



WEBINAR

COVID-19 RESPONSE USING IMAGERY AND GEOSPATIAL DATA



MAXAR



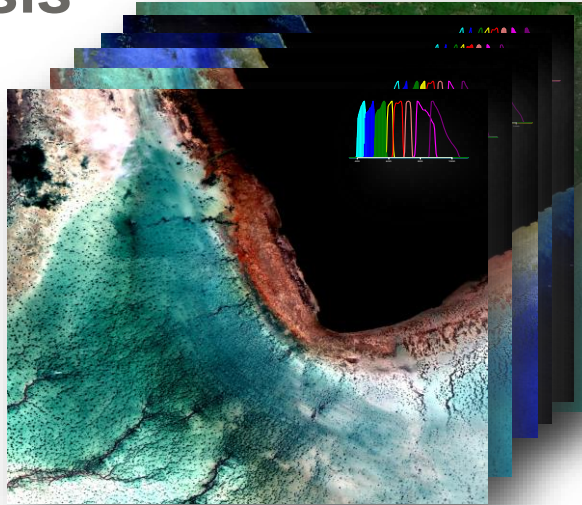
Leveraging Imagery for COVID-19 Response

Kumar Navulur
April 2020

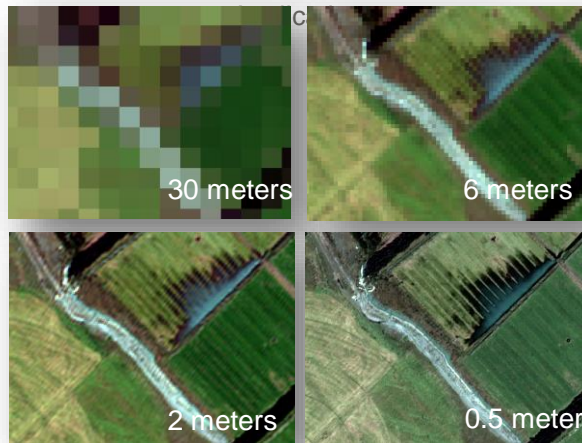




Maxar satellite constellation is capturing images of our planet on a daily basis



Increasing Number of Spectral bands for Mapping



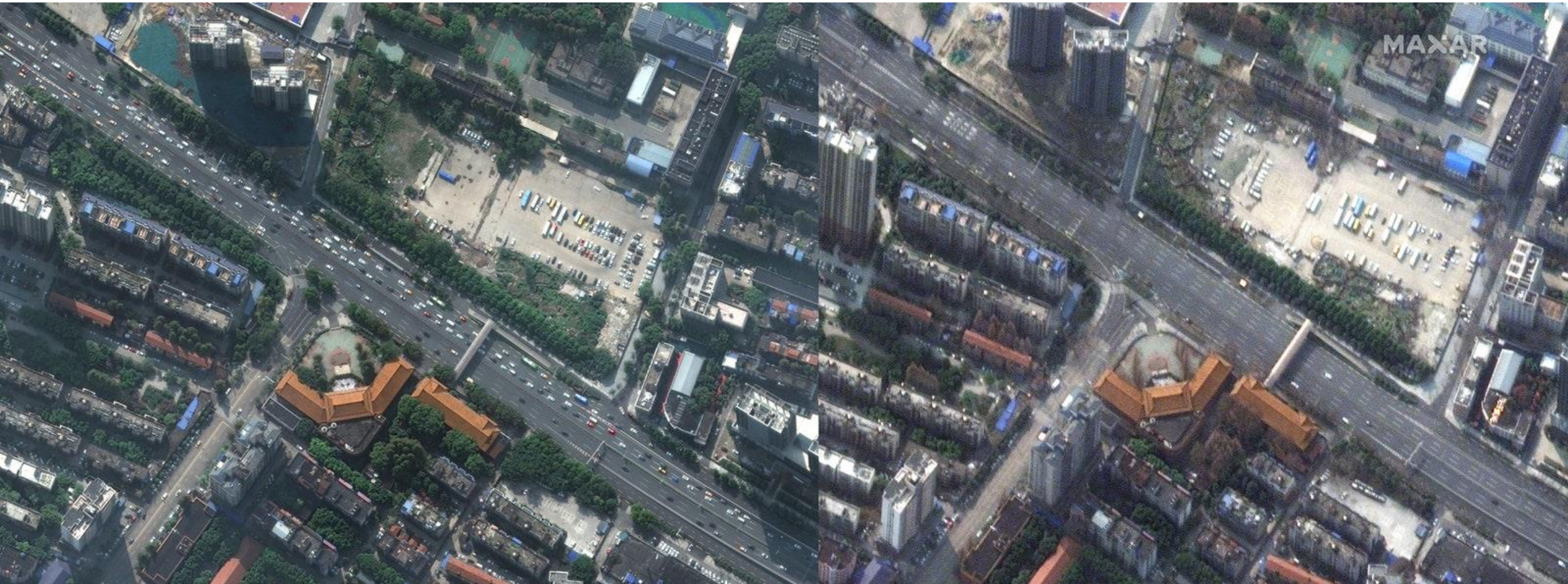
Increasing Spatial Resolution for Monitoring Areas



Global Collection Capacity and Frequent Refresh for Monitoring Changing



Large Scale Computing and Global Infra-Structure Allows Making Maps in Days



A main street in Wuhan



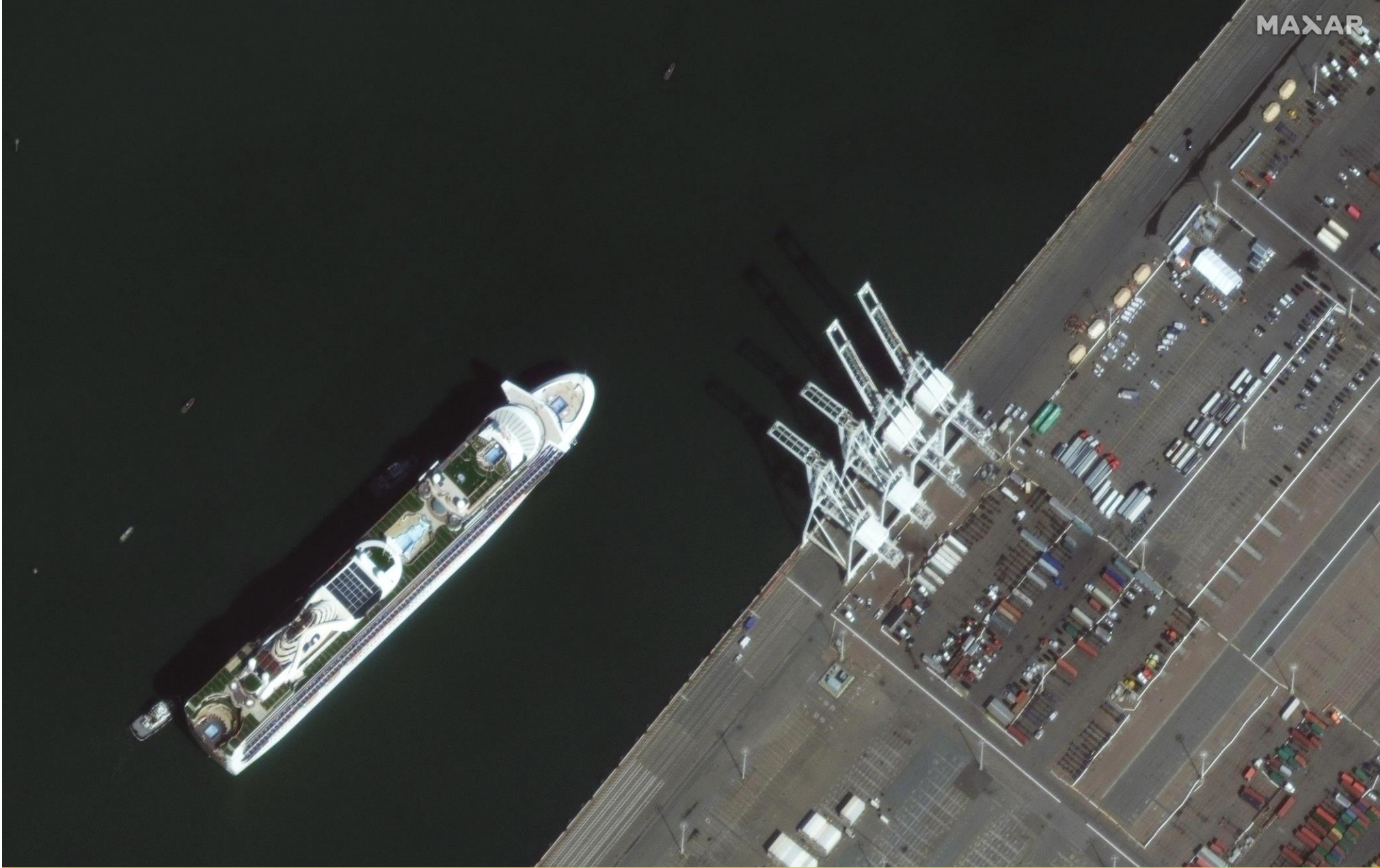
MAXAR



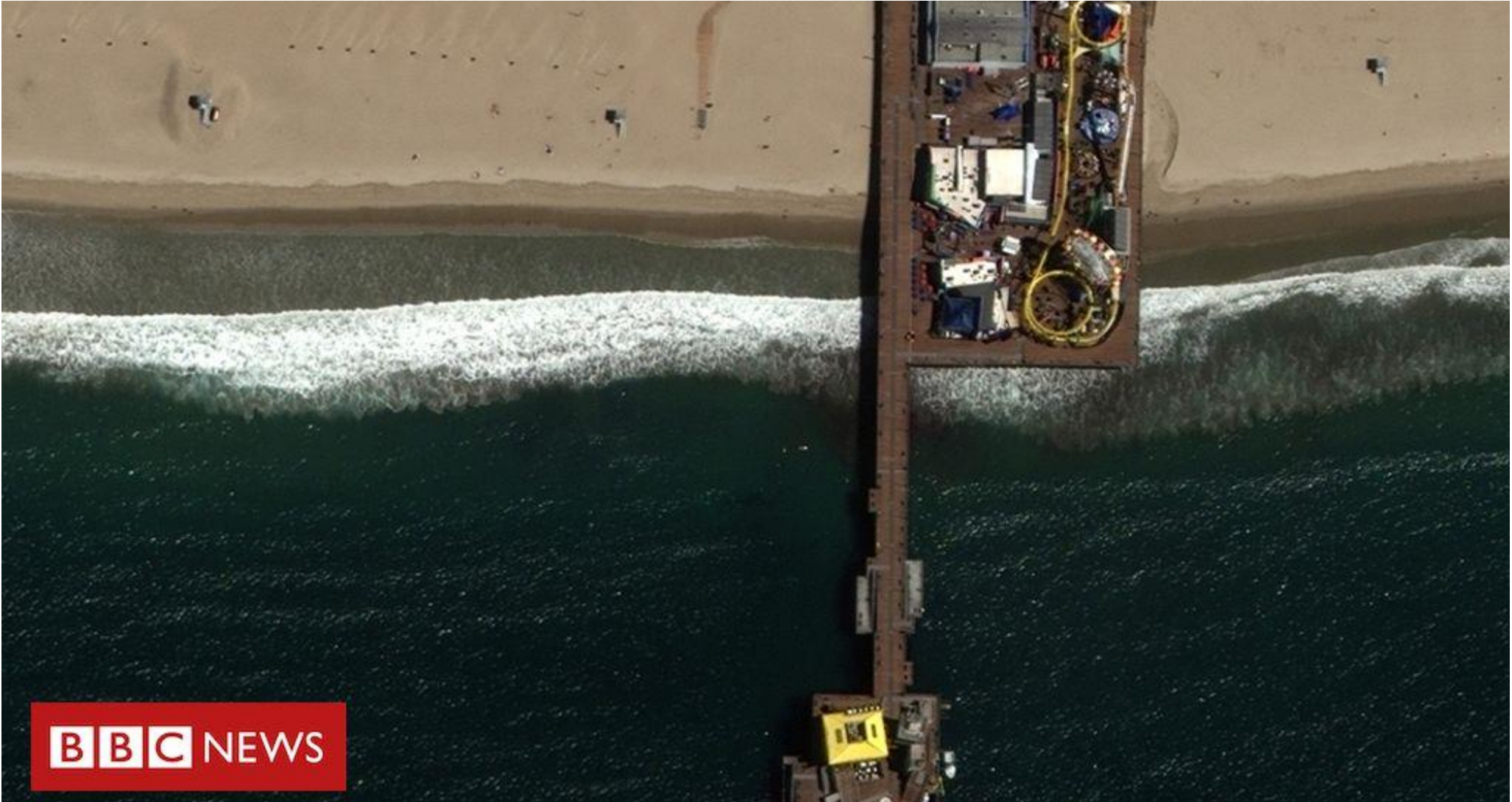
Satellite images reveal Russia is rapidly building a 500-bed hospital in a field outside Moscow to handle a surge in coronavirus cases



