



منتدى الدوحة للبيانات

من أجل الابتكار في التنمية المستدامة

2024 أكتوبر 23-22

DOHA DATA FORUM

FOR INNOVATION IN SUSTAINABLE DEVELOPMENT

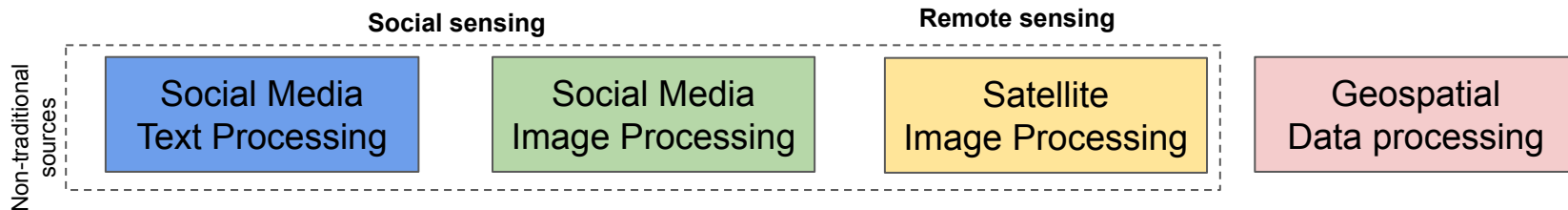
October 22-23, 2024

Artificial Intelligence Applications for Social Good

Dr. Muhammad Imran
Senior Scientist
Qatar Computing Research Institute
Hamad Bin Khalifa University

Humanitarian Computing: R&D Overview

Research & Data



Systems & Services



End-users



2022 Unprecedented Flooding in Pakistan

1545 people killed – "one-third" of the country submerged – 33 million people affected



Source: Abdul Majeed/AFP via Getty Images



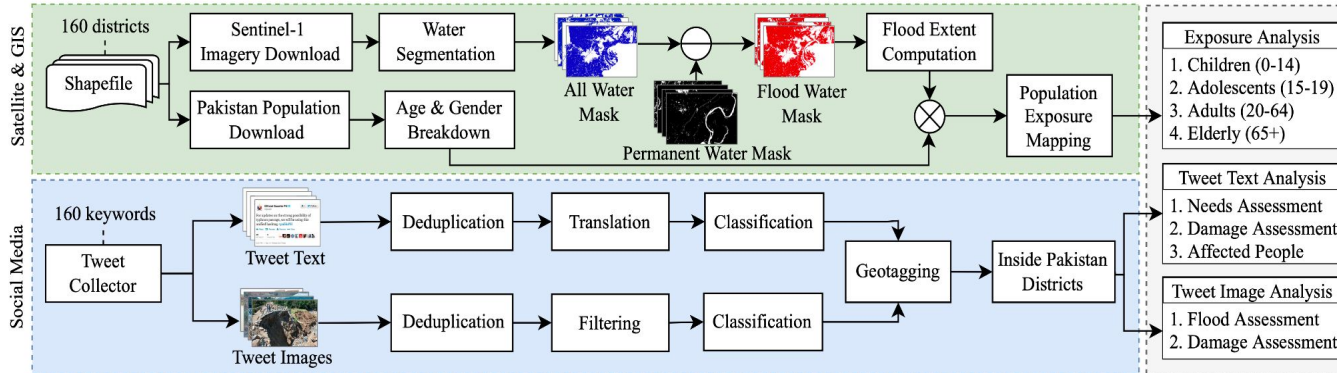
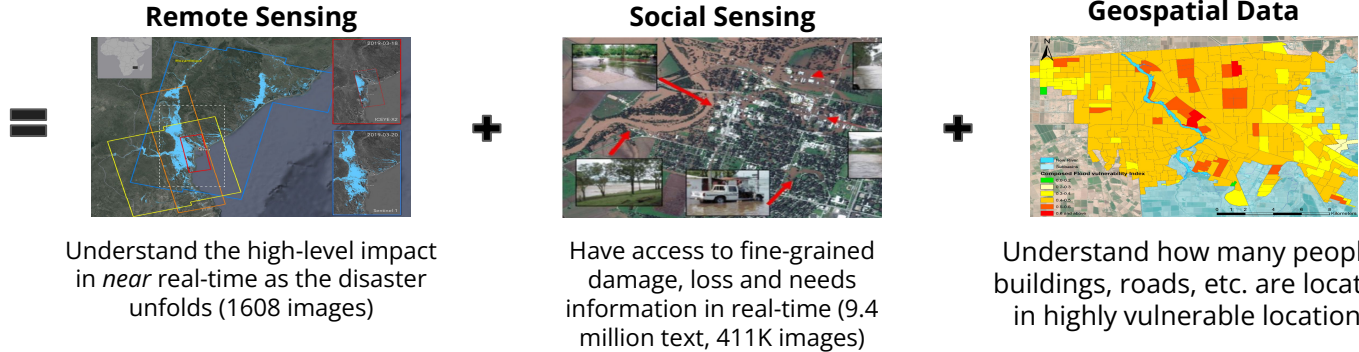
Goal: Answering 5 vital humanitarian questions

- 1) What is the extent of flooding ?
- 1) How many people are **exposed** (age and sex) ?
- 1) How are the exposed **population being affected** ?
- 1) What are the **urgent needs** of the affected population?
- 1) What type of **damage** are incurred as a result of flooding ?

