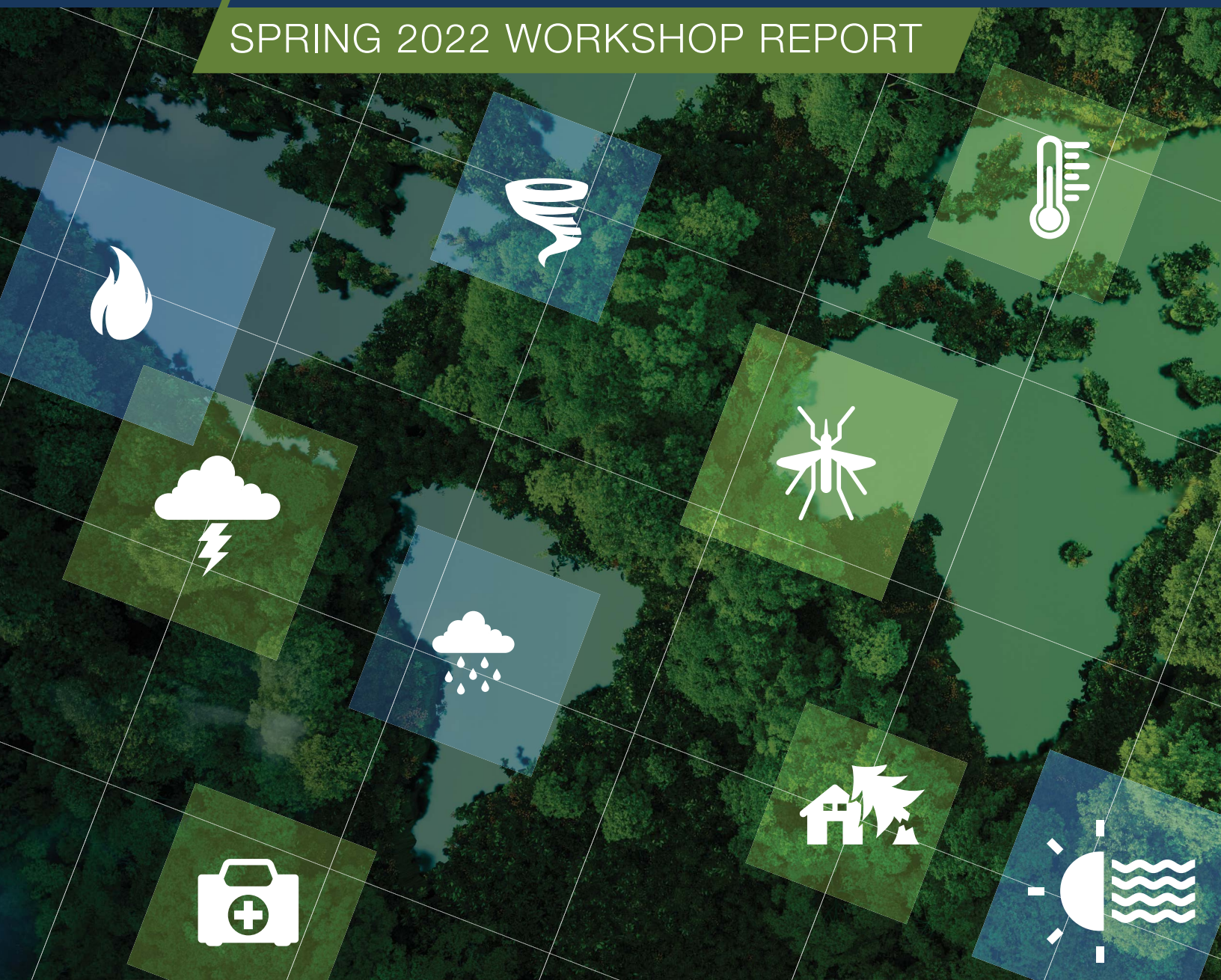




National Institute of  
Environmental Health Sciences  
*Worker Training Program*

# Preparing Workers for the Impacts of Climate Change through Training

SPRING 2022 WORKSHOP REPORT





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# Executive Summary

On May 18 and 19, 2022, the NIEHS Worker Training Program (WTP) hosted a virtual workshop, [Preparing Workers for the Impacts of Climate Change through Training](#). The workshop provided an opportunity for program staff, grantee organizations, and partners to engage in discussions about climate change on a local and national scale.

Speakers and workshop participants shared strategies that have been used to educate and train workers, employers, and communities to prepare for and mitigate hazards associated with climate change. Additionally, participants shared input regarding how to conduct occupational climate vulnerability assessments. More information about the agenda and presentations can be found on the [workshop website](#). A [recording](#) of the entire workshop is also available online.

This report focuses on the paramount work of WTP grantees in addition to work being conducted by partner organizations in support of the intersection of worker health and safety and climate change, with a focus on underserved and vulnerable workers and communities.

Communities addressed in this report include migrant and agricultural workers, day laborers, tribal communities, domestic workers, and urban communities and workers. This report focuses on various climate-related issues including heat stress, wildfires, hurricanes, flooding, and mental health. It also explores different methods to train workers based on location and type of disasters. The following are key themes from the workshop:<sup>1</sup>

- **Varied exposures and impacts.** Speakers shared how climate-related disasters or events, such as wildfires and flooding, create unanticipated and

toxic exposures, which disproportionately impact underserved workers and communities.

