Students Converging COVID-19: Environment, Health, and Equity

AMERICAN ACADEMY OF ENVIRONMENTAL ENGINEERS & SCIENTISTS®

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ABET

The webinar will begin in a few moments.

Students Converging COVID-19: Environment, Health, and Equity

Naughton, C.C., James, B., Roman, F.A. Jr., Tariqi, A., Alvarado, A.G.F., Trotz, M.A.

AAEES Seminar

July 28th, 2021

What We Do

We strive for Food-Energy-Water Systems for the Underserved (FEWS-US) and all of us in the United States and globally.

Through our research, we co-design sustainable and culturally sensitive Food-Energy-Water (FEW) systems with communities.

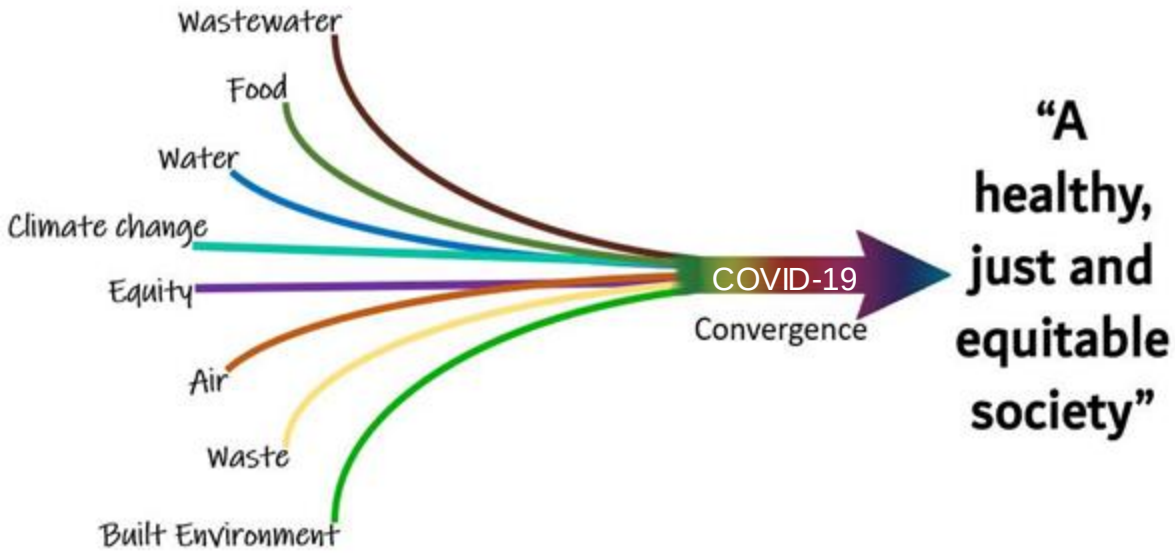
ENGINEERING WITH F.E.W. RESOURCES

https://fews-us.org/

UNIVERSITY OF CALIFORNIA MERCED

Presentation Outline

I. Converging COVID-19 Series
II. Youth Moving Forward Session
III. COVID-19 Impacts on food supply system
IV. Wastewater and COVID-19
    a) COVIDPoops19
    b) W-SPHERE
V. Conclusions
VI. Acknowledgements
VII. Questions and Answers



WASTEWATER SPHERE

Student Presenters

Brooklyn James
Fourth Year Undergraduate at UC Merced

Ana Grace Alvarado
Second-Year PhD student at UC Merced

Fernando Adali Roman Jr.
Recent Graduate at UC Merced

Arianna Quinn Tariqi
Recent Graduate at UC Merced

Report from Converging COVID-19 series

Colleen Naughton, Assistant Professor, Environmental Engineering University of Merced
Maya Trotz, Professor, Civil and Environmental Engineering, University of South Florida

Mistelle Haughton

Heather Hopkins

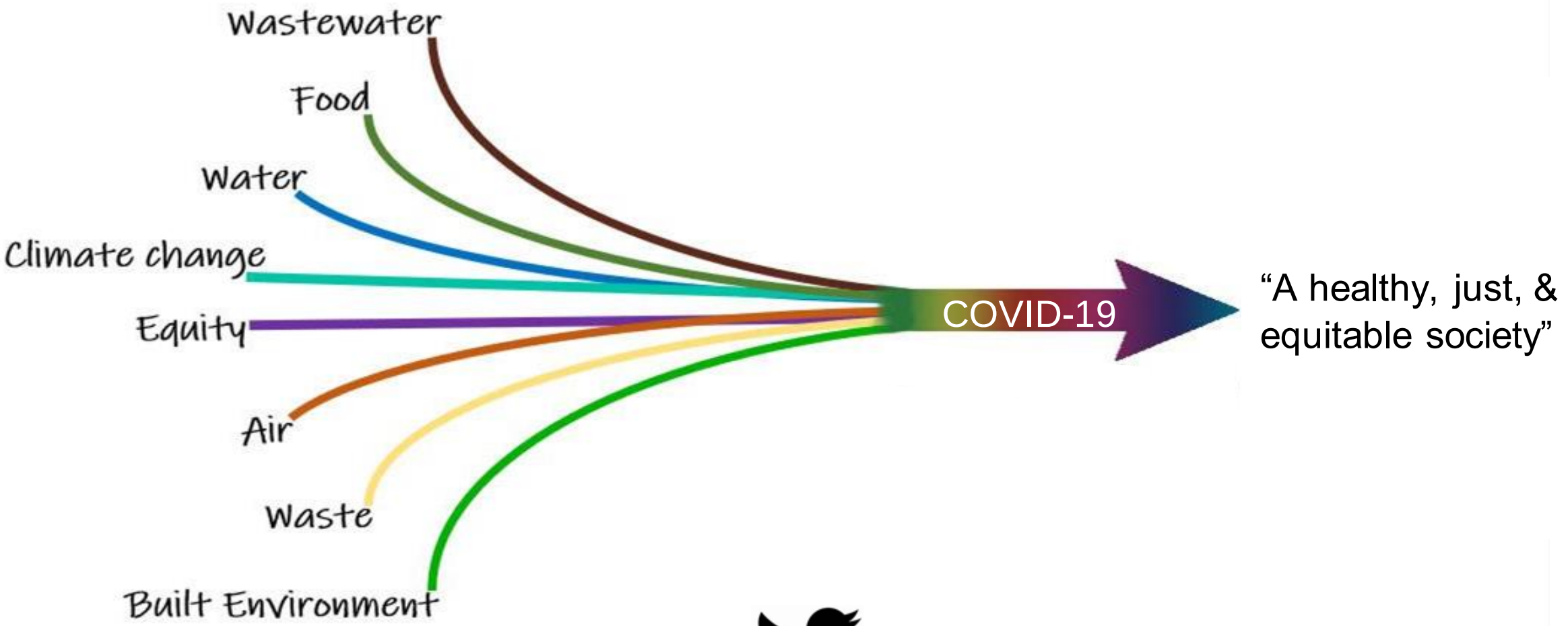
Brooklyn James

Ashley Osler

Thank you to our organizers!

Goals & Motivation

AEESP Converging COVID-19: environment, health,



#AEESPConvergingCOVID19

Logistics


Session 1: Friday, October 16
COVID-19, systemic biases, and environmental engineering education
Moderator: Kimberly Jones
Maya Trotz
Susan Masten
Marc Edwards
Alesia Ferguson
Daniel Giammar


Session 2: Friday, October 23
COVID-19, and fostering informed decisions and actions
Moderator: Amy Stuart
Linsey Marr
Colleen Naughton
Yang Wang
Shamia Hoque
Charles Haas


Session 3: Friday, October 30th
COVID-19 and the creation of efficient, healthy and resilient cities
Moderator: Katherine Alfredo
Shelly Miller
Andrew Whelton
Paloma Beamer
Anu Ramaswami
Anthony Kane


Session 4 November 6th: COVID-19 and sustainably supplying food, water, and energy COVID-19
Moderator: James Mihelcic
Weslynne Ashton
Karletta Chief
Tala Navab-Daneshmand
Anjali Muchandani
Matt Verbyla


Session 5 November 13th: COVID-19 and designing a future without pollution and waste
Moderator: Colleen Naughton
Juyeong Choi
Shakira Hobbs
Julie Zimmerman
Cesunica Ivey
Constantine Samaras


Session 6 November 20th: COVID-19 and climate change mitigation, and adaptation
Moderator: Lilia A. Abron
Shanon Capps
Dan Oerther
Marccus Hendricks
Richard Corsi
Sybil Derrible

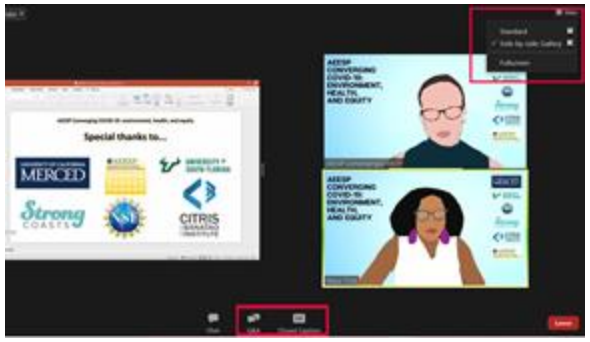
Logistics

Registration

zoom

Webinar

Accessibility



Quiz

https://forms.gle/xmvERALBJ8Brmywy8

Earn a certificate for scoring 80% or better on each session quiz!
Earn Envision Credits!

Questions

#AEESPConvergingCOVID19

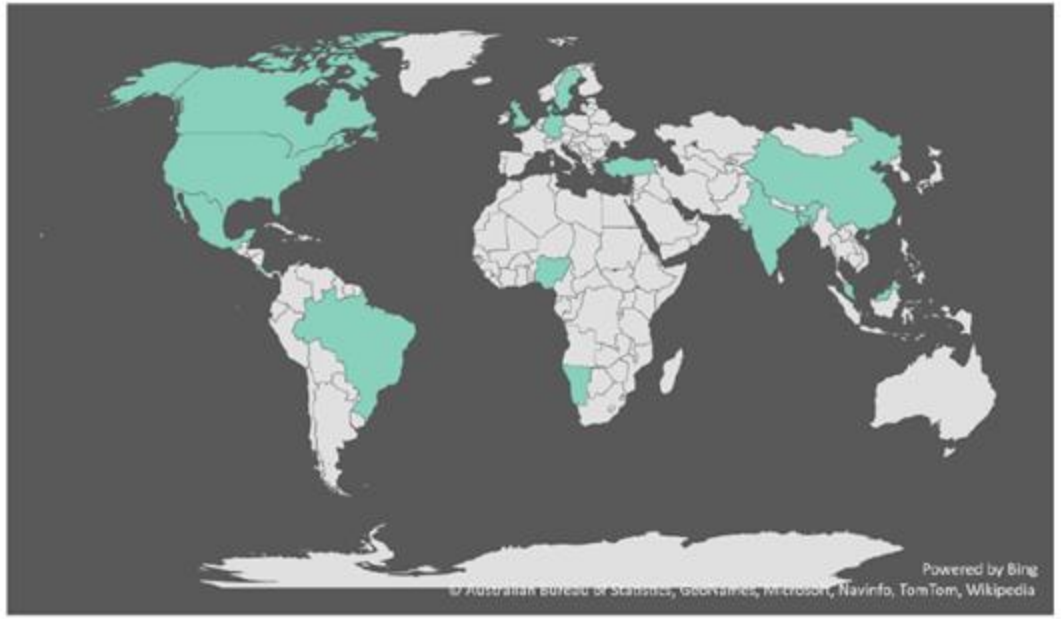
aeespconvergingcovid19@gmail.com

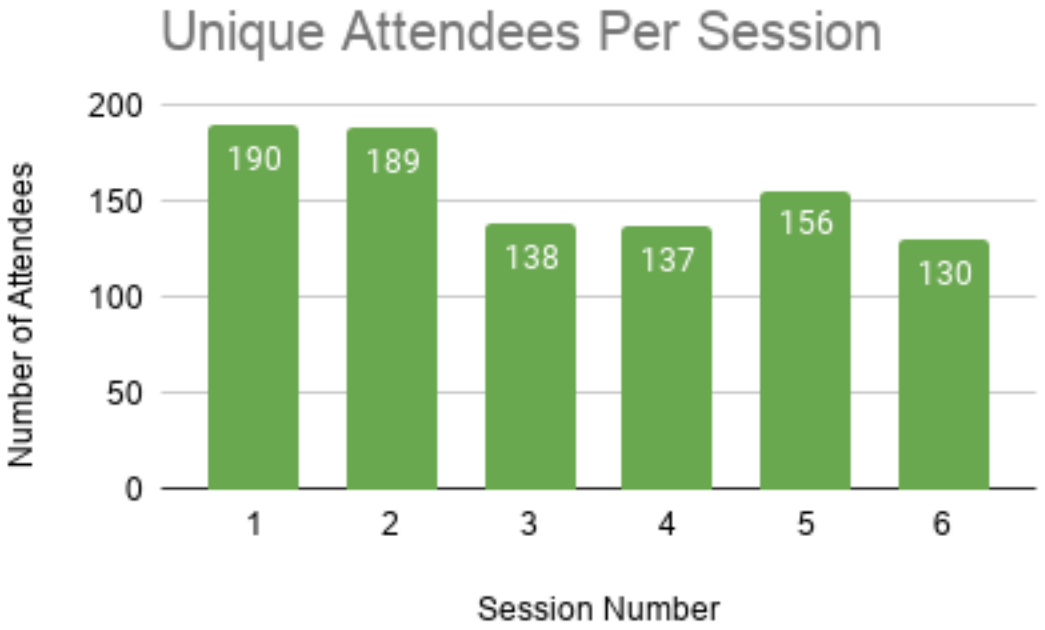
Zoom Q&A function

1. What role does **equity** play in your research and teaching? How do you incorporate equity in your research and teaching?

2. Related to the theme of **convergence** and others on this panel, after hearing their presentations, how can we make our research more convergent?

