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IPU Science for Peace Parliamentary Meeting

Water security and insecurity: Rebuilding peaceful coexistence with science

September 11-13, 2023

Water Security in the Vietnamese Mekong Delta: *Current, Future and Adaptation Strategies*

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Quy Nhon, September 2023



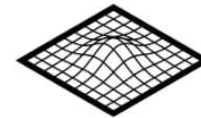
The Vietnamese Mekong Delta



$\approx 40,922 \text{ km}^2$



17.4 millions inhabitants

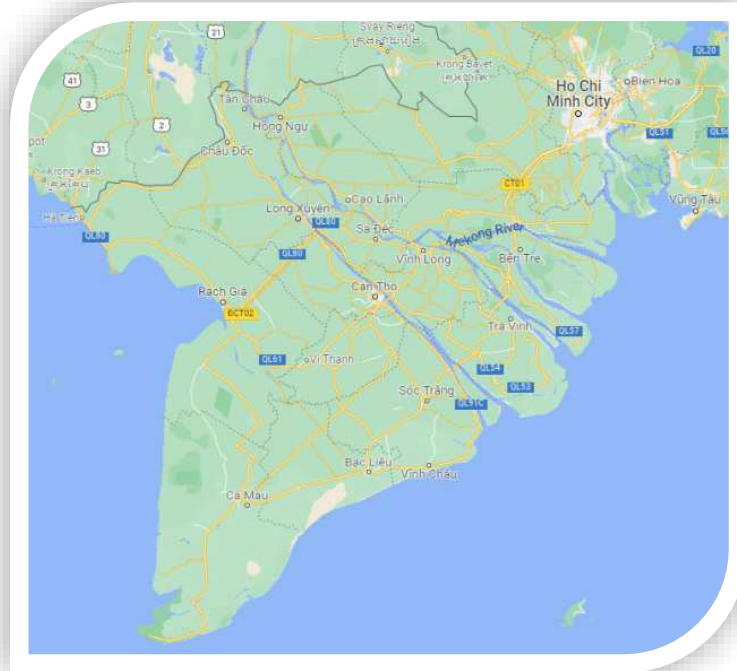


Flat area



Tropical climate

The Vietnamese Mekong Delta



- VMD is a dynamic and key economic region.
- VMD has an abundant and diverse ecosystem.
- Agriculture and aquaculture are the main products.

