Climate change and public health: impacts, global responses and initiatives in the Western Pacific Region

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Presentation contents

1. Evidence and health impacts of climate change;
2. Global, regional and national commitments to develop health adaptation solutions
3. Adaptation strategies and models: how to best support countries that do want to take action?
   - Vectorborne disease example from Cambodia, Mongolia, Papua New Guinea
4. What next?

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Climate change undermines environmental determinants of health

Lack of water quality and quantity: Contributing to a doubling of people living in water-stressed basins by 2050.

Decreased food security: In some African countries, yields from rain-fed agriculture may halve by 2020.

Direct impacts of extreme weather: Increasing exposure to coastal flooding by a factor of 10, and land area in extreme drought by a factor of 10-30.

Increased incidence of infectious disease: Including vectorborne diseases (increasing population at risk of malaria by 170 million by 2030; risk of dengue by 2 billion by 2080s.)

"Global climate change will have a wide range of health impacts. Overall, negative health impacts are anticipated to outweigh positive health impacts." –IPCC

1. IPCC *Third Assessment Report - Climate Change.* 2001.

Particularly vulnerable groups to different CC health outcomes

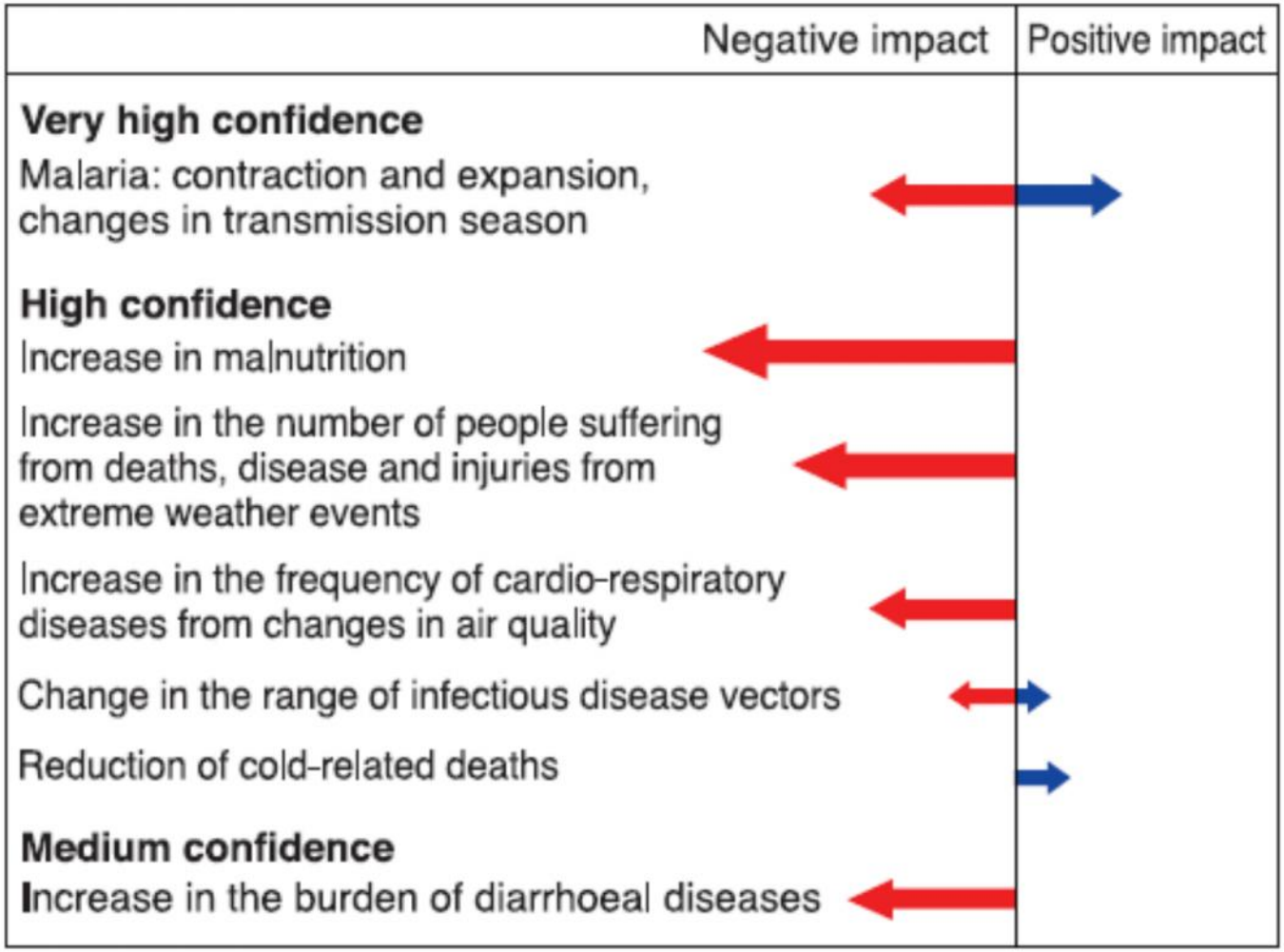
Heat stress	**Elderly; infants and children; pregnant; chronically ill; working outdoors**
Air pollution	**Children; pre-existing heart/lung disease; diabetics; working outdoors**
Extreme weather events	**Poor; pregnant women; chronic medical conditions; mobility and cognitive constraints**
Water/food-borne diseases	**Immuno-compromised; elderly; infants; (specific risks)**
Vector-borne diseases	**Children; poor; non-immune populations; outdoor workers; genetic conditions; pregnancy**

