



Tyndall Centre

The impact of a global temperature rise of 4 °C (7 °F) in South East Asia







### The impact of a global temperature rise of 4 °C (7 °F) in South East Asia





### unkong celta 🕦

the walking cells as low lying region in coultern values and carebods. Amund half of the design cells is less than a miscown select, making it values bits in the life footing, storm surges and saline infrascon, like level one is a threat to the scoring and scoling. of the region, the welcong civilla alone generalist over half of verham"s total non-productions.

trader in 1° cultical across interpretation receives. The distable acrossing in the found ride for light to our thing the rest of the certainty, retaining account of foliately are stores in the level and changes in head the service of the rest of the certainty in the level and changes of a certain fibe westering total respons such as a level rate could of an original to the certain retaining to the level rate of the certain retaining to the level rate or the area of the level rate of the area of the level rate of the area of the level rate of the district certain rate of the level rate of the area of the level rate of the level rate of the area of the level rate of the level rate of the area of the level rate of the level

### A global senage temperature role of 4 °c has the potential to have all we impact on antigapore. clobal senage see levels could me by up to so on by the end of the

sertuny, conflippending to a local, relate is see level risk of around as cm. For a small coulding with a high population density and automated by see, the could have implications for flooding, could the coulding see the coulding of the coulding see the coulding of the coulding could be seen to be seen t and kee and sall water retreason of groundwater aquation. their water supplies are required to purport the high population density of singligeness but are limited by the country's shall amount of land, water supplies are all land to the higher as parts of south seat Assa could see drought events occurring more than twice

the unique geography of surgicions makes increasing lampsealunes under oftende clientals a particular health concern. Any increase in temperature as a reliuit of cliente change will be in addition to the higher lampsealunes that must from 10% unban heart night effect, in height inexpendants that must from 186 other heat direct effect, and far man, the combination of holding durine inexpendants and the last of registers are result of warmer contribute to implement and the last of registers are result of warmer contribute to implement and the state of the contribute o lines, softma and fronts.



in inchorate, bitting and aquiculture play a sold role in the inchorate play as the role in the inchorate play and a sold role in the inchorate population, in not of present between, marries between approximation and present playing and aquiculture provided more than the intellicit population, who are had depending on married adjust behavior another products and approximate playing and a pla

A 4 to the iniglobal average temperature is expected to have negative emplications for fishing and aquarculture across indonesia, selfacts in the effect of a global beforesture to so in manne capture between around the efforts from that indonesia may be capation formers account on whom an industrial termination may not and the countries that operates the largest decline in such polarital, warmer count interpretations can flatnicity effect the physicology, life halony, produce my and controlled the first the physicology, life halony, produce my and my and my and the filled the first three productions, or flatness and my and shelling the countries of the my and the filled three productions, a millianced by variations in multiple formers production, a millianced by variations in multiple filled the my and the filled three productions or multiple filled three productions. response, a product controlled by other currents, couple upwelling and the frequency of all vefto a whip — all of which could change under a warmer Circuit.

such projections may have large emplications for food security acrost indicress, duly to the niligate is empact on communities so dependent on between for load and revenue.





over half of the cland of someo (which is shared by indonesia, satisps and manual a covered by broads amborist, the foreithes an important role to play within the carbon cycle and the materials of clinials change, with resp., it a above threatist to change of dimate through fluctuations in temperature and numbal patterns. was lines in rankmab are not well adapted to withstand bred fires. the humidity of the climate and the define caregy mean that the ground a plaufit dampand not anticle for confluence, that that or return deplates manners that, for example, many trees have relate by the best in companion to the fricker blest of trees more used to experiencing return

warm forci free across south set Ass are human-induced for a sample of macon, recovery, the climate thanges accordingly to a moveler in macon, recovery, the climate changes accordingly the moveler in global arrange temperature of 4 "Care projected to after conditions to that the fiftest the mit across the region could increase, it is the complex interestion between human agritton of time and changes in the strengthers conditions suitable for the line in spread that increases the ractor forest line, in addition, changes in the of selfo southern cocollation, which influences the enfount of named in the region, could have significant positive or negative impacts on the risk of forest fine in acrifice.

rosed line are already a problem in the region, not gut because of the destruction of the links, but also as a feasil of the evolutioned pollution caused by the smooth plumes, currently, some obtain such as simppions and duals cumput suffer periods of reduced are quality from this base.

