Smartphone applications (FishGIS, HydroColor)

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Background

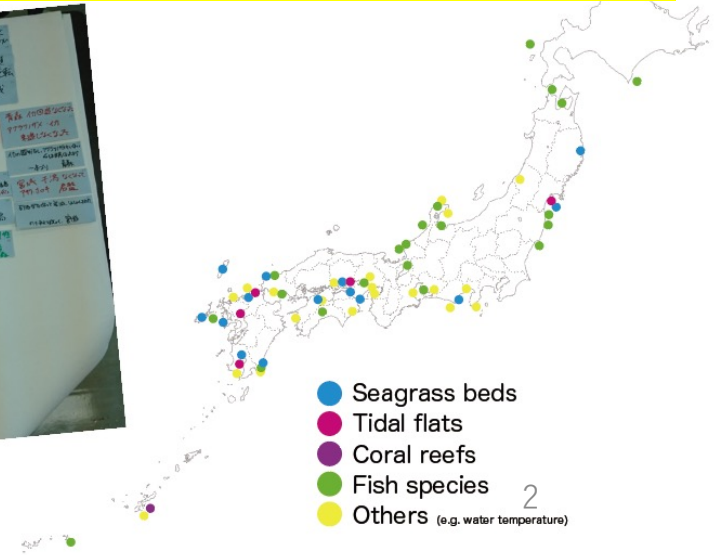
- The marine environment has changed dramatically in recent years.

- There are lots of needs from small-scale fishers (SSFs) for a platform and/or tool to report and share information on the ocean conditions and realities with stakeholders in order to adapt to ocean climate changes.

Workshop with young adult fishers (June, 2019)

Takemura et al., (2022)

Fishers' realities for ocean climate changes in Japan



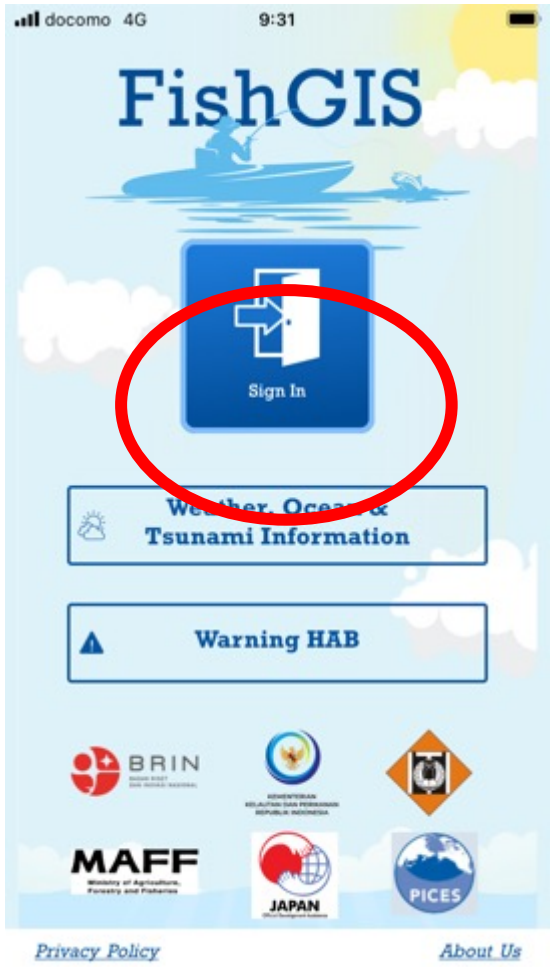
Challenges for adaptations to climate change in data-limited SSFs management

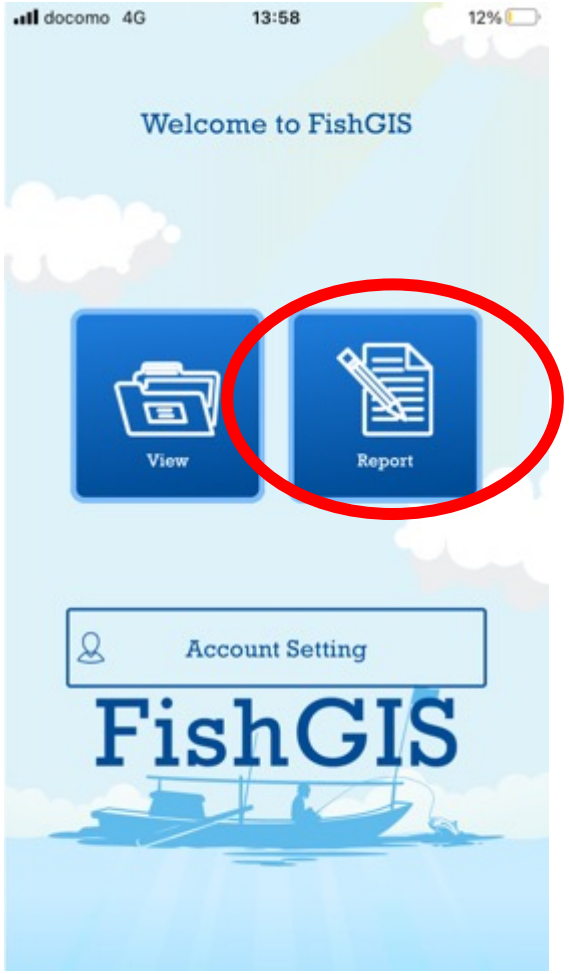
1. to **detect** changes in the ocean ecosystem
2. to **share** this information rapidly among stakeholders
3. to **use** it for decision making on adaptation measures