Balbus and Malina 2009. *Environmental health perspectives* 119; 291

Some of the largest disease burdens are climate-sensitive

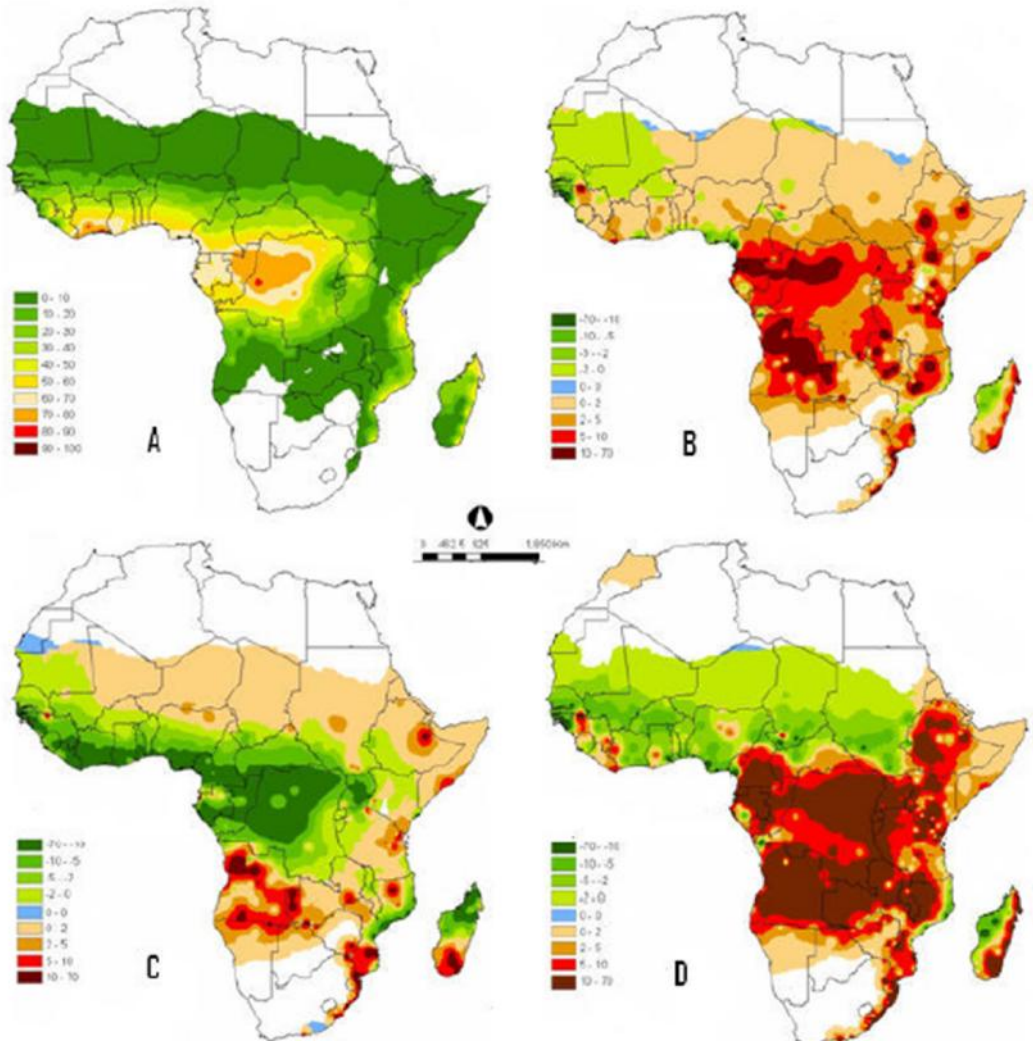
- Each year:
  - Undernutrition kills 3.5 million
  - Diarrhoea kills 2.2 million
  - Malaria kills 900,000
  - Extreme weather events kill 60,000
- WHO estimates that the climate change that has occurred since the 1970s already kills over 140,000 per year.

Direction and magnitude of change of selected health impacts of climate change



Source: IPCC AR4 WG-II, 2007

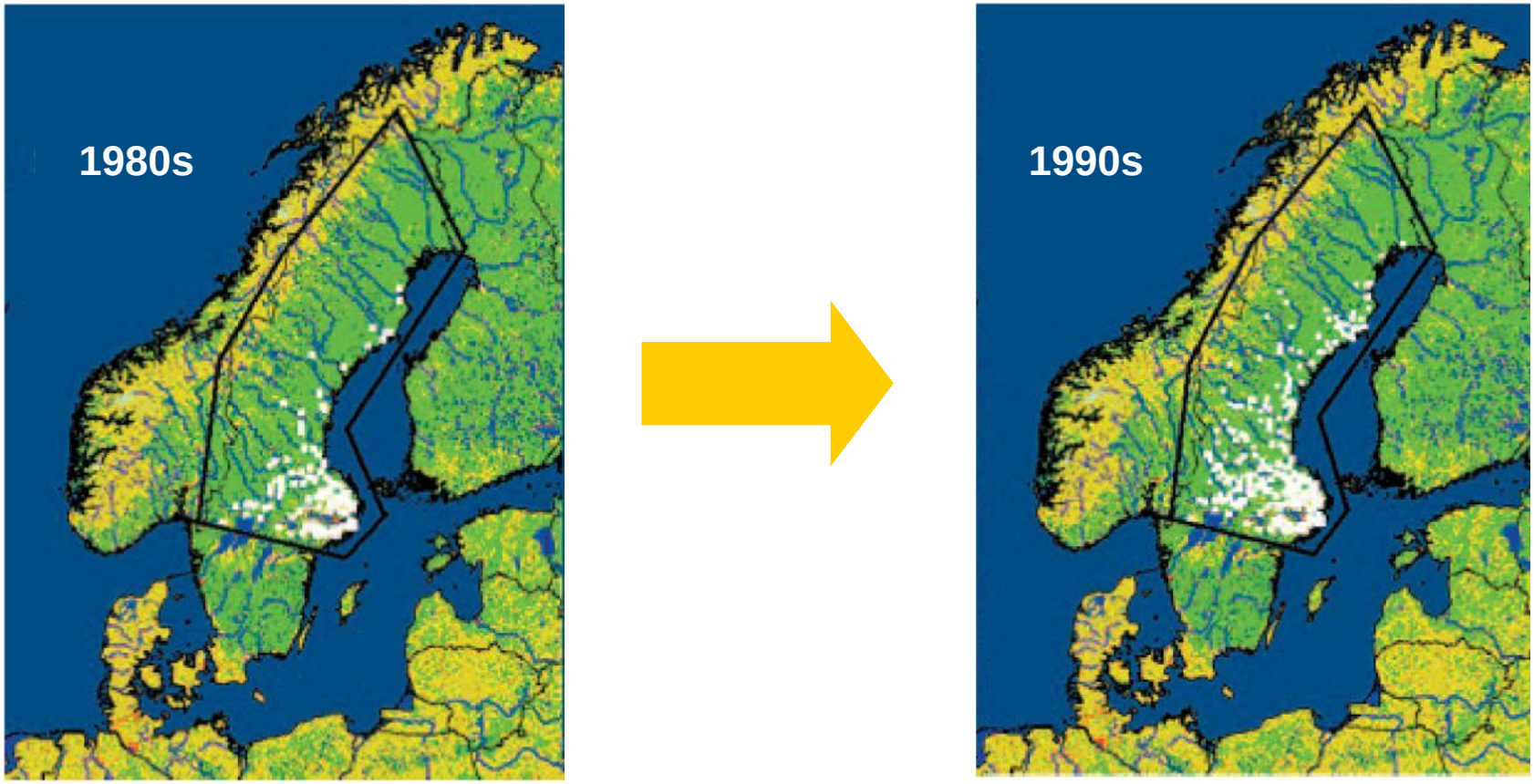
Projected expansion of *An. gambiae* in Africa according to different climate scenarios