- **Impacts of social determinants of health.** Speakers noted the complexity of factors driving climate change and public health outcomes. Factors such as race, economic status, health care access, and other social determinants of health impact climate vulnerabilities. Focusing on these factors is key to developing strategies to protect the health of workers and communities.
- **Building culturally sensitive relationships and training underserved communities is critical.** Speakers discussed how underserved communities and workers, such as immigrant day laborers and agriculture workers, are often overlooked during climate-related events or disasters. These workers face unique challenges and need targeted training to protect their health and safety. Building culturally sensitive relationships prior to a disaster is critical. Trust and open channels of communication are key.
- **Need to focus on infrastructure, green spaces.** Speakers suggested there is a need to build and develop infrastructure that can withstand climate-related disasters.
- **Need a holistic approach.** Speakers said holistic assessments are needed to help employers and workers better prepare for the various factors involved in climate related emergency response efforts.
- **Diverse educational and training approaches needed.** WTP grantees offer diverse and creative ways to train workers to prepare for climate related disasters.

<sup>1</sup> Freeman, K.; Hernlund, M. (2022, June). Climate change impacts on workers, communities addressed at workshop. Retrieved June 15, 2022, from <https://factor.niehs.nih.gov/2022/6/community-impact/climate-change-and-worker-health/index.htm>



# Renewed Focus to Address Climate Change Impacts

The best way to protect workers from climate-related impacts is to train them to identify and mitigate these hazards. While WTP is responsible for helping protect workers from hazardous materials, the program also must recognize its own vulnerabilities related to climate change to best accomplish its mission. The impacts of climate change have become more frequent and the health consequences more severe.

The federal government now has a renewed focus to empower workers and communities and to strengthen their resilience to the impacts of climate change, as noted in the Biden Administration's Executive Orders [13990](#), [13995](#), [13985](#), and [14008](#). This renewed focus supported WTP's decision to host their spring 2022 workshop, [Preparing Workers for the Impacts of Climate Change through Training](#).

WTP Director [Sharon Beard](#) opened the [first day of the workshop](#) by highlighting the connection between climate change and worker safety and health.

WTP-funded organizations (grantees) have trained a wide range of worker populations that are at high risk of exposure to climate-related hazards. This includes vulnerable groups such as tribal nations, day laborers, and socio-economically disadvantaged populations.

Climate change is a critical challenge and [WTP has an important role to play](#) in tackling the climate crisis. Since 2010, WTP has:

- Used the latest scientific research to develop preventative interventions.
- Developed resources and trained workers on topics related to heat stress, hurricane response, and wildfires, among others.

- Delivered focused training for worker populations based on job hazards and risks.
- Supported trainers who translate and disseminate scientific data.
- Ensured materials consider cultural, literacy, and multilingual needs.

## A look back at WTP and climate vulnerability assessments

In 2015, WTP and the National Clearinghouse for Worker Safety and Health (National Clearinghouse) released the Climate Change and Vulnerability Assessment report, which outlines climate change vulnerabilities that may affect the program, its grantees, and target worker populations.

That same year, WTP hosted its first workshop on climate change. The workshop helped shape the Climate Change and Vulnerability Assessment report, which has in turn helped WTP and its grantee community better plan for health impacts and programmatic changes due to predicted changes in the global climate.

In May 2022, the Climate Change and Vulnerability Assessment report was updated with findings captured from more recent literature reviews; grantee training populations; newly identified climate change hazards; and biohazards, such as infectious diseases, wildlife, and fungi.

During the spring 2022 workshop, participants reviewed the updated version of the report and corresponding risk assessment and were asked to think about ways WTP grantees can use it with their trainees. (See pages 18-19).



According to Beard, every person WTP trains - and every booklet, training tool, or curriculum WTP develops, revises, or adapts - matters. WTP trained workers have been called in to respond to many of the worst natural and manmade disasters in the U.S. WTP's partnerships and coalitions make the program stronger and expand the reach to new worker populations.

WTP serves as a national resource during climate-related events and health emergencies, including tornadoes, flooding, hurricanes, wildfires, mudslides, and infectious diseases.

For example, WTP grantees deliver training to construction workers, day laborers, volunteers, firefighters, and emergency response teams during wildfire response and debris cleanup. Since 2014, WTP has provided more than 5,000 training booklets containing health and safety tips related to wildfire smoke and toxic ash hazards and correct use of personal protective equipment (PPE).



Wildfire cleanup in Almeda, Oregon. (Photo courtesy of Oregon Department of Transportation).

## Protecting the Health of All Americans in the Face of Climate Change

John Balbus, M.D., with the U.S. Department of Health and Human Services (HHS), Office of the Assistant Secretary for Health, [Office of Climate Change and Health Equity](#) (OCCHE), described the many ways climate change impacts health, how it affects workers and occupational health.