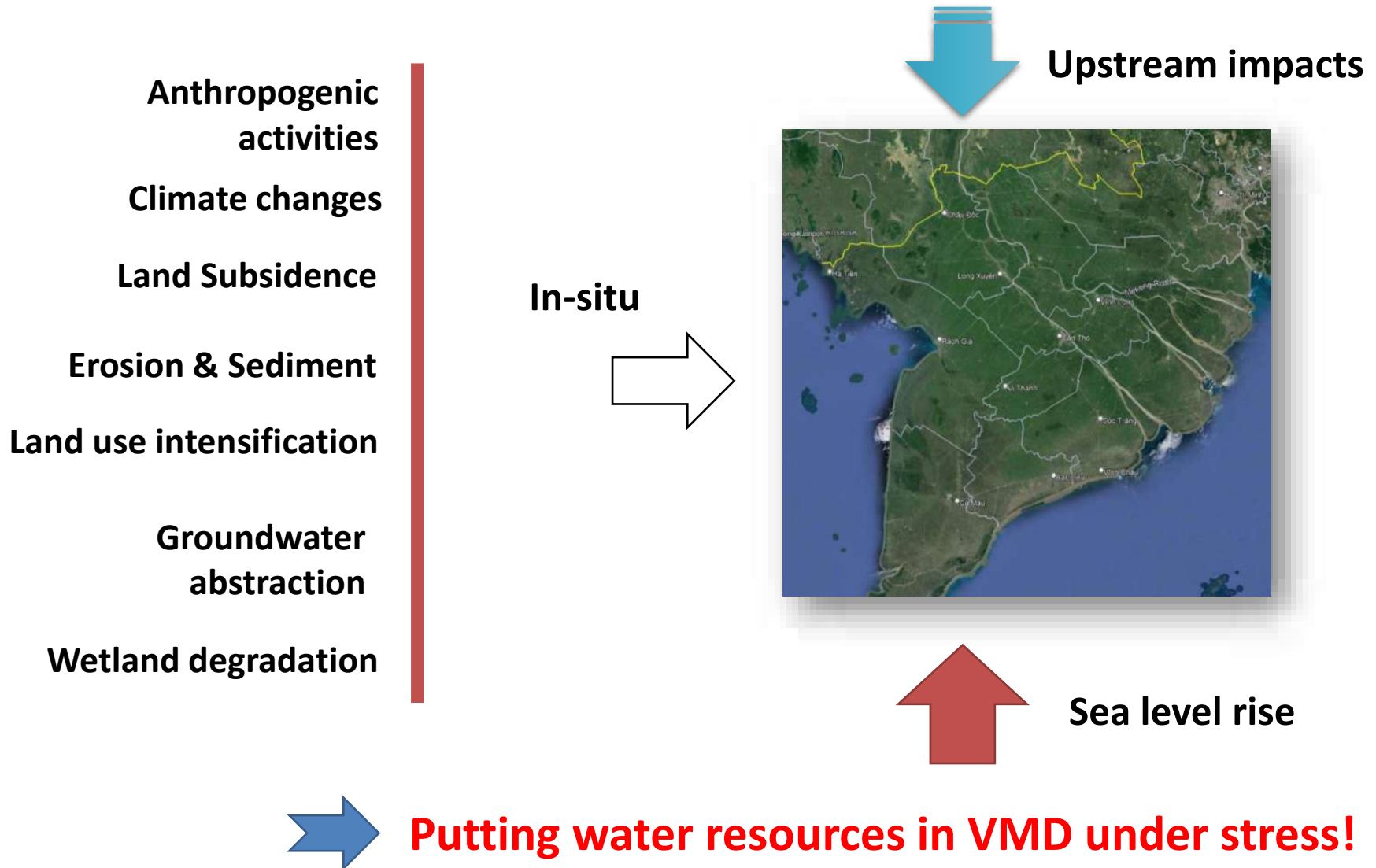


Current status of water security

Internal and External Threats to Water Resources

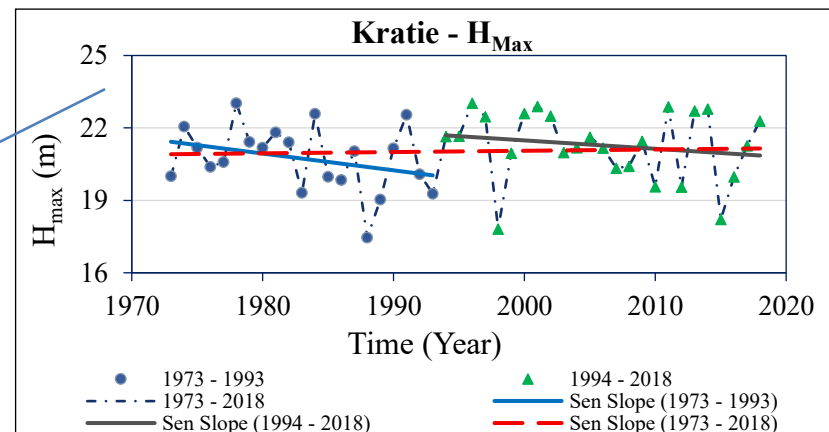
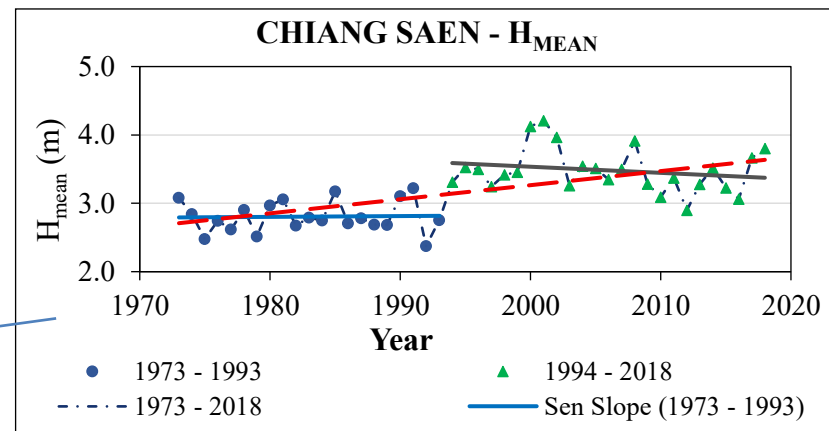
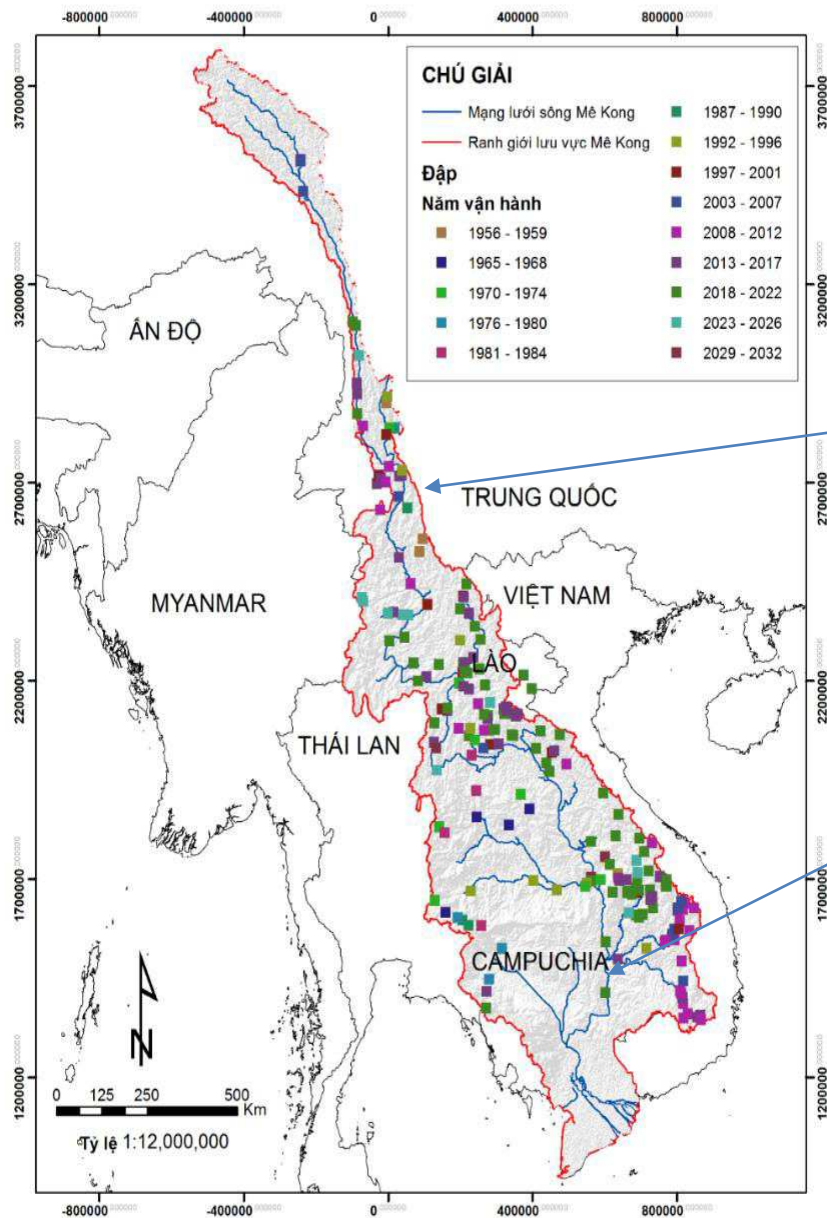