Results

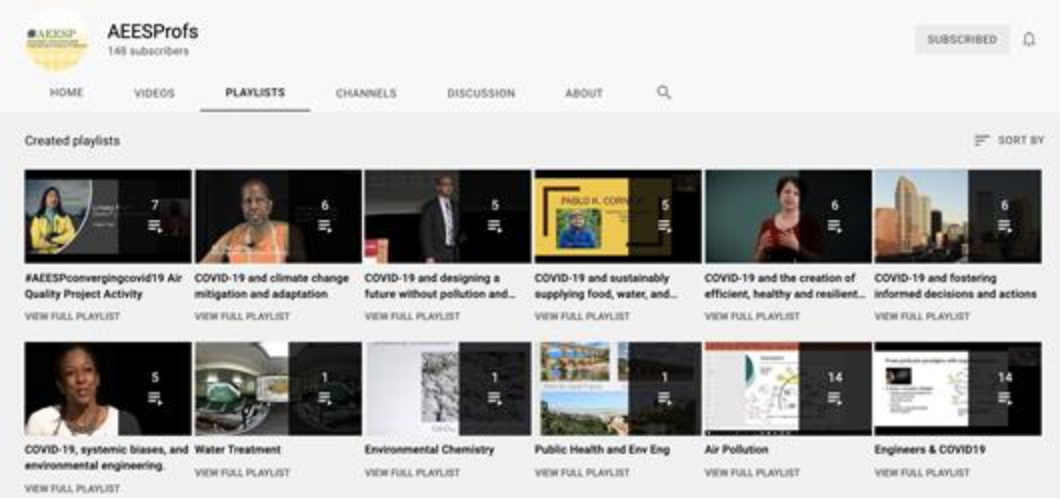




# quiz participants:	106	80	74	64	61	50

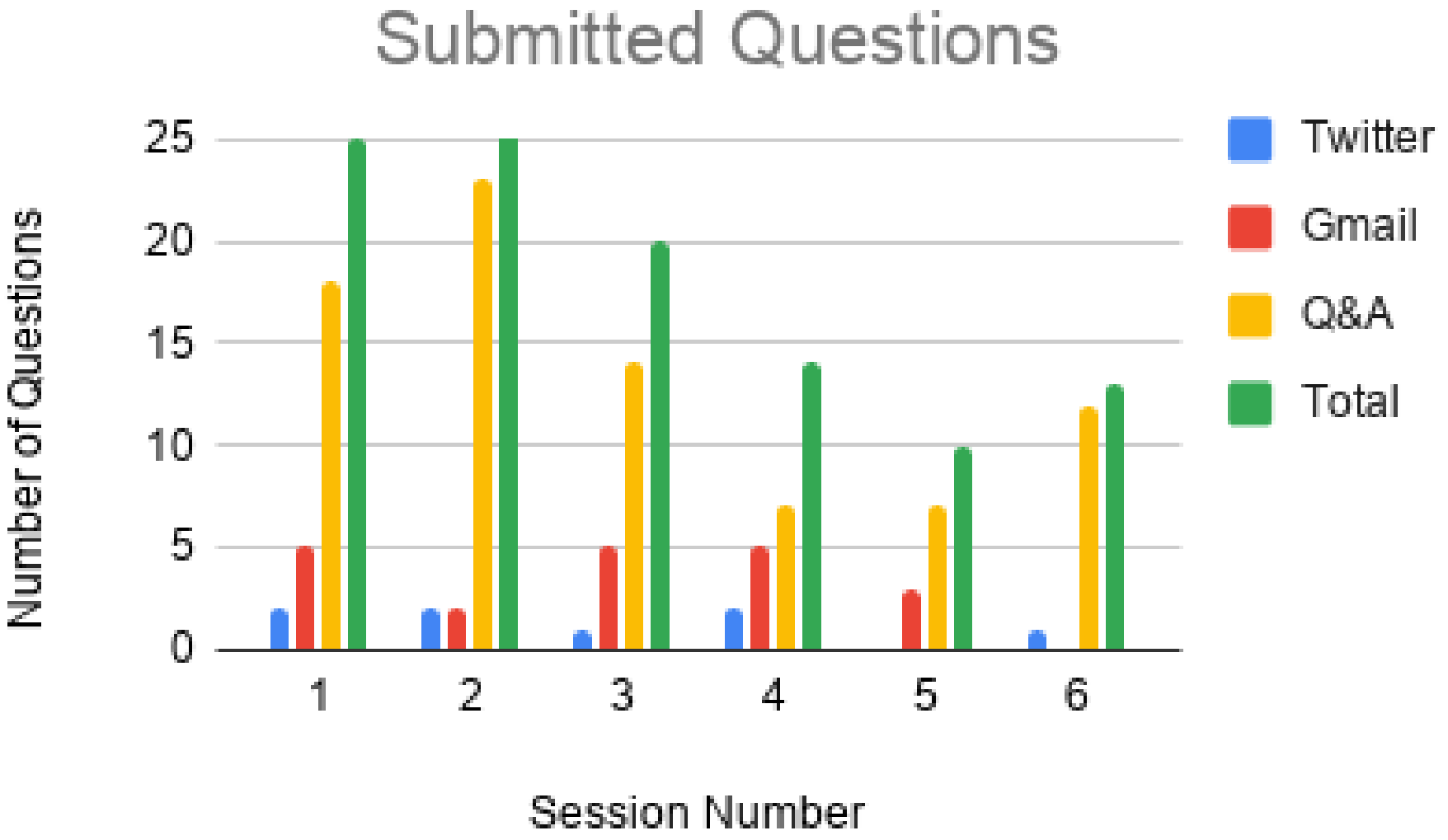
43 certificates were awarded
32.1% completion rate

Results



Session Number	Views	Likes	Dislikes
1	209	8	0
2	208	7	0
3	126	0	0
4	113	3	0
5	131	1	0
6	117	0	0

Results


Submitted Questions
Number of Questions
25
20
15
10
5
0
1
2
3
4
5
6
Session Number
Twitter
Gmail
Q&A
Total

Brooklyn James

Presenting on:
Converging COVID-19 series
Youth Moving Forward Session

Related to the theme of convergence and others on this panel, after hearing their presentations, how can we make our research more convergent?

1. Recognition of the importance of community outreach, asking those in need for what will benefit them the most

2. Pandemic has caused an increase in awareness of convergence research

What role does equity play in your research and teaching? How do you incorporate equity in your research and teaching?

1. Addressing a variety of cultural perspectives in one's teaching is essential, remaining humble in one's knowledge while truly learning from students' unique cultural perspectives.

2. A key aspect of classroom equity is taking time to make connections with students: more listening, empathy, and understanding

Recommendations

1. Create more opportunities for sub-disciplinary discussions and collaboration within environmental engineering and sciences
   - Also, seek interdisciplinary opportunities, e.g. “Predictive Intelligence for Pandemic Prevention Phase I: Development Grants (PIPP Phase I)” https://www.nsf.gov/pubs/2021/nsf21590/nsf21590.htm)
2. Broaden participation, paying attention to various forms of underrepresentation of speakers and institutions/organizations
   - Continue providing accessible meeting spaces (virtually, closed captioning, sign language, etc.)
3. Engage students, especially through formal course requirements for participation in online conference components

CONVERGING COVID-19: YOUTH MOVING FORWARD

Virtual Conference: Thursday April 8th, 2021 1:30 - 3:00pm EST

Education

Susan Masten, Ph.D.

Youth Health

Mahmooda Khaliq Pasha, Ph.D.

Vaccination

Jill Roberts, Ph.D.

Environment

Colleen Naughton, Ph.D.

Brooklyn James

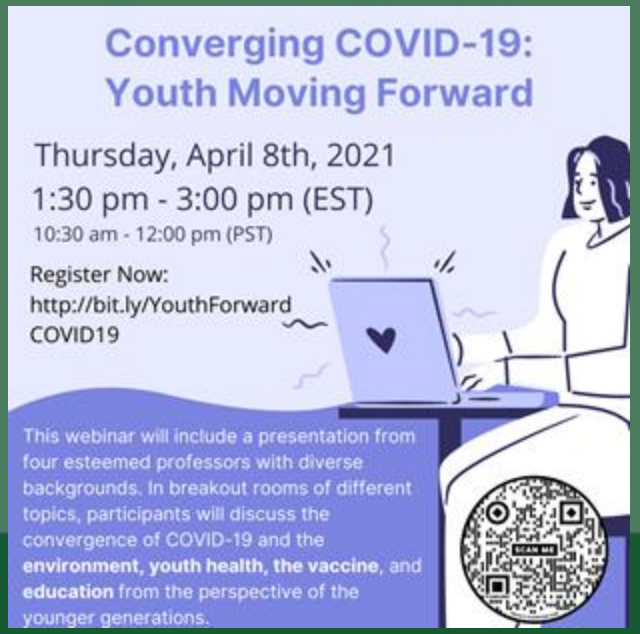
Ashley Olser

Isabella Silverman

Mistelle Haughton

Goals and Motivation

Provide a platform for the younger generation to discuss the impact of COVID-19 and youth health, the environment, education, and vaccines.



Spread awareness to students about convergence research and the importance of equity regarding COVID-19

YOUTH HEALTH

What other aspects of health have been/will be affected by COVID-19?

peer pressure, not fashionable, FOMO (benefits have to outweigh risk, what has value to them)

fatigue has probably increased more since September - affects every aspect of social life/identity

social marketing with philanthropic cause idea (buy a mask, support a charity)

How does wearing a mask or social distancing relate to equity?

social boundaries are large - if you see people in your community doing it, it can become "cool"

Notes on incentives: scholarships, letters of recommendation,

In what ways can young people be leaders during and after the COVID-19 pandemic?

students were not involved in process of creating protocols and imposing rules - citing no time

Going forward: engage students on social media

Altura Centers for Health in CA has Wellness Wednesday idea to engage high school students: gives information to students and they creatively present to peers (topics like COVID, vaping, tobacco)

VACCINE

Questions to consider

Can you see the role that these issues will play in vaccination and how do we address them?

-There has been a supply surplus in vaccine in the US.

-If people continue to get vaccinated, the pandemic could come under control in the US in July. However, in Spain it is not predicted to end until 2024.

What data could help us determine if the current rate of vaccinations is appropriate?

-Statistics can be misinterpreted. Equity vs. Equal when vaccinating different demographic groups.

How does vaccine hesitancy relate to equity? How do we address this to build confidence?

-Younger people can experience more side effects (adenovirus in J&J)

"Do I need the vaccine if I had COVID"

-Immunity will not last and the virus can mutate.

How to address COVID hesitancy?

-Address misinformation. Learn what is in each vaccine (Pfizer is different from Modern and J&J)... Explain what is happening in the vaccine and what people can do.

How to respond to "I don't want to get the vaccine because it won't make me feel good" -It can be a better alternative than getting COVID or the long term effects of COVID

How to respond to: "This is just a big experiment" -reach people in their own communities, churches and schools have been helpful with increasing vaccinations in communities

ENVIRONMENT

Setbacks

Increased Waste

Early Progress with airquality, due to lack of mobility

Increased use of disinfectants discharge to the environment

Room For Growth

WFH =Less transportation

Technology for new materials for masks

using the quick Covid 19 response as motivation for a quick climate change implementation

Continued Collaboration with other professional

How to Protect yourself

Plexi Glass

Air filters

Facemasks

EDUCATION

What are some accomodations you would like to see the professors incorporate during the transition back to "normal"?

Professors to be more understanding, and compassionate. This encourages students to engage and really learn the material.

Not adding more work load just because it is virtual. Professors assume students have more time, being at home.

Continue using participation questions to engage with students, can be anonymous with polling, makes students feel like their opinions are truly heard.

What will returning to in person education look like?

Anonymous mid-semester feedback assessments. Allowing students to provide feedback, without hesitation.

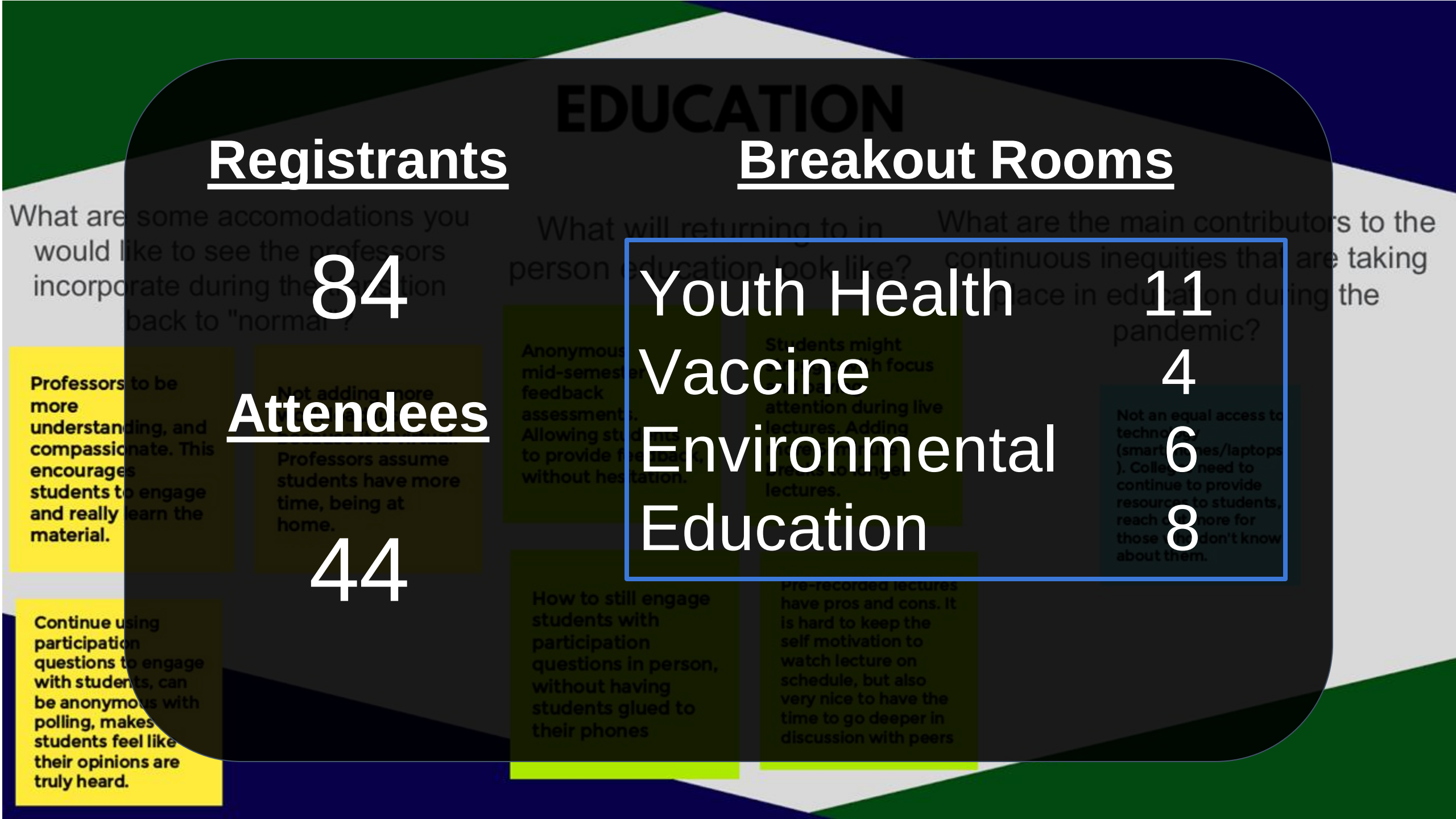
Students might struggle with focus and paying attention during live lectures. Adding more 5-minute breaks to longer lectures.