Increasing temperatures and exposures to ultraviolet radiation present challenges for outdoor workers. Balbus said that climate change can also have an adverse impact on indigenous and rural populations, including displacement due to rising sea level and other factors.

Social determinants of health intersect with vulnerability to climate change. Poverty, occupation, racial discrimination, underlying health disparities, and more have impacts on climate drivers and outcomes. Social determinants of health can worsen exposure effects, increase sensitivity, and hamper adaptive capacity to climate change. For example, redlined areas have a higher rate of exposure to heat and air pollution overall. However, each community's adaptivity level is related to their governance, social capital, policies, and practices.

Established by [Executive Order 14008](#), Tackling the Climate Crisis, HHS mandated the creation of OCCHE. OCCHE is an interagency working group that aims to reduce risk of climate change to children, the elderly, people with disabilities, and the vulnerable.

One of the objectives in the HHS strategic plan is to mitigate the impacts of environmental factors, including climate change, on health outcomes.



To achieve this objective, OCCHE prioritizes climate and health resilience for the most vulnerable; climate actions to reduce health disparities; health sector resilience and decarbonization.

Climate change exacerbates stressors to workers, whether through illness or changes in productivity and industries. OCCHE recognizes that fundamental health inequities are a key part of addressing climate resilience in communities. According to Balbus, community-based solutions are an essential for long-term resilience.



Trainer discussing health and safety with AmeriCorps volunteers in Texas following Hurricane Harvey. (Photo courtesy of WTP).

## Challenges and Approaches to Train Workers and Communities on the Impacts of Climate Change

### Addressing Agriculture Workers' Exposure to Severe Environmental Conditions

Amy Liebman of the Migrant Clinicians Network, a partner of the Atlantic Center for Occupational Health and Safety Training, [presented](#) on the vulnerabilities of agriculture workers and ways to connect and prepare these workers for climate change through training.

Agriculture workers are largely made up of immigrants, and increasingly more women are working in this industry. Over 64% of agriculture workers in the U.S. are Spanish speaking and 37% lack work authorization.<sup>2</sup>

Recently, there has been a significant increase in agriculture workers immigrating from southern Mexico and Central American countries like Guatemala, Honduras, and El Salvador. Most of these individuals speak Indigenous languages and Spanish as a second language. This is important to keep in mind when looking at barriers to care.

2 Ornelas, I., Fung, W., Gabbard, S., & Carroll, D., A Demographic and Employment Profile of United States Farmworkers (2021). Retrieved June 15, 2022, from <https://www.dol.gov/sites/dolgov/files/ETA/news/pdfs/NAWS%20Research%20Report%202014.pdf>.



It is reported that 29% of agriculture workers had no healthcare visits in the last two years, which is partially because 44% of them do not have health insurance.<sup>3</sup>

In addition to not having health insurance, agriculture workers face economic hardship. Mean and median individual income ranges from \$20,000 to \$29,000 annually.

Liebman said with climate change, agriculture workers are dealing with changing work environments due to weather. For example, agriculture workers are 20 times more likely to die from heat-related illnesses than other workers. Wildfires are another hazard that these workers face. Liebman said that migration is another factor for agriculture workers in response to climate change. Hurricane Maria stripped Puerto Rico of its farmland - approximately 13,000 farms - which accounts for roughly a quarter of the island's total land. Extreme hurricanes like these are forcing agriculture workers to migrate to the U.S.

For agriculture workers, vulnerabilities include cultural and language differences; pregnancy; pre-existing health issues; low wages; inherent dangers and health risks of occupations; immigration status; migratory lifestyle; lack of access to health care, insurance, or financial resources; and lack of regulatory protection.

The bottom line is that climate change impacts the working conditions of agriculture workers, and they have fewer protections compared to other workers.

Training may be provided to agriculture workers to mitigate some of the harms. Popular education is a pedagogical theory originated by Paulo Freire.<sup>4</sup> Popular education enlists the tools of social justice and community empowerment. The trainees' knowledge and experience

are honored in this way of training and the content is guided by the expressed learning goals of the participants.

To reach adult learners, trainers must consider cultural backgrounds, literacy levels, and language.

Training content should be relevant to the lives of workers. The content builds on the workers' existing knowledge and experience and offers opportunities to engage the participants in a meaningful and participatory manner. The training is a collaborative, two-way exchange.

### **Farmworkers: Stories from the Field**

"It's hard work because the foreman constantly rushes us.... Many workers have died in the fields due to dehydration or illness. I have seen men and women faint. I was picking chiles once and a woman worker told the foreman she didn't feel well. The foreman took her out of the field. Three days later it was 115 degrees out and another young woman, just 21 years old, fell ill... When we returned, we saw the ambulance taking her away because she had fainted."

"In addition to low pay, there are a lot of contractors out there that don't allow workers a break at the required time, or even a break at all. At work, I want the contractor to consistently let us take breaks at our scheduled times of 9:00 a.m. and noon. There are many contractors that don't rehire us if we don't work the way they demand. They speed up the machine and we're expected to keep up."

