

Understanding Climate Change and Its Impacts on Water Utility Operations

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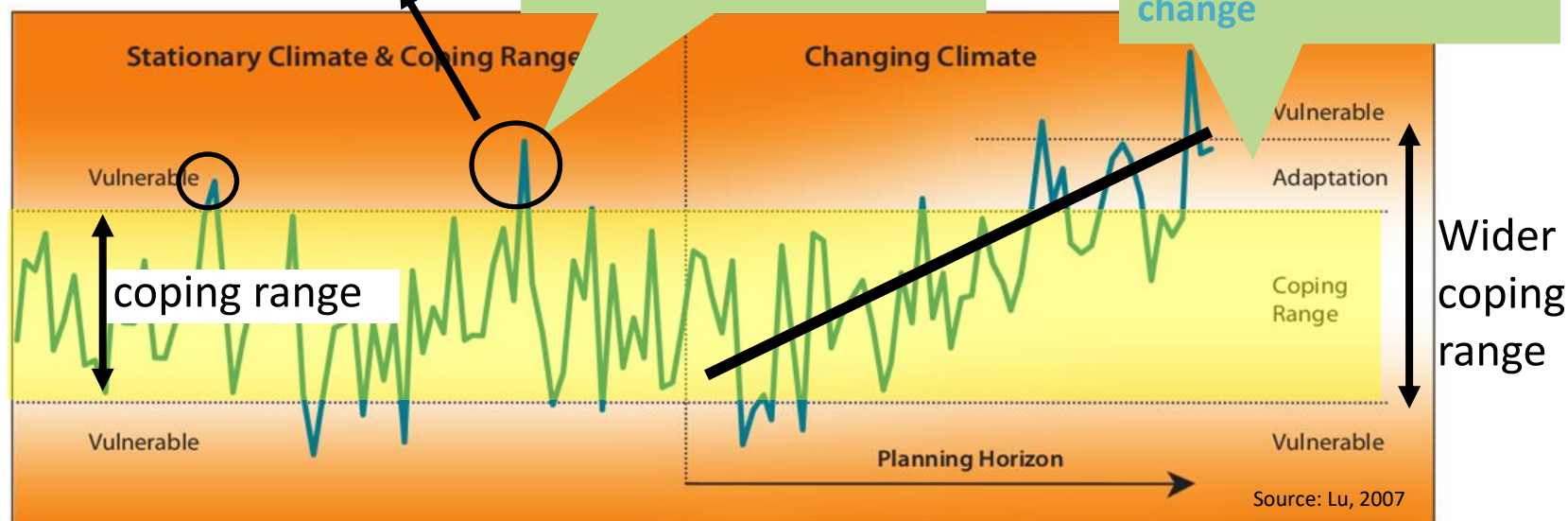
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Climate variability and climate change



