

## Climate and Health Resource Bank - General Resources

Risk Monitoring Tools		Global	Regional	National	Health
<a href="#">EM-DAT</a>	Database that provides current and historical information on disasters around the world from 1900 to present.	•			
<a href="#">WMO Climate Data and Monitoring Products</a>	Provides links to and information on data and monitoring products relevant to climate and weather	•			
<a href="#">International Research Institute for Climate and Society Data Library</a>	Multiple datasets for different climate and environmental variables from multiple sources (e.g. NASA, NOAA, etc.) as well as a Health and Climate Maproom with tools and forecasts specific to certain health concerns.	•	•	•	•
<a href="#">FEWS NET</a>	Provides near-real time information on food insecurity per country and/or region. A data portal allows you to access environmental monitoring data for the globe and 5 different regions.	•	•		
<a href="#">Climate Explorer – Human Health</a>	Provides weekly up-to date information on current drought conditions in the U.S. Includes an interactive map that has different climate threats layers and datasets that impact people and assests.			•	•
<a href="#">U.S. Global Change Research Program</a>	Provides multiple datasets on weather, climate, and environmental variables for at different temporal and spatial scales.	•	•	•	
<a href="#">European Environment Agency</a>	Offers multiple datasets and maps (historical and modeled) pertaining to different variables relating to the environment, climate, and health.		•		•
<a href="#">Metadata Access Tool for Climate and Health (MATCH)</a>	Searchable repository of U.S. federal climate and health metadata and links to datasets. Metadata ranges from local to global scales.	•	•	•	•
<a href="#">Global Disaster Alert and Coordination System</a>	Provides information on current disasters around the world. Global map depicts disaster alerts that have occurred in the past 4 days. Also includes extensive information, resources, and links to <a href="#">other data</a> and information.	•			
<a href="#">Global Risk Data Platform</a>	Data platform that provides spatial data information on global risk from natural hazards. Users have the ability to visualize, download, or extract data on past hazards (e.g. tropical cyclones, drought, floods, biomass fires). Also includes information on human economical hazard exposure and risk from natural hazards.	•			
<a href="#">Global Climate Observing System (GCOS)</a>	Observations and monitoring data for different climate, weather, and environmental variables. Also provides resources and links to partner observing networks.	•			
Risk Forecasting Tools		Global	Regional	National	Health
<a href="#">Meteoalarm</a>	Provides extreme weather (e.g. heavy rain, floods, extreme heat, etc.) warnings and alerts for Europe. Information is displayed on an interactive map with available		•		

	reports and warnings that can be downloaded for each country that have high alerts.			
<a href="#">Climate map explorer – Drought Frequency</a>	This product is a drought frequency viewer that allows the user to interactively change timescales, emissions scenarios, and more to see how global drought frequency is projected to change in the future.	•		
<a href="#">Global Integrated Drought Monitoring and Prediction System (GIDMaPS)</a>	Provides near real-time information on drought conditions across the globe and seasonal predictions.	•		
<a href="#">Center for Ocean-Land-Atmosphere Studies Weather and Climate Data</a>	Provide short-term temperature outlooks for two different periods (0-8 days out and 9-16 days out) for 11 different regions around the world, plus departures from the mean from the first 8-day period.		•	
<a href="#">European Climate Adaptation Platform – Map Viewer</a>	Interactive web map viewer that includes multiple layers of data that can be overlaid. Includes multiple climate projections based on different models and scales, e.g., precipitation, temperature) as well as vulnerability layers.		•	
<a href="#">Government of Canada Temperature and Precipitation Probabilistic Forecasts</a>	Temperature and precipitation probabilistic forecasts for Canada for 1-3, 2-4, 4-6, 7-9, and 10-12 month lead times. Can view current issued forecasts as well as ones issued in the previous one to two months. Forecasts are issued in map format with accompanying model reliability assessments.			•
<a href="#">U.S. Hazards Outlook</a>	NOAA's Climate Prediction Center issues a hazards outlook every day for the U.S. Provides 3-7 day and 8-14 day outlooks using precipitation, temperature, and soils data. They provide outlook for 15 different hazards using a web-based map as well as stationary maps issued for the categorical and probabilistic outlooks. A summary of the forecasts is also given.			•
<a href="#">National Weather Service – National Forecast Maps</a>	Issues U.S. forecasts at varying temporal scales for multiple weather variables, e.g. temperature, precipitation amounts, chance of precipitation, wind speed and direction, etc.			•
<a href="#">ASEAN Specialised Meteorological Centre</a>	Issues a seasonal forecast for the ASEAN region and provides a summary of the forecast along with information and expected impacts due to El Niño/La Niña.		•	
<a href="#">Somalia Water and Land Information Management (SWALIM)</a>	Issues flood and drought alerts and bulletins as well as rainfall forecasts for Somalia. In addition, they provide 4 online data catalogues and repositories for various weather, climate, and environmental data pertaining to Somalia.			•

Risk Management and Communication Tools		Global	Regional	National	Health
<b>Guidance Documents</b>					
<a href="#">IPCC's Fifth Assessment Report</a>	Fifth Assessment of the Intergovernmental Panel on climate change. Extensive assessment that details the current state of the climate and future projections.	•	•		•