"The only thing that never changes is that everything changes"

Louis L'Amour



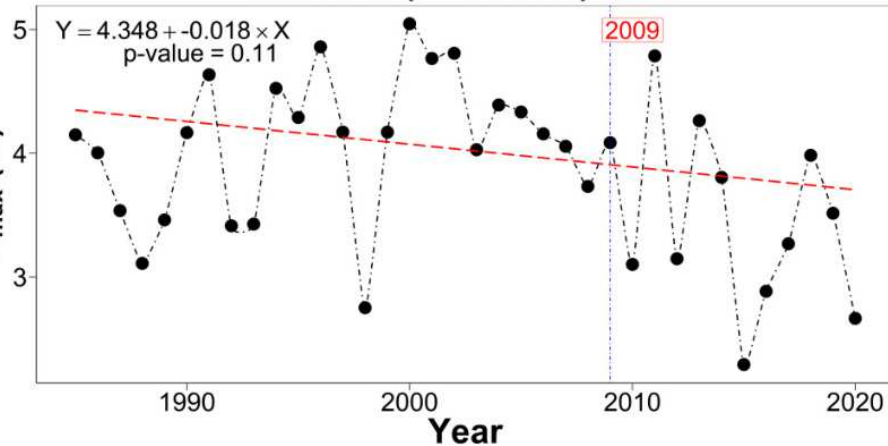
Upstream Impacts



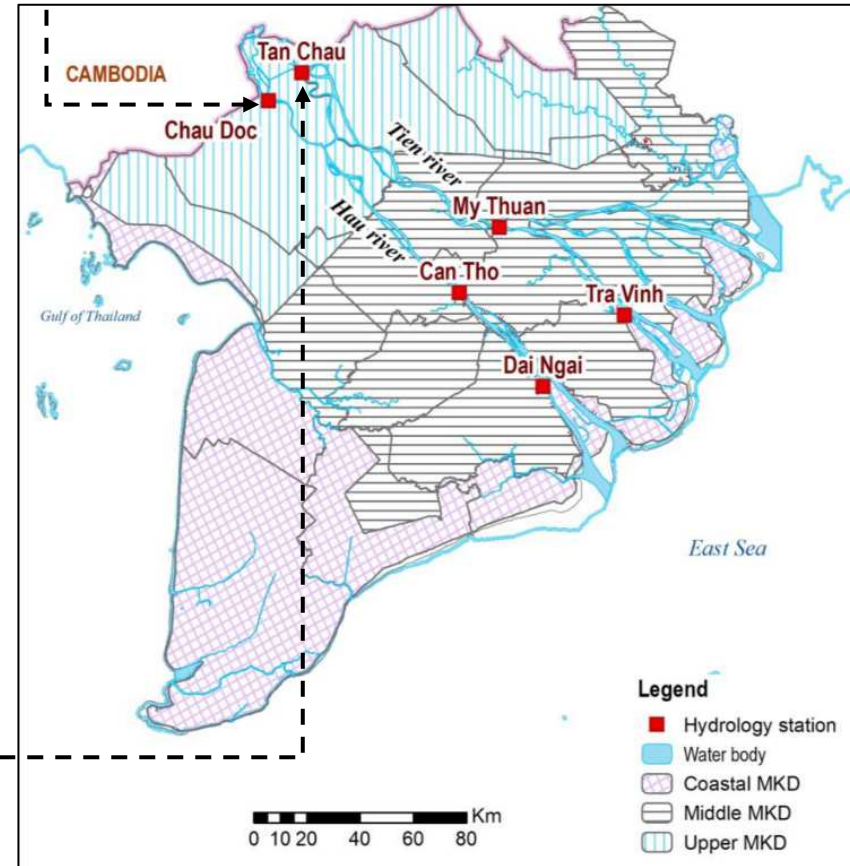
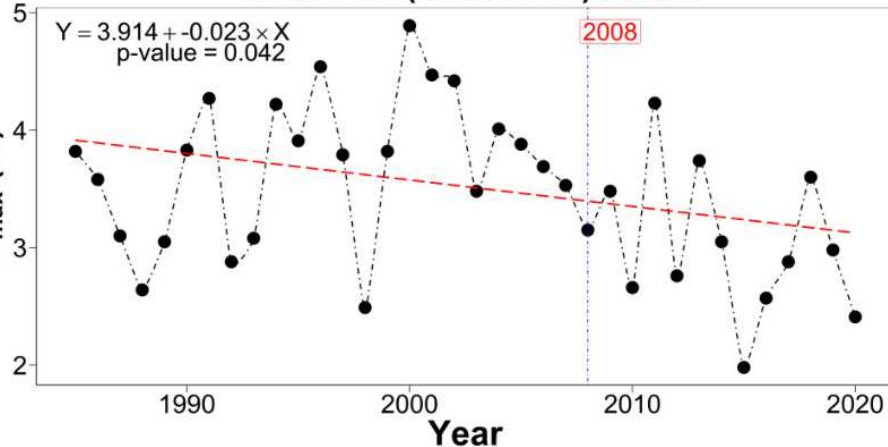


