FOODSERVICE CONSULTANTS SOCIETY INTERNATIONAL
ASIA PACIFIC

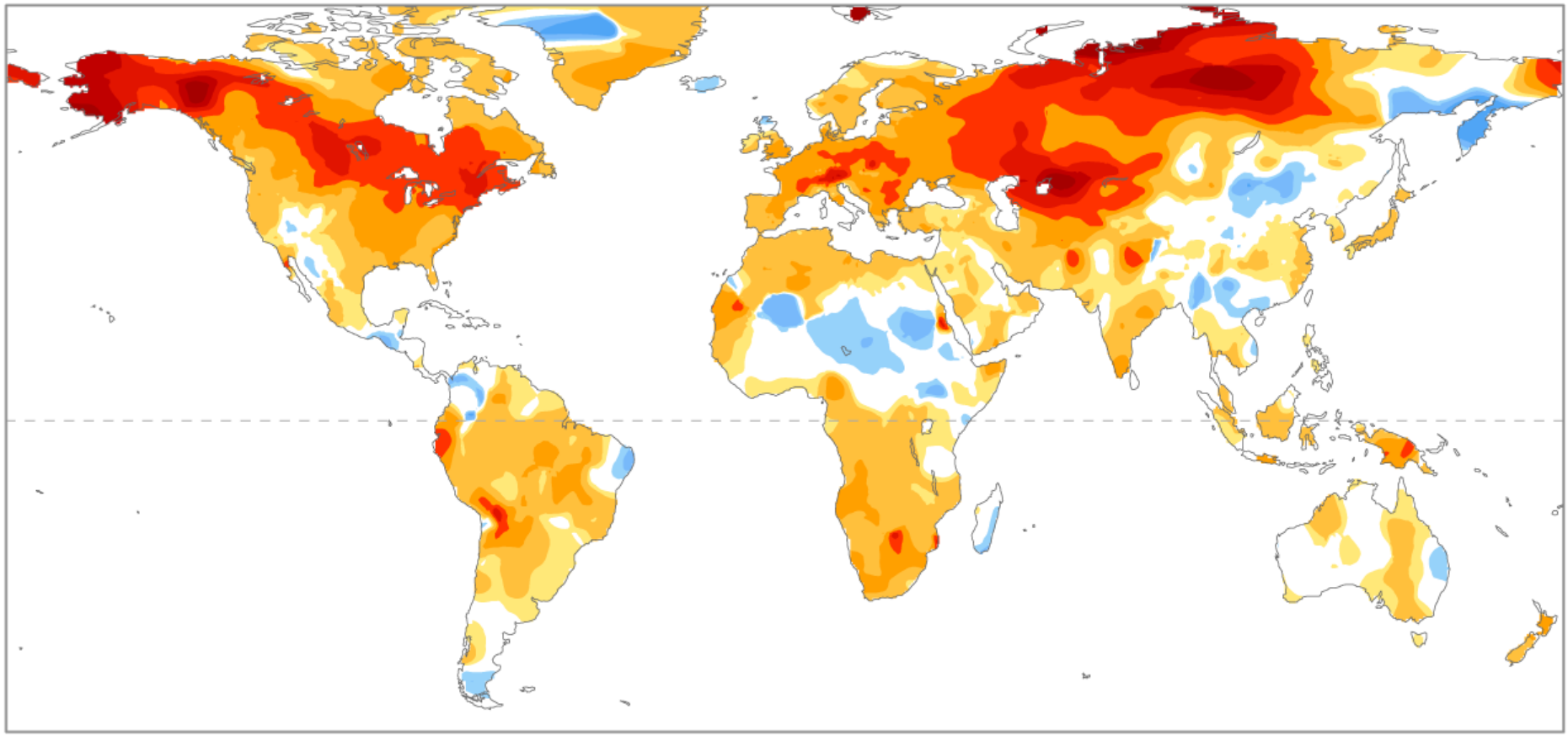
" Climate Change and Impact on Foodservice Insight from Paris COP-21"

Brandon Kua, Citrus Consultant Pte. Ltd.