We become vulnerable when conditions are extreme

Adaptation strategy will depend on planning horizon and **projected change**



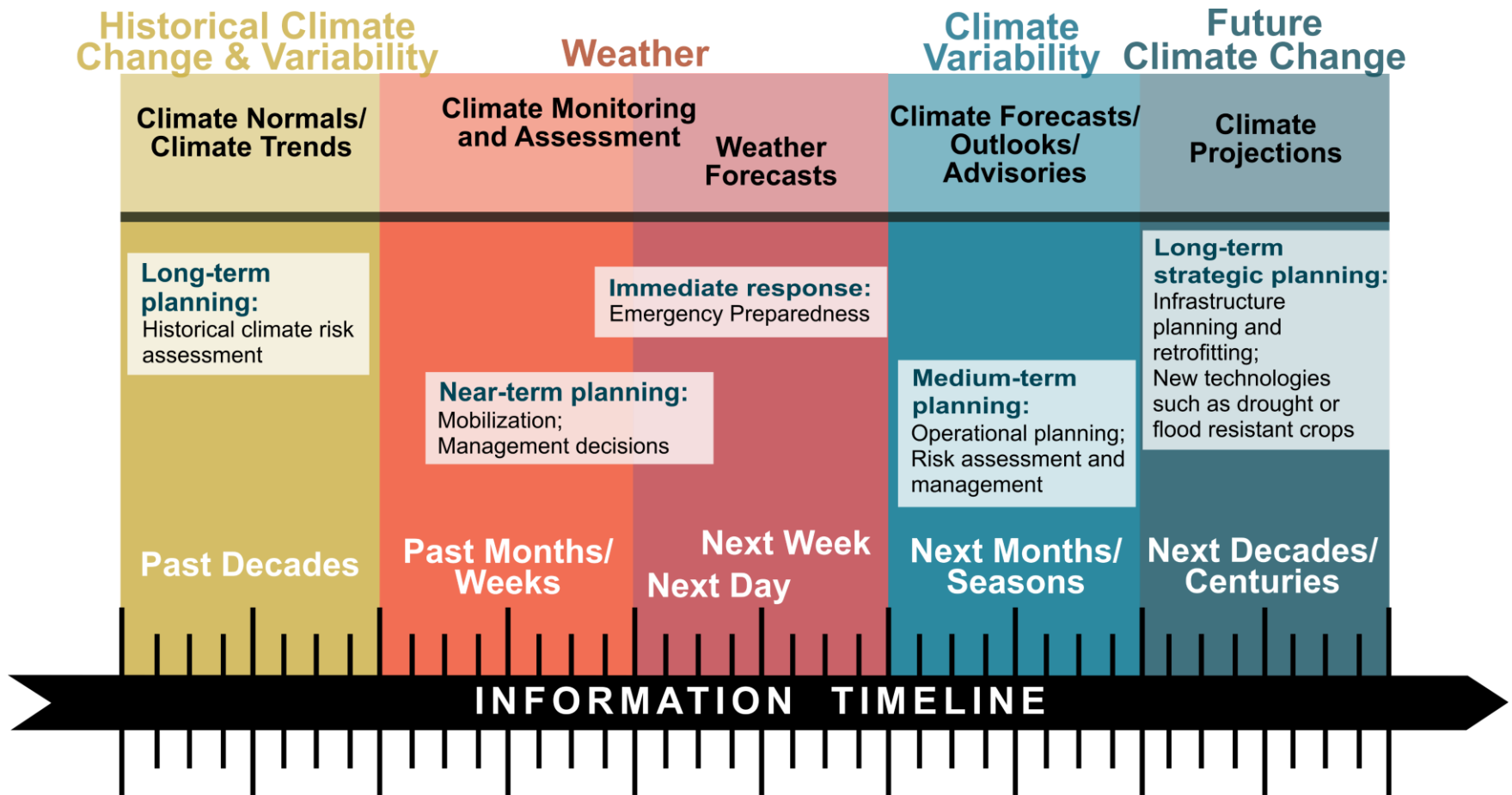
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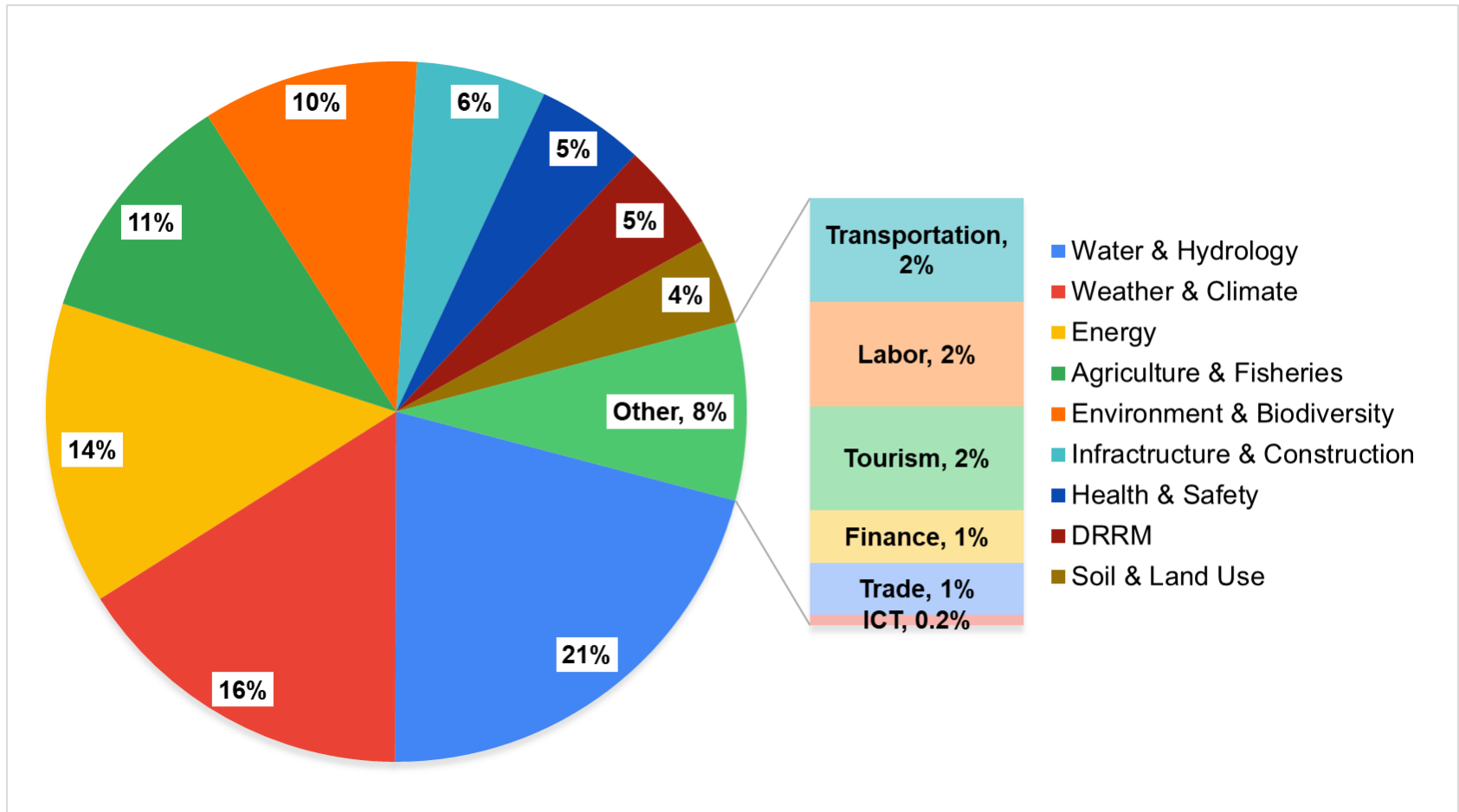
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Weather and climate information being provided by PAGASA that you may find useful

