



CLIMATE CHANGE AND HEALTH IN THE ARAB REGION: A WADI APPLICATION

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Climate change and health

- **“The effects of climate change are being felt today, and future projections represent an unacceptably high and potentially catastrophic risk to human health...Tackling climate change could be the greatest global health opportunity of the 21st century” - Lancet Commission on Health and Climate Change, 2015**





Health impacts in the Arab region

- Direct impacts
 - Heat-related illnesses, extreme events
- Indirect impacts
 - Spread of disease vectors
 - Undernutrition
 - Mental health



Case study:

Impacts on neglected tropical diseases (NTDs) in the Arab region

- **Climate change impacts**
 - Disease vectors are very sensitive to changes in climate conditions
 - Rising T_{min} and T_{max} may result in range changes or expansions
 - Disruptions to ecosystems indirectly impact disease cycle
- **Other environmental and social changes**
 - E.g. displacement, desertification, conflict





Approach

- Water-associated disease index (WADI) used to provide an integrated view of environmental and social disease determinants

Conceptual framework and identification of thresholds for case studies (Leishmaniasis in Tunisia and Morocco; Schistosomiasis in Egypt)

Creation of indicator layers for case studies including RICCAR climate projections for RCP 4.5 and RCP 8.5

Integrated map output of exposure conditions



Applying WADI in RICCAR: Leishmaniasis

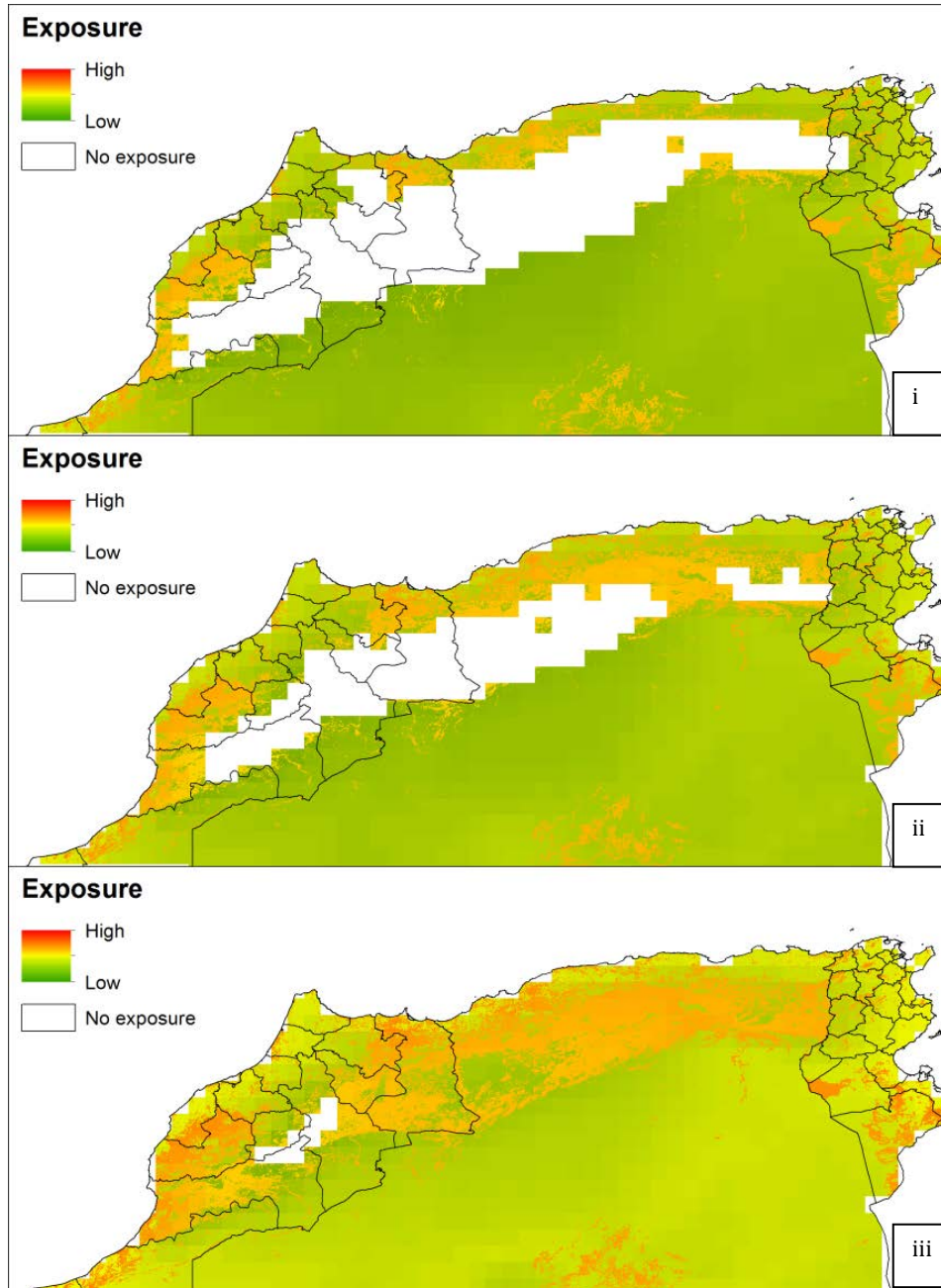


Figure 1: End of transmission season (October) ZCL exposure

i) Historical (1986-2005)

ii) RCP 4.5 Mid-century (2046-2065)

iii) RCP 8.5 End of century (2081-2100)

