



# The Visayan Sea Seasonal Fishery Closure: Effectiveness from the Standpoints of Fishery- Dependent Communities and Fishery Management

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## 1. Philippines & its fisheries

Importance



## 2. Visayan Sea

Background, status



## 3. Motivations

Why focus on this?



## 4. Methodology

BACI-DID; interviews



## 5. Results

Annual & seasonal catch;  
community perspective



## 6. Key takeaways

# Philippines



- 7,641 islands; 5<sup>th</sup> longest coastline in the world (~36,289 km)
- 62% of Ph population lives in the coastal zone; 54% of municipalities are coastal (DENR et al., 2001)
- 2018: ranked 8<sup>th</sup> among top fish producing countries (~4.35M MT) → 2% of the world total fish production (FAO, 2020)
- 2020: contributed 273 B pesos (at current prices) and 266 B pesos (at constant prices) to the Phil GDP (FAO, 2020)
- livelihoods to ~2M Filipinos → 49% in capture fishing; 19% in gleaning; 11% in aquaculture; 20% others (fish vending, processing, etc)
- fish as a cheap source of protein for the Filipino population
- ~34.3 kg per capita consumption of fish & fish products (2018-2019 DOST FNRI report)



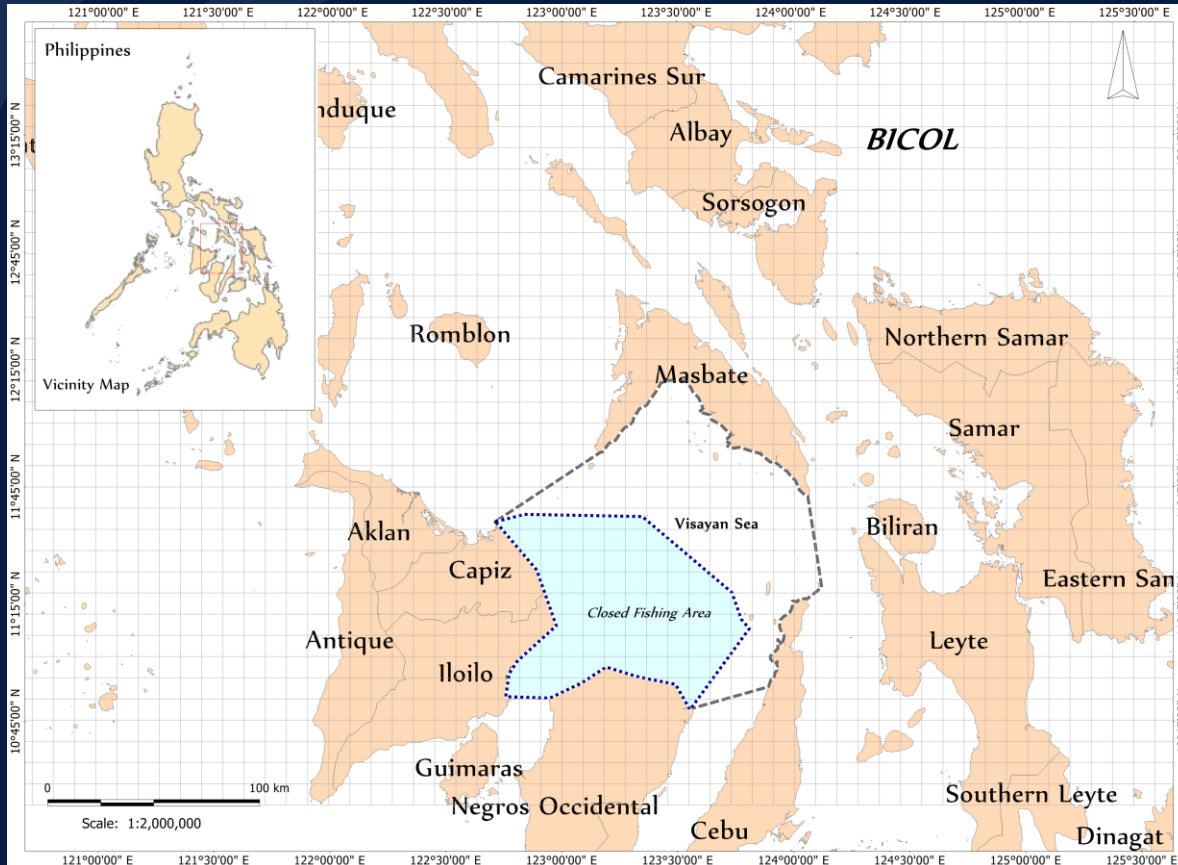
1939

1976


2012

2013

# Visayan Sea



- Chl concentrations in the Visayas was noted to be the highest in any Philippine basin measures (Willette et al. 2011).
- Central Visayas historically has the highest concentration of coral reef fishes than any LMA (Nañola et al. 2010)



## DA-BFAR: Success of sardines closed season, not impossible for galunggong


April 24, 2013

An April 23, 2013, press release from the Department of Agriculture, Bureau of Fisheries and Aquatic Resources: As a result of this success, Director Perez is looking into extending the fishing closed season for round scad or galunggong. At the height of news about depletion in supply of galunggong and increase of its prices in the market (ranging from P60.00 up to P120.00 depending on size), the BFAR Director sees possible fishing closed season for galunggong as a positive way to address such problems.