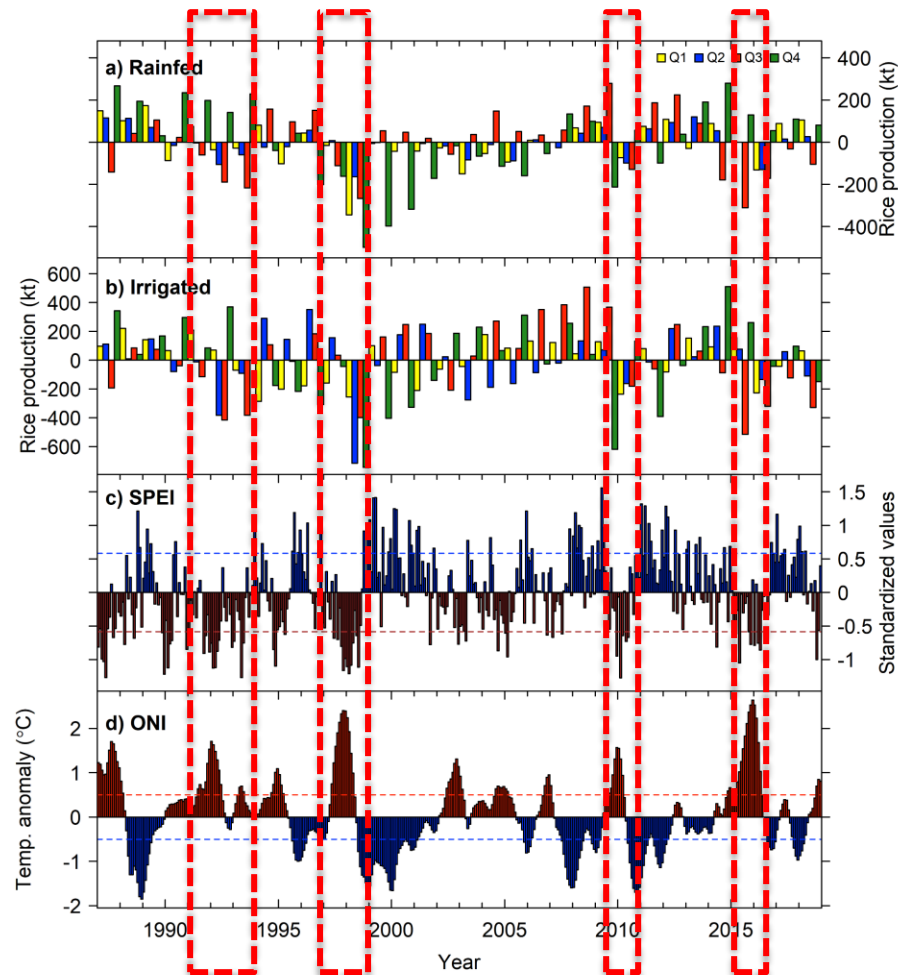


Utilization of PAGASA's climate data in 2019



Villafuerte et al., Phil. J. Sci. (2021)