A Carbon Neutral Event

We Share We Support We Inspire

Dec 2015—Feb 2016 temperature anomaly



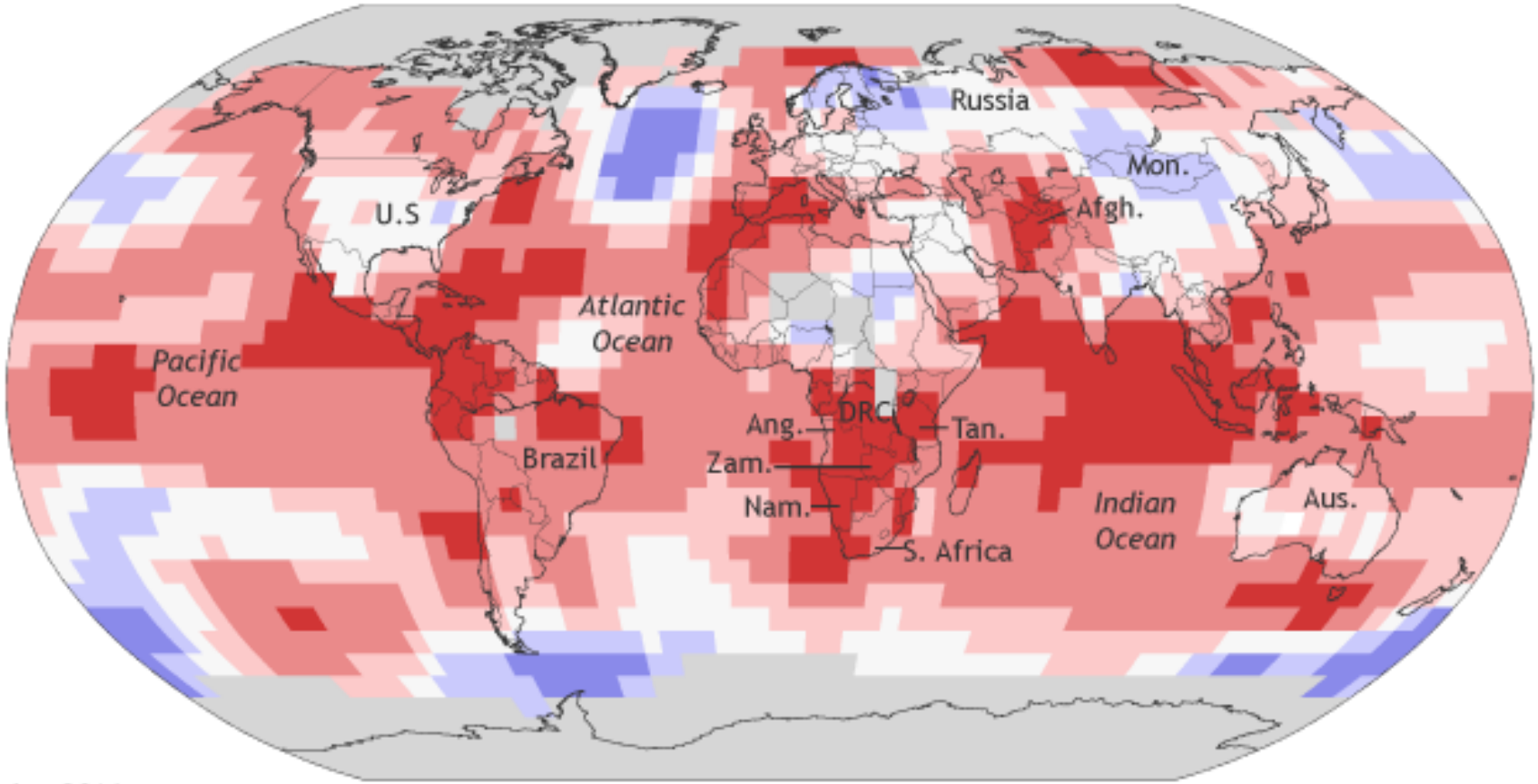
Compared to 1981—2010

NOAA Climate.gov
Data: CPC

Difference from average temperature (˚C)

-2 -1 -0.5 0.5 1 2 3 4 5 6

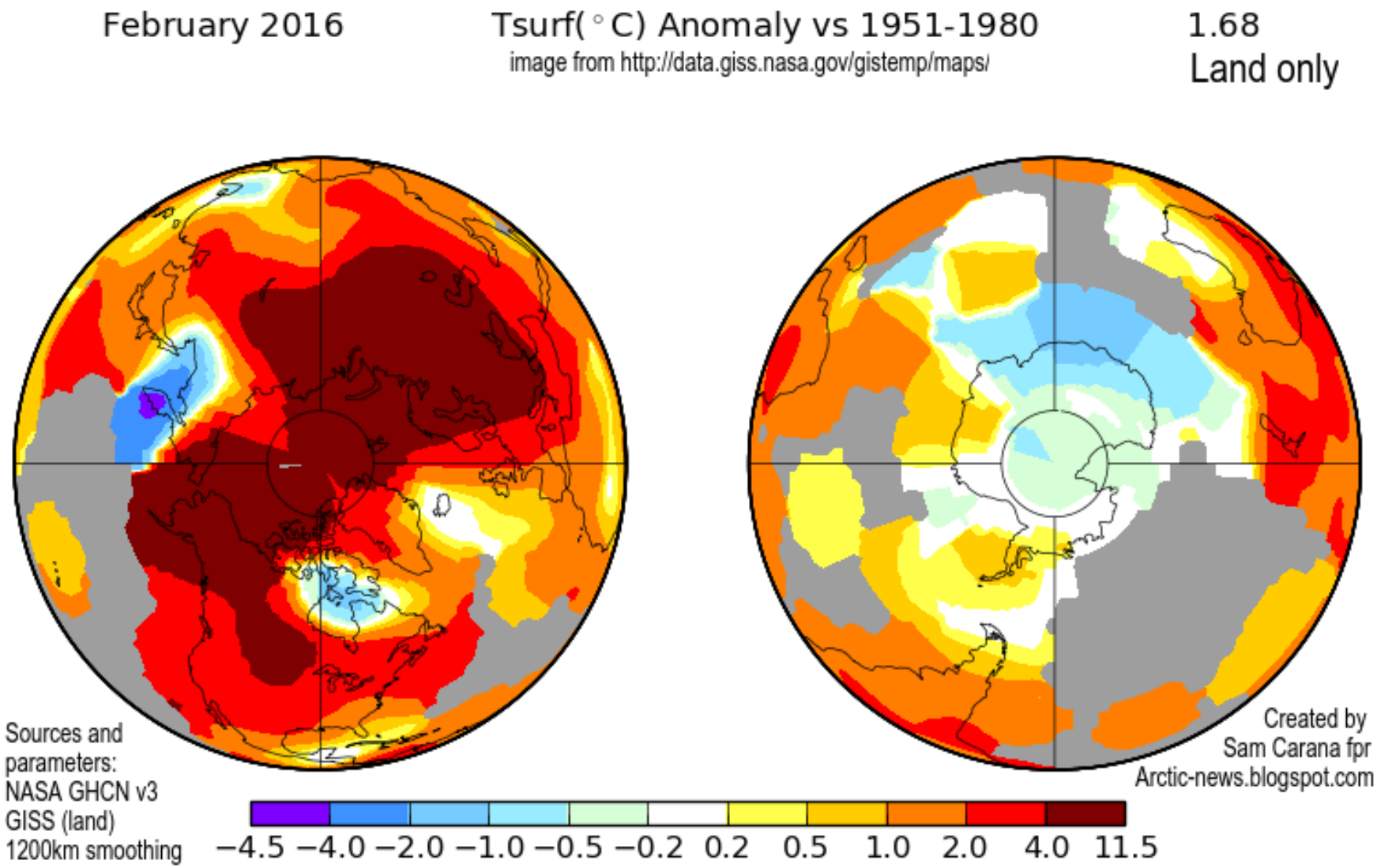
January 2016 temperatures compared to historical record