3 National Agricultural Workers Survey. United States Department of Labor. <https://www.dol.gov/agencies/eta/national-agricultural-workers-survey>

4 Freire, P. (2000). Pedagogy of the oppressed (30th anniversary ed.). Continuum. <https://envs.ucsc.edu/internships/internship-readings/freire-pedagogy-of-the-oppressed.pdf>

## Immigrant Day Laborers as Second Responders in Climate Disasters

Other speakers like Arturo Archila, of the Steelworkers Charitable and Educational Organization (SCEO)/The Labor Institute, Cal Soto with the SCEO/National Day Laborer Organizing Network, and Nik Theodore, Ph.D., with University of Chicago Illinois, addressed how day laborers are often overlooked during climate-related disaster response. The speakers referenced a new report, [Recovering from Climate Disasters: Immigrant Day Laborers as “Second Responders.”](#)

Day laborers are overwhelmingly from Mexico and Central America. Approximately 80% of day laborers are undocumented immigrants. In New Orleans, there is a high prevalence of mobile work crews traveling to the area to deal with the aftermath of the disaster. This presents a new challenge for trainers and organizations trying to improve health and safety training on the job. There is not much time to provide training. The top occupations of day laborers are roofing, remodeling, demolition, and clean-up.



Trainers from WTP grantee organizations training day laborers following Hurricane Harvey in Texas (Photo courtesy of Mitchel Rosen, Ph.D., Atlantic Center for Occupational Health and Safety Training).

Day laborers, particularly in the aftermath of a climate disaster, face three primary health and safety concerns:

- Rapid pace of recovery operations (long hours plus few or no work breaks).
- Multiple hazards at any given worksite.
- Hazards encountered that are unknown to the work crews entering the site.

Day laborers are often not provided with adequate PPE. As a result, day laborers may become victim to eye problems, recurring headaches, common cuts and puncture wounds, serious falls, and ergonomic injuries and fractures.





Worker education can help mitigate the dangers faced by day laborers in disaster response. Trainers need to conduct targeted outreach and must be able to provide training in Spanish. Training, as well as PPE, must be widely available.

Additionally, stronger anti-employer-retaliation measures must be taken to protect workers.

The United Steelworkers (USW) has a cadre of fifteen Specialized Emergency Response Trainers (SERTs) trained to respond to emergencies when called upon to provide on-the-spot training to workers and communities. In recent years, SERTs have shifted their focus to preparedness versus response. USW SERTs are developing and creating community connections with those on the ground, where local workers go and which they identify as safe spaces. SERTs are building capacity by partnering with community connections.

SERTs have a long history of responding to natural disasters. Through experience, the SERT team realized it is impossible to maintain their past deployment strategy, which was more reactionary than proactive. They recognized the need to identify the most vulnerable workers and proactively engage with them prior to a disaster occurring.

SERTs provide training in an array of languages. Most have the lived experience of surviving a natural disaster. SERTs work to create a safe space for communities to come and exchange their experiences with union workers. They also undergo specific trainings to understand the science and root causes behind climate change issues.

SERTs build capacity in disaster-prone areas and create pathways to technical knowledge. By the time the disaster happens, the local community is prepared to respond.

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## Tribal Approaches to Address Climate Change Impacts

Julie Thorstenson, Ph.D., director of the Native American Fish and Wildlife Society (NAFWS), [spoke](#) about tribal approaches to addressing climate change impacts. The mission of NAFWS is to assist Native American and Alaska Native Tribes with the conservation, protection, and enhancement of their fish and wildlife resources. NAFWS consists of seven regions across the U.S. Tribes own or influence the management of nearly 140 million acres.

Thorstenson, who is Lakota and a citizen of the Cheyenne River Sioux Nation, mentioned challenges and best practices for engaging with tribes to address the impacts of climate change. According to Thorstenson, there are several barriers to addressing climate change impacts, including lack of capacity, other tribal priorities, and state-tribal relations. Also, it is often challenging to connect with the right person within a tribe.

While tribes are often consulted with, they may not be included in final decision making. Additionally, while some tribes are included in decision making, others lack the capacity and resources to be at the table.

Thorstenson said the best ways to be inclusive of tribal nations in combating climate change is to work with the tribes from start to finish—build relationships, ensure safeguarding of the natural environment, respect cultural values, and be aware of nation-to-nation relationships. Relationship-building must be culturally sensitive.

“Nobody tells our story better than us,” said Thorstenson.



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## Educational and Outreach Approaches for Day Laborers and Domestic Workers

Nancy Zuniga of the Institute of Popular Education of Southern California (IDEPSCA) [discussed](#) educational and outreach approaches for day laborers and domestic workers.

“The people forgotten are the workers that take care of the whole family - these are the people who are impacted by climate change,” said Zuniga.

Day laborers and domestic workers continue to go to work even when fires are happening.

By regularly surveying the community, the IDEPSCA learned what day laborers and domestic workers need. Day laborers and domestic workers in large part do not have access to N95s when wildfires start. The IDEPSCA identified outreach “hot spots” including bus stops. The IDEPSCA goes to the worker hot spots and provides PPE. Workers are engaged through text messaging and social media (Facebook and Instagram), so IDEPSCA uses these communication channels to keep workers informed.