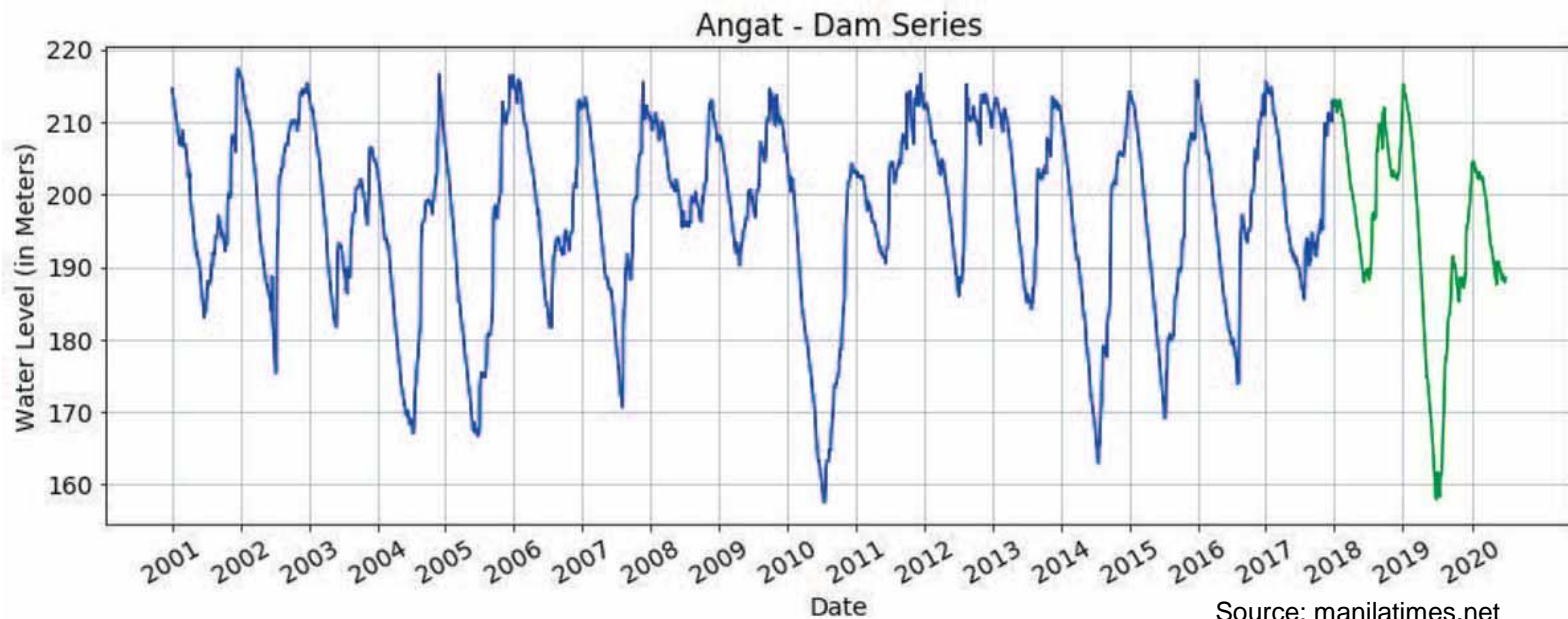
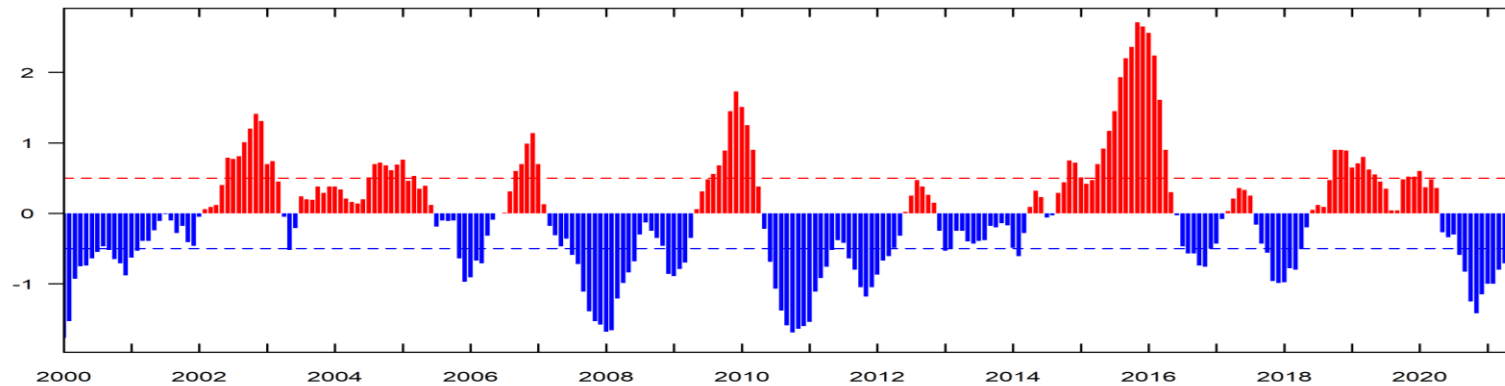
Drought events are associated with rice production losses in the Philippines



Villafuerte et al., Phil. J. Sci. (2021)



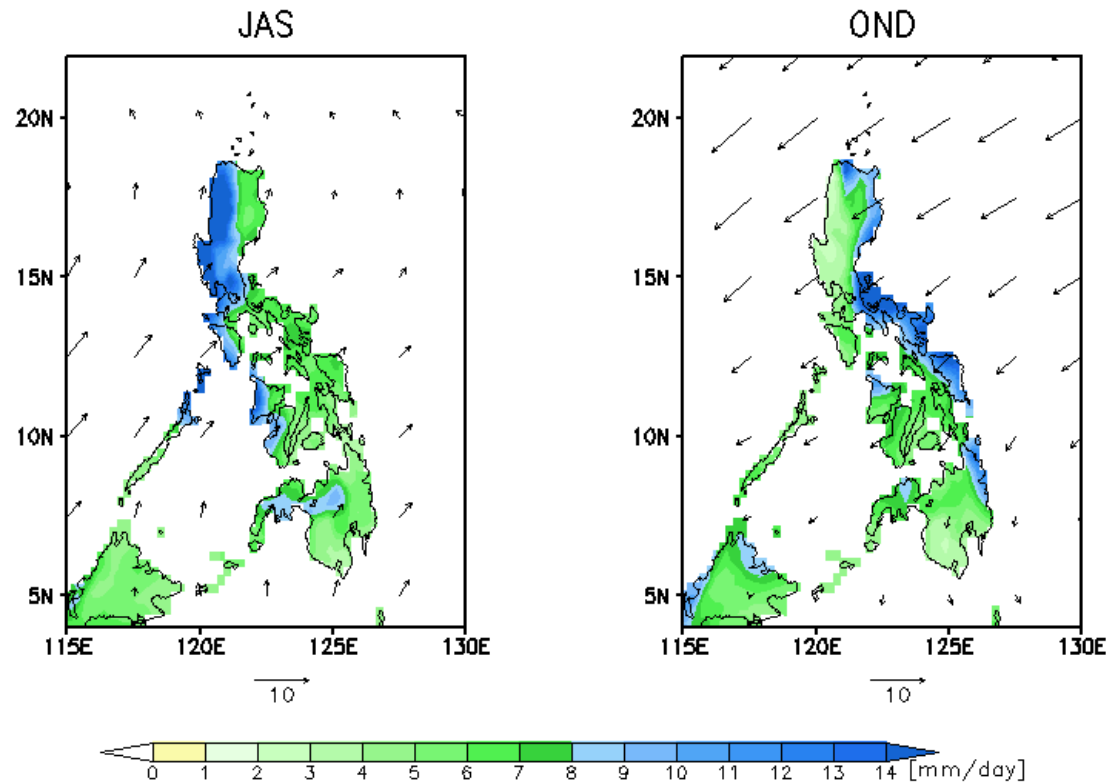
Can we see the same signal for water level in Angat dam?