- ICT tools such as **smartphones** are expected to be a **breakthrough** in solving these challenges.

https://en.wikipedia.org/wiki/Supercomputer

FishGIS App (target users: local fishers)





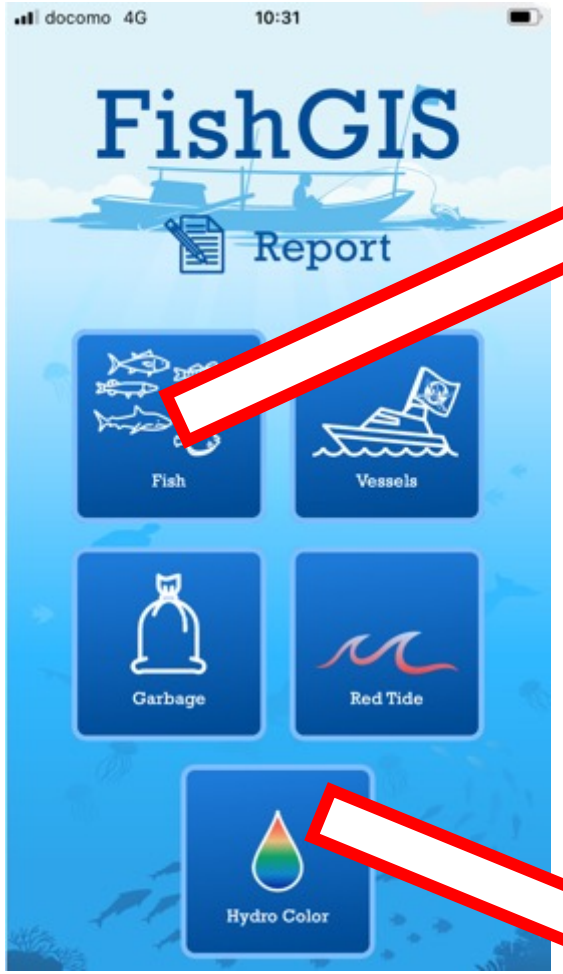
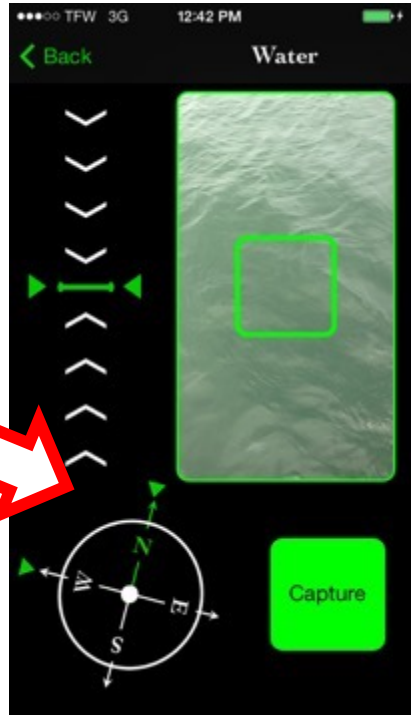


Photo of Fish

Photo of watercolor



How the ocean is changing?

