Environmental Measurement Symposium

"Technology Innovation, Citizen Science : What's Next ?"

32nd Annual Conference

Orange County, California **August 8-12, 2016**

32nd Environmental Measurement Symposium

Forum on Environmental Accreditation

National Environmental Monitoring Conference

NELAC

US EPA

Hyatt Regency **Anaheim, CA**

Technology Innovation, Citizen Science : What's Next ?

PROMOTING PUBLIC HEALTH THROUGH

CITIZEN RESEARCH

Leon F. Vinci, DHA, DAAS, RS
CEO-President
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32nd Annual Conference

Orange County, California **August 9, 2016**

MIT Technology Review *JAN '89*

Quoting from R. Kerson in a Wilson Center report :

"The new form of engagement in science received the name "citizen science".

Described how 225 volunteers across the US conducted citizen research in assisting the Audubon Society in an acid-rain awareness raising campaign. The volunteers collected rain samples, checked for acidity, and reported back to the organization. The information was then used to demonstrate the full extent of the phenomenon.

DEFINITION

- **Citizen Science/Research** is defined as :

  "scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions"

- The term *citizen science* entered the Oxford English Dictionary (*OED*) June 2014

Promoting Public Health Through Citizen Research

Today's Discussion :

Climate Change

Infectious Disease

Promoting Public Health Through Citizen Research

Other Health Areas of Impact Include :

Safe Drinking Water	(Flint, MI)
Nutrition	(Schools, Sugary Foods)
Clean Indoor Air	(Secondhand Smoke)
Energy	(Pipelines, Hydro-fracturing)

CITIZEN SCIENCE

&

CLIMATE CHANGE

Citizens See Fire

Citizens See Smoke

Citizens See Rain

1,000 Year Flood Events

Eight since 2010 (NOAA) :

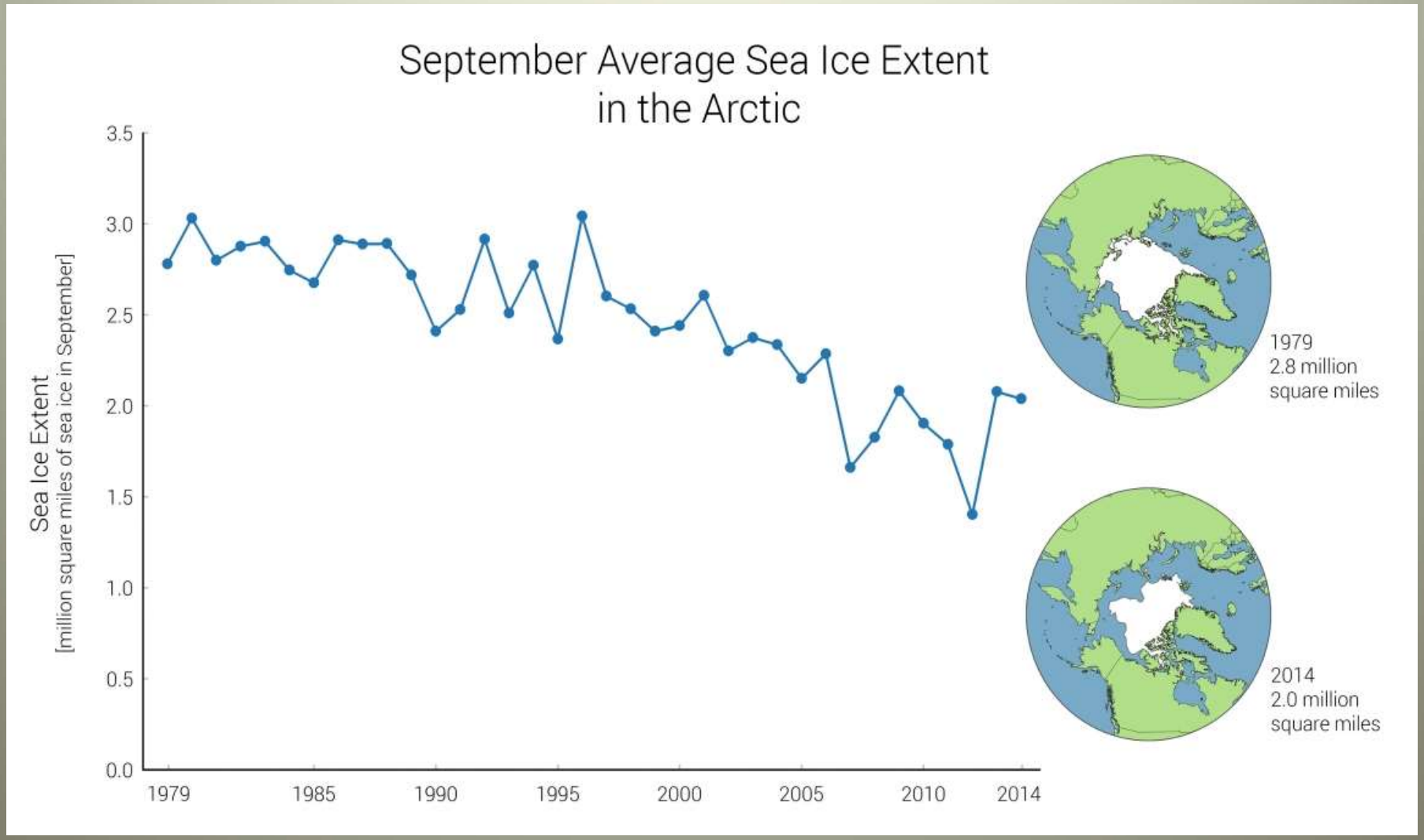
- 2010, May -- Tennessee Flooding
- 2011, Aug. -- Hurricane Irene
- 2013, Sept. -- Colorado Springs Flooding
- 2014, Aug. -- Baltimore Deluge
- 2015, Mar. -- Nebraska
- 2015, Oct. -- South Carolina Flooding
- 2016, May/July W Virginia, Maryland