Down Trend of Flooding

Tan Chau (1985-2020) Hmax



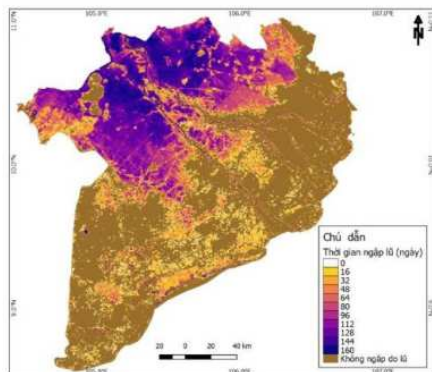
Chau Doc (1985-2020) Hmax



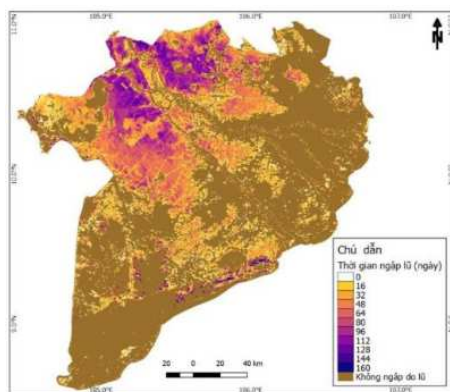
Trend of Flooding Extent



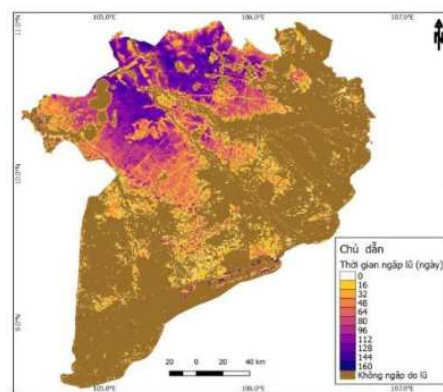
2000



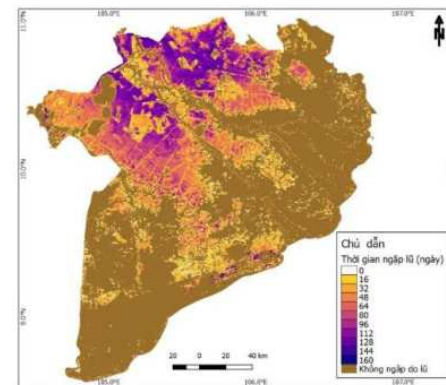
2003



2006



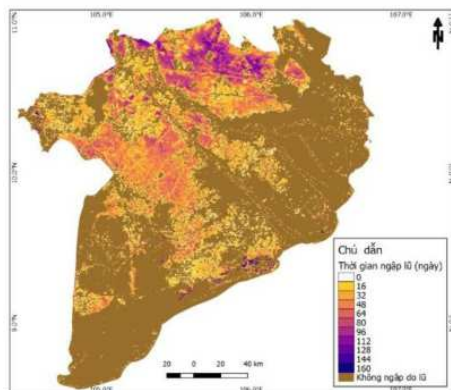
2009



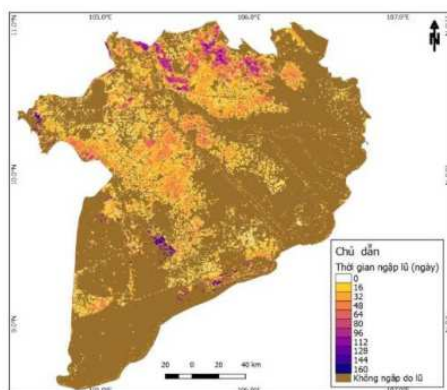
Trend of Flooding Extent



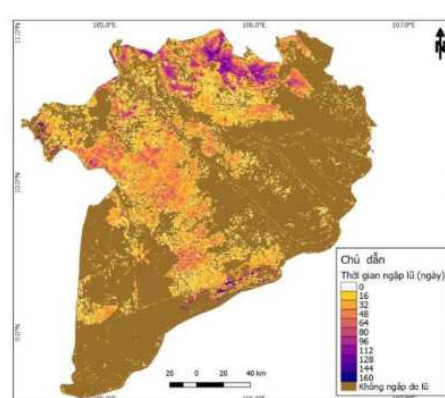
2012



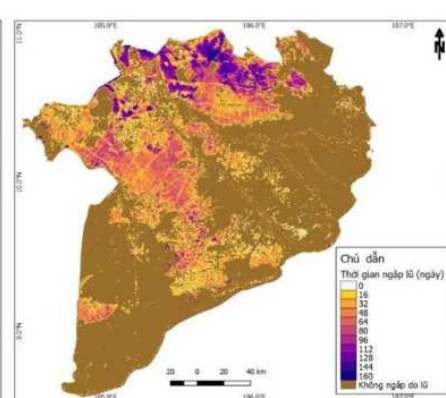
2015



2016

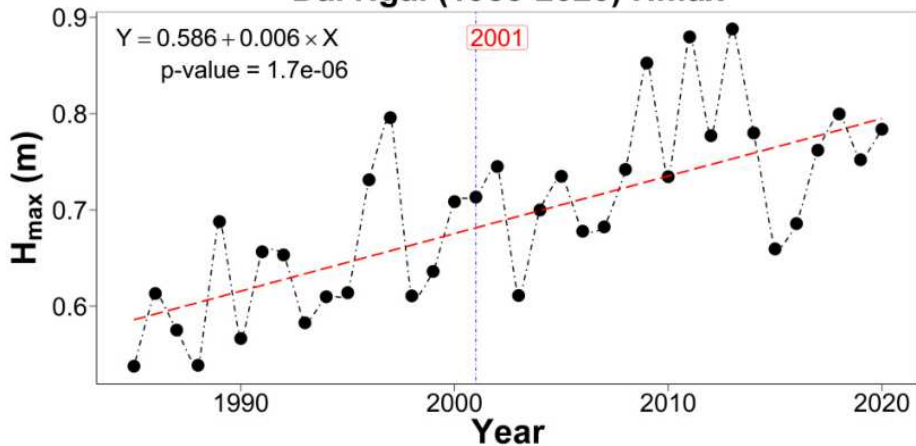


2017

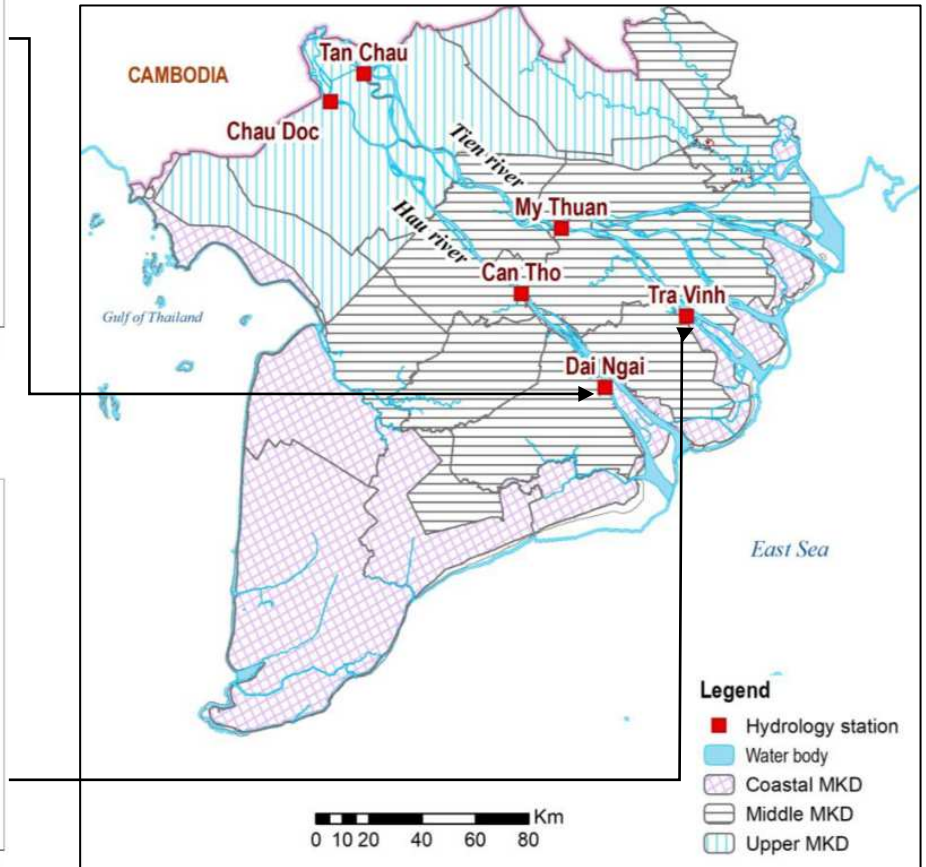
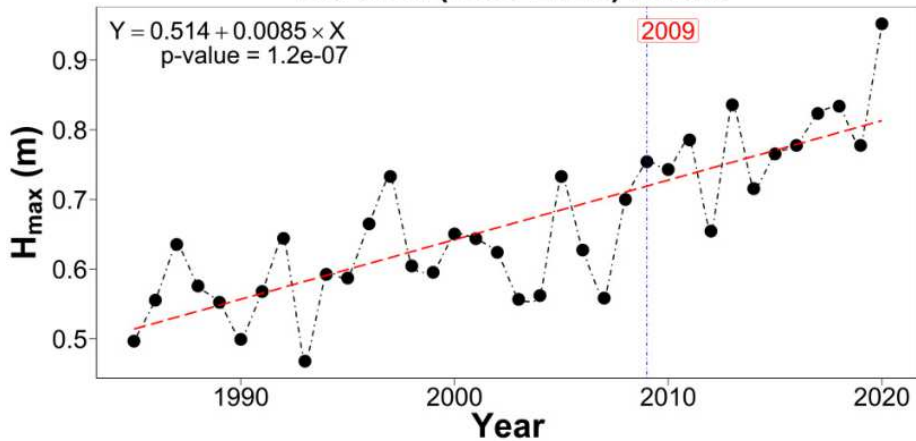