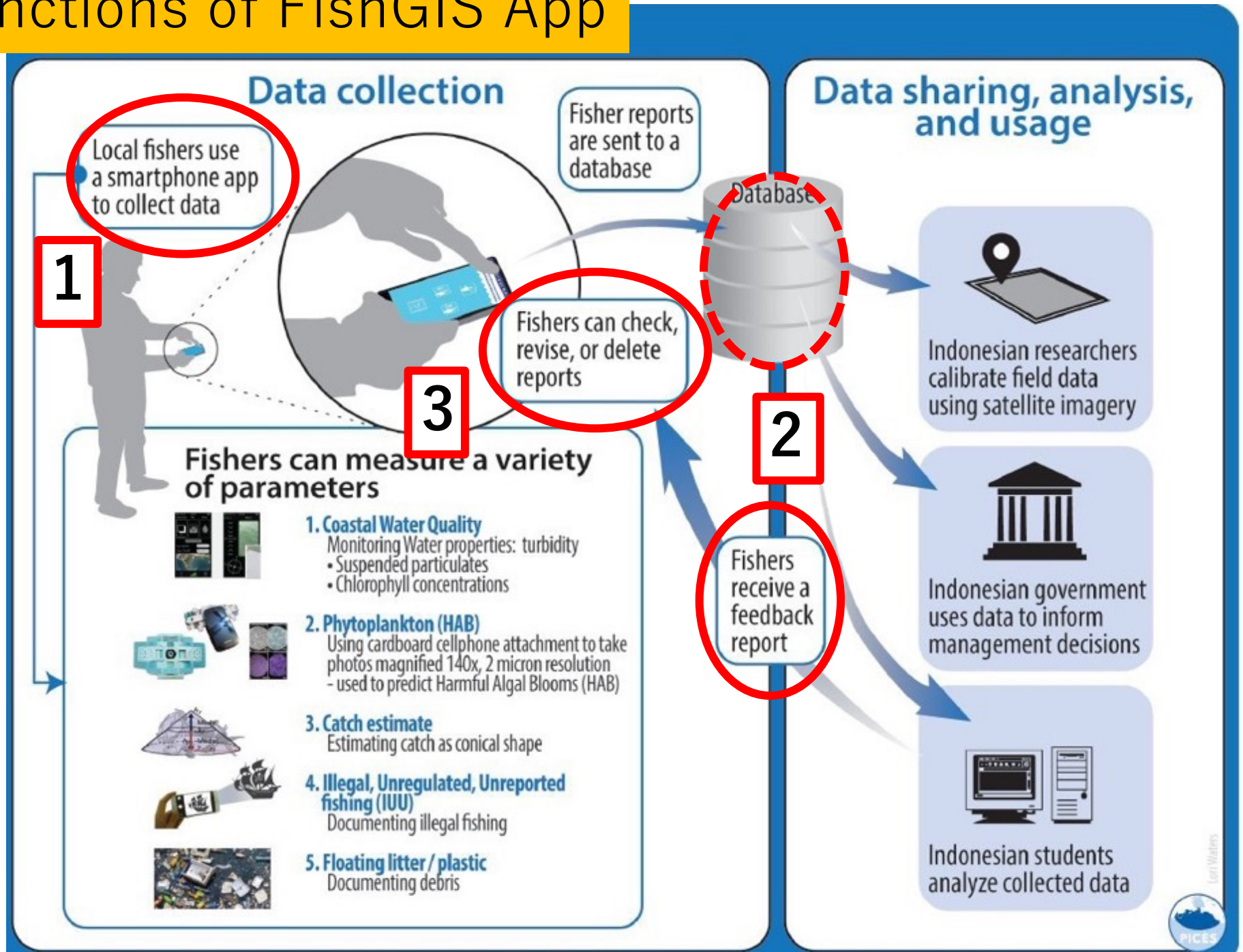
→ Tools for reporting photos of ocean conditions

FishGIS can be installed from Apple Store and Google Play!!

iOS（iOS10 or later）
Search for “FishGIS” in Apple Store

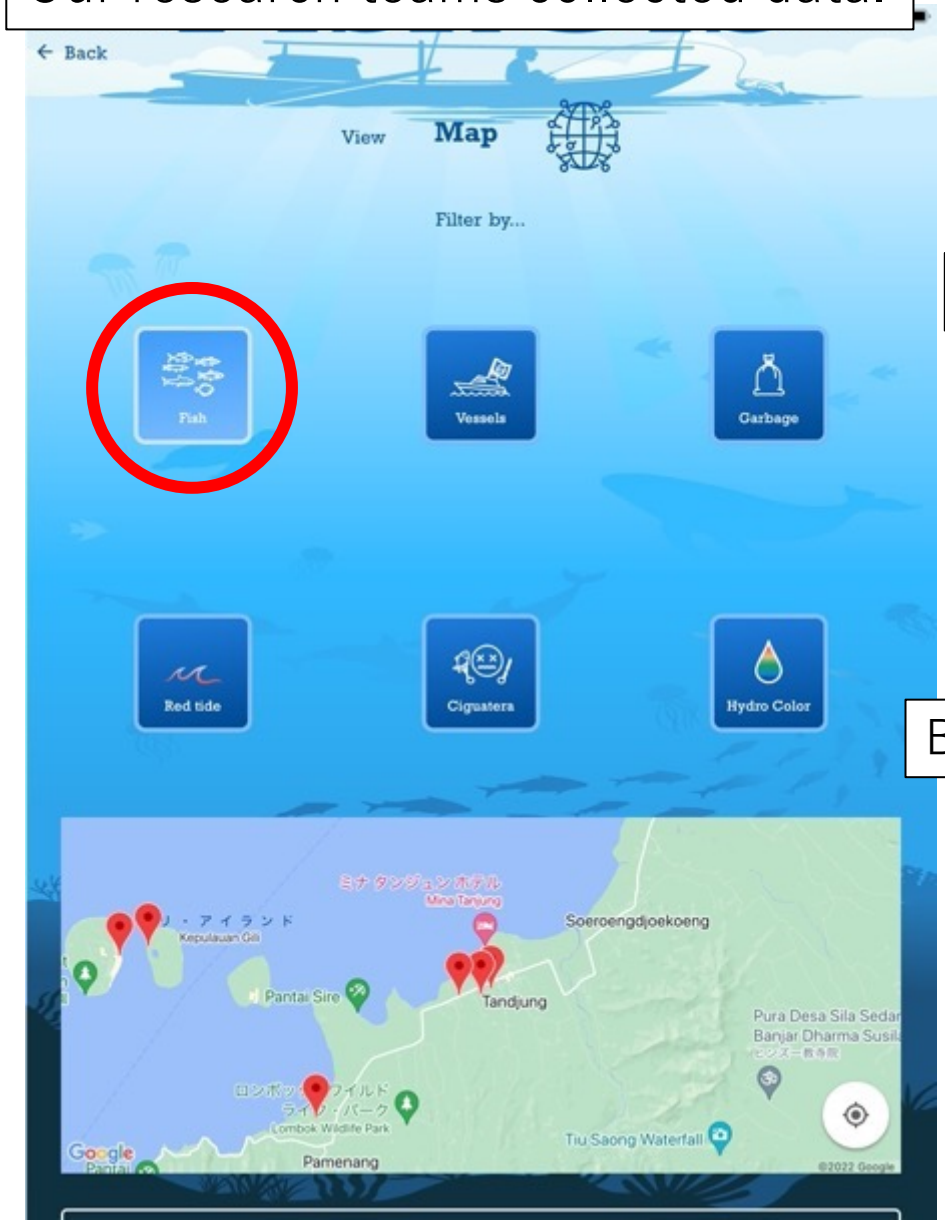
Android（Android7 or later）
Search for “FishGIS” in Google Play