Satellite images potential mass graves in Iran



Thousands on virus-hit cruise ship wait their turn to leave



Social Impact due to COVID-19

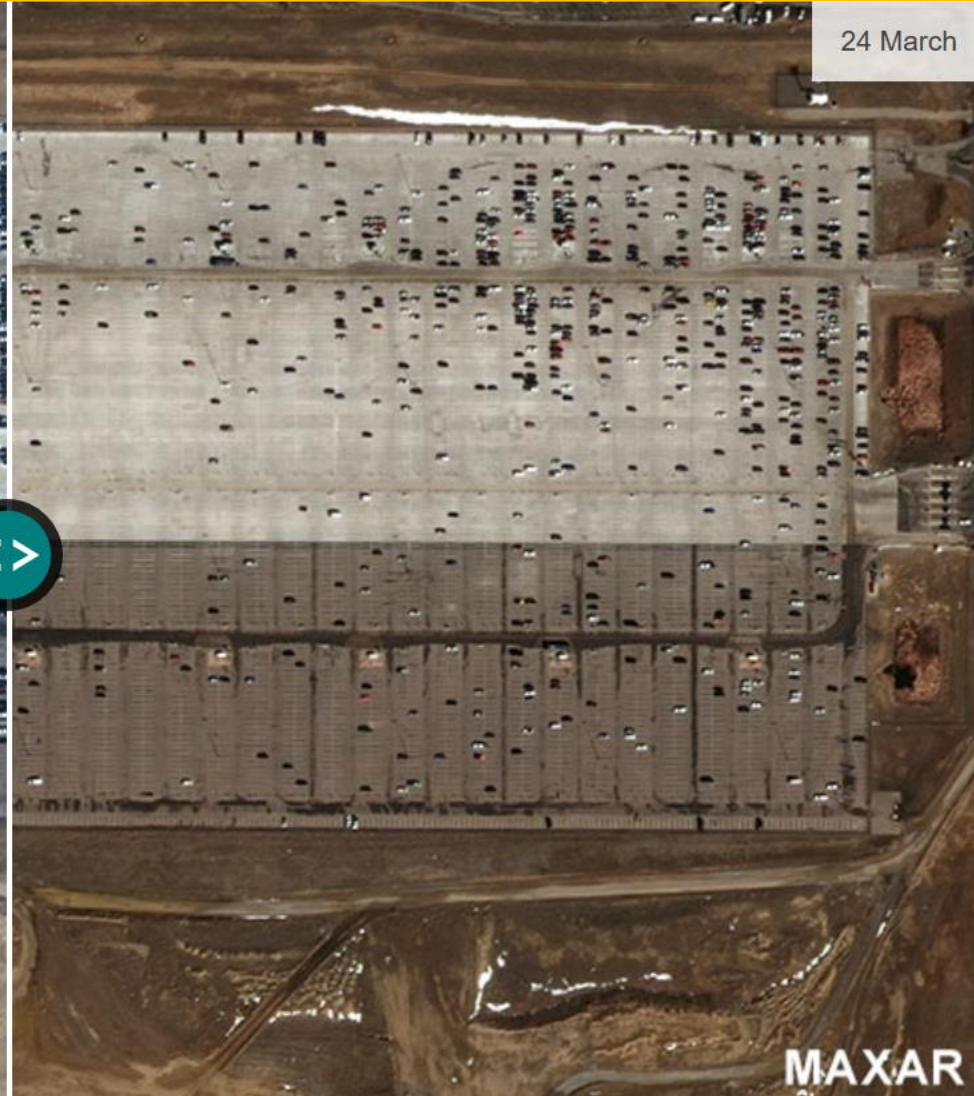


Socia/Economic Impact due to COVID-19, Denver International Airport

7 March

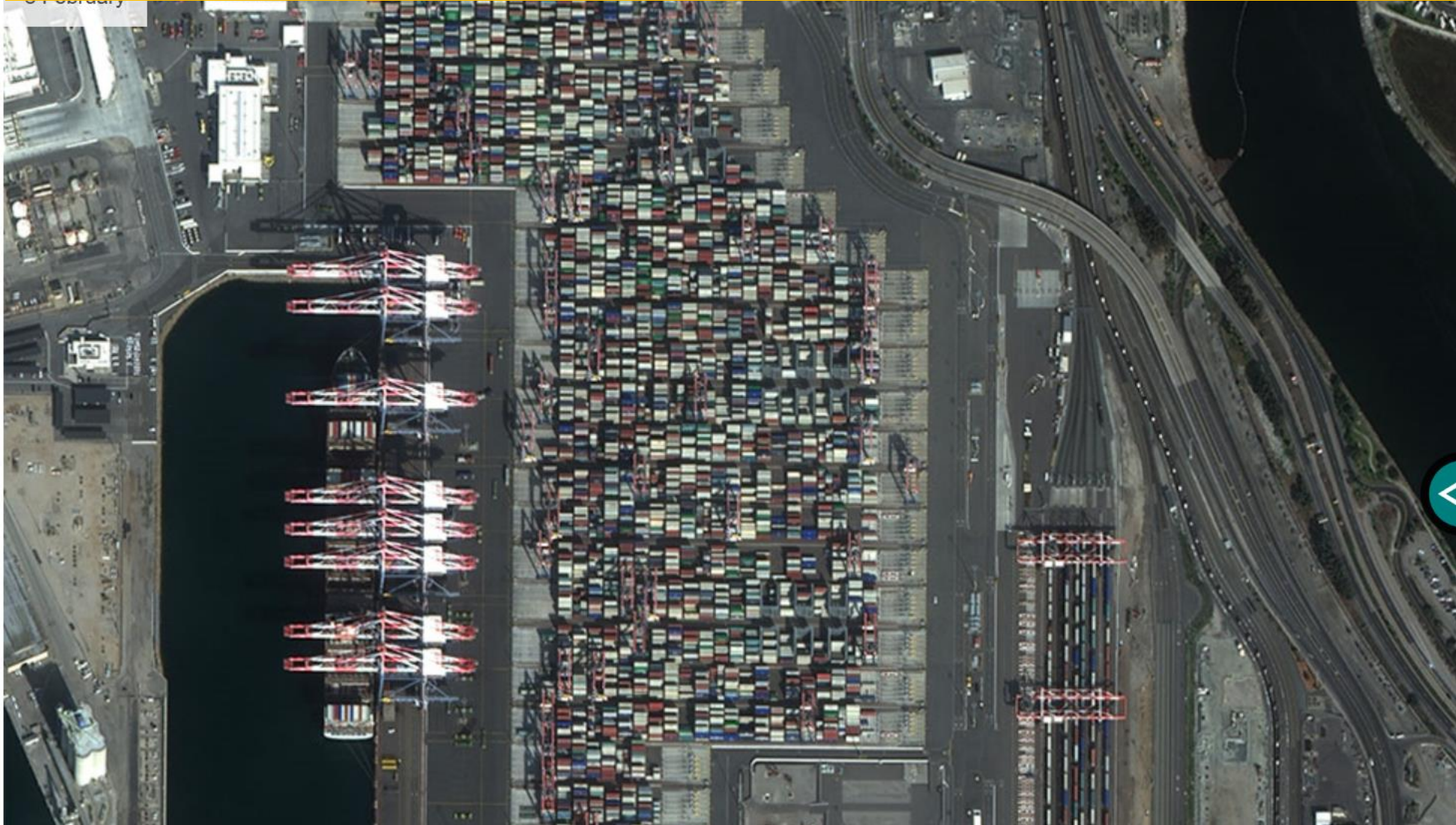


24 March



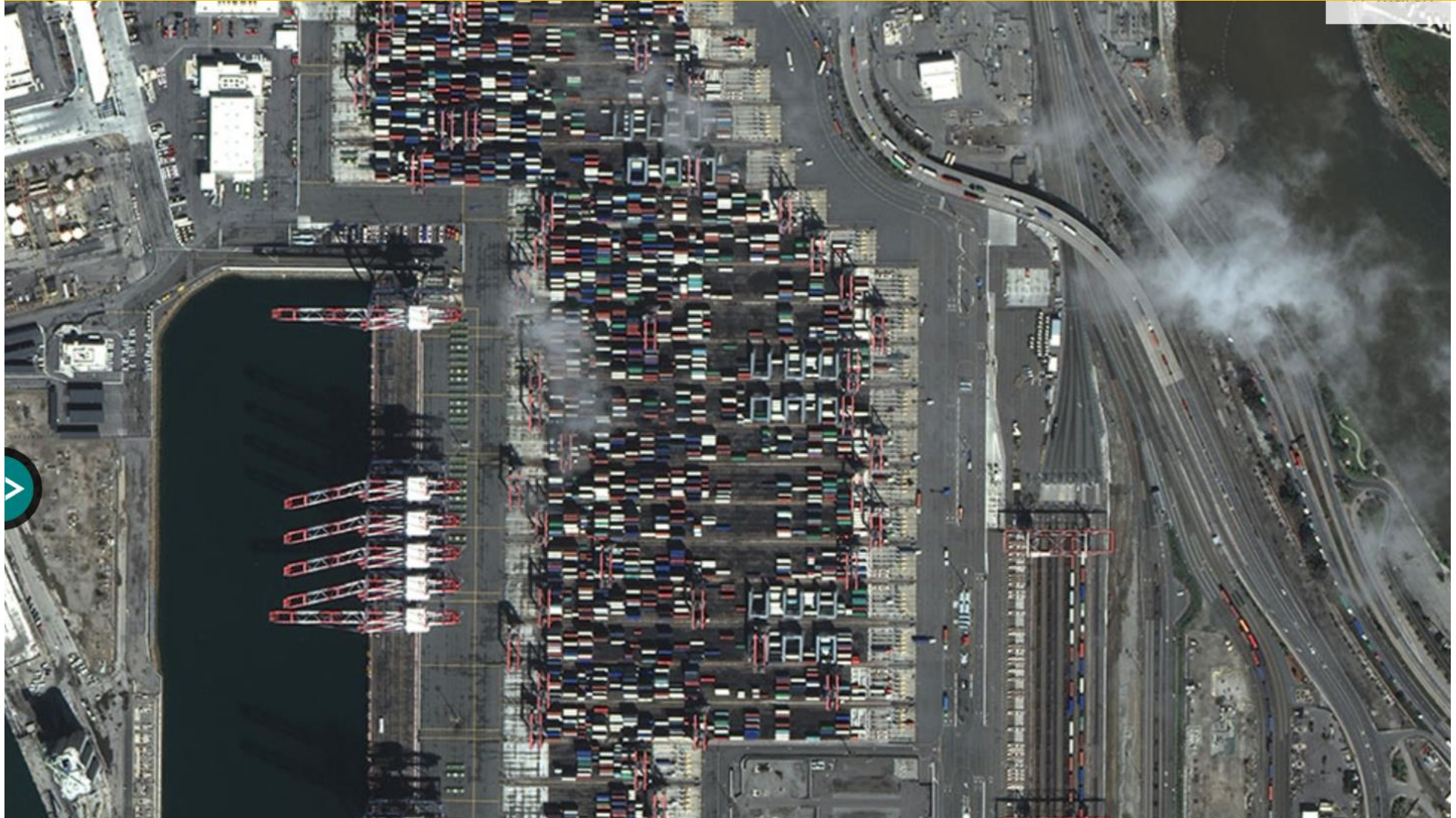


Economic Impact due to COVID-19, Long Beach, CA, USA