Map	Temperature	Summer rain	Winter rain
A	Current climate		
B	↑2°C	↑10%	↓10%
C	↑0.1°C/ degree latitude	↑10%	↓10%
D	↑4°C	↑20%	↓20%

Tonnang H *et al. Malaria Journal* 2010: 9;111

Impact of CC on latitude limit of tick *Ixodes ricinus* in Sweden: field/survey data

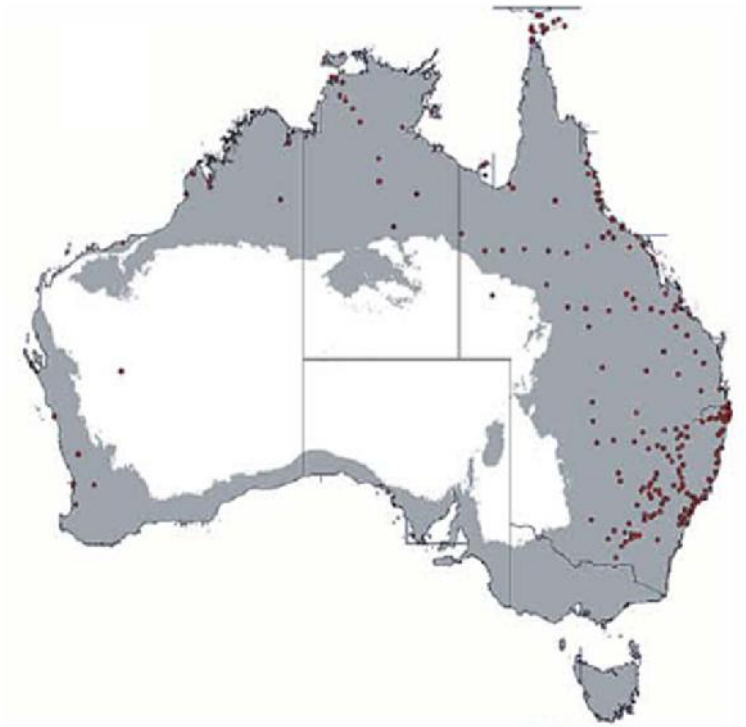


Tick distribution expanded due to fewer cold days (below -12°C)

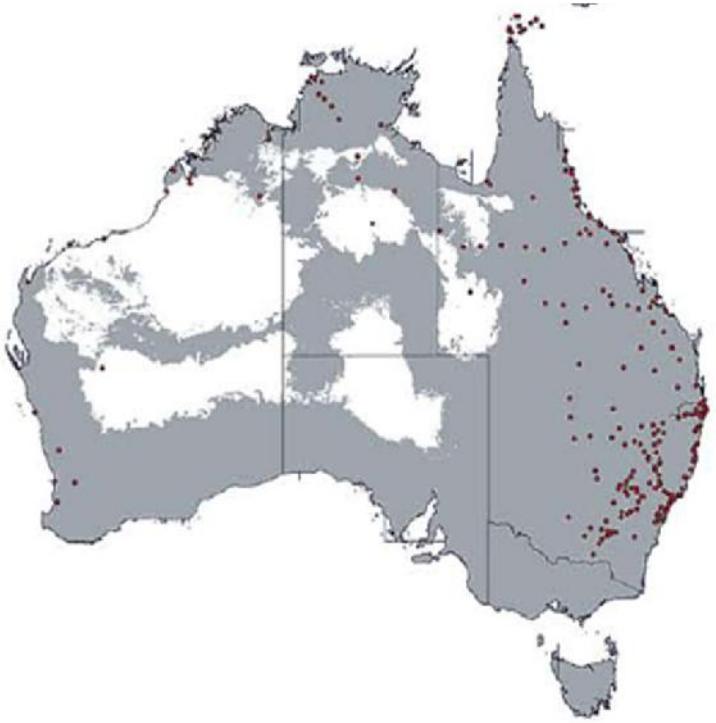
Lindgren *et al. Envir Health Pers.* 2000;108:119-123

Impact of climate change on *Ae. aegypti* distribution in Australia: Modelling data