Three functions of FishGIS App



Examples of **fish photos** collected by the ***FishGIS*** App

Our research teams collected data.



Barracuda?

Horse mackerel?

Bonito?

Horse mackerel?

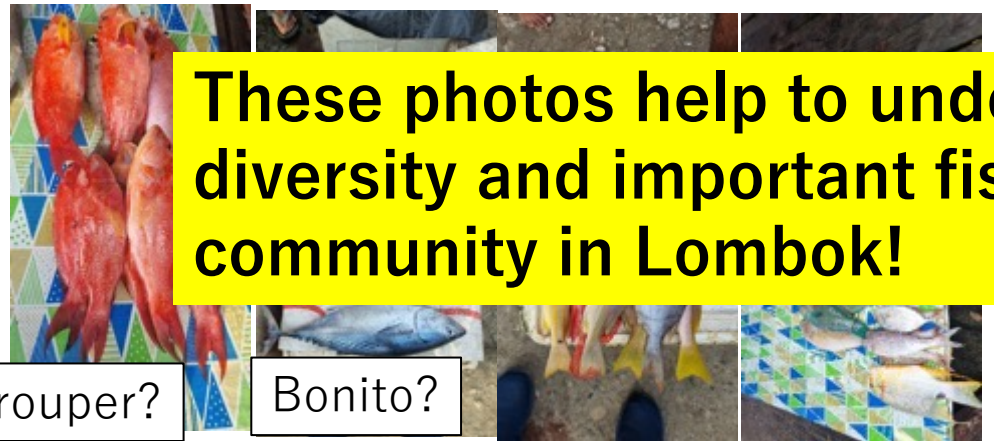
Bonito?

Tuna?

Bonito?

Snapper?

Sardines?



Grouper?

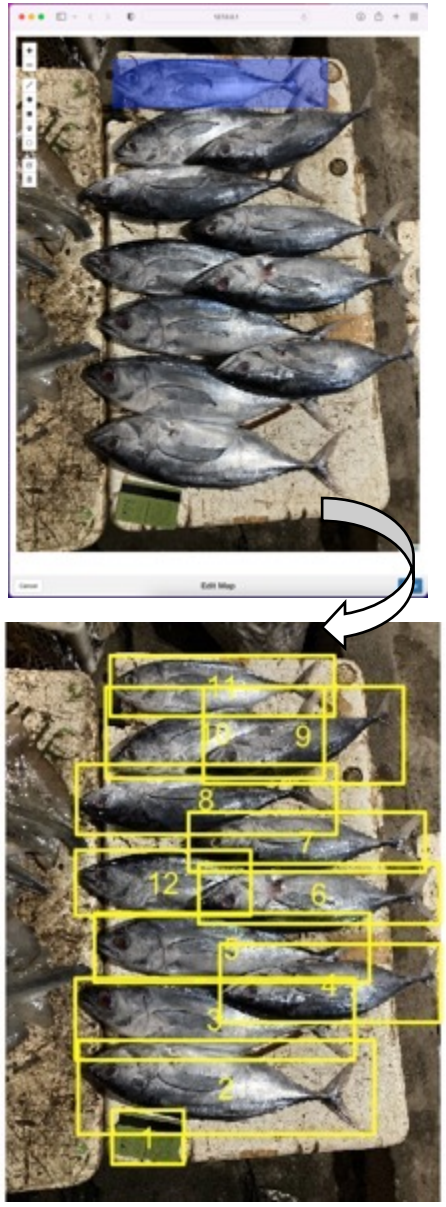
Bonito?

These photos help to understand fish diversity and important fishes for local community in Lombok!

