Advancing Climate Resilience in Workplace Safety

Adapting HSE Protocols to Rising Environmental Challenges

Dr. Neelesh Sogani

General Manager – Altasnim |

IOSH Oman Chair | RoSPA Ambassador

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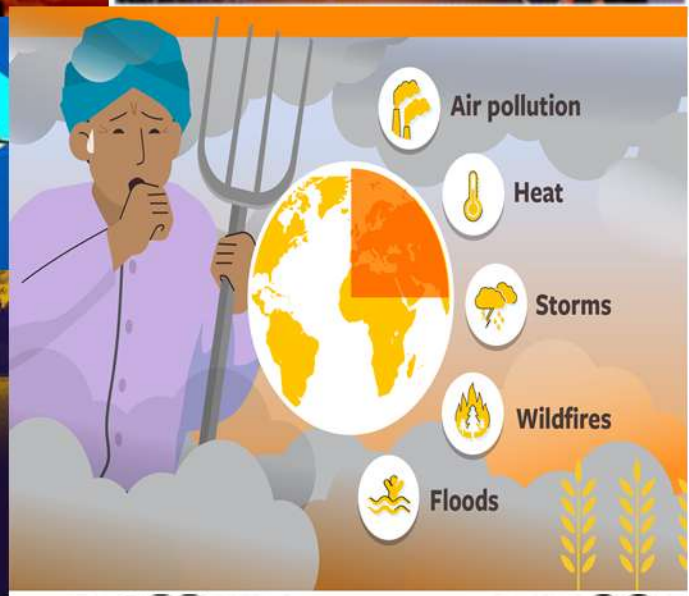
- IOSH Oman Community-Chair
- General Manager –Altasnim
- RoSPA Regional Ambassador
- Ex IOSH Council Member
- LinkedIn Top Voices- Risk Management, Workplace Safety, Change Management
- Motivational Coach,
- Experience of 28+ years in Process Industry, Oil & Gas Refinery, Steel Plant, EPC Contracts , Infrastructure & Transportation Projects backed with hands on experience in Middle East, North Africa and India
- Won several International as well as National Awards in the field of HSE & CSR for the company from British Safety Council, American Society of Safety Engineers, Construction Week, Oman Society of Contractors, Dossier etc
- Prominent Speaker on HSE Leadership for International, Regional & Oman conferences



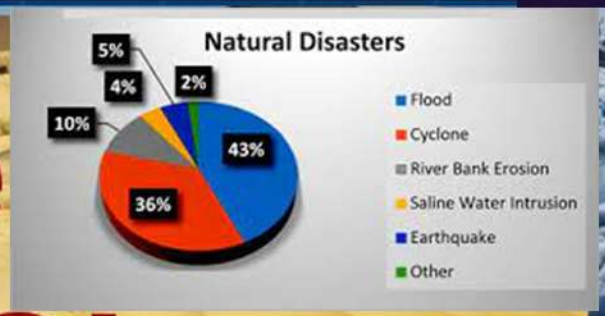


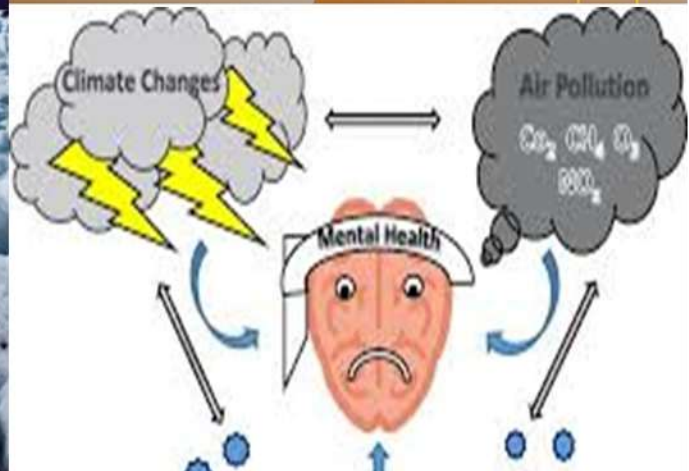


We are running out of time
Ensuring safe and healthy work now
in a changing climate