Posted under Briefing Room, Bureau of Fisheries and Aquatic Resources, Department of Agriculture

# Motivations

## ➤ Lack of robust analysis

- Local: People's livelihoods are at stake due to the disruption in their livelihoods
  - National: Limited resources
  - Global: Visayan Sea is an important biodiversity area
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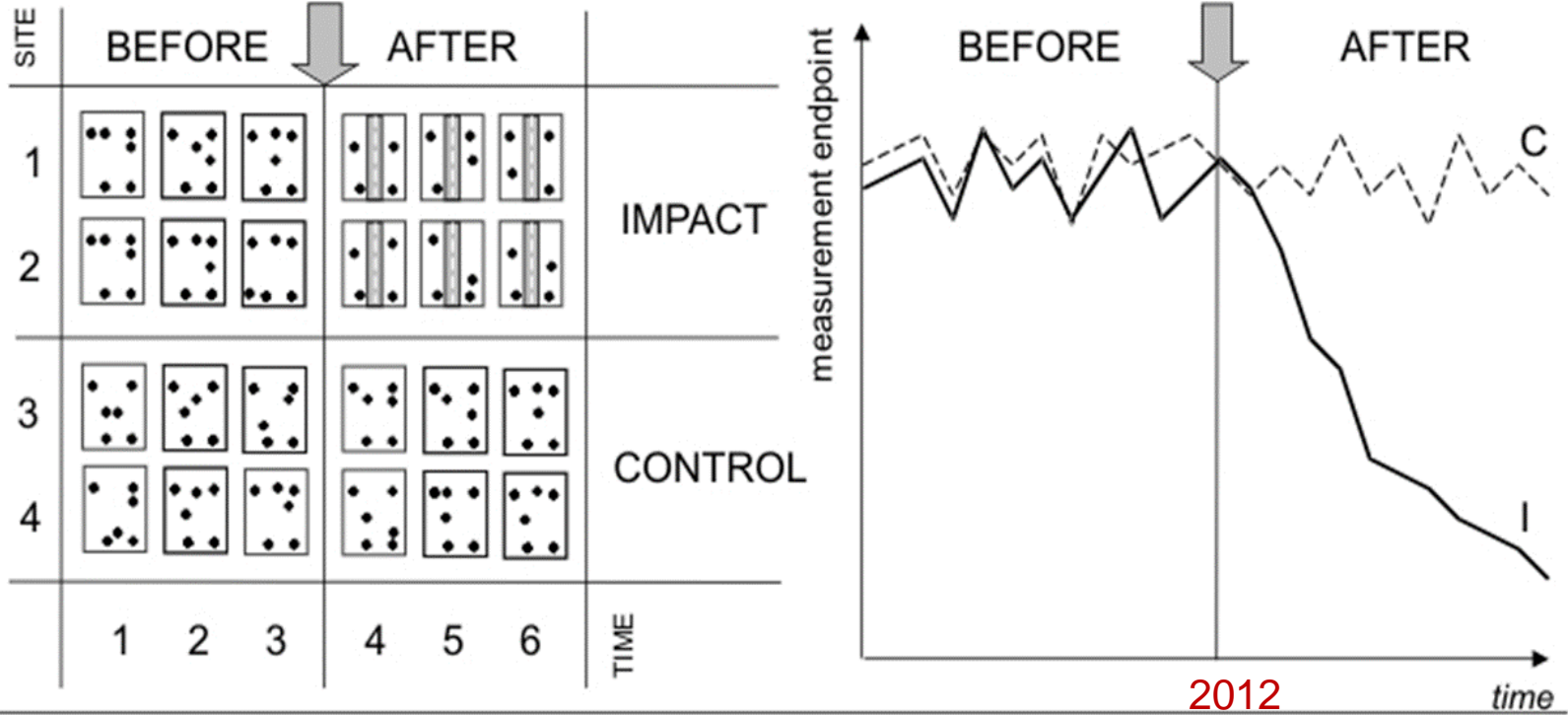
# Methodology