Downstream Impacts

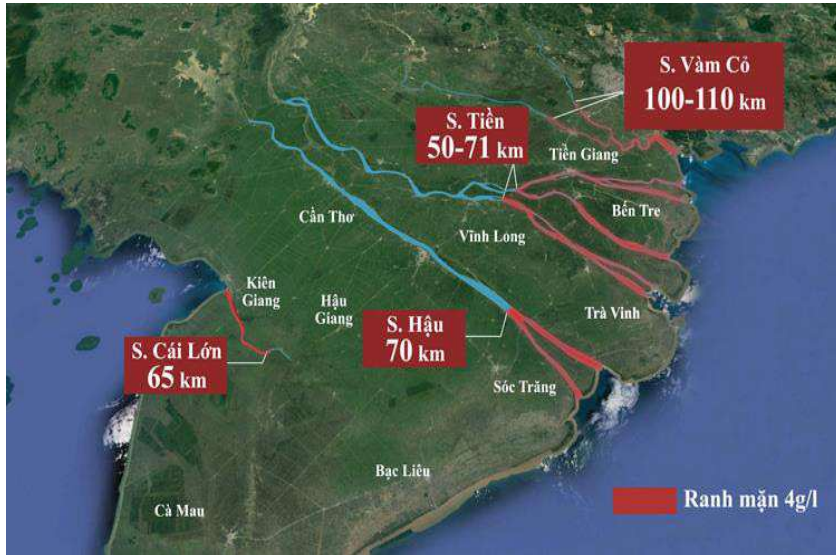
Dai Ngai (1985-2020) Hmax



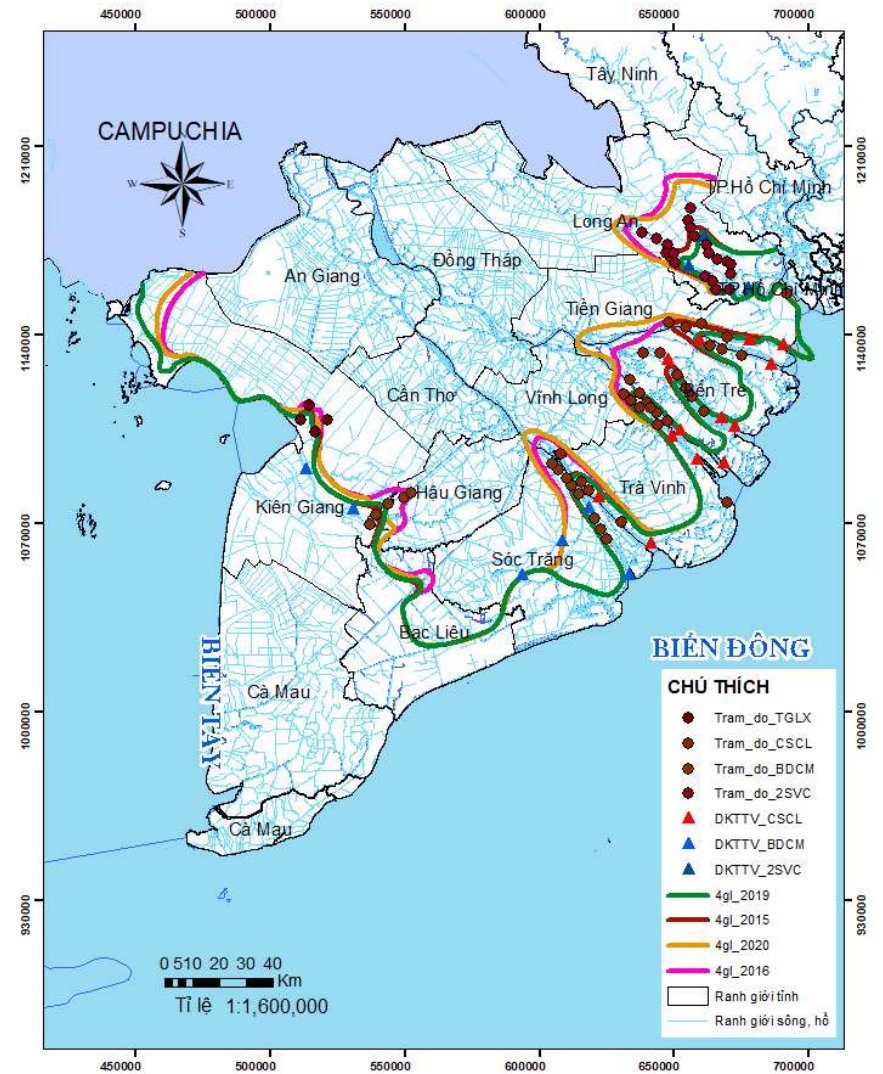
Tra Vinh (1985-2020) Hmax



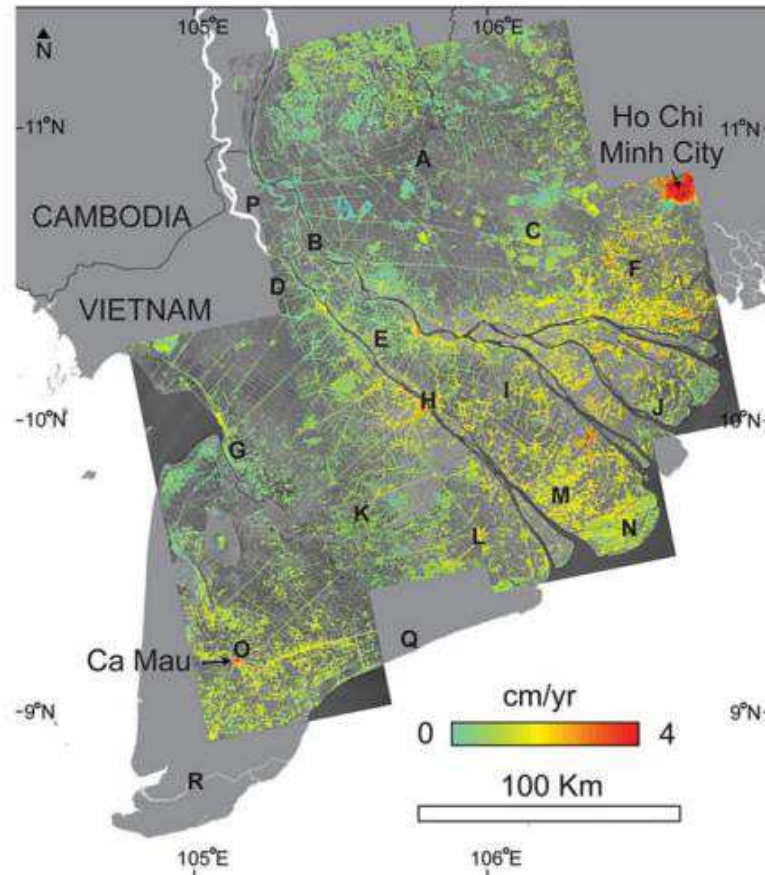
Increasing Salinity Intrusion



Salinity intrusion in VMD 2020 (Sources: vnexpress.net)



Is Mekong Delta sinking?



Salinity Intrusion

Urban Flooding

Environ. Res. Lett. 9 (2014) 084010 (6pp)

doi:10.1088/1748-9326/9/8/084010

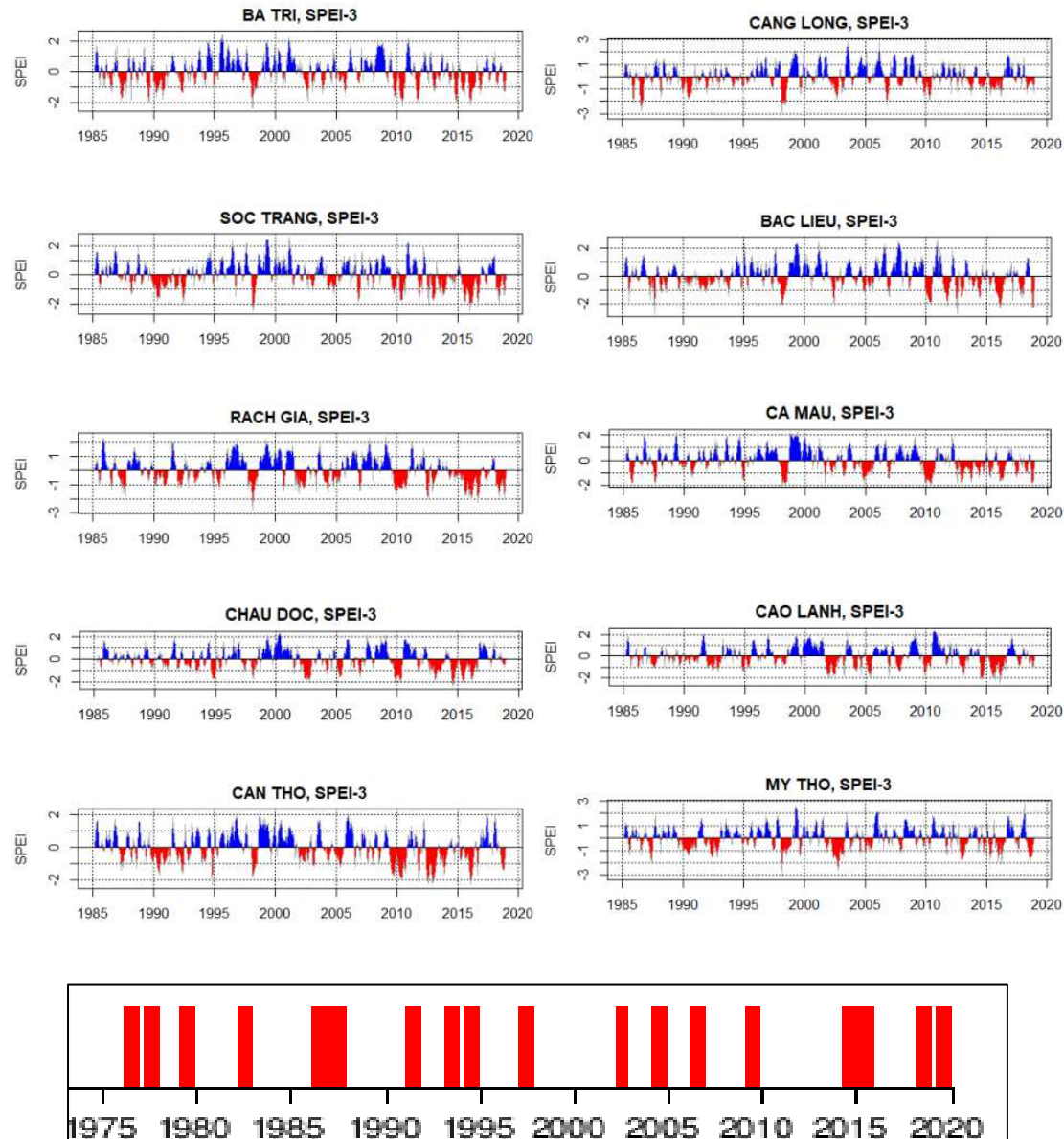
Groundwater extraction, land subsidence, and sea-level rise in the Mekong Delta, Vietnam

