Drought and Health: Engaging Public Health and Policymakers

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Health Impacts of Drought

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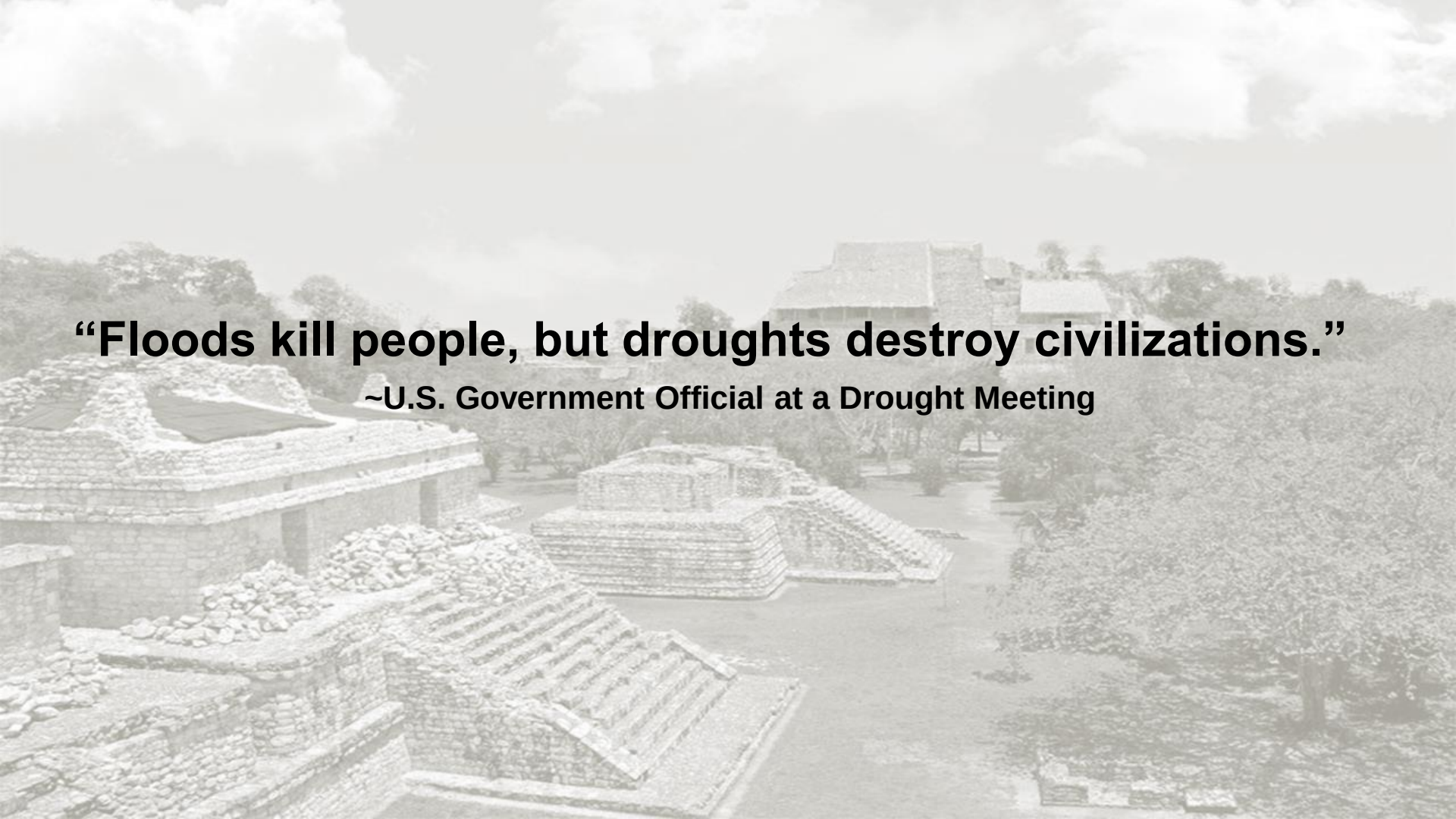
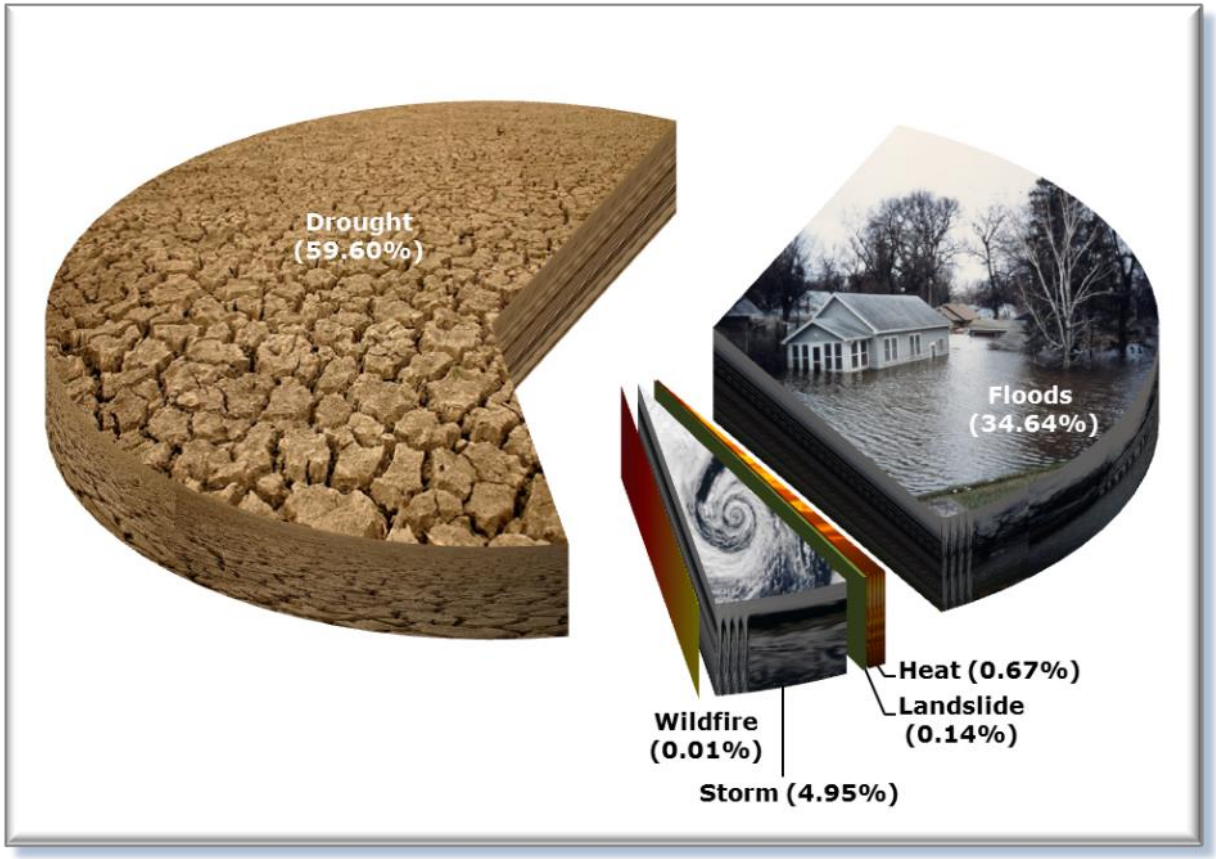


“Floods kill people, but droughts destroy civilizations.”