### ske-growing in rhalland (2)

rhaland a the world's soft largest producer of non and the world's larged exporter, selling around to fullion tomes in zone and coffinbuting about a third of the total world not bade, sice is also the staple lood of the this population, regardless of their income. comparatively, may fairth are very arrative to estimate of as country gravity, may fairth are very arrative to estimate and tempolighes, comp time become desire of temporatures expect as 'co-anisted Colevery's medicancy to a encountry from a sensible for consumptions, cole improvement of during other stages of the plant's grave to than this other is surplicated megalize effect of yearth of prove that make the encountry of the control of the State of emperature ran of 4 °C, the fifth to not comp from low the first provided of the control of the country of the things and the country of the country of the country of the first provided on the country of the country of the first provided on the country of the country of the desired on the country of the country of the desired of the country of the country of the desired of the country of the country of the desired of the country of the country of the desired of th Responsible may describe by the form of lately to be offered by reductions in yellow costs related as to be the reduction or yellow costs related as to be the reduction of the reportance of the reportance of the reduction of th Country's economy. As not a size the principal sixple crop of Alia, any despectation of the projection is starts could project a lood security in the continuent as start hose.

### rropical cyclones in the rhillppines (a)

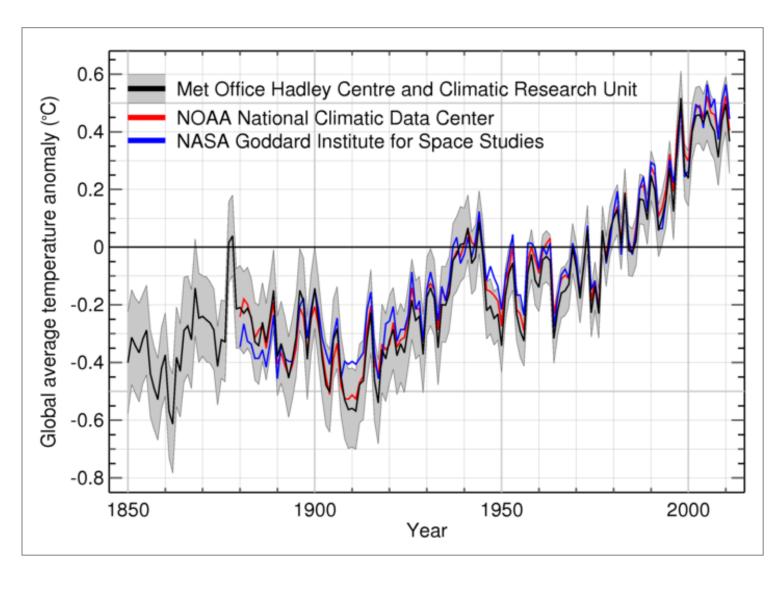


go very, more along the base of support unity made landfull in the visige fallend of the independs which only a popular and having based on the independs which only a popular and having by on bornelson, seek the suited from extreme faller flooding, the fallen of a dies and numerous brothistics, such large search floritisch the breast to the population of the inhipports from such a difficultie to breast of the population of the inhipports from such a difficultie material desired.

As a result of a 4 °c man disball energy temperature, tropical cyclores could be more infleran, the pittential rise in sea-likel across south self-ass could further member the country's witnesshifty to storm surges and other could flooding.