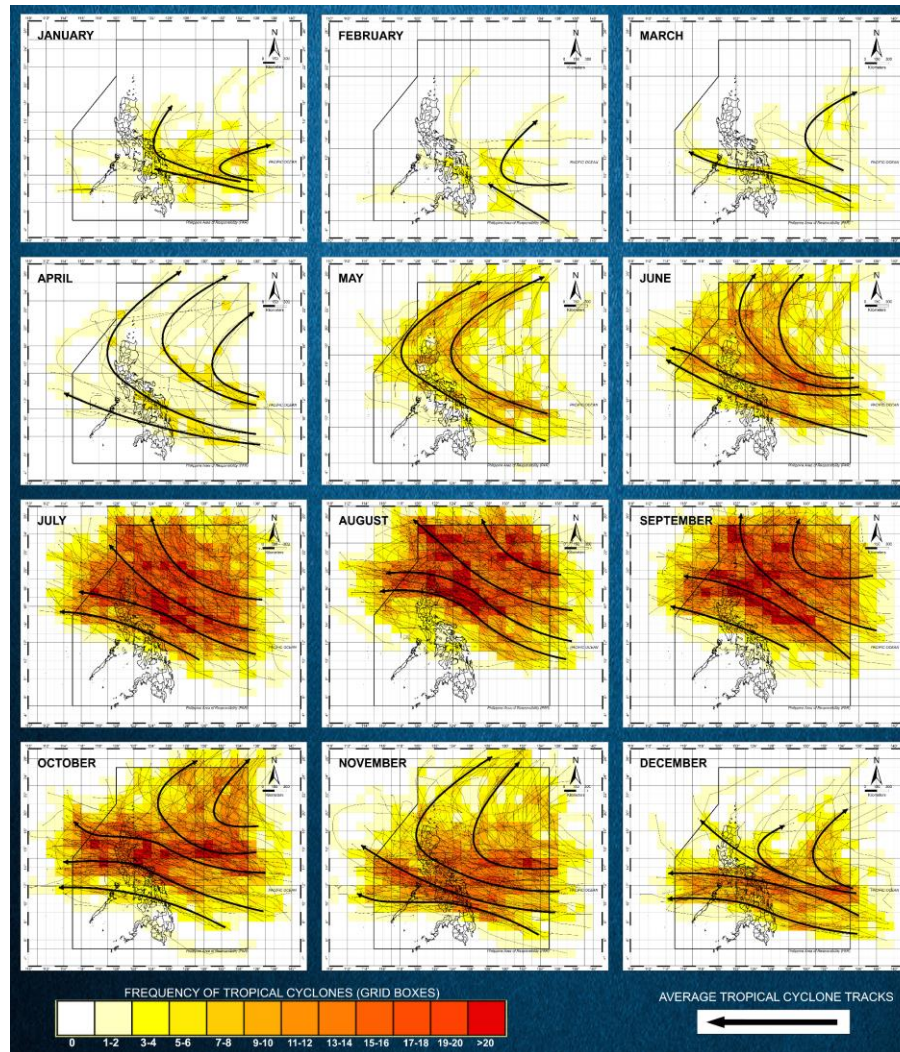
Source: manilatimes.net



The SW and NE monsoons in the Philippines



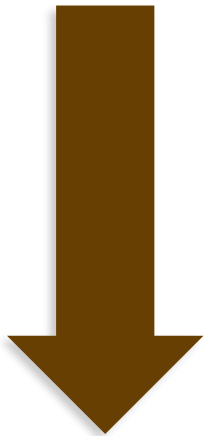
Monthly tracks of Tropical Cyclones affecting the Philippines



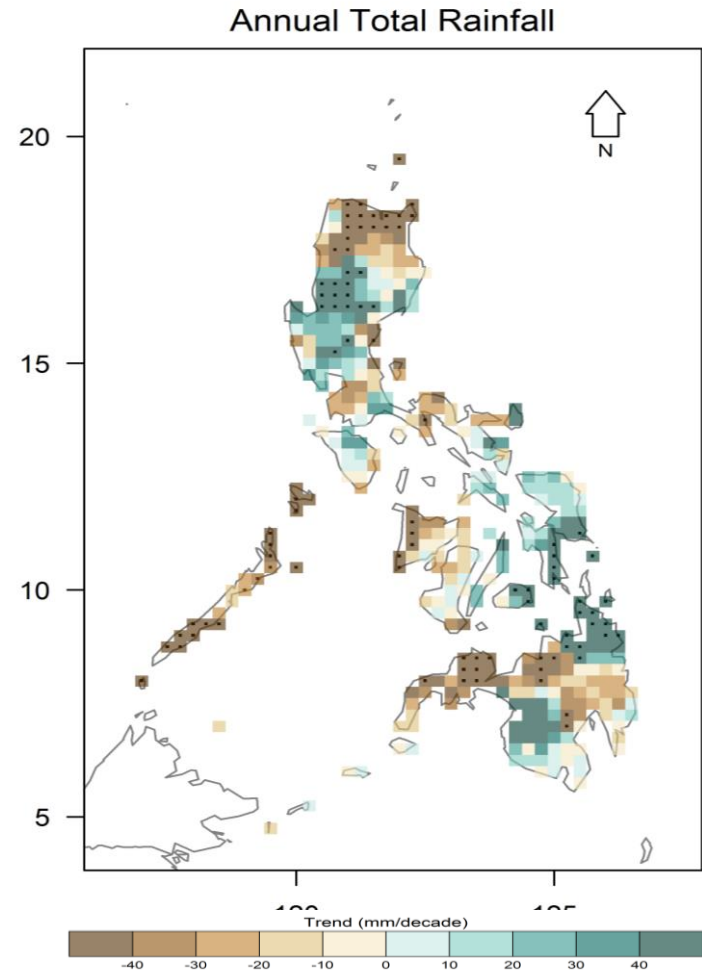
Increasing/decreasing trend in annual total rainfall in the Philippines