~U.S. Government Official at a Drought Meeting

Percentage of disaster-deaths worldwide according to each category of climate-related hazard, (1900-2013)

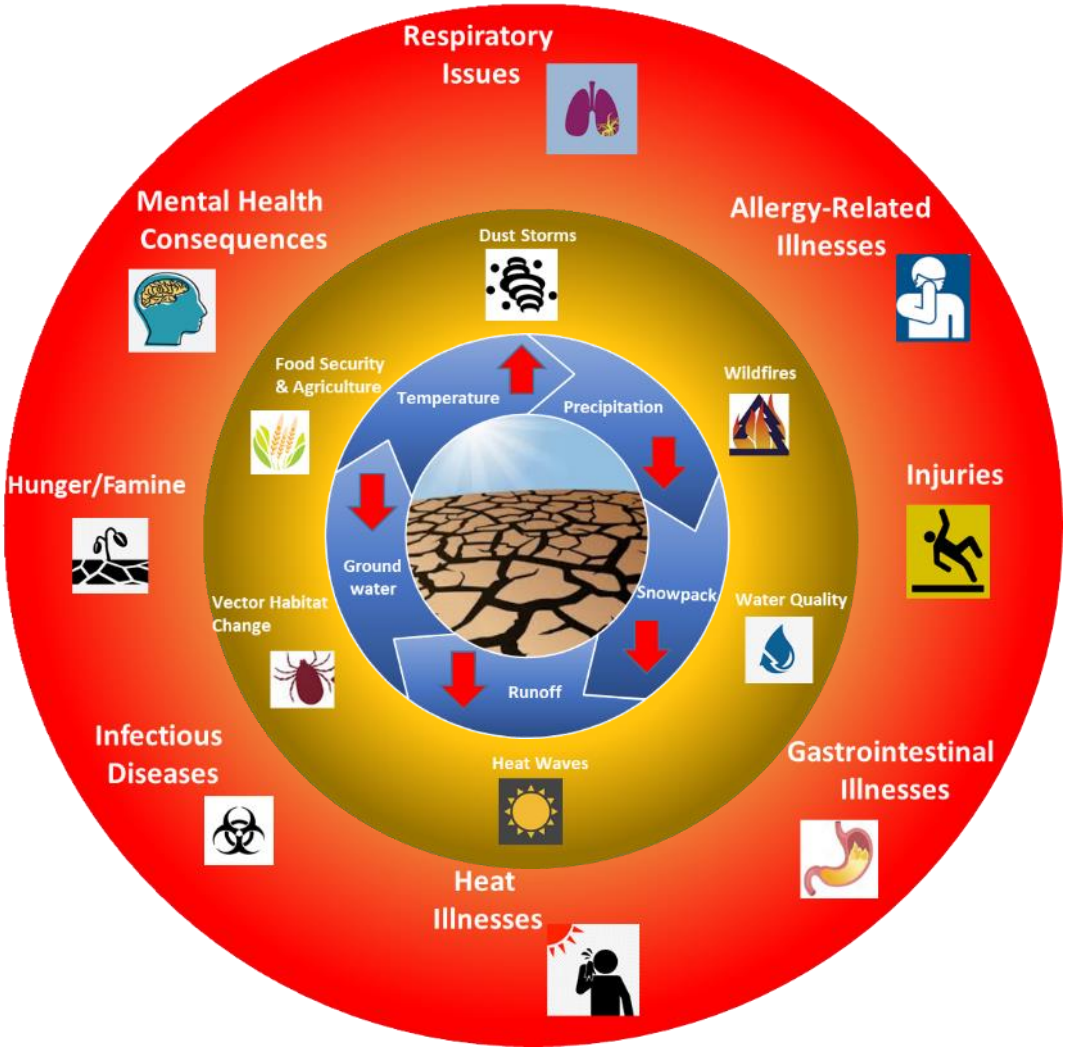


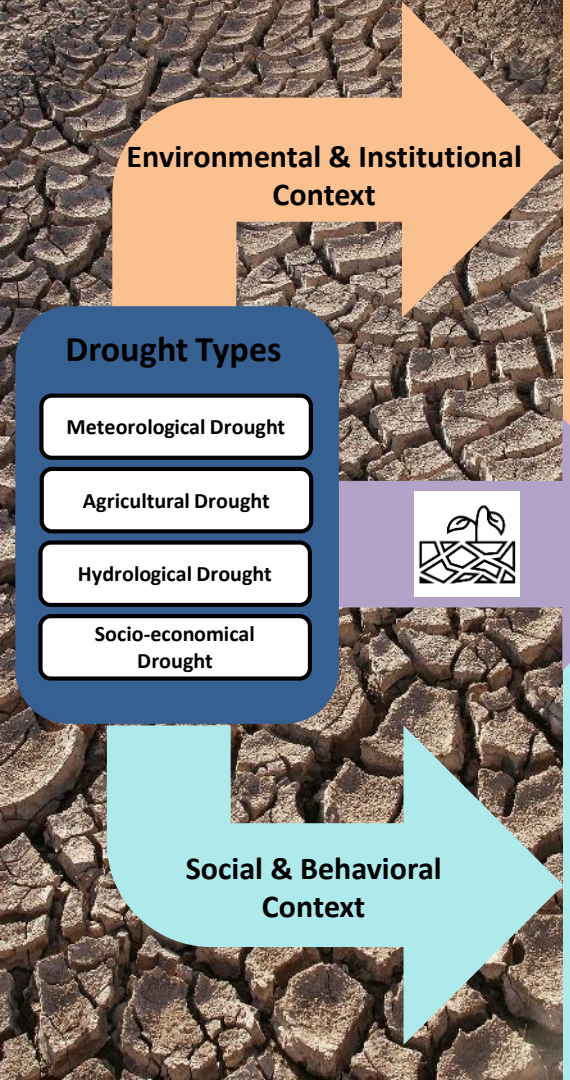
Source: Adapted from EM-DAT: The OFDA/CRED International Database, Belgium 2012
Keim, ME Extreme Weather Events: the role of public health

Health Surveillance Data

- ✓ Drought can be a slow evolving
- ✓ The impacts are not immediate
- ✓ Can require intermediate steps for health outcomes
- ✓ Surveillance is not designed to connect drought and health

Drought → ? → Health Outcome


Respiratory Issues
Mental Health Consequences
Allergy-Related Illnesses
Dust Storms
Food Security & Agriculture
Temperature
Precipitation
Wildfires
Hunger/Famine
Injuries
Ground water
Snowpack
Vector Habitat Change
Water Quality
Runoff
Infectious Diseases
Heat Waves
Gastrointestinal Illnesses
Heat Illnesses



Environmental & Institutional Context

Water Supply

Local Environmental Conditions

Preparedness of Health Departments

Agricultural Management Practices

Power, Transportation, Communication and Healthcare Infrastructure

Drought Types

- Meteorological Drought
- Agricultural Drought
- Hydrological Drought
- Socio-economical Drought

Exposure Pathways

- Increase in Dust and dust Storms
- More Frequent Wildfires
- Decrease in Water Quality and Quantity
- More Frequent and More Intense Heat Waves
- Change in Vector Habitat and Range
- Loss of Agriculture and Food Security

Health Outcomes

- Respiratory Issues
- Allergy-related Illnesses
- Injuries
- Infectious Disease
- Hunger/Famine
- Heat Illnesses
- Gastrointestinal Illnesses
- Mental Health Consequences

Social & Behavioral Context

Social Determinants of Health

Occupation

Rural/Urban

Race/Literacy/Age

Dependence on Caregivers and Medication

Engaging Key Stakeholders

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Engagement Strategies

Public Health Preparedness

Emergency Management

Healthcare Preparedness

Drought and Health Project Goals

- Share the current state of knowledge on drought and health
- Identify gaps and needs for evidence-based research, capacity building, and communication
- Engage and develop a drought and health community of practice
- Jointly develop a collaborative, multi-partner NIDIS Drought & Public Health Strategy that builds upon project outcomes.