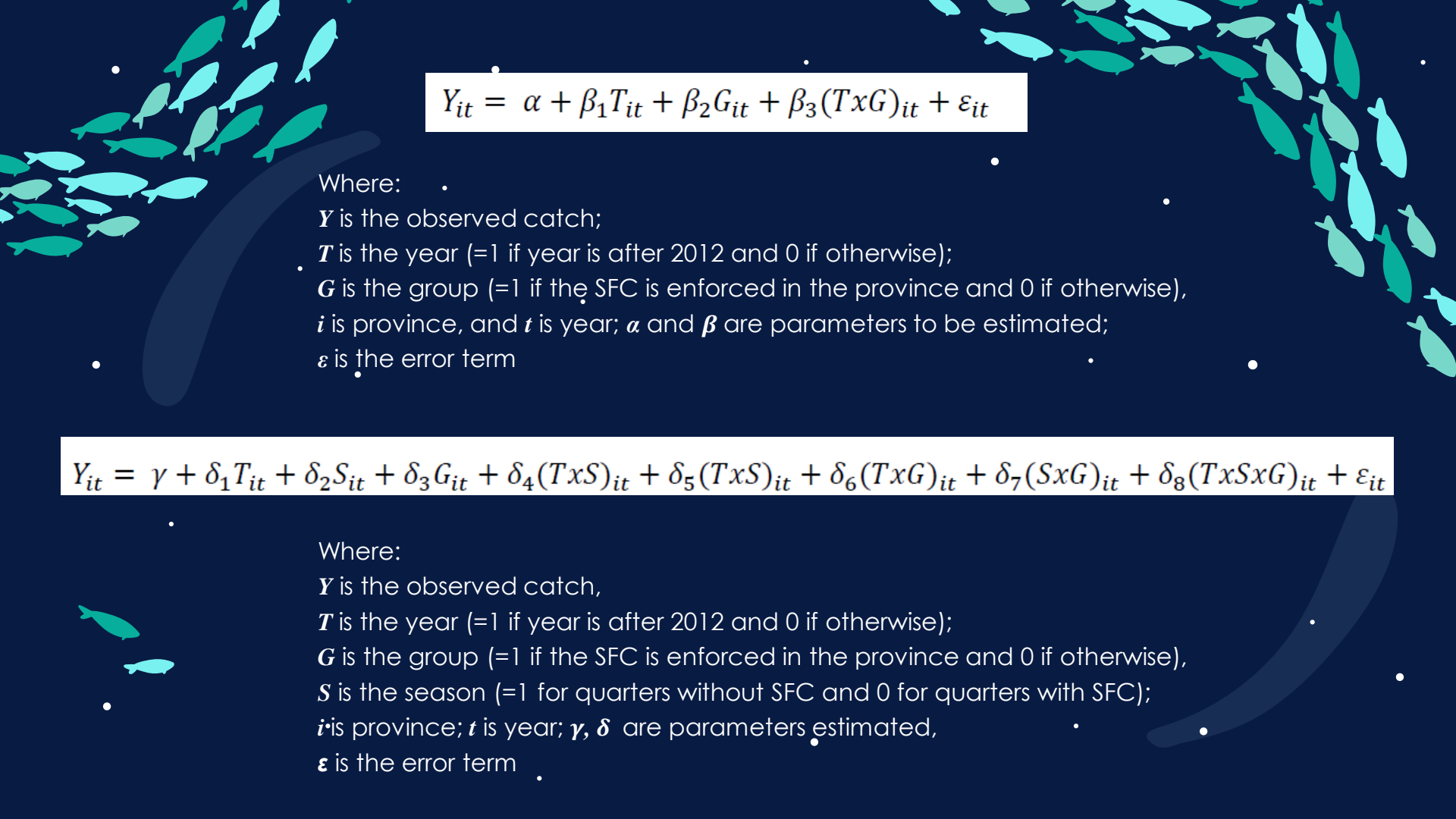


- Provincial level longitudinal catch data on sardine (*S. lemuru* & *S. fimbriata*) and mackerel (*R. kanagurta* & *R. brachysoma*) from PSA (2007-2018)
- 2012 as base year (6 yrs before and 6 yrs after)
- PG: Iloilo, Capiz, Cebu, Masbate, Negros Occidental
- NPG: all other provinces with at least 7 yrs of catch data
- Generalized estimating equations (GEE); SPSS v26

Species	PG (Treatment)	NPG (Control)	Total no of observation
Sardine	5	56	732
Mackerel	5	54	708

# BACI




$$Y_{it} = \alpha + \beta_1 T_{it} + \beta_2 G_{it} + \beta_3 (TxG)_{it} + \varepsilon_{it}$$

Where:

$Y$  is the observed catch;

$T$  is the year (=1 if year is after 2012 and 0 if otherwise);

$G$  is the group (=1 if the SFC is enforced in the province and 0 if otherwise),

$i$  is province, and  $t$  is year;  $\alpha$  and  $\beta$  are parameters to be estimated;

