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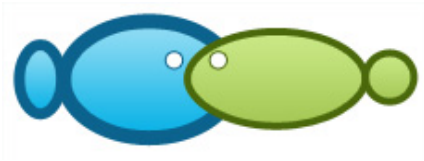
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This study aims to investigate the application of the Global Fishing Watch System as a potential breakthrough in the fight against illegal fishing and fishing that is not reported or regulated. This study utilized a socio-legal method by investigating the legal norms contained within legislation relating to the disclosure of public information and conducting interviews with actors from the fishing business. The findings of this investigation indicate that there is a requirement for government regulations to be able to remedy infractions in the ...

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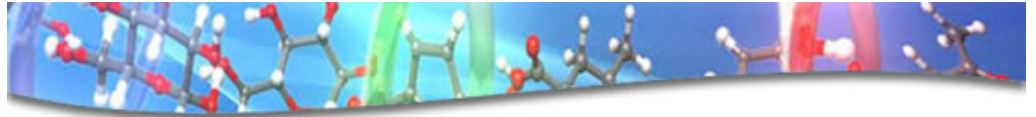
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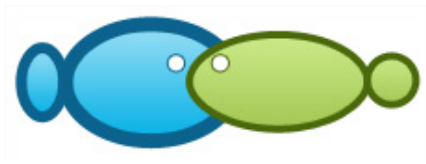


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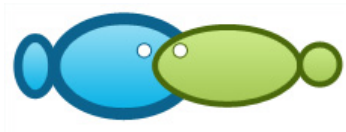
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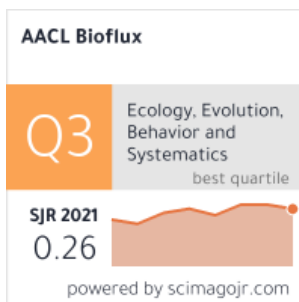
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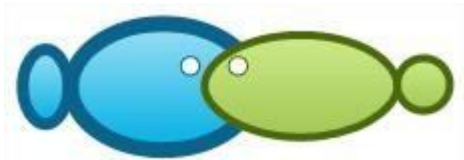
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# Global Fishing Watch System as a solution in the control of the fishing industry in Indonesia

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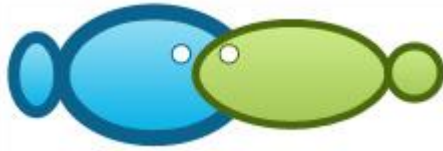
**Abstract.** This study aims to investigate the application of the Global Fishing Watch System as a potential breakthrough in the fight against illegal fishing and fishing that is not reported or regulated. This study utilized a socio-legal method by investigating the legal norms contained within legislation relating to the disclosure of public information and conducting interviews with actors from the fishing business. The findings of this investigation indicate that there is a requirement for government regulations to be able to remedy infractions in the fishing industry by making allowances for information technology. The Global Fishing Watch System is a piece of information technology that may be utilized, and it is open to the community for anyone to access. On the other hand, this goes against letter d of Article 17 of Law No. 14 of 2008, which states that information regarding Indonesia's natural resources cannot be disclosed to the general public. Consequently, the Global Fishing Watch System requires additional research before it can be put into effect effectively.

**Key Words:** fishing industry, implementation, public information disclosure, the Global Fishing Watch System.

**Introduction.** Indonesia is the largest archipelago country globally, has a coastline length of 81,000 km and a sea area of about 3.1 million km<sup>2</sup>. The territorial sea area and archipelago waters cover almost 2/3 of the territorial area. Based on the United Nations Convention on the Law of the Sea 1982 (UNCLOS 1982), Indonesia obtained the right of authority to use the exclusive economic zone (EEZ) covering an area of 2.7 km<sup>2</sup> which involves the exploration, exploitation, and management of biological and non-biological resources, such as fish wealth, coral reefs and alternative resources that are below sea level (Darsono 1999). So, with this abundant potential, many fishery industries are found in Indonesia. Based on data from the Central Statistics Agency in 2018 (Soemarmi et al 2020a, b), the fishing industry in Indonesia experienced a very drastic increase; in 2016, there were 95 fishing industries, while in 2017, there were 122 industries, as shown in Figure 1.