- Parts of central and northern Luzon
- Parts of eastern Visayas
- Northeastern and southwestern sections Mindanao



- Northern sections of Luzon
- Parts of western Visayas
- Central and western sections Mindanao



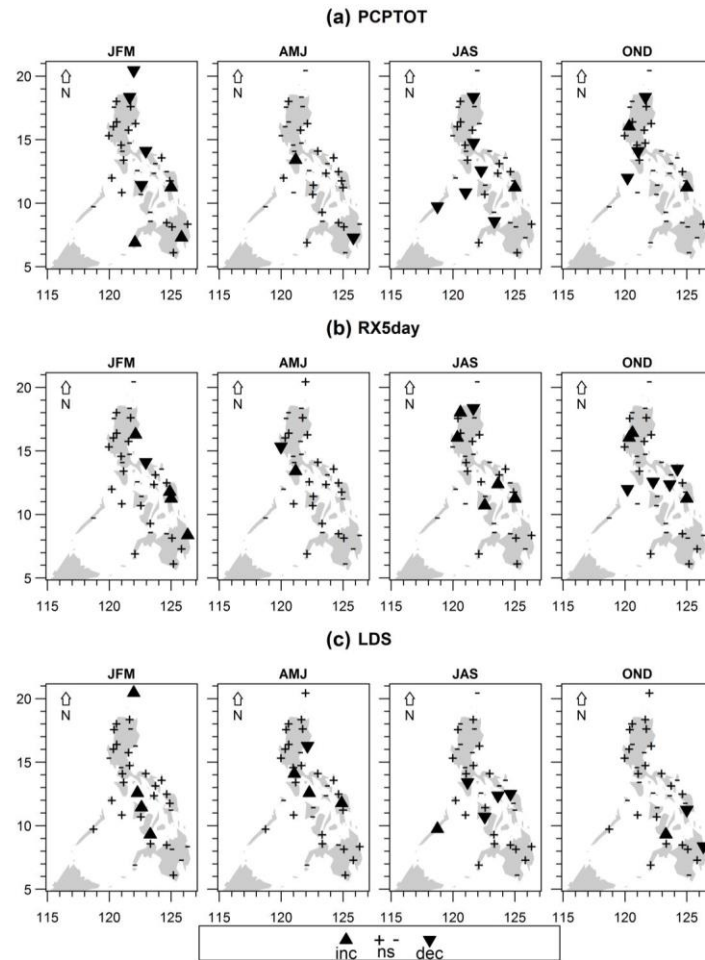
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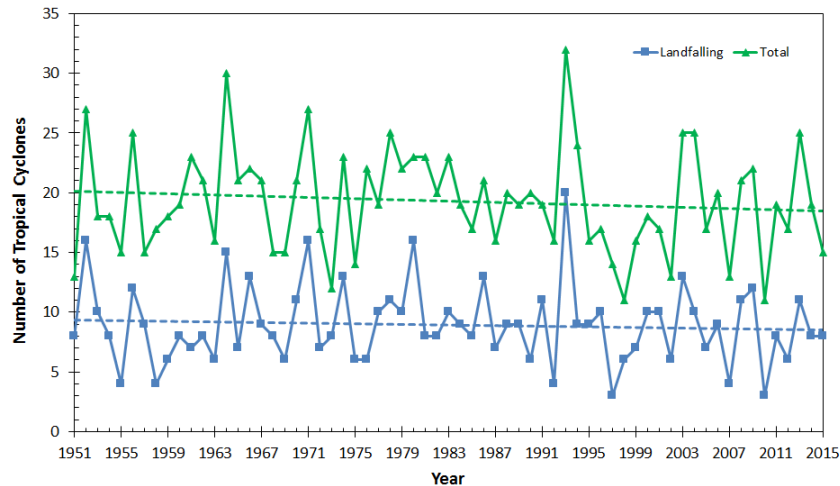
Increasing frequency of extreme rainfall events has also been observed (1951–2010)



Source: Villafuerte et al., 2014

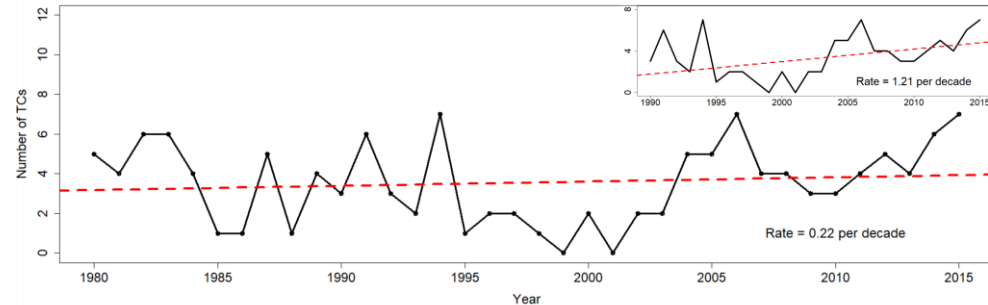


Observed changes in tropical cyclones affecting the Philippines



There is a minimal decrease in the number of TCs entering the PAR and made landfall over the Philippines.