1995



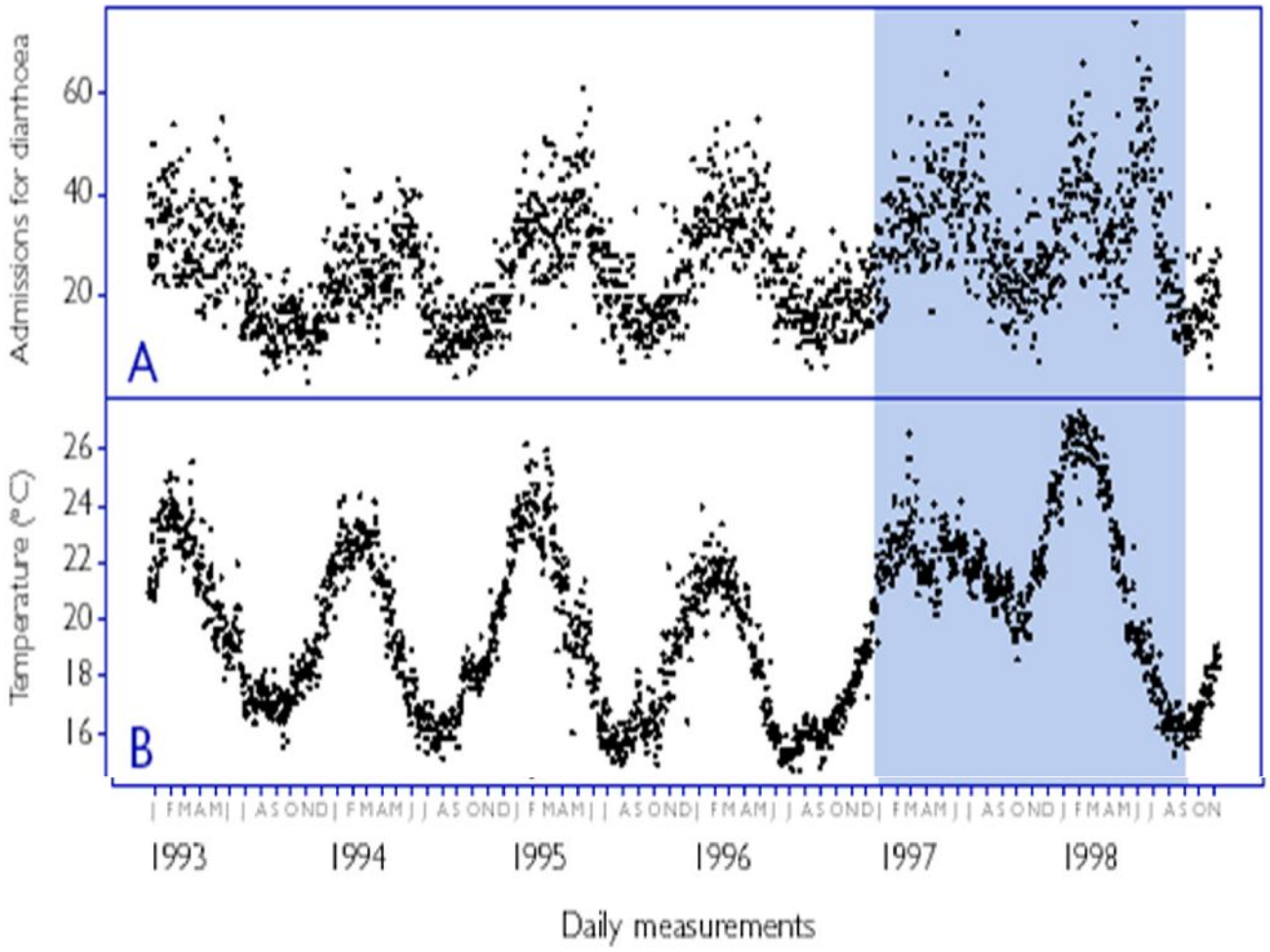
2050



Expanded potential distribution projection of *Ae. aegypti* in Australia, 1995 - 2050

Beebe NW *et al. PLOS NTDs* 2009; 3;e429

Increases in diseases of poverty may be even more important: diarrhoea



Diarrhoea is related to temperature and precipitation.

In Lima, Peru, diarrhoea increased 8% for every 1^0C temperature increase.

Checkley *et al*, Lancet, 2000

A word of warning: problems with attributing disease trends to CC

- Timescale of periods of observation long: confounding unavoidable
  - Population movement
  - Surveillance mechanisms change
  - Urbanization/demographics
- Ecological systems do not respond to global averages: local and heterogeneous
- Long-term entomological data may reflect presence of entomologists rather than insects
- What to accept as evidence?
  - Biological sensitivity
  - Meteorological change in climate
  - Plausible, consistent epidemiological changes

Kovats RS *et al. Phil. Trans. Soc. Lond*. 2001:356;1057-1068. Walther et al. Nature 2002;416:389-395

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Gap between national CO_2 emissions and regional CC mortality

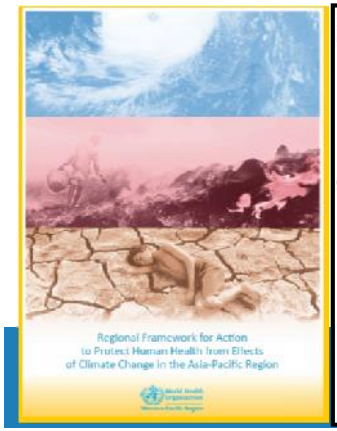
Scaled by cumulative emissions of CO_2, by country, to 2002

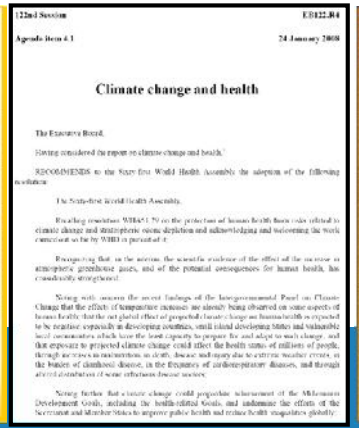
Scaled by WHO regional estimates of *per capita* mortality from climate change, 2000

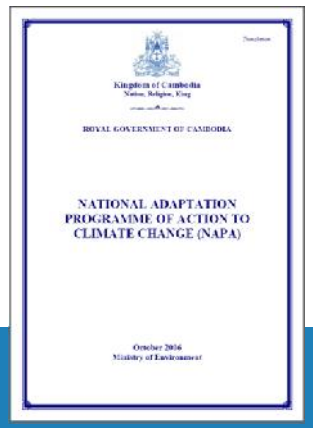
Patz *et al., Ecohealllth* 2007. 4; 397

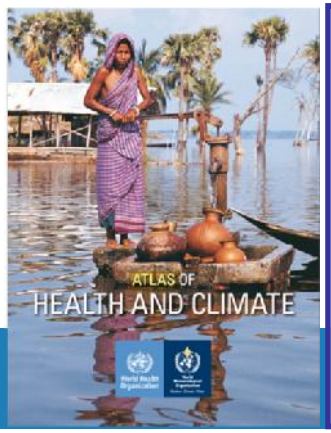
Climate change and vectorborne diseases: health commitments

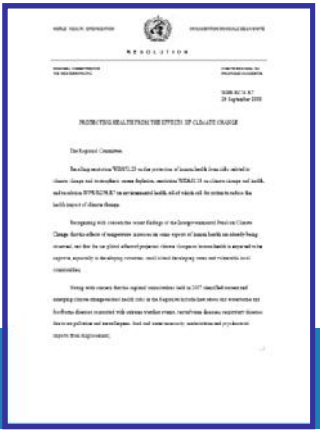
- International resolutions endorsed by Member States, eg.:
  - 61st World Health Assembly resolution, May 2008. Climate Change and Health;
  - 59th Session of the Regional Committee for Western Pacific, September 2008;
  - Climate Change and Health workplan, 2008 - 2013
- NAPAs, health CC vulnerability assessments, national health adaptation plans;
- Agreed strategies, tools and plans to combat specific diseases'
- Donor commitment