Laura E Erban¹, Steven M Gorelick¹ and Howard A Zebker²

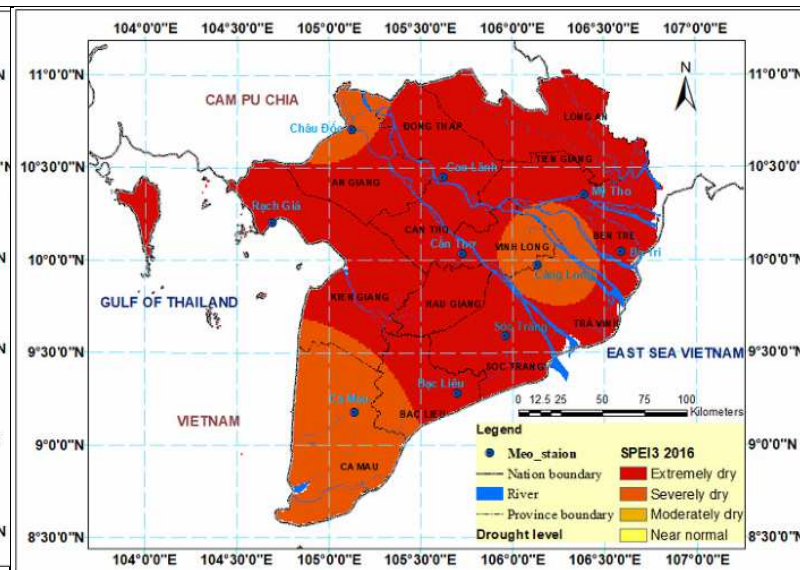
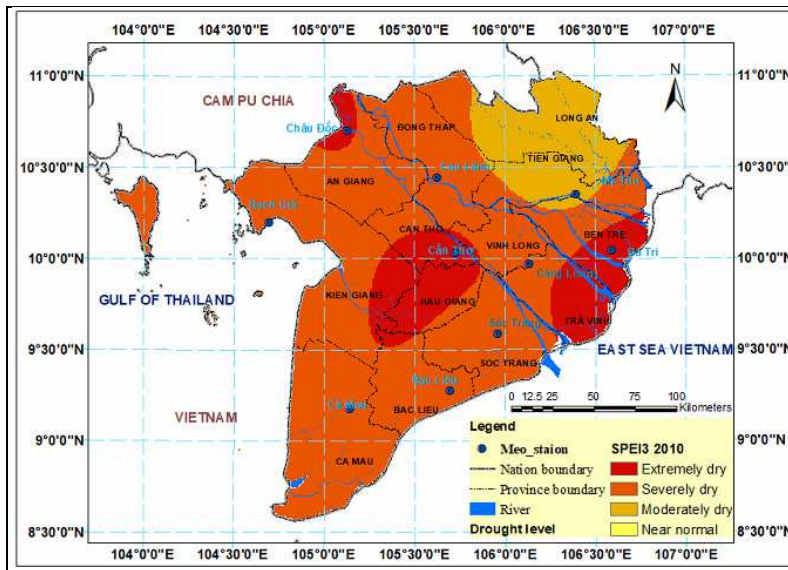
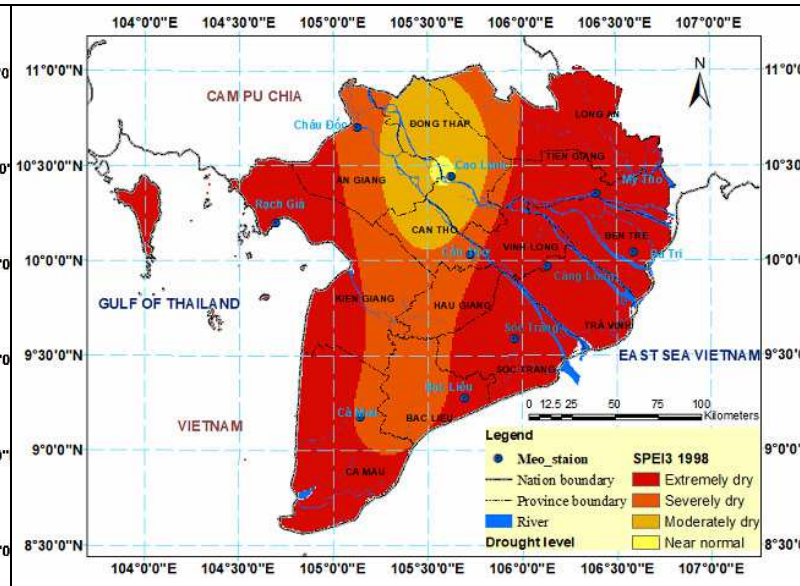
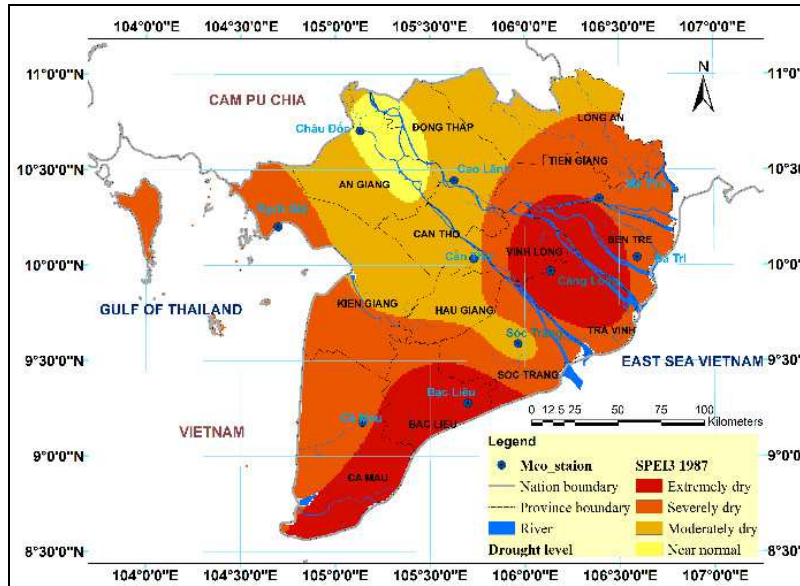
¹Department of Environmental Earth System Science, Stanford University, Stanford CA 94305, USA