There is an increase in the number of **strong TCs** with maximum wind speeds of greater than 170 km/h.



Will those changes continue in the future?



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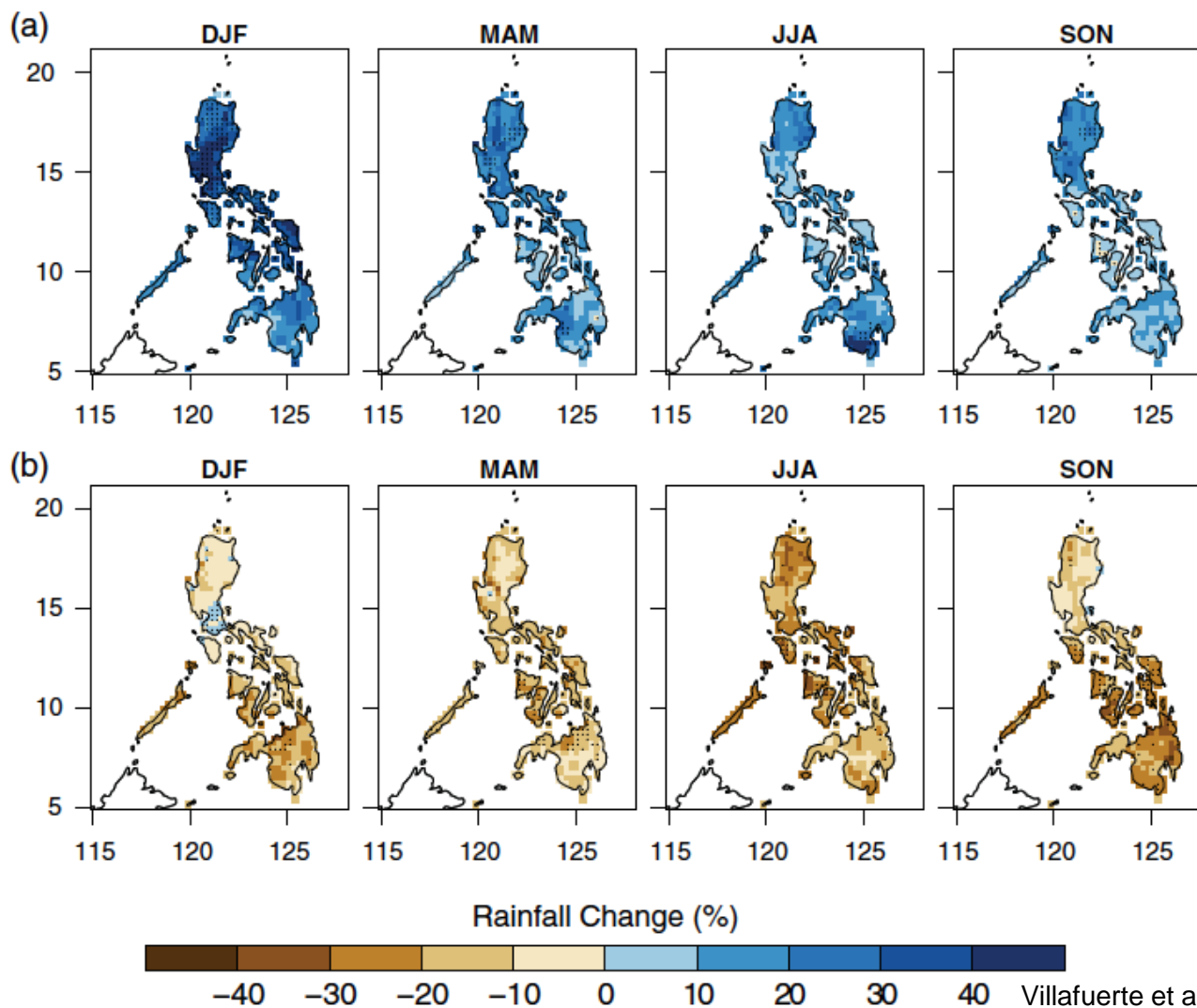
Projected changes in tropical cyclones affecting the Philippines

| | Climate Model Simulations | | | | |
|--------------------------------------|---------------------------|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Change in tropical cyclone frequency | ↓ | ↓ | — | — | ↓ |
| Change in tropical cyclone intensity | — | ↑ | ↑ | ↑ | ↑ |

Source: Daron et al. 2016, DFID project, UK- Met-office report



Range of projected changes in seasonal mean rainfall by the Mid 21st Century (2036–2065) relative to (1971–2000) in the Philippines



Villafuerte et al., Int. J. Climatol. (2020)