IDEPSCA training not only covers working conditions, but by frequently surveying workers, meets the trainees where they are and provides information on basic needs identified by the workers. IDEPSCA learned that employers often move following a fire and never pay day laborers and domestic workers for their labor. In response, IDEPSCA provides information and support to trainees regarding wage theft.



Workers discussing safety precautions. (Photo courtesy of Nancy Zuniga, IDEPSCA).

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## A Community Resilience Center Responds to COVID-19 and Climate Change

Donele Wilkins, founding director of the [Green Door Initiative](#), spoke about how their Community Resilience Center supported communities in Detroit following extreme weather and flooding in the summer of 2021.

Wilkins said training for workers and the community is largely focused on environmental literacy. Trainings help mitigate the lack of confidence in the science of climate change. Community members often have issues receiving inspections or funds from the Federal Emergency Management Agency because of application errors or gaps in information provided. The trainings help alleviate this issue as well. Wilkins keeps a blog, posting stories to keep track of community needs. This data can be used to make fact sheets and communication materials.

Wilkins said partnership with the Detroit Health Department has been key in reaching a broader audience. For example, the Detroit Health Department was able to provide access to new childcare facilities when existing facilities were impacted by flooding and needed to be remediated.

According to Wilkins, despite efforts, worker protections do not go far enough to protect vulnerable workers. Advocacy must continue at the local, state, and federal levels for more resources. Resources need to be equitably distributed and reach vulnerable communities.



# Climate Impacts on Worker Health

Participants had an opportunity to participate in various breakouts to hear and discuss more about the different climate hazards and challenges workers face.

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## Heat and Construction Workers

[Gavin West](#), from CPWR – The Center for Construction Research and Training, addressed the climate concern of heat as it impacts construction workers and how CPWR trains workers on this issue.

West explained how rising temperatures impact worker health and productivity. He also listed critical elements of heat safety plans and highlighted various resources to use in training programs.

While it is important to train on climate change, a major challenge of addressing climate change is the lack of understanding of the issue. Only 49% of Americans say human activity contributes to climate change.<sup>5</sup>

One way to get past these obstacles in training is to utilize visual aids to tell a story with facts and scientific data. For example, Climate Central has an extreme heat toolkit with useful graphics.<sup>6</sup>



Construction Worker on a hot day. (Photo courtesy of Gavin West, CPWR).

Environmental risk factors for heat illness are common in construction. CPWR provides [resources](#) in their heat toolbox on creating a heat safety plan, as well as a training to prepare workers for heat on the job. Toolbox talks on heat are one of the most frequently accessed resources at CPWR.

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5 Funk, C., & Hefferon, M. (2021, July 12). U.S. public views on climate and Energy. Pew Research Center Science & Society. Retrieved June 15, 2022, from <https://www.pewresearch.org/science/2019/11/25/u-s-public-views-on-climate-and-energy/>

6 Resources. Resources | Climate Central. (n.d.). Retrieved June 15, 2022, from <https://medialibrary.climatecentral.org/extreme-weather-toolkits/extreme-heat>



## Wildfires

[Kevin Riley, Ph.D.](#), principal investigator for the Western Region Universities Consortium (WRUC), addressed how wildfires impact workers in California.

WRUC developed training approaches and materials for responding to wildfires because California has been dealing with record-breaking wildfires.



Wildfire (Photo courtesy of WikiCommons)

California Occupational Safety and Health Administration (Cal/OSHA) implemented a heat standard to protect workers from wildfires.<sup>7</sup> The standard applies to outdoor and indoor workers exposed to wildfire smoke for more than one hour a day, even if they are not directly impacted by fires. The standard does not apply to wildland firefighters or indoor workers with filtered air.

WRUC training aims to identify health effects of wildfire smoke exposure, use online tools to determine real time air quality, describe Cal/OSHA requirements, and list the benefits and limitations of N95 respirators.

AirNow is an online tool that measures air regional quality.<sup>8</sup> Once the Air Quality Index goes above a metric, employers are required to provide respirators. Employers are also required to provide training to eligible workers, communicate with workers about the dangers, and reduce exposure to wildfire smoke.

Wildfire smoke consists of tiny ash particles and harmful chemicals and gases. Health effects include burning eyes, runny nose, chest pain, fatigue, coughing, and difficulty breathing. Workers impacted by smoke events include: front-line firefighters, delivery workers, construction workers, agricultural workers, school workers, and anyone who works outdoors where air is not filtered. The new Cal/OSHA standard and the training provided by WRUC are ways to mitigate the harms of wildfires for workers.

7 Cal/OSHA. (n.d.). Worker protection from wildfire smoke. Wildfire Smoke Emergency Standard. Retrieved June 15, 2022, from <https://www.dir.ca.gov/dosh/doshreg/Protection-from-Wildfire-Smoke/Wildfire-smoke-emergency-standard.html>

8 System alerts. [AirNow.gov](http://www.airnow.gov/). (n.d.). Retrieved June 15, 2022, from <http://www.airnow.gov/>



## Hurricanes and Flooding

[Kim Dunn and Bruce McClue](#) of the [Deep South Center for Environmental Justice](#), part of the [Historically Black Colleges and Universities Consortium](#), shared the impacts that flooding and hurricanes have on workers. Dunn and McClue spoke both as worker trainers and as residents of New Orleans, who lived through Hurricane Katrina and other major climate disasters.