²Department of Geophysics, Stanford University, Stanford CA 94305, USA

Drought Trend

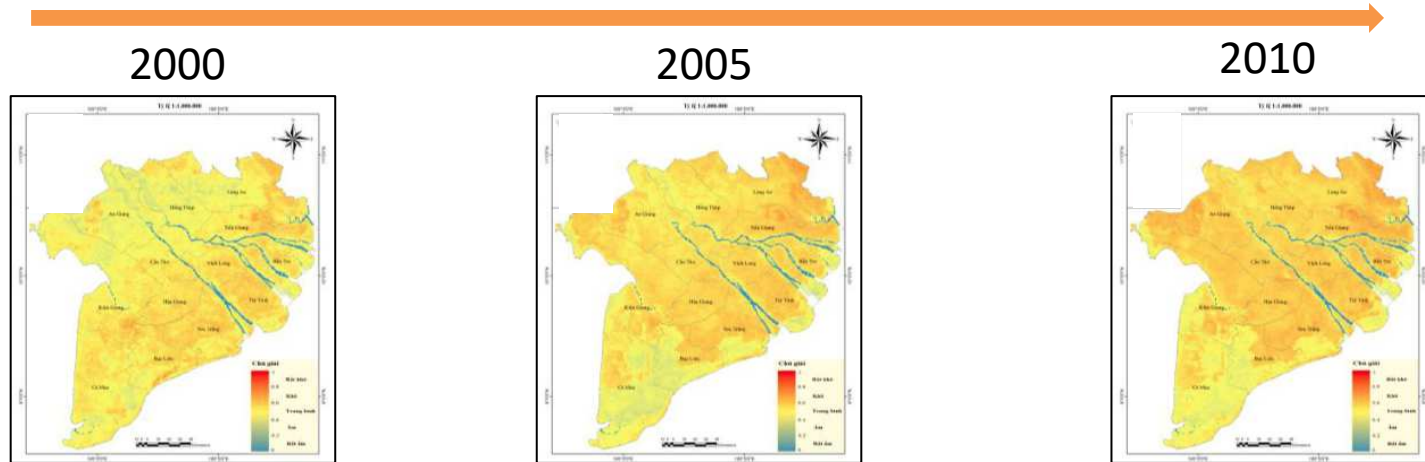


Drought Trend

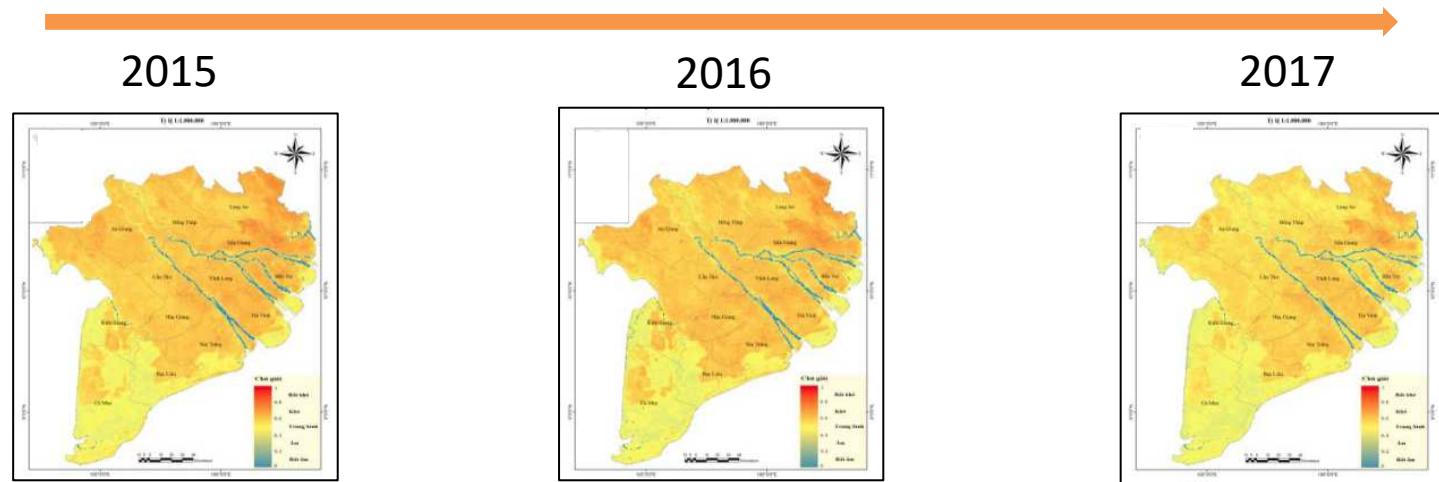


Is Mekong Delta Drier?

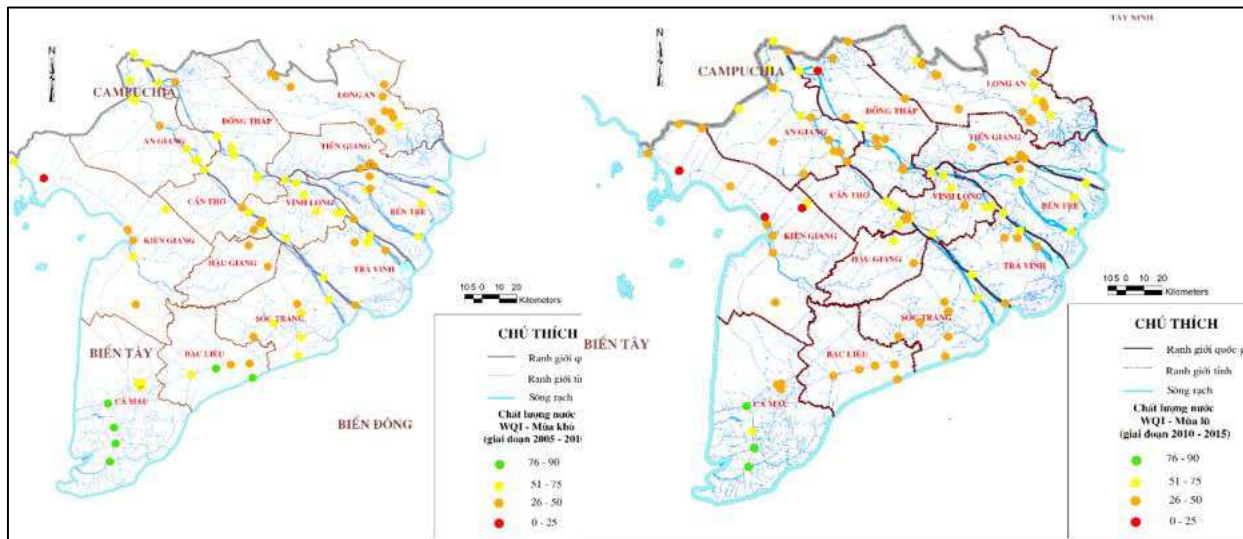
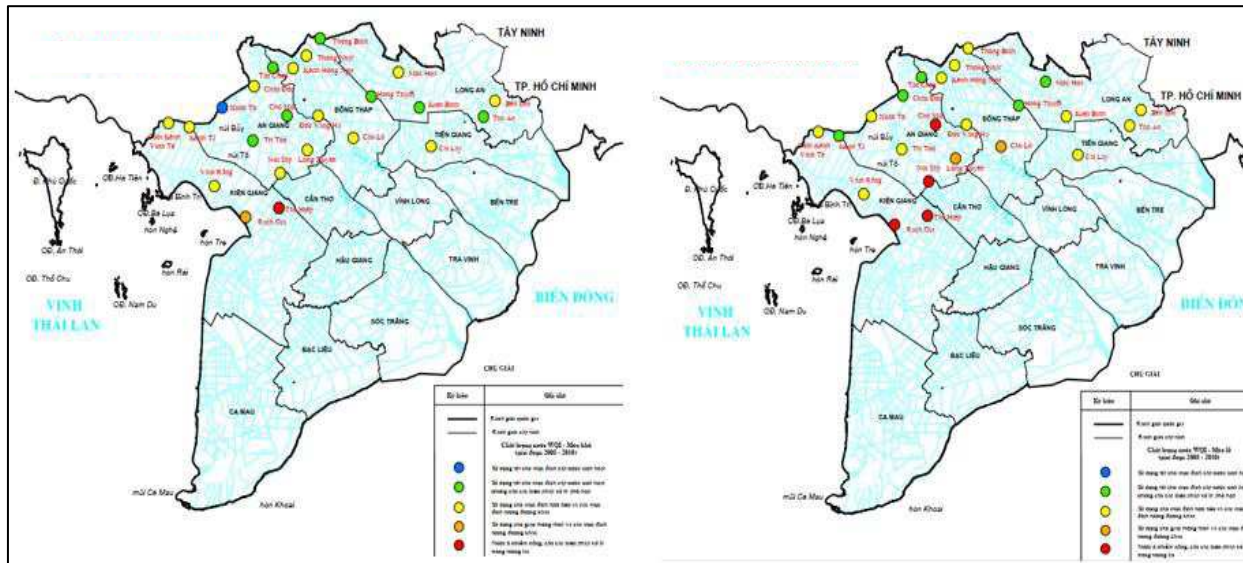
Surface Moisture Trend



Surface Moisture Trend



Surface Water Pollution



Water is vital for maintaining VMD's essential ecosystem and human life, but it has changed rapidly!



Future Water Security Perspectives

Future Impacts to Water Resources

DRIVERS

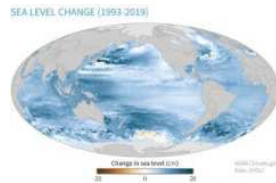
Upstream
Dams



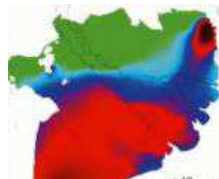
Water Demand
(Irrigation,
Population,
Industry)



CC & SLR



Land
subsidence



Extreme
hydrological
events



IMPACTS

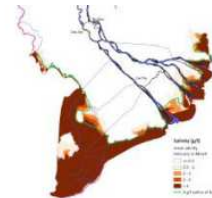
Flooding



Drought



Salinity



Water
pollution



Extreme
event



Water resources in VMD are more scarce, degraded, and uncertain in the future!

Future Water Security



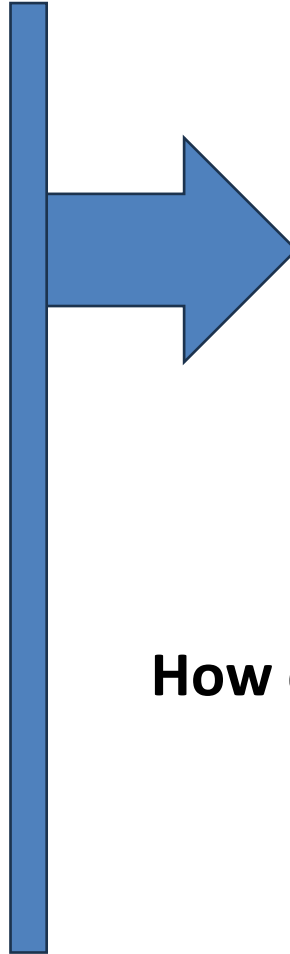
Water Scarcity



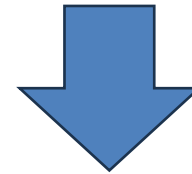
Water Degradation



Poor Water Infrastructure



Water Insecurity!