<b>Web Resources</b>		
<a href="#">U.S. Climate Resilience Toolkit</a>	Provides information (resources and guidance documents) on how to build health care sector resilience in the face of climate change.	•
<a href="#">U.S. Global Change Research Program</a>	Repository of reports, assessments, resources, data, and multimedia all pertaining to climate change. Includes special collections and resources on public health impacts, adaptation, education, and coastal resilience.	•
<a href="#">NRDC Climate Change Threatens Health</a>	Covers the most serious public health threats to the U.S. from climate change. Includes information on extreme events, vectorborne diseases, and air quality. Provides links and resources to maps, reports, and assessments on these topics.	•
<a href="#">WHO Climate change and health fact sheet</a>	Provides background information on the impacts of climate change on health with links and information to pertinent documents and resources.	•
<a href="#">PAHO/WHO - Knowledge Center on Public Health and Disasters</a>	Provides a wealth of information on topics related to natural disasters and public health. Geared for Latin American and Caribbean region.	•
<a href="#">Pacific Disaster Center</a>	Provides resources on different hazards to help prepare the public and educate them on what actions they can take before, during, and after an event to minimize impact.	•
<a href="#">Neglected Infectious Diseases (EID) in the region of the Americas</a>	Interactive web map providing information and data on infectious diseases in the Americas.	•
<a href="#">Environmental and Health information System (ENHIS)</a>	Interactive database providing information and data for WHO European Region to support public health and environmental policies.	•
<a href="#">GRID-Arendal – Environmental Knowledge for Change</a>	Website provides numerous publications on a range of topics dealing with climate and environmental issues.	•
<b>Key Relevant Programs and Partners</b>		
<a href="#">World Bank</a>	Committed to bold action on climate change in its goal to eliminate extreme poverty and boosting shared prosperity.	•

## Part 2. Extreme Heat Monitoring and Forecasting Tools useful for Health Risk Assessment

Risk Monitoring Tools		Global	Regional	National	Health
<a href="#">Heat-Health Watch – UK</a>	Service operates annually between June and mid-September to forecast maximum day and nighttime temperatures and monitor temperatures. Once a heat threshold is passed, warnings are sent to health professionals and updated on their website			•	•
<a href="#">France’s Heat Health Watch Warning System</a>	Advisories and monitoring of high temperatures occurs in France between June and August. The Met service coordinates and collaborates with the Ministry of Health to issue warnings about potential heatwaves.			•	•
<a href="#">Heatwave Service for Australia – Bureau of Meteorology</a>	National heatwave monitoring and forecasting service for Australia. Provides monitoring from the past two three day periods and forecasts heatwaves for the next three to five days.			•	•
<a href="#">National Weather Service – National Oceanic and Atmospheric Administration</a>	Heat-health warning system for the U.S. Each NWS Forecast Office issues a specific one for their region. They also provide a contiguous <a href="#">U.S. forecast map</a> of maximum and minimum temperatures in real-time and <a href="#">maximum heat index forecasts</a> .			•	
Risk Forecasting Tools		Global	Regional	National	Health
<a href="#">Extreme Heat Risk Map (EEA)</a>	Online interactive GIS map of the heatwave risk of European cities based on historical data and climate change projections.		•		
<a href="#">EuroHEAT</a>	Medium range heatwave forecasts for Europe for 1-9 day lead times. Forecasts are updated each day and issued for the next 9 days. The forecasts from the past nine days are also available so users can monitor the development of the event.		•		
<a href="#">Meteoalarm</a>	Provides extreme heat warnings and alerts for Europe. Information is displayed on an interactive map with available reports and warnings that can be downloaded for each country that have high alerts.		•		
<a href="#">Climate Prediction Center - NOAA</a>	Provides forecasts for excessive heat and above normal temperatures for the United States at 3-7 day lead times.			•	

### 3. Resources for Health Risk Management during Extreme Heat

Risk Management and Communication Tools		Global	Regional	National	Health
<b>Guidance Documents</b>					
<a href="#">Communicating the Health Risks of Extreme Heat Events</a>	Document for health professionals and emergency managers about how to best communicate the risks of extreme heat.			•	•
<a href="#">Heatwave Plan for England</a>	Provides information about extreme heat and health in England so that people can prepare for, know where to find alerts, and prevent health issues associated with heatwaves.			•	•
<a href="#">Heatwave Plan Ahmedabad India</a>	Document discusses how to build awareness, initiate warnings and coordination, build capacity in the health sector, and reduce heat exposure in India.			•	•
<a href="#">WHO/WMO Heatwaves and Health: Guidance on Warning-System Development</a>	Guidance document for practitioners, National Meteorological and Hydrological Services (NMHSs), and National Health Services (NHSs) surrounding extreme heat and how to prepare for and develop heat health warning systems.	•			•
<a href="#">WMO Guidelines on Biometeorology and Air Quality Forecasts</a>	Guidance document for NMHSs on methods of incorporating biometeorology and air quality forecasts into their products and services.	•			
<a href="#">WHO/WMO Atlas of Health and Climate</a>	Provides scientific information on the connection between weather and climate and health challenges.				
<a href="#">WHO Heat Health Action Plans</a>	Guidance document for improving public health response to heatwaves through the development of heat-health action plans.	•	•	•	•
<a href="#">CDC's Climate Change and Extreme Events</a>	Provides information of how to prepare and respond to extreme events, including extreme heat.			•	•
<b>Web Resources</b>					
<a href="#">Extreme Heat Toolkit for Health Sector (HealthCanada)</a>	Provides information about extreme heat and health including brochures, reports, and guidebooks.	•		•	•