Report images

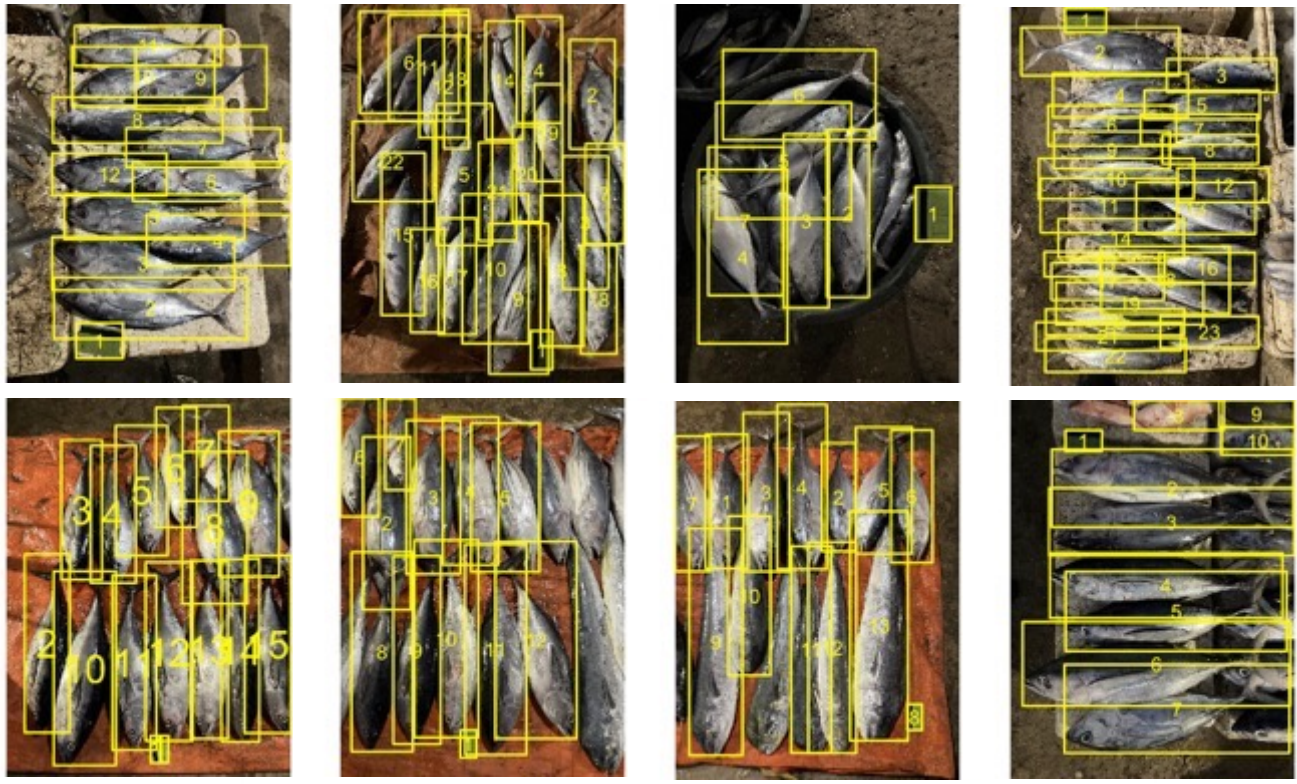
Work time per image:
less than 1 minute

Identify fish species



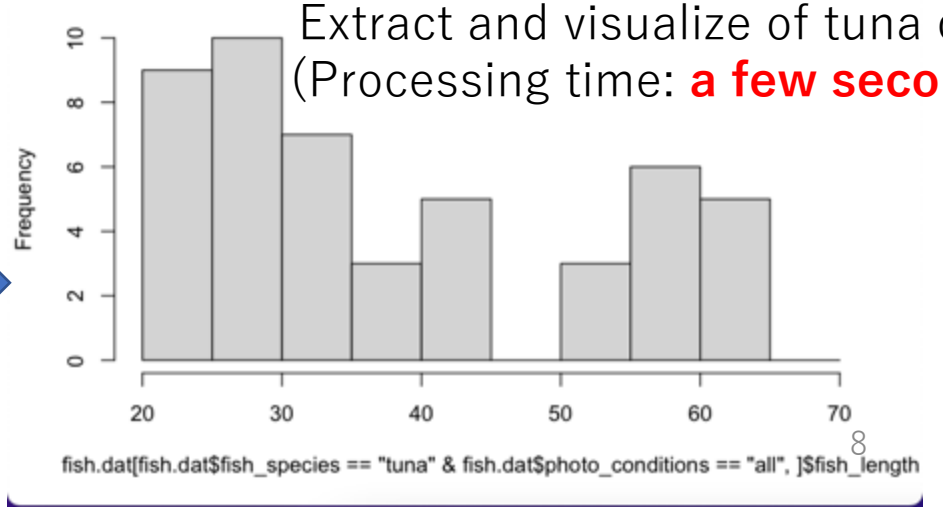
Work time per image:
about 5 minutes

Measuring total length from images



fish.dat[fish.dat$fish_species == "tuna" & fish.dat$photo_conditions == "

Extract and visualize of tuna data
(Processing time: **a few seconds**)