Drought and Health Project Approach

- National Drought and Health Summit
- Regional Drought and Health Workshops
- Individual Interviews and Surveys

National Summit

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NATIONAL DROUGHT & PUBLIC HEALTH SUMMIT

June 17-19, 2019 | Atlanta, GA

Thank you to our Summit Planning Partners:

Centers for Disease Control and Prevention (CDC)
National Integrated Heat Health Information System (NIHHIS)
Environmental Protection Agency (EPA)
Natural Resources Defense Council (NRDC)
UNL National Drought Mitigation Center (NDMC)

NOAA
NIDIS
Water for Food
DAUGHERTY GLOBAL INSTITUTE
at the University of Nebraska
UNMC
COLLEGE OF PUBLIC HEALTH

Summit

- Over 50 attendees
- 3 days of presentations and discussions

Topics Discussed

- Environmental Exposure
- Water Quality/Quantity
- Heat
- Air Quality
- Disease
  - Valley Fever and West Nile
- Vulnerable Populations
- State, Local, and Tribal Health Departments
- Non-Government Organizations
- International
- Next Steps

Outcomes

- Building Collaboration
- Communication and Education
- Data and Indicators
- Coordination and Implementation
- International Synergies
- Research
- Resources and Support

Regional Workshops

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Regional Workshops

- November 20-21, 2019 – St. Paul, Minnesota
- February 26-27, 2020 – Tucson, Arizona
- September 23-24, 2020 – Virtual Carolinas workshop

Regional Workshop Development

- Identify local partner
- Local partner helps identify advisory committee members
    - Mix of state gov’t, local gov’t, academics, tribal, etc.
- Regular calls with advisory committee
- Local partner and advisory committee approve agenda
    - **Focus on diversity and practitioners**

Regional Workshop Format

- Introduction to Drought and Health
- Drought 101 – State Climatologist
- Blend of panel and plenary presentations
- Conclude with a facilitated discussion: “After this workshop, someone should _____.”

Interviews & Strategy Document

Interviews

- Individual interviews currently being conducted with state health departments
- Common concerns across states
    - Private wells
    - Urban heat centers

NIDIS Drought and Health Strategy Document

- To be released in 2022
- Based on summit, workshop, survey, and interview findings
- Will help inform future health-related activities with NIDIS and potential future funding opportunities
- Will support federal and state entities in policy actions needed for public health, healthcare, and emergency preparedness for addressing drought events

Policy Recommendations

- Increased use of public health emergency declarations
- Inclusion of drought in public health risk assessments
- Development of a cross-sector drought community of practice

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BREAKTHROUGHS FOR LIFE.®

Questions?
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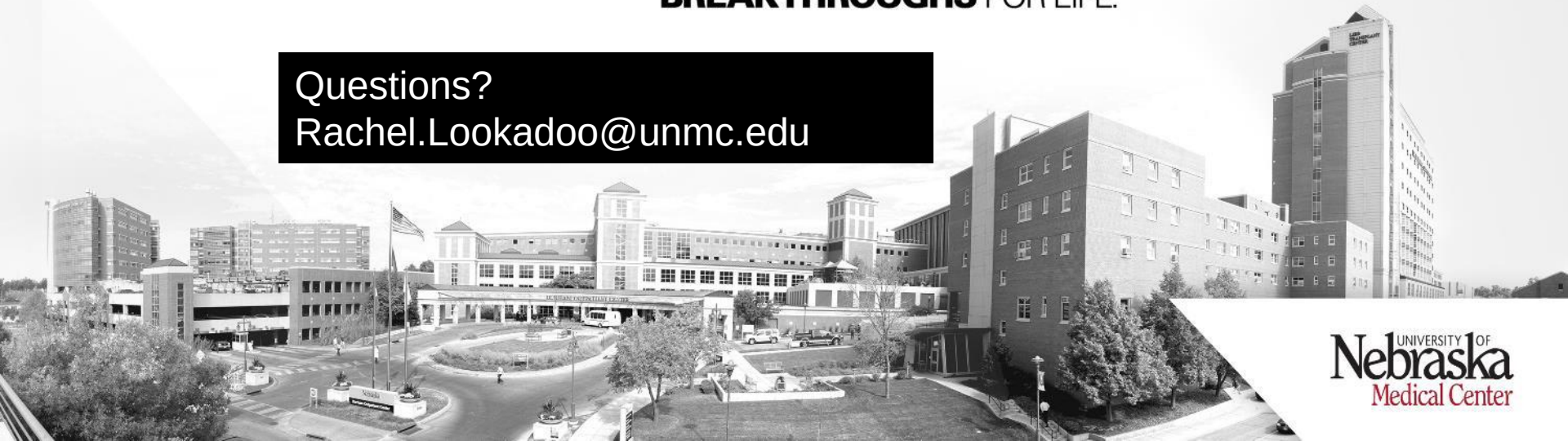