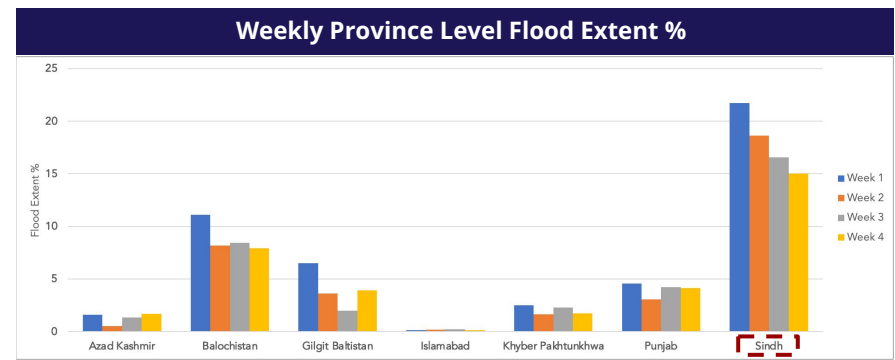
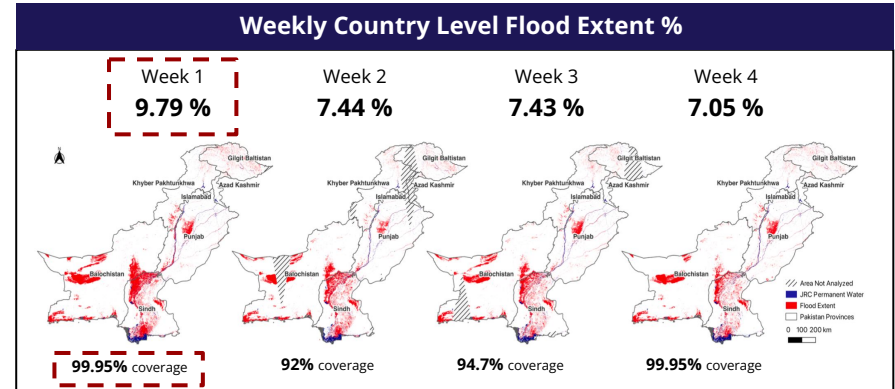
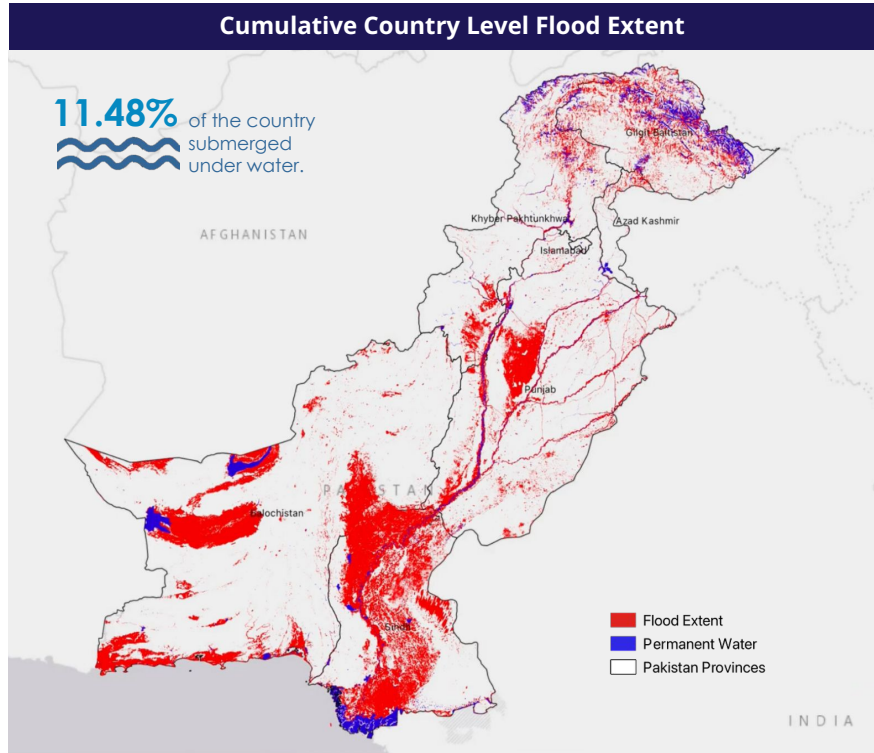


Mapping Flood Exposure, Damage, and Population Needs

Flood Insights

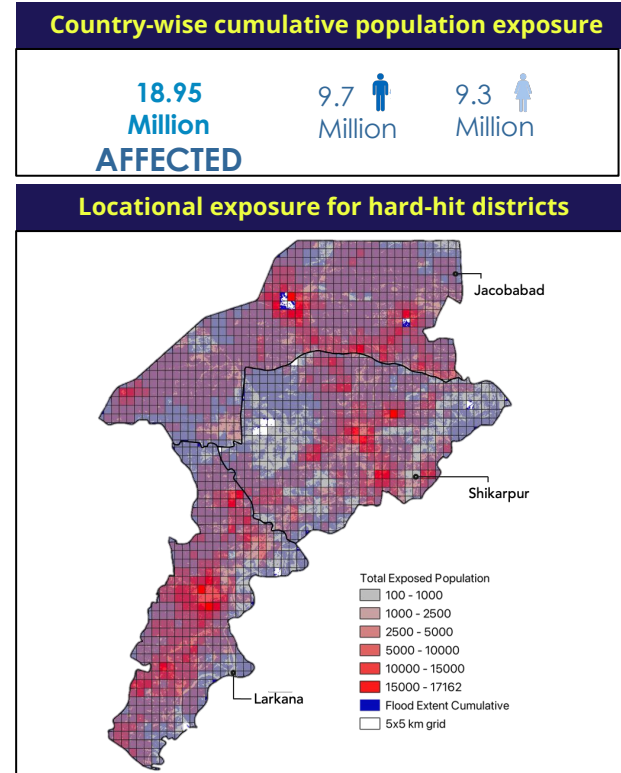
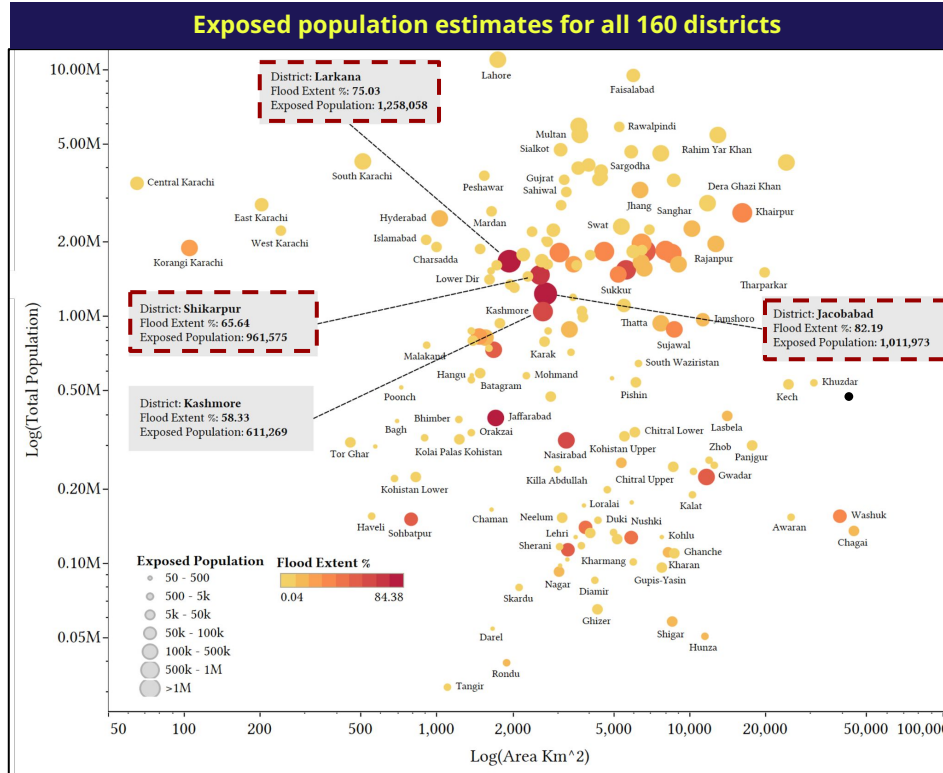