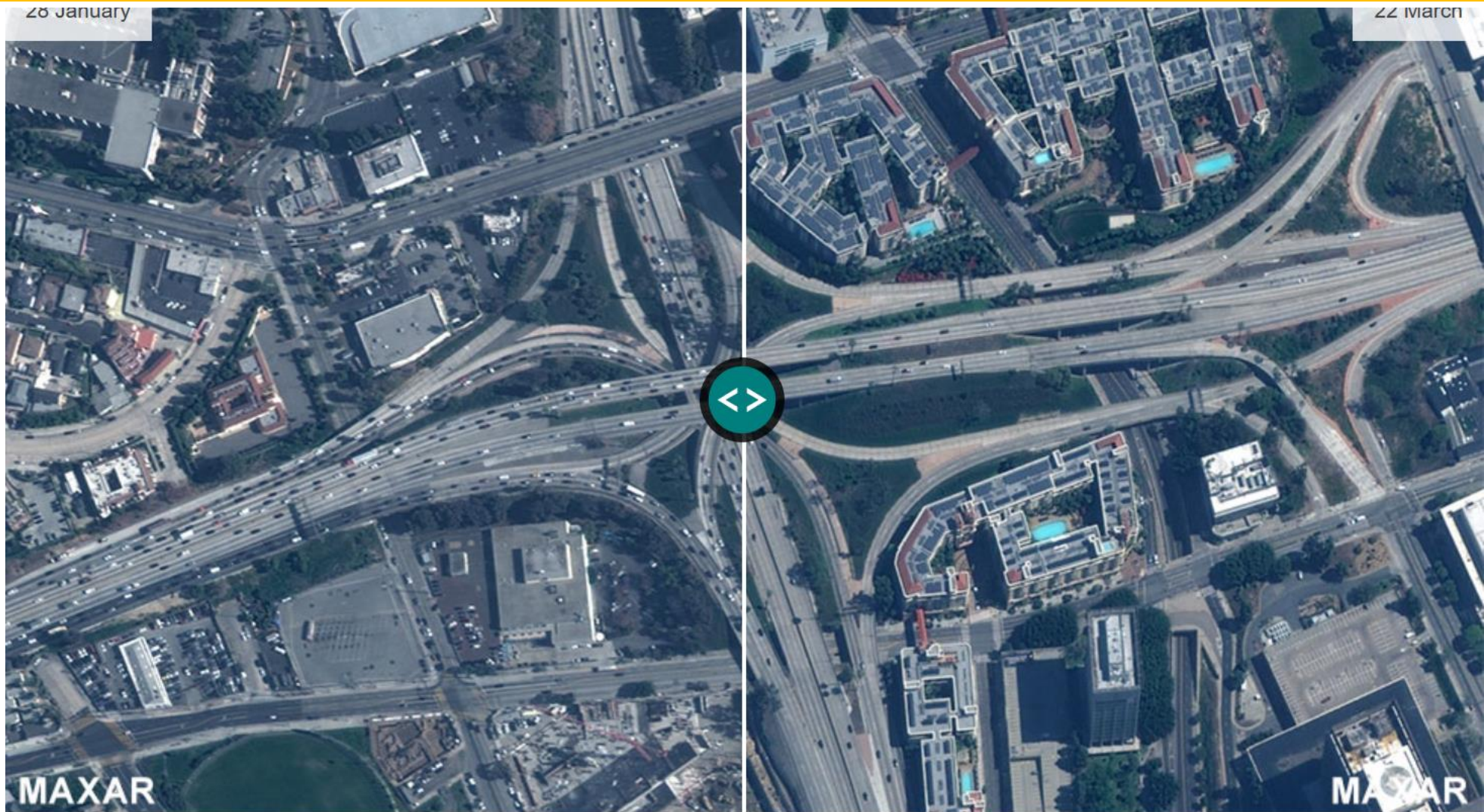


Economic Impact due to COVID-19, Long Beach, CA, USA





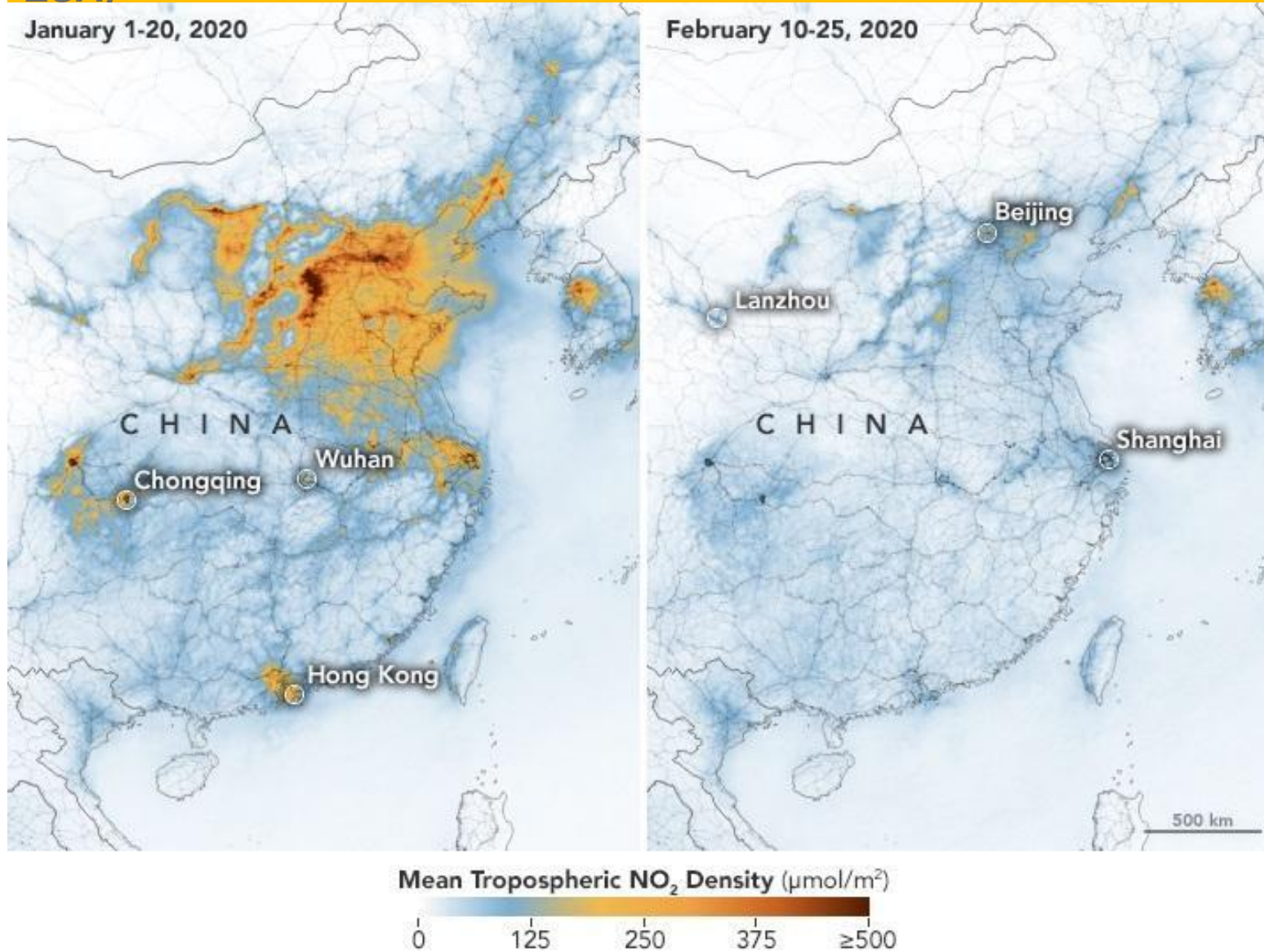
Environmental Impact due to COVID-19, 101 interstate in downtown Los Angeles.



And people aren't flying either - as Maxar Technologies' satellite images of Denver International Airport in Colorado show.



Environmental Impact due to COVID-19, China (Source: NASA and ESA)