<a href="#">CDC's Extreme Heat and Your Health</a>	Supplies information on how individuals can protect themselves from extreme heat as well as provides resources for public health professionals.	•	•	•
<a href="#">Disaster Information Management Research Center</a>	Provides resources and information pertaining to extreme heat and health.	•	•	•
<a href="#">Environmental Protection Agency</a>	Tips and resources for preparing for and dealing with extreme heat.		•	•
<a href="#">National Oceanic and Atmospheric Administration</a>	U.S. Climate Resilience Toolkit – Extreme Heat. Presents information on the background of extreme heat in the U.S. and its impacts on health. Provides links to featured tools and case studies in the U.S.		•	•
<a href="#">Natural Resources Defense Council (NRDC) – Extreme Heat</a>	Provides information on extreme heat and health, along with maps of the U.S. depicting heat exposure, and resources on the topic. <a href="#">Future risks to health.</a>		•	•
<b>Key Relevant Programs and Partners</b>				
<a href="#">World Meteorological Organization</a>	Supports the health sector with weather and climate science tools, services, and resources.	•		
<a href="#">World Health Organization</a>	Provides support to improve health outcomes for countries around the world.	•		•
<a href="#">Centers for Disease Control and Prevention</a>	Provides health information in relation to extreme heat and guidance on how to prepare, respond, and stay safe during heatwaves		•	•
<a href="#">Health Canada</a>	Provides sound scientific knowledge and communicates public health threats to promote and support healthier lives.		•	•
<a href="#">National Oceanic and Atmospheric Administration</a>	Climate Program Office seeks to understand, communicate, and educate the risks associated with extreme heat.		•	•
<a href="#">UK MET Office</a>	Provides health forecasts for health conditions that are affected by weather in order to help people take preventative action.		•	•



## 2. Air Quality Monitoring and Forecasting Tools useful for Health Risk Assessment

Risk Monitoring Tools		Global	Regional	National	Health
<a href="#">WHO Ambient air pollution in Cities Database</a>	WHO database for ambient air pollution monitoring from cities and countries around the world depicting annual mean concentration of particulate matter (particles smaller than 10 or 2.5 microns) for 2008 to 2013. Contains data from around 1600 cities and 91 countries.	•			
<a href="#">WHO Global Health Observatory Map Gallery – Environment and Health</a>	Provides global maps that display information regarding exposure and percentage of population to different air pollution metrics (e.g. population using solid fuels, exposure to particulate matter, etc.).	•			•
<a href="#">Environmental Protection Agency Air Quality System Data Mart</a>	Multiple datasets and visualization maps for air quality measurements over the United States.			•	
<a href="#">Tropospheric Emission Monitoring Internet Service (TEMIS)</a>	Air pollution and ozone near-real time data.	•			
<a href="#">Global Ozone Maps</a>	Current day ozone maps and archives for different spatial scales – global, northern hemisphere, and southern hemisphere.	•			
<a href="#">Satellite Measurements from Polar Orbit (SAMPO)</a>	Real-time satellite data (~15 minutes delayed from satellite passover) of northern hemisphere air pollution data (e.g. ozone and sulfur dioxide).	•			
<a href="#">European Environment Agency Air Pollution Data Centre</a>	Air pollution data from different sources and measured ambient air pollution across Europe. Products include datasets, maps, interactive maps, air pollution indicators, and graphs.		•		
<a href="#">Local Air Quality and Health Index - Government of Canada</a>	Canada's Air Quality Health Index for cities and provinces around the country. Provides real-time monitoring as well as forecasts for the next 18 hours coupled with health messages.			•	•
<a href="#">Singapore Governments' National Environment Agency Haze Updates</a>	Singapore's monitoring of haze and health advisories. Provides 24-hour Pollutant Standards Index (PSI) that includes health advisories and recommendations for sub-populations. Includes historical PSI data and hotspot and <a href="#">satellite images</a> over Southeast Asia.		•	•	•
<a href="#">ASEAN HAZE Action Online – Haze Hotspot Map</a>	Daily hotspot maps derived from NOAA satellites for the Association of Southeast Asian Nations (ASEAN) Member States.		•		
<a href="#">ASEAN Specialised Meteorological Centre</a>	Provides air quality data for the past 7 days in cities within the ASEAN Member States. Measurements are based on 24-hour PM <sub>10</sub> concentration.		•		•
Risk Forecasting Tools		Global	Regional	National	Health
<a href="#">NASA Ozone and Air Quality Data</a>	NASA data repository containing multiple datasets for ozone and air	•			•



	quality measurements and includes highlights from around the world about pollution hazards and alerts. Temporal scale of data ranges from the 1970s to present day.			
<a href="#">AirNow</a>	Provides current maps of air quality for the United States and Canada through the Air Quality Index (AQI), which combines particulate matter and ozone measurements). Maps are translated into language and visuals that enable the public and stakeholders to take action to protect human health. Additionally, the site provides forecasts of AQI for the current day.	•	•	•
<a href="#">AirNow International</a>	Based off the US EPA AirNow framework, AirNow International provides links to countries that use their platform to deliver current air quality measurements.	•		
<a href="#">Ozone Forecasts provided by Environment Canada</a>	Forecast maps of total ozone and deviations from normal ozone for multiple spatial scales (global, northern hemisphere, southern hemisphere).	•		
<a href="#">WMO Global Atmospheric Watch</a>	Contains multiple links to relevant data sites provided by numerous organizations around the world. Additionally, GAW serves as an early warning system with the ability to detect changes in atmospheric concentrations (e.g. acidity and toxicity of rain and atmospheric content of aerosols).	•		
<a href="#">CPTEC – Air Quality Forecasts</a>	Provides air quality forecasts for South America. Includes different forecast lead times and monitoring of different pollutants (e.g. Carbon Monoxide, Ozone, and Nitrogen Oxides).	•	•	
<a href="#">World Air Quality Forecasts</a>	Provides air quality forecasts (8-day forecasts) based on the AQI standard are computed and updated daily. Also includes regional forecasts for Asia, Europe and South America.	•	•	•
<a href="#">Copernicus Atmospheric Monitoring Service</a>	Air quality forecasts for Europe depicting concentration of atmospheric pollutants. Products come in 3 different formats (hourly ensemble maps, daily mean and maximum, and EPSgrams) with up to a 4-day lead-time.		•	
<a href="#">Air Korea Air Quality Forecast</a>	Provides air pollution and ozone forecasts (only available between 15 April and 15 October) along with ratings and recommendations for public action tips. Air Korea also provides <a href="#">Air Quality Alerts</a> .		•	•