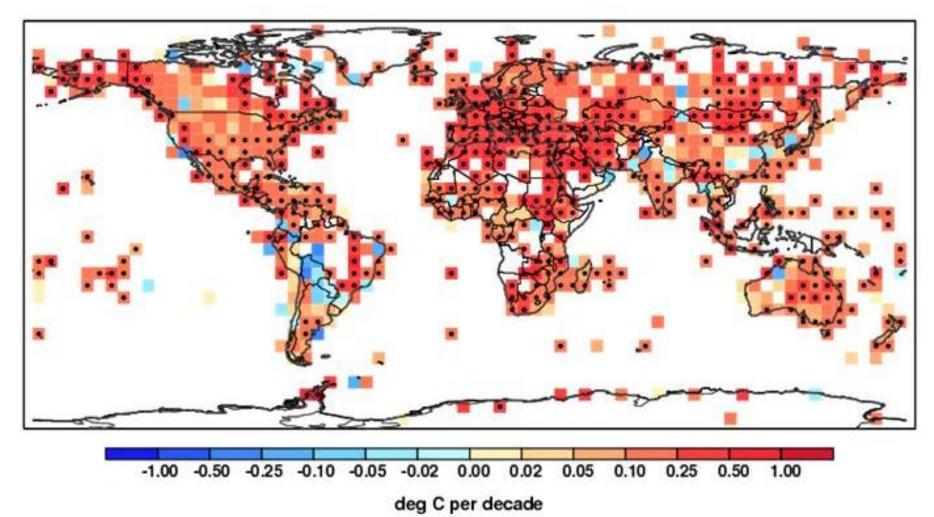


# Global temperature rise





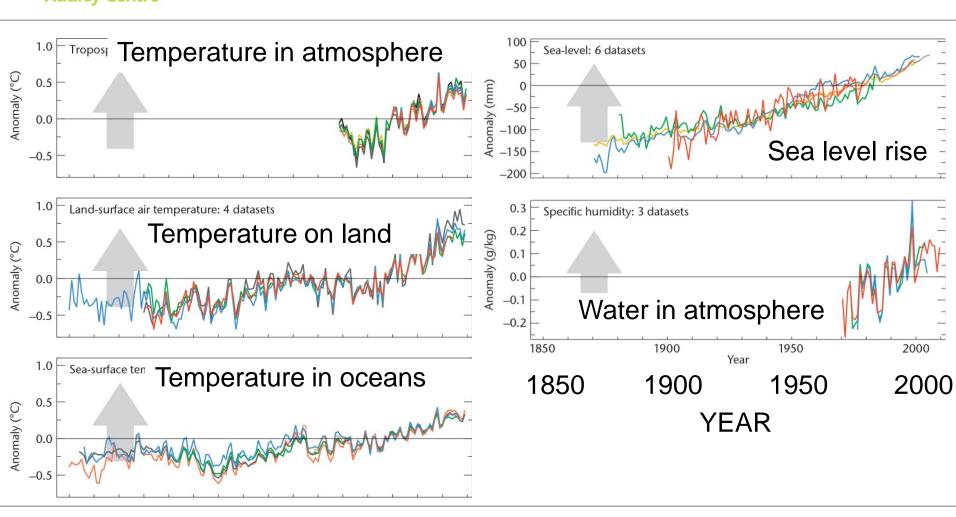
# Temperature trends from 1960-2010 for the June-July-August seasonal average