How do we adapt to water insecurity?

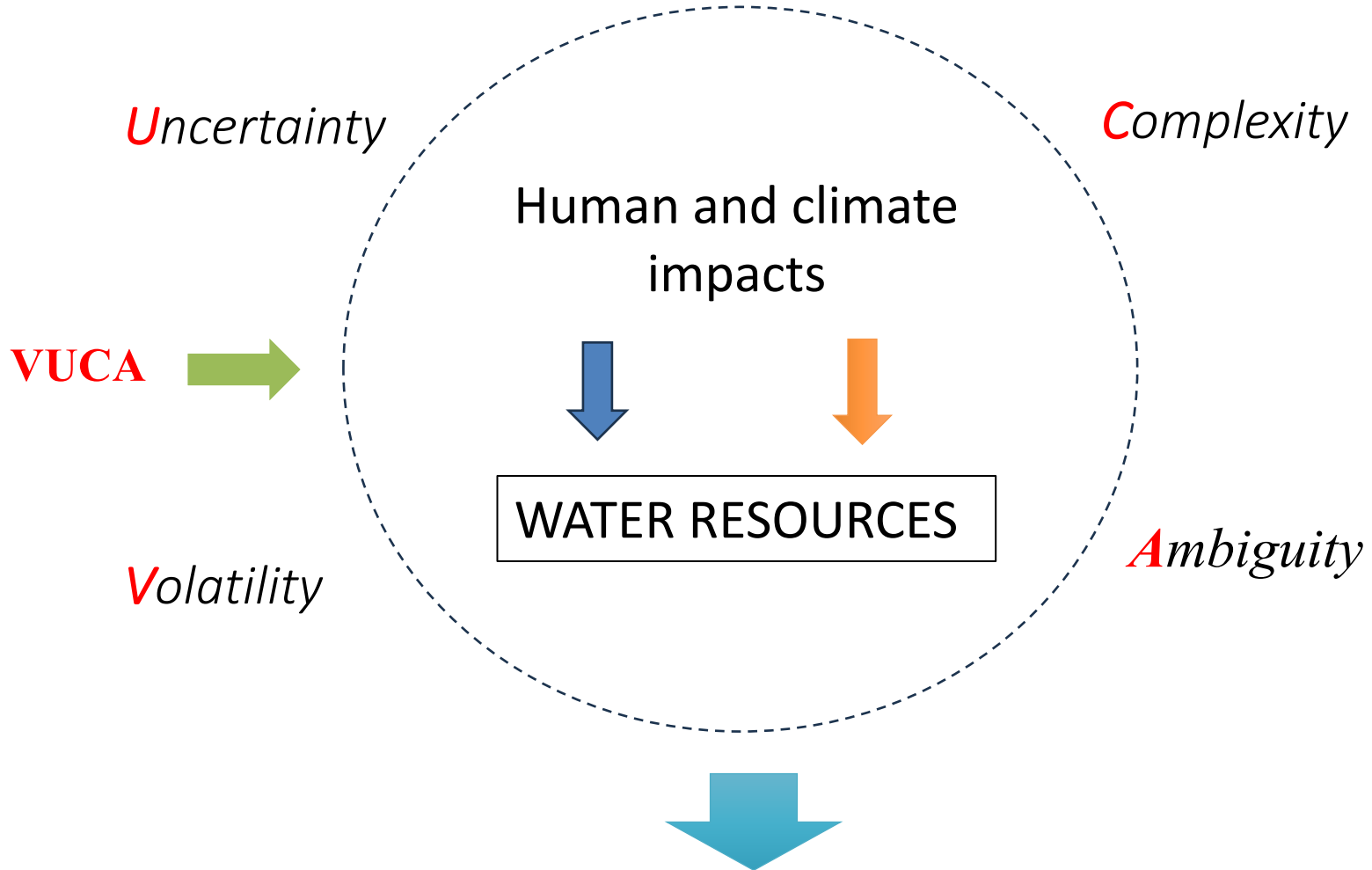




Adaptation Strategies for Water Security



Context



What are effective adaptation strategies?

Strategies



Think
globally, Act
locally



Change
inside, not
outside



Change in
mindsets not
climate



Flexibility



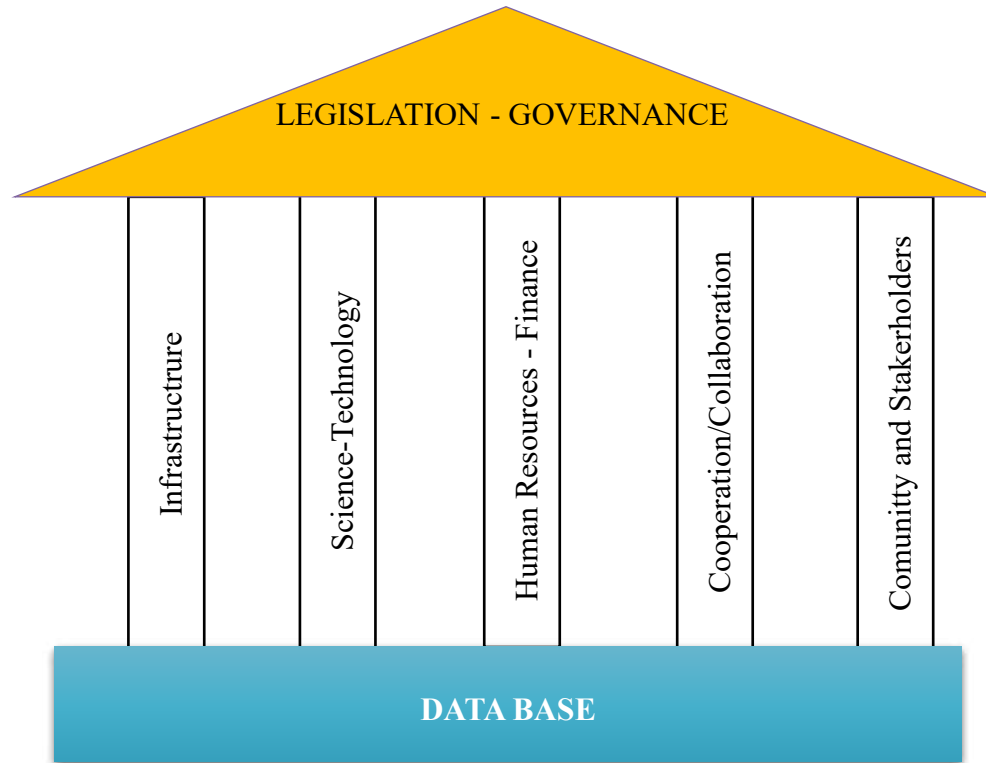
Interdisciplinary

Minimize Risk by improving adaptation capacity and minimizing exposure instead of mitigating hazards



$$Risk = \frac{Hazard * Exposure}{Capacity}$$

Framework for improving water security



Main components for improving water security in VMD

Key Adaptation Measures

Strengthening water infrastructure for water supply, irrigation, large-scale water storage, and salinity intrusion control will enhance VMD's water security.



Large scale water storage

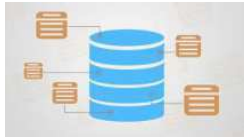


Salinity Intrusion Controls

Key Adaptation Measures



- Improving water legislation/governance



- Improving database



- Raising awareness



- Transforming production appropriately



- Evidence based decision making



- Water Diplomacy

Conclusion Remarks

- Multi-threats are challenging water security, which will be more severe in the future.
- A VUCA lens should be adopted to develop effective adaptation strategies to enhance water security.
- Minimizing RISK strategy with flexibility measures and an interdisciplinary approach should be applied.
- Water legislation should be improved to support water security promotion.
- Decision-making should be based on robust scientific evidence
- Data and water resource planning and operation sharing among Mekong's countries is essential
- The time to cope with water-related disasters is closing soon.

*Thank you very much for your
attention!*