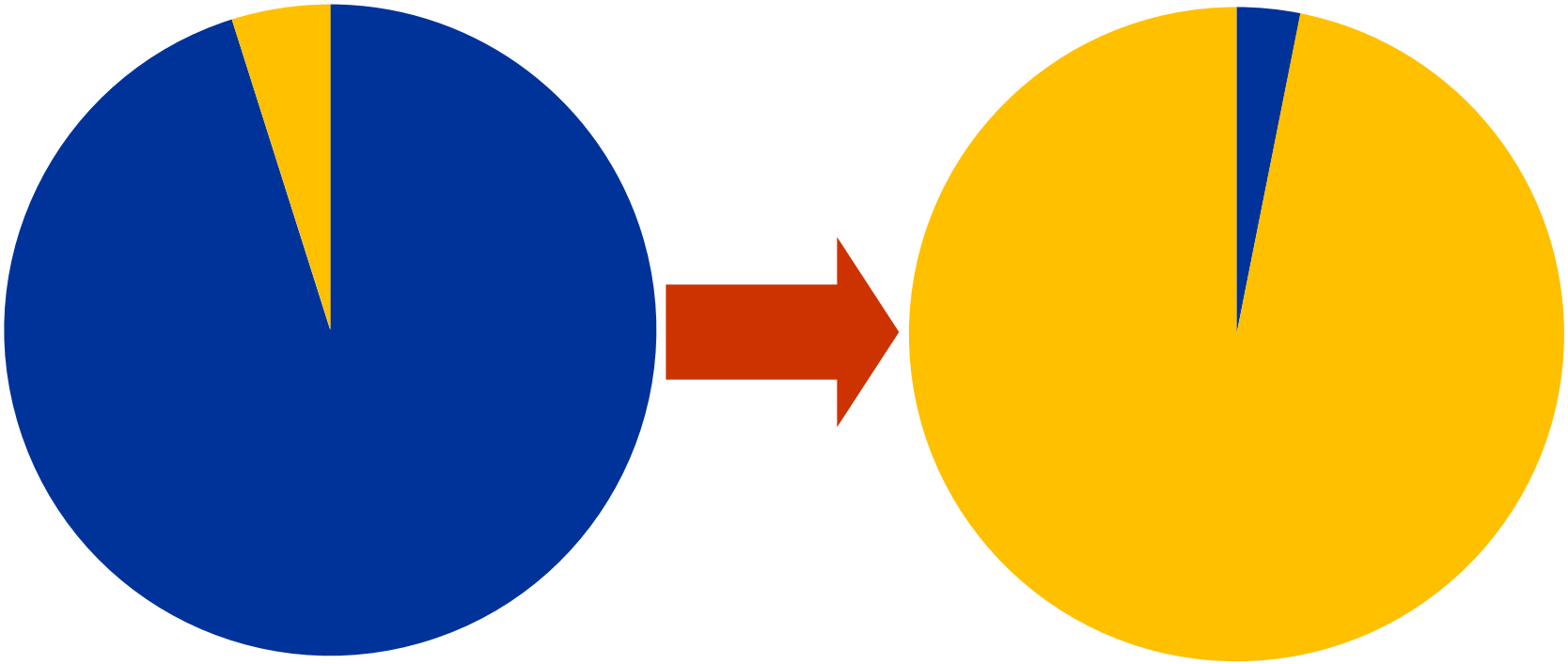






Health component of NAPAs in LDCs and small island states

Analysis of 41 NAPAs from Africa, LDCs and small island states



95% of NAPAs consider climate change will impact health

3% of funding for priority projects on health

Manga, Bagayoko, Meredith and Neira 2010. Overview of health considerations within National Adaptation Programmes of Action for climate change in least developed countriesand small island states. WHO.

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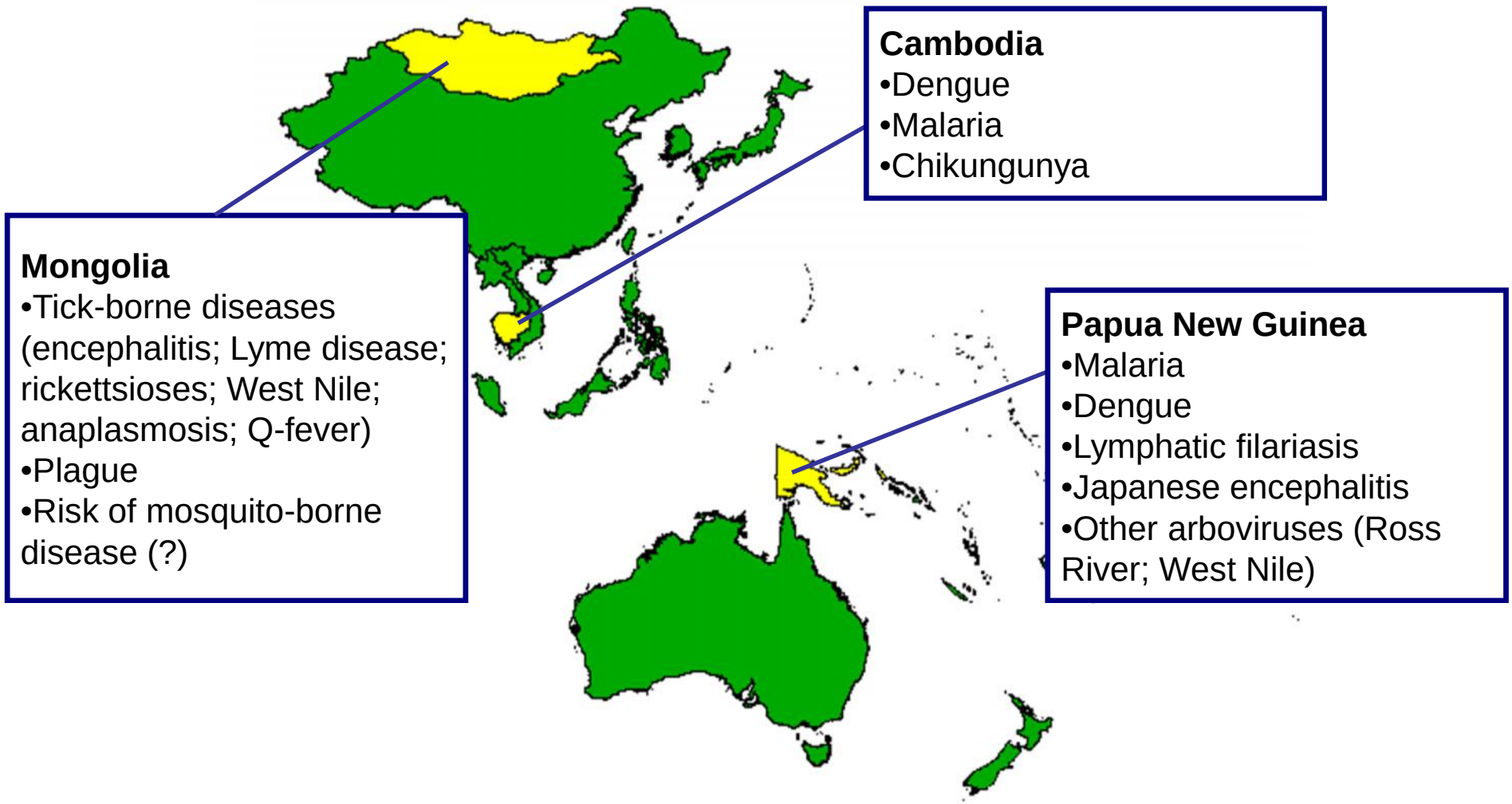
KOICA-funded, WPRO climate change and vector borne disease project: VBD vulnerabilities



Cambodia
- Dengue
- Malaria
- Chikungunya

Mongolia
- Tick-borne diseases (encephalitis; Lyme disease; rickettsioses; West Nile; anaplasmosis; Q-fever)
- Plague
- Risk of mosquito-borne disease (?)