University of Nebraska Medical Center

The Network for Public Health Law
10 YEARS STRONG

Climate Change and Precipitation Extremes

Legal and Policy Responses to Protect Public Health

Betsy Lawton

Senior Staff Attorney, Network for Public Health Law

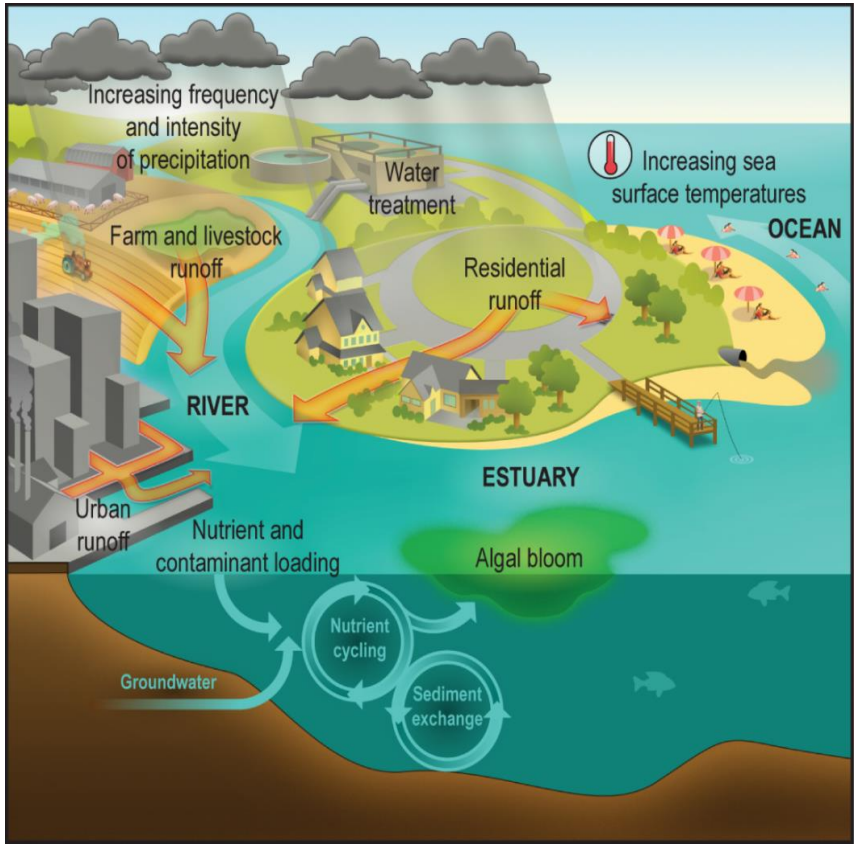
blawton@networkforphl.org

Extreme Precipitation and Climate Change

More frequent and severe extreme precipitation events

- **Waterborne illness**
- **Water pollution**
- **Well contamination**

Higher temps = more toxic algae blooms

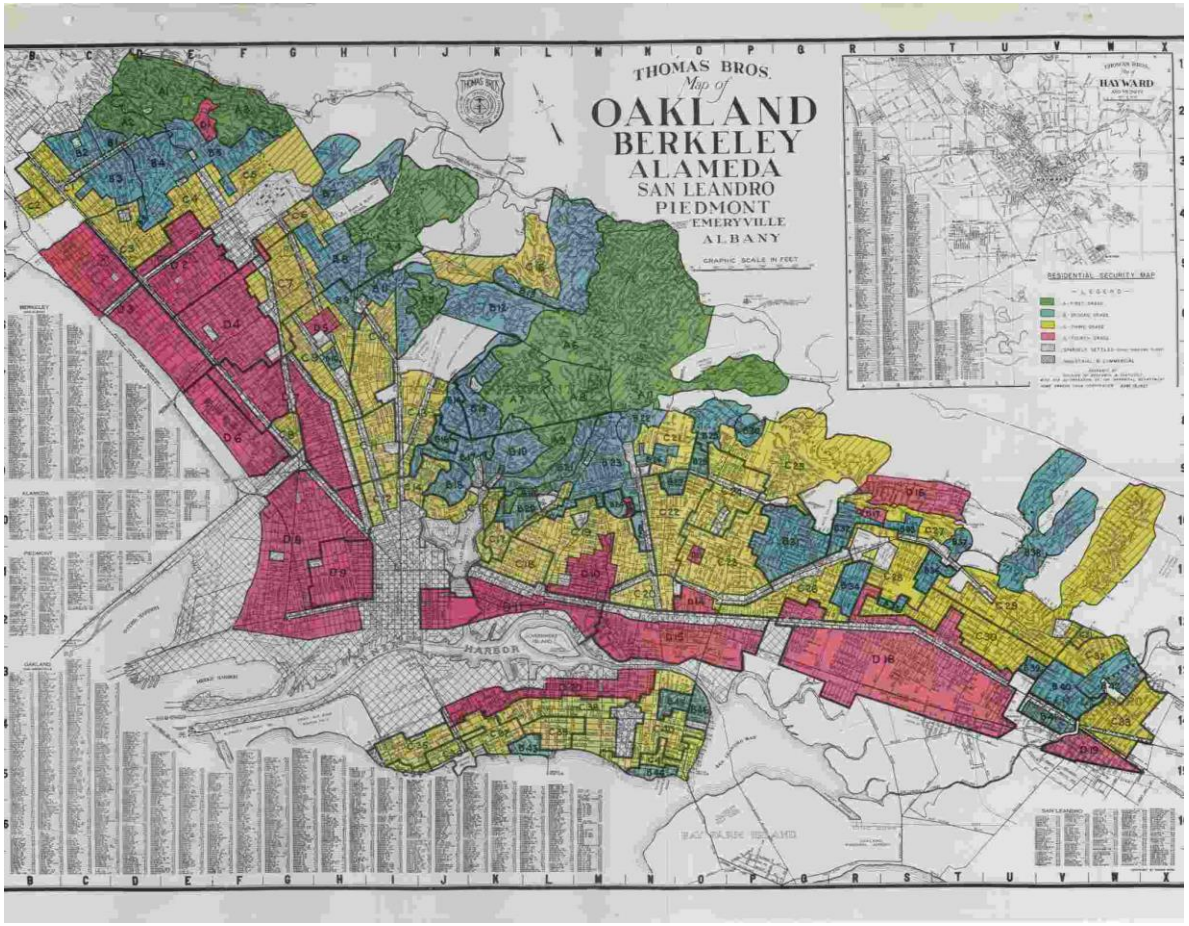


Program Climate and Health Assessment
https://health2016.globalchange.gov/water-related-illness

Extreme Precipitation: Health Impacts

- **Water contamination**
  - » pathogens
  - » chemicals
  - » agricultural chemicals and animal waste.
- **Mold**
- **Vector borne diseases**
- **Physical harm and Drowning**
- **Food instability**
- **Lack of access to medical supports**
- **Power Outages**
- **Displacement**
- **Income and educational opportunities disrupted**
- **Mental health**
- **Housing instability**

Inequitable Impacts

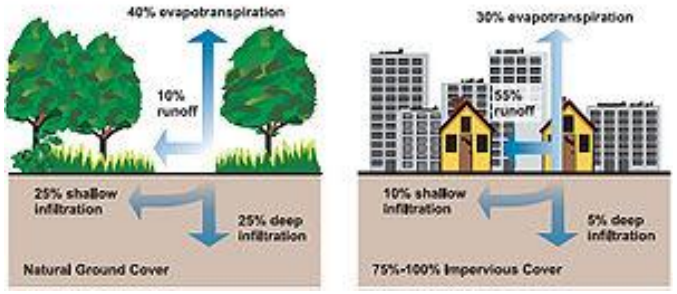


Redlining
- Impervious surface
- Disinvestment

Resources for recovery
- Based on property value
- Climate gentrification

Law and Policy Solutions

- Community solutions/ Resilience Hubs
- Green Infrastructure
- Pollution Reduction
- Land Use Regulations
- Building Codes



Community Derived Solutions

The Network for Public Health Law
10 YEARS STRONG

Community Derived Solutions

Tribal Adaptation Menu

- framework for integrating indigenous knowledge, culture and history into climate adaptation planning.
- promote natural solutions and restore natural ecology (wetlands, etc)
- pollution reduction
- Expand floodplain in anticipation of more extreme flood

Resilience and Preparedness Funds

- Using Social Vulnerability Index or Community decision making model rather than cost/benefit analysis.

Declaration of Racism as a Public Health Crisis

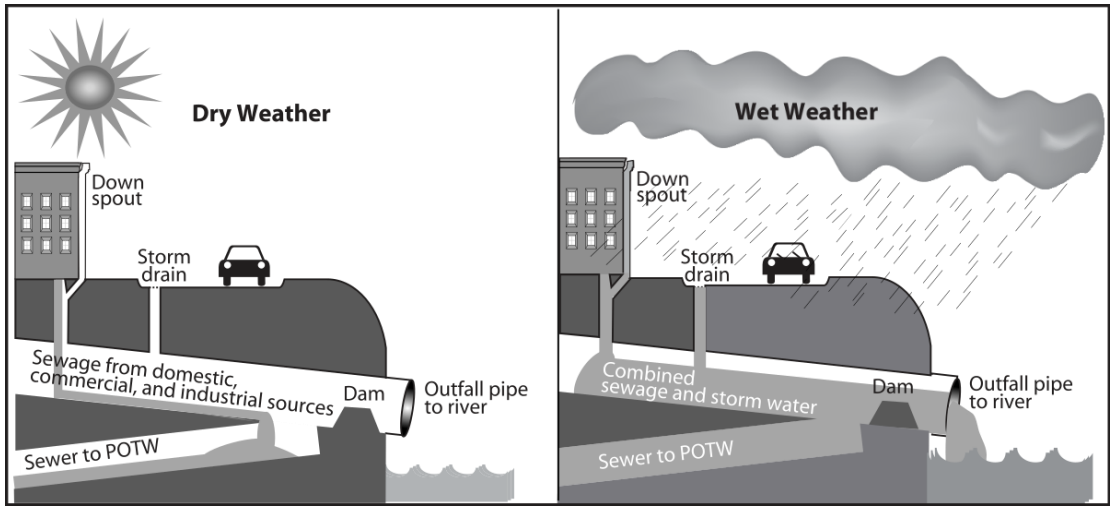
- Recognize health impacts of environmental racism
- Multnomah County commits to implement the Climate Justice Initiative, which seeks to co-create solutions for mitigating and adapting to the climate crisis with frontline BIPOC organizations and individuals

Green Infrastructure

- Rain water harvesting requirements for commercial buildings
- Impervious surface restrictions/permeable pavement requirements
- Tree planting programs
- Rain gardens
- Infiltration requirements included in county stormwater plans (Washtenaw County Water Resources Commissioner)
- Green Schoolyards

areas. Indeed, the city of Olympia, Washington found that

Mitigate Flooding and Reduce Pollution



Milwaukee ordinance requires new development and redevelopment over one acre to utilize enough "green infrastructure" practices to reduce the amount of rainfall that will directly enter into the city's combined sewer system.