### 3. Resources for Health Risk Management for Air Quality

Risk Management and Communication Tools		Global	Regional	National	Health
<b>Guidance Documents</b>					
<a href="#">WMO Guidelines on Biometeorology and Air Quality Forecasts</a>	Guidance document for NMHSs on methods of incorporating biometeorology and air quality forecasts into their products and services.	•			•
<a href="#">WHO Air Quality Guidelines for particulate matter, ozone, nitrogen dioxide, and sulfur dioxide, Global Update 2005</a>	Guidelines for reducing the health impacts of air quality.	•			•
<a href="#">Health Risk Assessment of Air Pollution</a>	Provides information on the concept of air pollution health risk assessments and gives an overview of general principles.	•			•
<a href="#">WHO Air Quality and Health Questions and Answer</a>	Question and answer guide that affords information on background information and provides links to WHO guidance documents and reports on air quality.	•			•
<a href="#">Air Quality in Latin America: An Overview</a>	Report by the Clean Air Institute on the challenges and recommendations associated with air pollution in Latin America.		•		•
<a href="#">WHO Europe - Health effects of transport-related air pollution</a>	Report on the health effects caused by transport-related air pollution in the Europe. Guide to help WHO Member States protect human health and the environment, and encourage changes in public behavior and management of transport demands and urban planning.	•	•		•
<a href="#">ASEAN Cooperation on Transboundary Haze Pollution</a>	Document pertaining to the regional haze agreement by the ASEAN Member States. This was the first regional agreement on tackling transboundary haze pollution and serves as a role model for transboundary issues.		•		
<b>Web Resources</b>					
<a href="#">WMO Air Quality and Human Health Bulletin</a>	Provides information on air quality and human health along with the role of the health and meteorological communities in developing climate services.	•			•
<a href="#">WMO's List of Global Research and Monitoring Reports</a>	List of Global Atmospheric Watch research and	•			

	monitoring products.		
<a href="#">Environmental Protection Agency – Air Quality</a>	Provides information and resources on air quality policies, standards, pollutants, and more.	•	
<a href="#">WHO Europe</a>	Air quality information, resources, and publications for Europe.	•	•
<a href="#">WHO - Public health, environmental and social determinants of health (PHE)</a>	Contains documents that outline the mortality due to indoor and outdoor air pollution as well as links to the Global Health Observatory.	•	•
<a href="#">CDC – National Environmental Public Health Tracking</a>	Provides information on the health impacts from outdoor air pollution. Additionally, they provide links to data resources, other government agencies that work on this subject, and supplementary resources.	•	•
<b>Key Relevant Programs and Partners</b>			
<a href="#">World Meteorological Organization</a>	Global Atmosphere Watch is a program of the WMO that works with its partners to monitor the chemical composition of the atmosphere (natural and anthropogenic), understand the interactions between different aspects of the natural world, and risk reduction of air pollution on health.	•	•
<a href="#">Centers for Disease Control and Prevention</a>	Communicates and studies the effect air quality has on public health in the United States.	•	•
<a href="#">World Health Organization</a>	Studies and communicates the burden of diseases from indoor and outdoor air pollution to improve health.	•	•
<a href="#">National Institutes of Health</a>	National Institute for Environmental Health Services program studies the environmental impacts on health in order to promote healthier lives.	•	•
<a href="#">ASEAN – Haze Action Online</a>	Regional organization that is tackling transboundary haze issues within ASEAN Member States.	•	•

## 2. Ecological Change Monitoring and Forecasting Tools useful for Health Risk Assessment

Risk Monitoring Tools		Global	Regional	National	Health
<a href="#">International Research Institute for Climate and Society Maprooms – Climate and Health</a>	The Malaria Early Warning System under the Climate and Health Maproom produced by the IRI Data Library includes different environmental datasets (such as land surface temperature and precipitation) for monitoring conditions that are associated with malaria risk in Africa.		•		•
<a href="#">G3 Geoportal – European Environment and Epidemiology Network</a>	Online portal for the exchange of epidemiological and environmental data for Europe.		•		•
<a href="#">NOAA Harmful Algal BloomS Observing System</a>	Data collection service for harmful algal bloom information in Gulf of Mexico that provides monitoring information (environmental variables and cell counts) on a web-based ArcGIS <a href="#">map</a> .		•		
<a href="#">Harmful Algae Event Database (HAEDAT)</a>	Meta database that contains records of harmful algal events in the North Atlantic and North Pacific and provides <a href="#">maps</a> of past events for each region and toxin.		•		•
<a href="#">Regional Visualization and Monitoring System for MesoAmerica</a>	Monitors in near-real time Red Tide conditions over MesoAmerica using an interactive map.		•		
<a href="#">Global Land Cover Facility – Landsat Forest Cover Change</a>	Monitors changes in forest cover using Landsat satellite imagery at 30 meters spatial resolution.	•			
<a href="#">Fire Information for Resource Management System (FIRMS)</a>	Provides data for active fires in near-real time (~4 hour delay from satellite passover) with global coverage in downloadable files or in an interactive <a href="#">Web Fire Mapper</a> . Additionally, users can sign up for fire email alerts in near-real time or in daily or weekly summaries in their region of choice.	•			
<a href="#">Fire Alert System for Mexico</a>	Near-real time active fire map for Mexico. Web map includes multiple data layers (e.g. heat points, ground cover, vegetation anomalies, regional fire management centers), information on satellite data, and option for real-time warnings of hot spots in specific states.			•	
<a href="#">Global Forest Watch</a>	Interactive map that displays data for forest change, land cover, land use, and conservation. Satellite imagery and products are provided from private and public entities (e.g. NASA, Google, USGS).	•			
Risk Forecasting Tools		Global	Regional	National	Health

