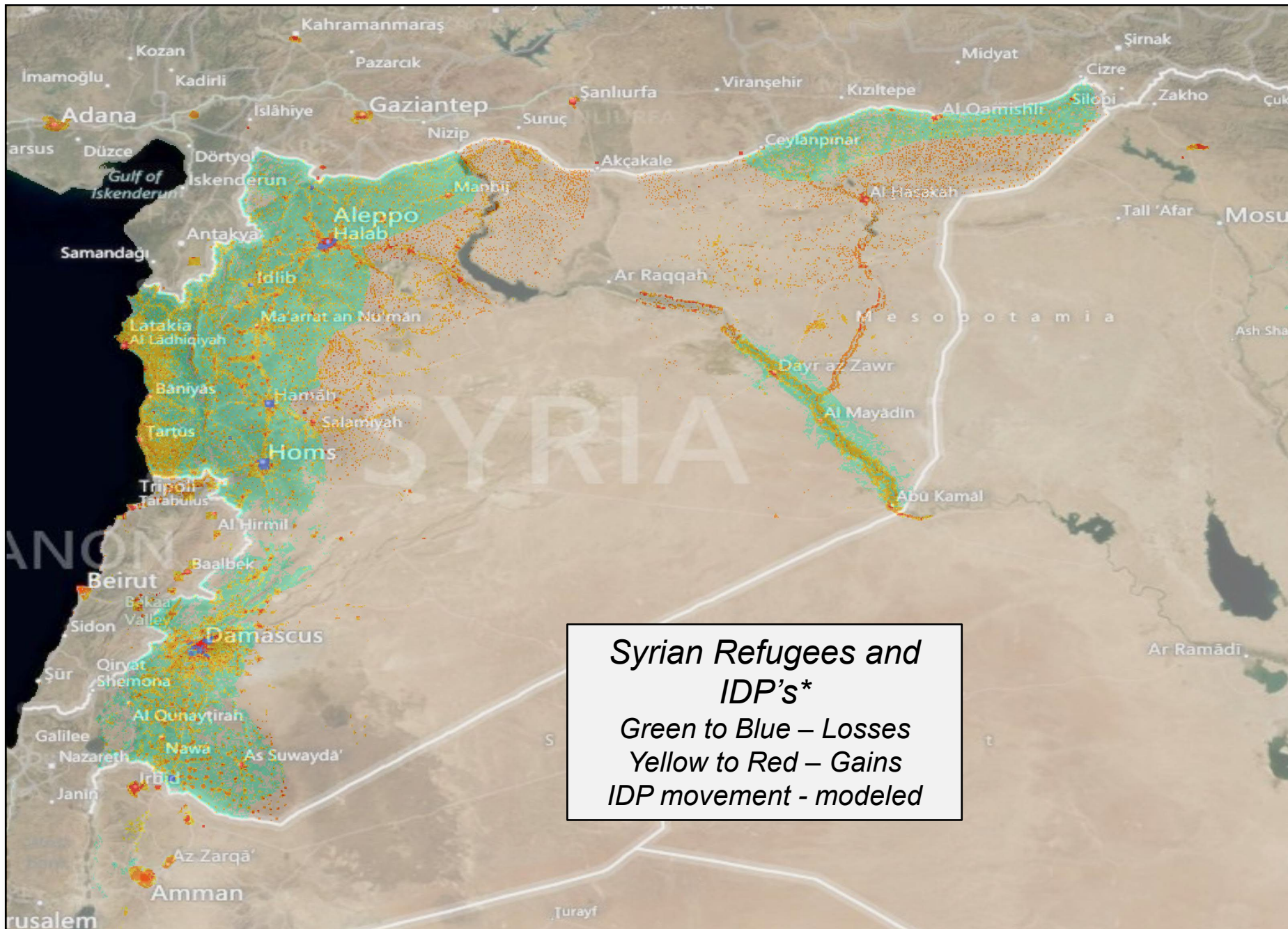
## Wide Area Outages



# Syrian Refugee Movements

August 2012

LandScan Update



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# Questions?

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**ENERGY**