Inclusion of green infrastructure requirements in NPDES permit, capable of storing 50 million gallons of storm water. Help prevent pollution from entering rivers and lakes due to combined sewer overflow.

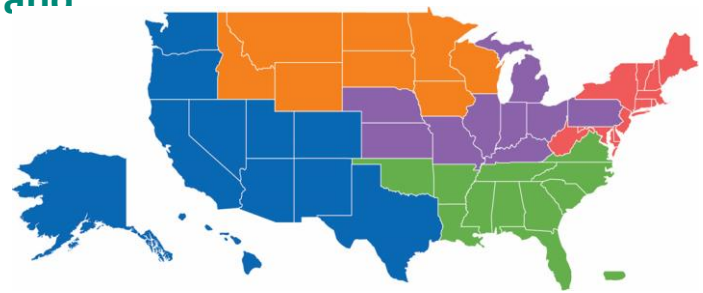
Protect Drinking Water

- Zoning/Overlay districts
- Fertilizer use restrictions
- Cover crop requirements
- Limits on number of animals at concentrated animal feeding operations

The Network for Public Health Law

Contact the Network to:

- **Get practical legal assistance on a variety of public health topics**
- **Find helpful resources from webinars and trainings to fact sheets and legal briefs**
- **Connect with a community of experts and users of public health law**



Thank you!

Please remember to fill out the conference survey location in the description of this session

Disasters, Public Health Emergencies, and the Safe Drinking Water Act

2021 Public Health Law Conference

David Harvey, PE, MPH

Fellow, Bloomberg American Public Health Initiative

Johns Hopkins School of Public Health

Graphic Source: Public Domain https://www.usgs.gov/media/images/glass-drinking-water-municipal-water-use

Road Ahead

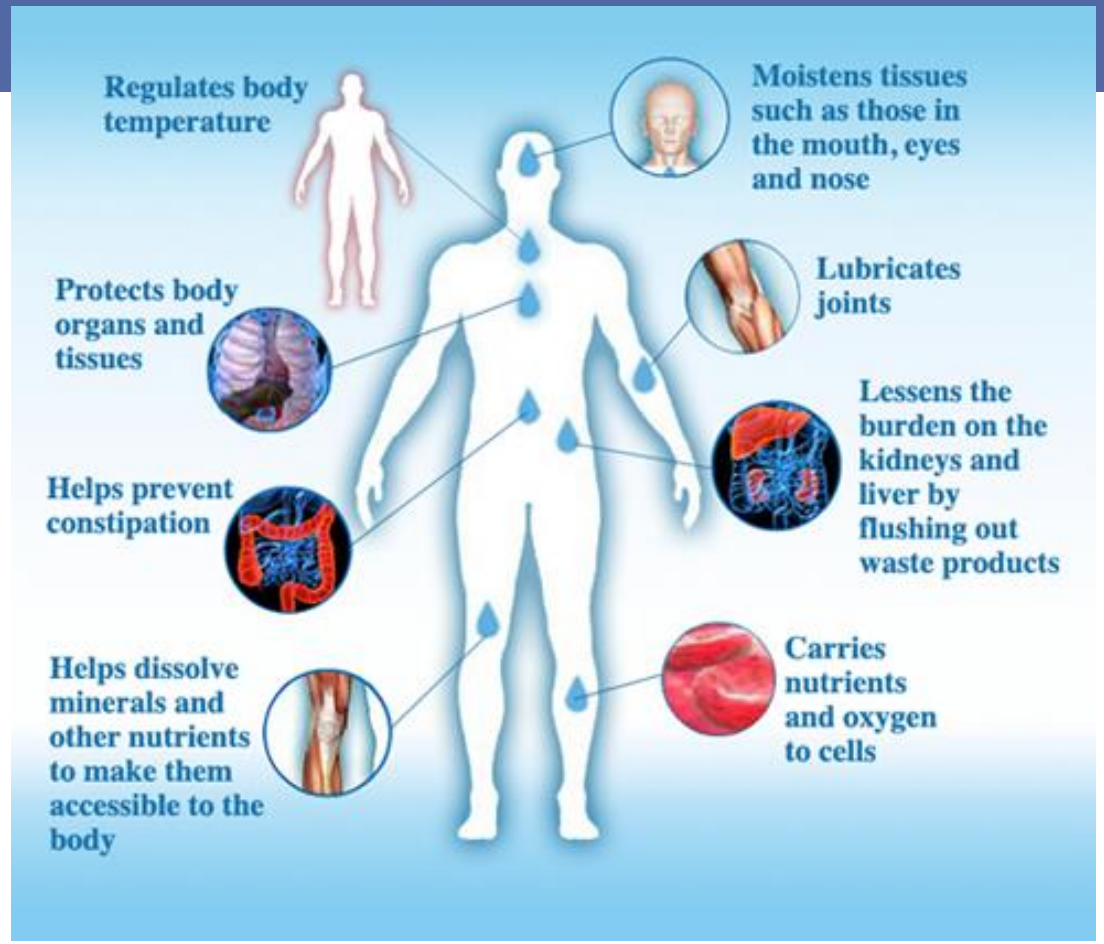
- Drinking Water & Health
- Disasters & Drinking Water Impacts
- Relevant Laws
  - Public Health Service Act (42 USC 247d)
  - Safe Drinking Water Act & Public Notification Rule
- Drinking Water Disaster Response Plan vs. Reality
- Recommendations to Improve Confidence in Drinking Water Safety

Disclaimer

The views and opinions here represent those of the speaker and should not be considered to represent advice or guidance of Johns Hopkins University or the US Public Health Service Commissioned Corps

Drinking Water & Health

Why Water?