Air pollution
Heat
Storms
Wildfires
Floods

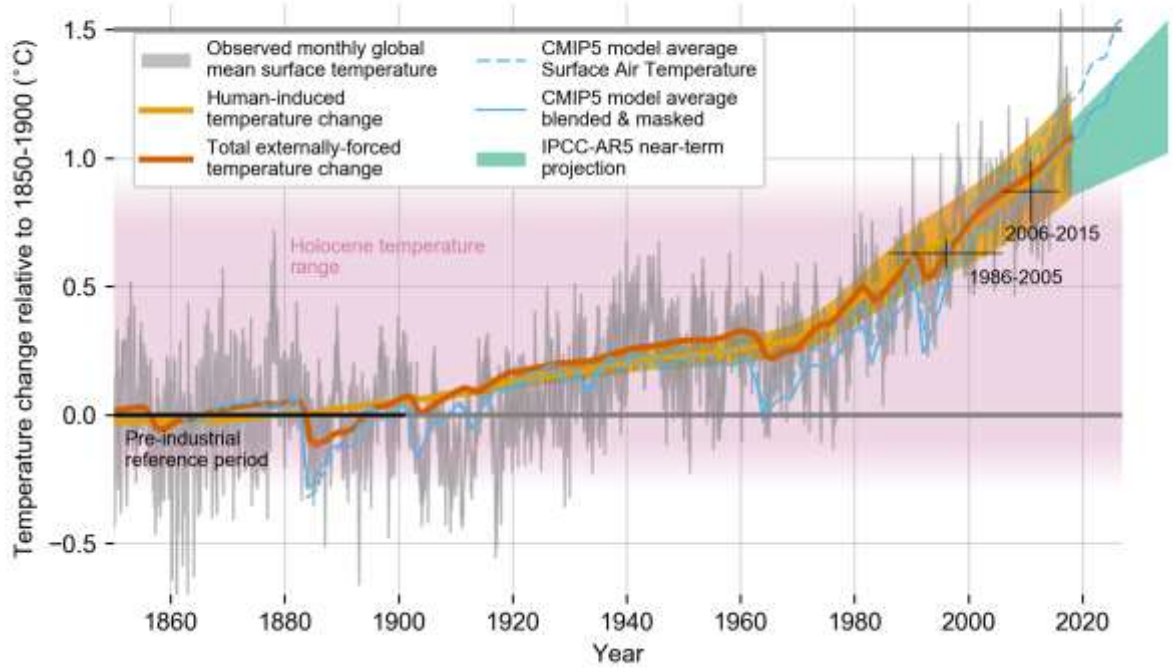

Climate


Natural Disasters
5%
4%
2%
10%
43%
36%
Flood
Cyclone
River Bank Erosion
Saline Water Intrusion
Earthquake
Other