$\varepsilon$  is the error term

$$Y_{it} = \gamma + \delta_1 T_{it} + \delta_2 S_{it} + \delta_3 G_{it} + \delta_4 (TxS)_{it} + \delta_5 (TxS)_{it} + \delta_6 (TxG)_{it} + \delta_7 (SxG)_{it} + \delta_8 (TxSxG)_{it} + \varepsilon_{it}$$

Where:

$Y$  is the observed catch,

$T$  is the year (=1 if year is after 2012 and 0 if otherwise);

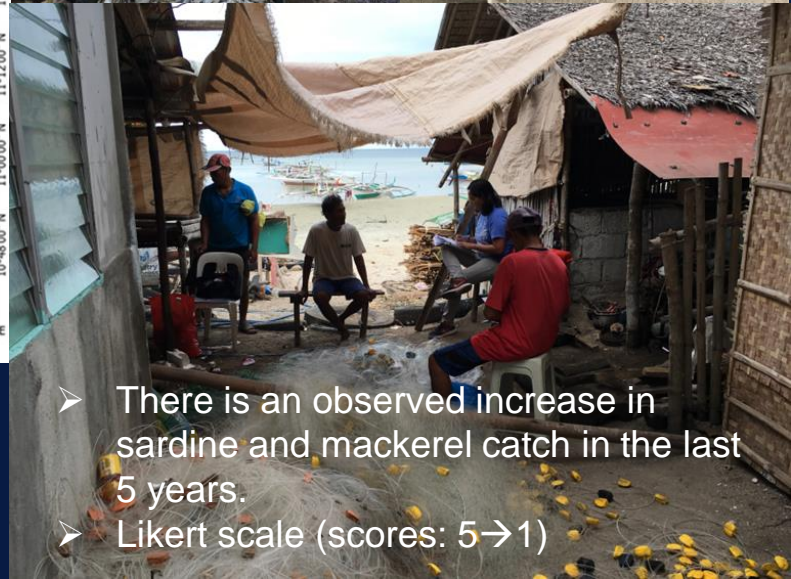
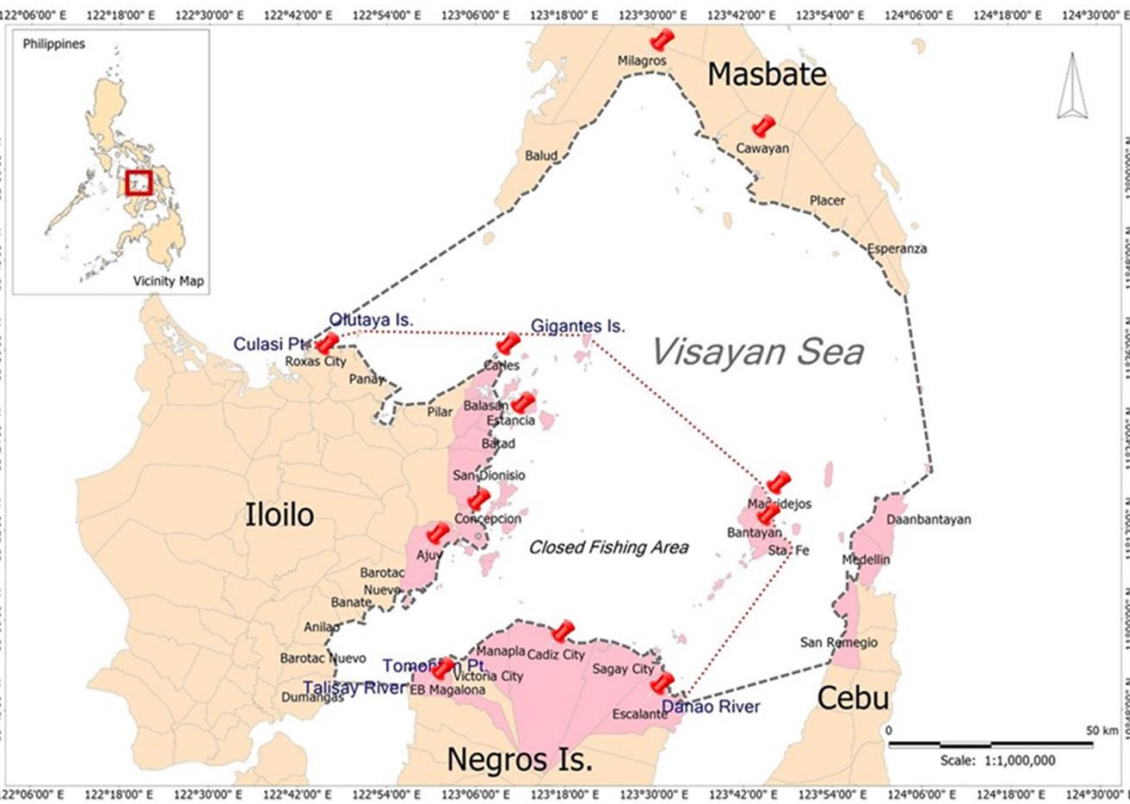
$G$  is the group (=1 if the SFC is enforced in the province and 0 if otherwise),