tuna

mahimahi

bonito

greater amberjack

mackerel scad

dogtooth tuna

snapper

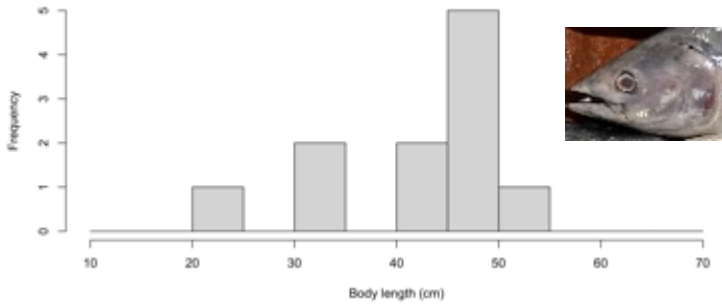
double-lined fusilier

yellowtail blue snapper

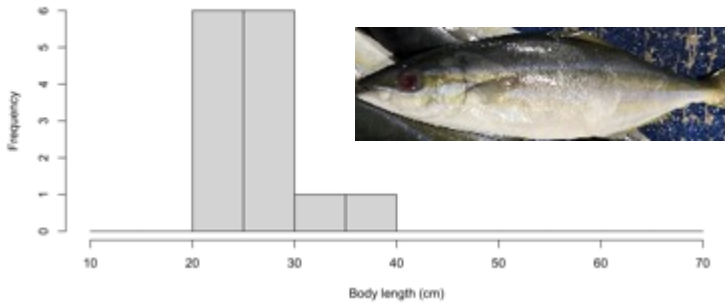
grouper

goatfish

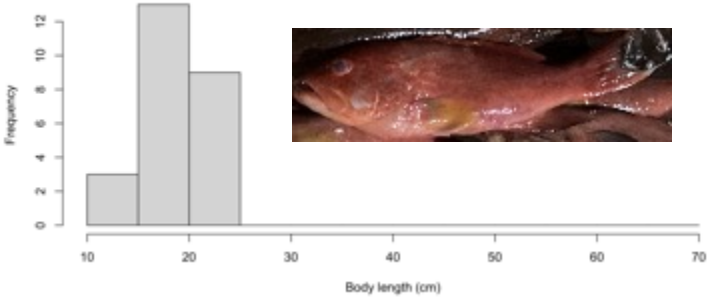
bonito



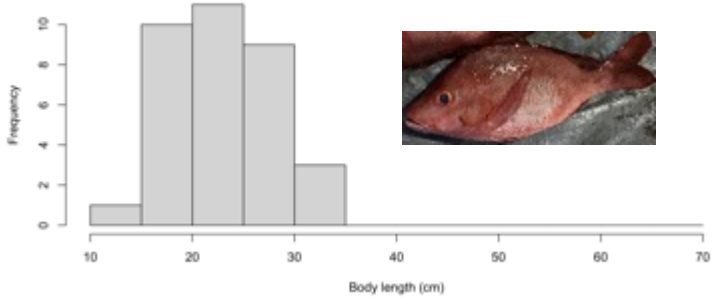
greater amberjack



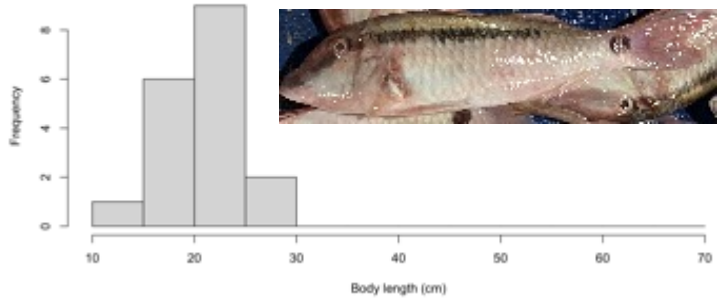
grouper



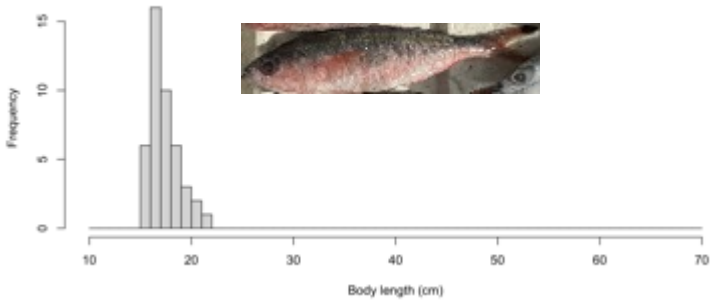
snapper



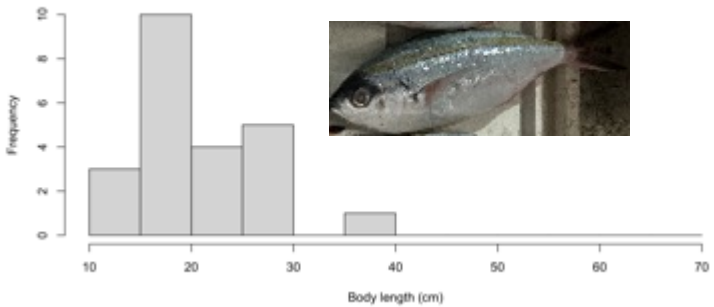
goatfish



double-lined fusilier



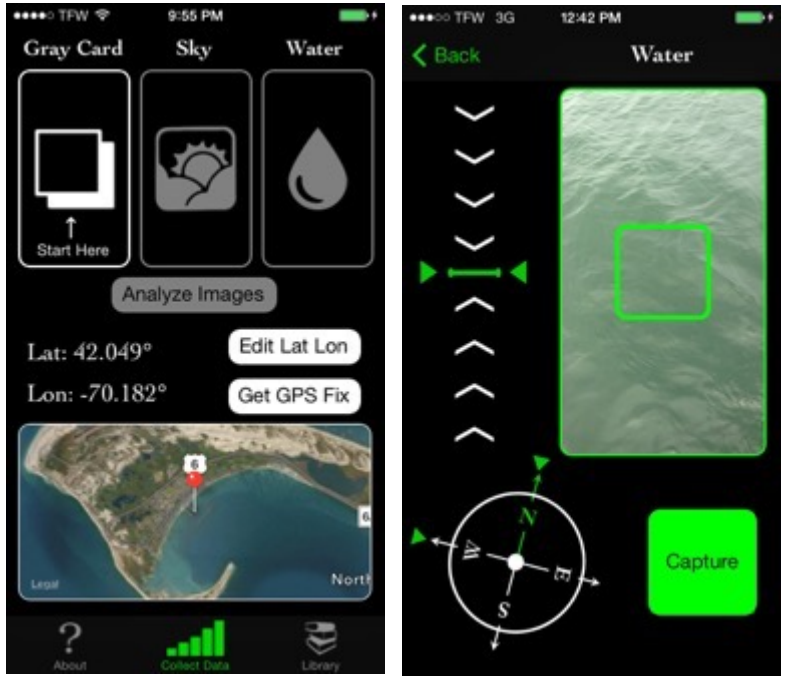
yellowtail blue snapper

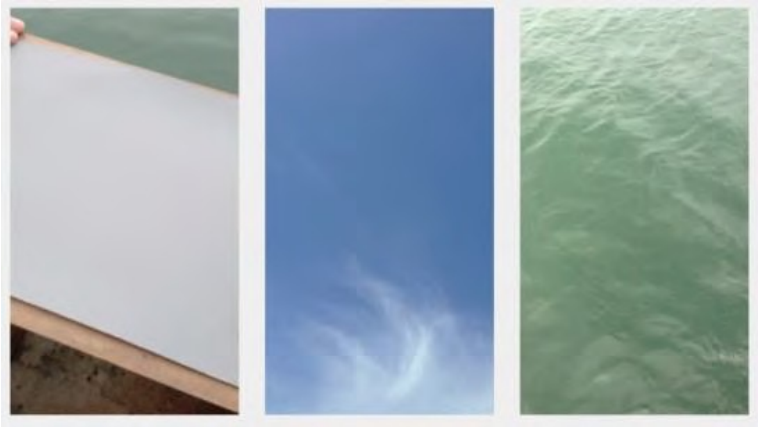


FishGIS helps to collect basic information on fish stocks.

→ yearly and seasonal changes of composition of catch (species, size)