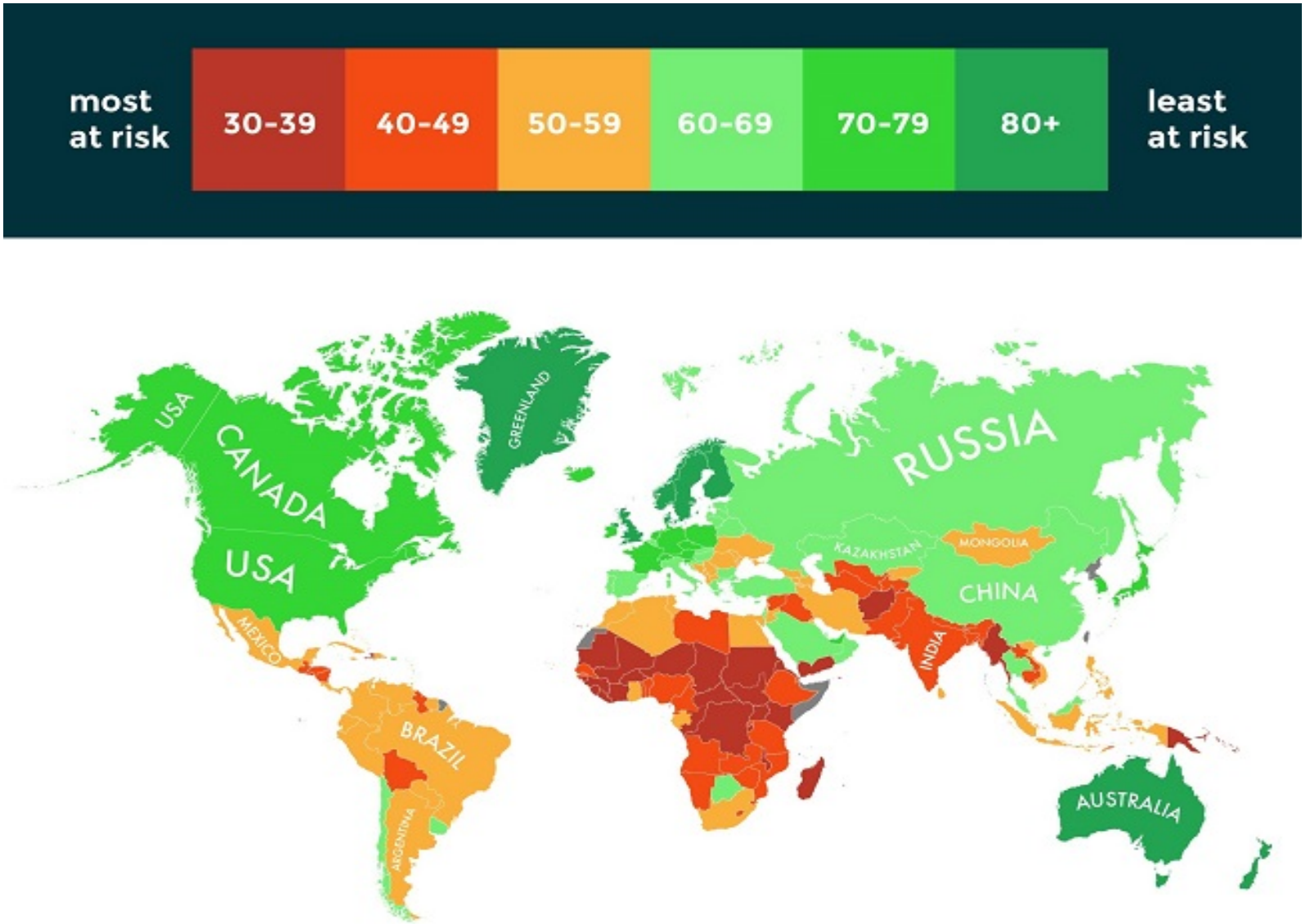


Jan 2016

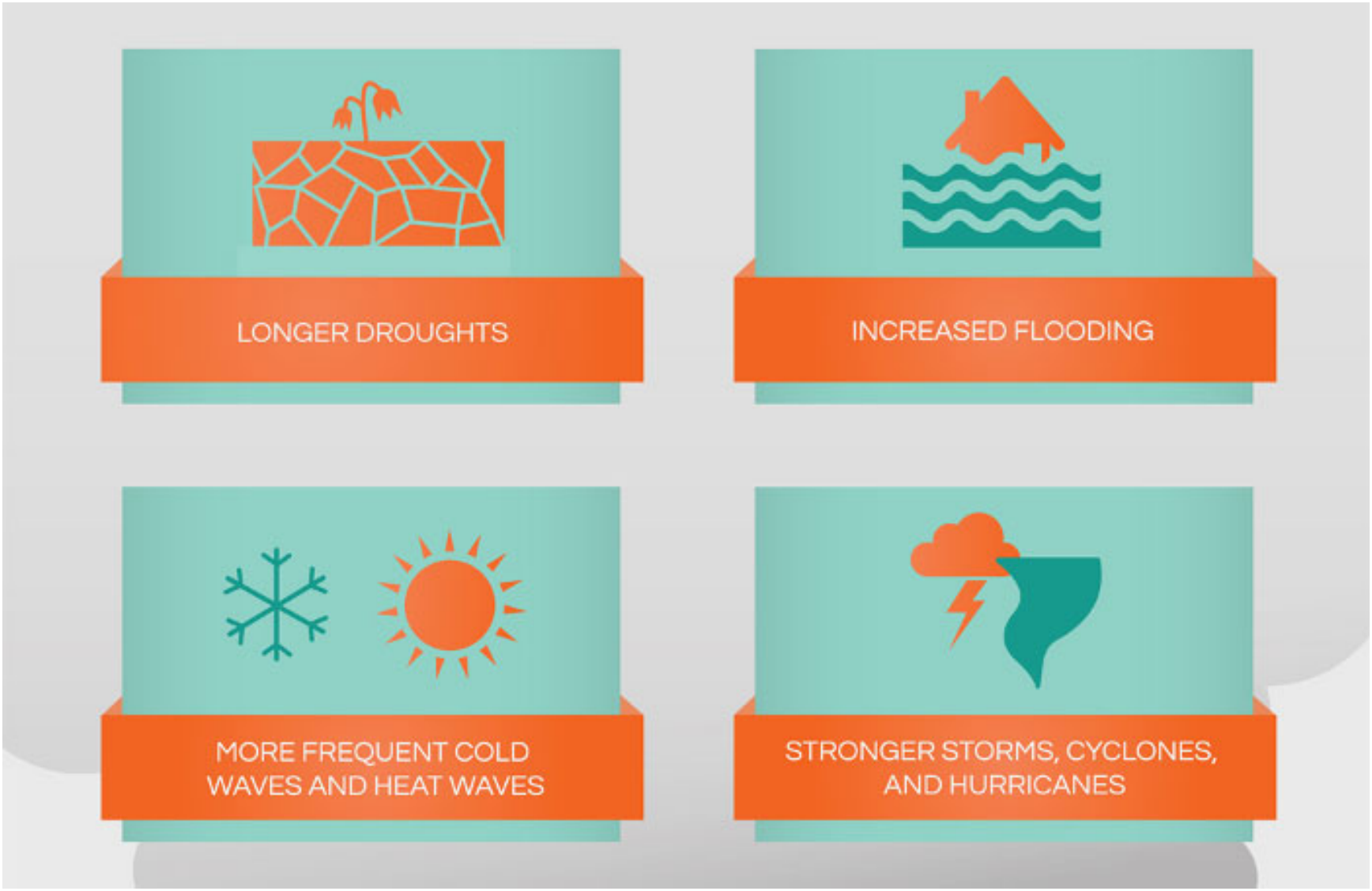
NOAA NCEI

record coldest | much cooler than average | cooler than average | near average | warmer than average | much warmer than average | record warmest


February 2016
Tsurf(°C) Anomaly vs 1951-1980
image from http://data.giss.nasa.gov/gistemp/maps/
1.68
Land only
Sources and parameters:
NASA GHCN v3
GISS (land)
1200km smoothing
−4.5 −4.0 −2.0 −1.0 −0.5 −0.2 0.2 0.5 1.0 2.0 4.0 11.5
Created by
Sam Carana fpr
Arctic-news.blogspot.com


most at risk
30-39
40-49
50-59
60-69
70-79
80+
least at risk
USA
CANADA
GREENLAND