September 2014 (AZ - 2)

September 2015 (UT-21)

May 2015 (TX – 21)
June 2016 (WVa – 23)

Ice Reduction

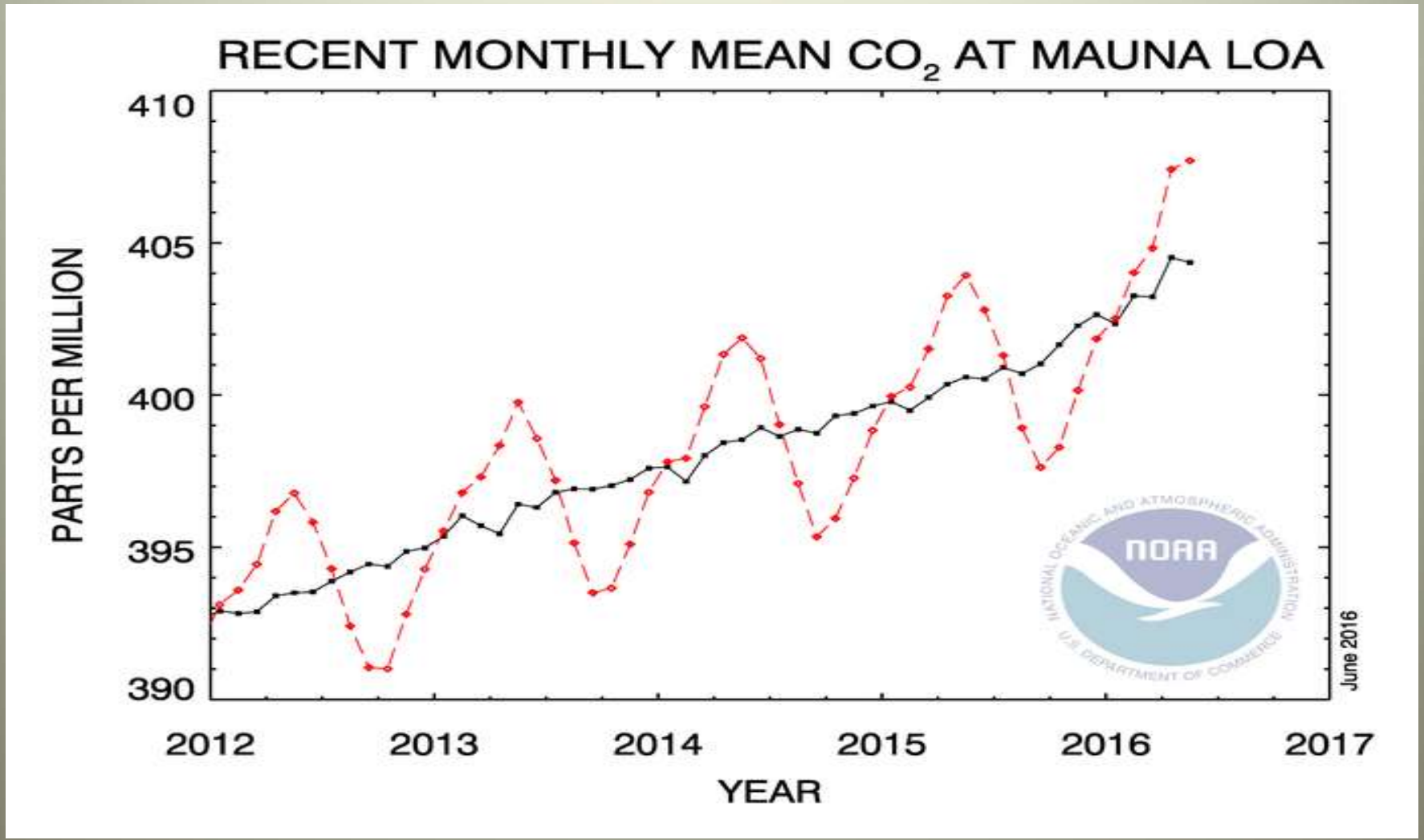


Jeff Masters, the web's most widely read meteorologist, explains (Mother Jones)

"The US and Canada are virtually snow-free …which is extremely rare for a January day, 2012. The lack of snow in the mountains of the Western US is particularly unusual. I doubt one could find a January day this cloud-free with so little snow …. throughout the entire satellite record, going back to the early 1960s."