How to still engage students with participation questions in person, without having students glued to their phones

Pre-recorded lectures have pros and cons. It is hard to keep the self motivation to watch lecture on schedule, but also very nice to have the time to go deeper in discussion with peers

What are the main contributors to the continuous inequities that are taking place in education during the pandemic?

Not an equal access to technology (smartphones/laptops). Colleges need to continue to provide resources to students, reach out more for those who don't know about them.



Registrants

84

Attendees

44

Breakout Rooms

Youth Health	11
Vaccine	4
Environmental	6
Education	8

Recommendations

1. Wider outreach
2. Higher attendance → greater participation
3. Youth inclusion creates diverse perspectives and is needed earlier

Ana Grace Alvarado

Presenting on:
COVID-19 Impacts on food supply system

COVID-19 FOOD SUPPLY CHAIN DISRUPTIONS

- Phantom Demand
- Dumpling of dairy products, tiling under fruits, vegetables, tubers, etc.
  - Food Box Program and Paycheck Protection Program
- Meat – Euthanization
  - Bottleneck effect
  - More than an economic loss

Source: New York Times

Source: Milwaukee Journal

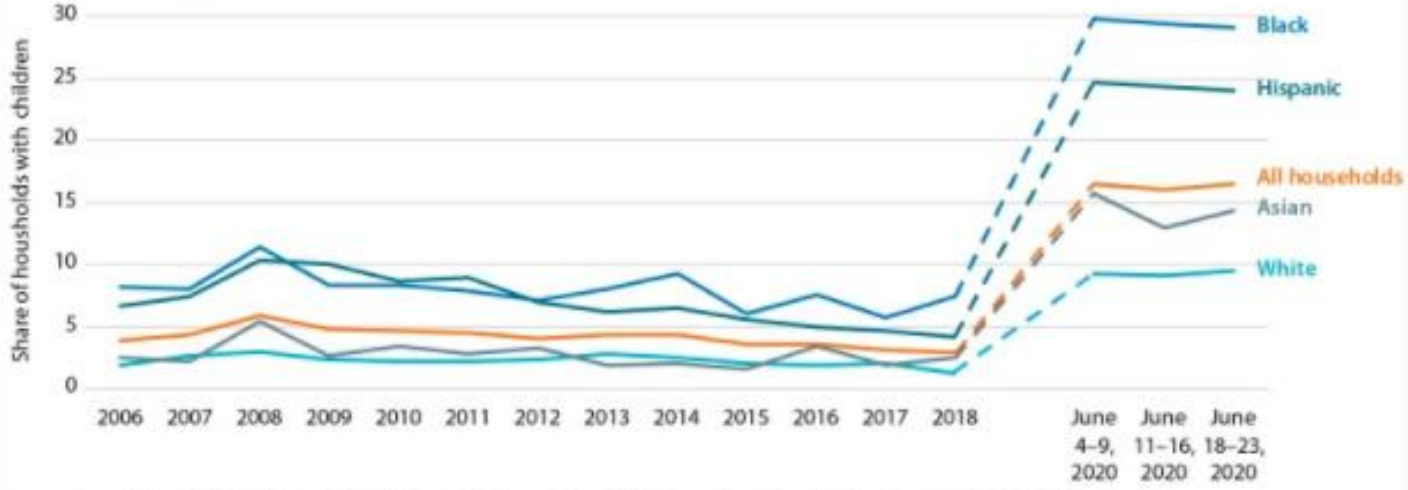
FOOD INSECURITY

- Increased usage of food assistance programs
- May 2020: 43 million people
  Great Recession: 50 million people
- Aid and a side of shame
- “There is not a lack of food but a lack of connections in the supply chain”- Tom Vilsack


Source: New York Times

FIGURE 1.

Share of Households with Children in which the Children Are Food Insecure by Race/Ethnicity, 2006–20



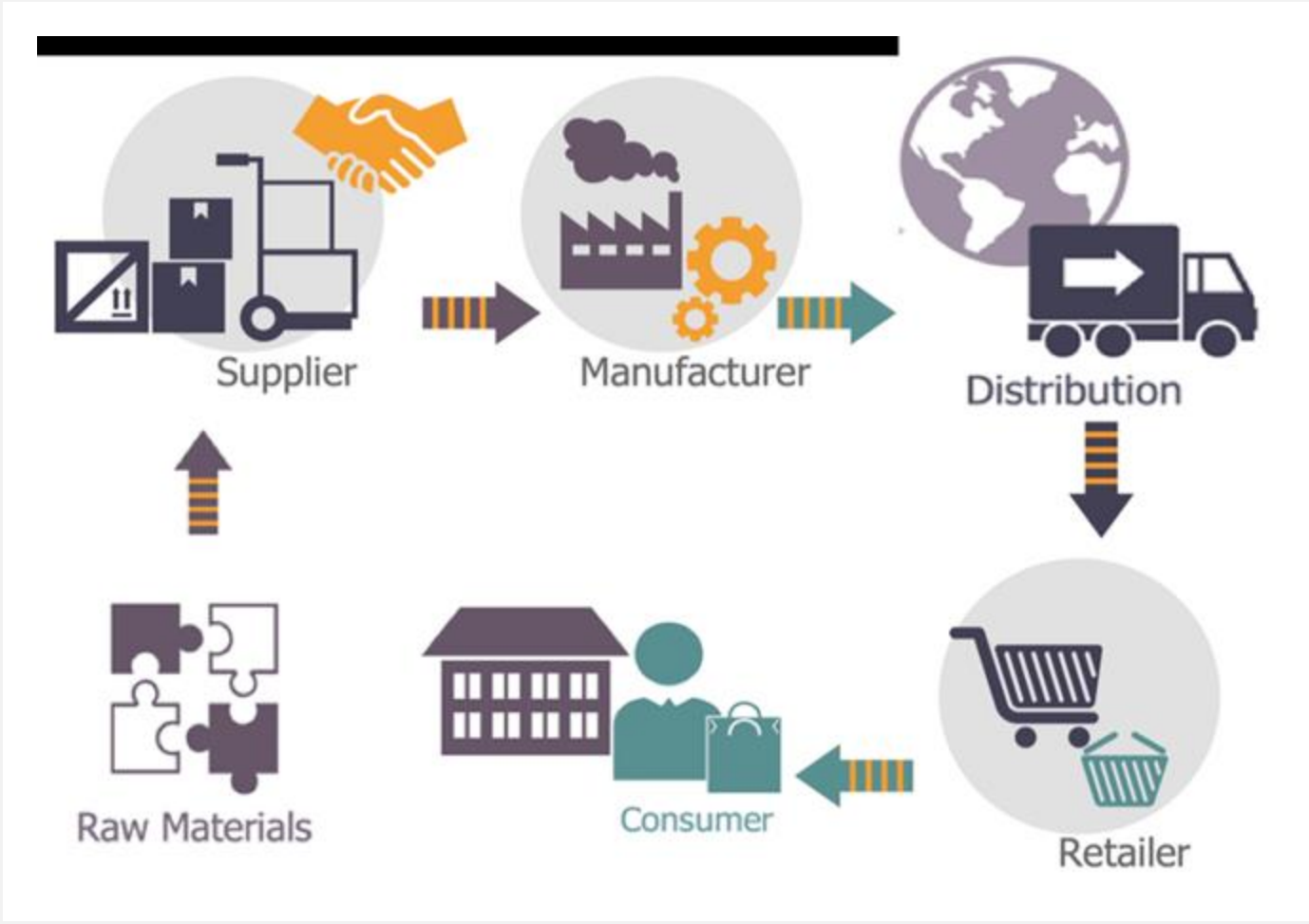
Source: Census Household Pulse Survey 2020 (Waves 6-8); Current Population Survey Food Security Supplement 2006-18; author's calculations.
Note: Surveys have been weighted to be representative of households with children, overall and by race/ethnicity. In the CHIPS (2020 datapoint), respondents were asked "Please indicate whether the next statement was often true, sometimes true, or never true in the last 7 days for the children living in your

SHEDDING LIGHT ON OUR FOOD SYSTEM FLAWS

- Workers and worker safety
- 70% of global meat companies are “high risk” for pandemics-CEPR
- Meat Processing Plants
  - COVID-19 outbreaks
  - Safety
- Policy – PRIME Act

SHIFTING TO SHORT-LOCALIZED RESILIENT SUPPLY CHAINS

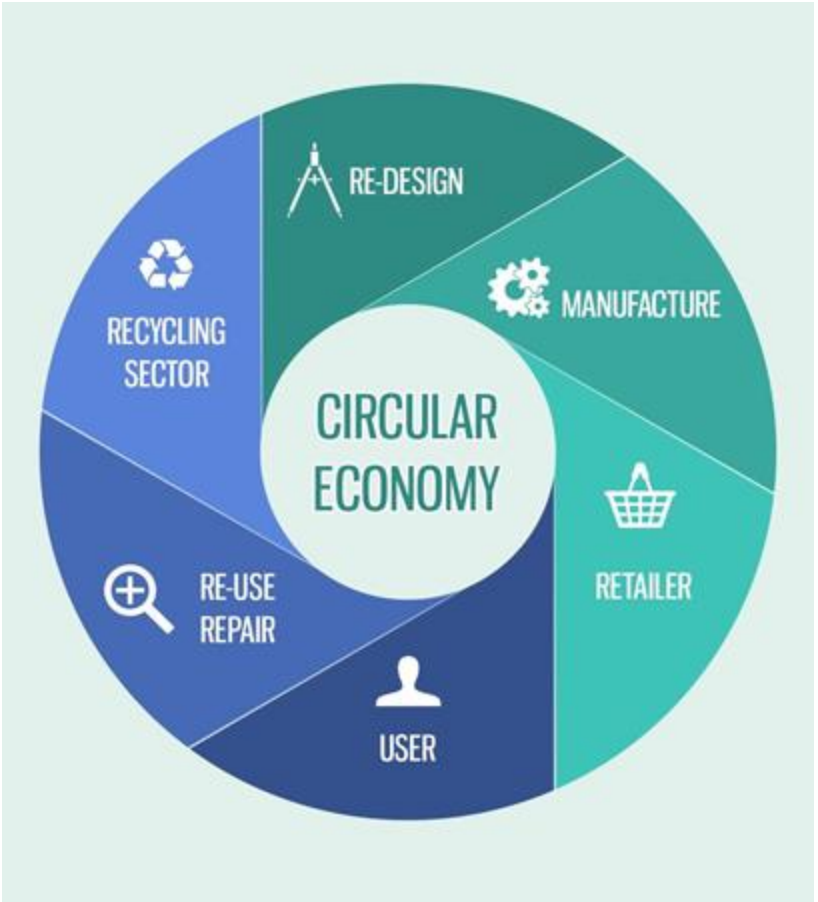
- Prioritizes long life and shorter feedback loops
- Circle of production and consumption
- Preservation of natural environment – shift from industrialized agriculture



Source: Malik, S., Kanhere, S., Jurdak, R. (2018).

POTENTIAL SOLUTIONS

- As a consumer
  - Awareness and appreciation
  - Purchasing locally, planning
- As a voter
  - Support localized supply chains
  - Co-management advisory teams
- Systematic changes
  - Shift to short-localized supply chains
  - Diversify – crops grown, chains, etc.
  - Co-management involving multidisciplinary advisory teams – underrepresented groups