USA
MEXICO
BRAZIL
ARGENTINA
RUSSIA
KAZAKHSTAN
MONGOLIA
CHINA
INDIA
AUSTRALIA

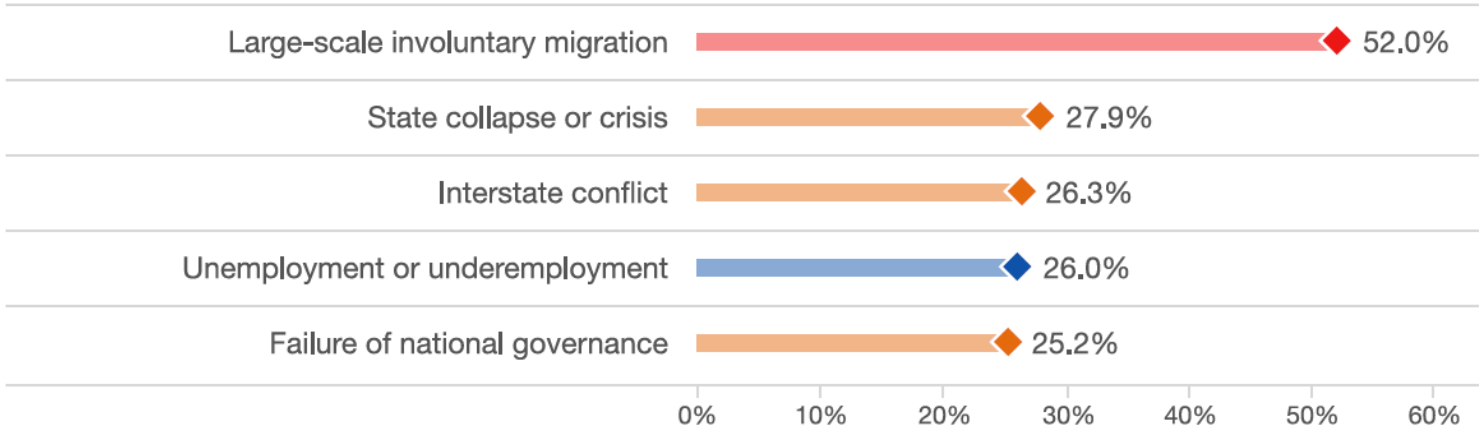
Signs Of Climate Change


LONGER DROUGHTS
INCREASED FLOODING
MORE FREQUENT COLD WAVES AND HEAT WAVES
STRONGER STORMS, CYCLONES, AND HURRICANES

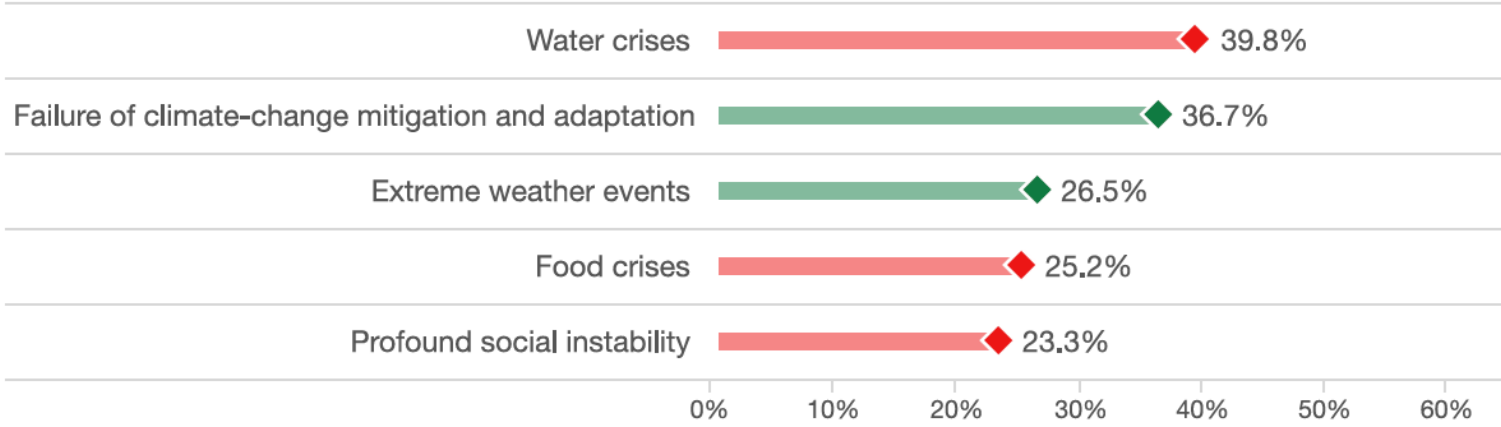
The Global Risks of Highest Concern, 2016

Percent of participants mentioning the respective risk to be of high concern for the time frame of 18 months or 10 years, respectively. Participants could name up to five risks in each time frame. In each category, the risks are sorted by the total sum of mentions.