Flood Extent Mapping Using Remote Sensing



Added Value: Prioritize highly impacted provinces and districts in real-time for immediate response.

Exposed Population



Added Value: Identify highly exposed districts and pinpoint hard-hit communities within districts.



Exposed Population Segments (age groups)

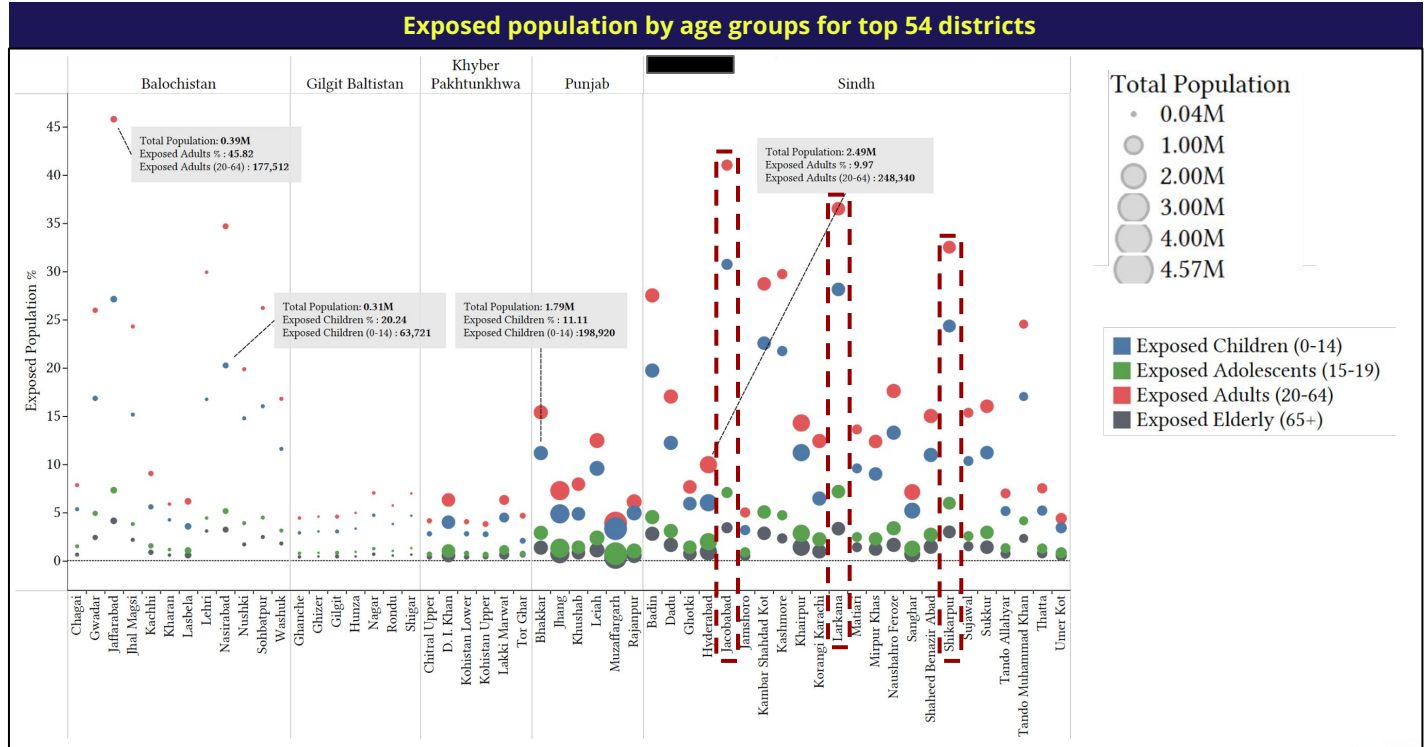
Country-wise cumulative age group exposure