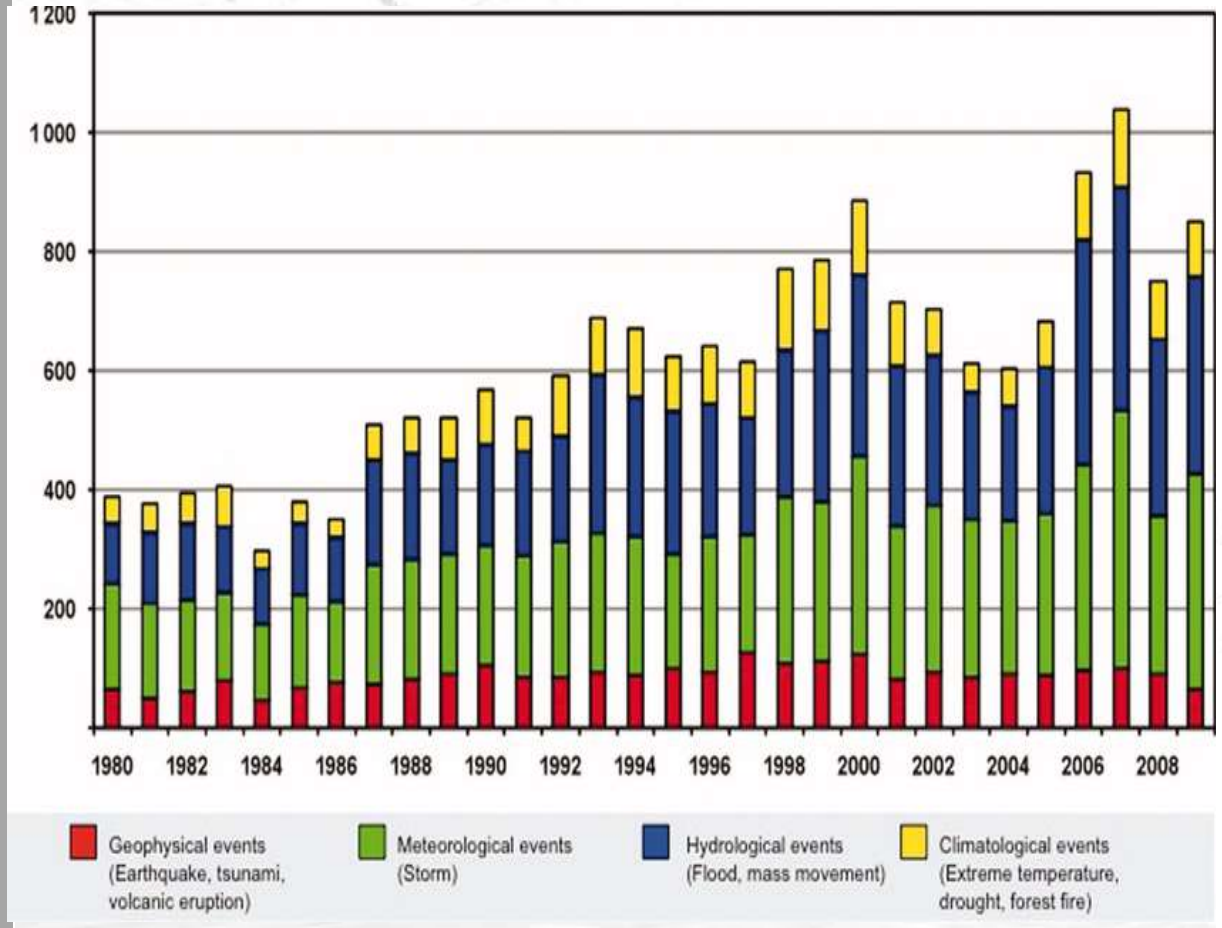

Climate Changes
Air Pollution
Mental Health

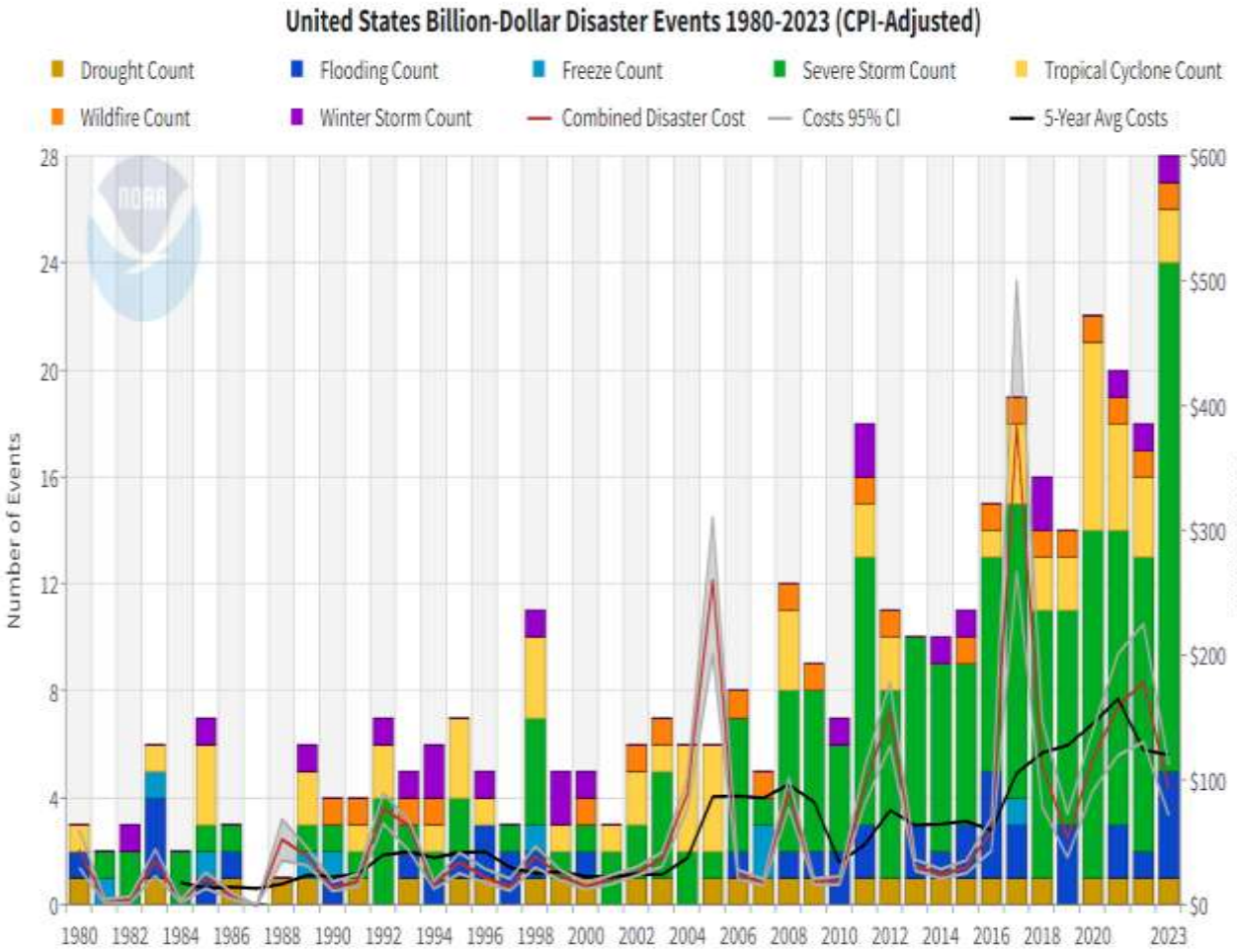
Change

1.1°C Global Temperature Rise Since 1880



432% Increase in Climate Disasters (1980-2020





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Climate Crisis & Workplace Safety

- 1.1°C rise in global temperature since 1880
- 432% increase in climate disasters (1980–2020)
- 70% increase in heat-related incidents (2010–2020)
- Workers’ safety directly linked to climate resilience

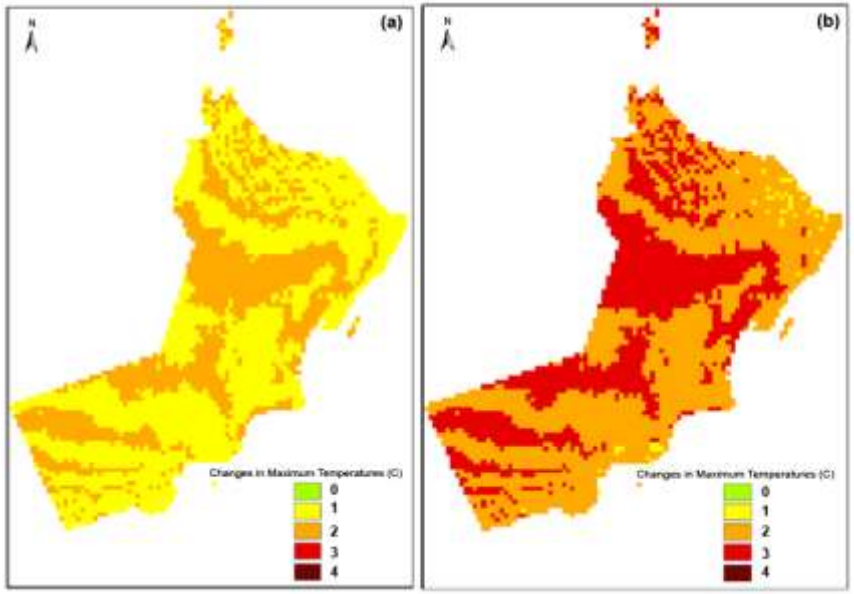
Extreme Weather Events and Safety Challenges

Increased frequency of extreme weather, such as **Extreme temperature-Hot /Cold**, **storms, flooding** and **poor air quality,** creates unique workplace hazards.