For the next 18 months



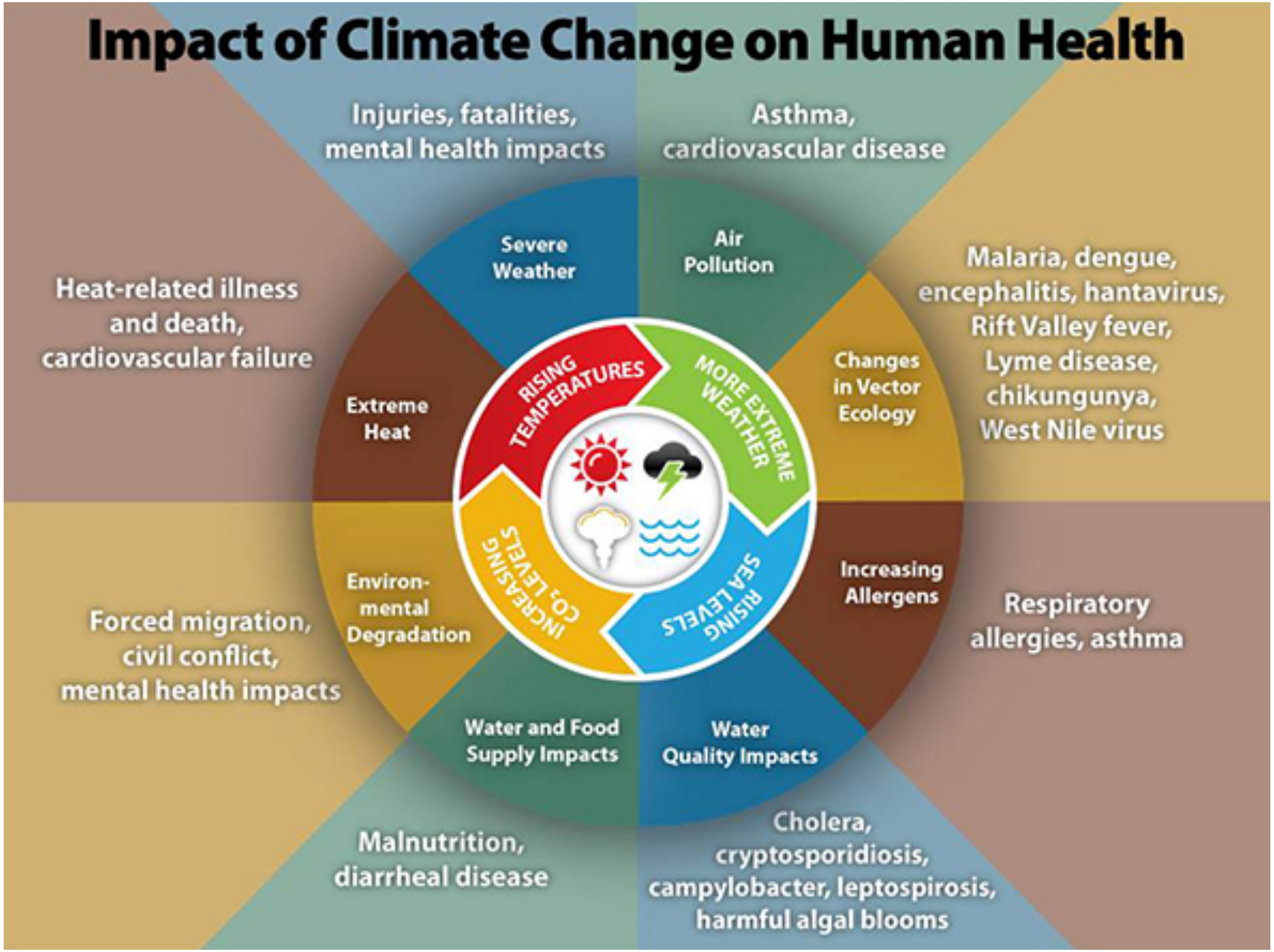
For the next 10 years



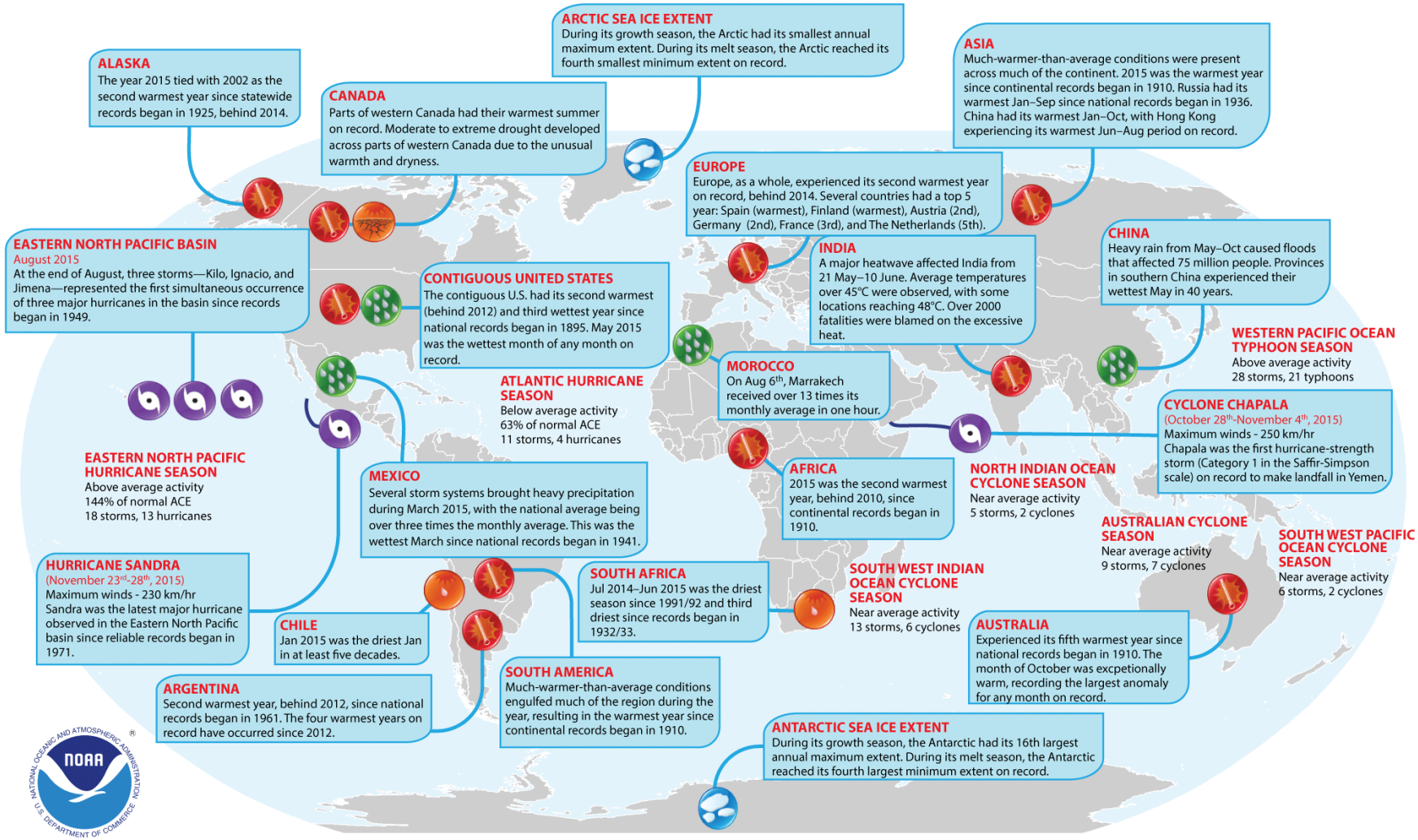
Read more: wef.ch/risks2016 #risks2016

Impacts of Climate Change

1. Temperature/Weather
   - Extreme Weather Events
2. Change in behaviours of living beings
   - Species Extinction
   - Human Health
3. Migration
4. Landscape of a territory
   - Arctic Icecap Melting
   - Sea Levels Rising
5. Imbalance in the stability & sustainability of the ecosystem


Impact of Climate Change on Human Health
Injuries, fatalities, mental health impacts
Asthma, cardiovascular disease
Heat-related illness and death, cardiovascular failure
Malaria, dengue, encephalitis, hantavirus, Rift Valley fever, Lyme disease, chikungunya, West Nile virus
Forced migration, civil conflict, mental health impacts
Respiratory allergies, asthma
Malnutrition, diarrheal disease
Cholera, cryptosporidiosis, campylobacter, leptospirosis, harmful algal blooms
Severe Weather
Air Pollution
Extreme Heat
Changes in Vector Ecology
Environ-mental Degradation
Increasing Allergens
Water and Food Supply Impacts
Water Quality Impacts
RISING TEMPERATURES
MORE EXTREME WEATHER
INCREASING CO2 LEVELS
RISING SEA LEVELS

Selected Significant Climate Anomalies and Events in 2015



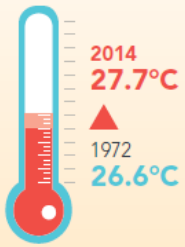
Please Note: Material provided in this map was compiled from NOAA's NCEI State of the Climate Reports and the WMO Provisional Status of the Climate in 2015.
For more information please visit: http://www.ncdc.noaa.gov/sotc

CLIMATE CHANGE IN SINGAPORE

OBSERVED CHANGES IN SINGAPORE'S CLIMATE

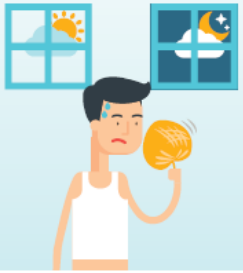