6.8 Million CHILDREN
0-14 Ages

1.7 Million ADOLESCENTS
15-19 Ages

9.6 Million ADULTS
20-64 Ages

0.8 Million ELDERLY
65+ Ages

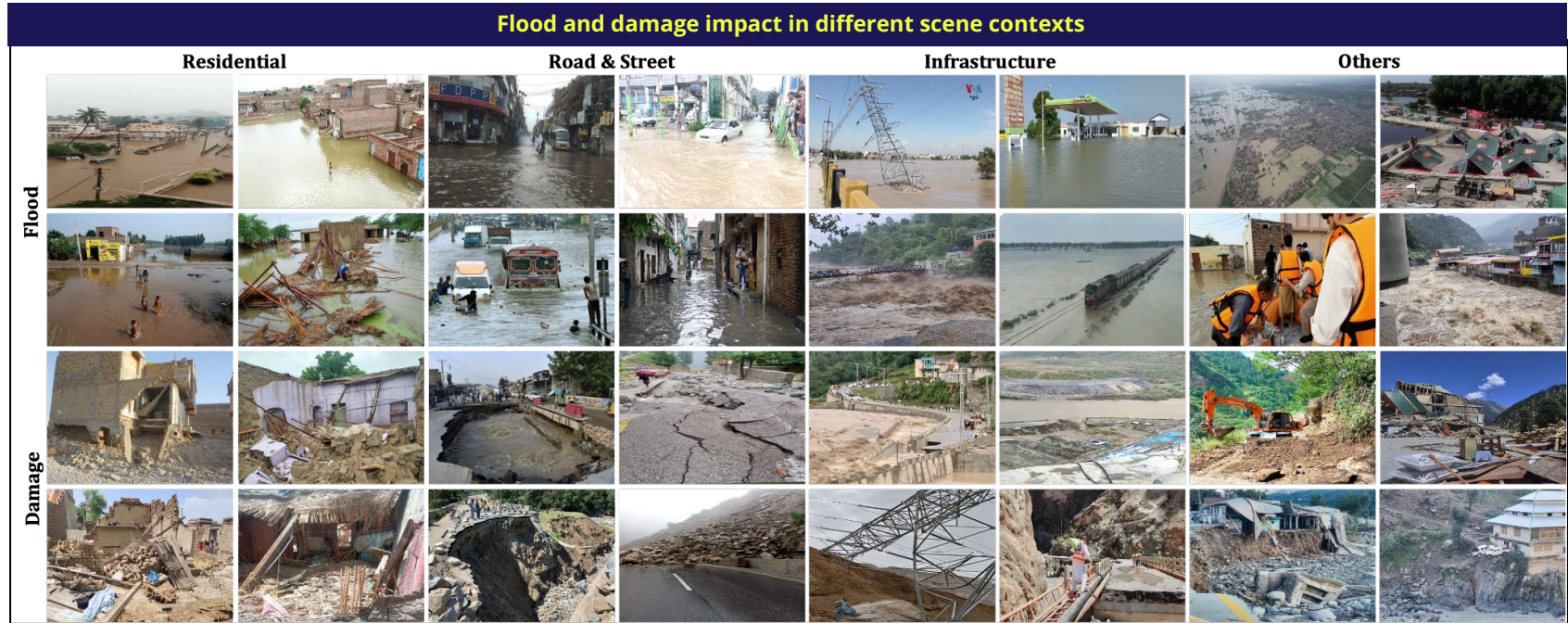


Added Value: Tailored response efforts to vulnerable age groups i.e medical care, evacuation support.



Damage Identification Using Ground-Level Images

Tweet Images (411K) → Deduplication → Filtering → **Classification (Incidents Model)** → Geotagging (6.9K)



Added Value: Quick situational awareness of the flood and damage impacts through automatic classification.

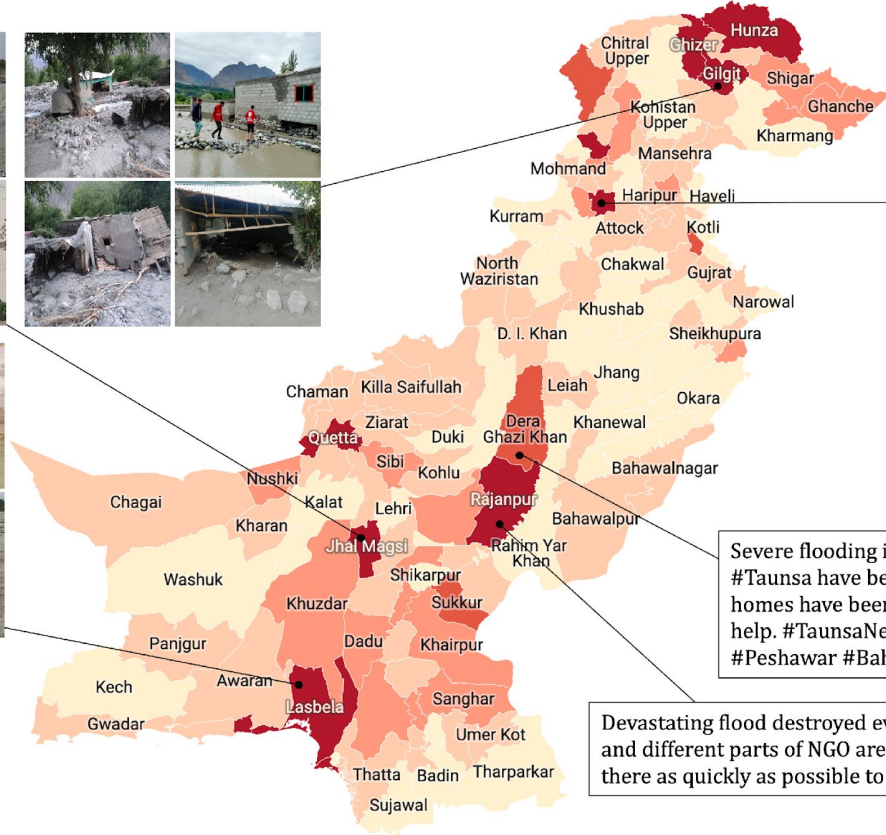


District-level mapping of damage reports

411K images



Normalized damage reports



سیلاب میں انسانوں کے ساتھ مویشی بھی بہت متاثر ہوئے ہیں؛ نوشہرہ میں سڑک کنارے بڑی تعداد میں لوگ اپنے مویشیوں کی دیکھ بھال کر رہے ہیں؛ بتاتے ہیں ایک چارے کا ریڑھ 10 ہزار تک آ رہا ہے؛ جانوروں کیلئے پانی کا انتظام بھی ایک مشکل امر ہے؛ ان لوگوں کی اپنی زمینیں و فصلیں زیر آب سیلاب# ہیں

