Impact assessment of Slow-Onset Events (Heat)

POSSIBLE IMPACTS OF HEAT (AMONG OTHER):

- Increase in land surface evaporation through the gradual increase in temperature
  - Impact: Water balance
  - Adaptation: Water conservation
- Changes in agricultural suitability of crops
  - Impact: Agricultural production
  - Adaptation: Temperature-resilient crops
- Coral bleaching and damage to ocean biodiversity
  - Impact: Ocean ecosystem
  - Adaptation: Conservation program
- Increase in the potential of land heatwaves (seasonal and geographically-specific)
  - Impact: Health issues & mortality
  - Adaptation: Environmental engineering
CHARACTERIZATION OF EVENTS:

General principle: monitoring of an event should consider the **intensity, temporal and spatial characteristics**. Its definition should be **impact-independent**, with the aim of developing a system that can report consistently on the **nature, occurrence and evolution of the event**.

Properties:

- **Magnitude**: measure of the departure from a baseline or a predefined threshold.
- **Duration**: the difference between the time at which the event began (meaning when the threshold is exceeded for the first time) and the time it ended.
- **Extent**: the geographical area where covering stations recording the event from the start to the end, or area computed using gridded dataset.
- **Severity (optional)**: composite of magnitude and duration.

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2023 STATE OF CLIMATE SERVICES: HEALTH

Only 54% of Met Services (104) have extreme heat warnings. Capabilities:

- monitor, forecast and warn for extreme temperatures (78)
- provide thermal human heat budget information (9)
- monitor, forecast and warn for heatwave intensity (2)

Skills of present models used for extreme heat warnings.
Partners

The service is a partnership, made up of world leading science, information and expertise from the Bureau of Meteorology, Geoscience Australia, CSIRO and Australian Bureau of Statistics. It brings the Commonwealth’s extensive climate and natural hazard information into a single national view.

Project team

Matt Beaty – Location Insights, Australian Bureau of Statistics
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Catherine Cash – Location Insights, Australian Bureau of Statistics
**Heatwave trends in Australia**

Trend in number of very hot days 1980-2022 (days/10yr)

The frequency of extreme heat events is increasing.

Number of days each year where the Australian area-averaged daily mean temperature for each month is extreme (extremely warm days). Extremely warm days are defined as those where daily mean temperatures are the warmest 1 per cent of days for each month, calculated for the period from 1990–2021.

**Projecting future health outcomes from climate change**

Projected changes in heatwave characteristics at different global warming levels (GWL)

Global warming levels for Shared Socioeconomic Pathways (SSPs)

Plot adapted from IPCC (2021).
Heatwaves and health – a complex problem

Factors affecting behaviour:
- Physical or cognitive impairment
- Psychiatric illness
- Injuries

Increased heat gain:
- Exercise
- Outdoor activity
- Medications

Factors influencing cardiac output:
- Cardiopulmonary disease
- Medications

Factors reducing plasma volume:
- Diabetes
- Dialysis
- Renal disease
- Heart disease
- Medications

Factors affecting sweating:
- Diabetes
- Renal disease
- Heart disease
- Medications

Heatwaves and health risk
- Core Temperature
- Skin temperature
- Radiation
- Conduction
- Convection
- Evaporation

Spatial analysis products
- Melbourne heat-health risk
- Area risk profiles
- Projected heat-related deaths by global warming level
Application of findings and recommendations

- **Individuals and communities** – Individual and neighbourhood level factors are important in driving patterns of risk of dying and getting sick during heatwaves. Individuals are more susceptible if they have certain underlying health conditions, are from vulnerable groups or live in heat exposed neighbourhoods.

- **Spatial variation** – There is considerable spatial variation in heat vulnerability and health outcomes across Australia and especially within larger urban areas. Different factors drive these patterns including the degree to which communities can respond and adapt to heatwaves.

- **Evidence for planning and response** – As heatwave impacts vary between populations and locations, evidence concerning the places and people vulnerable at a local level is critical for effective policy, planning, and interventions, especially in a warming climate.

- **Targeted interventions** – Opportunities for spatial targeted interventions should be identified so warnings, targeted response plans and other outreach methods can be customized for specific segments of the population and specific places.

Thank You

Workshop on assessing the impact of slow onset events
Bonn, Germany 8-9 November

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