# Other signs consistent with a warming world

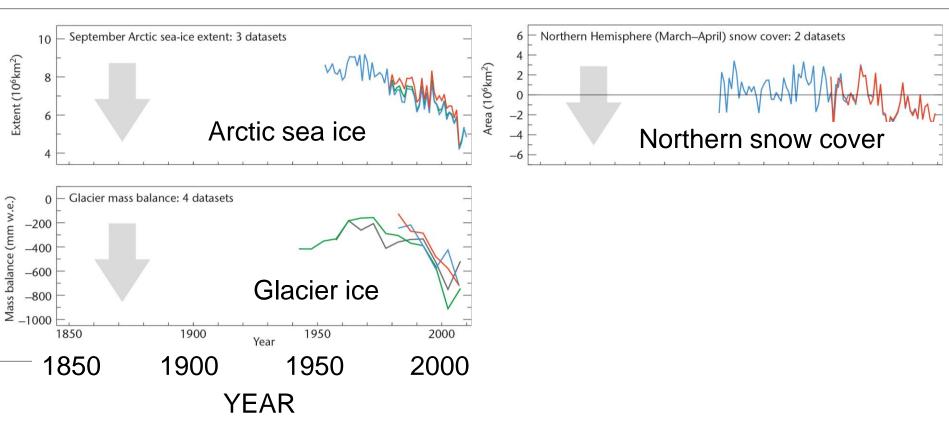
**INCREASING** – Observations consistent with a warming world





# Other signs consistent with a warming world

DECREASING - Observations consistent with a warming world

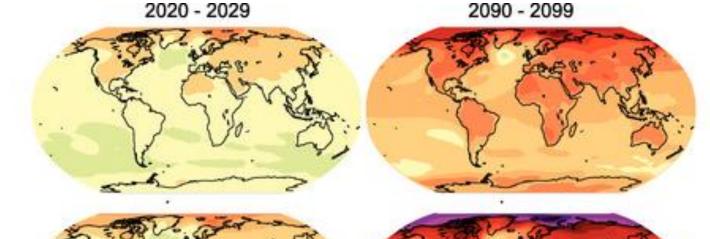


## IPCC AR4 future temperature change ©IPCC 2007: WG1-AR4 A2 6.0 A1B Met В1 Hadle Year 2000 Constant 5.0 Concentrations Global surface warming (°C) 20th century 4.0 4°C above pre-industrial 3.0 2.0 2°C above pre-industrial 1.0 0.0 -1.01900 2100 2000 © Crow Voor