Examples of data collected by the ***HydroColor*** App





HydroColor employs a similar methodology as precision radiometers and Ocean Color satellites to estimate three key water quality parameters: **turbidity** (NTU), **SPM**(g/cm3), and **chlorophyll concentrations** (when calibrated).

Three images are collected using a smartphone.

- 18% photographer's **grey card**
- the incoming (**sky**) radiation
- the light leaving the **water surface**.

Details are shown in Leeuw and Boss (2018).

Leeuw and Boss (2018) Sensor, 18:256

Examples of data collected by the ***HydroColor*** App

Our research teams collected data.

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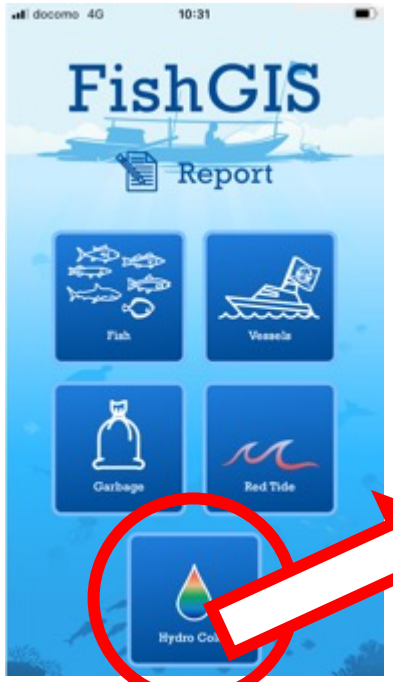

