

Farmers in the Mekong and Red River deltas of Vietnam observe sea level rise by more saline water coming into paddy fields challenging their rice crop

Being the second largest rice exporting country in the world and the most threatened by rising sea levels, makes Vietnam a hot spot for climate change impacts on global food security. Delta and coastal farmers, as well as local authorities, report stronger storm surges and increasing salinity levels in irrigation water sources destroying their crops. However, the scientific evidence is still inconclusive on tropical storm trends and what to be expected for near future local sea level rise.

Key points

- **Global sea level rise** at 3mm yr⁻¹ is caused by warmer oceans and melting land ice
- **Regional and local sea level rise rates** are associated with high scientific uncertainty about several complex phenomena like typhoon trends and, gravity of glacial melt
- **Increasing levels of salinity in irrigation water** delta and coastal farmers report

Vietnam's Mekong and Red River deltas are identified as areas at highest risk in the world to sea level rise. In ClimaViet project surveys (2014), farmers of the deltas reported key experiences of higher levels of salt in their irrigation waters, more frequent storm surges and less rainfall water available to flush out salts. Intrusion of saline water into the Mekong delta used to reach 20 km inland, but now reaches 40-60 km inland according to local sources.

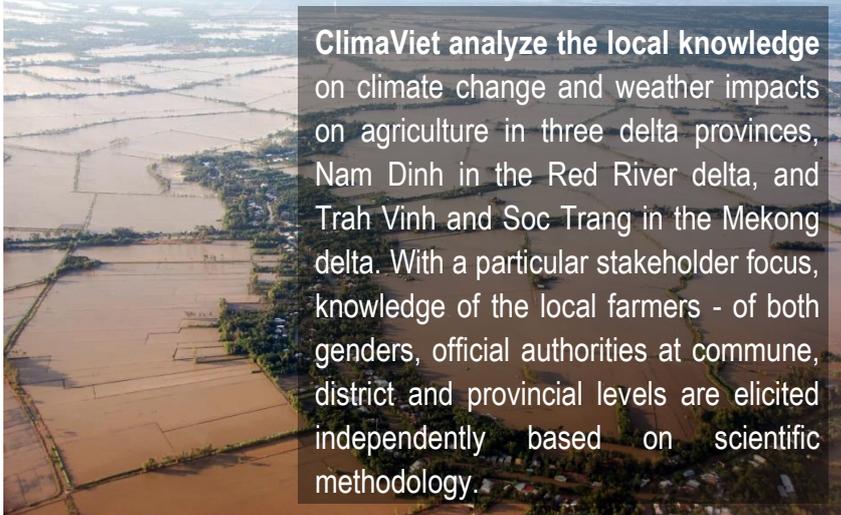
Sea level under global warming

Thermal expansion of the sea water and water from melting land ice, are the two factors causing the current global sea level rise rate of 3 millimetres per year [1]. Actually, more than 90% of the increase in energy in the climate system has been stored as thermal energy in the oceans over recent decades [1].

Regional distribution of sea level rise

Local sea level change might deviate substantially from the global average. Typhoons – the tropical storms of the Northwest Pacific – bring strong winds and intense low air pressure that generate storm surges which result in local temporal sea level rise of 1-3 metres magnitude over the still water level along coastal Vietnam [2]. If the frequency of such events increases in a region as expected [3] it will affect the local sea level average strongly as well as come in addition to the average global sea level rise.

ClimaViet analyze the local knowledge on climate change and weather impacts on agriculture in three delta provinces, Nam Dinh in the Red River delta, and Trah Vinh and Soc Trang in the Mekong delta. With a particular stakeholder focus, knowledge of the local farmers - of both genders, official authorities at commune, district and provincial levels are elicited independently based on scientific methodology.





Gravity of glacial melt is another important and intriguing, but less well known factor, in the complexity of regional sea level change from with climate warming [4]. Bodies of land ice like the Greenland and Antarctic ice sheets which exert relatively strong permanent gravitational attraction on the nearby ocean. To get a grasp on this it might help to remind about how the gravitation of the moon is causing tides. A continued global warming will cause the land ice to melt which reduce its mass and consequently its gravitation, resulting in reduced attraction of nearby ocean which give a lower local sea level, but the double effect of both meltwater plus the sea water not anymore attracted, in other areas. Unfortunately, as Vietnam is located far away from both of these two largest ice sheets, there is little hope for a decreasing sea level effect from the former factor, but rather the double opposite effect, if the land ice is further reduced by global warming.

Climate change concerns for Vietnam

- Sea level rise
- Rising temperatures
- Variability in the seasonality of rainfall

The rainfall amounts and pattern plays a key factor in saline affected soils, as the fresh water helps in flushing out salts enabling rice to grow in such areas.

Key climate change factors affecting salinity of irrigation waters in Vietnam [5]:

- Typhoons increased with higher intensity
- Cold fronts reduced in the last two decades
- Sea level: 3mm/year during 1993-2008 (in Hondau: 20cm over 50 years)
- Rainfall: Decreasing in Northern part, and increasing in Southern part. Average 1958-2007: decreasing 2%
- Drizzle: average number of drizzle days in Hanoi decreased during last 10 years
- Temperature: 1958-2007 annual average increase 0.5-0.7 °C

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