Supplementary Materials for

Fish crimes in the global oceans

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**Table S1. Definition of offences and crimes within the fishing sector**

**Fisheries crime:** “ill-defined legal concept referring to a range of illegal activities in the fisheries sector. These activities - frequently transnational and organized in nature - include illegal fishing, document fraud, drug trafficking, and money laundering.” (UNODC, https://www.unodc.org/unodc/about-unodc/campaigns/fisheriescrime.html)

**Fisheries crime:** “a wide range of offences along the value and supply chain of the fisheries sector, on land and at sea. It includes document fraud, tax evasion, corruption, money laundering, human trafficking and illegal fishing. The core of fisheries crime is economic crime aimed at increasing profits of outwardly legitimate fishing businesses or facilitating organized crime. It is wide-spread, usually transnational, largely organized, and negatively impacts states’ economies, distorts markets, harms the environment and undermines human rights including food security.” (Blue Justice, https://bluejustice.org/fishcrime/what-is-fisheries-crime/)

**Table S2. Interpol list of ‘fisheries crimes and related crimes’**

| Fisheries crimes                          | Related crimes                                      |
|------------------------------------------|-----------------------------------------------------|
| Document fraud                           | Human trafficking/smuggling of migrants             |
| Corruption                               | Drug smuggling                                      |
| Tax evasion                              | Maritime piracy                                     |
| Money laundering                         | Firearms trafficking                                |
| Disobedience of an order to stop         | Terrorism                                            |
| Forced labor                             |                                                     |
| Illicit trade or food fraud               |                                                     |
### Table S3. Ocean Panel list of ‘manifestations of organized crime in fisheries’

| Manifestations          | Definition                                                                                                                                 |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Fraud                   | Deliberate misrepresentation or concealing of facts for undue benefit (30). Includes **Fraud**, or misrepresentation by falsifying a document. Is often regarded as a subset of fraud. |
| Corruption              | The giving, solicitation or receipt of an undue advantage with the purpose of making a person (working as an official for a private or public entity) act or refrain from acting (26, see Chapter III). Includes **bribery** (26, see Articles 15 and 17), **embezzlement** (26, Article 17), and **abuse of function** (Article 19). |
| Tax crime               | Violation of tax and revenue regulations, including income tax, value added tax, property tax, company tax and other forms of state levies and duties, including customs duties. Also known as **tax evasion** or **tax fraud**. |
| Money laundering        | Intentional concealing or disguising of the illicit origins of the proceeds of crime (14, see Article 6).                                                                                          |
| Labor market crime      | Breaches of work and safety regulations to fraud, tax evasion, document forgery and deception. In extreme cases, crimes in the labor market include abduction, unlawful confinement, physical injury, culpable homicide, murder and sexual abuse, as well as **forced labor**, obtained ‘under the menace of any penalty and for which the said person has not offered himself voluntarily’ (46, Article 2(1)) and **human trafficking**, the procuring of and trading in human beings for the purposes of exploitation (14, see Annex II). |
| Security offences       | Threats to peace and security, including **fisheries conflicts** and security risks including **terrorism** (UN Security Council Resolution 2842/2019), **piracy** (UNCLOS III, Article 101), and **arms trafficking**. |
| Drug trafficking        | Illicit trade, involving the cultivation, manufacture, distribution and sale, of substances subject to drug prohibition law (48).                                                                 |
| Smuggling               | The **movement of otherwise legal goods** (esp. fuel) from one jurisdiction to another in violation of the law, is often engaged in to avoid customs or other duties. |
| Migrant smuggling       | Helping a migrant enter a country illegally in exchange for a (direct or indirect) financial or material benefit (14, Annex III, Article 3(a)).         |
| Fisheries offences      | **Illegal fishing** refers to fishing in violation of domestic fisheries laws and measures (or international, when applicable).                  |
### Table S4. Bueger and Edmunds categorization of ‘Blue crimes’

| Relation to the sea  | Crimes against mobility                  | Criminal flows                   | Environmental crimes                  |
|----------------------|------------------------------------------|----------------------------------|---------------------------------------|
| On the sea           | Kidnap and ransom                         | People smuggling                 | Fisheries crimes                      |
|                      | Ship/cargo seizure                        | Human trafficking                | Pollution                              |
|                      | Robber and theft                          | Arms trafficking                 | Illegal mining/resource extraction    |
|                      | Crimes in and against ports               | Narcotics trafficking            | Crimes against critical infrastructure|
|                      | Stowaways                                 | Illicit goods trafficking        |                                       |
|                      | Cyber crimes                              | Wildlife trafficking             |                                       |
|                      |                                          | Waste illegal disposal           |                                       |
| Across the sea        |                                          |                                  |                                       |
|                      |                                          |                                  |                                       |
| In the sea            |                                          |                                  |                                       |
|                      |                                          |                                  |                                       |