Increased Temperature

Changes Are Needed



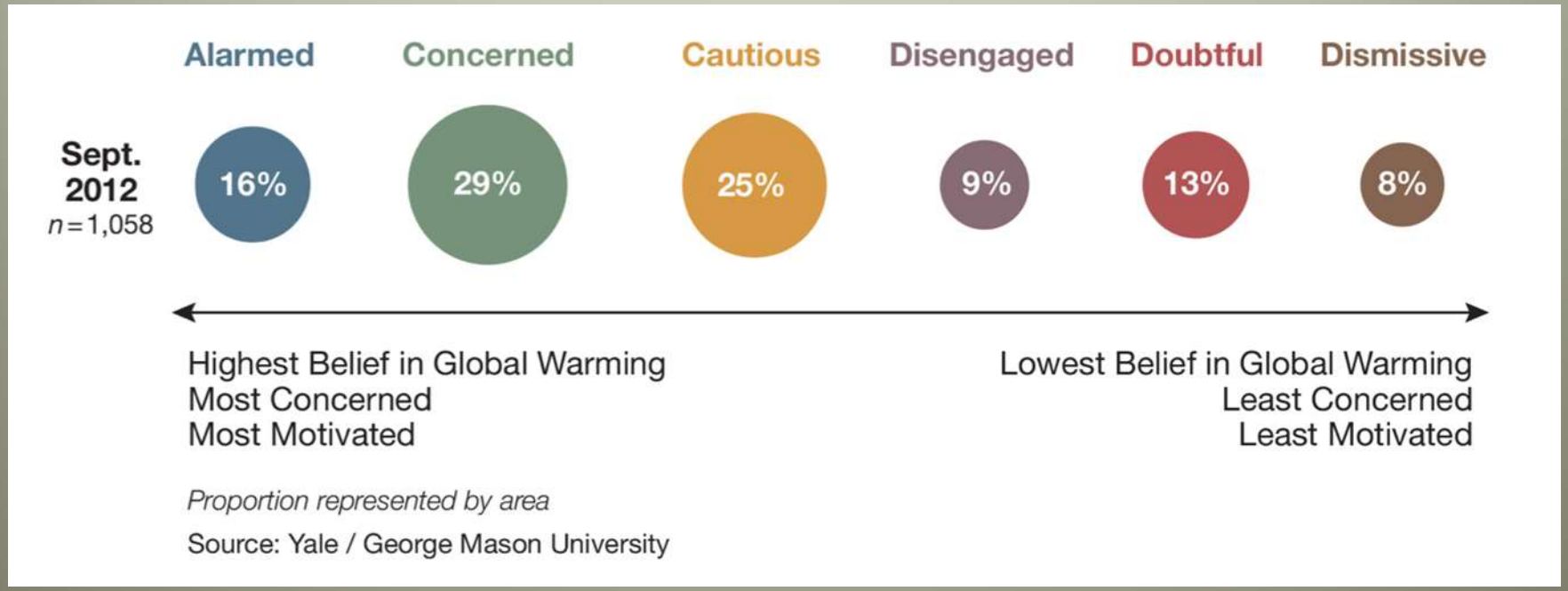
CLIMATE CHANGE

-- Education

- Citizen Science
- Citizen Research
- Citizen Action

Climate Change is Here

- What do you think about Climate Change?
- 0 = Dismissive 1= Doubtful 2 = Disengaged
  3 = Cautious 4 = Concerned 5 = Alarmed

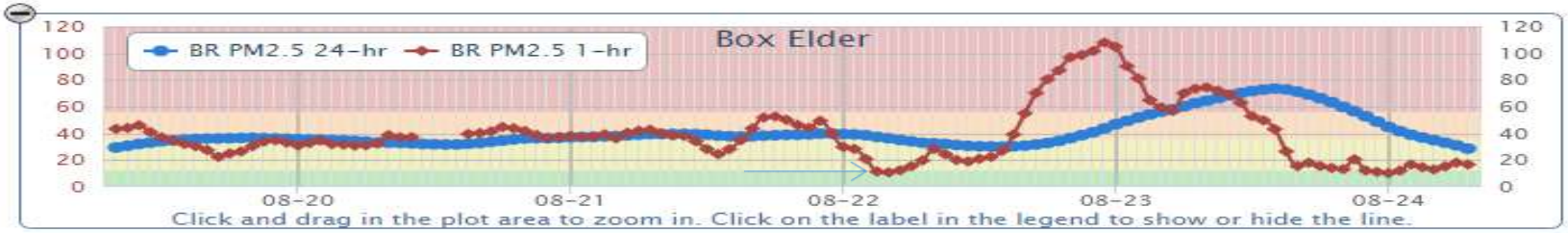


Drought → Dry → Fire → PM2.5