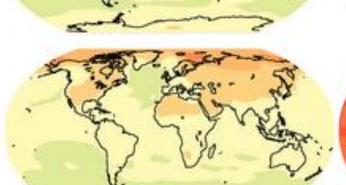
## IPCC AR4 future temperature change

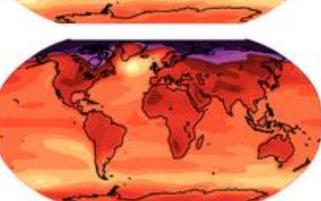






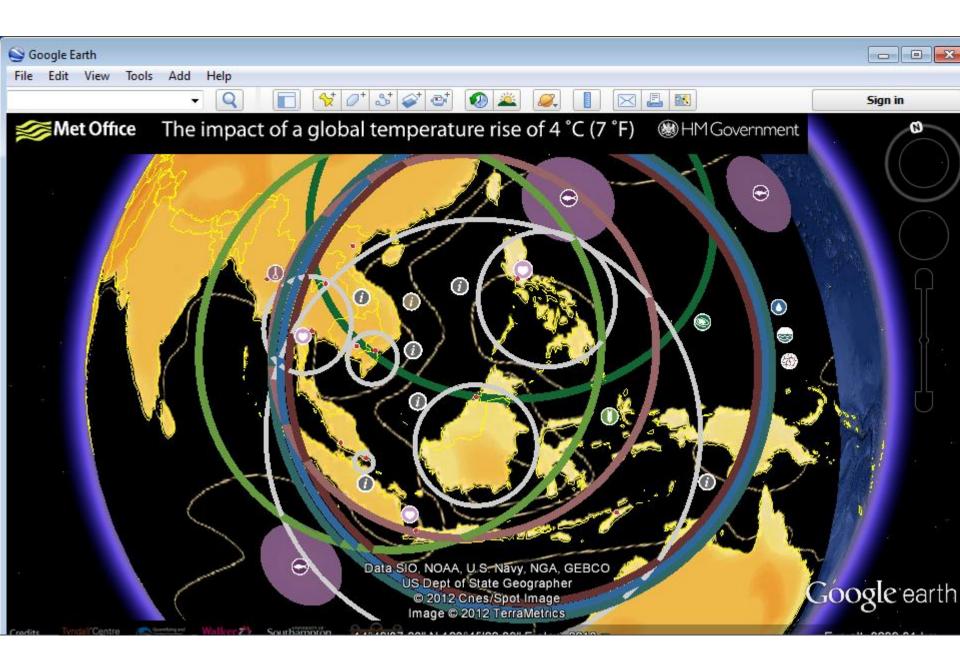
# Greenhouse gas A1B emissions

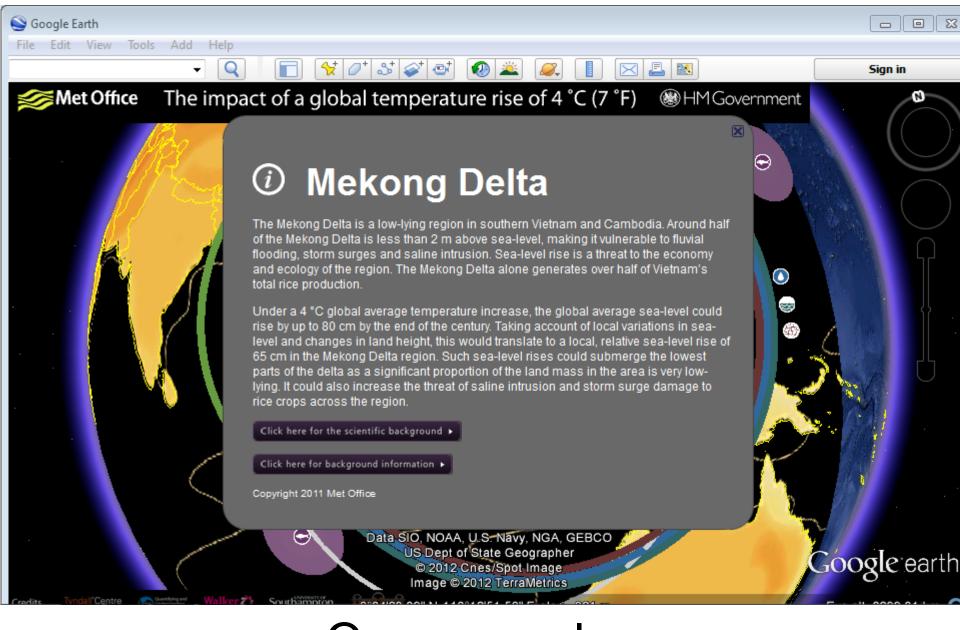




1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5

**A2** 





# One example multiple impact sectors on the map

View Favorites

Tools Help

You are here: Home > Climate change > Guide > Future > Impacts > High-end climate change > Mekong Delta - case study

### ■ Guide

What is climate?

What is climate change?

The science behind climate change

How has our climate changed?

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Climate projections

- ▼ Impacts
- ▼ High-end climate change

Agriculture

Drought

El Niño

Extreme temperatures

Fire danger

Health

Marine Ecosystems

Permafrost

Sea-level rise

Tropical cyclones

Water

## Mekong Delta - case study

The Mekong Delta is a low-lying region in southern Vietnam. Around half of the Mekong Delta is less than 2 m above sea-level, making it vulnerable to fluvial flooding, storm surges and saline intrusion.

Sea-level rise is a threat to the economy and ecology of the region. The Mekong Delta alone generates over half of Vietnam's total rice production.

Under a 4 °C global average temperature increase the global average sea-level could rise by up to 80 cm by the end of the century.