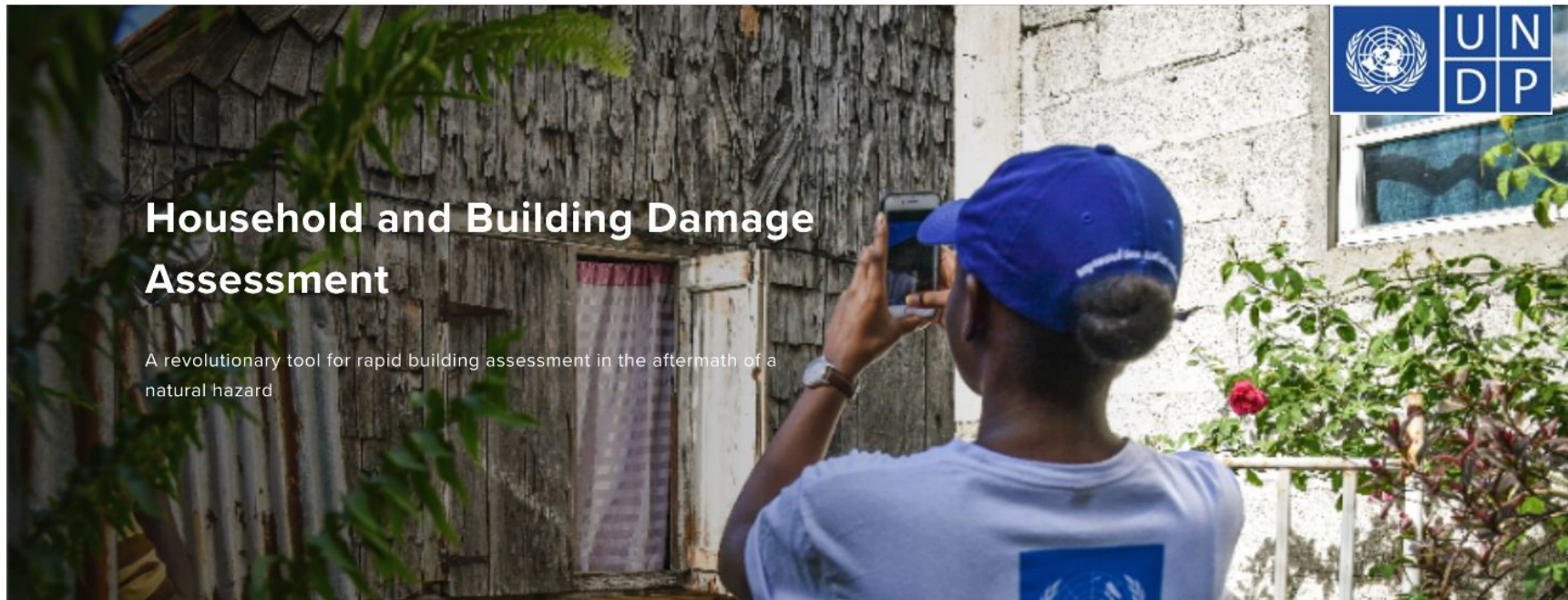
Along with humans, cattle have also been greatly affected by the floods; A large number of people are tending to their cattle by the roadside in Nowshera; It is said that one fodder is coming up to 10 thousand; Water management for animals is also a challenge; These people have their lands and crops under water سیلاب#

Severe flooding in #TaunsaSharif, rural areas of #Taunsa have been devastated by massive flooding, homes have been demolished, they are looking for help. #TaunsaNeedsAttention #FloodsInPakistan #Peshawar #Bahrain #ISPR #FindUzairAlive

Devastating flood destroyed everything in Rajanpur, south Punjab and different parts of NGO are requested to start relief operations there as quickly as possible to save children, women and patients.



UNDP Building Damage Assessment



Household and Building Damage Assessment

A revolutionary tool for rapid building assessment in the aftermath of a natural hazard.



Technical definition



Inspectors training



Field Assessment



Data management



Reporting



Recovery Programming

Beirut Explosion Rapid Damage Assessment (2020)