Workers responding to hurricanes and major flooding may have some training, but the biggest issues occur when response workers have no training. The most dangerous hazards include structural integrity, water (slips and falls, waterborne illnesses, dehydration); cuts and bruises; heat stress; sharp objects; vegetative debris; power lines and electrical hazards; and mold. Understanding what these hazards are and how to mitigate them is an essential component of training.

Workers often lack training in ergonomics, asbestos and lead-based paint handling, and mold remediation. Workers may also face a lack of supplies or potential alternatives to supplies.

The major mental health impact a storm can have on emergency response workers and the surrounding community often goes unrecognized. Mental health can be impacted by working long days, separation from family, living in constant devastation, and lacking resources and support. What makes situations worse is the stigma associated with seeking help.

## Mental Health and Climate Change

[Patricia Strizak](#) of [The New England Consortium – Civil Service Employees Association](#) spoke on how workers' mental health is impacted by climate change.

Climate change poses an under-appreciated threat to mental health and emotional wellbeing.

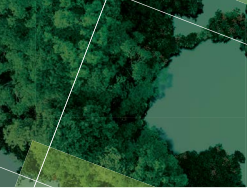
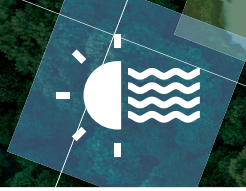
Every American is vulnerable to the impacts of climate change. The instability of climate change impacts both physical and social environments. Social environments are key for maintaining mental health. Climate change affects mental health directly and indirectly; directly by direct exposure to disaster, and indirectly through damages to physical health and mental well-being. When communities experience multiple climate-related disasters, the traumas are compounded with each new disaster.

Mental health is commonly overlooked in climate change because it is not immediate, as compared to a flood or hurricane. Environment and exposures play a role in well-being.

Climate change exacerbates inequities such that individuals with diagnosable mental illnesses are more vulnerable. One injustice is the lack of understanding of the impacts of climate change on mental health.



Graphic of feelings associated with unsupported mental health. (Photo courtesy of Patricia Strizak, The New England Consortium – Civil Service Employees Association).



The impacts of climate change on mental health have been largely ignored when accounting for the costs and benefits of climate action and planning climate mitigation and adaptation responses.

It is essential to train people on the mental health impacts of climate change, especially in more vulnerable communities.

Developing trainings must start with conducting needs assessments to see what the communities need regarding mental health. People with lived experiences of climate-related disasters should be involved in the conversations and in shaping mitigation strategies.

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## Training Needs from an Industrial Hygiene Lens

[Scott Patlovich, Ph.D.](#), of the [Prevention, Preparedness, and Response Consortium](#) shared the importance of using an industrial hygiene lens when considering training needs due to climate change. He shared his experiences responding to multiple storms. Following Tropical Storm Allison, staff at the University of Texas Health Science Center had to remove more than 5,000 cadavers of animals after the animal labs in the basement flooded. Contrastingly, Winter Storm Uri left completely different conditions and freezing impacts. Biohazards are a common theme in all these storms; they change and appear in new areas. Biohazard safety is a core American Industrial Hygiene Association (AIHA) competency, highlighting the need for preparation and preparedness to safely address biohazards.<sup>9</sup>

Industrial hygienists have an important role to play in responding to climate change and corresponding biohazards. Industrial hygienists need training on how to protect themselves following a climate disaster. The [Resiliency Center of Excellence](#) at Houston Community College provides real world training experience to prepare workers to stay safe.

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<sup>9</sup> AIHA is the association for scientists and professionals committed to preserving and ensuring Occupational Environmental Health and Safety in the workplace and community.

## Unrecognized Exposures in the Post-Wildfire Environment

[Dawn Bolstad-Johnson](#), MPH, CIH, CSP, FAIHA shared best practices documented in her book, *Exposed: Carcinogenic Exposures on the Fireground and 11 Work Practices to Minimize the Risk*.

A fireground is any structure that is partially or completely burned.

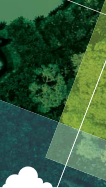
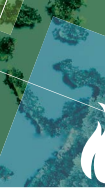
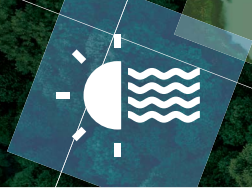
Wildfires are significantly different from house fires. Wildfires are fast moving and do not leave behind a lot of soot, which can be deceiving. Smoke from wildfires is extremely toxic, though this is not well defined. Smoke also may be present for multiple days.

In contrast, typical house fires have a point of origin. Household objects may heat and smolder for some time before igniting. Smoldering generates soot. Also, the fire department vents out house fire smoke as soon as possible — minutes later, as opposed to hours or days for a wildfire.

While wildfires may signify the presence of a forest, wildfires can destroy entire neighborhoods, with no forests in sight.

Fire smoke is toxic. Firefighters are exposed to these toxins and carcinogens constantly.

According to Bolstad-Johnson, there are dangerous amounts of chemicals left on the scene following house fires. Today, homes contain an average of 1,700 pounds of plastic.