WEBINAR

INFECTIOUS DISEASE RESPONSE PLANNING WITH GEOSPATIAL DATA



MAXAR



Infectious disease response planning with geospatial data

Alicia Williams

April 2020

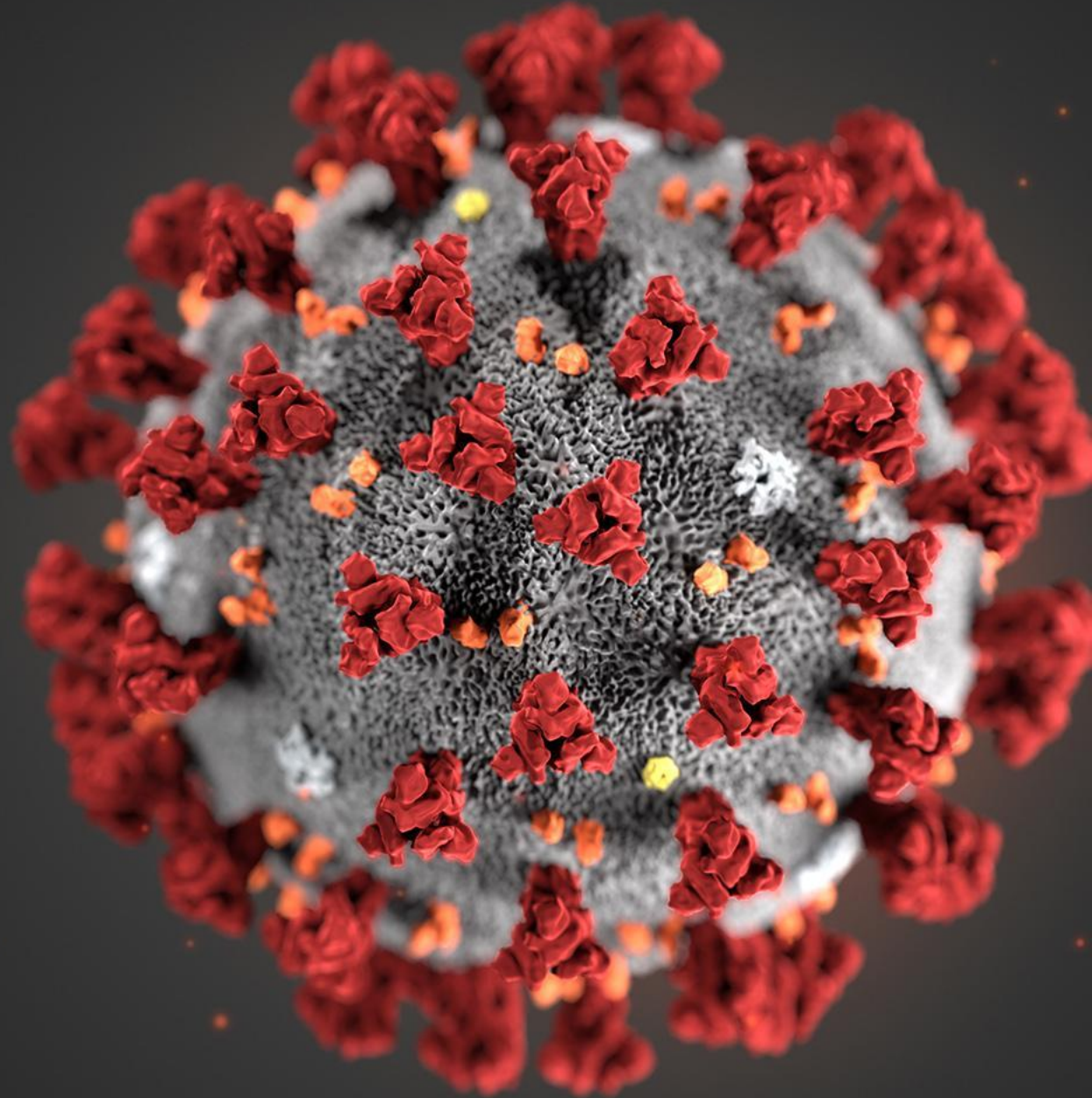


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Infectious disease modeling

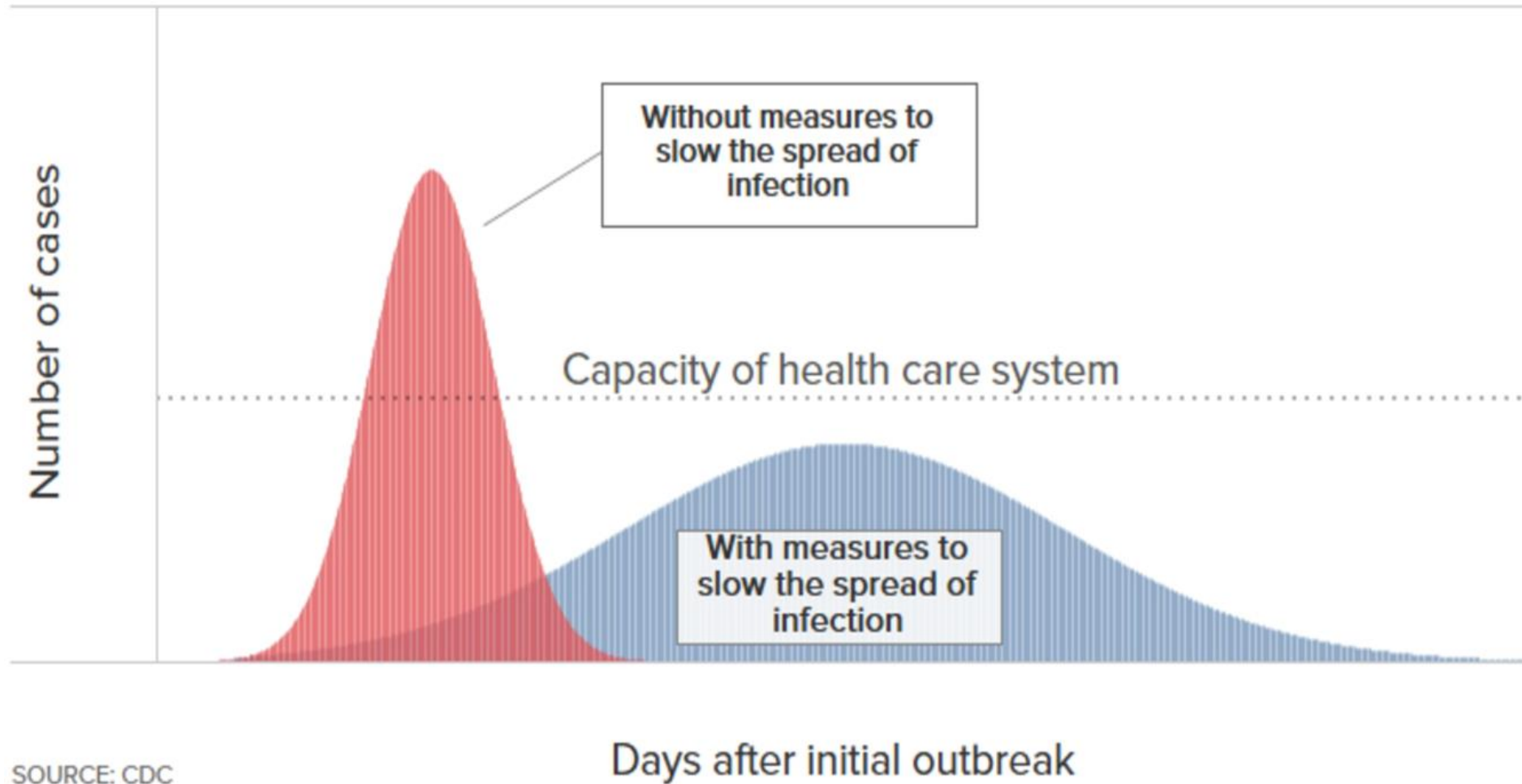
- Infectious diseases are estimated to be responsible for more than 15 million deaths globally each year
- Human mobility along with socioeconomic conditions are all important factors in modeling pandemics.





Geospatial data for infectious disease modeling

Flattening the Curve



SOURCE: CDC



Urgent need for data

- February 19th - Iran announces its first deaths from COVID-19
- March 1st - Large trenches are visible, mass graves for COVID-19 victims





Ebola disease modeling



Timely Transport

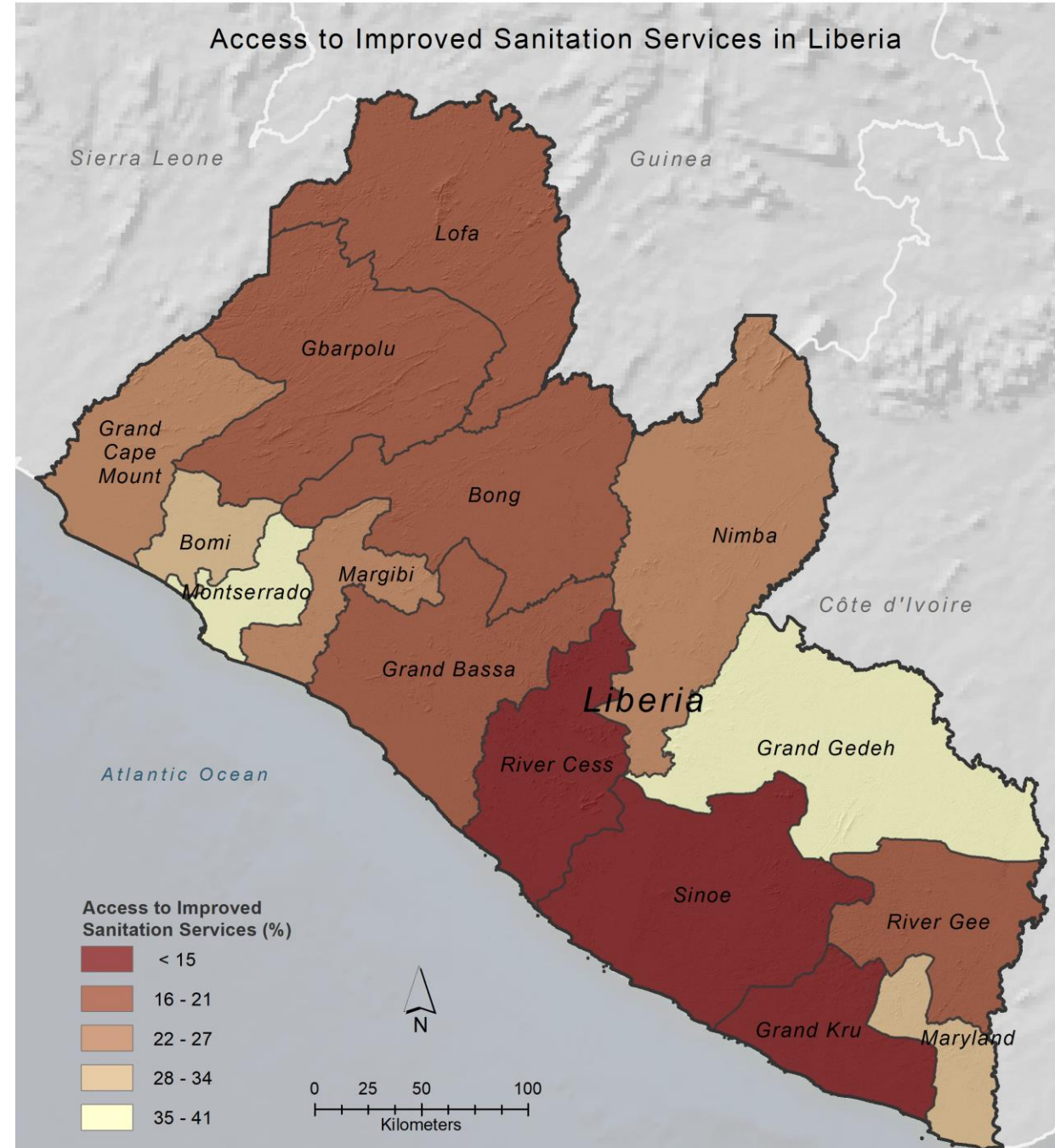
- Maxar human landscape datasets identified the locations of **key points of interest (POIs)**, such as medical facilities and clinics, in disease-affected areas like Monrovia, Liberia.





Sanitation Services

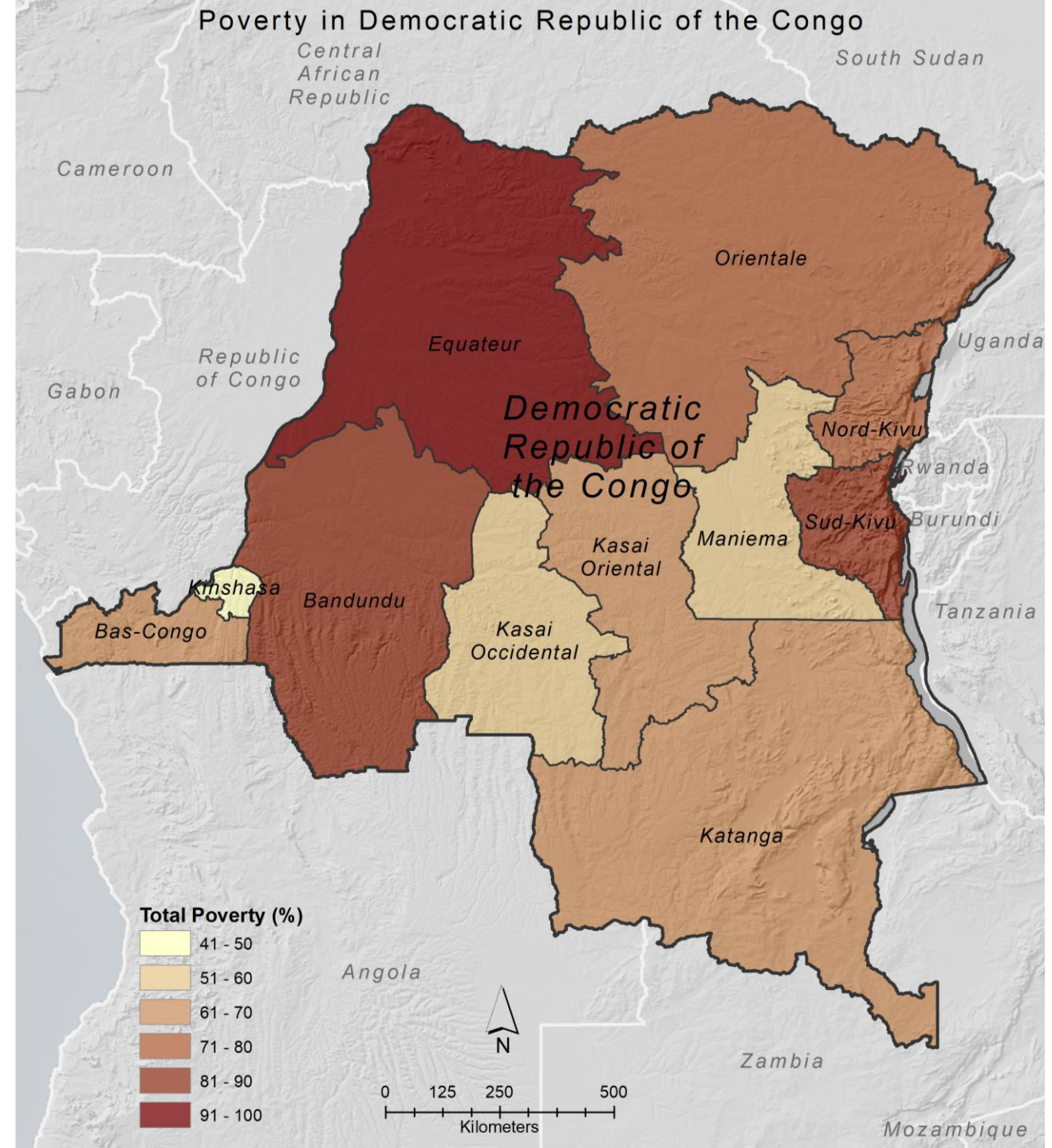
- **Sociocultural layers**, such as access to improved sanitation services, were important for modeling the Ebola outbreak in Liberia in 2014.