~100,000 images processed
over 20 days

12,355 SEVERE Damag
4,041 MILD Damag



<p>SEVERE DAMAGE</p> <p>ID: 1298630288298463236_0 Time: 26-Aug-2020 14:35:02 Text: Time stopped here... 3 weeks since #BeirutBlast #Gemmayzeh Location: N/A Tweet link</p>	<p>SEVERE DAMAGE</p> <p>ID: 1298630060484833281_2 Time: 26-Aug-2020 14:35:08 Text: الميزة العثة اليونسكو اوردى اوزلاي كوزون #بيروت وتؤكد ان التعليم والتراث والثقافة يجب ان يكونوا الاساس خلال جهود اعادة الاعمار Location: N/A @UNESCOarabic Tweet link</p>	<p>SEVERE DAMAGE</p> <p>ID: 1298627729471004672_0 Time: 26-Aug-2020 14:25:52 Text: Restoration in order 3 weeks after BeirutShima... #BEIRUTBLAST Location: N/A Tweet link</p>	<p>SEVERE DAMAGE</p> <p>ID: 129862635788745931_0 Time: 26-Aug-2020 14:20:25 Text: #بيروت الجمل الحزين #الحمزوة Text: 3 weeks since #BeirutBlast Location: N/A Tweet link</p>	<p>MILD DAMAGE</p> <p>ID: 1298625785985736705_0 Time: 26-Aug-2020 14:18:09 Text: استمر أ الجهدا في دعم الضحايا الإنسانية في #الإمارات تارسل شحنة مساعدات الإنسانية إلى #السعودية في مواجهة آثار الفيضانات Location: N/A Tweet link</p>
<p>SEVERE DAMAGE</p> <p>ID: 1298625413137260544_0 Time: 26-Aug-2020 14:16:40 Text: مثل روح نلسي جريمانك ولدنا روح من تكرك هيا! #الانجاز #بيروت Location: Lebanon Tweet link</p>	<p>SEVERE DAMAGE</p> <p>ID: 1298624124936323074_0 Time: 26-Aug-2020 14:11:33 Text: After port explosion, Lebanese excavate their dreams Location: N/A Tweet link</p>	<p>MILD DAMAGE</p> <p>ID: 1298622250489384961_0 Time: 26-Aug-2020 14:04:06 Text: Join hands to help #Lebanon. The blast in #Beirut has caused massive damage to homes, food stock, infrastructure, totally devastating so many lives. The people of Lebanon need your help to get back up on their feet. Donate generously #35yearsMuslimAid Location: N/A Tweet link</p>	<p>MILD DAMAGE</p> <p>ID: 1298620574470680577_0 Time: 26-Aug-2020 13:57:26 Text: مستشفى #الحرية A hospital 3 weeks after #BeirutBlast Location: N/A Tweet link</p>	<p>MILD DAMAGE</p> <p>ID: 1298617871774486528_1 Time: 26-Aug-2020 13:46:42 Text: Roofless houses... Beautiful old houses. #Beirut's #heritage blown away... #Gemmayzeh today 3 weeks after #BeirutBlast Location: N/A Tweet link</p>
<p>SEVERE DAMAGE</p> <p>ID: 1298613227220328450_0 Time: 26-Aug-2020 13:28:15 Text: Everything is blown away, 3 weeks after. #gemmayze #BeirutBlast</p>	<p>MILD DAMAGE</p> <p>ID: 1298613227220328450_1 Time: 26-Aug-2020 13:28:15 Text: Everything is blown away, 3 weeks after. #gemmayze #BeirutBlast</p>	<p>SEVERE DAMAGE</p> <p>ID: 1298611228592484357_0 Time: 26-Aug-2020 13:20:18 Text: #Liban Les derniers bilans font état de plus de 100 morts, 4000</p>	<p>SEVERE DAMAGE</p> <p>ID: 1298609068354015232_0 Time: 26-Aug-2020 13:11:43 Text: سلام لبيروت" ترحم 485 منزلًا وتشدت" لندامات2900 شخص من متضرري انفجار المرجة</p>	<p>SEVERE DAMAGE</p> <p>ID: 1298602344020492288_0 Time: 26-Aug-2020 12:45:00 Text: VIDEO: Ahmad had saved his family from Syria's war by bringing</p>

Hurricane Dorian 2019

Deployment with CERT and FEMA

Collected data (tweets): ~8M

Images analyzed: ~300K

System's output:

SEVERE & MILD damages: 13,349

95% reduction of information overload

MCERT volunteers analyzed 29K images (76% Accuracy)



FEMA

https://rda-aidr.qcri.org/hurricane_dorian_2019.php

QATAR COMPUTING RESEARCH INSTITUTE

AIDR Twitter Image Analysis --- Hurricane Dorian 2019

Total images collected: **279,819**

Choose a date: 2019-08-30 2019-08-31 2019-09-01 2019-09-02 2019-09-03 2019-09-04 2019-09-05 2019-09-06 2019-09-07 2019-09-08 2019-09-09 2019-09-10 2019-09-11
















Remove duplicates: YES NO

Remove irrelevant: YES NO

Damage Filter: No damage Mild Severe

Location Filter:

Country: All ----- State: ----- Not available ----- City: ----- Not available -----

 <p>SEVERE DAMAGE</p> <p>ID: 1171567568051683329_3 Time: 10-Sep-2019 23:34:09 Text: Personnel from the Florida Search & Rescue Task Force remove a body recovered in the destroyed the Muddy neighborhood after Hurricane Dorian hit the Abaco Islands in Marsh Harbour, Bahamas, September 10, 2019. #Reuters/Marco Bello Reuters @reuterspictures #photjournalism Location (q): Miami, Florida, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171566023746772997_0 Time: 10-Sep-2019 23:28:01 Text: "DEAD BODIES EVERYWHERE": Bahamian evacuees arrive in Chattanooga after facing Hurricane Dorian. My heart is aching for the Bahamas. These people lost everything. To donate, click here: Location (q): Chattanooga, Tennessee, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171566789675237378_0 Time: 10-Sep-2019 23:27:05 Text: Hurricane Dorian: BC rescue crews join grim search for dead Location: N/A Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 11715662025168896_0 Time: 10-Sep-2019 23:06:14 Text: Hurricane Dorian's death toll in Bahamas rises to 10 Location (q): Oakland, California, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171560540612812802_0 Time: 10-Sep-2019 23:06:14 Text: U.S. charges #FEMA official in #PuertoRico for taking bribes after Hurricane Maria (via@Reuters) Location: N/A Tweet link</p>
 <p>SEVERE DAMAGE</p> <p>ID: 1171558973598999649_2 Time: 10-Sep-2019 23:00:00 Text: "E3 We have issued a \$3.5 million donor appeal to cover short-term health care and other needs for the population in the #Bahamas (7/8 affected by #HurricaneDorian). Help us help the Bahamas! + INFO 691C #HealthForAll @WHO @UN Location: N/A Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 117155771822372044_0 Time: 10-Sep-2019 22:55:01 Text: Michelle Hamrick (dark shirt) of the Cascades Region & Christy Woods inspect decimated homes on Emerald Isle, North Carolina. Some RV homes were destroyed on Sept. 5 when a waterspout on the front edge of Hurricane #Dorian tore through an RV park. @DanielCima/American Red Cross Location: N/A Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171556994096361472_0 Time: 10-Sep-2019 22:48:01 Text: "Monumental task": Calgaryan dedicated to rebuilding Bahamas after surviving Dorian Location (q): Calgary, Alberta, Canada Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 11715565940630886_0 Time: 10-Sep-2019 22:31:03 Text: Fort Lauderdale News Search Reviews (Search-And-Rescue Teams Comb Through Debris To Find Hurricane Dorian Victims) Fort Lauderdale News Location (q): Fort Lauderdale, Florida, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171551688989894928_0 Time: 10-Sep-2019 22:31:03 Text: We've confirmed these 9 charities are on-site in the Bahamas delivering relief to citizens affected by #HurricaneDorian. Your donations can go a long way. Learn more: Location (q): Glen Rock, New Jersey, USA Tweet link</p>
 <p>SEVERE DAMAGE</p> <p>ID: 117154841216588509_0 Time: 10-Sep-2019 22:18:02 Text: Next at 6:30, a South Shore community is rallying around a young man from Grand Bahama who lost several members of his family, including his mother and 6 yr old nephew, in Hurricane Dorian. His message is powerful. @boston25 Location (q): Boston, Massachusetts, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171543776973795328_0 Time: 10-Sep-2019 21:59:37 Text: Here is what it looked like outside of where we hunkered down. #dorian #dorianbahamas #TreasureCay Location (q): New Jersey, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171543776973795328_1 Time: 10-Sep-2019 21:59:37 Text: Here is what it looked like outside of where we hunkered down. #dorian #dorianbahamas #TreasureCay Location (q): New Jersey, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171543333647795328_2 Time: 10-Sep-2019 21:59:37 Text: Here is what it looked like outside of where we hunkered down. #dorian #dorianbahamas #TreasureCay Location (q): New Jersey, USA Tweet link</p>	 <p>SEVERE DAMAGE</p> <p>ID: 1171543333647795328_1 Time: 10-Sep-2019 21:58:15 Text: After spending 20 hours in a bathroom this is what we came out to. #dorian #dorianbahamas #TreasureCay Location (q): New Jersey, USA Tweet link</p>