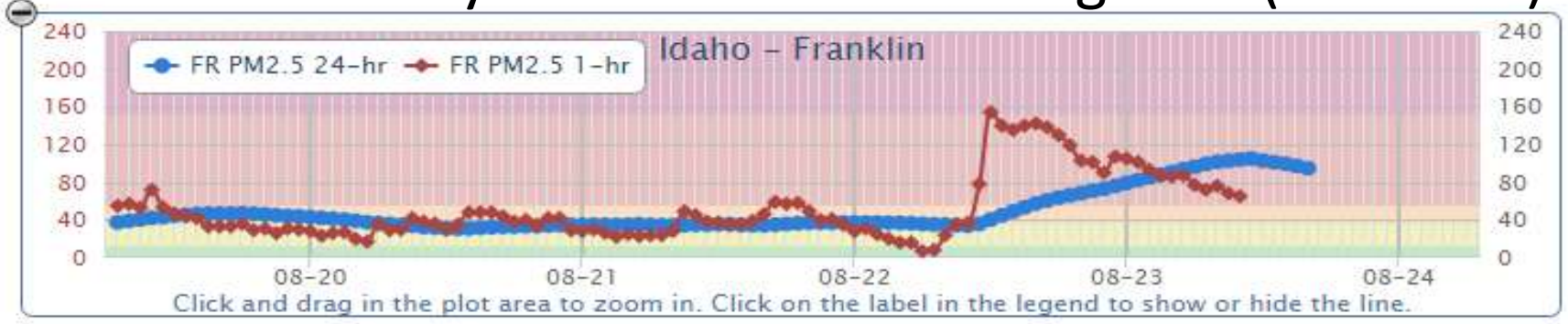
Levels in Utah were well into the Unhealthy for all

Smoke from wild fires could cause high concentrations of particulates in populated areas. If smoke becomes thick, persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activity. Individuals are asked to TravelWise by consolidating trips and choose cleaner transportation options.