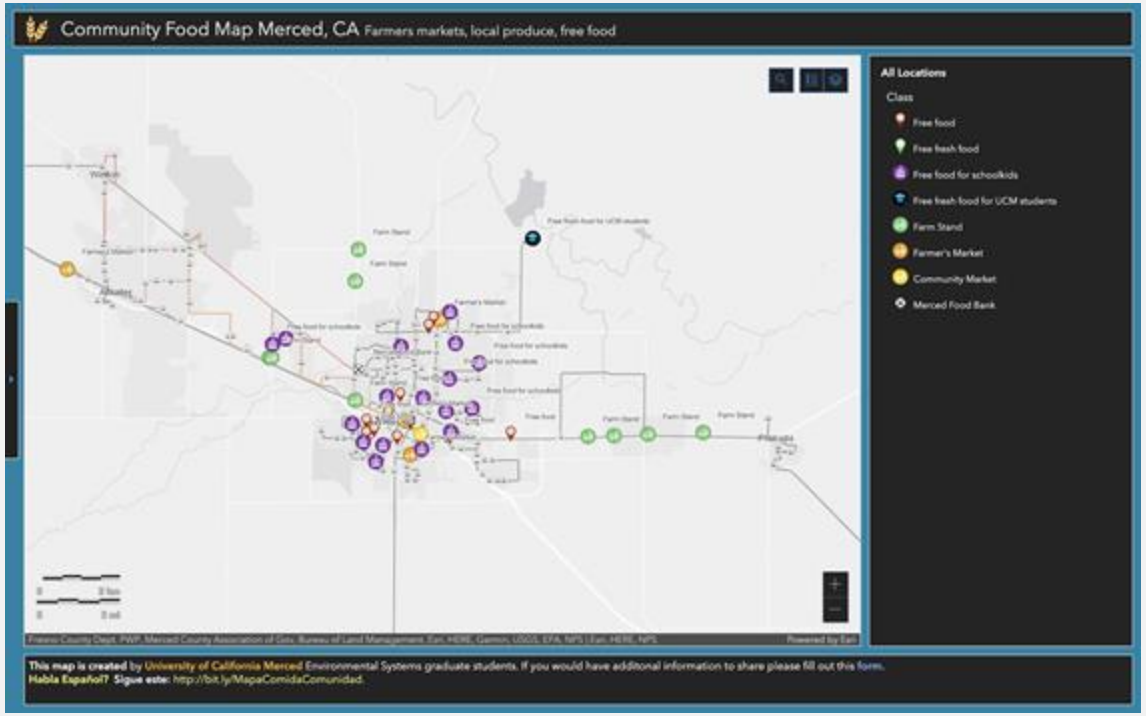
Source: Sustainability X

FIRST STEPS/OUTREACH

UC MERCED'S "BUILDING THE FUTURE" DOCUSERIES

https://youtu.be/5QQ55Ybf8cs

COMMUNITY FOOD MAP MERCED, CA

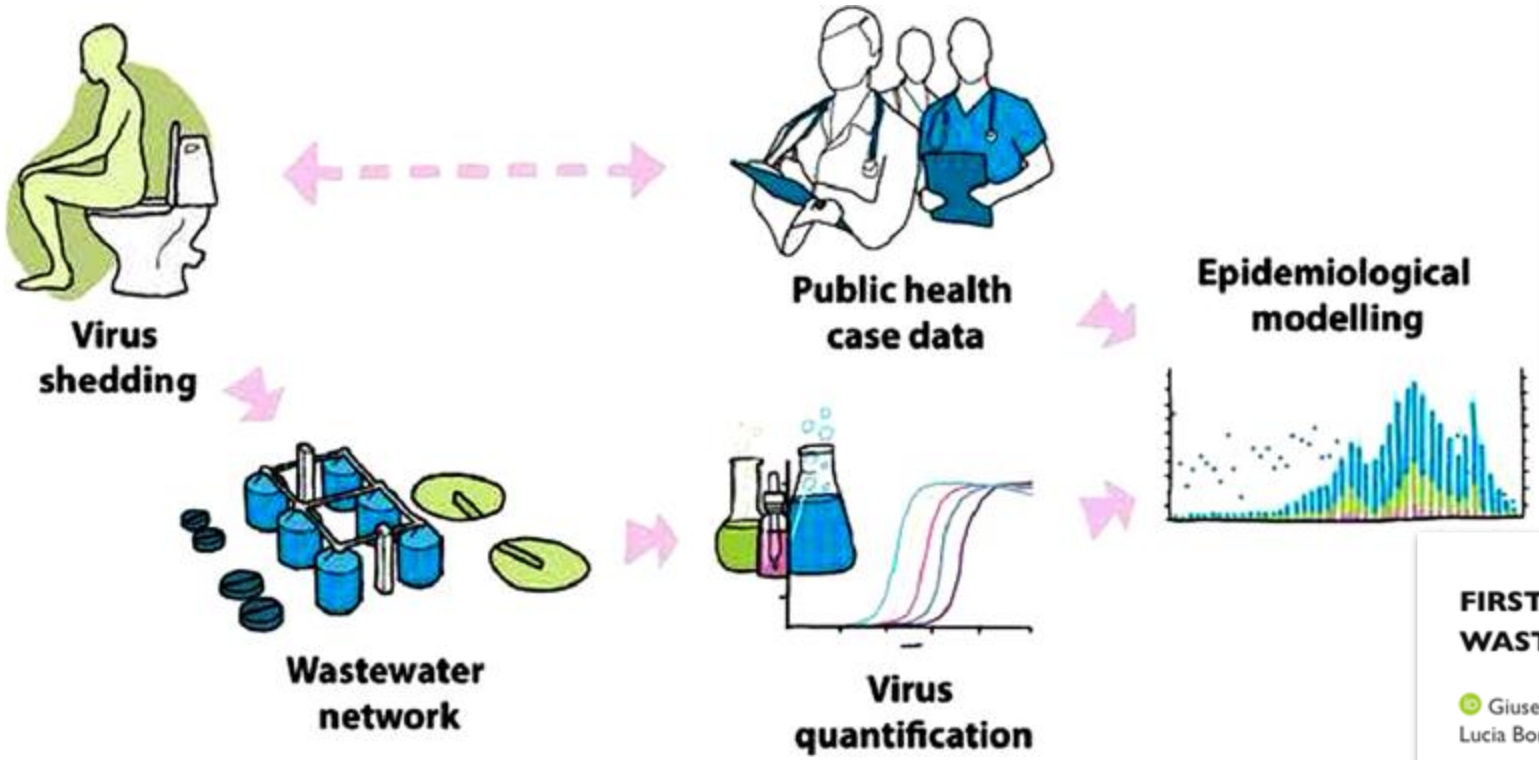


http://bit.ly/MercedFoodMap

Fernando Adali Roman Jr.

Presenting on:
COVIDPoops19 Dashboard

Wastewater Based Epidemiology



(Peccia et al., 2020, website: https://covidtrackerct.com/wastewater-current/)

Risk Analysis
AN INTERNATIONAL JOURNAL
An Official Publication of the Society for Risk Analysis

Poliovirus Surveillance by Examining Sewage Water Specimens: Studies on Detection Probability Using Simulation Models

J. Ranta, T. Hovi, E. Arjas

First published: 27 May 2002 | https://doi.org/10.1111/0272-4332.t01-1-216174 | Citations: 29

J. Ranta Rolf Nevanlinna Institute, University of Helsinki, Finland.

Comments (1)

FIRST DETECTION OF SARS-COV-2 IN UNTREATED WASTEWATERS IN ITALY

Giuseppina La Rosa, Marcello Iaconelli, Pamela Mancini, Giusy Bonanno Ferraro, Carolina Veneri, Lucia Bonadonna, Luca Lucentini, Elisabetta Suffredini

doi: https://doi.org/10.1101/2020.04.25.20079830

Now published in *Science of The Total Environment* doi: 10.1016/j.scitotenv.2020.139652

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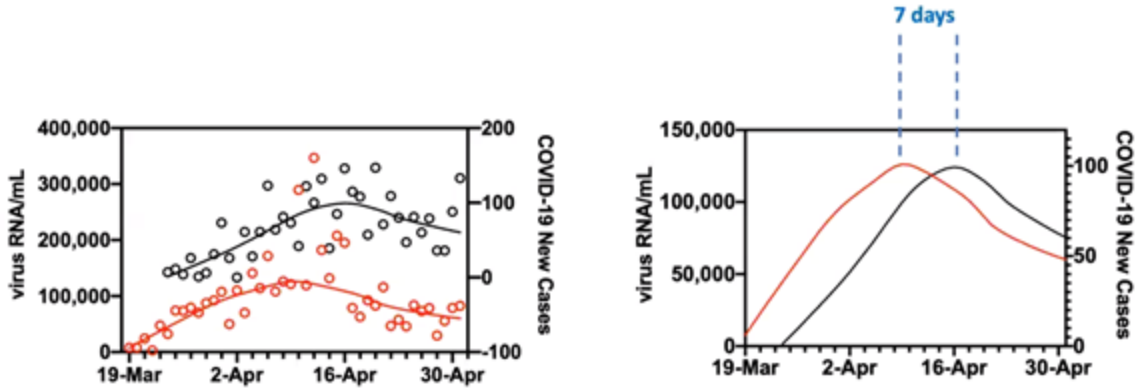
Fostering Informed Decisions and Actions through Wastewater

SARS-CoV-2 (can be) A LEADING INDICATOR OVER TESTING



(Peccia et al., 2020, website: https://covidtrackerct.com/wastewater-current/)

COVIDPoops19 Global Wastewater Dashboard

https://arcg.is/1aummW

https://www.covid19wbec.org/

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Dashboard Data Flow

https://www.covid19wbec.org/

Daily key word searches

Literature and internet searches

Google forms

Category sort

ESRI

ArcGIS online dashboard

Continuously update

https://www.medrxiv.org/content/10.1101/2021.03.14.21253564v1

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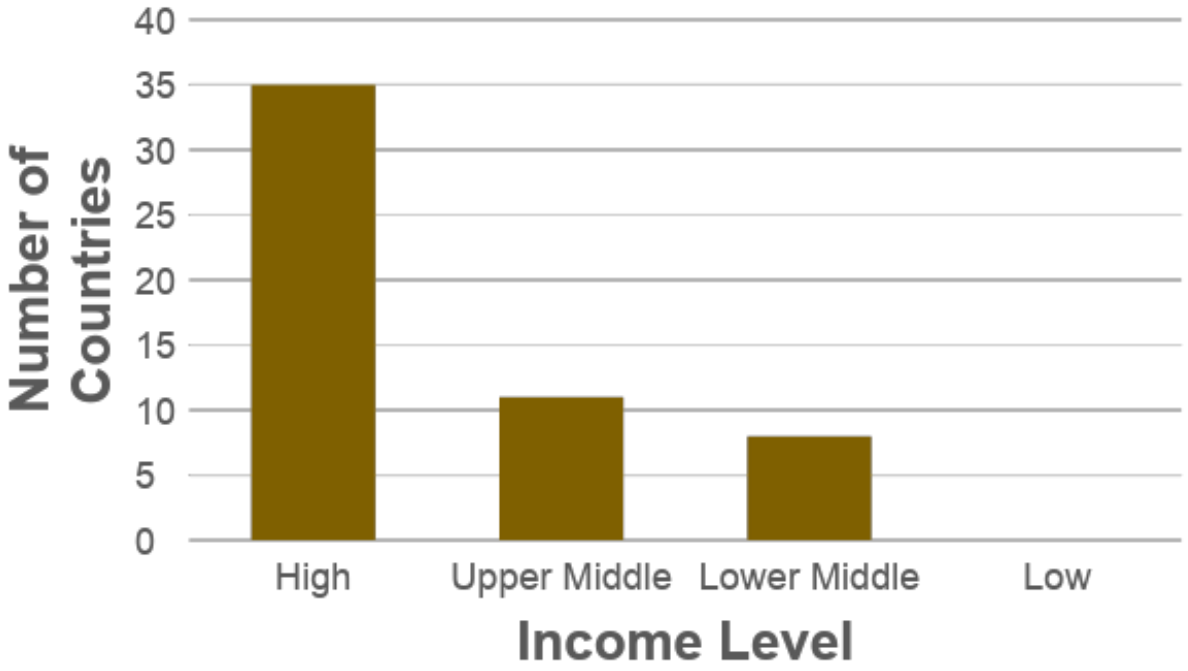
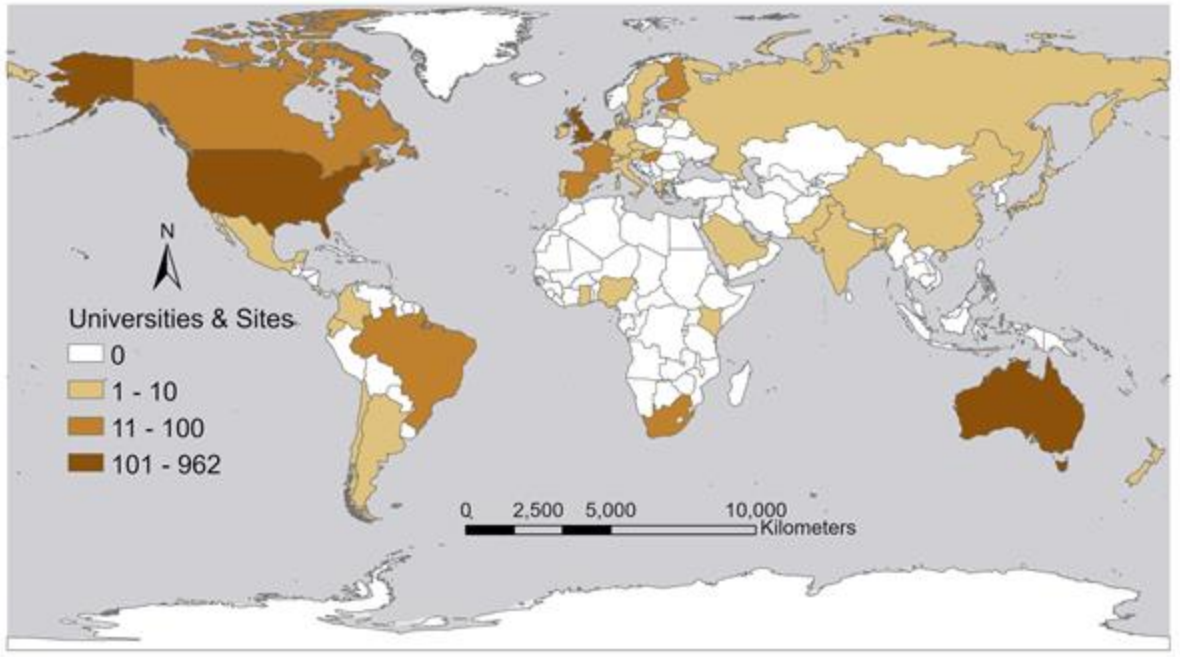
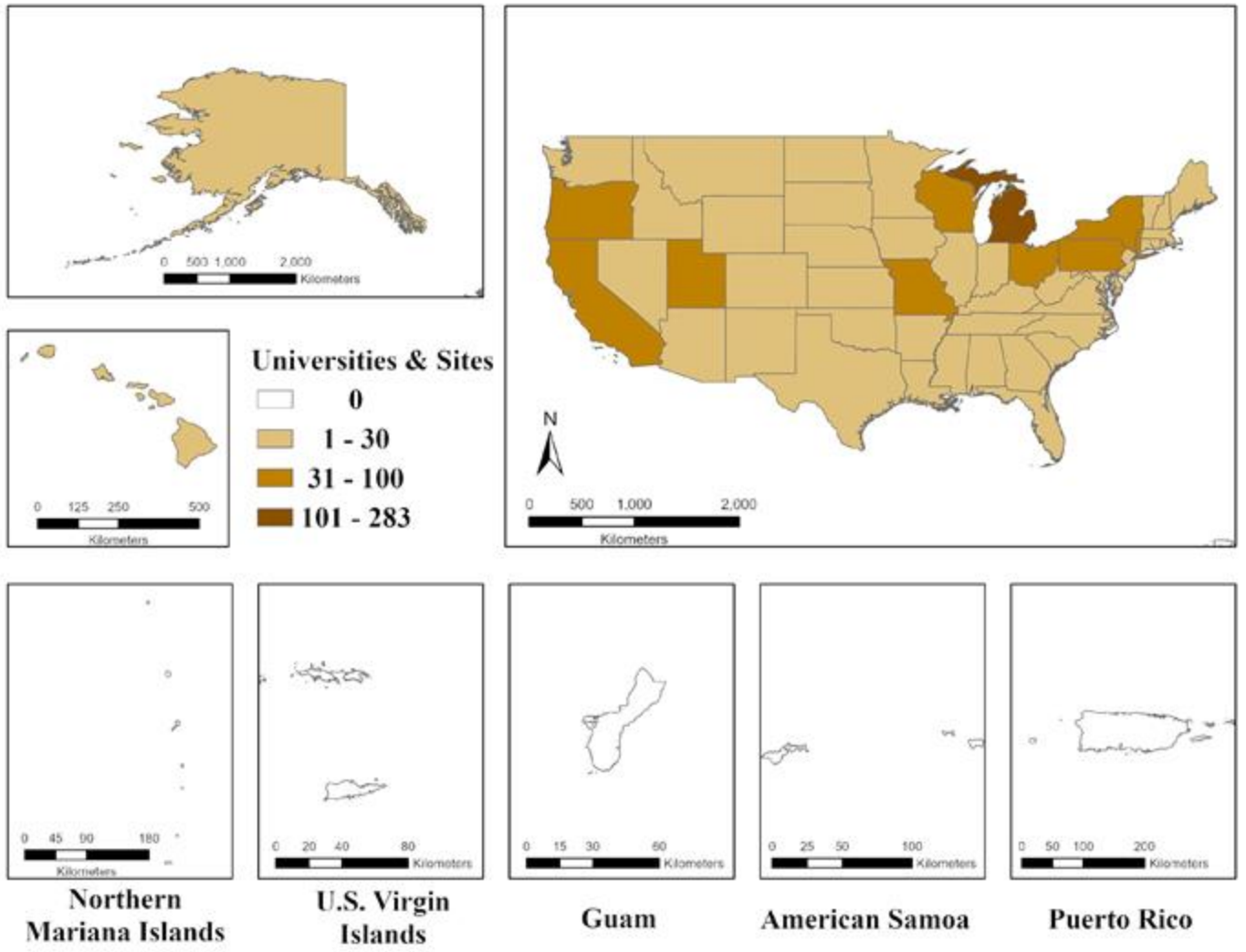
Countries using WBE for COVID-19