Papua New Guinea
- Malaria
- Dengue
- Lymphatic filariasis
- Japanese encephalitis
- Other arboviruses (Ross River; West Nile)

Vulnerability assessment criteria and health adaptation planning

1. Areas at risk of recent or imminent impacts of CC effects	2. Known transmission of VBDs, and risk of changes in incidence due to CC	3. The availability of historical climatic and VBD data	4. The availability of proven interventions to minimize CC/VBD risks

Health adaptation planning

Cambodia:

- Expansion of dengue and other arbovirues in rural areas
- Changes in malaria ecology and epidemiology

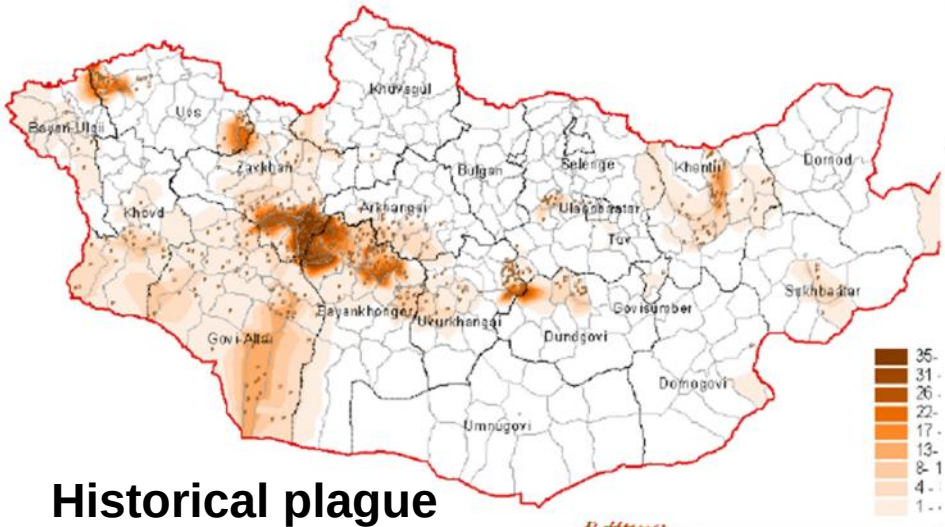
Mongolia:

- High incidence focal areas: tick-borne diseases and plague
- Population/hospital-based surveillance in vulnerable groups

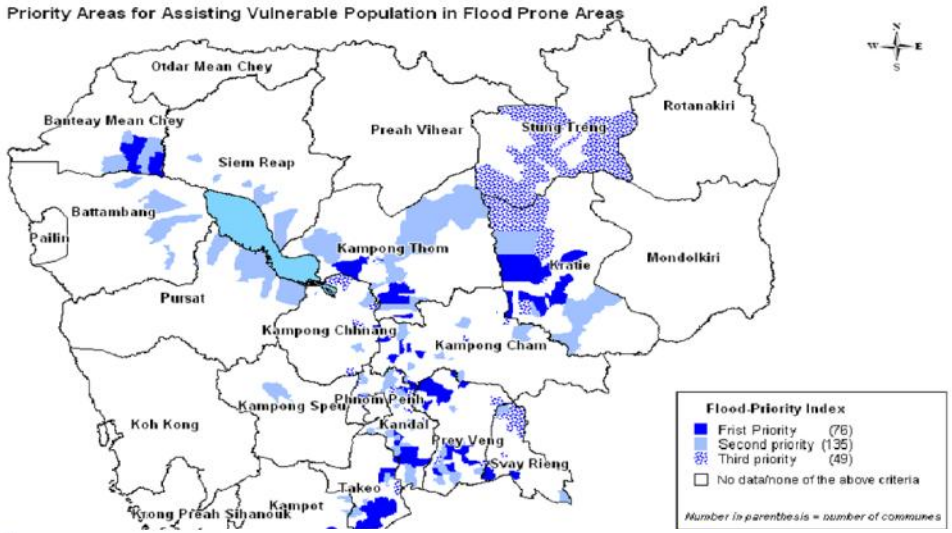
Papua New Guinea:

- Highland areas at risk of malaria
- Others (dengue, arboviruses, filariasis) circulating without surveillance

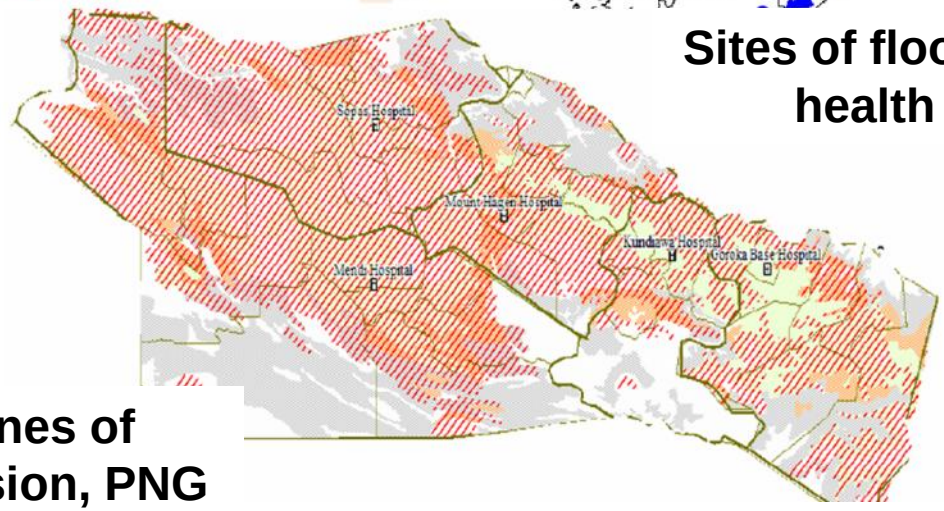
Identification of vulnerable project sites in each country