Last Updated: August 24, 2015 8:00 AM
(Data Not Quality Assured)



- In Idaho they were over 100 micrograms (std. is 35)



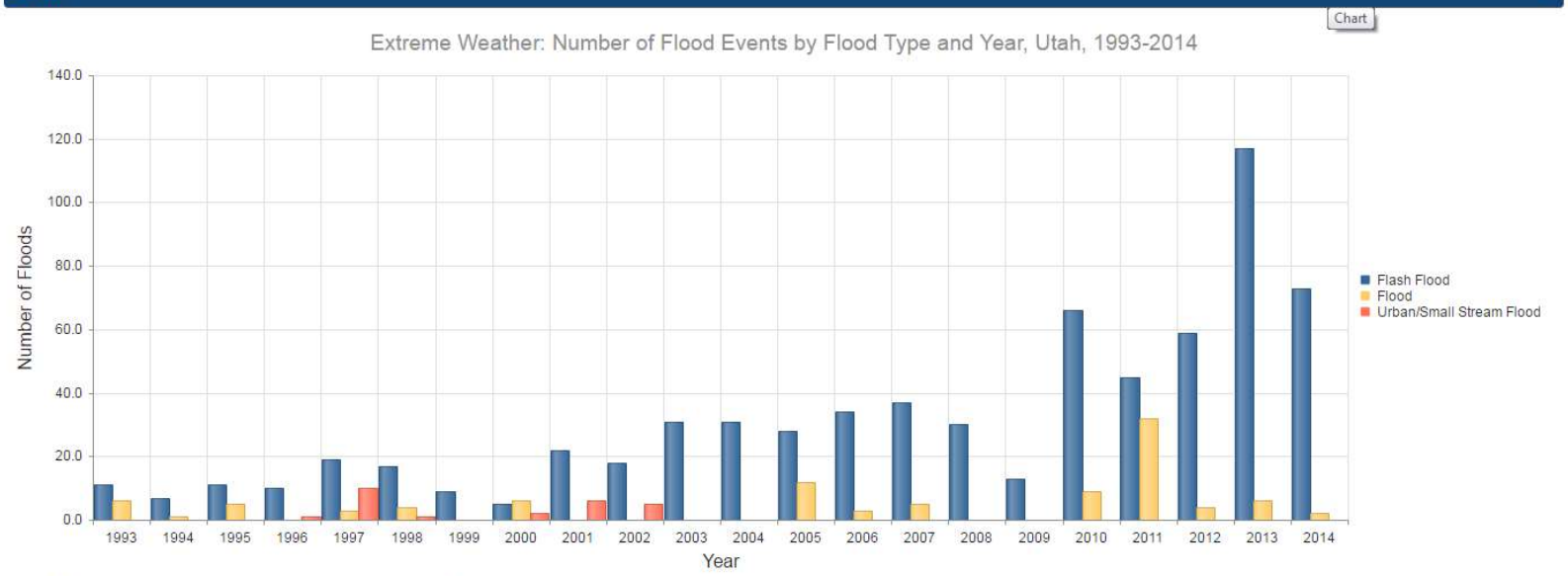
SALT LAKE COUNTY HEALTH DEPARTMENT

Health Indicator Report of Climate Change: Extreme Weather Events

Why Is This Important?

Climate experts project that as the climate continues to change, so will the frequency of extreme weather events. Such events have the potential to adversely affect human health and are therefore a public health concern. Droughts, floods, and wildfires have occurred in Utah, but the question is whether climate change will influence the frequency of these extreme weather events.