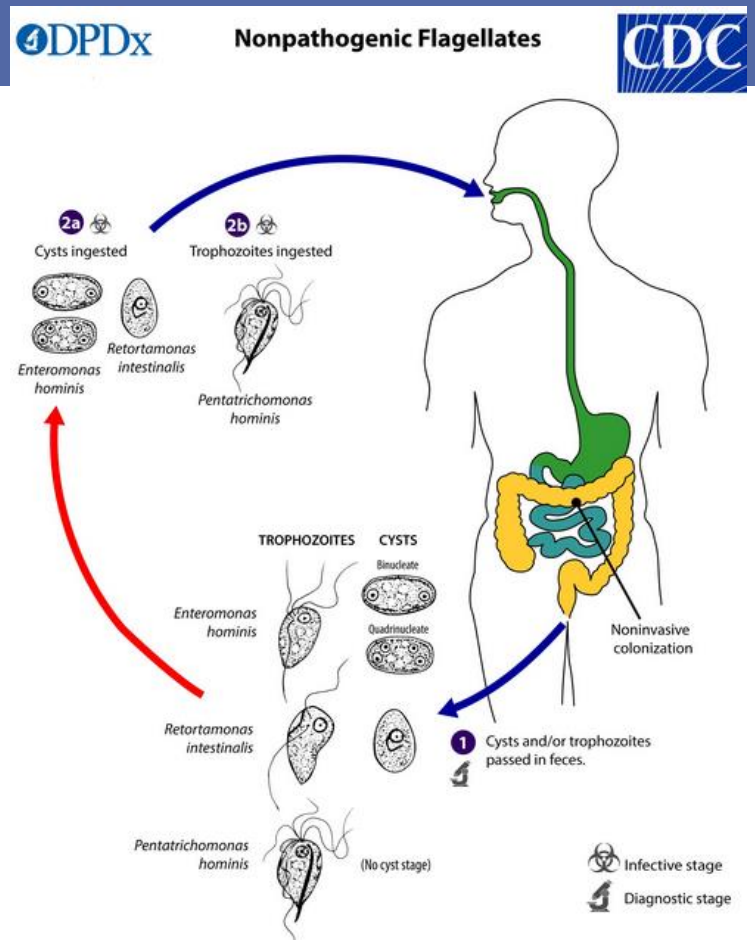
Why Quantity Matters?

- Low Blood Pressure
- Kidney Problems
- Mental Changes
- Skin Infection
- Respiratory Infections

Graphic Source: Drinking Water Research Foundation accessed September12 2021 https://thefactsaboutwater.org/importance-water-body/

Drinking Water & Health

Why Water?



Why Quality Matters?

- Gastrointestinal sickness (Waterborne Disease)
  - Giardia lamblia
  - Cryptospridium parvum
  - Fecal coliform
- Vector of Exposure
  - Benzene
  - Dichorlomethene
  - Styrene

Graphic Source: CDC Division of Parasitic Diseases accessed here https://www.cdc.gov/dpdx/nonpathogenic_flagellates/index.html

Drinking Water & Disasters

Extreme Precipitation Events + Drinking Water Impact = Waterborne Disease

- Health Surveillance Measure: GI Illness
- 16 Peer Reviewed Studies in USA from 1978 to 2016
- Measured associations between storm/rainfall events and clinical diagnosis of disease.

Reference: Exume et al., (2018) Extreme Precipitation, Public Health Emergencies, and Safe Drinking Water in the USA. Current Envi. Health Reports 5(2):316. doi: 10.1007/s40572-018-0202-3.

Drinking Water & Disasters

Wildfire Events + Drinking Water Impact = Health Impacts?

Contaminant	2017 Tubbs Fire 21 Months post-fire max ppb (Sample Size)	2018 Camp Fire 8 Month post-fire Max ppb (Sample size)		US SDWA MCL (ppb)
	City of Santa Rosa	Paradise Irrig. District (PID)	CA State Water Resource Contr Board in PID	
Benzene	40,000 (8,347)	923 (1,699)	>2,217 (1)	5
Dichloromethane	41 (6,254)	28 (Not Recorded)	Not Measured	5
Styrene	460 (6,227)	6,800 (Not Recorded)	378 (1)	100

Reference: Proctor et al., (2020) Wildfire causes widespread drinking water distribution network contamination. AWWA Water Sci. 2(4):e1183

Disasters & Drinking Water Impacts

U.S. NEWS

Puerto Ricans at Risk of Waterborne Disease Outbreaks in Wake of Hurricane Maria

ENVIRONMENT SEPTEMBER 10, 2021

Hurricane Ida Left a Huge Water Crisis in Its Wake

Hundreds of thousands of people still lack safe dr

ENVIRONMENT

...s without running ...wer. This is life one

WINTER STORM 2021

Over a million Texans are still without drinking water. Smaller communities and apartments are facing the biggest challenges.

complexes also

Unsafe to drink: Wildfires threaten rural towns with tainted water

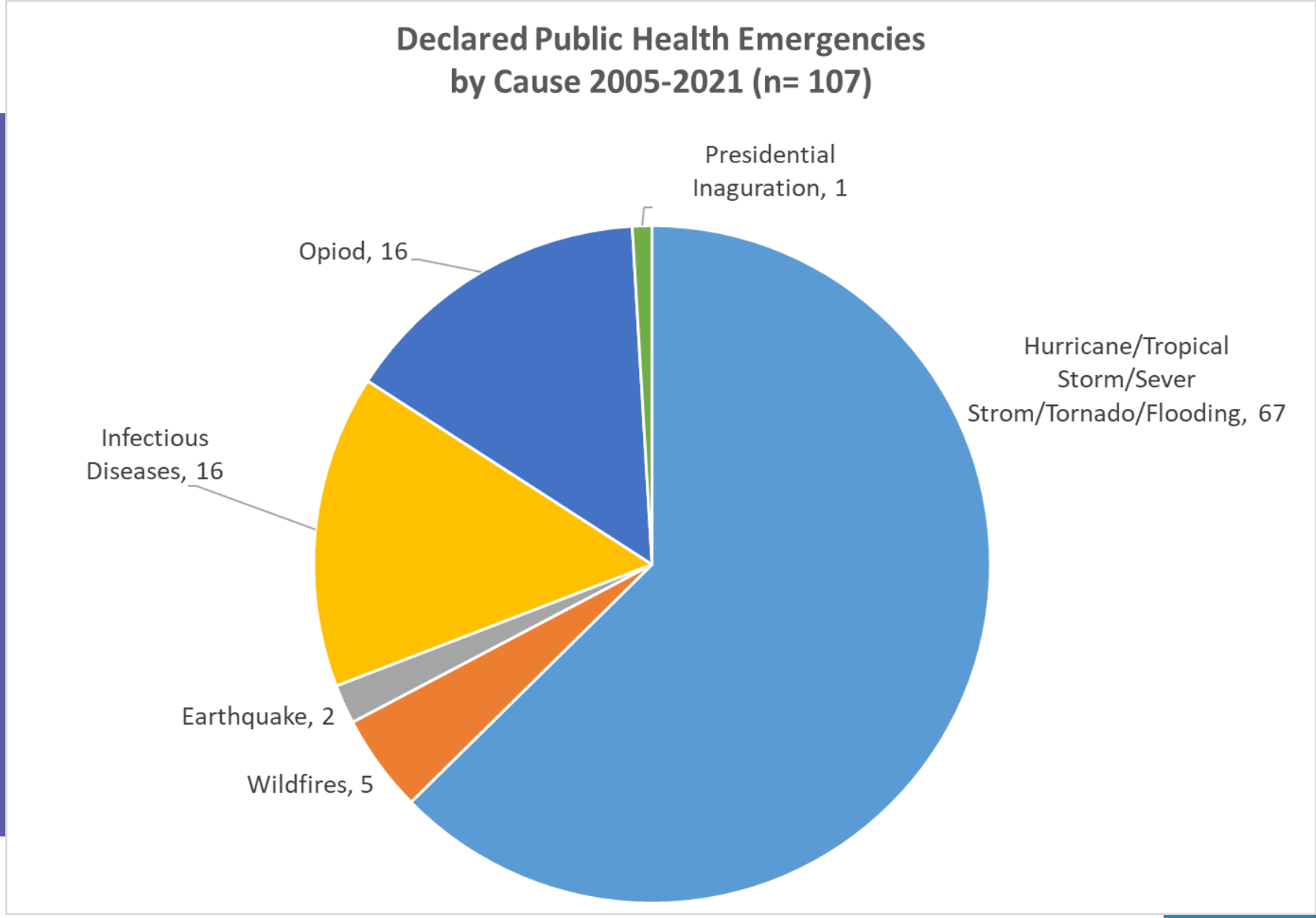
BY RACHEL BECKER , OCTOBER 5, 2020 UPDATED OCTOBER 7, 2020