- Intensifies workplace hazards
- Workers' safety is directly linked to climate resilience
- **Traditional HSE frameworks must evolve**

Climate change and OSH

- Climate change is already having serious impacts on planetary health, human health and the world of work.
- Workers are frequently the **first to be exposed to the effects of climate change**, often for longer periods and at greater intensities (ILO 2023).
- Climate change effects can **lead to a deterioration of working conditions** and an increased **risk of occupational injury, disease and death** (Kiefer et al. 2016).
- Numerous health effects in workers may result, including injuries, cancer, cardiovascular disease, respiratory conditions, macular degeneration and mental health issues.



The impact of climate change on the world of work

- Climate change effects on OSH are unevenly distributed across regions and sectors.

- Workers particularly at risk:

emergency services, health care sector and public services

Unorganised Sector

Key climate change issues impacting workers' health and safety

Excessive Heat

Temperature-Related Hazards

Heat Stress & Heat Stroke

- 35+ cases per 100,000 workers annually
- 70% increase in heat-related incidents (2010-2020)
- Peak risk: 10 AM - 4 PM during summer months

Dehydration & Fatigue

- Cognitive performance drops 12% at 32°C
- 23% increase in workplace accidents
- Reduced manual dexterity and decision-making

- Rising global temperatures may result in more frequent and severe heatwaves
- Heat-related risks are influenced by environmental conditions, physical exertion and clothing
- **High risk jobs:** Outdoor workers in physically demanding jobs and indoor workers in poor ventilated workplaces where temperature is not regulated

At least **2.41 billion** workers exposed (ILO 2024)

22.85 million occupational injuries

18,970 work-related deaths

2.09 million DALYS in 2020 (ILO 2024)

Solar UV radiations

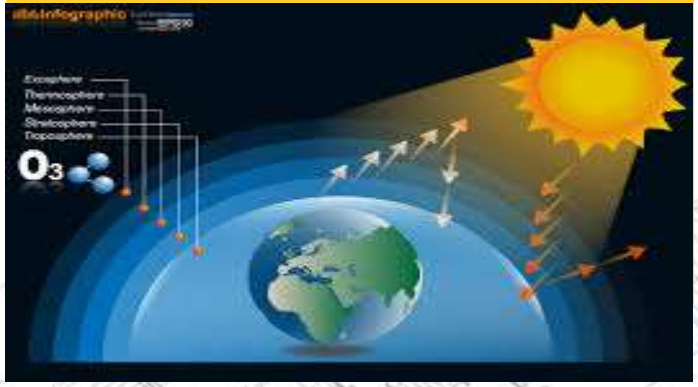
- Thinning of the ozone layer is impacting the quantity of solar UV radiation reaching earth
- Workers may unknowingly face dangerously high levels of solar radiation exposure
- **High risk jobs:** Outdoor workers
- **Primary health impacts:** Sunburn, eye damage, weakened immunity and various skin cancers

1.6 billion

workers exposed (Pega et al. 2023)

Over **18,960**

work-related deaths in 2019 due to non-melanoma skin cancer alone (Pega et al. 2023)



Extreme weather events

- Projected increases in the frequency, duration and intensity of extreme weather events (heat waves, winter storms, tropical cyclones, droughts and torrential rains)
- Possible consequences include wildfires, flooding, famines, major industrial accidents and water-borne diseases
- Workers may be exposed during the event, in the immediate aftermath or during clean-up operations
- **High risk jobs:** Emergency workers, workers involved in clean-up, agriculture workers and fishing workers
- **Primary health impacts:** Traumatic injury, burns, respiratory tract injury, diseases from biological hazards, toxic effects from chemicals, physical and emotional fatigue, anxiety, stress and PTSD

Severe Weather Events

•340% increase in extreme weather days

•Work stoppages: 15-25 days/year average

•Material damage: $2.3B annually

Limited data on occupational exposures

2.06 million

deaths due to weather, climate and water hazards (not just occupational exposures) from 1970 to 2019 (WMO 2021).

Work place Air pollution

- Modified weather patterns have influenced levels of both outdoor and indoor air pollutants.
- Greater exposures are observed for outdoor workers in areas with high levels of air pollution generated by heavy traffic or industries.
- **High risk jobs:** All workers, particularly outdoor workers, transport workers and firefighters.
- **Primary health impacts:** Cancer (lung), stroke, respiratory disease, cardiovascular disease and eye irritation.

Over 1.2 billion
workers exposed (WHO 2018)

860,000
work-related deaths (outdoor workers only) (ILO 2021a)

By 2060, 3.7 billion lost working days annually due to exposure to air pollutions (OECD 2016)

Air Quality Deterioration

- PM2.5 levels exceed WHO guidelines 180+ days/year
- Respiratory incidents up 45%
- Reduced visibility affecting crane operations

PM2.5 should not exceed 5 micrograms per cubic meter (µg/m³

Vector-borne diseases

- Climate change has been linked with an increased risk of vector-borne diseases in workers through:

- Effects on vector population sizes, survival rates and reproduction.
- Broader impacts on natural ecosystems and human systems e.g. changes in land use from droughts.

- **High risk jobs:** Outdoor workers.
- **Primary health impacts:** Malaria, Lyme disease, dengue, schistosomiasis, leishmaniasis, Chagas disease and African trypanosomiasis, among others.