Türkiye-Syria Earthquake

Feb 2023



Kitchen Supply Needs



fatoş FÖ
@fatosfansa

Antakya expoda konteynir alanındayız mini dolap mini fırın ihtiyacımız var kendimiz yemek yapacak artık yardımcı olun.küçük çocuklar engelliler var #DEPREMOLDU #ALTIN #akdeniz #sanilurfa #halisca #pomem #deprem #yardım #ahbab #ahbabderneği #HalukLevent #OguzhanUgur

We are in the container area at Antakya expo, we need a mini cabinet, a mini oven, we will cook by ourselves, now help, small children have disabilities #DEPREMOLDU #ALTIN #akdeniz #sanilurfa #halisca #pomem #deprem #yardım #ahbab #ahbabderneği #HalukLevent #OguzhanUgur

12:48 AM · Mar 15, 2023 from Hatay Merkez, Hatay · 3,639 Views

Shelter Requests



Utku Çakırözer
@utkucaakirozer

Deprem bölgesinde nereye gitssek öncelikli ihtiyaç çadır ve barınma

Aileler evlatlarını soğuktan korumak için karton içinde uyutuyor...

Tır, kamyonet kasalarında barınmaya çalışıyor.

Acil ihtiyaç: çadır çadır çadır!
#hatay #altınözü #deprem #fatikali

Wherever we go in the earthquake zone, the primary need is tents and shelter!

Families put their children to sleep in cardboard to protect them from the cold...

The truck is trying to shelter in pickup trucks.

Urgent need: tent tent tent!
#hatay #altınözü #deprem #fatikali



2:03 PM · Feb 12, 2023 · 2,472 Views

Medical Supply Needs



İsmail Yüksek Vekili
@furbolcuotacam

⚠️ RT YAPALIM İLAÇLARIN ULAŞIMINA YARDIMCI OLALIM
Afet alanında en fazla ihtiyaç olduğu ilaçlar listesi;

-Calpol Şurup
-Ibuprofen Cold
-Nurofen
-Aferin Sinüs
-parol
-Majestic
-Arveles
-Apranax Dört
Deprem bölgesinde ki öncelikli olarak çocuklar için acil ilaç desteği gerekmektedir

⚠️ LET'S RT LET'S HELP TRANSPORT MEDICATIONS
The list of drugs you need most in the disaster area;

-Calpol Syrup
-Ibuprofen Cold
-Nurofen
-Well done Sinus
-password
-Majestic
-Arveles
-Apranax Four
Emergency medicine support is needed primarily for children in the earthquake zone.

10:27 PM · Feb 7, 2023 · 561 Views

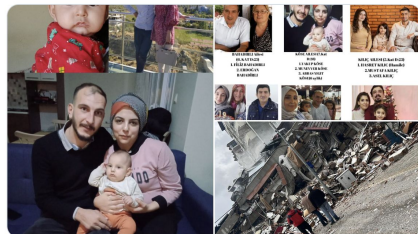
Missing People



Büşra
@busrakoseyazgan

Hatay Antakya Güzelburç mah. Zümri sok. İlke apartmanında 28 kişi kayıp. 9 Aile hala bulunamadı. Abim yengem yeğenim hala kayıp. Babamla kardeşim şehir şehir gezip onları arıyor. Biz bu kadar çaresizken acı içindeyken siz ne yapıyorsunuz?

#DEPREMOLDU #Hatay
Hatay Antakya Güzelburç mah. Put emerald. 28 people are missing in the principle apartment. 9 families still not found. My brother, aunt and nephew are still missing. My father and brother travel from city to city looking for them. What are you doing when we are so helpless and in pain?
#DEPREMOLDU #Hatay



10:47 AM · Mar 14, 2023 · 893 Views

Tent Needs



melosin
@metemalkan

Acil çadır lazım :15 kişi bir çadırda kalıyor 2 bebek 3 çocuk
Küçükaldayan mahallesi can sokak no 20 defne Hatay @HatayValiligi @HatayBSB @ahbap_istanbul @OguzhanUgur @haluklevent

Urgently need a tent: 15 people stay in a tent 2 babies 3 children
Küçükaldayan neighborhood can street no 20 bay Hatay @HatayValiligi @HatayBSB @ahbap_istanbul @OguzhanUgur @haluklevent

5:46 PM · Mar 14, 2023 · 105 Views

Search & Rescue



T.C. Jandarma Gn. K
@jandarma

Deprem sonrası arama kurtarma faaliyetlerinin yanı sıra tüm imkan ve gayretimizle enkaz kaldırma çalışmalarına da hassasiyetle eşlik etmekteyiz.