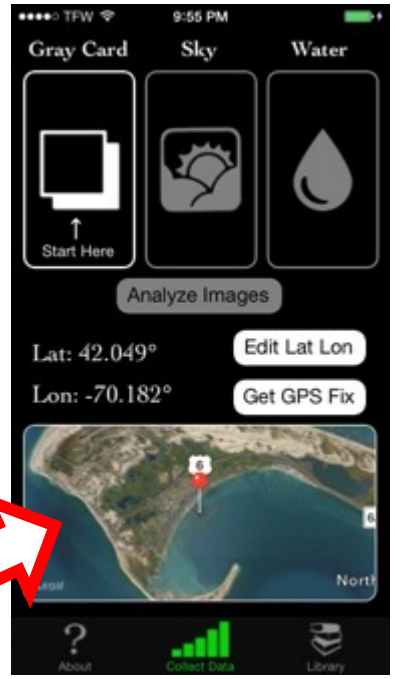

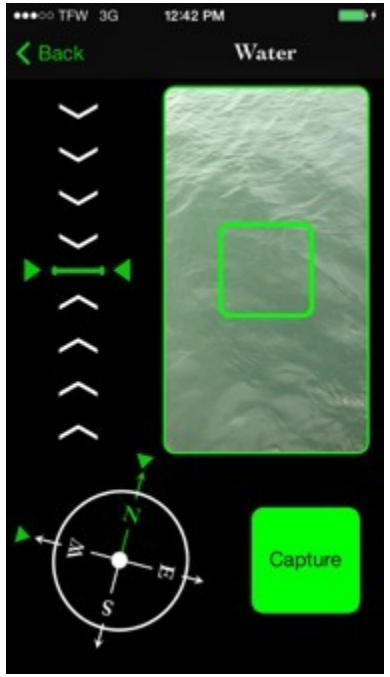

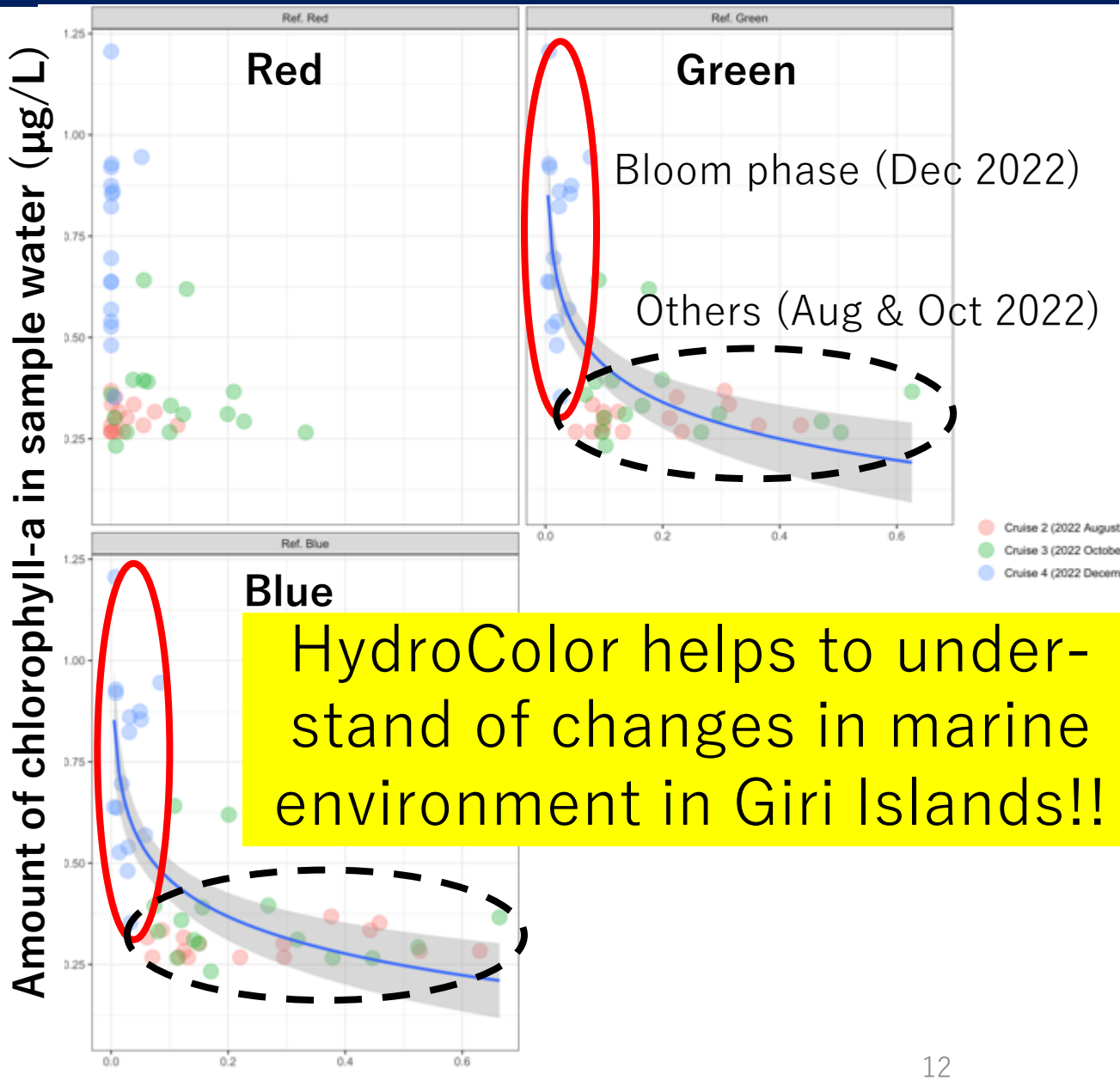

HydroColor helps to under-stand of changes in marine environment in Giri Islands!!

Source: Survey Report II (Fig 11, Table 4) & III (Table 7)

Summary and Conclusion

- ICT tools are expected to be a breakthrough in solving challenges for adaptations to ocean climate change in data-limited SSFs management.

- The FishGIS app is a tools for reporting images of ocean conditions.
  → Fish images help to collect basic information about fish stocks.

  →Watercolor images (HydroColor) helps to understand of changes in the marine environment.

- A future challenge is not only a collecting data but also establishment of a mechanism for local stakeholders to actively participate in data accumulation.
  →Would you like to join our research team?

Thank you for your attention!