DAILY TEMPERATURE

From **1972 to 2014**, annual average temperature has **increased** from **26.6°C** to **27.7°C**.



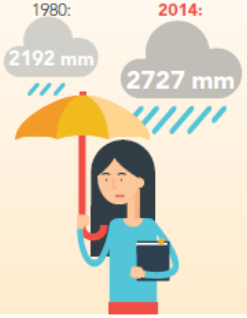
FREQUENCY OF WARM DAYS & NIGHTS

From 1972, the **number of warm days & nights have increased**, and the **number of cool nights have decreased**.



RAINFALL

General uptrend in annual average rainfall from **2192 mm in 1980** to **2727 mm in 2014**.

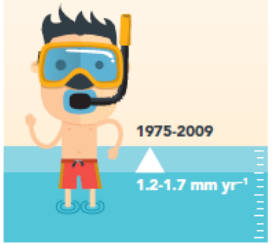


WIND

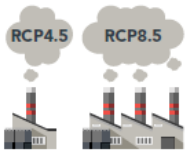
- General wind patterns influenced by **northeast and southwest monsoons**.
- No clear trends as wind speed is **environment dependent** (e.g. presence of buildings and trees).

SEA LEVEL RISE

Annual sea levels in the Straits of Singapore rose at the rate of **1.2–1.7 mm yr^{-1}** in the period **1975-2009**.



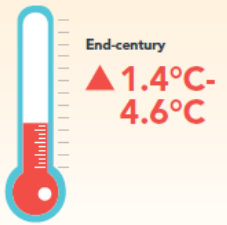
FUTURE CLIMATE PROJECTIONS FOR SINGAPORE



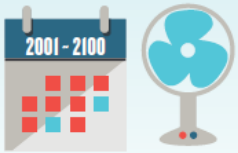
Higher greenhouse gas emissions lead to larger changes in the climate*

*Representative Concentration Pathways (RCPs) are defined by the cumulative measure of human emissions of Greenhouse Gases (GHGs).

Changes in daily mean temperatures are projected to increase **1.4-4.6°C** by **end-century (2070-2099)** with respect to the baseline period 1980-2009.



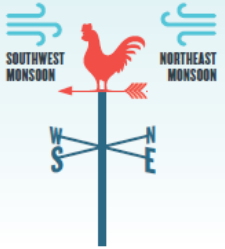
More warm days and **warm nights** for **Feb to Sep*** **throughout the 21st century**.



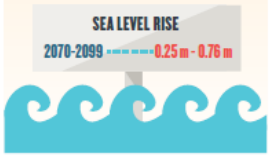
*Under the current climate, the period February to May has the highest number of warm days, and the period June to September has the highest number of warm nights.