Durmadan Yorulmadan...🇹🇷

#Jandarma
#Deprem

#earthquake
#Hatay
Translated from Turkish by Google

In addition to the search and rescue activities after the earthquake, we also accompany the debris removal works with all our means and efforts.

Without stopping, without getting tired...

#Jandarma
#Deprem
#earthquake
#Hatay



8:59 AM · Feb 20, 2023 · 371K Views

Aid Distribution



Genç Fenerbahçeliler
@gençfborg

Deprem bölgesinde yardım dağıtım araçlarımızla ihtiyaç sahibi ailelere yardımımızı ulaştırıyoruz. #HepBirlikteyiz

We deliver our aid to families in need with our aid distribution vehicles in the earthquake area. #HepBirlikteyiz



3:53 PM · Feb 20, 2023 · 89.5K Views

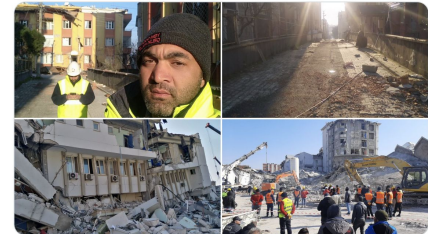
Damage Reports



BE-TAMI BOZKURT
@bestamibozkurt

-Anadolu'nun ilk camisi artık yok.
-Dünyanın ilk ikilandırınan caddesi artık yok
-Hatay devleti zamanında Meclis olarak kullanılan bina artık yok
-200 yıldan önce yapılmış tarihi Eski Antakya sokakları artık yok
-Tarihi Cami, kilise, sinagog, Antakya artık yok #antakyahatay

Translated from Turkish by Google
-The first mosque of Anatolia no longer exists.
-The world's first illuminated street no longer exists
-The building that was used as a parliament during the Hatay state no longer exists.
-The historical Old Antakya streets built more than 200 years ago no longer exist
-Historical Mosque, church, synagogue, Antakya no longer exist
#antakyahatay



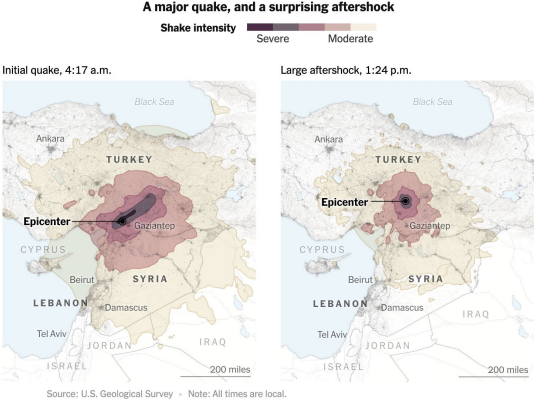
11:52 PM · Feb 12, 2023 from Hassa, Hatay · 745 Views

Türkiye-Syria Earthquake (2023)

Mapping Missing Persons, Shelter, Damage Reports

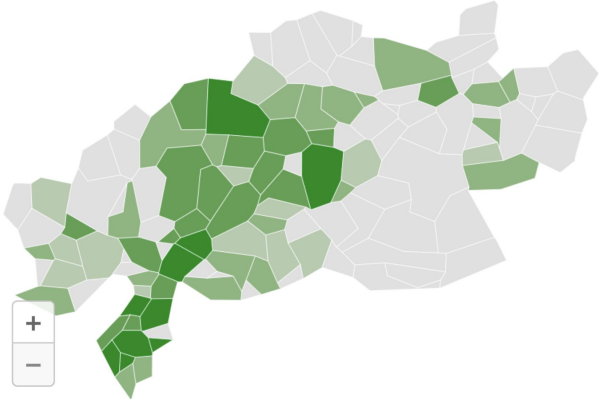
Data analyzed:
95+ million Twitter messages
3.62 million images

District-level mapping of pertinent reports:



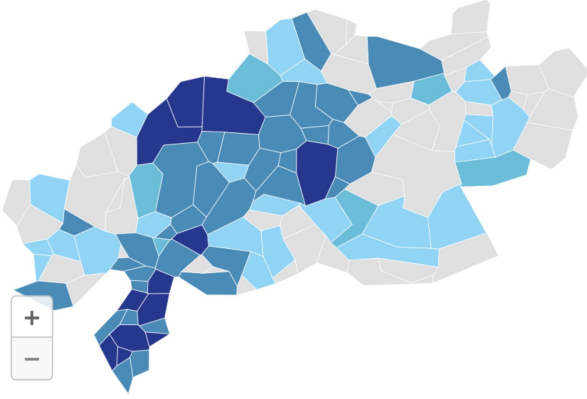
Missing People Reports

Normalized Impact Score
No Reports | Low | Medium | High | Very High



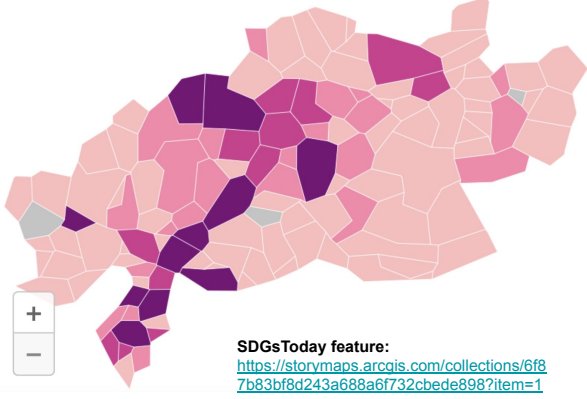
Shelter Requests

Normalized Impact Score
No Reports | Low | Medium | High | Very High



Damage Reports

Normalized Impact Score
No Reports | Low | Medium | High | Very High



Thanks!

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من أجل الابتكار في التنمية المستدامة
DOHA DATA FORUM
FOR INNOVATION IN SUSTAINABLE DEVELOPMENT

ثروة وطن
FAMILY IS THE TREASURE OF A NATION
العدالة الاجتماعية للجميع • 2021
International Year of the Family • Qatar 2021



المجلس الوطني للتخطيط
National Planning Council
دولة قطر • State of Qatar