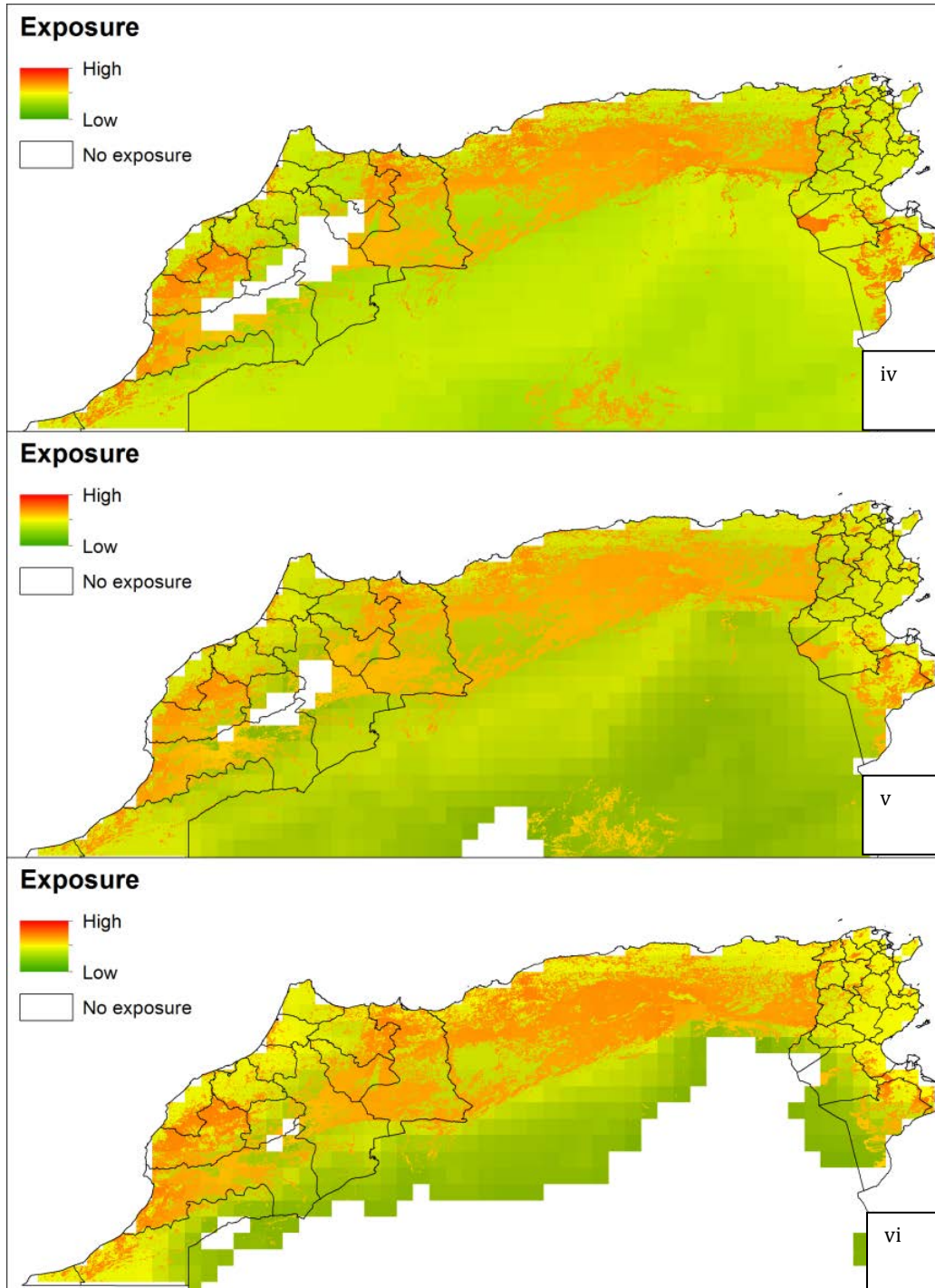


Figure 1b: Middle of transmission season (June) ZCL exposure

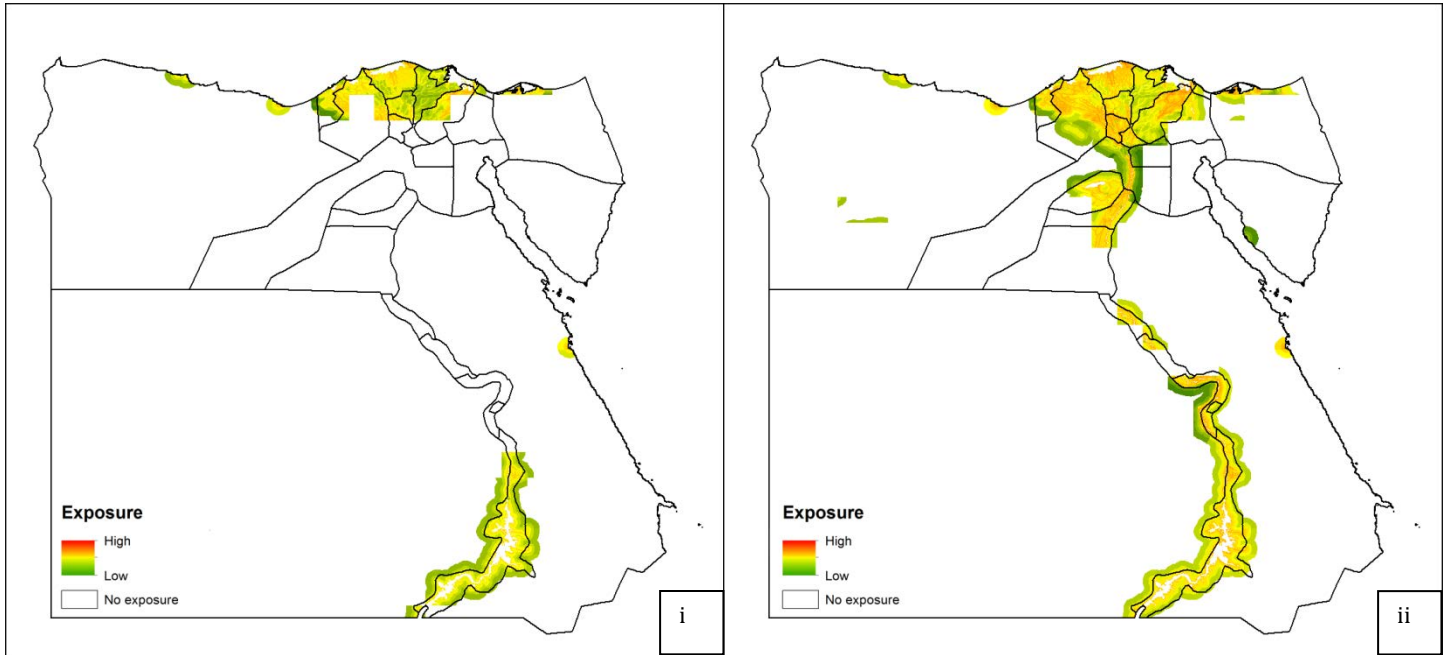
iv) Historical

v) RCP 4.5 Mid-century

vi) RCP 8.5 End of century



Projected Climate Change Impacts

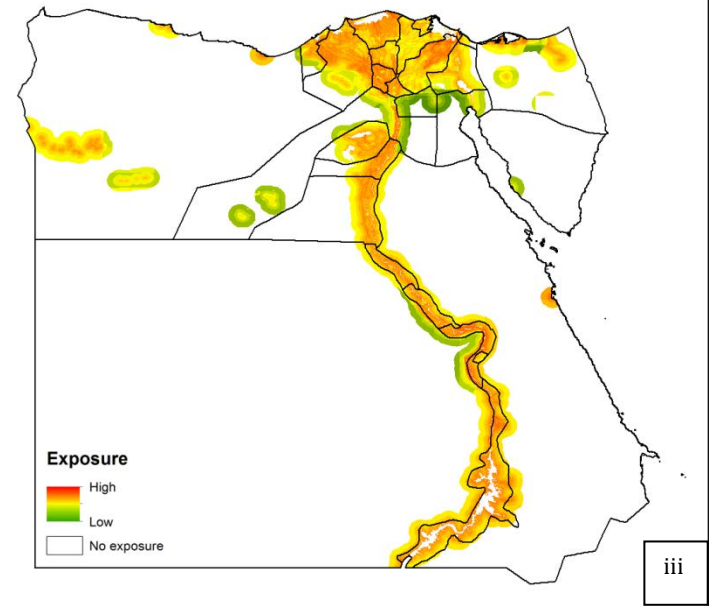


Schistosomiasis exposure in winter (Low transmission season)

i) Historical (1986-2005)

ii) RCP 4.5 Mid-century (2046-2065)

iii) RCP 8.5 End of century (2081-2100)





Summary

- Transmission seasons could increase in the Arab region due to rising temperatures that have historically limited the range of disease vectors

Limitations:

- Climate models provide long term projections but disease incidence characterized by extremely focal outbreaks within exposed areas
- Other environmental and social changes also play an important role in patterns of disease transmission





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Thank you





Projected climate change impacts

RCP 4.5 and RCP 8.5 mid- and end- of century

- Climate change may have an important impact on the range of leishmaniasis transmission
 - Increasing T_{min} will increase length of exposure season and geographic range (including higher altitudes) ($>10^{\circ}\text{C}$)
 - Increasing T_{max} will reduce exposure ($>40^{\circ}\text{C}$); however, generally occurring in uninhabited desert regions
 - Increasingly dry conditions less favourable for animal host, but projected changes in humidity are small





Projected climate change impacts

RCP 4.5 and RCP 8.5 mid- and end- of century

- Climate change may impact the seasonal range of schistosomiasis transmission
 - Projected warming will create suitable snail conditions during colder months ($>12.5^{\circ}\text{C}$), when fewer cases currently occur
 - Projected warming during summer months may decrease exposure in Upper Egypt
- Impacts on public health control measures
 - Schistosomiasis control activities currently undertaken during warmer months when most people become infected