Chart

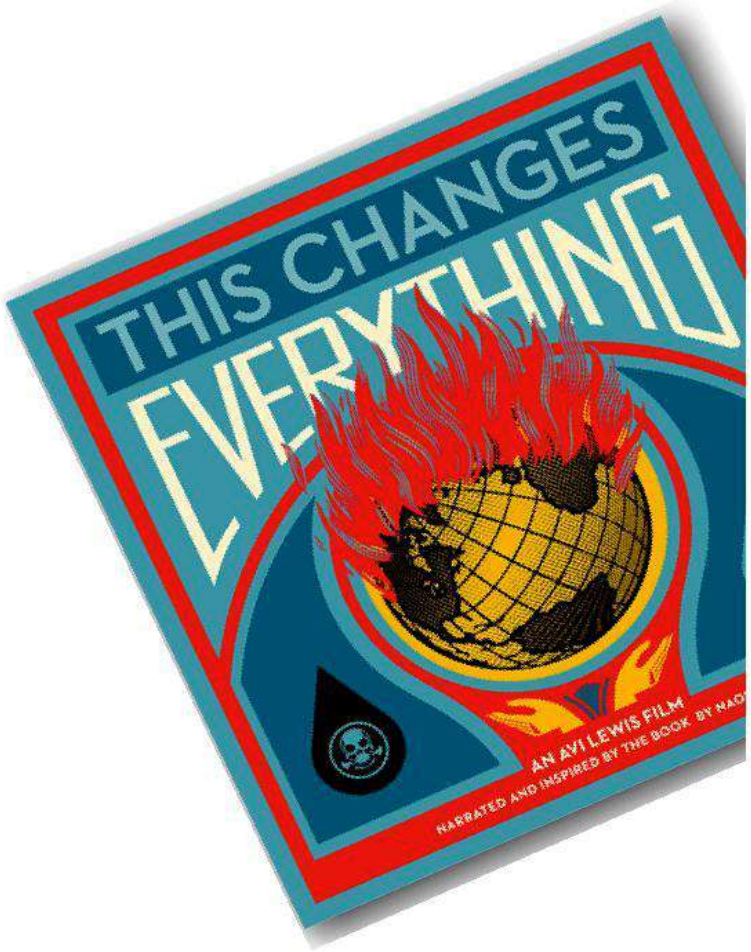


In Utah, long-term rainfall, rapid spring snowmelt, dam breaks, and flash flooding are the four primary ways floods occur [4]. No matter how it occurs, flooding can be extremely dangerous to the health of Utah citizens. In terms of climate change, the data regarding how climate change may affect flood frequency is minimal. The EPA reports that the number of heavy rainfall occurrences has increased and these occurrences lead to increased flooding events. Yet, the EPA recognizes that this is not happening in all areas [5].

Whether it is an abundance of snowmelt runoff, a heavy thunderstorm, or dam failure, floods can negatively affect public health in a number of ways. One of the primary concerns is contaminated drinking water.

Floods can move massive amounts of debris and compromise sewage systems, which can contaminate the drinking water supply. Waterborne diseases such as giardia are transmitted through the consumption of contaminated water (polluted with fecal matter) and can cause debility and even death. Stagnant flood waters can become a breeding ground for vector-borne diseases, like West Nile virus, that could impact individuals who are displaced by a flood. Severe floods can knock over power lines and damage homes, allowing the release of hazardous chemicals into the community [6]. Other health concerns include drowning and injuries directly related to flooding.