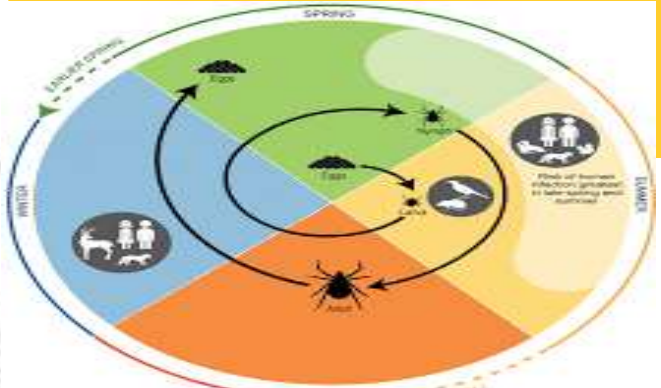
Limited data on occupational exposures

14,576

work-related deaths due to malaria (Takala et al. 2023)

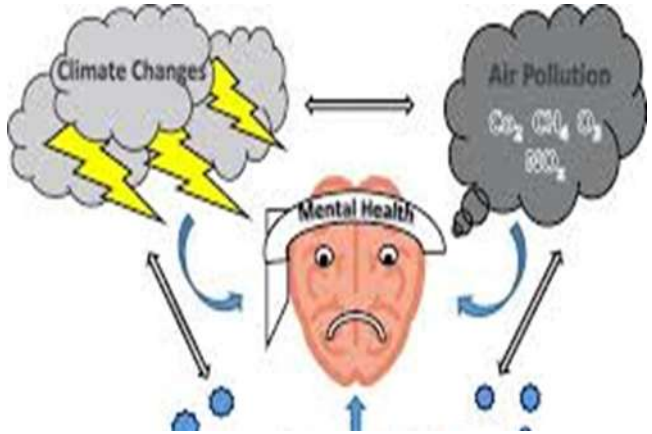
Over 700,000

deaths annually (not just occupational exposure) (WHO 2020).



Spotlight on Climate Change and Mental Health

- **Job insecurity due to climate change** can cause distress, especially in communities reliant on specific industries that will be impacted more significantly
- **Specific occupations** like those in disaster relief and recovery, construction, agriculture, and healthcare have been found to be particularly at risk for mental health issues due to climate change, including PTSD, depression and anxiety.
- Climate change impacts, such as excessive heat, can lead to **sleeping disorders, behavioral changes, and decreased concentration**, impacting work safety and productivity.

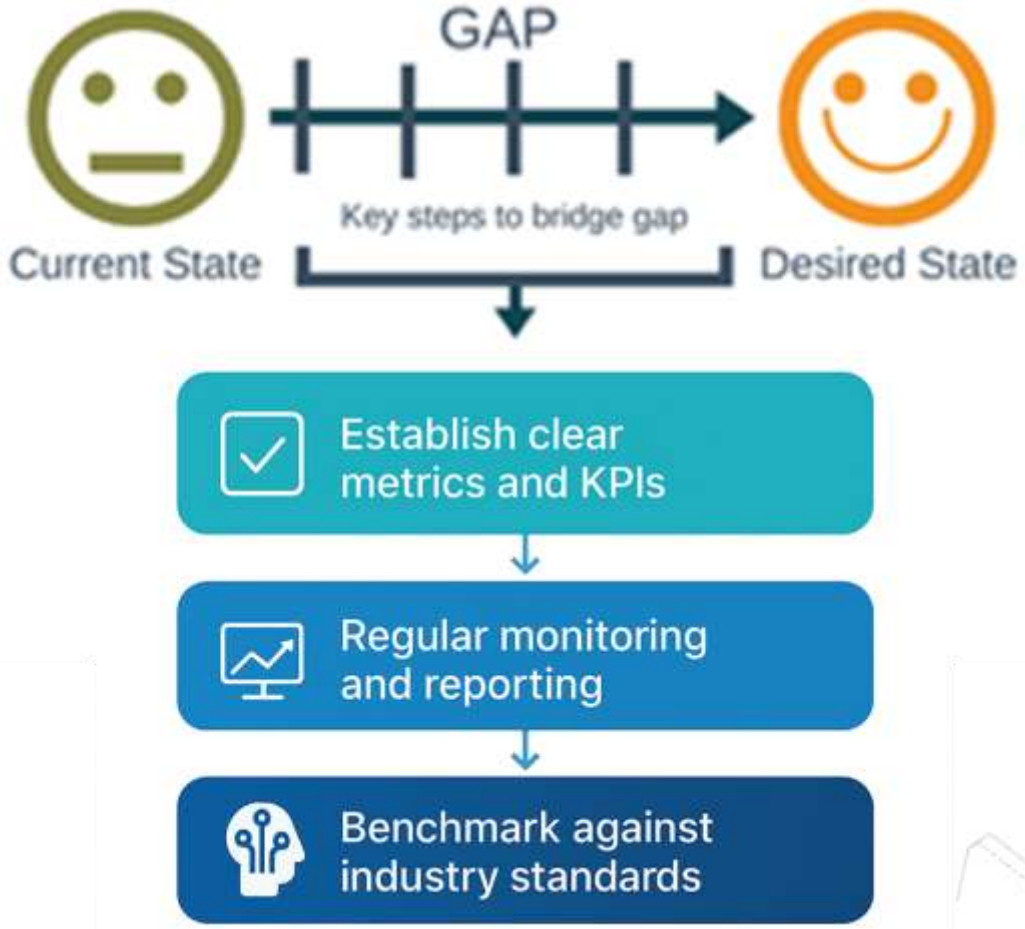


Adaptation Strategies

Current HSE Protocols – Gaps & Challenges

Protocols built for ‘normal’ condition not extremes

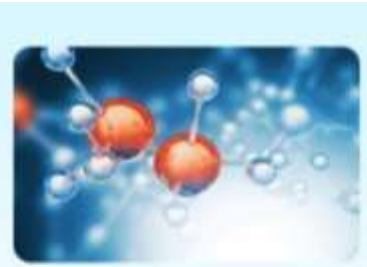
heat stress, wildfire smoke, flooding incidents