...nds Still Waiting on Clean Water

December 04, 2017 09:50 PM

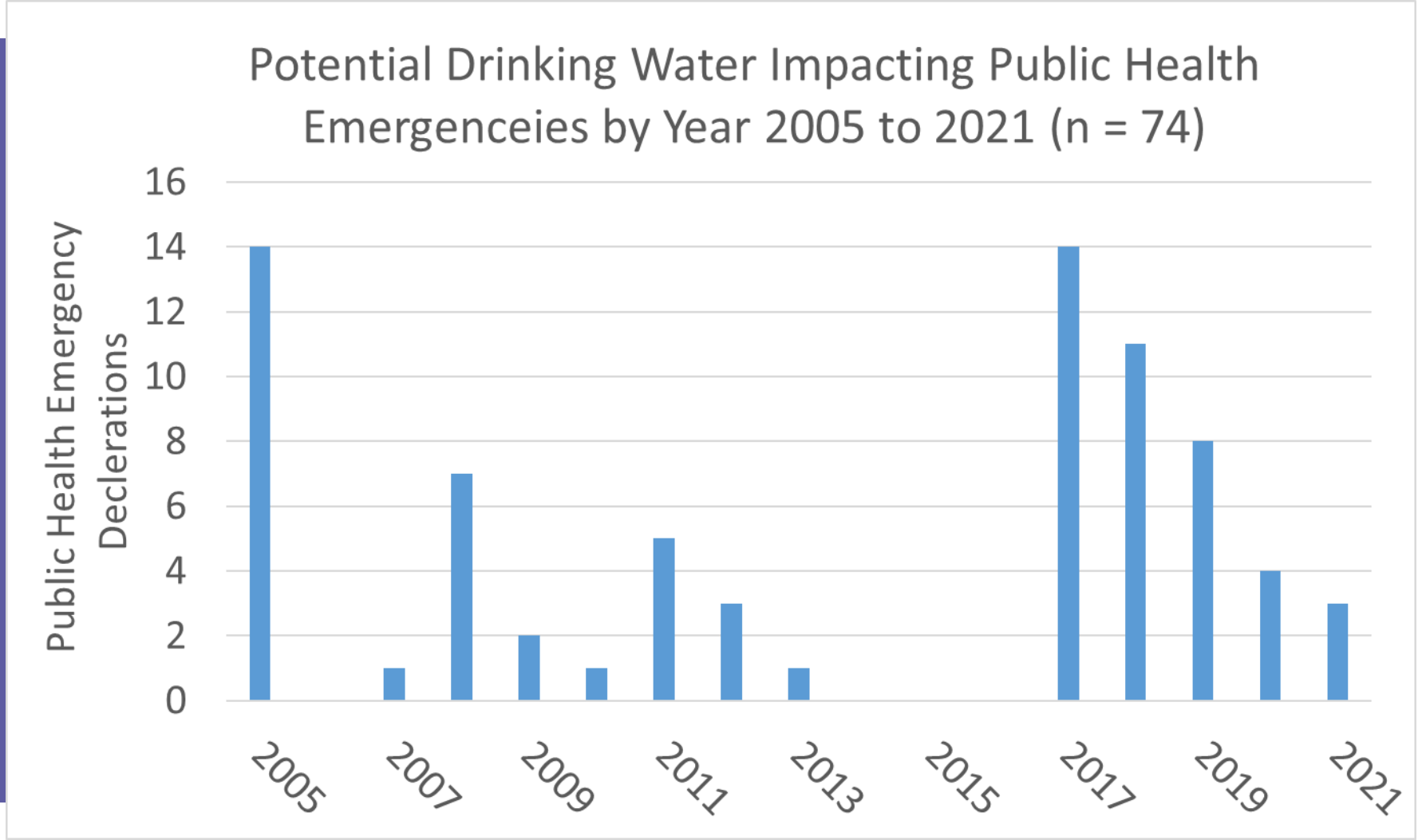
Drinking Water & Health

Nearly 70% of the Public Health Emergencies declared over last 12 years impacted or had potential to public drinking water systems.



Drinking Water & Health

Public Health Emergencies Cyclical and increasing in frequency.



Relevant Laws & Rules

Public Health Service (PHS) Act 42 USC 247d

- Foundation of HHS' legal authority for responding to public health emergencies; it authorizes the HHS Secretary to lead all Federal public health and medical response to public health emergencies.
  - to lead all **Federal public health** and medical response to public health emergencies and incidents covered by the National Response Framework;
  - to direct the **U.S. Public Health Service** and other components of the Department to respond to a public health emergency;
  - to declare a **public health emergency** (PHE) and take such actions as may be appropriate to respond to the PHE consistent with existing authorities;

Reference: HHS Legal Authorities Related to Disasters and Emergencies accessed here https://www.phe.gov/Preparedness/planning/authority/Pages/default.aspx

Relevant Laws & Rules

Safe Drinking Water Act (SDWA) 42 U.S.C. §300f et seq. (1974)

- Protect public health by **regulating nation's** public water systems (PWS)
- **Establishes contaminate level** and treatment techniques to guide response actions of public water systems to maintain quality drinking water supply.
- **Right-to-know** about drinking water quality cornerstone of law since 1974
- 1986 Amendments added to require PWS provide **quicker notification** of serious violations
- GAO Findings 1992 SDWA public notification laws "**do not ensure the public is effectively informed**"
- 1996 SDWA amended to strengthen public notification requirements following **largest US waterborne disease outbreak** in Milwaukee (1993)

Relevant Laws & Rules

Safe Drinking Water Act (SDWA) 42 U.S.C. §300f et seq. (1974)

- 1996 SDWA Amendments included public notification by PWS to customers within **24 hour** of any violation with potential to cause serious adverse health effect.
- Expanded public notice situations to include "**waterborne disease outbreaks**" or "**other waterborne emergencies**"
- SDWA is **administered by primarily States** through primacy agreement (WY and Tribal Entities Administered by EPA "Direct Implementation Program")
- 1996 Amendments **did not specific** which entity was responsible for determining the occurrence of an outbreak or emergency.

Relevant Laws & Rules

Public Notification (PN) Rule

Following 1996 SDWA Amendments EPA issued regulation on the PN Rule requiring a 10 step process public water system (PWS) must follow:	
1) Description of violation or situation, containment and contaminate levels.	6) Actions consumers should taking (including when to seek medial treatment)
2) When the violation/situation started	7) What PWS is doing to address the problem.
3) Description of adverse health effects	8) When the problem is expected to be resolved
4) Population at risk (including vulnerable subpopulations).	9) Contact information of the PWS to acquire more information.
5) Whether alternative water supplies should be used.	10) Statement encouraging distribution of the notice to other people.