<a href="#">Malaria Early Warning System</a>	International Research Institute for Climate and Society's Malaria Early Warning System for Africa and provides information on products used in the prediction of malaria outbreaks.	•		•
<a href="#">Ethiopian Malaria Early Warning System</a>	Provides maps that display empirically derived thresholds of climatic variables (e.g. precipitation, temperature, and relative humidity) to assess the suitability of malaria transmission in Ethiopia.		•	•
<a href="#">NOAA Harmful Algal Bloom Operation Forecast System (HAB-OFS)</a>	Forecast system for the Gulf of Mexico. Provides 3 to 4 day forecasts of potential levels of respiratory infection associated with a <i>K. brevis</i> bloom. Forecasts are updated twice a week when a bloom has been confirmed and once per week during the inactive HAB season.	•	•	•
<a href="#">National Institute for Space Research (INPE) - Portal Monitoring Fires and Fire</a>	Provides risk forecasts and observations for Latin America. Forecasts are provided in different lead times (e.g. 1-3 day and 1-4 week) and for each region (e.g. South America, Central America/Caribbean/Mexico), each country, and regions in Brazil.	•	•	

### 3. Resources for Health Risk Management for Ecological Change

Risk Management and Communication Tools		Global	Regional	National	Health
<b>Guidance Documents</b>					
<a href="#">Health Societal Benefit Area: Infectious Diseases, Ceccato 2010</a>	Report provides information on the type of earth observations (e.g. satellite data) that is relevant to health with particular emphasis on infectious diseases.	•			•
<a href="#">UNEP Early Warning Systems A State of the Art Analysis and Future Directions</a>	Provides information on different early warning systems and monitoring products around the world, as well as providing guidelines for developing a global multi-hazard EWS.	•			•
<a href="#">WHO/WMO Atlas of Health and Climate</a>	Provides scientific information on the connection of weather and climate and health challenges.	•			•
<a href="#">WHO Malaria World Report 2015</a>	Offers insight on global malaria trends and describes opportunities and challenges in controlling and eliminating the disease.	•			
<a href="#">U.S. National Climate Assessment</a>	Chapter 9: Human health - contains information			•	•

	on the impacts from climate change on human health in the United States.			
<a href="#">UNESCO's Manual on Harmful Marine Microalgae</a>	Guidance document on harmful microalgae research and management activities around the world.	•		•
<a href="#">Harmful Algal Blooms: A scientific summary for policy makers</a>	Summary report on the science surrounding harmful algae and their societal importance. This is a scientific guide intended for policy makers.	•		•
<b>Web Resources</b>				
<a href="#">Malaria Atlas Project</a>	Open and free database containing information and monitoring products, maps, and resources pertaining to malaria.	•	•	•
<a href="#">Global Malaria Mapper</a>	Collection of maps regarding malaria (e.g. percent of population at risk, country malaria classification).	•		•
<a href="#">WHO Vectorborne Diseases</a>	Information on the impacts of vector borne diseases. WHO provides web pages on specific vectorborne diseases (e.g. <a href="#">malaria</a> , <a href="#">leishmaniasis</a> , <a href="#">dengue</a> ), which include information, resources, data, and publications pertaining to each disease.	•		•
<a href="#">U.S. Department of Health and Human Services</a>	Enviro-Health Links – Climate Change and Human Health. Provides information, resources, documents, and links on health relevant impacts.	•	•	•
<a href="#">Centers for Disease Control and Prevention</a>	Provides information on vectorborne diseases and their relation to climate change.		•	•
<a href="#">National Ocean Service – Harmful Algal Blooms</a>	Contains background information on harmful algal blooms, where they occur, and how they are forecasted.		•	•
<a href="#">Intergovernmental Oceanographic Commission of UNESCO – Harmful Algal Bloom Programme</a>	Presents information on harmful algal blooms including resources, publications, and links to regional networks.	•		•
<a href="#">Pan American Health Organization (PAHO)/WHO Regional Office for the Americas</a>	Provides information on vectorborne diseases in the Americas, such as <a href="#">leishmaniasis</a> , <a href="#">malaria</a> , and <a href="#">dengue</a> .		•	•
<a href="#">Environmental Protection Agency – Ecosystem Impacts</a>	Provides information, resources, and links pertaining to the climate's impact on ecosystems.	•	•	•

<a href="#">UCAR Center for Science Education</a>	Gives a nice overview of information on the interaction between climate change and vectorborne diseases.	•	•
<b>Key Relevant Programs and Partners</b>			
<a href="#">World Health Organization</a>	Supports efforts that seek to improve the health outcomes of countries around the world.	•	•
<a href="#">International Research Institute for Climate and Society (IRI)</a>	Provides expertise in climate and public health and strives to enhance the understanding and capability of society to adapt and manage the impacts of climate.	• •	•
<a href="#">World Meteorological Organization</a>	Supports the health sector with weather and climate science tools, services, and resources.	•	
<a href="#">National Institutes of Health</a>	National Institute for Environmental Health Services is dedicated to understanding how the environment affects health in order to support healthier lives.	•	•
<a href="#">Center for Health and the Global Environment</a>	Researches and communicates the connection between human health and the environment. Website provides materials and resources on the human health dimensions of environmental change.	•	•
<a href="#">EcoHealth Alliance</a>	International organization that is dedicated to conserving biodiversity and researching the relationships between wildlife, ecosystems, and human health.	•	•
<a href="#">Centers for Disease Control and Prevention – Division of Vector-Borne Diseases (DVBD)</a>	The Division of Vector-Borne Diseases seeks and works to protect the public from vector-borne diseases.		• •
<a href="#">Intergovernmental Oceanographic Commission (IOC) Harmful Algal Bloom Programme</a>	UNESCO's Intergovernmental Oceanographic Commission aims to foster effective management as well as to understand the causes and predict the occurrences of harmful algal blooms in order to mitigate their effects.	•	•
<a href="#">National Centers for Coastal Ocean Science</a>	NOAA's NCCOS program works directly with managers, industry, regulators, and scientists to deliver accurate and timely scientific knowledge and tools to make informed decisions.		•