Need for climate-focused safety strategies

Adapting HSE Protocols

- Dynamic risk assessment models
- Work Planning
- Inspection and assurance Audits
- Emergency preparedness for climate risks
- Health Protection & prevention measures



Protect workers in a changing climate

- Promoting, respecting and realizing the fundamental principle and **right at work of a safe and healthy working environment** means also **addressing dangerous climate change impacts** in the workplace.
- Protect workers against the different **workplace hazards and risks**, including those related **to climate change**.
- Just Transition towards Environmentally Sustainable Economies and Societies for All can be used to ensure that **no workers are left behind during the transition to a green economy**.
- OSH concerns related to climate change should be positioned high on **global and national policy agendas**.
- Implementation of **OSH measures** for workers affected by climate risks.

Existing international labour standards and codes of practice related to climate change and OSH

General climate-related OSH hazards

- Occupational Safety and Health Convention, 1981 (No. 155)
- Occupational Safety and Health Recommendation, 1981 (No. 164)
- Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)
- Promotional Framework for Occupational Safety and Health Recommendation, 2006 (No. 197)
- List of Occupational Diseases Recommendation, 2002 (No. 194)
- Hygiene (Commerce and Office) Recommendation, 1964 (No. 120)
- Protection of Workers' Health Recommendation, 1953 (No. 97)
- Workers' Housing Recommendation, 1961 (No. 115)
- Safety and health in ports (2018)
- Safety and health in forestry (1998)
- Safety and health in construction (1992)
- Safety and health in opencast mines (1991)
- Safety and health in shipbuilding and ship repair (revised 2019)
- Reduction of Hours of Work Recommendation, 1962 (No. 116)
- Occupational Health Services Convention, 1985 (No. 161)
- Safety and Health in Agriculture Recommendation, 2001 (No. 192)

Excessive heat

- Ambient factors in the workplace (2001)
- Plantations Convention, 1958 (No. 110)

Ultraviolet (UV) radiation

- Ambient factors in the workplace (2001)

Air pollution

- Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148)
- Working Environment (Air Pollution, Noise and Vibration) Recommendation, 1977 (No. 156)

Extreme weather events

- Prevention of Major Industrial Accidents Convention, 1993 (No. 174)
- Prevention of Major Industrial Accidents Recommendation, 1993 (No. 181)
- Employment and Decent Work for Peace and Resilience Recommendation, 2017 (No. 205)

Vector-borne diseases

- Workers' Housing Recommendation, 1961 (No. 115)
- Technical guidelines on biological hazards in the working environment

Agrochemicals

- Chemicals Convention, 1990 (No. 170)
- Chemicals Recommendation, 1990 (No. 177)
- Safety and Health in Agriculture Convention, 2001 (No. 184)
- Safety and health in agriculture (2010)
- Safety in the use of chemicals at work (1993)

Laws and regulations

- OSH legislations have historically addressed the protection of workers against **extreme temperature**, **non-ionizing radiation** (including solar UV radiation), **air pollution**, **biological hazards** (including vector-borne diseases) and **hazardous chemicals** (including agrochemicals).
- Some OSH laws also refer to the **protection of workers during extreme weather events** and natural disasters, requiring workplace emergency response plans.
- Sometimes, legislation may **require the employer to perform risk assessment** and to adopt some specific measures (e.g., acclimatization, hydration, ventilation, breaks, information and training, PPE and safety equipment, and other control measures).
- **Occupational exposure limits** have been adopted in some countries for exposure **to heat and to air pollutants**, but are very rare for other hazards, such as solar UV radiation or agrochemicals.
- In some countries, OSH legislation provides for **regular medical surveillance** for prevention or early recognition of the diseases associated with heat, solar UV radiation, air pollution, vector-borne diseases and agrochemicals
- Some countries include in the **national list of occupational diseases** heat-related diseases, diseases caused by solar UV radiation, diseases caused by biological hazards and/or pesticide-related disorders.

National responses to key climate change issues

Legal & National Frameworks

- Oman MD 286/2008: Ban on midday outdoor work (12:30–3:30, June–Aug)
- OSH laws cover heat stress, UV exposure, air pollution & chemicals
- Need for updated climate-integrated safety regulations
- Promote 'Just Transition' to ensure no workers are left behind

Climate Risk Assessment Matrix

Integrated Climate-HSE Risk Framework

Environmental Monitoring Real-time weather data integration with HSE management systems

Vulnerability Assessment
Worker exposure mapping based on task duration and intensity

Adaptive Controls Dynamic safety protocols triggered by environmental thresholds

LOW	MEDIUM	HIGH	EXTREME
Continue Normal Operations	Enhanced Monitoring	Protective Measures	Work Suspension

