Human Health, Climate Change and Sustainable Development

Martin Parry
WGII, IPCC
Malaria transmission season
Estimated for the present day (*falciparum*)

London School of Hygiene and Tropical Medicine
Malaria transmission
Change in duration of season, 2080s

London School
of Hygiene and
Tropical Medicine
People at risk of malaria additionally from climate change

![Graph showing additional people at risk (millions) for different emissions scenarios and time periods.](graph)

- **Unmitigated emissions**
- **750 ppm stabilisation**
- **550 ppm stabilisation**

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London School of Hygiene and Tropical Medicine
Figure 11-12: Heat stroke morbidity cases per million; Tokyo, July-August, 1890-1995, males >65 years) (Piver et al., 1999)
Millions at Risk in the 2050s

Additional millions of people at risk of hunger, malaria and coastal flooding

Temperature Increase

Legend
- Risk of water shortage
- Risk of malaria
- Risk of hunger
- Risk of coastal flooding
Millions at Risk in the 2080s

Additional millions of people at risk of hunger, malaria, and coastal flooding vs. Temperature Increase.

Legend:
- Black: Risk of water shortage
- Gray: Risk of malaria
- Dark gray: Risk of hunger
- Black: Risk of coastal flooding

Stab. 550
Stab. 650
Stab. 750
Stab. 1000
Unmitigated emissions - IS92a
Annual runoff

Percentage change in 30-year average annual runoff by the 2080s.

University of Southampton
Change, due to climate change, in the number of people living in countries with extreme water stress.
Percentage change in average crop yields for the climate change scenario. Effects of \( \text{CO}_2 \) are taken into account. Crops modelled are: wheat, maize and rice. Changes shown are averaged for national or regional levels based on the economic components of the Basic Linked System.

Jackson Environment Institute, University College London / Goddard Institute for Space Studies / International Institute for Applied Systems Analysis
Projected global cereal production for reference case and the climate change scenario.

Percentage change in global cereal prices under the climate change scenario (0 = Projected reference case).

Additional people at risk of hunger under the climate change scenario (0 = Projected reference case).

Jackson Environment Institute, University College London / Goddard Institute for Space Studies / International Institute for Applied Systems Analysis
People at risk from sea-level rise

Percentage change in the number of people at risk under the sea-level rise scenario and constant (1990s) protection (left bar) and the sea-level rise scenario and evolving protection (right bar).

Middlesex University / Delft Hydraulics
Emissions and concentrations of CO$_2$ from unmitigated and stabilising emission scenarios

Hadley Centre for Climate Prediction and Research
Changes in river runoff from the present day to the 2080s

Unmitigated emissions

Stabilisation of CO$_2$ at 750 ppm
Stabilisation of CO$_2$ at 550 ppm

University of Southampton
Changes in water stress from the present day to the 2080s

Billions of people

University of Southampton

- Unmitigated Emissions
- 750 ppm Stabilisation
- 550 ppm Stabilisation
Changes in crop yield from the present day to the 2080s

Potential change in cereal yields (%)

-10 -- 20
-5 -- 10
-2.5 -- 5
0 -- 2.5
5 -- 10
10 -- 20
No data

Unmitigated emissions

Stabilisation of CO$_2$ at 750 ppm

Stabilisation of CO$_2$ at 550 ppm

University of East Anglia
Global Estimate of Additional People at Risk of Hunger due to Climate Change
Conclusions

• Most serious effects are at the margins.
• Stab’n at 750 does not avoid most effects. Stab’n at 550 does, but cost (= c.20 times Kyoto reductions).
• Adaptation AND stabilisation are necessary.
• Sustainable development (cf SRES B2 marker scenario) a potential ‘solution’.