Population Density

- **Sociocultural layers** informed response teams where high-density populations were located, specifically low-income communities with higher risk of contracting the disease.



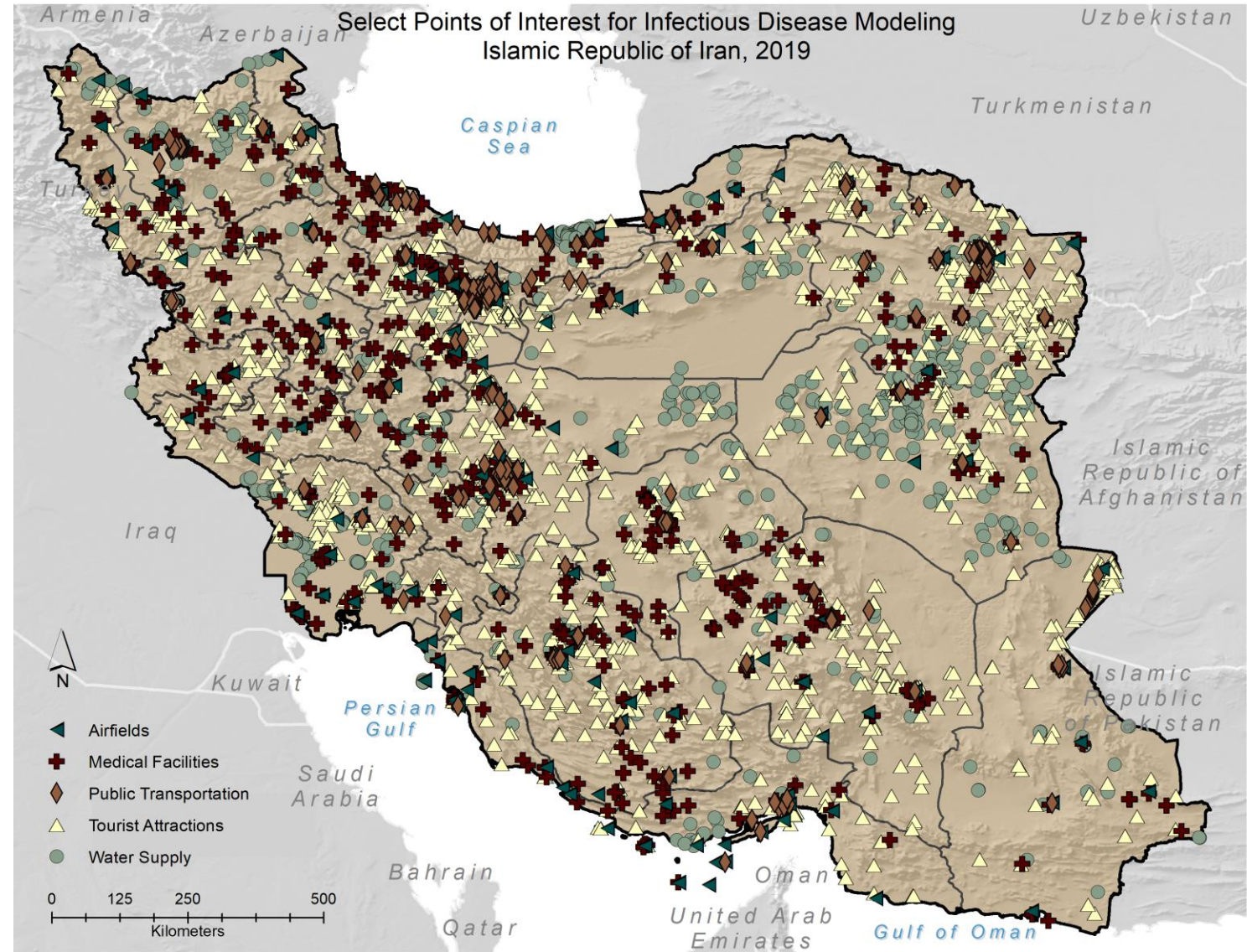


COVID-19 disease modeling



Disease modeling POIs

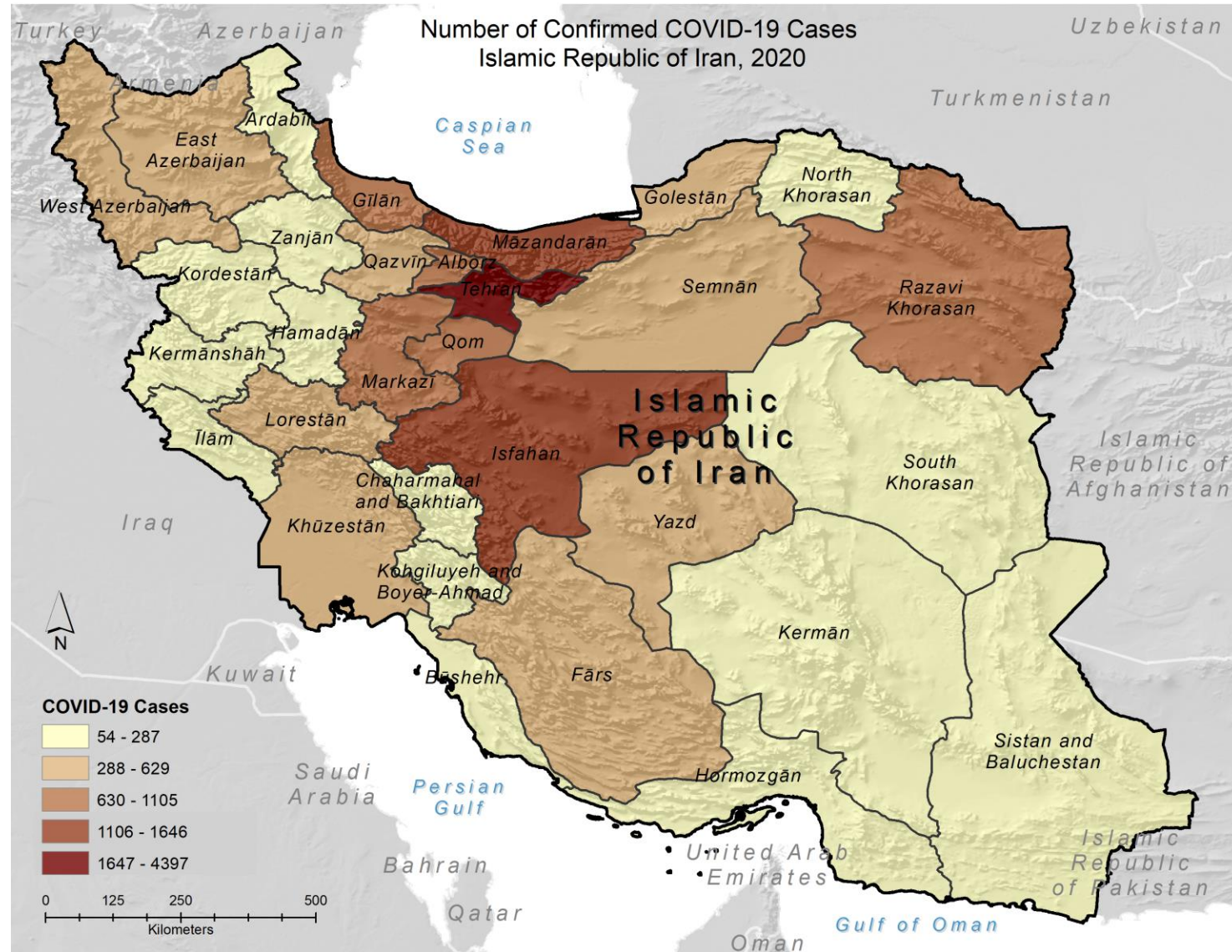
- Key points of interest (POI) layers in Iran were mapped to model infectious disease outbreaks.





COVID-19 Cases

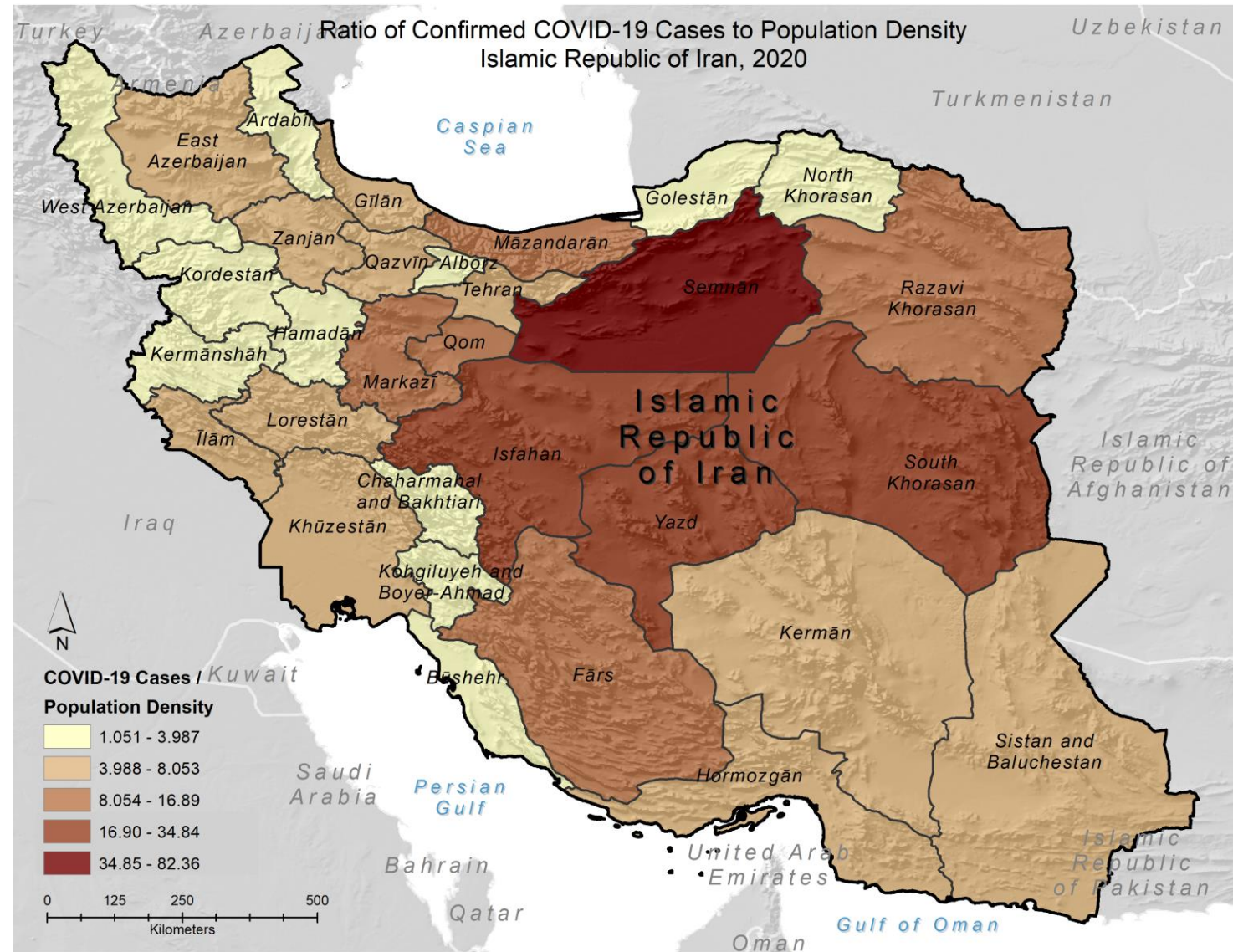
- Tehran: 4,397 cases
- Isfahan: 1,646 cases
- Semnan: 593 cases