<a href="#">International Society for the Study of Harmful Algae (ISSHA)</a>	Promotes and encourages research and training programs on harmful algae as well as co-sponsor meetings at the international, regional, and national levels.	• • •	
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## 2. Flood Monitoring and Forecasting Tools useful for Health Risk Assessment

Risk Monitoring Tools		Global	Regional	National	Health
<a href="#">African Flood and Drought Monitor</a>	Interactive drought and flood monitoring and forecasting tool, utilizing multiple datasets (e.g. precipitation, maximum temperature, streamflow, drought index), for Africa over different temporal scales.		•		
<a href="#">Global Flood and Landslide Monitoring - NASA</a>	Near-real time information on heavy rainfall and flood potential maps of the global scale.	•			
<a href="#">Global Flood Monitoring System (GFMS)</a>	Flood detection and intensity estimates for most of the globe (50°N to 50°S).	•			
<a href="#">Dartmouth Flood Observatory (DFO)</a>	DFO has near-real time information on current floods around the world as well as global flood data from 1985 to the present.	•			
<a href="#">Vibrio Map Viewer by E3 Geoportal, European Environmental and Epidemiology Network</a>	Near-real time model that provides global remotely sensed information on environmental variables that are suitable for cholera bacteria, <i>Vibrio</i> spp, which informs areas of potential human exposure. Additionally, the portal includes a 5-day forecast.		•		•
<a href="#">Global Flood Detection System – Version 2</a>	Near-real time satellite observations of river floods around the world.	•			
Risk Forecasting Tools		Global	Regional	National	Health
<a href="#">National Oceanic and Atmospheric Administration – Automated Flood Warning System</a>	Automated flood alerts for the United States. Also includes precipitation and <a href="#">river observations</a> and <a href="#">river forecasts</a> .			•	
<a href="#">UK Met Office – Flood Warnings</a>	Issues flood warnings and alerts with updates every 15 minutes.			•	
<a href="#">European Flood Awareness System</a>	Monitors floods and issues alerts up to 10 days in advance of flooding to partners.		•		
<a href="#">Meteoalarm</a>	Provides flood warnings and alerts for Europe. Information is displayed on an interactive map with available reports and warnings that can be downloaded for each country that have high alerts.		•		
<a href="#">IRI Data Library Maproom – International Federation of Red Cross and Red Crescent Societies: Forecasts in</a>	Provides historical maps and forecasts regarding heavy precipitation. Contains 6 day and 3 month forecasts as well as recent climate trends, past conditions, and vulnerability indicators	•			

<a href="#">Context</a>	to help decision-makers take action.				
<a href="#">Global Flood Monitoring System (GFMS)</a>	Short-term (4 to 5 day outlooks) flood forecasts for most of the globe (50°N to 50°S) using satellite data.	•			
<a href="#">Central America Flash Flood Guidance System</a>	Flash flood guidance for Central America pertaining to flash flood threats. Products are updated every 6 hours.		•		
<a href="#">3-Day Flood Risk: UK</a>	Provides forecasts for 3 days in advance that are updated daily. Issues summaries and maps for counties in England and Wales.			•	
<a href="#">Global Flood Awareness System</a>	Provides daily flood forecasts that incorporate weather forecasts with a hydrological model to produce global flood forecasts.	•			
<a href="#">Mekong River Commission</a>	Flood forecasting and monitoring system for the Mekong River Basin. Provides flash flood warning products, water level data, rainfall data, maps of maximum flood extent, and historical data and reports for the basin and sub-basin level.		•		
<a href="#">Bangladesh Flood Forecasting and Warning Centre</a>	Provides flood forecasting and warnings for Bangladesh. These are available in 5-day and medium range (1-10 day) formats. Additionally, offers hydrograph forecasts for individual rivers and streams as well as water level data and rainfall data.			•	
<a href="#">Pacific Disaster Center</a>	Provides flood and tsunami warnings and alerts for the countries in the Pacific.		•		
<a href="#">EFAS – The European Flood Awareness System</a>	Delivers Pan-European flood probability maps for up to 10 days in advance and detailed flood forecasts from national weather stations.		•	•	

### 3. Resources for Health Risk Management during Floods

Risk Management and Communication Tools		Global	Regional	National	Health
<b>Guidance Documents</b>					
<a href="#">University Corporation for Atmospheric Research's (UCAR) and NOAA Flash Flood Early Warning System Reference Guide 2010</a>	Guidance document for the development and maintenance of flash flood warning systems.	•			
<a href="#">WHO/WMO Atlas of Health and Climate</a>	Provides scientific information on the connection of weather and climate and health challenges.	•			•