Burned mobile home neighborhood in California (Photo courtesy of WikiCommons).

Even if a house is not burned down, a house filled with smoke can pose significant immediate and long-term threats to responders, demolition crews, cleaning crews, rebuilding crews, occupants, and domestic workers.

Wildfires crossing into urban neighborhoods carry much more than just soot, char, and ash. Damage to a home can be both obvious and not obvious. Houses are like porous sponges. The absence of soot does not mean there is no danger. Homes need to be sampled for more than soot, char, and ash after a fire.

Studies have found that sometimes formaldehyde degrades as a function of time and sometimes it increases. Investigators disturbing debris piles can cause toxic formaldehyde to be released in the form of a gas.

PPE is vital for responding to a fire. This includes but is not limited to:

- CBRN Canister Full Face Respirator: Filters out volatile organic compounds, particulate, and formaldehyde, protection level of 50, meaning concentration inside the respirator is 50 times lower than the concentration outside the mask.

- N95 masks: Filters out non-oil-based particulate only, protection factor of 10. The concentration inside the N95 mask is 10 times lower than the concentration outside the mask. N95 masks require fit testing.
- Nitrile gloves.
- Disposable plastic shoe covers.

PPE can help prevent immediate and delayed health effects, such as cancer.

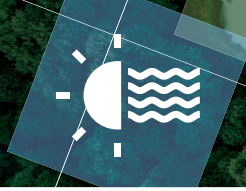
Particulate meters are a useful tool to determine the impact of smoke in an indoor environment. Particulate counts are compared to outside air. In normal conditions, particulate counts inside a home should be less than or equal to outside counts. In post-fire conditions, levels inside the home could be powers of 10 higher than outside air.

The [AIHA Technical Document on Direct Reading Instruments](#) is a helpful tool to test for home safety. When using the tool, responders must remember there is air movement inside wall cavities, so they must be sure to collect samples before opening walls.

For responders to anticipate what contaminants may be present in a home, responders should:

- Interview the homeowner.
- Determine whether or not it is safe to sample for gas and vapors.
- Look for soot, char and ash.
- Determine whether or not to include a mold sampling.
- Determine whether or not to look for particulates.

Following work, all clothes should be removed to prevent contaminating non-responders (family, children) following exposure.



# Addressing Infrastructure Needs for Worker Safety and Community Resilience

Justin Brown of the [Metropolitan Water Reclamation District](#) of Greater Chicago (MWRD) gave an innovative presentation that included a virtual tour of the Chicago River and MWRD’s wastewater treatment plants, along with tunnel and reservoir plans put in place to help capture water overflow during flood events.

Today, MWRD treats an average of 1.3 billion gallons of water each day, and MWRD’s total water treatment capacity is over 2 billion gallons per day.

Brown said today, MWRD has a deeply ingrained culture of workplace safety. He spoke about some of the hazards that workers face at a wastewater treatment plant, such as exposure to raw sewage.

The wastewater treatment process relies on tunnels for moving water. Construction workers build and fix the tunnels. These tunnels are considered mines and are regulated by the Mine Safety and Health Administration. Workers need to attend site specific training before entering the sites.

MWRD currently has more than 100 stormwater management projects in design or under construction. MWRD’s stormwater projects incorporate elements of both gray and green infrastructure.

The [Space to Grow](#) program is one recent example of MWRD establishing programs and partnerships with nearby schools and communities to implement green infrastructure as a mitigation strategy for flooding.

Space to Grow transforms Chicago schoolyards into beautiful and functional spaces to play, learn, garden, and be outside. The schoolyards also use special

design elements to help reduce neighborhood flooding. Schoolyard transformations prioritize physical activity, outdoor learning, and community engagement. The green schoolyards incorporate landscape features that capture a significant amount of rainfall, helping keep the city’s water resources clean and resulting in less neighborhood flooding.

Through this program, MWRD has helped transform 30 schools in Chicago. The green infrastructure can hold roughly 5.6 million gallons of water.

Today, MWRD is actively working to support underserved communities. MWRD recently received \$1.5 million in federal funding to reduce flooding of homes and environmental contamination in four disproportionately impacted municipalities, Stone Park, Harvey, Riverdale, and Dolton, Illinois.



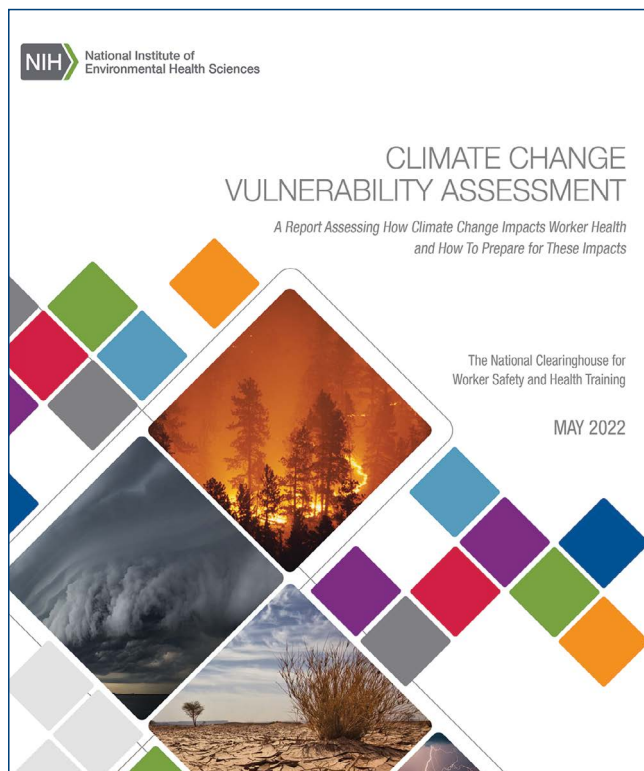
Chicago schoolyard before and after transformation. (Photos courtesy of Justin Brown, MWRD).