- The contrast between the wet months (Nov to Jan) and dry months (Feb and Jun to Sep) is projected to become **more pronounced**.
- **Increasing trends** in both **intensity** and **frequency** of **heavy rainfall** events as the world warms.

- Singapore will continue to be influenced by the **northeast** and **southwest monsoons**.
- **No substantial changes** in wind direction but potential increase in wind speeds during the northeast monsoon season.



- **End-century (2070-2099) mean sea-level rise projections** relative to baseline period ranges from **0.25 m** to **0.76 m**.
- Changes in extreme sea levels for the Singapore region over the 21st Century are likely to be dominated by the **regional time-mean sea level rise**, with only small future changes to the storm surge and wave components.



Climate Change Implications on Food Service

1. Supply Chain Disruption
2. Property Damage
3. Agricultural Production Stress
4. Access to Process Water
5. Food Insecurity

Impacts of Climate Change to Food Industry

1. Crops
   - Change of soil & moisture conditions
   - Harms crops & reduces yields
   - More prone to weeds, pests, and fungi attack
2. Livestocks
   - Increase vulnerability to disease, reduce fertility, reduce milk production
   - Pastures & feeds supplies affected
3. Fisheries
   - Survival of species
   - Reproduction & Migration

Impacts of Climate Change to Food Industry

4. Water
   - Supply & Quality
5. Food Insecurity
   - Food Demand Increasing Drastically
   - Reduce Growth in Food Production
   - Price Hikes

Contributions of Food Industry to Climate Change

1. Increasing production, trade and consumption of foods that are big emitters of GHG
2. Promoting industrial farming for export over local farms and food systems
3. Boosting global supermarkets and highly processed foods

Contributions of Food Industry to Climate Change

4. Outsourcing manufacturing to low wage countries with few environmental restrictions
5. More biofuels
6. The promotion of local food economies undermined
7. Food security measures made illegal

How Food Industry Is Affecting Climate Change

1. Agriculture
   - Deforestation – Land to Farm
   - Fertilizers
   - Rearing of Livestocks
2. Dairy & Meat Production
   - Deforestation – Create Pasture & Grow Feed
   - Methane Emissions
   - Animal Waste

How Food Industry Is Affecting Climate Change

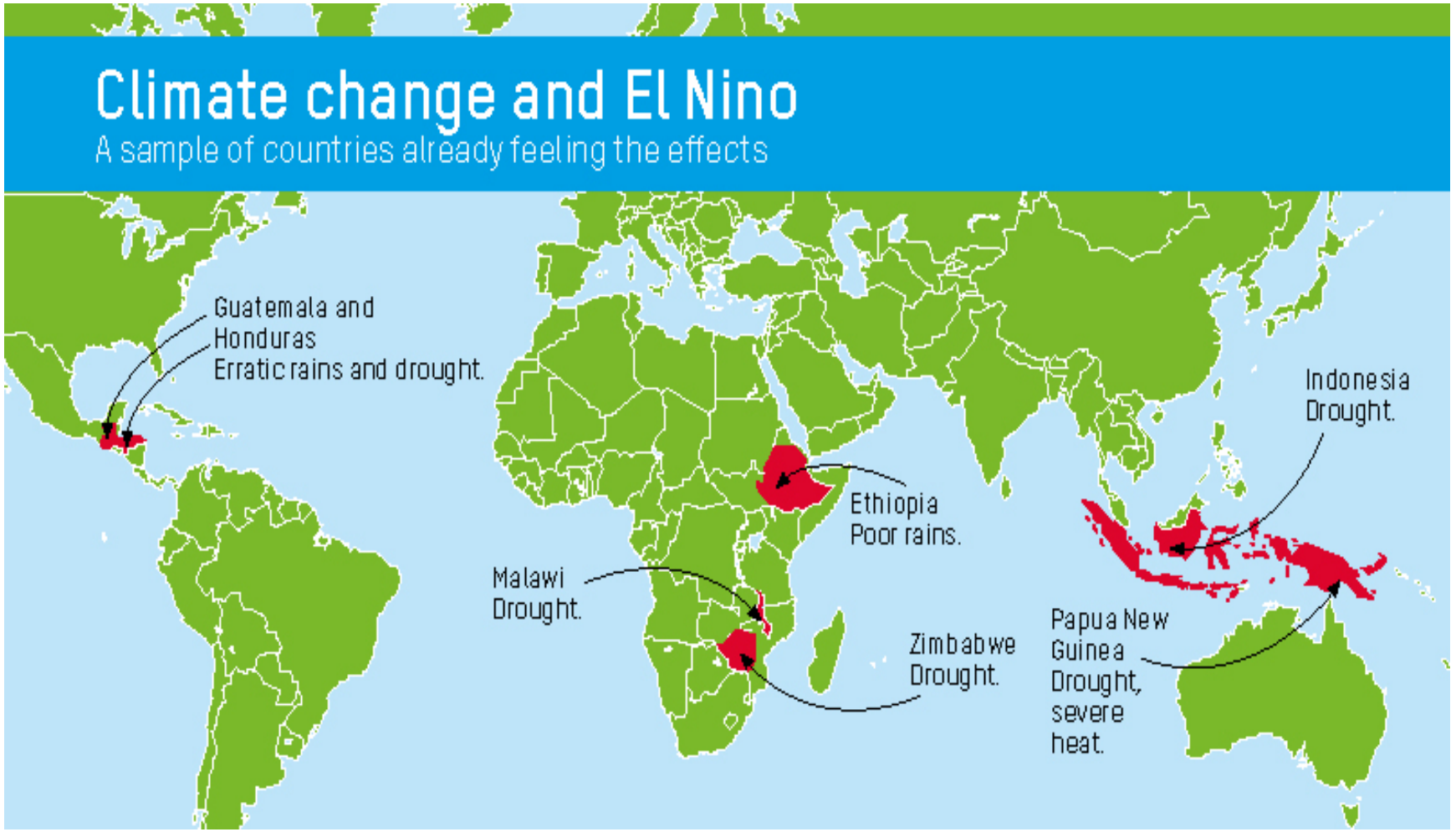
3. Food & Drink Manufacturing
   - Consume High Amount of Energy
   - Packaging
   - Food Processing
4. Food Refrigeration
   - Caused by shift of food culture & taste
   - Increasing demands for food that requires to be chilled
5. Transportation
   - Carbon emissions from vehicles