Citizen Science : Action



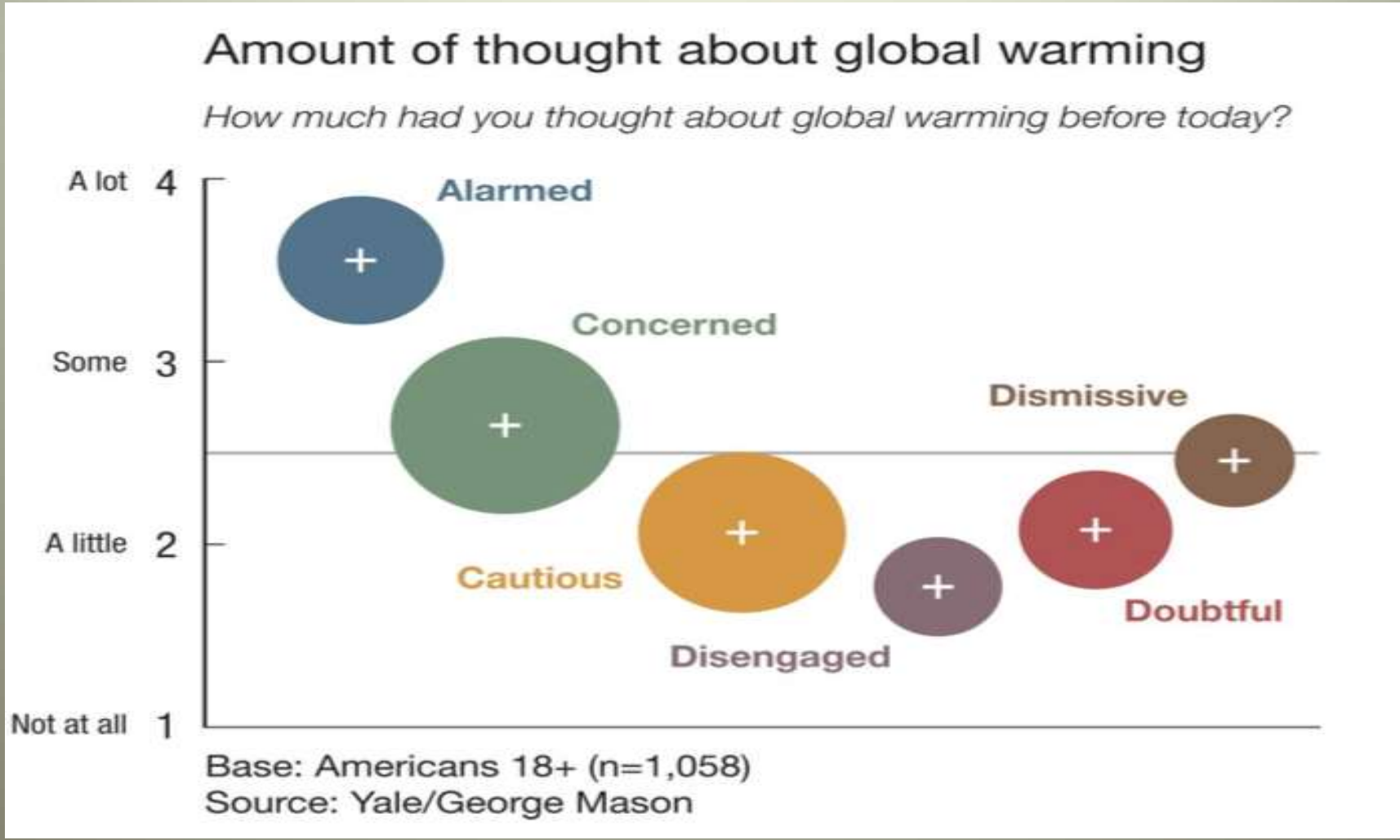
Save the Date

Join **PSR Philadelphia** and **NEHA** for

a ***civil salon*** examining the nexus between climate change and economics including a discussion and screening of "*This Changes Everything*"

WHEN: Thursday, **February 11**
WHERE: **Friends Center**
1501 Cherry Street
TIME: 5:15 Mix and mingle
5:30 Program and Movie
For more info: psrphila.org

How does the amount of thought affect the *level of concern* with regard to: Global Warming?



Citizen Science : Impacting Policy Makers

Building support : local leaders and decision-makers both in the public and private sector

in recognizing climate risks and taking actions to :

-- reduce impacts

-- enhance adaptability

CITIZEN SCIENCE

&

INFECTIOUS DISEASE

Environmental Impacts

CLIMATE CHANGE

Temperature Rise [1]
Sea level Rise [2]
Hydrologic Extremes

Urban Heat Island Effect	Heat Stress Cardiorespiratory failure
Air Pollution	Respiratory diseases, e.g., COPD & Asthma
Vector-borne Diseases	Malaria Dengue Encephalitis Hantavirus Rift Valley Fever
Water-borne Diseases	Cholera Cyclospora Cryptosporidiosis Campylobacter Leptospirosis
Water resources & food supply	Malnutrition Diarrhea Toxic Red Tides
Environmental Refugees	Forced Migration Overcrowding Infectious diseases Human Conflicts

[1] **3° C** by yr. 2100
[2] **40 cm** " "
IPCC estimates


HEALTH PROFESSIONALS AND SCIENTISTS WARN OF SPREADING INFECTIOUS DISEASES.
Global Warming's greatest threat may also be the smallest.

Zoonoses

- Disruption of ecosystems and natural controls are leading to atypical outbreaks of zoonotic infectious diseases

  (i.e., transmitted by, or have reservoirs in, rodents, birds, or insects)

  - hantavirus, plague, dengue fever, west nile virus, Zika and arboviruses (ticks and fleas).
  - Pine beetle/bark beetle infestations. Forest die-offs.

(e.g., Routt national Forest , Colorado)

Mosquito-Transmitted Infections

First :

Permit me to say that West Nile Virus serves as one of the best examples of illustrating *disease transmission* directly via the vector (mosquito).