Although fishing is one of the most widespread activities humans harvest natural resources, its global footprint is poorly understood and has never been directly quantified. Global fishing patterns have surprisingly low sensitivity to short-term economic and environmental variation and a strong response to cultural and political events such as holidays and closures (Kroodsma et al 2018).

Indonesia is a country with the second-longest coastline in the whole world (No title n. d.), but the export of marine resources is the only second rank in Southeast Asia; its potential for capturing fisheries in Indonesian public waters is estimated at 0.9 million tons of fish per year with a total area of around 54 million hectares which includes lakes, reservoirs, rivers, swamps, and other puddles (Regulation of The Ministry of Maritime Affairs and Fisheries 2012). Nevertheless, according to FAO data, Indonesia loses the US \$ 50 billion per year due to illegal fishing (FAO 2012). Illegal fishing cases in Indonesia, both by the Indonesian and foreign fish boats, have become a classic problem in the Indonesian fishing industry. Government policies through the Ministry of Maritime Affairs and Fisheries continue to be issued, such as the addition of surveillance operation



# Community structure of freshwater fishes from the Sibugay River, Mindanao, Philippines

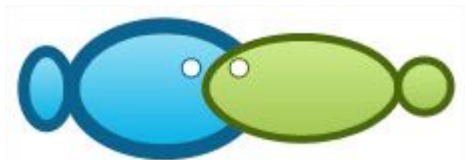
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**Abstract.** This study aimed to evaluate the diversity and distribution of freshwater fishes in Bayog Watershed, Bayog, Zamboanga del Sur, Philippines. A total of 1408 fish individuals were collected, comprising 11 families, 13 genera, and 19 species. Out of the 19 species, 11 were identified as endemic and native, while eight were introduced species. The presence of *Pterygoplichthys disjunctivus* is the most concerning since it would be a possible pest in this area. The two most abundant species comprised 51% of the overall count: *Oreochromis niloticus* (25.99%) and *Barbodes binotatus* (25.5%). Shannon-Weiner's diversity indices calculated for the six sampling sites varied from 1.67 to 2.05 ( $H' = 2.04$ ), which is relatively good. However, the abundance of many introduced species may disrupt the population structures of the native/endemic freshwater species in the different sites. The information generated in this study may serve as one of the bases for different conservation strategies for the fish of the area.

**Key Words:** Bayog watershed, diversity, freshwater fishes.

**Introduction.** Inland waters such as rivers and lakes are considered important for hydrology sources and fisheries (Costanza et al 1997; Kent 1997; Groombridge & Jenkins 1998; Jenkins 2003; Mutia et al 2018; Mogalekar & Canciyal 2018). These waters are considered a source of food in many poor communities in the world (Briones et al 2004; Valentin & Berja 2012; Van der Ploeg et al 2017). Their contribution to the economy of the Philippines is important (delos Angeles et al 1990; Israel 2008). However, pollution, overexploitation, invasive species, and rapid land-use transitions have led to a severe decline in biodiversity in these many aquatic resources (Kottelat & Whitten 1996; Araullo 2001; Ong et al 2002; Dudgeon et al 2006; Appleton et al 2006; UNEP 2008; Zhang et al 2011; Ahmad et al 2013; Biña-de Guzman et al 2013; Guerrero III 2014; Macusi et al 2015; Curvin-Aralar 2016; Nieves et al 2020; Su et al 2021). These even pose biosecurity issues such as outbreaks and the spread of diseases (Pruder 2004; Lightner 2005; Mendoza et al 2019). Aquaculture is one of the most critical industries in the Philippines; therefore, these resources must be conserved, protected, and properly managed. One of the efforts supporting these actions is comprised of looking into the inventory of fishes present as ecological indicators and descriptors of fisheries stability, as well as the ecological integrity of aquatic habitats (Karr 1991; Welcomme 1995; Zampella & Bunnell 1998; Angermeier & Davideanu 2004; Kwak & Peterson 2007; Ikpi & Offem 2011), impacts of habitat deterioration, invasive alien species, and climate change in a particular aquatic environment across spatial and temporal scales (Ter Braak & Verdonschot 1995; Nisikawa & Nakano 1998; Zampella & Bunnell 1998; Angermeier & Davideanu 2004; Ramsundar 2005; Kwak & Peterson 2007; Cagauan 2007; Vescovi et al 2009; Guerrero III 2014; Anticamara & Go 2016). Many studies conducted in the Philippines have shown the importance of biodiversity assessment of many inland aquatic resources to the integrity of the aquatic ecosystem (Paul & Meyer 2001; Corpuz et al 2009; Bradford & Heinonen 2008; Uy 2010; Paller et al 2011; Curvin-Aralar 2016; Paler et al 2013; Romero et al 2016; Paller et al 2013; Guzman & Capaque 2014; Natividad et al 2015; 2015a, 2015b, 2016; Romero et al 2016; Briones et al 2016; Quimpang et al