COVID-19 Cases by Population

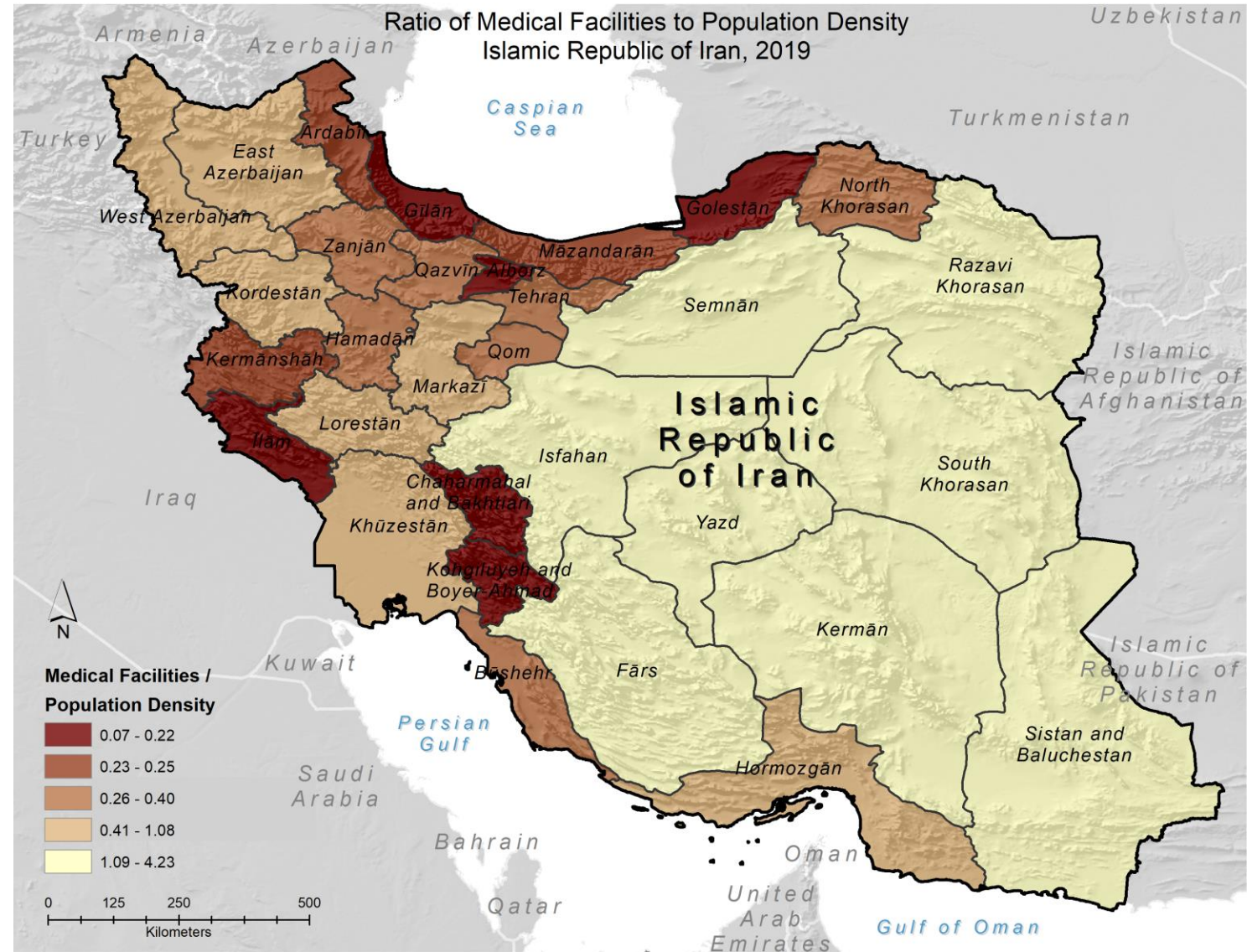
- When normalized by population density, Semnan becomes the standout
- While more research needs to be done, this could very well be due to proximity to Tehran





Medical facilities by Population

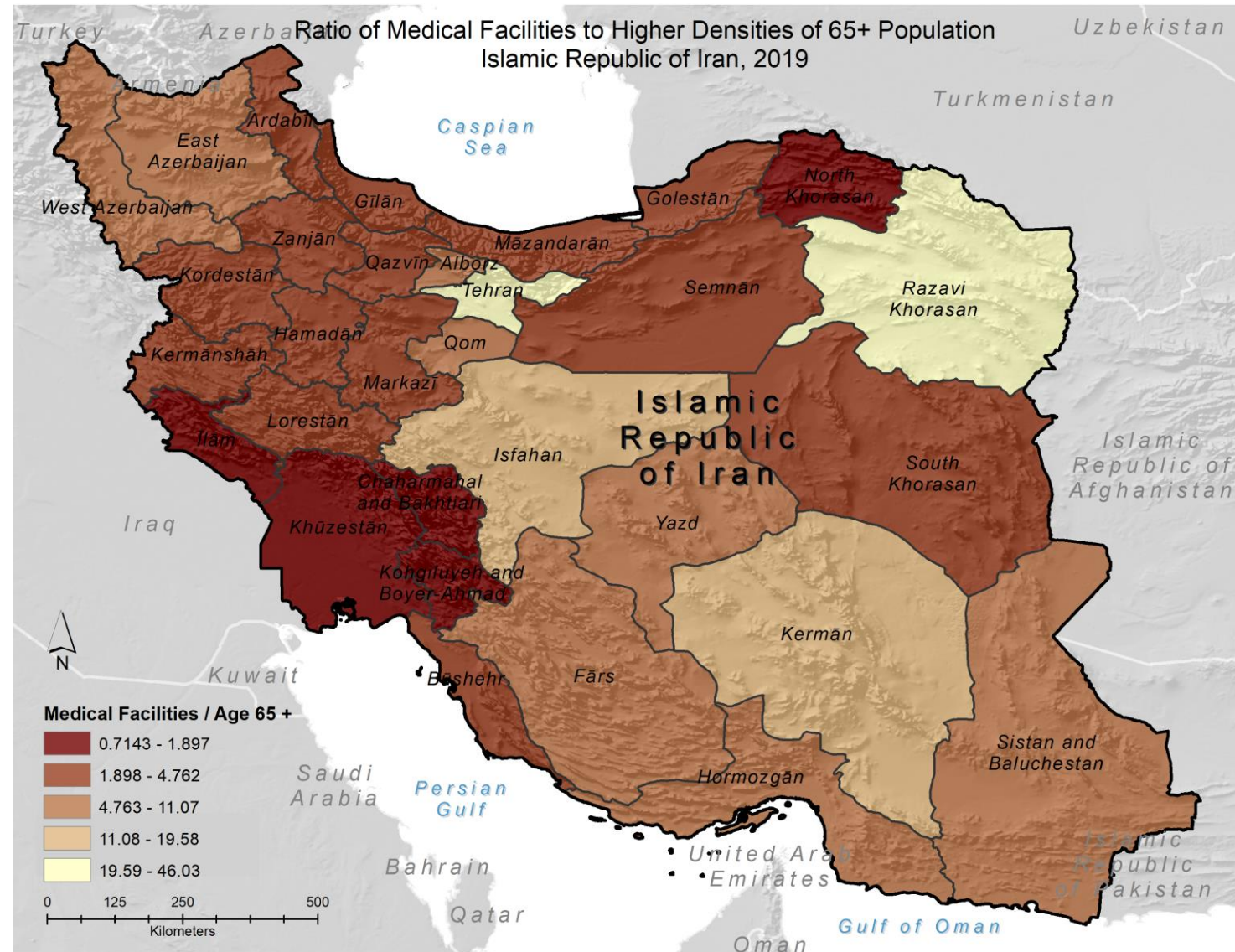
- The ratio of medical facilities to population density quickly identifies at-risk communities.
- The provinces in darker red colors indicate locations where the number of medical facilities is far lower than necessary, compared to population.





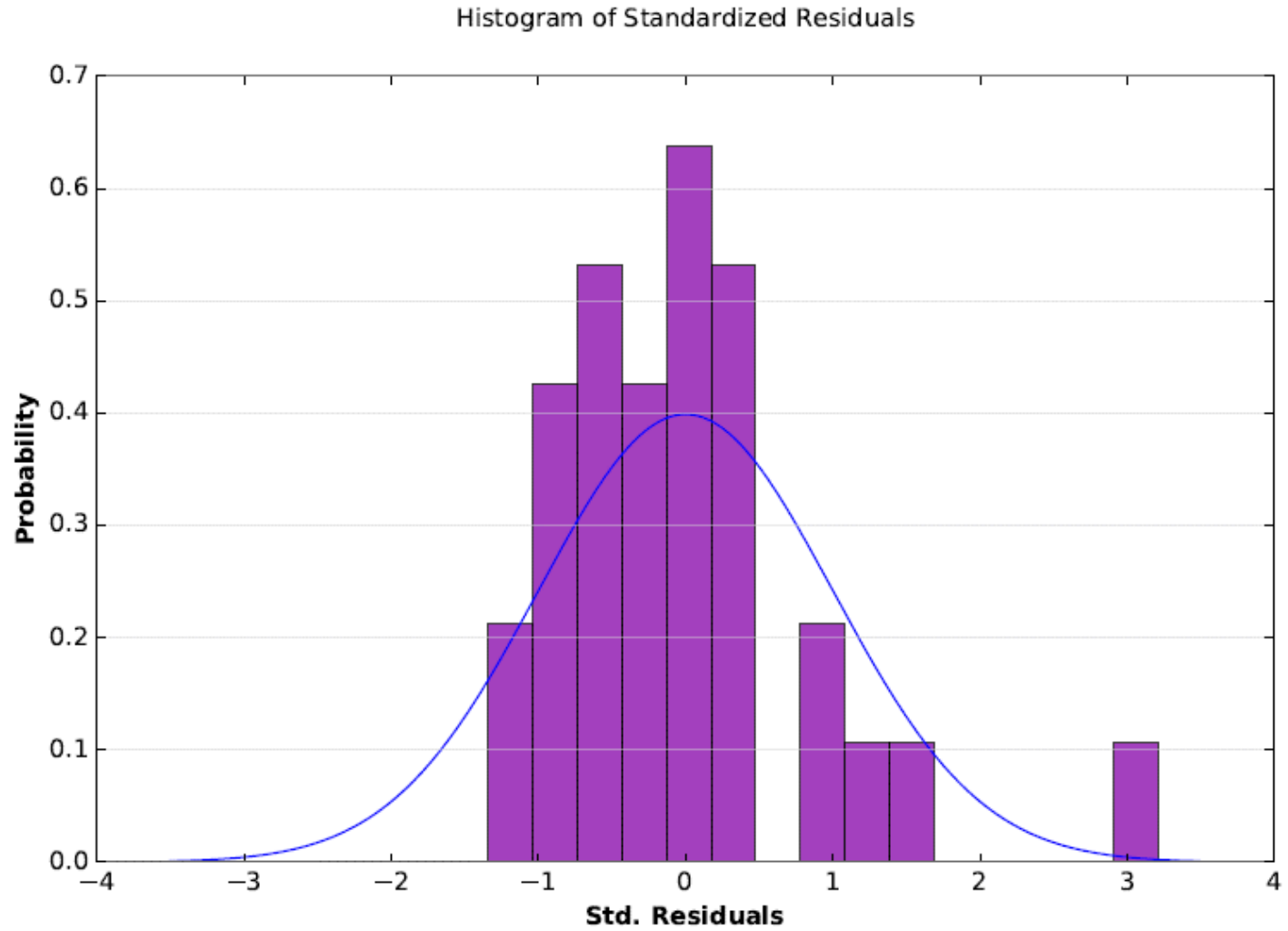
Medical Facilities by Age 65+

- Ratio of medical facilities by population density of ages 65 and over.
- Khuzestan is one of the standouts here.