| Ideal-type of object | Ships                                    | Societies                        | Nature                               |
|----------------------|------------------------------------------|----------------------------------|---------------------------------------|
|                      | Ports                                    | Communities                      | Installations                        |

| Subcategories         | Maritime trade                           | Formal economy                   | Environmental destruction            |
|-----------------------|------------------------------------------|----------------------------------|---------------------------------------|
|                      | Supply chains                            | Public health                    | Biodiversity                          |
|                      | Seafarers                                | Environmental destruction        | Legitimate coastal economy            |
|                      | Coastal economies                        | Trafficked persons               | Coastal livelihoods                   |
|                      | Port facilities                          | National security                | Food security                         |

| Forms of harm and victims |                                 |                                 |                                       |
|---------------------------|----------------------------------|----------------------------------|                                       |
|                           |                                  |                                  |                                       |
### Table S5. Uncertainty analysis table

| Analysis path                      | Uncertainty                                                                                                                                                                                                 |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Offence committed                 | Not all offences are detected and reported; some offences vary between jurisdictions                                                                                                                                 |
| Offence reported                  | Reporting of offences may be biased, with offences reported only for the mandate of the enforcement agency; offences and offending vessels being under-reported (e.g. following bribe), mis-reported, or selectively over-reported (e.g. English media reporting offences from or for some countries compared to others). Reliability, and hence uncertainty, also depends on the type of the source used. Government lists score higher (low uncertainty), than media reports, third party reports, and AIS track analysis. |
| Offence integrated into dataset   | Reported offence/vessel not identified by research team and thereby not included in the database; offence/vessel reports are incomplete and thereby reduce cases in some categories.                                      |
| Offence statistically analyzed    | Missing or mis-reported offences result in distorted statistical results                                                                                                                                 |
| Offence statistics interpreted and communicated | Statistical results are mis-interpreted and over-generalization by media failing to account for the limits of the study.                                                                                                  |
Supplementary Discussions

- PT. MUTUAL Dwikarya ABADI (https://spyglass.fish/company/417/) is a Chinese ‘shell-company’ serving in part the activities of Chinese fishing companies (including Fuzhou Hong Long Ocean Fishing Co. Ltd. under Indonesian flag, whose vessels have been engaged in 100 offences of illegal fishing, human rights and labor abuse, and illegal transshipment (Figure 11). This company’s vessels operated solely in Indonesia using an Indonesian flag. However, There is also a claim letter number 2010 / G / 2015 / PTUN-JKT by the plaintiff is PT Dwi Karya Abadi Mutual. According to the Ministry of Maritime Affairs and Fisheries, the company is affiliated with Fuzhou Hong Long Ocean Fishing Co. Ltd. [from Fujian, China PRC], PT Jaya Timur Nusantara, PT Etna Lestari. Directors: Gao Ti Qi and Mafitha Mery; Commissioner of the company is known is Tiong See Chu, Sutarmo Sugondo. There is in the board of directors of this company include Ti Gao Qi, Mafitha Mery (72). This would make the “Indonesian” company, international in nature, with FUZHOU HONG LONG OCEAN FISHING recorded on the Criminal Record of Fishing Vessels for 3 other offences, in Fiji, Galapagos, and the Western and Central Pacific Fisheries Commission (WCPFC) area. FUZHOU HONG LONG OCEAN FISHING CO. LTD. is linked to Pingtan Marine (see below) through ownership by Pingtan’s Chairman and CEO, Mr. Xinrong Zhou. Linkages between these actors suggest that they constitute the entity with the highest number of combined reported offences (118 offences).

- FUZHOU HONGDONG PELAGIC FISHERY COMPANY LIMITED is a Chinese based company whose vessels were caught with 87 offences of illegal fishing (unauthorized, zone and season related offences, species and bycatch related offences) on 86 vessels, illegal transshipment and flag related offences. This is not surprising given the heavy use of reflagging practices by the company’s notorious Fu Yuan Yu armada. Between 2010 and 2020, the company’s vessels used the flags of East Timor, Malaysia, Singapore, China, Philippines, Indonesia, and China while operating in the waters of Indonesia and Mauritania, and operated illegally at least once in Mauritania and Timor Leste according to the information from the criminal record of fishing vessels.

- SAJO INDUSTRIES CO., LTD. Is a South Korean based company whose fleet was caught with 64 offences of human rights and labor abuse, fishing without an authorization, and fishing in a prohibited area, in various EEZs, namely in the Eastern Bering Sea, Madagascar, the Marshall Islands, and New Zealand using the South Korean flag. The company owns a fleet of 55 vessels flagged mainly to South Korea, Kiribati, and Tuvalu. The company has a branch in the United
States (SAJO AMERICA, Inc.), which has imported squid to the United States in the past (2016). Information available through the US corporate registry shows an individual named Tai Youn as a Governor, and the company listed under the categories machinery and equipment, food, and beverages.