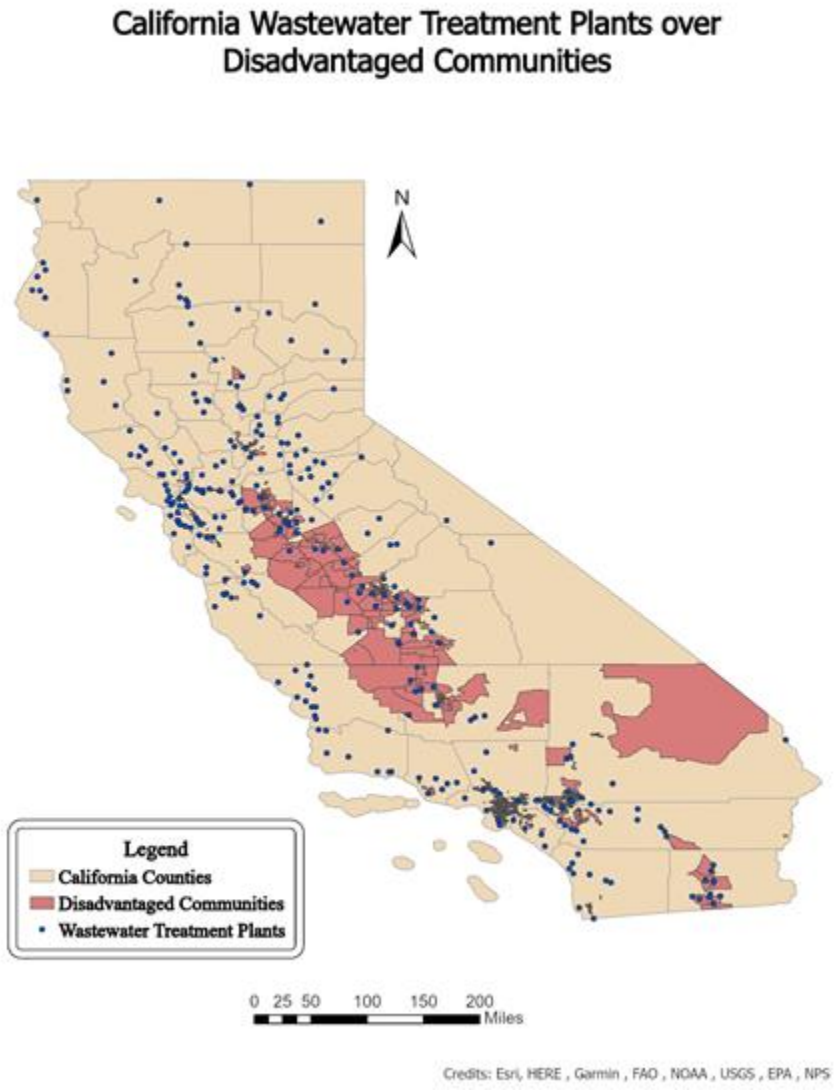
Income level classifications from the World Bank (2020): https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups

WBE for COVID-19 in the United States



https://www.medrxiv.org/content/10.1101/2021.03.14.21253564v1

Disparities in WBE Testing Locations

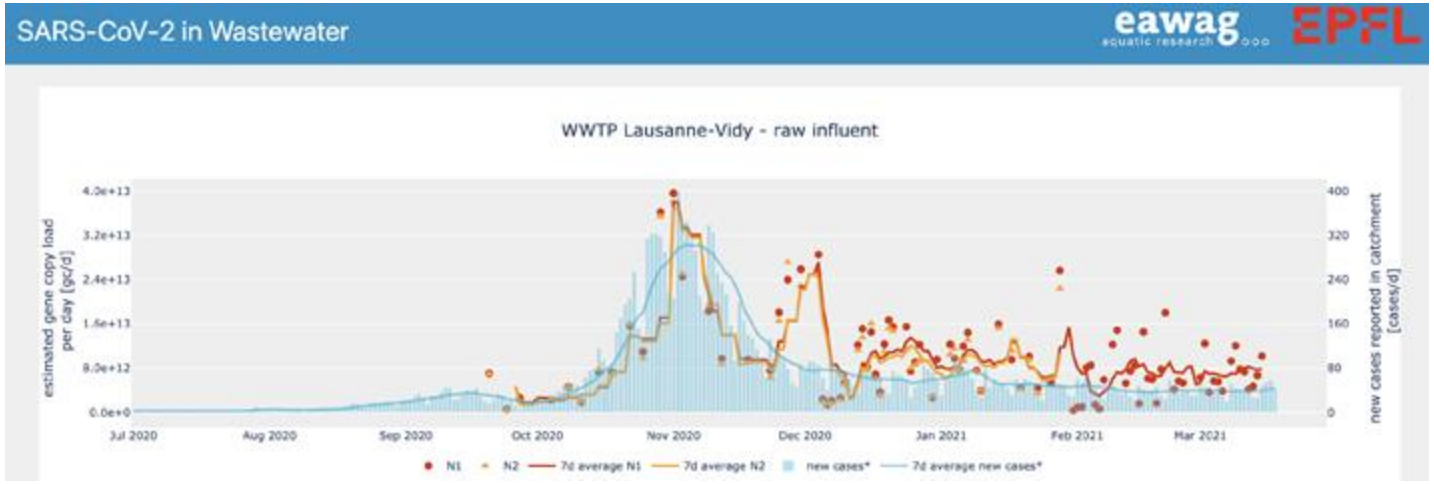


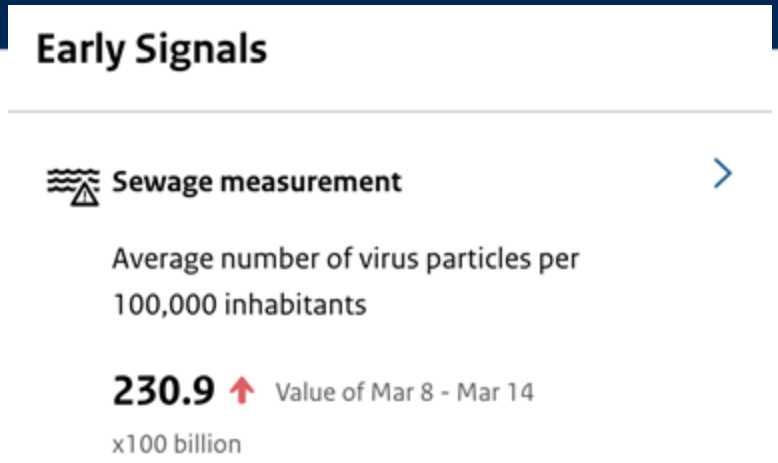
Sewage Monitoring in Rural Communities: A Powerful Strategy for COVID-19 Surveillance

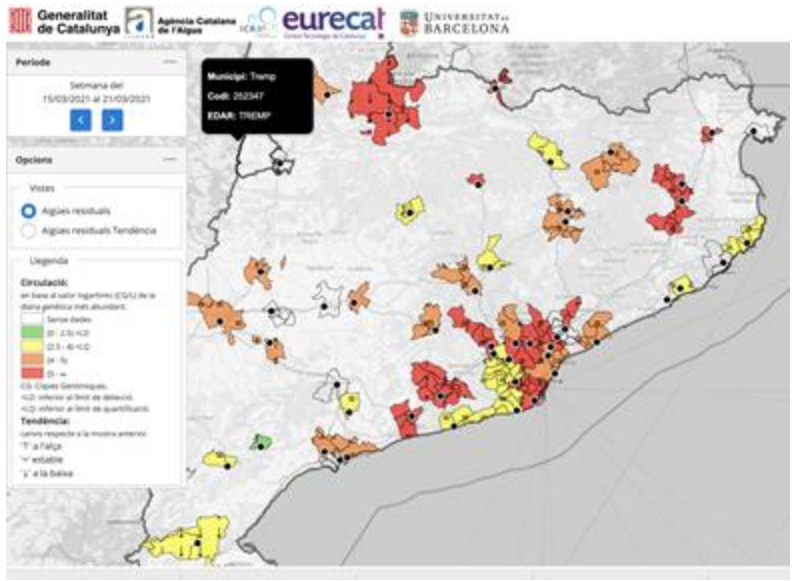
https://www.neha.org/node/61667

Dashboard Review and Best Practices

- 88+ Dashboards
- Only a few with downloadable data
- Lots of Variation
- Tips: Include videos, non-technical language, and downloadable data



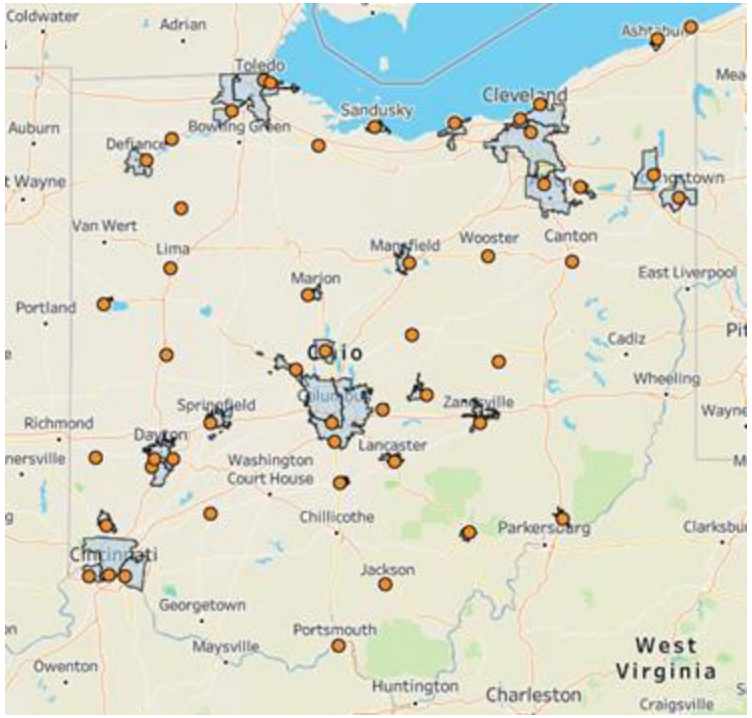




https://www.medrxiv.org/content/10.1101/2021.03.14.21253564v1

Ohio-Example of Wastewater SARS-CoV-2 Dashboards

Ohio

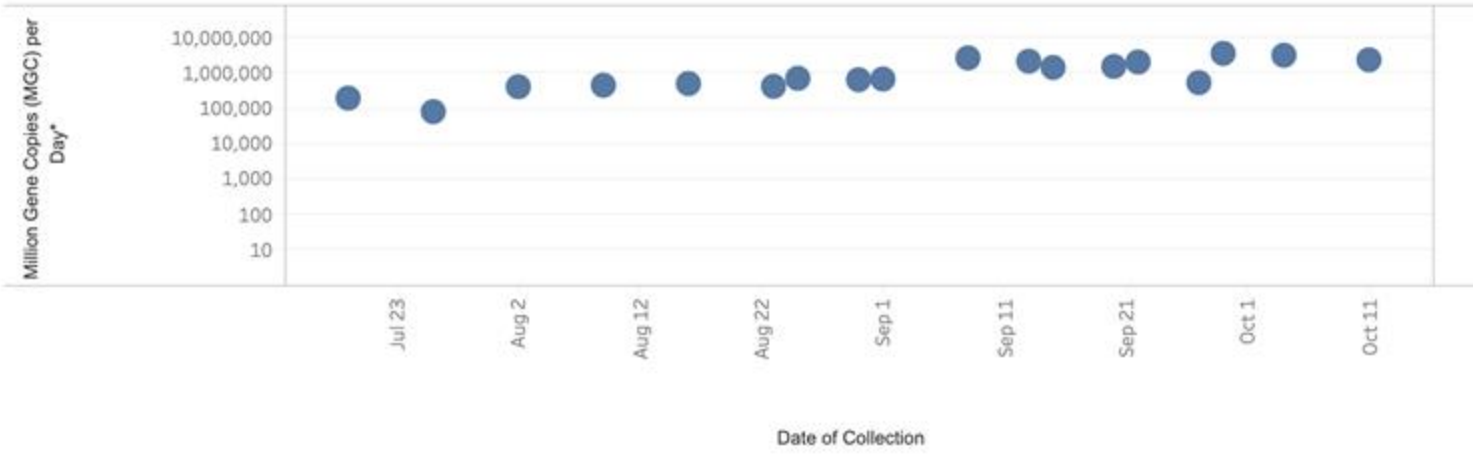


https://coronavirus.ohio.gov/wps/portal/gov/covid-19/dashboards/wastewater

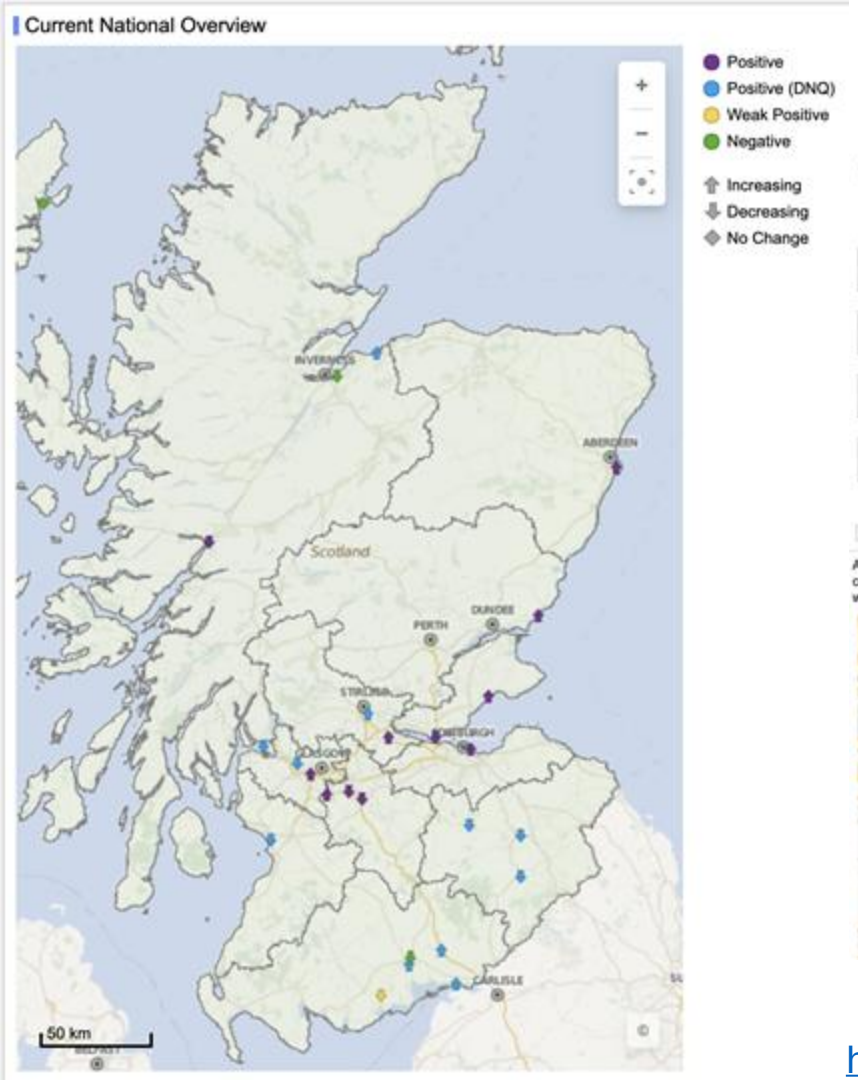
Click a site to zoom in and view data for that site. To return to the state view, click the site again.
When viewing on a mobile device, such as a phone or tablet, pinch with both fingers to move the map or zoom in on a specific area.