# Building Plans to Address Climate Change in the Workplace: Evaluating the Climate Change Assessment Tool

Participants engaged in an interactive activity to review the newly updated Climate Change Assessment Tool, which is a supplement to the [Climate Change Vulnerability Assessment Report](#).

Joy Lee and Amber Mitchell, Ph.D., [presented](#) on the process and outcomes of updating the report and a corresponding Risk Assessment Checklist.



Front cover of the Climate Change Vulnerability Assessment report.

## Climate Change Vulnerability Assessment Report

The goal of the [Climate Change Vulnerability Assessment report](#) is to help WTP and its grantee community better plan for the health impacts and programmatic changes due to predicted changes in the global climate.

The updated report captures findings from more recent literature reviews and resources. The report outlines additional climate-related hazards that affect WTP and grantee training populations. It presents issues that WTP and grantees should consider moving forward, and also provides a list of resources.

The report includes information on climate challenges for workers including:

- Early insights into COVID-19 and climate change.
- Climate change occupational health impacts and anticipated training needs. Needs for training identified were air pollution, biological hazards, extreme ambient temperature, extreme weather, ozone depletion, and industrial transitions and emerging industries.
- Work-related factors to consider.
- Individual health-related factors to consider.



## **Risk Assessment Checklist to Reduce the Impact of Climate Change on Health and Safety**

Building [the checklist](#) transformed the report into a resource. The checklist is meant to function as a baseline risk assessment, but can be tailored to geography, population, and event.

The checklist is a tool for employers and worker representatives that are assessing climate-related health and safety risks within their organizations, including special considerations for those with employees in indoor and outdoor environments. Sections address employers, facilities, workers, and communities.

In this interactive session, workshop participants were asked to consider the following questions:

- Does this capture the essence of the report?
- Is it valuable?
- Is it adaptable?
- What is missing?
- How might this checklist be used?
- Is this checklist in the right format?

The report was created because, across the spectrum of events — from acute severe-weather disasters to intense heat waves—the consequences of climate change directly and indirectly impact worker health. Depending on the location and nature of the work, some impacts may constitute a heavier burden on certain industries, trades, workers, and the communities where they are located and which they serve.

When implemented, employers and worker representatives should:

- Review each item.
- Develop an action plan that lists each item, who is responsible, what needs to be done, and by when.

- Develop a communication plan to inform employees, customers, and the public of actions taken by the organization to protect workers and the public from climate-related hazards.

The major sections of the checklist are:

- General Program Design and Planning
- Heat
- Cold, Polar Vortex
- Biological and Vector-borne Hazards
- Flooding
- Emerging Challenges and Air Pollutant
- Resources

Breakout groups reported back suggestions for improvements to the check list. Those suggestions are being worked into the document.



## Conclusion and Next Steps

WTP continues to demonstrate its commitment to keeping workers and communities, including the most vulnerable, safe in the face of climate change.

Given the examples presented during the workshop, WTP grantees are well positioned throughout the country to reach workers and communities who are touched by climate change. All workers need the tools and training to respond to climate disasters and these approaches need to be adapted to the training audience, particularly underserved communities. WTP grantees are doing the essential grassroots outreach to build culturally sensitive relationships before a disaster occurs so that workers are ready to respond following an incident.

Preparedness and inclusivity are key in response planning. The Risk Assessment Checklist to Reduce the Impact of Climate Change on Health and Safety addressed at the end of the workshop will prove to be a useful tool for WTP grantees and their respective communities. Grantees should work with trainees to promote use of the tool to support workers and communities to be more prepared for climate change and the disasters it will bring. Grantees are also encouraged to continue to provide feedback to WTP on the tool so it can be as effective and adaptable to local communities as possible.

Janelle Rios, Ph.D., from the Prevention, Preparedness and Response Consortium at the University of Texas Health Science Center in Houston, spoke as someone who has, along with every member of her large and extended family, experienced the impacts of climate change. She said most notably, unprecedented climate conditions like Winter Storm Uri have created a new reality for workers and communities.

Undoubtedly, every worker trained through WTP should be more prepared to face climate-related disasters.



Workers helping local community following disaster. (Photo courtesy of Wikicommons).

## Additional Resources from NIEHS

- [Urban Flooding and Worker Health Effects](#)
- [Urban Flooding Fact Sheet](#)



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