# Effects of plant extracts on selected haematological parameters, digestive enzymes, and growth performance of striped catfish, *Pangasianodon hypophthalmus* (Sauvage, 1878) fingerlings

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**Abstract.** This study examined the effects of dietary supplementation with selected plant extracts on the haematology, enzymatic activities, and growth of *Pangasianodon hypophthalmus* fingerlings. A 60-day feeding trial was conducted with 11 diets: basal diet (basal diet); and basal diet supplemented with 0.4% or 2% *Euphorbia hirta* (Eh), 0.2% or 1% *Phyllanthus amarus* (Pa), 0.4% or 2% *Mimosa pudica* (Mp), 0.2% or 1% *Psidium guajava* (Pg), and 0.4% or 2% *Azadirachta indica* (Ai). On days 30 and 60, the haematocrit improved significantly in response to the Pg 0.2 diet ( $35.9 \pm 0.8\%$  and  $36.4 \pm 0.7\%$ , respectively), while the haemoglobin level increased significantly in fish fed a diet with Mp or Pg at both concentrations. Chymotrypsin activity was highest ( $121 \pm 6.10 \text{ U min}^{-1} \text{ mg}^{-1} \text{ protein}$ ) under the Pa 0.2 diet followed by the Eh 0.4 and Pa 1.0 diets ( $94.1 \pm 7.20$  and  $92.2 \pm 7.80 \text{ U min}^{-1} \text{ mg}^{-1} \text{ protein}$ , respectively) on day 30. The Pa 0.2 diet significantly enhanced chymotrypsin activity on day 60 compared to the other diets. Fish fed the Pa 0.2, Pa 1.0, or Pg 1.0 diet showed significantly increased pepsin activity than those fed the control diet on day 30, whereas there was not observed significant difference on day 60. Amylase activity was significantly enhanced in response to the Eh 0.4, Pa 0.2, Pg 0.2, and Ai 0.4 diets, but none of the diets led to a change in trypsin. Sixty days of oral administration of Pg 0.2 or Pa 0.2 extracts modulated haematological parameters and digestive enzyme activities of *P. hypophthalmus* fingerlings and resulted in higher growth performance.

**Key Words:** enzyme activity, glucose concentration, haematology, *Pangasianodon hypophthalmus*.

**Introduction.** The rapid growth of the striped catfish, *Pangasianodon hypophthalmus* (Sauvage, 1878), can be attributed to the intensification of the farming system in the Mekong Delta, Viet Nam. The intensification of farming has increased the incidence of stress-related diseases and mortality and compromised the immune system of the fish resulting in frequent outbreaks of diseases (Phan et al 2009). Bacillary necrosis of *Pangasius* (BNP) and motile *Aeromonas* septicaemia (MAS), caused by *Edwardsiella ictaluri* and *Aeromonas hydrophila*, respectively, commonly occur in farmed *P. hypophthalmus* (Crumlish et al 2010). Consequently, these diseases can be devastating to the aquaculture industry and cause significant economic losses. Evidence shows that stressors, such as localized environmental deterioration, agricultural waste, inadequate care, excessive stocking density, and poor seed quality, increase stock susceptibility to infectious diseases (Phuong et al 2007). Stressors in aquaculture can result in impaired metabolism (Santos et al 2010), inferior fillet product (Jittinandana et al 2003), higher disorder susceptibility (Wu et al 2013), and in severe cases, high mortality (McKenzie et al 2012).

Numerous efforts have been attempted to tackle the mortality problem, including the application of chemicals and antibiotics as prophylactic and therapeutic