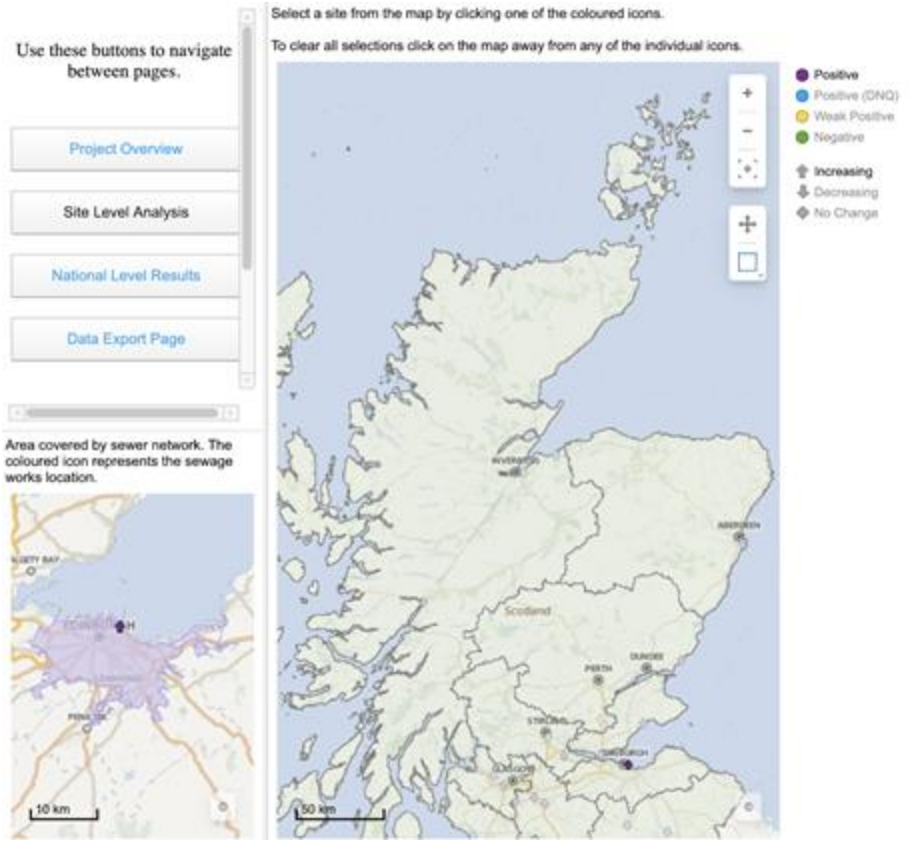
Facility Name = Jackson Pike WRRF

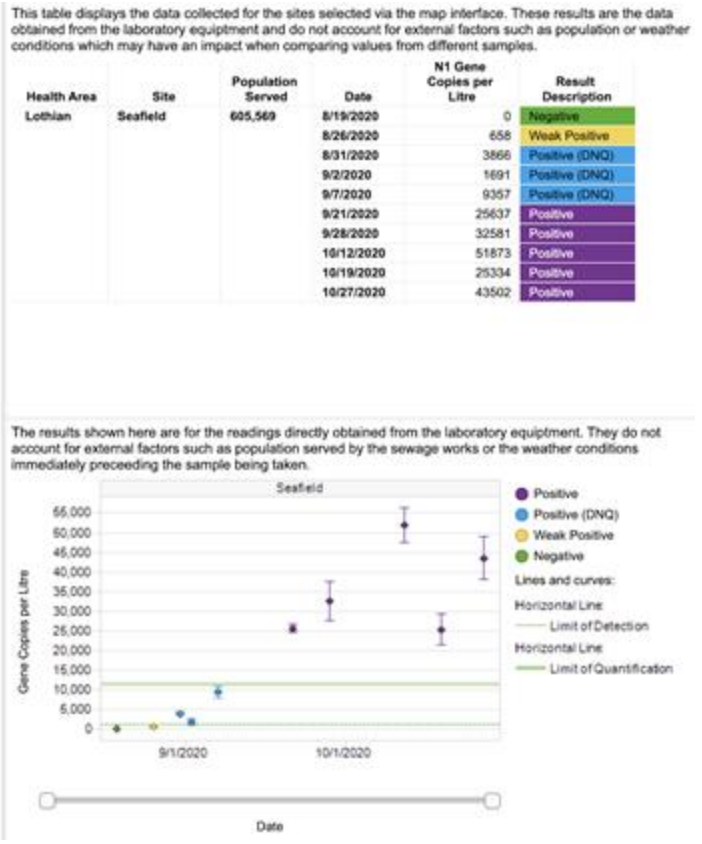
Viral Gene Copy Trends



Scotland-Example of Wastewater SARS-CoV-2 Dashboards





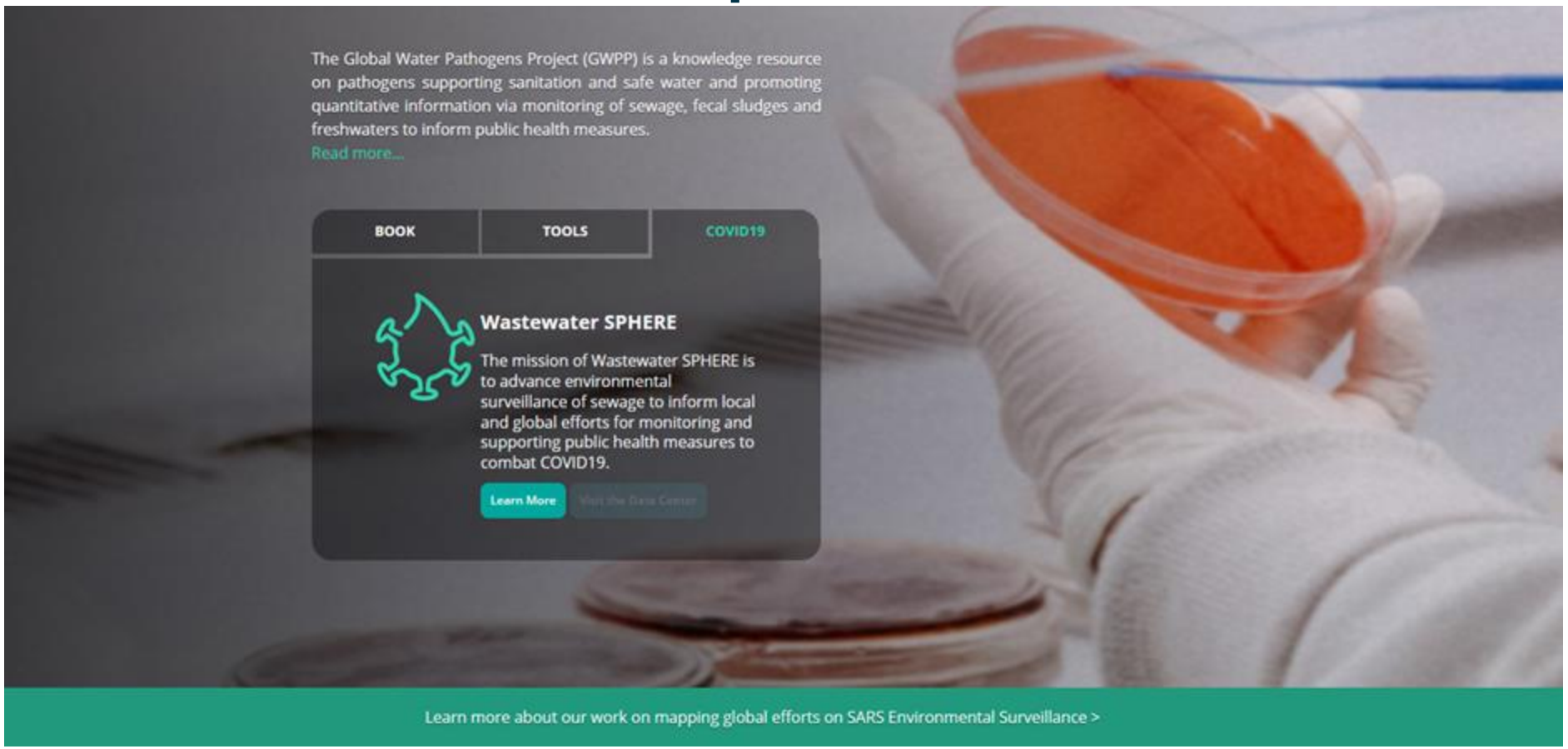


https://informatics.sepa.org.uk/RNAmonitoring/

Arianna Quinn Tariqi

Presenting on:
W-SPHERE

Wastewater SARS Public Health Environmental REsponse



www.waterpathogens.org

W-SPHERE

Mission: advance environmental surveillance of sewage to inform local and global efforts for monitoring and supporting public health measures to combat disease

PATH, Michigan State University, KWR Water Research Institute, University of California Merced and Venthic are collaborating to develop a repository of databases (geospatial and tabular) for organizations and individuals testing for SARS-CoV-2 in wastewater and other waterways.

WASTEWATERSPHERE

The Data Center will:

- Integrate data generated through the field deployments
- Integrate data produced from high-income countries Dashboards
- Develop approaches for visualizing and presenting global data sets on the virus in sewage.
- Provide access to global data for scientific advancements
- Provide Use-Case Studies addressing the role of wastewater surveillance in the global COVID-19 response.

Data Flow

Landscaping

Identify new Data Sources

Data Sources

Data Collection

Harvest Dashboards and Websites

Fill-in data templates

Link to service area geodata

Data Files

Data Management

Create Datasets

Create Metadata

Import Samples over time

Import & curate Lab Methods

Import & geocode Sites

Open-Access Data feeds

Data Visualization

SPHERE Website

Search data

Visualize study sites

Browse case studies

ArcGIS

ArcGIS Dashboards

ArcGIS Storymaps

Our database currently

97
data points

24
countries

622
sampling sites

>15000
samples

13 datasets from open data sources
more to come

WASTEWATER
SPHERE

GLOBAL MAP DATA CASE STUDIES ABOUT

A global data center by the Global Water Pathogens Project

Advancing environmental surveillance of sewage to inform local and global efforts for monitoring and supporting public health measures to combat disease.

Read more | See global map

Contribute to the Wastewater SPHERE data center

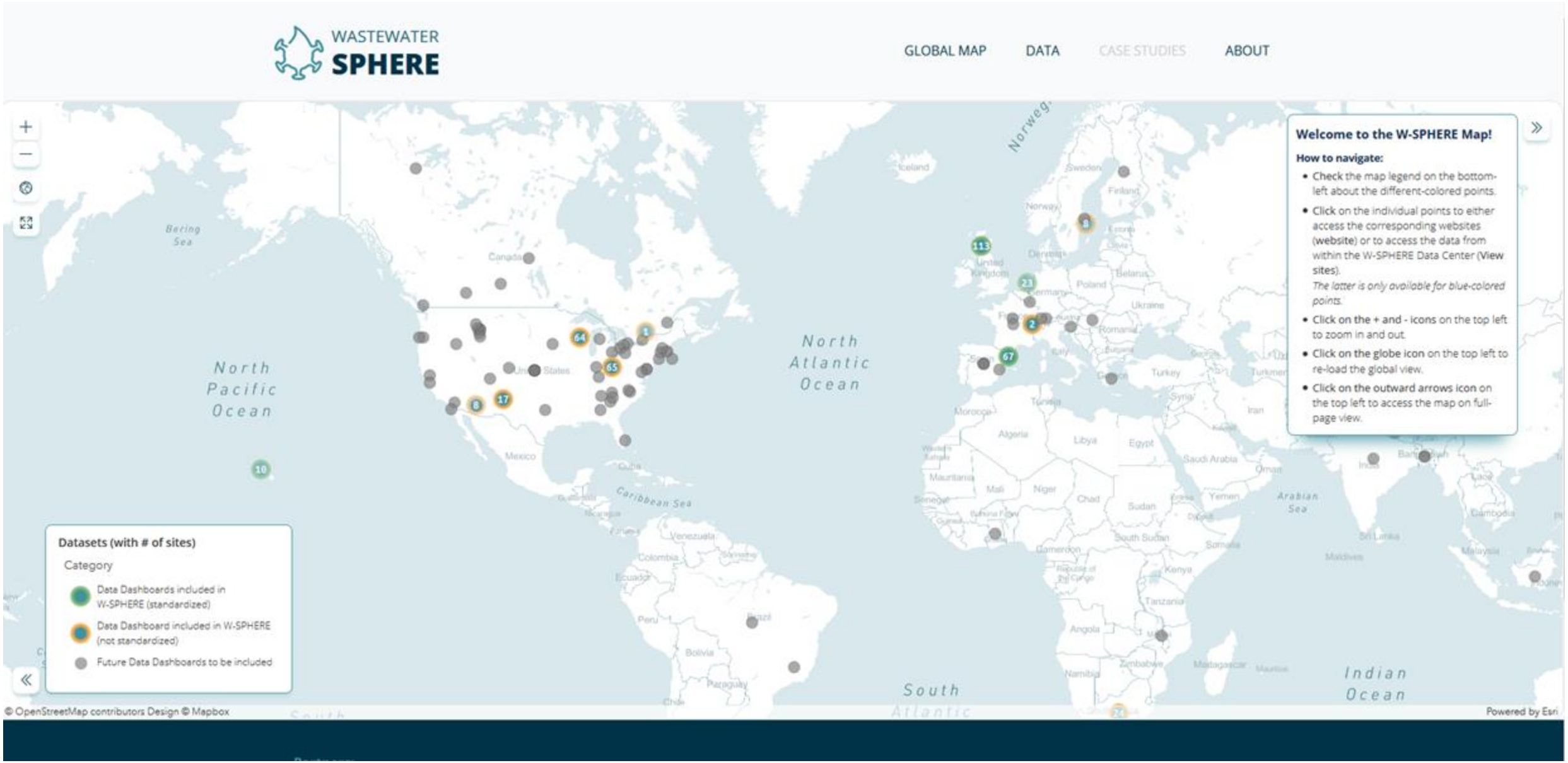
Contributing data to SPHERE can help you get started with standardized data reporting and licensing, while creating your own space for visualizations and analysis.