$S$  is the season (=1 for quarters without SFC and 0 for quarters with SFC);

$i$  is province;  $t$  is year;  $\gamma$ ,  $\delta$  are parameters estimated,

$\varepsilon$  is the error term

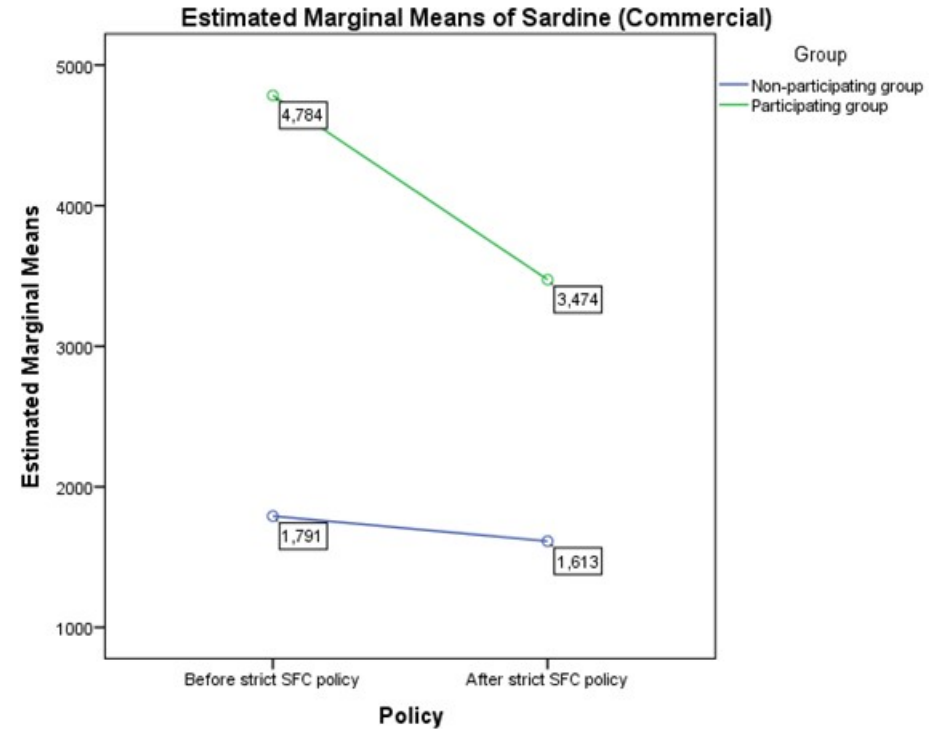
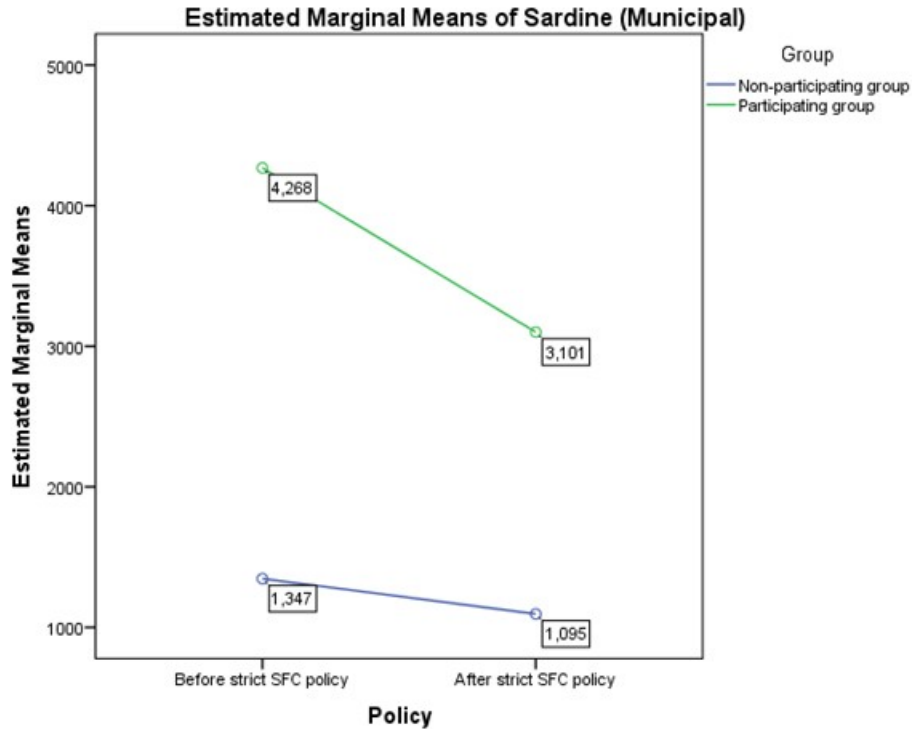