Over the course of a 3 year period, one can easily track its dramatic spread from the East Coast across the country to the West.

Mosquito Infections

West Nile :

That distribution process is directly attributed to humans being bitten by infected mosquitoes.

Zika Virus :

Thru 6/16 – *EVERY* case in the US was connected to an over-seas exposure/bite.


Zika :

Zika Virus

Discovered :

1947 Uganda : Zika Forest

Today 64 countries (and increasing)

Zika Virus Infection

Virus Found In :

Saliva

Urine

Blood

Bodily Fluids

Zika Virus Infection

Symptoms/Effects

Mild illness/cold symptoms

Sexual Transmission/Pregnancy

Microcephaly

Miscarriages

Guillain-Barre Syndrome

Zika Virus Infection

Through June, 2016

U.S. Cases --- from mosquito bites (elsewhere)

July, 2016

New U.S. Cases --- origin : Mosquito bites (FL)


Places with active **Zika virus** trans-mission:
U.S.
Mexico
Haiti
Dominican Rep.
Puerto Rico
U.S. Virgin Islands,
Saint Martin, Guadeloupe,
Martinique, Barbados,
Guatemala
El Salvador
Honduras
Panama
Venezuela
Guyana
Suriname
French Guiana
Colombia
Ecuador
Brazil
Bolivia
Paraguay
Pacific Ocean
Atlantic Ocean
Not shown:
Samoa in the Pacific Ocean and
Cape Verde in the Atlantic Ocean
Source: CDC
THE WASHINGTON POST

Zika Virus

TRAVEL ROUTE :

Uganda ---- Africa ---- SE Asia ---- Micronesia

and French Polynesia ---- South America

and now, North America

Zika Virus

How did it jump to South America ?

[*Becoming a Disease of Sporting Events !!]*

Strong link to :

World Cup (Soccer)

World Sprint Championship (Canoeing)

*** *** *** *** *** *** ***

2016 Olympics (Tourist Risk of 3.2 per 100K) 16 cases

Zika Virus

W H O [World Health Organization]

Issued a declaration for :

International Public Health Emergency

(Only the 4th Time)

Zika Virus

2015 – 1st year of widespread contact in North *and* South America

2013 - 2015 1.7 M Infected : Chikagunya and Zika combined

Zika Virus -- Current

In the U.S. :

July 2016 – 1657 Infections (history of travel)

\- cases (sexual transmitted- not counted)

1 case (lab acquired)

Aug 2016 -- 14+ cases suspected of local mosquito bite

CDC Response Team – Miami, FL

(Wynwood)

Now : A Reportable Disease to CDC

Prevent Mosquito Bites

Reduce Mosquito Habitat (Bird Baths, Tires, Standing Water, Bats, Science)

Use Insect Repellent

Use EPA-registered insect repellents* that contain at least 20% DEET.

•Picaridin (also known as KBR 3023, Bayrepel, and icaridin); products include Cutter Advanced, Skin So Soft Bug Guard Plus, and Autan

•Oil of lemon eucalyptus (OLE) or Para-menthane-diol (PMD); products include Repel Lemon Eucalyptus

•IR3535; products include Skin So Soft Bug Guard Plus Expedition and SkinSmart

•In general, higher percentages of the active ingredient provide longer-lasting protection. However, this increase in protection time maximizes at about 50% DEET.

•If you are also using sunscreen, apply it first, let it dry, and then apply repellent. Do not use products that contain both sunscreen and repellent.

•Do not spray repellent on the skin under clothing.

Cover Exposed Skin

Avoid Mosquitoes Where You Are Staying

Citizen Science -- Infectious Disease

Conclusion

- Citizen Education
- Citizen Engagement
- Citizen Research -- Surveys
- Citizen Science
- Outreach & Sharing Data
- Negotiation

Citizen Research : Impacting Policy Makers

Citizen Science to support local leaders and decision-makers (in public and private sectors) in recognizing risks to public health and taking actions to :

-- improve health

-- reduce impacts (to health/environment)

-- enhance our lives

Future (present) Citizen Research Efforts to Protect the Public's Health

Flaring Gas in NoDak

PROMOTING PUBLIC HEALTH THROUGH CITIZEN RESEARCH

Questions, Thoughts, Comments

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