CONTRIBUTE

13 Datasets

622 Sites

24 Countries


WASTEWATER
SPHERE
GLOBAL MAP
DATA
CASE STUDIES
ABOUT
Welcome to the W-SPHERE Map!
How to navigate:
Check the map legend on the bottom-left about the different-colored points.
Click on the individual points to either access the corresponding websites (website) or to access the data from within the W-SPHERE Data Center (View sites).
The latter is only available for blue-colored points.
Click on the + and - icons on the top left to zoom in and out.
Click on the globe icon on the top left to re-load the global view.
Click on the outward arrows icon on the top left to access the map on full-page view.
Datasets (with # of sites)
Category
Data Dashboards included in W-SPHERE (standardized)
Data Dashboard included in W-SPHERE (not standardized)
Future Data Dashboards to be included
North Pacific Ocean
North Atlantic Ocean
Bering Sea
Caribbean Sea
Arabian Sea
Indian Ocean
South Atlantic
Canada
United States
Mexico
Iceland
Norway
Sweden
Finland
Poland
Ukraine
Turkey
Algeria
Libya
Egypt
Saudi Arabia
Kenya
Tanzania
Angola
Namibia
Zimbabwe
Madagascar
Peru
Bolivia
Paraguay
Venezuela
Colombia
Ecuador
Brazil
Chile
Sri Lanka
Maldives
Malaysia
Cambodia
64
1
65
17
6
10
113
8
23
2
67
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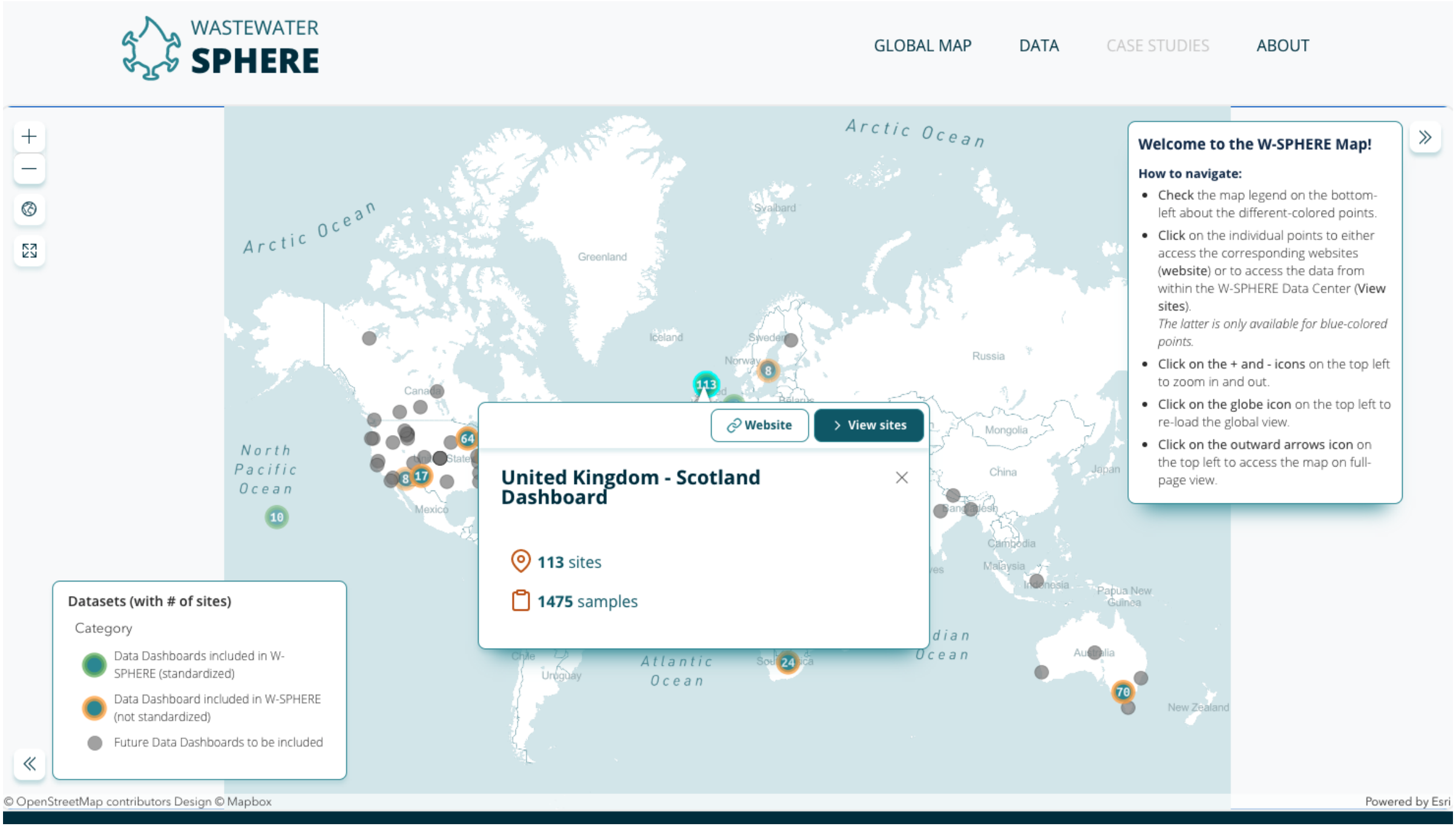
WASTEWATER
SPHERE
GLOBAL MAP
DATA
CASE STUDIES
ABOUT
Arctic Ocean
Arctic Ocean
Svalbard
Greenland
Iceland
Sweden
Norway
Russia
Canada
Mongolia
China
Japan
North Pacific Ocean
Mexico
Cambodia
Malaysia
Indonesia
Papua New Guinea
Australia
New Zealand
Atlantic Ocean
Uruguay
Chile
Website
View sites
United Kingdom - Scotland Dashboard
113 sites
1475 samples
Welcome to the W-SPHERE Map!
How to navigate:
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Click on the individual points to either access the corresponding websites (website) or to access the data from within the W-SPHERE Data Center (View sites).
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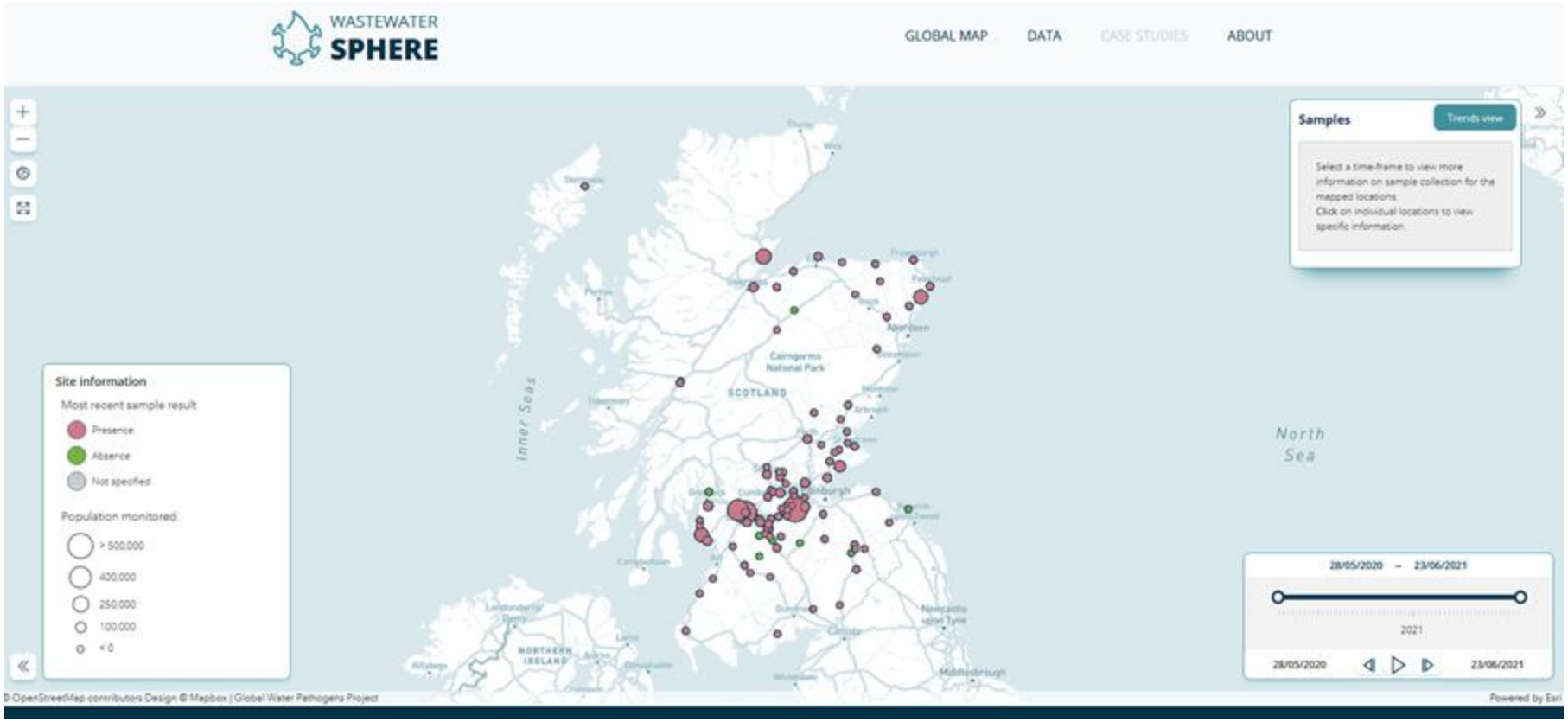
WASTEWATER
SPHERE
GLOBAL MAP
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ABOUT
Samples
Trends view
Select a time-frame to view more information on sample collection for the mapped locations.
Click on individual locations to view specific information.
Site information
Most recent sample result
Presence
Absence
Not specified
Population monitored
> 500,000
400,000
250,000
100,000
< 0
Inner Seas
North Sea
SCOTLAND
NORTHERN IRELAND
Cairngorms National Park
28/05/2020 – 23/06/2021
2021
28/05/2020
23/06/2021
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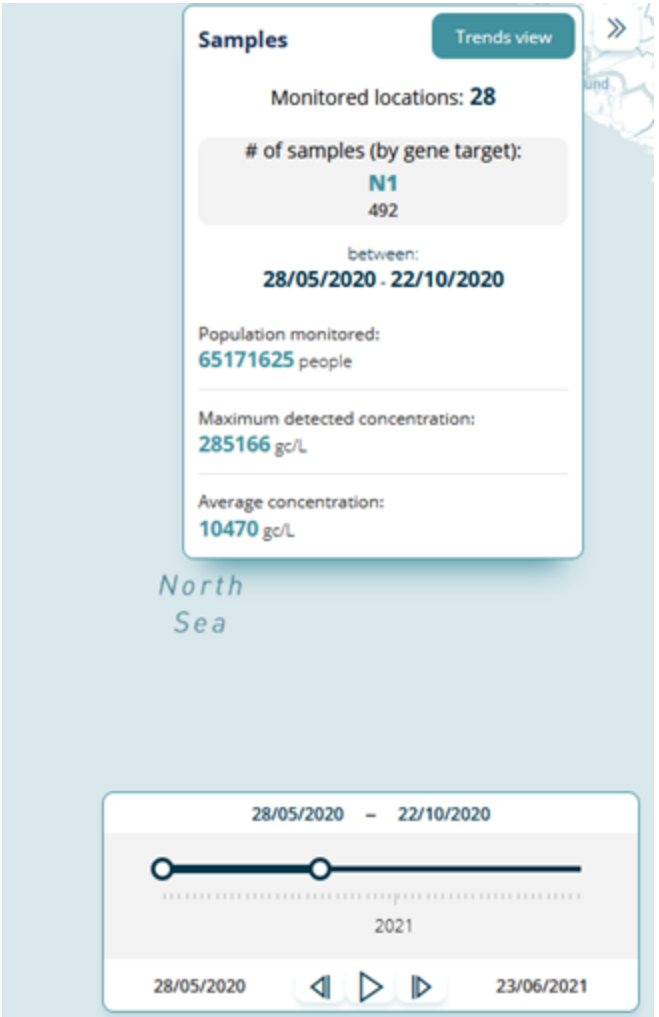
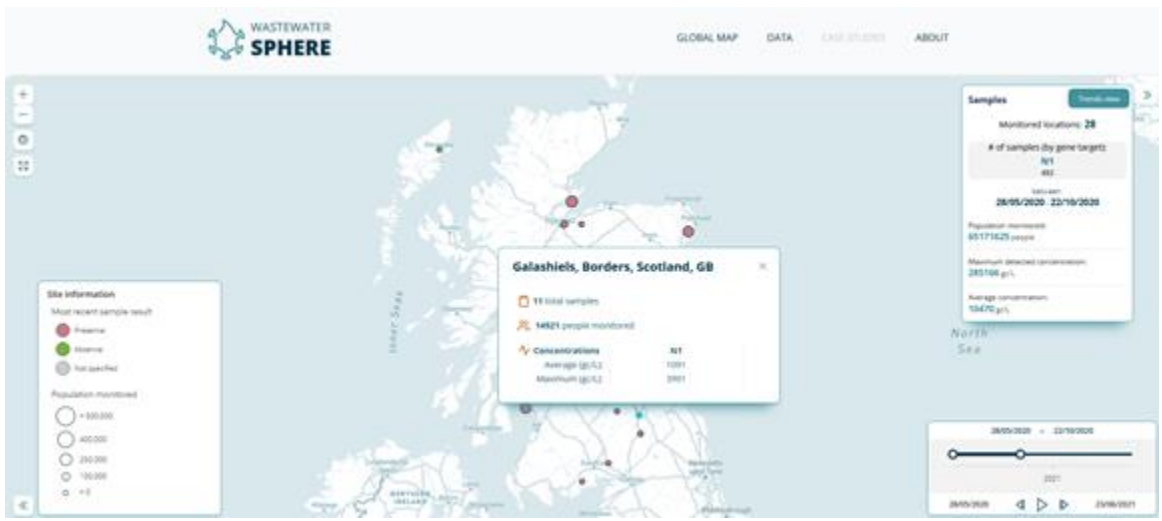
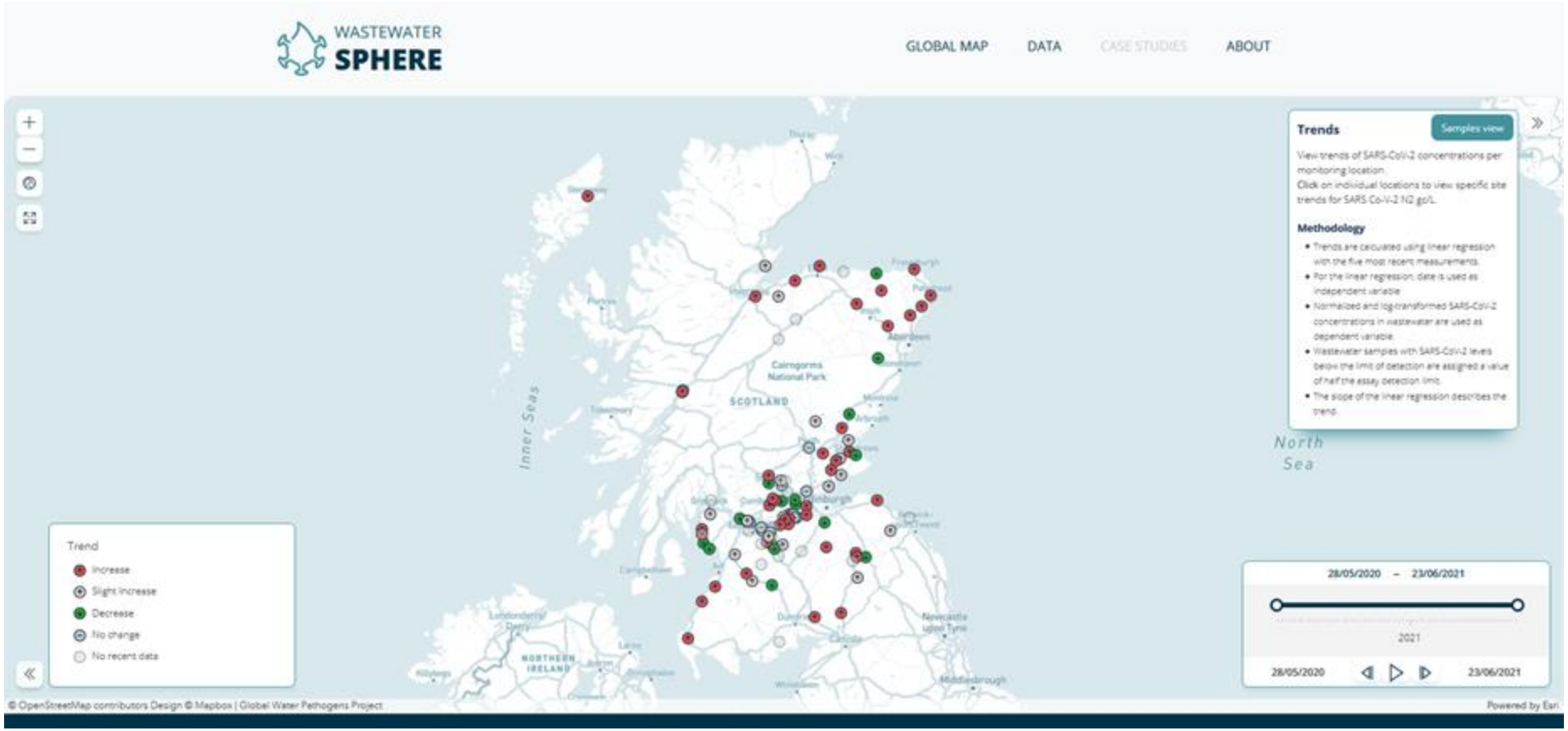