- 12 municipalities in 5 provinces
- Municipal fisheries stakeholders (N=235)
- Purposive sampling strategy (fishers, fish dryers, fish vendors/traders/brokers; LGUs, Fish wardens, PNP-MG, PCG)

- There is an observed increase in sardine and mackerel catch in the last 5 years.
- Likert scale (scores: 5 → 1)

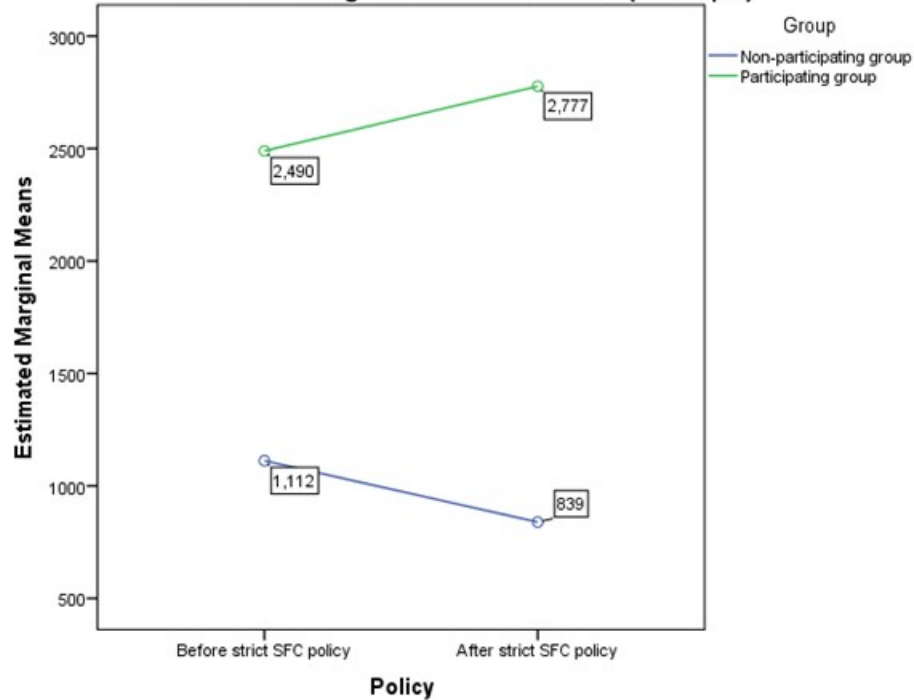
# Annual fish catch: SARDINE



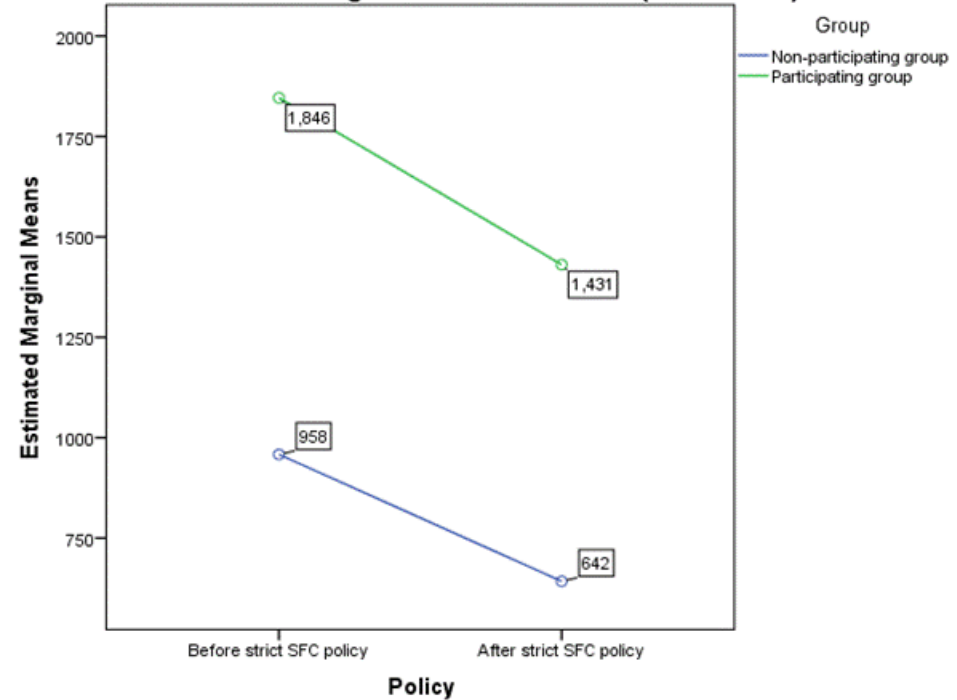
- Sardine catch for municipal and commercial sectors among SFC-participating provinces declined by 917 MT and 1,133 MT