Use case examples

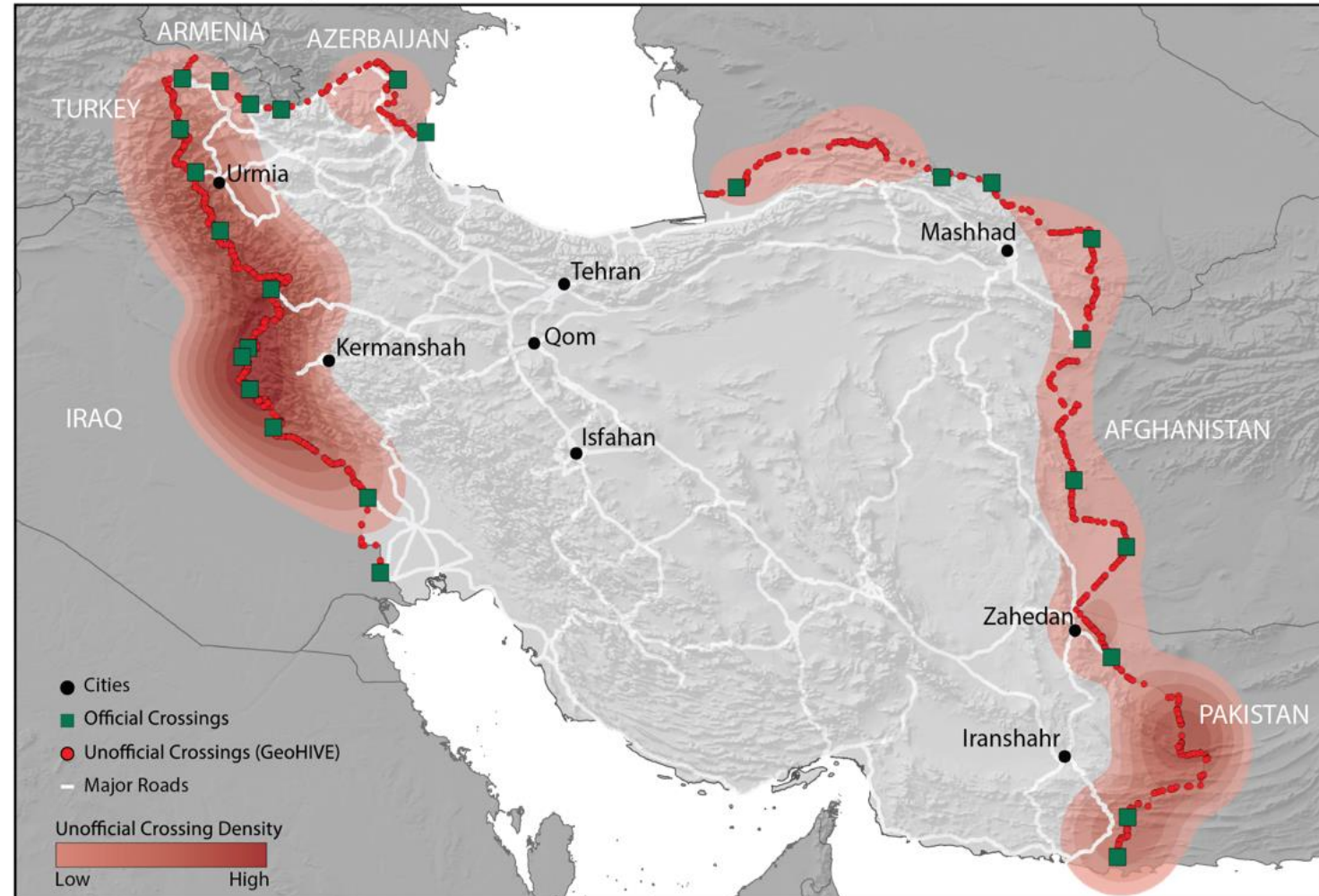




Border porosity

- This analysis reveals how established smuggling networks increase risks of COVID-19 outbreaks in neighboring countries

Iran's Border Porosity





Analysis-ready geospatial data



Why use Maxar Data?

- **80%** of the work of a data scientist is data cleaning and preparation, rather than actually mining or modeling data.*
- **Analysts can jump straight into analytics!**
- Our data has been validated, is easy to understand, and ready to use!



*Source: "Cleaning Big Data: Most Time-Consuming, Least Enjoyable Data Science Task, Survey Says." Forbes. March 23, 2016. www.forbes.com.



How geospatial data can help

**Imagery
Basemaps**

Foundational view of your area of interest

**Building
Footprints**

Identify where population is located

**Human
Landscape**

Determine available critical services where people congregate



Imagery basemaps

- Maxar imagery basemaps provide an accurate, consistent and actionable satellite image layer to support mapping, visualization and analytics at local, regional and global scale.





Building footprints

- Ecopia Building Footprints – powered by Maxar – are GIS-ready polygons generated by the most sophisticated and advanced high-resolution satellite imagery, artificial intelligence, and cloud-computing power available.
- Enables users to detect and classify infrastructure at scale, with precision!





HUMAN LANDSCAPE

8 COMMON THEMES

Human Landscape

- Country-by-country datasets
- Geospatial data across 8 core themes
- **60+ data layers** per country
- Delivery in ready-to-use, **easy to navigate** formats
- Data compiled from hundreds of sources by expert analysts
- Designed to support **advanced analytics** within the ESRI platform





Human Landscape disease modeling layers

- Medical facilities
 - Hospitals
 - Urgent care facilities
 - Pharmacies
- Sociocultural Layers
 - Population density
 - Access to services (internet)
 - Access to clean water
 - Access to updated sewage systems
 - Access to education
 - Employment rates
- Airfields
- Tourist Attractions
- Cultural point of interest
- Roads
- Public transportation hubs
- Water infrastructure locations
- Recreational points of interest

*Poh-Chin Lai, Chun Bong Chow, Ho Ting Wong, Kim Hung Kwong, Yat Wah Kwan, Shao Haei Liu, Wah Kun Tong, Wai Keung Cheung & Wing Leung Wong (2015) An early warning system for detecting H1N1 disease outbreak – a spatio-temporal approach, International Journal of Geographical Information Science, 29:7, 1251-1268, DOI: 10.1080/13658816.2015.1030671



Human Landscape difference

- Data is collected at the lowest administrative level possible
- Information is vetted against multiple sources
- Machine learning or crowdsourcing is used to validate data
- Expert analysts enhance the data
- Quality control
- Finalize deliverable





Data validation with GeoHIVE



Is this a parking lot?



Data validation with machine learning

- 90% + Accuracy!



Is this point on a building?



The Human Landscape difference

- Attributes add depth to the spatial data
- Multiple sources are used to fill in as many attributes as possible
- Easy access to attributes within the feature class

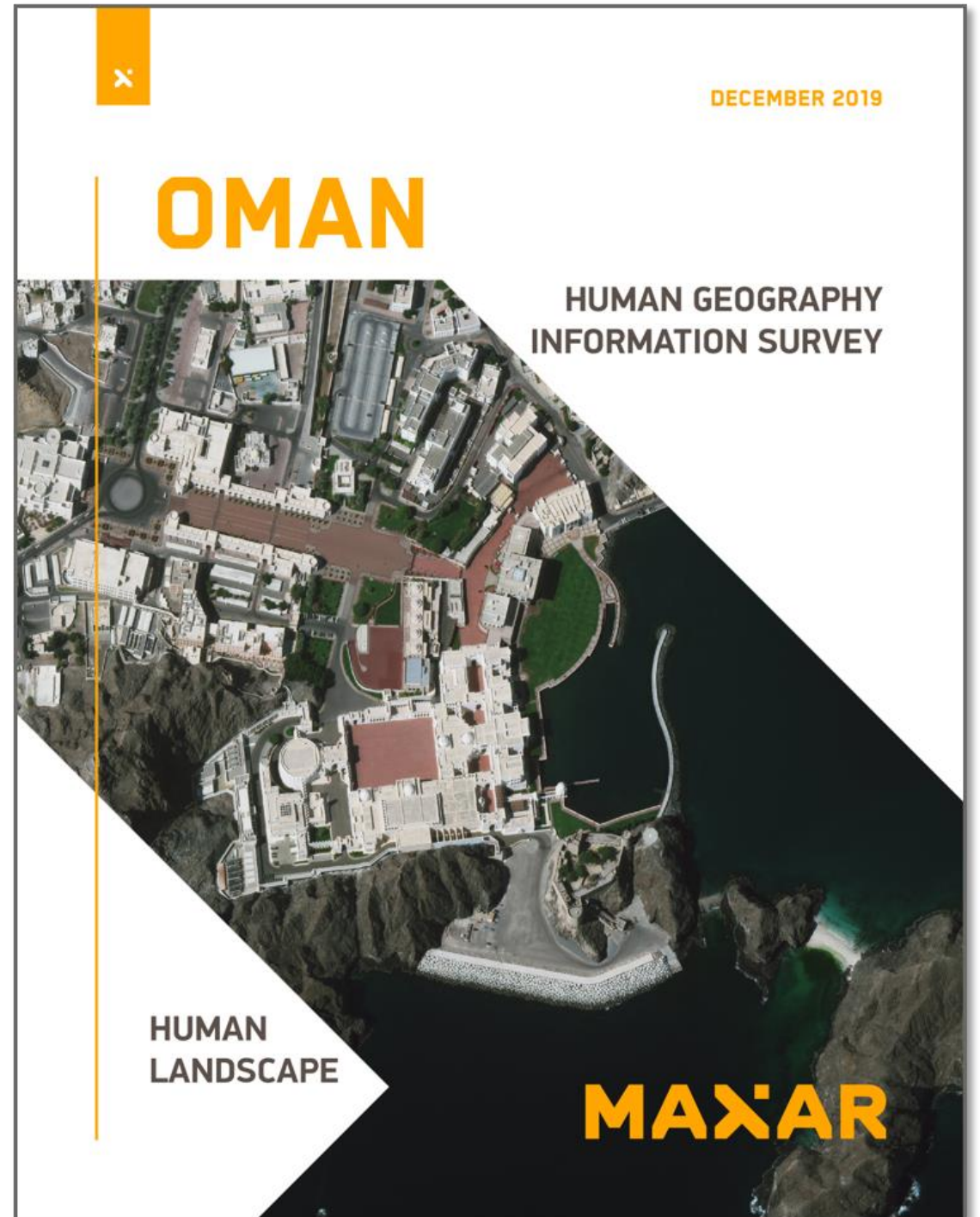
Airfields

NAME	TYPE1	ICAO	IATA	RUNWAY	N_RUNWAYS	R1_SURFACE	R2_SURFACE	R_LENGTH	R_WIDTH	USE	CUSTOMS	SPA_ACC	CONF_IMAGE
Aghajari Airport	Commercial	OIAG	AKW	Paved	1	Asphalt	<Null>	2113	45	Regional	<Null>	1 - High	Confirmed
Ahwaz Airport	Commercial	OIAW	AWZ	Paved	1	Asphalt	<Null>	3398	45	Regional	No	1 - High	Confirmed
Arak Airport	Commercial	OIHR	AJK	Paved	1	Asphalt	<Null>	2990	45	Local	No	1 - High	Confirmed
Ardabil Airport	Commercial	OITL	ADU	Paved	1	Asphalt	<Null>	3299	45	Regional	<Null>	1 - High	Confirmed
Asaloyeh Airport	Commercial	OIBI	AOY	Paved	1	Asphalt	<Null>	3604	45	Regional	<Null>	1 - High	Confirmed
Bam Airport	Commercial	OIKM	BXR	Paved	1	Asphalt	<Null>	3385	45	Regional	<Null>	1 - High	Confirmed
Bandar Lengeh Airport	Commercial	OIBL	BDH	Paved	1	Asphalt	<Null>	2500	45	Regional	No	1 - High	Confirmed
Bojnord Airport	Commercial	OIMN	BJB	Paved	1	Asphalt	<Null>	3225	45	Regional	<Null>	1 - High	Confirmed
Dasht-E Naz Airport	Commercial	OINZ	SRY	Paved	1	Asphalt	<Null>	2648	45	Regional	<Null>	1 - High	Confirmed
Dayrestan International Airport	Commercial	OIKQ	GSM	Paved	1	Asphalt	<Null>	4226	45	International	Yes	1 - High	Confirmed
Fasa Airport	Commercial	OISF	FAZ	Paved	1	Asphalt	<Null>	1982	30	Regional	<Null>	1 - High	Confirmed