Samples
Trends view
Monitored locations: 28
# of samples (by gene target):
N1
492
between:
28/05/2020 - 22/10/2020
Population monitored:
65171625 people
Maximum detected concentration:
285166 gc/L
Average concentration:
10470 gc/L
North Sea
28/05/2020 – 22/10/2020
2021
28/05/2020
23/06/2021


WASTEWATER
SPHERE
GLOBAL MAP
DATA
ABOUT
Galashiels, Borders, Scotland, GB
Site information
Inner Seas
North Sea


WASTEWATER
SPHERE
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ABOUT
Trends
Samples view
View trends of SARS-CoV-2 concentrations per monitoring location.
Click on individual locations to view specific site trends for SARS Co-V-2 N2 gc/L.
Methodology
Trends are calculated using linear regression with the five most recent measurements.
For the linear regression, date is used as independent variable.
Normalized and log-transformed SARS-CoV-2 concentrations in wastewater are used as dependent variable.
Wastewater samples with SARS-CoV-2 levels below the limit of detection are assigned a value of half the assay detection limit.
The slope of the linear regression describes the trend.
Trend
Increase
Slight increase
Decrease
No change
No recent data
28/05/2020 – 23/06/2021
2021
28/05/2020
23/06/2021
Inner Seas
North Sea
SCOTLAND
NORTHERN IRELAND
Cairngorms National Park
Aberdeen
Edinburgh
Glasgow
Dundee
Perth
Inverness
Newcastle upon Tyne
Middlesbrough
Carlisle
Londonderry
Derry
Lisburn
Belfast
Armagh
Omagh
Enniskillen
Killybegs
Thurso
Wick
Stornoway
Portree
Fraserburgh
Peterhead
Montrose
Arbroath
Kirkcaldy
Dunfermline
Falkirk
Ayr
Dumfries
Whitehaven
Barrow-in-Furness
Lancaster
Ardrossan
Campbeltown
Douglas
Ramsey
Castletown
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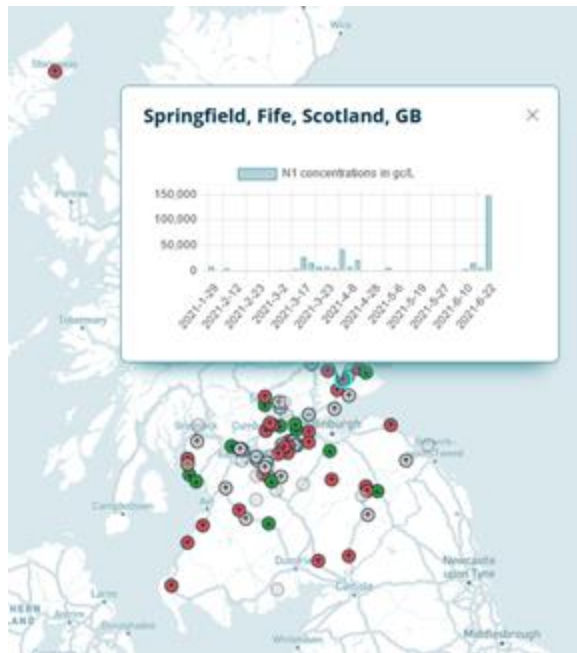

Springfield, Fife, Scotland, GB
N1 concentrations in gc/L
150,000
100,000
50,000
0
2021-1-29
2021-2-12
2021-2-23
2021-3-2
2021-3-17
2021-3-23
2021-4-8
2021-4-28
2021-5-6
2021-5-19
2021-5-27
2021-6-10
2021-6-22

WASTEWATER SPHERE

GLOBAL MAP DATA CASE STUDIES ABOUT

Datasets

Contribute your data

Type your search term here

Sort by: Alphabetical

13 datasets found

Urban

Arizona - City of Tempe Dashboard

City of Tempe, Arizona

Tempe is in a unique position for an innovative response to the coronavirus/COVID-19 pandemic due to the Wastewater Data Analytics - Opioids program supported by the Tempe City Council's Innovation Fund in 2018 and the...

2x csv 1x geojson

Regional

Australia - Victoria State Government - DHHS

Department of Health and Human Services Victoria

The Department of Health is overseeing the Victorian wastewater surveillance program with support from Victorian water utilities which collect the samples, and our laboratory partners (Australian Laboratory Services, Monash University and the Walter and Eliza...

1x geojson

Resolution

- Regional (7)
- National (4)
- Urban (2)

Data Sources

- Scottish Environmental Protection Agency (1)
- KWR Water Research Institute (0)
- Ohio Department of Health (1)
- Ottawa Public Health (1)
- KWR Watercycle Research Institute (1)

Australia - Victoria State Government - DHHS

View on Map

Department of Health and Human Services Victoria - Regional

140
monitored sites

3507
collected samples

256
dates sampled

The information on this page is also available via the API.

Description

The Department of Health is overseeing the Victorian wastewater surveillance program with support from Victorian water utilities which collect the samples, and our laboratory partners (Australian Laboratory Services, Monash University and the Walter and Eliza Hall Institute) which analyse the samples. Victoria is a member of the collaboration for sewage surveillance for SARS-CoV-2 (ColoSSoS). Coordinated by Water Research Australia, the ColoSSoS project brings together health departments, water utilities, laboratories and researchers from Australia and New Zealand to share advances in this rapidly evolving field.

Files

DHHS - Samples CSV

DHHS - Samples GeoJSON

DHHS - Sites CSV

W-SPHERE Case studies

Health actions:

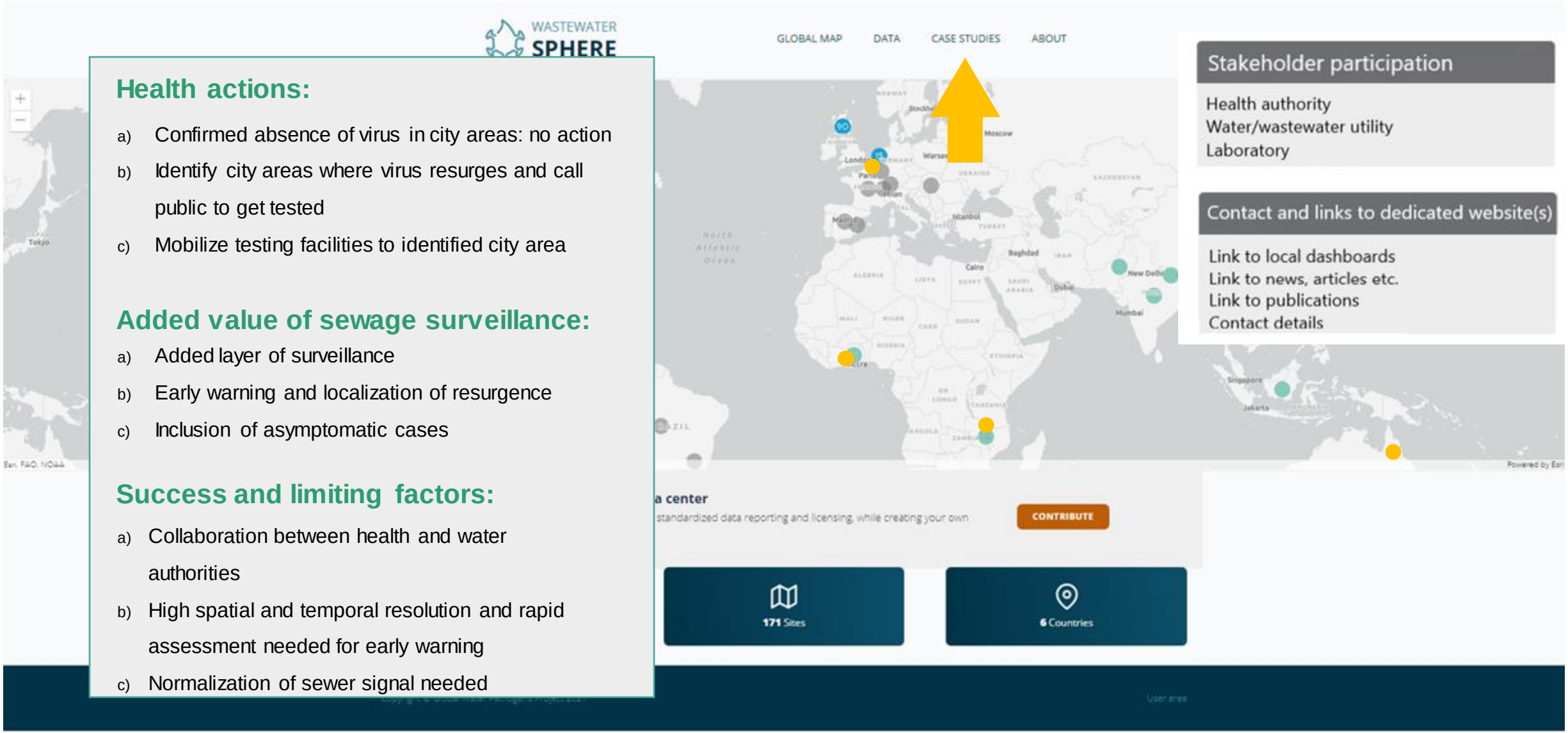
a) Confirmed absence of virus in city areas: no action
b) Identify city areas where virus resurges and call public to get tested
c) Mobilize testing facilities to identified city area

Added value of sewage surveillance:

a) Added layer of surveillance
b) Early warning and localization of resurgence
c) Inclusion of asymptomatic cases

Success and limiting factors:

a) Collaboration between health and water authorities
b) High spatial and temporal resolution and rapid assessment needed for early warning
c) Normalization of sewer signal needed



We are calling on utility, laboratory and public health communities who are interested in submitting their data or accessing these global datasets to join the W-SPHERE Collaboration!

Use the contact form on:

www.waterpathogens.org

@COVIDPoops19

@water_pathogens

W-SPHERE Acknowledgements

Dr. Joan B. Rose

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Panagis Katsivellis

Arianna Tariqi

Fernando Roman

Clara Medina

Krystin Kadonsky

Sotirios Paraskevopoulos

Theo Kontogiannis

Conclusions

- Important to get the youth involved early
- Support and advocate for essential workers
- Data is an important resource in fostering informed decisions and actions for communities

AEESP Converging COVID-19: environment, health, and equity
https://aeespconvergingcovid19.org/

Special thanks to...

UNIVERSITY OF CALIFORNIA MERCED

AEESP
Association of Environmental Engineering & Science Professors

UNIVERSITY OF SOUTH FLORIDA

Strong COASTS

NSF

CITRIS AND THE BANATAO INSTITUTE

Questions?

- Follow @COVIDPoops19 and @naughtoncc
- Colleen Naughton: cnaughton2@ucmerced.edu

https://arcg.is/1aummW

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UC DAVIS
UNIVERSITY OF CALIFORNIA MERCED

Students Converging COVID-19: Environment, Health, and Equity

AMERICAN ACADEMY OF ENVIRONMENTAL ENGINEERS & SCIENTISTS®

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Need a Certificate?
You will be emailed a PDH Certificate for attending this webinar within two weeks.

Want more?
Our next webinar will be on Wednesday August 25th. A sign-up page will display when this event is over.

Questions?
Email Marisa Waterman at mwaterman@aaees.org with any questions you may have.