Taking account of local variations in sea-level and changes in land height, this would translate to a local, relative sea-level rise of 65 cm in the Mekong Delta region;

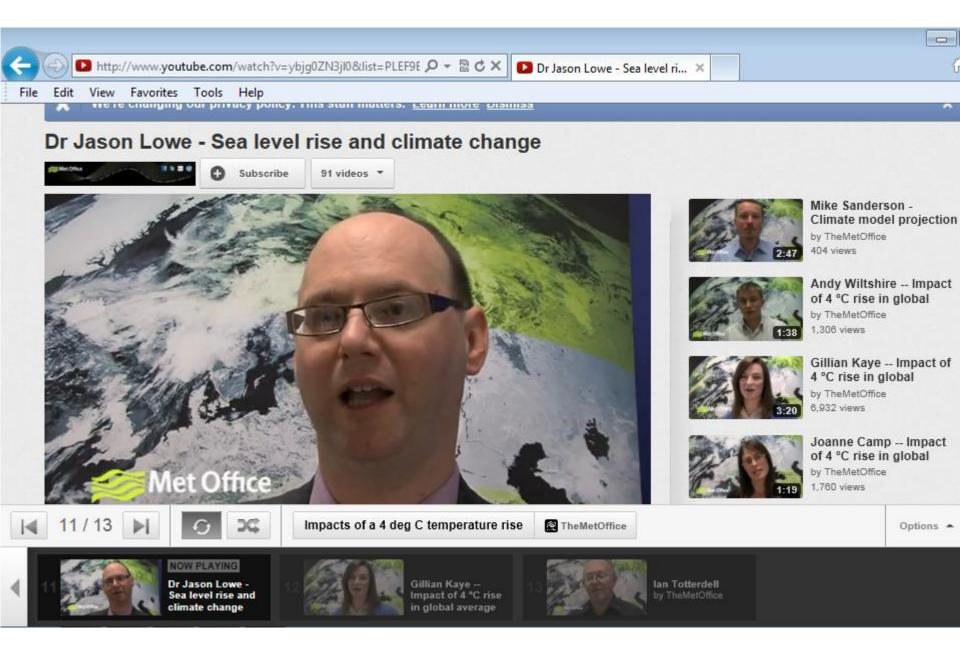
Such sea-level rises would submerge the lowest parts of the delta with up to 13% (5,100 km²) of the land mass in the area being below sea-level. It would also considerably increase the threat of saline intrusion

and storm surge damage to vital rice crops across the whole region.

In Vietnam, the Mekong Delta alone yields 54% of the national rice production with the Red River Delta adding another 17% (data for 2005 from IRRI 2008). Production growth in the Mekong Delta has driven the steadily increasing rice production in Vietnam over the last decades. The Mekong Delta contributes to the vast share of rice exports in Vietnam, which accounts for 4.7 million tons of rice every year, making it the second largest exporter worldwide (IRRI 2008). Any shortfall in rice production in this area because of climate change would not only affect the economy and food security in Vietnam but also have repercussions on the international rice market.



## Includes scientific source references



## 13 videos online



# Using the map online

- Please explore the online map and information resources
- Build your own picture of climate change impacts in your region of the world
- Remember that 4degC is not extreme compared to what is projected to happen with no mitigation action
- Do look at other areas of the world as well climate change is a truly global issue
- The 4 degC map is one way of making the impacts of climate change more tangible



## How to view the map?



- 1. You need to download Google Earth.
- 2. Use your Google Earth to view the map at

http://www.fco.gov.uk/google-earth-4degrees.kml

3. Click the radio button in the 'Temporary places' hierarchy to view the Southeast Asia map.

Alternatively, you can <u>download</u> the map [PDF, 296KB, opens in new window]



# Further information about this map



Please go to:

www.metoffice.gov.uk/climatechange/guide/effects/

Or Le Bich, Climate Change Attaché
South East Asia Climate Change Network
British Embassy Hanoi

le.bich@fco.gov.uk