Mitigation Design to Reduce Impact Towards The Environment

1. Development is inevitable, but can be managed
2. Green Technology Implementation
3. Renewable Energy Harvesting
4. Low Carbon Menu Planning
   - Minimize processed & can food
   - Use fresh & local products
   - Reduce waste
5. Responsible & Sustainable Farming/Supply Chain

Mitigation Design to Reduce Impact Towards The Environment

6. Waste Management
   - Landfill
   - Reduction
   - Recycling
   - Composting


Climate change and El Nino
A sample of countries already feeling the effects
Guatemala and
Honduras
Erratic rains and drought.
Ethiopia
Poor rains.
Malawi
Drought.
Zimbabwe
Drought.
Indonesia
Drought.
Papua New
Guinea
Drought,
severe
heat.

Sustainability Best Practices Framework

Energy Efficiency & Conservation

Water & Wastewater Systems

Green Building

Waste Reduction & Recycling

Climate-Friendly Purchasing

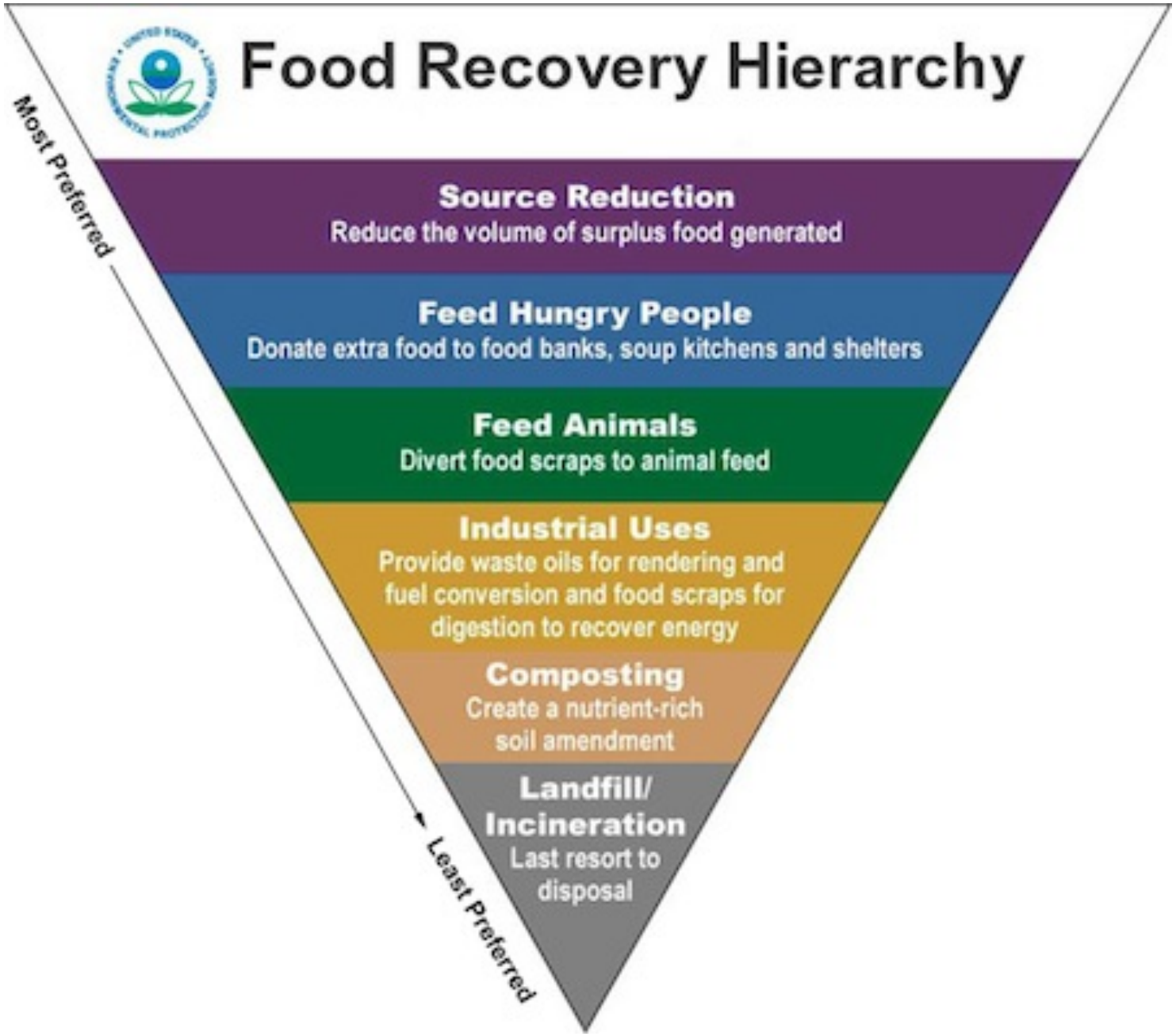
Renewable Energy & Low-Carbon Fuels

Efficient Transportation

Land Use & Community Design

Open Space & Offsetting Carbon Emissions

Community & Individual Action


Food Recovery Hierarchy
Most Preferred
Least Preferred
Source Reduction
Reduce the volume of surplus food generated
Feed Hungry People
Donate extra food to food banks, soup kitchens and shelters
Feed Animals
Divert food scraps to animal feed
Industrial Uses
Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy
Composting
Create a nutrient-rich soil amendment
Landfill/ Incineration
Last resort to disposal

UN Climate Conference (COP21) Outcomes

- Mitigation
  Reducing emissions fast enough to achieve the temperature goal.
- A transparency systems and global stock-take: Accounting for climate action.
- Adaptation
  Strengthening ability of countries to deal with climate impacts.
- Loss and damage
  Strengthening ability to recover from climate impacts.
- Support
  Including finance, for nations to build clean, resilient futures.

Aims of The Paris Agreement

1. Strengthening the ability to deal with the impacts of climate change.
2. Keeping the temperature rise well below 2 degrees Celsius and to drive efforts to limit the temperature increase even further to 1.5 degrees Celsius above pre-industrial levels.
3. A global transition to clean energy and a shifting away from polluting fossil fuels.

Thank You