Historical plague incidence: MNG

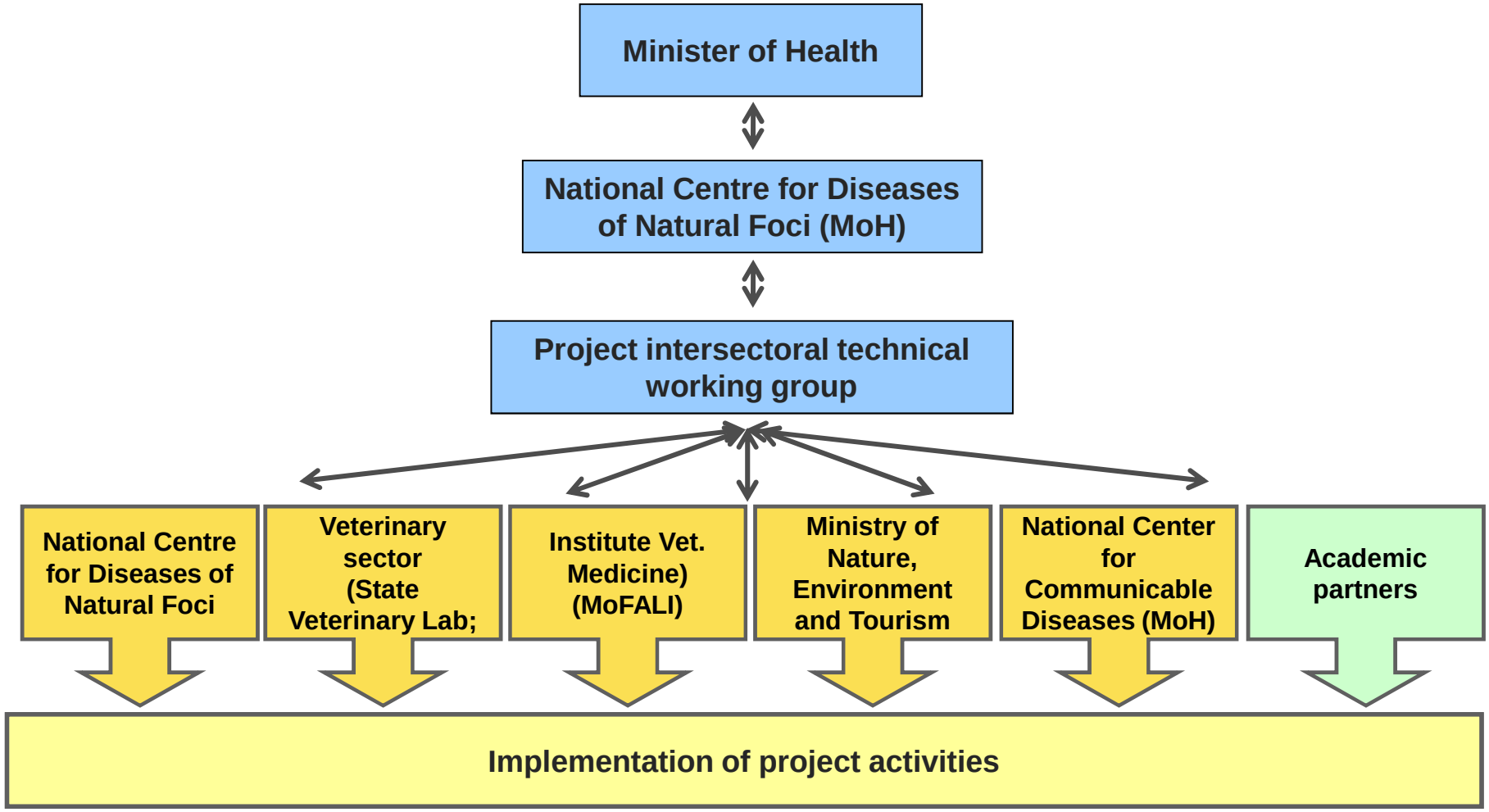


Sites of flooding with possible health impacts, KHM



Theoretical zones of malaria transmission, PNG

Project structure: highly intersectoral approach to determinants of health



Project design: compatible with existing disease, environmental plans and national strategies

Objective: **To build capacity in countries and at regional level to minimize consequences of VBDs to populations in areas that are prone to climate change**

Outputs

1)	2)	3)	4)	5)	6)
Increased awareness to minimize VBD consequences of CC	Strengthened surveillance (vectors, VBD, climatic indicators)	Enhanced vector control	Strengthen capacity for diagnosis and treatment of VBDs	Identify and fill strategic knowledge gaps including research	Strengthened programmes and good project management

Engaging *intersectoral* partners responsible for health determinants

Awareness-raising activities including information, education and communication (IEC)

Vector surveys for ticks and fleas to determine outbreak risk

- To understand risks in vulnerable populations and plan preventive measures
- Surveys conducted in different ecotypes, seasons, times of day

Climate surveillance to incorporate with epidemiological data

Human surveillance to understand disease distribution, infection history and risks

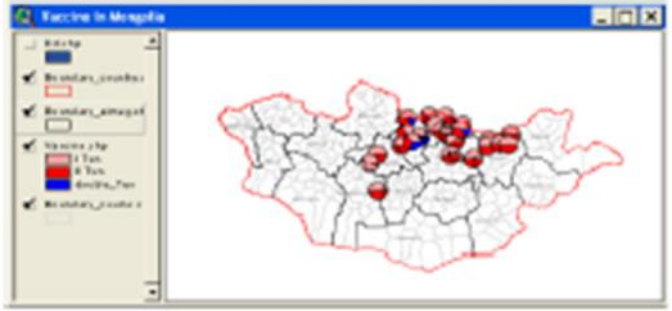
- Population and hospital surveys and laboratory investigation to identify previous infection with tick-borne diseases;

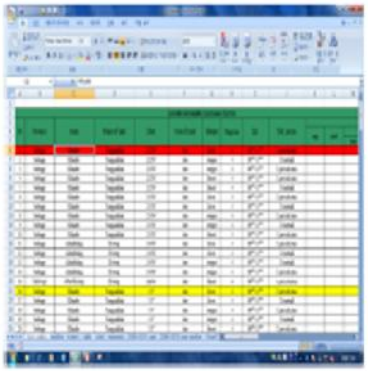
Results:

- Most infections in June/July: health professionals more aware;
- Climate change likely to expand transmission season;
- High risk behaviours:
  - Picking berries/herbs; chopping trees; mining; herding; picnic; cutting hay.

Strengthened surveillance and development of prospective systems

- Established e-database of VBD and meteorological data;
- Data obtained from sources including:
  - National Statistical Office,
  - National Center for Infectious Disease with Natural Foci,
  - Institute of Veterinary Medicine,
  - National Agency of Meteorology





- Training of professor Cheong Hae-Kwan on database establishment
- Participants were 20 professionals
- Training subject: Database establishment on MS Excel in the field, organizing data for further analysis, basic concepts of analyzing.