Comprehensive Heat Stress Management

Hydration Protocols

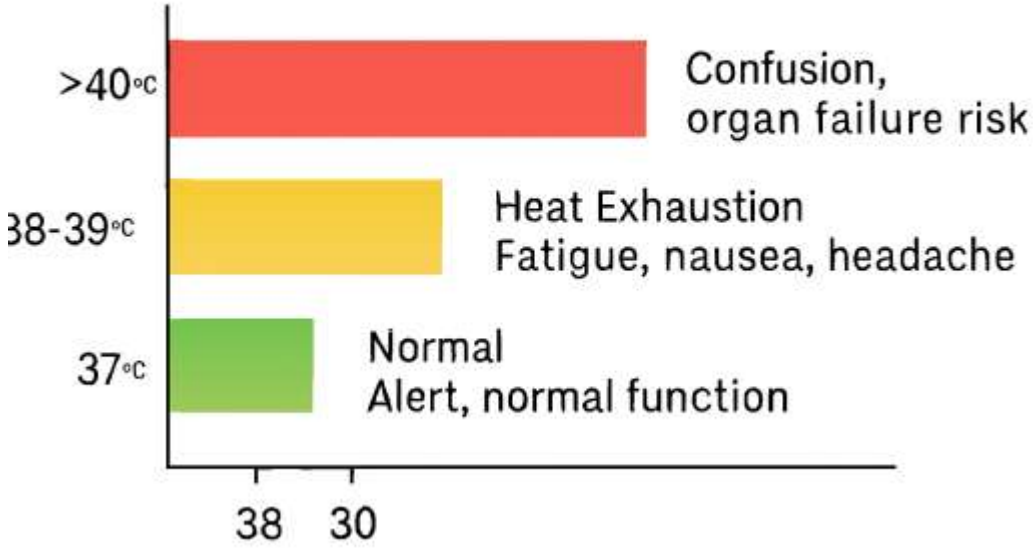
- Pre-hydration: 500ml 2 hours before
- During work: 200ml every 15–20 minutes
- Electrolyte replacement for >2 hour exposure

Cooling Infrastructure

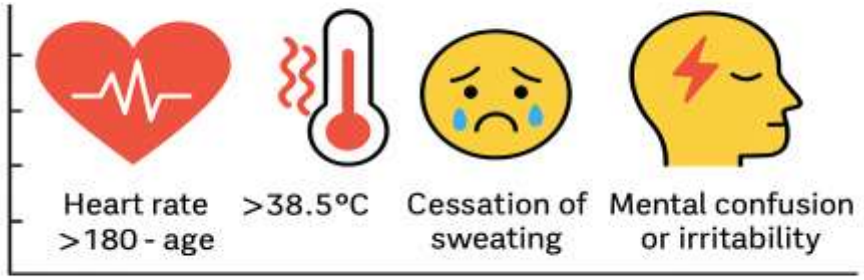
- Misting systems at work zones
- Climate-controlled rest areas
- Ice vests for extreme conditions