Human Landscape deliverable

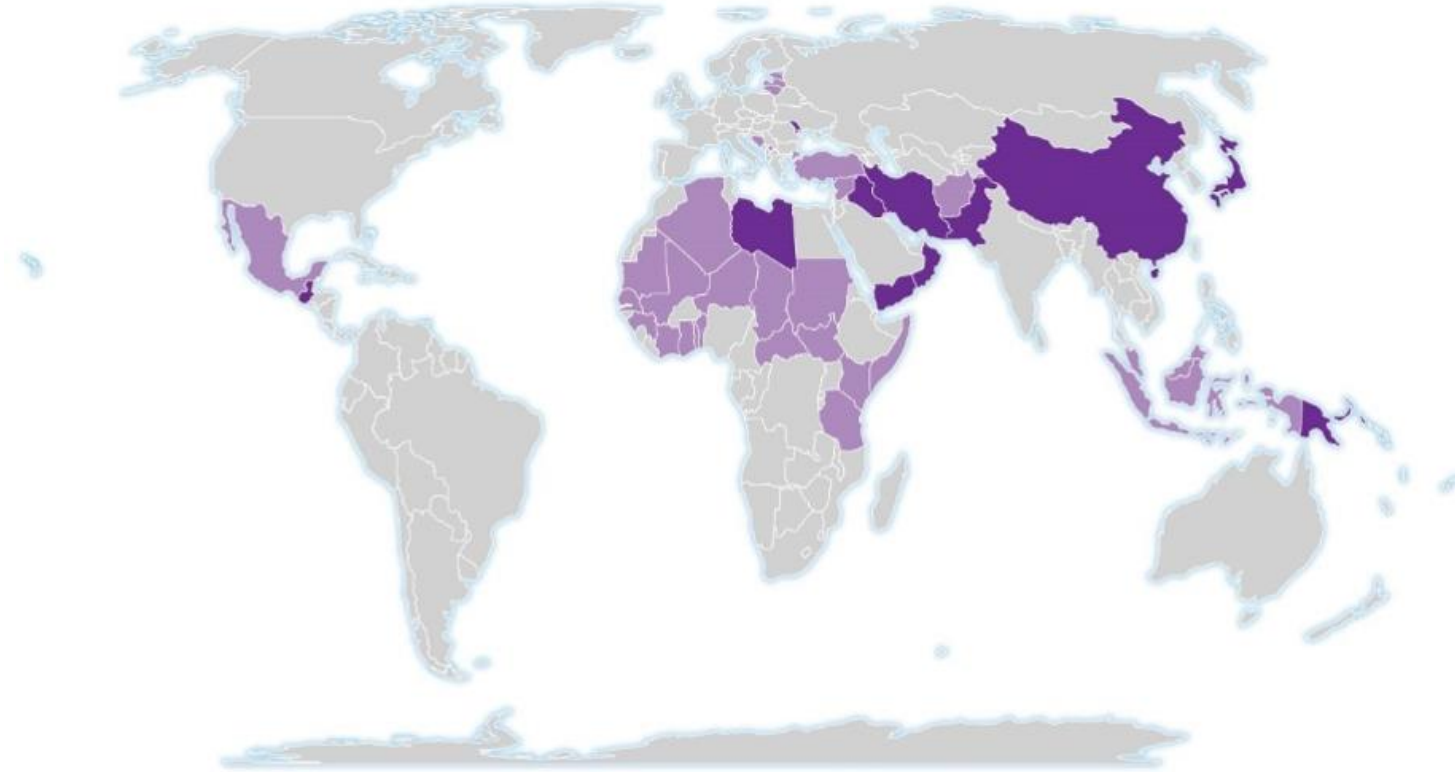
- Packaged geodatabase file
- A symbolized ArcMap document or ArcGIS Pro Project
- A booklet describing the data delivered





Human Landscape availability (COVID Response)

- Off the shelf (immediate delivery):
 - Guatemala
 - Iran, Islamic Republic of
 - Iraq
 - Japan Northern Territories
 - Libya
 - Moldova
 - Oman
 - Pakistan
 - Papua New Guinea
 - Yemen
 - Fujian, Hainan, Jilin, Liaoning & Zhejiang China



Available Human Landscape Datasets

- Off the shelf: 1-5 day deliverable timeline*
- Quick turnaround: 1-2 week deliverable timeline

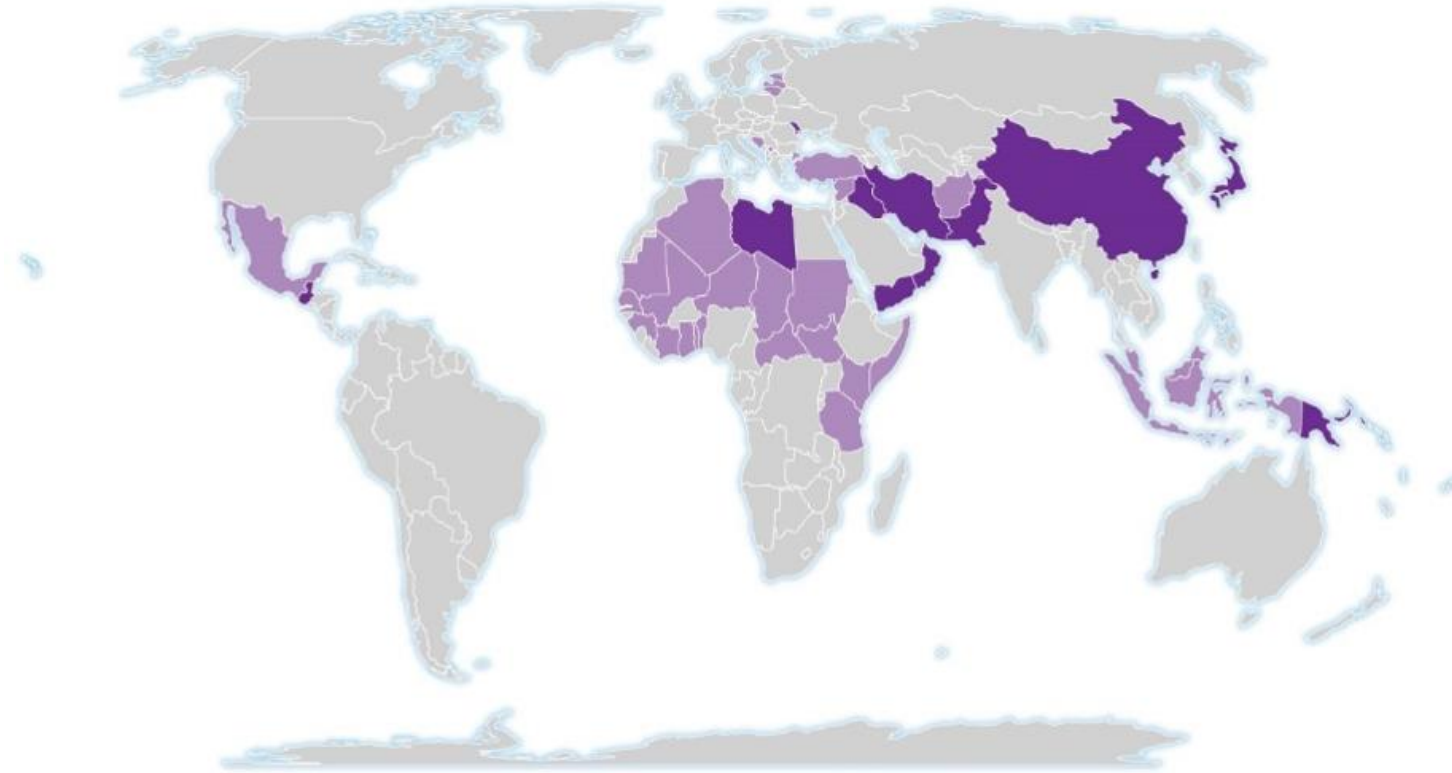
* Fujian, Hainan, Jilin, Liaoning & Zhejiang provinces in China

Available Human Landscape countries listed represent those that have been completed since 2018.



Human Landscape availability (COVID Response)

- Recent production (1-2 week delivery):
 - Afghanistan
 - Algeria
 - Benin
 - Bosnia and Herzegovina
 - Central African Republic
 - Chad
 - Côte d'Ivoire (Ivory Coast)
 - Estonia
 - Ghana
 - Guinea
 - Indonesia
 - Kenya
 - Kosovo
 - Latvia
 - Lithuania
 - Malaysia
 - Mali
 - Mauritania
 - Mexico
 - Niger
 - Nigeria
 - Senegal
 - Somalia
 - South Sudan
 - Sudan
 - Syria
 - Tanzania
 - Togo
 - Turkey



Available Human Landscape Datasets

- Off the shelf: 1-5 day deliverable timeline*
- Quick turnaround: 1-2 week deliverable timeline

* Fujian, Hainan, Jilin, Liaoning & Zhejiang provinces in China

Available Human Landscape countries listed represent those that have been completed since 2016.



Spotlights: On-Demand Analysis

VOLUME 21 | MARCH 2020

SPOTLIGHT

A new coronavirus epicenter: misinformation and negligence in Iran

Thank you for reading Maxar spotlight, the monthly geopolitical intelligence periodical from Maxar.

Each issue provides an in-depth look at a strategically important region of the world - demonstrating Maxar's ability to provide solutions to the world's most challenging geopolitical problems.

MAXAR

Regions Impacted

MAXAR SPOTLIGHT

CORONAVIRUS IN IRAN

The mortality rate of Iranian coronavirus cases is 10% in regions double that of global assessments. It has also been disproportionately infected a high number of government officials, with assessments suggesting upwards of 20% of the country's parliament has been infected. Based on these statistics and additional on-the-ground reporting, there are signs to believe the total number of cases and subsequent deaths from the virus in Iran is far greater than that being shared by the Iranian government.

At least 18 countries have confirmed cases of the coronavirus that are linked to people who have traveled to Iran. Many of the reported hot-spots, hence the "Iranian Response Time" story and our coronavirus update. Some of these cases have also been linked to Mequien, which is the site of the Iran's first case. 20% of these cases died at the level of infection, which is an unusually high rate.

While the discrepancy between the mortality rate in Iran compared to the rest of the world could partially be due to the government's inability to collect and properly analyze data, it is also possible that the government has limited transparency with the public, which in turn is the country's leadership has been working to report deaths. There are strong indications that the Iranian government, which has a history of government corruption, will likely attempt to suppress or even deny information and will likely continue to do so.

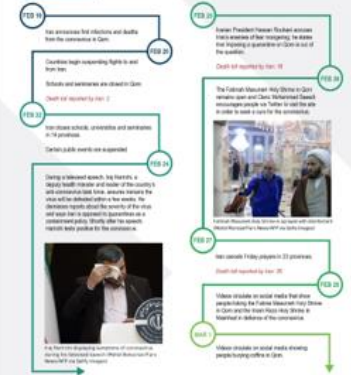
COUNTRIES WITH KNOWN CASES FROM IRAN



Assess the Timeline

MAXAR SPOTLIGHT

IRANIAN GOVERNMENT RESPONSE TIMELINE



Visualize the change

MAXAR SPOTLIGHT



Understand Implications

MAXAR SPOTLIGHT

IMPLICATIONS FOR IRAN AND RISK TO TRANSIENT POPULATIONS

Iran is at the center of a troubled region that has been hit hard by the coronavirus. The country's leadership has been slow to respond to the crisis, and the country's population is growing rapidly. The country's leadership has been slow to respond to the crisis, and the country's population is growing rapidly. The country's leadership has been slow to respond to the crisis, and the country's population is growing rapidly.

HUMAN LANDSCAPE DATA



Sign up at: explore.maxar.com/spotlight-signup





Contact Information

- Follow-up questions: Camille.Cassidy@maxar.com
- Spotlight registration: <https://explore.maxar.com/spotlight-signup>

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