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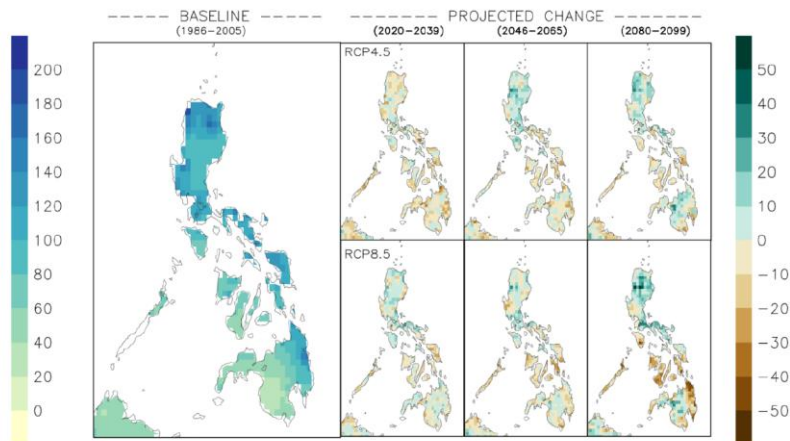
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Projected changes in extreme rainfall

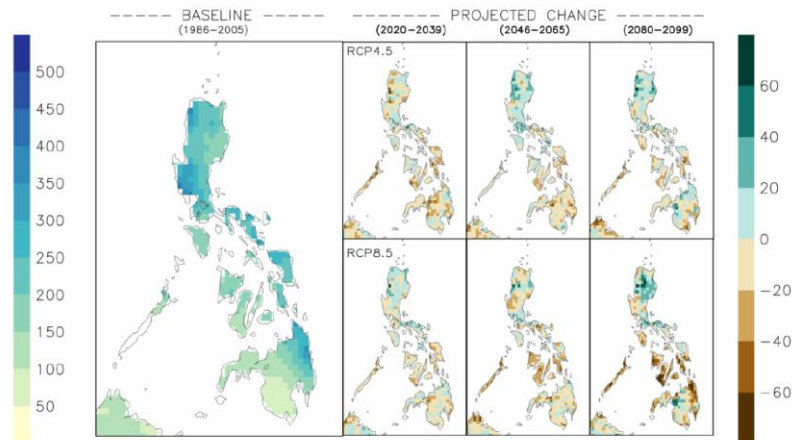
(a) Rx1day



Increases in maximum 1-day rainfall are projected in many areas of Luzon and some parts of Mindanao towards the end of the 21st century.

Projections are also pointing toward increases in maximum 5-day rainfall over many areas in Luzon and some parts of Mindanao.

(b) Rx5day



Source: PAGASA, AdMU and Manila Observatory 2021



What do these projected changes in climate mean to our water sectors?

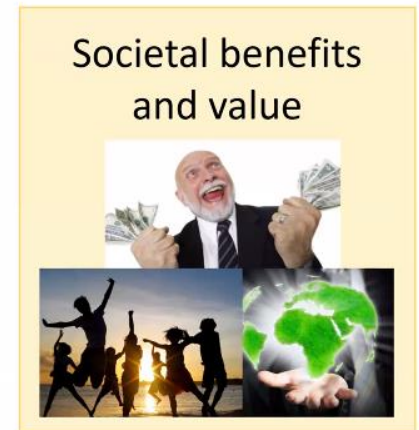
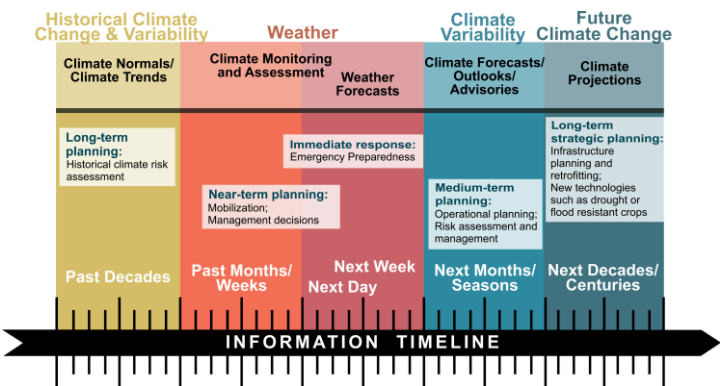


Excessive rains could lead to flooding...

In contrast, drier future may lead to water security issues.



Linking climate information to value



Illustrations adapted from: Podesta 2021

At the root of problem: lack of *fit* between capabilities and needs...

"I know
what users need"

"Users do not
understand
my products"

State-of-the-art
climate
information &
services

Needs and
expectations
of users

"I have to follow my
procedures manual
or I can get fired!"

"Can my firm
lose money if
I do this??
How much?"

"X is nice...
but I actually need
to know Y"

Source: Podesta 2021



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Possible approach to bridging the gap

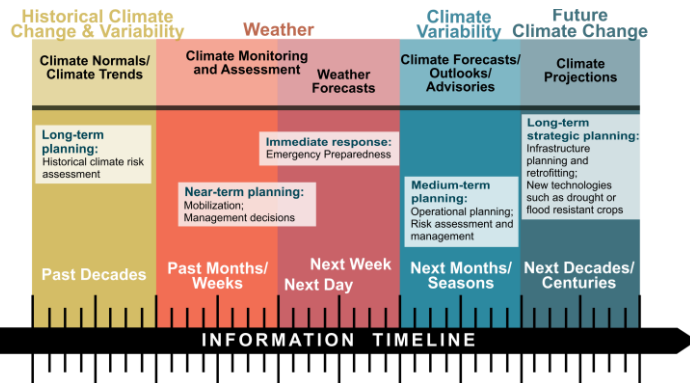


Let's talk... Tell me what you really need.

We have this new "thing"



Go use it!



Illustrations adapted from: Podesta 2021



Thank you!

Contact us:

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Climatology and Agrometeorology Division, DOST-PAGASA
Trunkline No.: (02)8284-0800 (Loc. 904)

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