<a href="#">WHO – Floods in the WHO European Region: Health Effects and Their Prevention</a>	Provides information to help WHO European member states to understand the health risks from flooding and how to develop public health responses for flood prevention.	•	•
<a href="#">WMO Guidelines on Early Warning Systems and Application of Nowcasting and Warning Operations</a>	Guidance on the development of early warning systems and the application of warning systems and nowcasting operations.	•	
<a href="#">Black Sea and Middle East Flash Flood Guidance System User Guide</a>	Provides operational insight into the Black Sea and Middle East flash flood guidance systems.	•	
<a href="#">WHO/WEDC Technical notes on WASH Emergencies</a>	Provide practical recommendations on responding to immediate and medium-term water, sanitation, and hygiene needs of populations impacted by emergencies.	•	•
<a href="#">WMO Flash Flood Guidance Systems</a>	Document provides background on Flash Flood Guidance Systems and describes their scientific basis, development, and recommended resources.	•	
<a href="#">Flash Flood Warning System Reference Guide</a>	Guide describes proven and effective methods for the development and implementation of flash flood early warning systems. Provides case studies and other examples of early warning systems from around the world.	•	
<a href="#">Flooding – Frequently Asked Health Questions</a>	Public Health England provides an overview of commonly asked questions regarding the threats to health from floods. Offers tips and guidance on preparation and safety.	•	•
<a href="#">Floods, health and climate change: a strategic review</a>	Provides a review on global health impacts from flooding, identifies challenges for intervention, and assesses the implications of climate change on future health impacts.	•	•
<a href="#">Health impacts of floods in Europe: Data gaps and information needs from a spatial perspective</a>	Report outlines the health impacts of floods in European countries using both statistical and spatial data.	•	•
<a href="#">Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21<sup>st</sup> Century</a>	Guidance document for policy-makers, government officials, stakeholders for information on urban flood risk management.	•	

<b>Web Resources</b>					
<a href="#">European Commission – Flooding in Europe: Health Risks</a>	Provides information on the health risks from flooding as well as links out to pertinent resources and documents.			•	•
<a href="#">WHO Flooding and Communicable Diseases Fact Sheet</a>	Provides information on diseases associated with floods.	•			•
<a href="#">Centers for Disease Control and Prevention (CDC) - Floods</a>	Site provides information about the health impact from floods and how to prepare for them.	•		•	•
<a href="#">National Institute of Environmental Health Sciences</a>	Provides information on the health impacts associated with floods along with mitigation and adaptation options and research needs.	•			
<a href="#">Disaster Information Management Research Center - Floods</a>	Contains information, resources, documents, and guidance tools for the preparation and management of the health risks posed by flooding.	•		•	•
<a href="#">Environmental Protection Agency - Flooding</a>	Information pertaining to health safety during and after a flood.			•	•
<a href="#">Flood List</a>	Provides near-real time information on major flood events from around the world from news reports. Includes articles, reports, and resources on the impacts of floods on humanity.	•	•	•	•
<a href="#">Public Health England</a>	Provides guidance documents on health risks to floods and how to address those risks.			•	•
<a href="#">Natural Resources Defense Council – Flooding: Devastating Floods and Heavy Rains</a>	Overview of the health impacts of floods in the United States. Provides links to different state’s plans to address the risk of flooding.			•	•
<a href="#">Disaster Information Management Research Center</a>	Contains extensive information and links to resources on the health impacts from floods, preparedness and response information, cleanup and recovery, and other resources geared to specific populations.	•		•	•
<b>Key Relevant Programs and Partners</b>					
<a href="#">World Health Organization</a>	Emergency and Disaster Risk Management for Health program provides support to improve health outcomes for countries dealing with disasters and emergencies.	•			•
<a href="#">World Meteorological Organization</a>	Supports the health sector with weather and climate	•			

	science tools, services, and resources.		
<a href="#">Associated Programme on Flood Management</a>	Supports an integrated approach to flood management in numerous countries. Works in partnership with the Global Water Partnership and WMO.	•	
<a href="#">CDC Emergency Preparedness and Response</a>	Provides health information in relation to floods and guidance on how to prepare, respond, and stay safe during flood events.	•	•
<a href="#">National Institutes of Health</a>	National Institute for Environmental Health Services program studies the environmental impacts on health in order to promote healthier lives.	•	•
<a href="#">World Bank</a>	Supports and implements programs and projects in the health and water sectors.	•	

## 2. Drought Monitoring and Forecasting Tools useful for Health Risk Assessment

Risk Monitoring Tools		Global	Regional	National	Health
<a href="#">United States Drought Monitor</a>	Monitors drought conditions over the United States, providing summaries for each major U.S. region, and issued in map format. Updated every Thursday.			•	
<a href="#">United States Drought Impact Reporter</a>	Provides near real-time information on the impacts of drought across the United States. Includes an interactive map with different data layers (e.g. drought monitor overlay, climate divisions) along with report and impact counts per state.			•	•
<a href="#">Drought Monitor – Chile Agroclimatic Observatory</a>	Depicts the different indicators for drought in map form for Chile through variables that contribute to meteorological, hydrological, and agricultural drought conditions. Additionally, the combined drought index displays current drought conditions over the country.			•	
<a href="#">African Flood and Drought Monitor</a>	Interactive drought and flood monitoring and forecasting tool, utilizing multiple datasets (e.g. precipitation, maximum temperature, streamflow, drought index), for Africa over different temporal scales.		•		
<a href="#">North American Drought Monitor</a>	Monitors drought conditions in North America based on multiple variables and indices.		•		
<a href="#">Global Integrated Drought Monitoring and Prediction System (GIDMaPS)</a>	Provides near real-time information on drought conditions across the globe and seasonal predictions.	•			
<a href="#">European Drought Observatory</a>	Provides drought-relevant information such as <a href="#">maps</a> of indicators derived from different data sources (e.g., <a href="#">precipitation measurements</a> , <a href="#">satellite measurements</a> , <a href="#">modelled soil moisture content</a> ).		•		
<a href="#">Satellite Division and Environmental Systems – Drought Monitoring</a>	Brazil's Satellite Division and Environmental Systems drought monitor. Provides real-time monitoring of drought conditions over South America based on multiple climatic factors (e.g. dry days, precipitation, average temperature, and average humidity).		•		
<a href="#">Agricultural Stress Index System (ASIS)</a>	Food and Agricultural Organizations' near-real time (10-days) monitoring of cropped land with a high likelihood of water stress based multiple seasonal	•			