# Annual fish catch: MACKEREL

Estimated Marginal Means of Mackerel (Municipal)

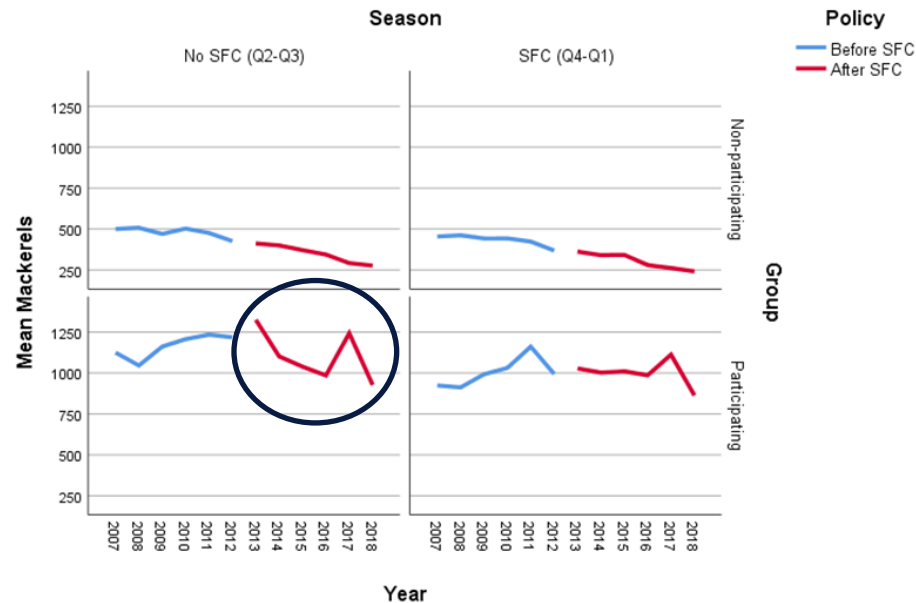
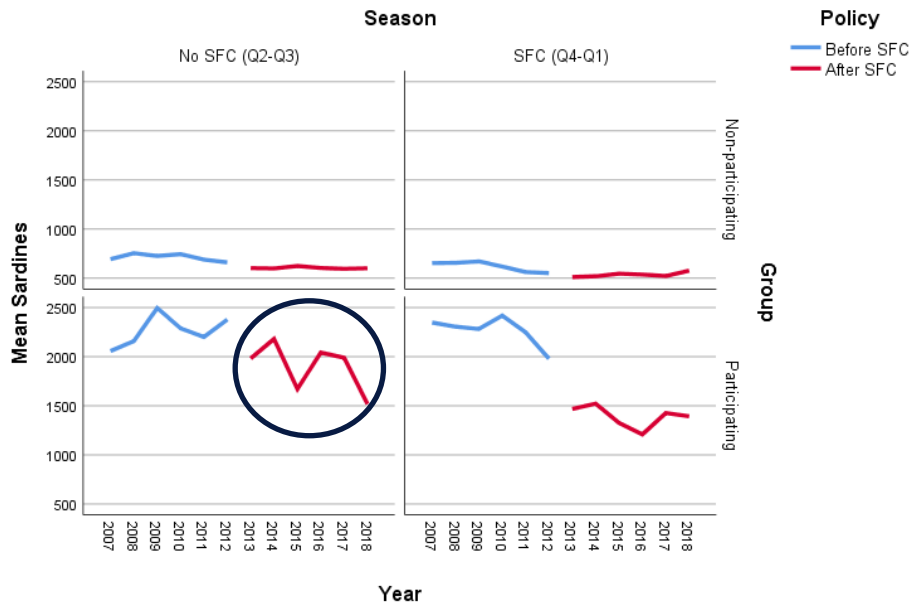


Estimated Marginal Means of Mackerel (Commercial)