Climate change and health in Pacific island countries (PICs)

- Most PICs have completed National CC&H Action Plans (NCCHAPs) or equivalent, with some notable exceptions (Samoa, Tokelau)
- Atoll countries, particularly the low-lying ones (Tuvalu, Kiribati, Marshall Islands, Tokelau) are extremely vulnerable to the impacts of climate change, including its detrimental effects on health
  - Increasing incidence of food-, water- and vector-borne diseases, injuries/deaths from extreme weather events, mental health disorders and other NCDs

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Next steps

- Mainstreaming of climate change and health into existing public health systems
  - With SPC in the Pacific, integrating with existing surveillance systems;
  - With disaster response/water and sanitation/other compatible programmes, at first
- Expand and improve climate-communicable disease models (with focus on potential utility of climate-based early warning systems for infectious disease epidemics in PICs)
- Evaluate vulnerability assessment and adaptation planning; revise plans periodically;
- Monitoring and evaluation of climate change and health: develop the evidence base;
- Formalize group of experts in climate change and health

Thank you

Health system strengthening: Definition of an essential public health package

Most health risks in next 20-30 years could be averted through:

- comprehensive assessments of climate risks to health and health systems;
- integrated environment and health surveillance;
- delivery of preventive and curative interventions for identified climate-sensitive public health concerns;
- preparedness and response to the public health consequences of extreme weather events;
- applied research; and
- strengthening of human and institutional capacities and inter-sectoral coordination.

Health impacts of climate change

- Adaptive capacity needs to be improved everywhere
  - Even high-income countries are unprepared to cope with extreme weather events
- Adverse impacts greatest in low-income countries
  - Those at greatest risk include urban poor, elderly and children, traditional societies, subsistence farmers, coastal populations
- Economic devt important, but insufficient to protect populations against health impacts of climate change
  - Critical factors include how growth occurs, distribution of benefits, public health infrastructure, and other factors that influence population health

2008 WHA resolution

WHO is Requested to;

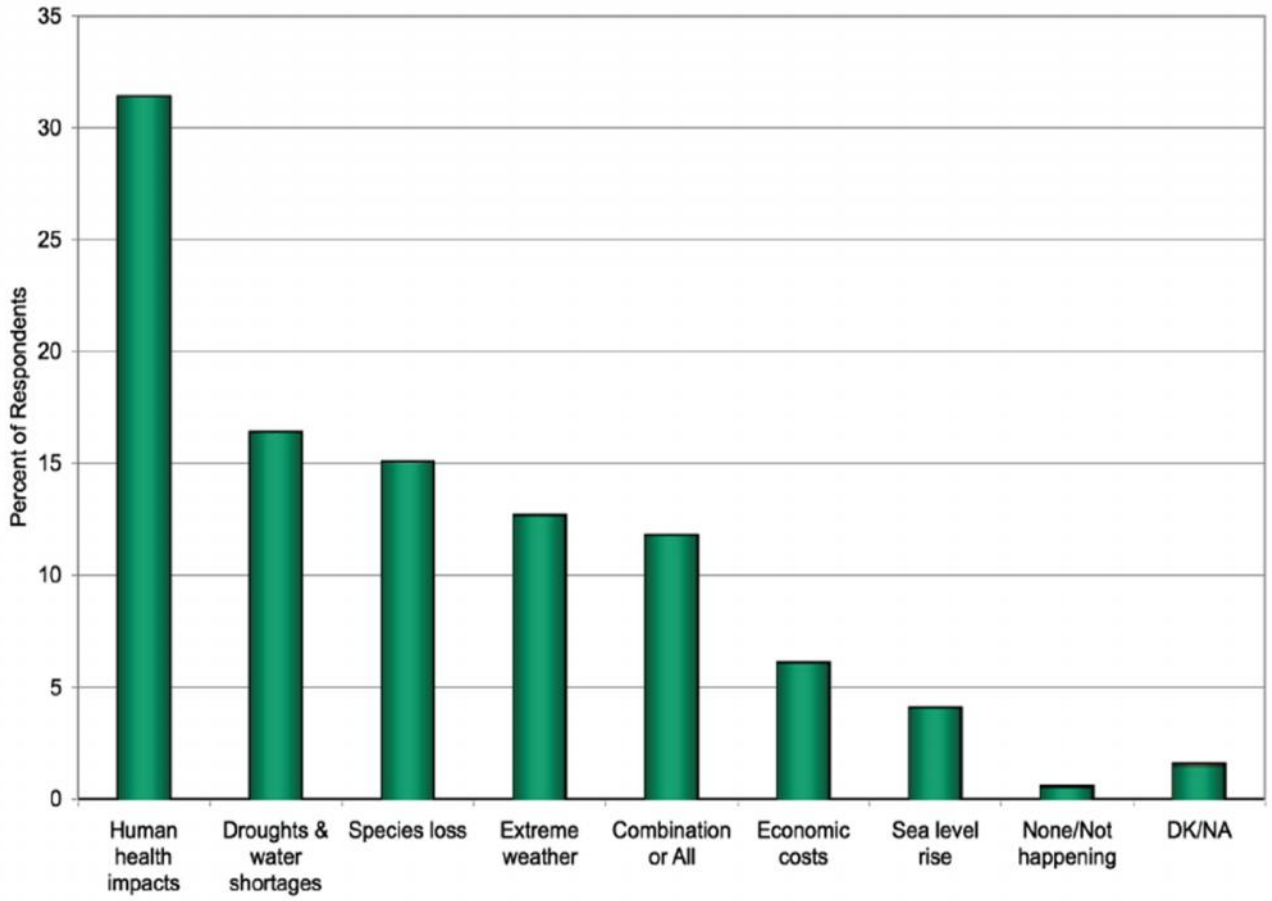
1. Raise awareness of health implications of climate change, in partnership with other UN agencies
2. Participate in and ensure health relevance of the UNFCCC Nairobi Work Programme on Adaptation
3. Promote consideration of health impacts by relevant UN bodies to help developing countries to adapt
4. Promote research and pilot projects in five key areas (vulnerability assessment; interventions; assessment in other sectors; decision support and other tools; assessment of costs)
5. Consult with member states on scaling up WHO support in this area.

2008 WHA resolution

Member States are urged to

1. Develop health measures and integrate them into adaptation plans
2. Build the capacity of public health leaders to be proactive and take rapid and comprehensive action
3. Strengthen the capacity of health systems to prepare for and respond to natural disasters
4. Promote health sector engagement with other sectors to reduce risks
5. Commit to meeting health challenges of climate change

Awareness raising:
High public concern over climate risks to health



Globescan poll in 30 countries (UNDP 2007):

"Now I would like to ask you some questions about climate change, which is sometimes referred to as global warming or the greenhouse effect. Which ONE of the following possible impacts most concerns you personally, if any?"