	indicators from remotely sensed temperature and vegetation data and combined with historical information on cropping cycles and a global crop mask.				
<a href="#">Global Agricultural Drought Monitoring and Forecasting System (GADMFS - CSISS)</a>	Drought monitoring webtool that contains different layers that measure drought in various ways (e.g. drought index, Normalized Difference Vegetation Index (NDVI), and Vegetation Condition Index (VGI)).	•			
<b>Risk Forecasting Tools</b>		<b>Global</b>	<b>Regional</b>	<b>National</b>	<b>Health</b>
<a href="#">Meteoalarm</a>	Provides extreme weather (e.g. heavy rain, floods, extreme heat, etc.) warnings and alerts for Europe. Information is displayed on an interactive map with available reports and warnings that can be downloaded for each country that have high alerts.		•		
<a href="#">Climate map explorer – Drought Frequency</a>	This product is a drought frequency viewer that allows the user to interactively change timescales, emissions scenarios, and more to see how global drought frequency is projected to change in the future.	•			
<a href="#">Global Integrated Drought Monitoring and Prediction System (GIDMaPS)</a>	Provides near real-time information on drought conditions across the globe and seasonal predictions.	•			
<a href="#">Global Drought Information System</a>	Provides near real-time information on drought conditions around the globe and provides links to regional drought resources	•			
<a href="#">Jamaica Climate – Drought Map</a>	1-2 month forecasts on drought conditions throughout Jamaica based on the Standardized Precipitation Index (SPI). Information is provided in short summaries and national maps.			•	

### 3. Resources for Health Risk Management during Droughts

<b>Risk Management and Communication Tools</b>		<b>Global</b>	<b>Regional</b>	<b>National</b>	<b>Health</b>
<b>Guidance Documents</b>					
<a href="#">WHO Drought Technical Hazard Sheet – Natural Disaster Profiles</a>	Supplies information about drought and its implications on health. Provides information on which WHO offices to contact for drought and health assistance and further reading resources.	•			•
<a href="#">When Every Drop Counts: Protecting Public Health During Drought Conditions—A Guide for Public Health Professionals</a>	Document aimed to assist public health professionals, practitioners, and other stakeholders in understanding drought and its implication on	•			•

	health as well as to help them prepare for drought in their communities.		
<a href="#">UNEP Early Warning Systems A State of the Art Analysis and Future Directions</a>	Provides information on different early warning systems and monitoring products around the world, as well as providing guidelines for developing a global multi-hazard EWS.	•	•
<a href="#">WHO/WMO Atlas of Health and Climate</a>	Provides scientific information on the connection of weather and climate and health challenges.	•	•
<a href="#">National Drought Management Policy Guidelines – A Template for Action</a>	Resource/guide material for practitioners on developing a national drought management policy.	•	
<b>Web Resources</b>			
<a href="#">Integrated Drought Management Programme</a>	Includes a repository of documents on drought management policies, guidelines, and plans.	•	
<a href="#">Disaster Information Management Research Center</a>	Provides resources on the topic of droughts and health.	•	
<a href="#">UNEP Global Risk Data Platform</a>	Contains historical information on global hazards (e.g. droughts, floods) in an interactive map viewer allowing you to choose different datasets to visualize.	•	
<a href="#">CDC Drought and Health information</a>	Website with information about the topic of drought and health with links to publications and further information on sub-topics.	•	•
<a href="#">Natural Resources Defense Council Climate Change Threatens Health: Drought</a>	Provides information about how droughts can affect health and links to specific states that have plans to manage the risks of drought.	•	•
<a href="#">U.S. Climate Resilience Toolkit - Drought</a>	Contains resources and tools that pertain to managing drought in the U.S.	•	
<a href="#">Disaster Information Management Research Center – Droughts and Health</a>	Provides information and resources related to droughts and health – includes both national and international resources.	•	•
<a href="#">UN-SPIDER Knowledge Portal – Links &amp; Resources</a>	Presents information on drought monitoring using earth observations. Provides links and descriptions of current drought monitoring products from around the world.	•	



Key Relevant Programs and Partners			
<a href="#">Centers for Disease Control and Prevention</a>	National Center for Environment and Health promotes a healthy environment and aims to improve the health of the American people.	•	•
<a href="#">World Health Organization</a>	Emergency and Disaster Risk Management for Health supports partners to improve the health outcomes of countries affected by disasters.	•	•
<a href="#">UNDP Drought Risk Management</a>	Provides information on drought risk management as well as UNDP's involvement in this area. Additionally it provides links to different programs it supports.	•	
<a href="#">African Drought Risk and Development Network</a>	Regional mechanism for capacity building, peer learning, and advocacy.	•	
<a href="#">Global Water Partnership</a>	The Integrated Drought Management Programme is a joint effort between the Global Water Partnership and the World Meteorological Organization. It aims to improve drought monitoring and prevention.	•	
<a href="#">National Institutes of Health</a>	National Institute for Environmental Health Services program studies the environmental impacts on health in order to promote healthier lives.	•	•