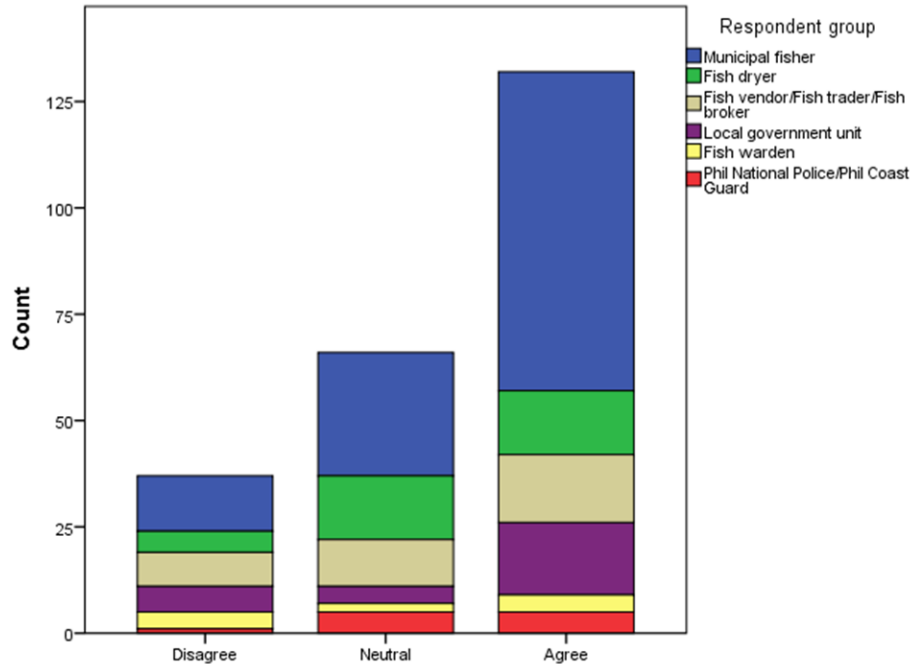


- Mackerel catch for municipal sector increased by 561 MT while mackerel catch for commercial sector declined by 99 MT among SFC-participating provinces, but they were not significant.

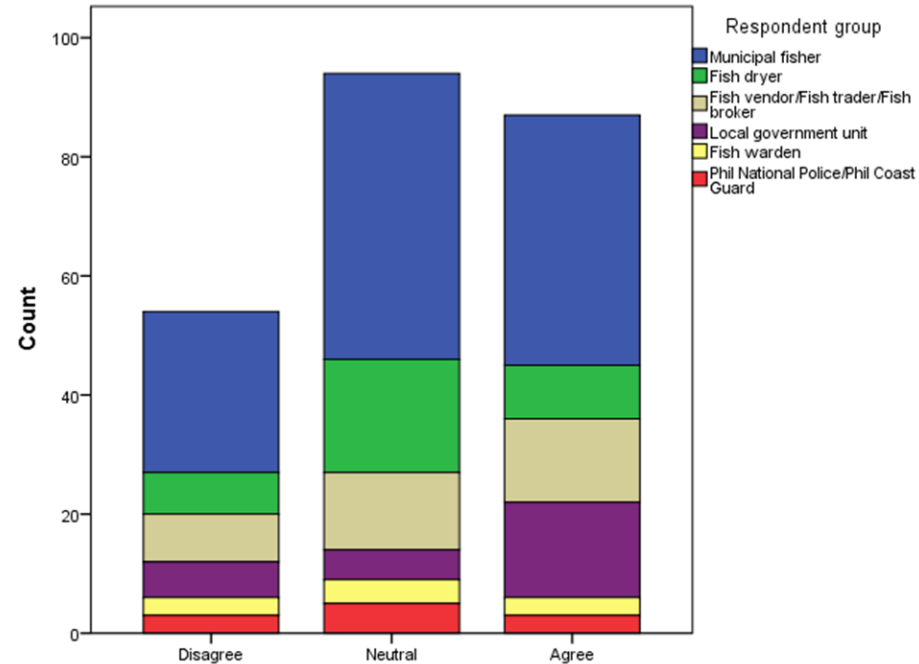
# Quarterly fish catch



- Significant increase in sardine catch in the SFC-participating provinces by 531 MT, compared to non-participating provinces, during the quarters when SFC was not enforced.
- Mackerel catch is 53.1 MT lower among provinces observing the SFC compared to their counterparts, even after the SFC is lifted seasonally.



There is an observed increase in the catch for sardine in the last 5 years (N=235).



There is an observed increase in the catch for mackerel in the last 5 years (N=235).



# Key Takeaways

- Quarterly analysis showed significant increase in the catch for sardine in the PG during the open season (Q2-Q3), but overall catch for sardine at an annual scale decreased after the strict enforcement of the SFC in 2012.
- There was no significant effect of the SFC policy on the catch for mackerel even during the open season. There was an increase in the overall catch for mackerel after 2012; however, the increase was not significant.
- These findings do not support the claims by the BFAR on the increasing catch of sardine in the Visayan Sea.
- These results are also contrary to the perceptions of the municipal fisheries stakeholders in the participating municipalities of the SFC who have indicated increasing catch for sardine catch in the Visayan Sea in the last 5 years.





*Thank you!*

Do you have any questions?



East Carolina University  
Coastal Resources Management