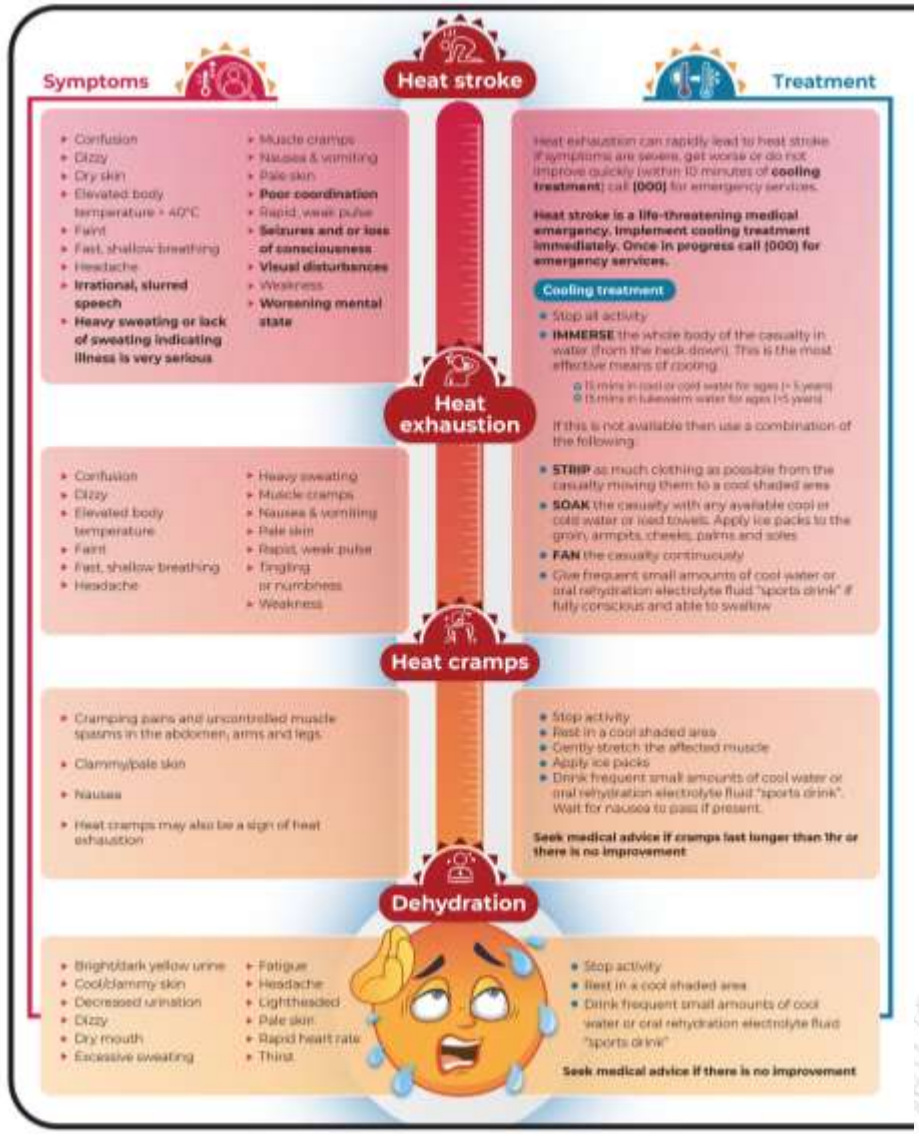
Monitoring & Response

Heat Illness Progression



Early Warning Indicators





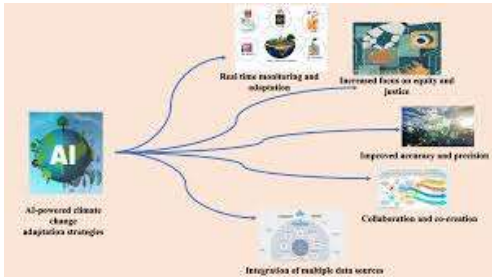
Technology-Enabled Climate Adaptation

Wearable Technology

- Real-time biometric monitoring
- Core temperature sensors
- Heart rate variability tracking
- Automated alert systems

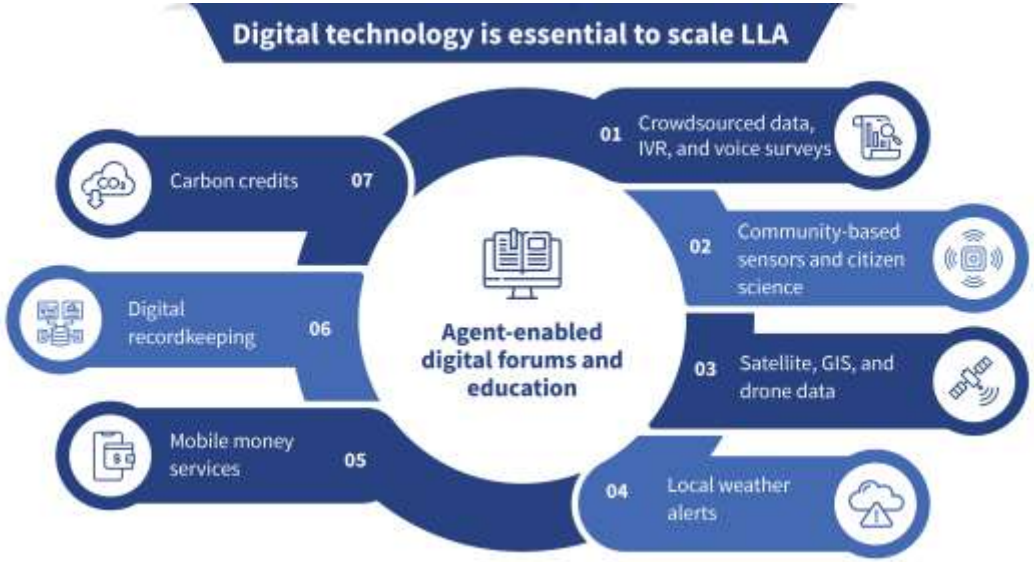
Weather Intelligence

- Hyperlocal weather forecasting
- WBGT calculations
- Air quality monitoring
- Storm tracking integration



AI-Powered Analytics

- Predictive risk modeling
- Dynamic schedule optimization
- Resource allocation algorithms
- Incident pattern analysis



Enhanced Emergency Response Protocols

Climate-Adaptive Emergency Response Framework

Tier 1: Environmental Monitoring - Continuous weather surveillance with 15-minute update intervals

Tier 2: Early Warning System - Automated alerts when conditions approach critical thresholds

Tier 3: Rapid Response - Pre-positioned resources and trained response teams

Emergency Triggers:	**Response Capabilities**:
Heat Emergency	**Medical Response**
•WBGT >35°C for >2 hours	•On-site paramedics trained in heat illness
•Multiple heat exhaustion cases	•Rapid cooling equipment available
•Equipment failure in extreme heat	•Direct helicopter evacuation protocols
Severe Weather	**Communication Systems**
•Wind speeds >60 km/h	•Multi-channel alert systems
•Lightning within 10km radius	•Real-time worker location tracking
•Visibility <100m due to dust/smoke	•Integration with local emergency services

Training and Culture Development

🎓 Climate-Aware Training Programs

Leadership Development
- Climate risk assessment certification
- Adaptive decision-making workshops
- Emergency response leadership training

Worker Education
- Heat illness recognition and response
- Personal protective strategies
- Technology utilization training

Supervisor Skills
- Environmental monitoring interpretation
- Work modification protocols
- Team wellness management

Building Safety Culture

Communication Strategies
- Regular climate briefings
- Two-way feedback systems
- Success story sharing

Engagement Initiatives
- Worker climate safety committees
- Suggestion and improvement programs
- Recognition and reward systems

Behavioral Change
- Peer support networks
- Mentorship programs
- Continuous learning culture

Key takeaways

The Future of Workplace Safety is Climate-Adaptive

- Climate change is a current reality, not a future risk
- Adapt HSE protocols now to protect workers

Best Practices and Recommendations

Technology + Training + Policy = Safer workplaces

Key Recommendations :

1. **Begin climate risk assessment immediately** - Don't wait for regulatory requirements
2. **Invest in worker education and engagement** - Technology alone is insufficient
3. **Collaborate with industry peers** - Share best practices and lessons learned
4. **Plan for long-term adaptation** - Climate change is a permanent challenge
5. **Measure and communicate success** - Build business case for continued investment


CLIMATE RESILIENCE IS NOT OPTIONAL — IT IS CRITICAL FOR WORKPLACE SAFETY
ADAPT, INNOVATE, AND PROTECT WORKERS


WORLD DAY FOR SAFETY AND HEALTH AT WORK

Thank You

Email: neelesh.sogani@altasnim.com
Website: altasnim.com