Drinking Water Disaster Response Plan vs. Reality

Federal Emergency Response Function #8 ("The Plan")[1]	Drinking Water Quality Response ("The Reality")
Detect and characterize **health** incidents to reduce/mitigate effects of acute and long term threats to help of the community.	Water assumed to be primarily handed through ESF #3 Public Works and Engineering. Water quality issues **don't ask don't tell** norm of Drinking Water Primacy Agencies (State and Territories).
Supplemental assistance to local, state, tribal, and territorial, on guidelines for potable water, wastewater and solid waste disposal focused on **public health**.	Public education materials sometimes provided on boil water and water disinfection best **practices outreach disconnected** from other local primacy agency messages.
Assists in assessing potable water, wastewater, and solid waste as well as examining and responding to **public health** effects from contaminated water.	All water related issues viewed an binary (Red/Green) under ESF #3 Public Works and Engineering **water quality ("yellow") not in the room.**

[1]Emergency Support Function #8 Public Health and Medial Services Annex (June 2016)

Drinking Water Disaster Response Plan vs. Reality

- <u>Theory:</u> EPA and HHS coordinate at request of State and Territory to ensure access to safe public water systems adhering to an "**all hazards approach**" following disaster with collaboration between ESF #3 and ESF #8.
- <u>Practice</u>: States and Territories typically only request federal assistance under ESF #3 with a **focus on keeping a supply** of water available following disaster (e.g. bottled water and emergency generators).
- <u>Results</u>: With no specific requests from States and Territories to support the water quality aspects **no federal assistance provided**.

20,000 pallets of bottled water left untouched in storm-ravaged Puerto Rico

Image Source https://www.cnn.com/2018/09/12/us/puerto-rico-bottled-water-dump-weir/index.html and https://www.standardsalescompanylp.com/community/

Case Study: Puerto Rico Drinking Water Hurricane Maria

Timeline

- Sept 10, 2017: Hurricane Maria (Cat 4) Landfall Puerto Rico 155 MPH Winds/40" rain
- Sept 27, 2017: PR Dept. of Health (PRDOH) country wide Boil Water/Chlorine Addition
  - 467 Public Water System
  - 3.7 million people
- Oct 2. 2017: EPA "*If you don't have safe bottled water, you should boil it to make it safe*." DHS "*Boil water notice is in effect island wide.*" CDC distributes public education material with boil water and chlorinated water instructions

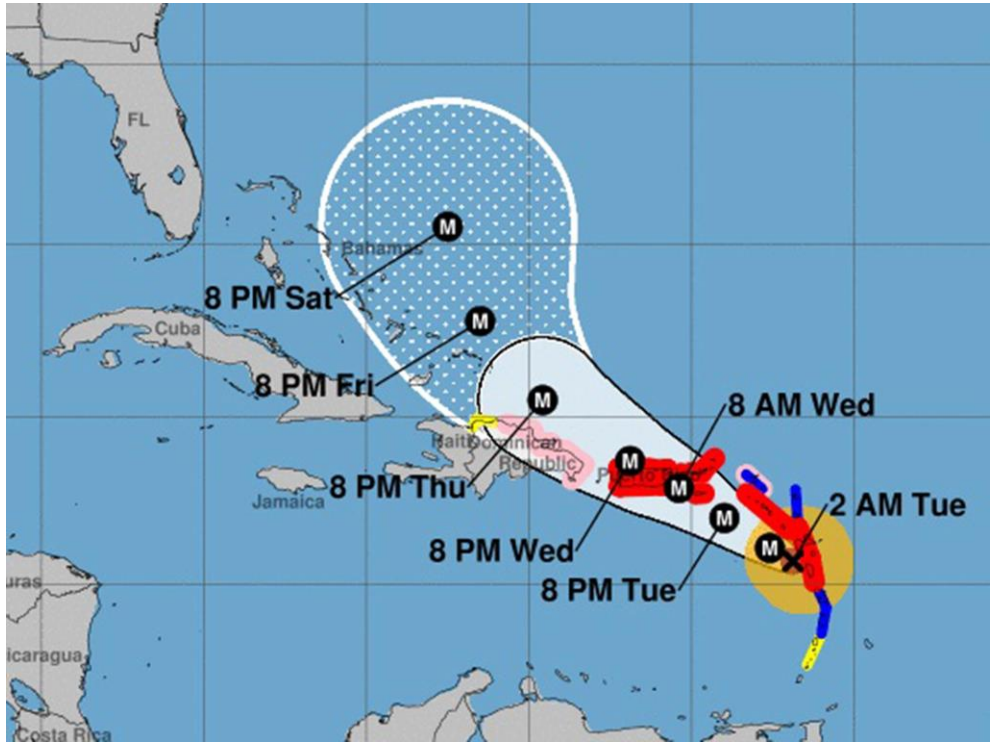


Image Source
https://www.nhc.noaa.gov/archive/2017/MARIA_graphics.php

Case Study: Puerto Rico Drinking Water Hurricane Maria

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Case Study: Puerto Rico Drinking Water Hurricane Maria

Timeline

- Oct 11, 2017: The President Puerto Rico Aqueduct and Sewer Authority (PRASA) "…*water that is arriving in homes complies with all of the federal and state requirements of the Safe Drinking Water Act that it administered by the Department of Health and EPA*"
- Oct 12, 2017: PR Department of Health standard drinking water quality control tests "*have been postponed until normality in terms of water supply has been achieved*."
- End Nov 2017: FEMA website "Signs of Recover" 96% had potable water.

National Resources Defense Council calls FEMA "Signs of Recovery" misleading. Population had service but no water quality testing.

Image Source: Retrieved here https://www.pbs.org/newshour/health/water-quality-in-puerto-rico-remains-unclear-months-after-hurricane-maria

Case Study: Puerto Rico Drinking Water Hurricane Maria

Timeline

- Conflicting public water quality messages from:
  - PR Department of Health
  - PRASA
  - FEMA
  - CDC
  - EPA (?)

Case Study: Puerto Rico Drinking Water Hurricane Maria

Outcome

Two month after hurricane landfall still:

- Confusion if public water was safe to drink (non-specific public notice and mixed public messages.)
- Continued to demand for bottled water supply.
- Delay in community recovery.

Recommendations to Improve Confidence in Drinking Water Safety

Public Health Emergency with Drinking Water Quality (PHE-DWQ) Impacts

Recommendation #1

Need

Clear delineation who as responsible for requiring notification under PN Rule “water borne disease outbreak” and “water borne emergency”.

Proposal

SDWA should explicitly obligate PWS to follow PN Rule when a Public Health Emergency with Drinking Water Quality (PHE-DWQ) is issued by the Secretary of HHS. PHE-DWQ determination should reside with HHS and should be based on potential health impacts associated with water contamination resulting from the disaster. HHS should coordinate this determination with EPA.

Recommendations to Improve Confidence in Drinking Water Safety

Public Health Emergency with Drinking Water Quality (PHE-DWQ) Impacts Recommendation #2

Need

PWS water quality sampling requirements following a PHE-DWQ should be based on potential hazards identified in the PWS's source water assessment plans prior to the disaster in addition to specific observations during and following the disaster.

Proposal

Obligate PWS to utilize source water assessment plans created under SDWA to identify possible contaminates for sampling even if a wavier had been issued prior to the disaster.

When establishing the PHE-DWQ, HHS should recommend to State or Territory the support of US Public Health Service Commissioned Corps to determine additional environmental health threats from drinking water contamination and other environmental health threats.

Recommendations to Improve Confidence in Drinking Water Safety

Public Health Emergency with Drinking Water Quality (DWQ) Impacts

Recommendation #3

Need

A systematic method of tracking PN Rule notifications from issuance to resolution and required reporting to EPA following declaration of a PHE- DWQ impacts.

Proposal

EPA Water Security Division should establish an IT reporting platform to facilitate flow of drinking water system and water quality data from PWS, to primacy agencies, to EPA, and to other federal agencies following the declaration of PHE-DWQ impacts.

Contact

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