- **PINGTAN MARINE ENTREPRISE**, a Chinese company made infamous as a result of major media attention (73) to its abuses, was caught with 92 offences of illegal fishing, human rights and labor abuse, and fraud. This company’s vessels operated criminally in Timor Leste, and the Galapagos, using the Chinese flag. The company reported dozens of vessels to its shareholders, which were then identified as part of a fraudulent reporting to attract investors. Pingtan Marine Entreprise is linked to another company whose fleet has transshipped illegally in the Galapagos, Honglong Ocean Fishing, linked to Pingtan County Ocean Fishing Group, a subsidiary of Pingtan Marine Enterprise Limited. It is worth noting that the latter is a NASDAQ-listed conglomerate incorporated in the Canary Islands. The CEO of Pingtan Marine is Zhuo Xinrong, who founded FUZHO HONGLONG OCEAN FISHING in 1995 and served as its supervising officer between June 1995 to September 2006. According to the Chinese business registry, Xinrong’s wife, Lin Ping, currently serves as the supervisor to Honglong Ocean Fishing while the majority shareholder is a Chinese investment company controlled by Zhuo Longjie, the brother of Zhuo Xinrong and a serving director of PINGTAN MARINE ENTERPRISE. Finally, according to SEC filings submitted by PINGTAN MARINE, Pingtan County Ocean Fishing sub-contracts a fleet of 20 fishing vessels from HONGLONG OCEAN FISHING under a 25-year exclusive operating license. This example is a perfect representation of transversal corporate criminality, i.e. within the same company.

- **FISHING & CARGO SERVICES SA** is a company whose records show that it is based in Panama. This company was caught on 69 transshipment and zone related infractions with its pelagic trawls and its reefer vessels, namely GABU REEFER, SALY REEFER, and SILVER ICE, notorious vessels known for transshipments along the West African coast. This company’s fleet uses the Comoros flag almost exclusively.

- **CHINA NATIONAL FISHERIES CORPORATION**, also referred to as the Chinese National Fisheries Corp. ranks amongst the first companies, worldwide in terms of illegal fishing and fish offences with over 50 offences by its fleet reported to be at 92 vessels. The offences were reported in Senegal, Guinea, Guinea Bissau, Tanzania, and Cote d’Ivoire and included gear related offences, under-reporting of fishing effort, human rights and labor abuse, species and bycatch related,
refusal to compliance, and zone and season related offences. The China National Fisheries Corp. is the parent company of the CNFC Overseas Fisheries Co. Ltd. which is reported by the Lloyd’s List Intelligence to be the beneficial owner of 72 fishing companies. The CNFC’s official website lists offices in Spain, Morocco, Mauritania, Senegal, Cape Verde, Guinea-Bissau, Guinea, Sierra Leone, Ghana, Madagascar, Mozambique, Oman, Yemen, Myanmar, Suriname, Ecuador, Portugal, Venezuela, and Indonesia. The China National fishing Corporation has several links to other companies (as a % of shares):

- 100% of ZHONGYU GLOBAL SEAFOOD CORP.
- 100% of BEIJING ZHONGSHUI OCEAN CONSULTING SERVICE CO., LTD.
- 51% of ZHONGSHUI (YANTAI) HAIFENG COLD CHAIN LOGISTICS CO. LTD.
- 35% of HAINAN ZHONGSHUI MODERN FISHERY CO. LTD.
- unknown % of PCI-SUNTEK TECHNOLOGY CO., LTD.

Figure S1 provides graphic depictions of transversal offences by five companies with a high record of illegal fishing and other maritime crimes.
Figure S1. Offences by companies with a high record of illegal fishing and other maritime crimes. Data extracted from the Criminal Record of Fishing Vessels (2000-2020).
Examples:
China
Thailand
India
Indonesia
Philippines

Examples:
Canada
United States
France
Australia
Japan

Examples:
Guinea
Sierra Leone
Mozambique

Examples:
Dominica
Grenada
Kiribati
Sao Tome y Principe
Cuba
Figure S2. Governance indicators and (co)occurrence fisheries-related offences across jurisdictions, 2000-2020. Note: Governance indicators extracted from the World Bank database, offenses data extracted from the Criminal Record of Fishing Vessels. Bubble size represents the number of times a node type appeared in that category of control of corruption and government effectiveness. Bubble color represents the different categories of nodes or offences (if no nodes were observed). Quadrants represent categories of countries depending on their control of corruption and government control ranking. For example, China, Thailand, Indonesia, India, and the Philippines represent countries with a low control of corruption and high government effectiveness. Most offenses are reported along a diagonal axis (as control of corruption and government effectiveness generally correlate), with the offenses in jurisdictions with high control of corruption and high government effectiveness (top right quadrant) mostly consisting of illegal fishing offenses, and those in low control of corruption and low government effectiveness (bottom left quadrant) including a lot of transversal criminality including human rights abuses and transshipments.

Table S6. Regression analysis of average under-reporting and average intensity of maritime crimes and offences by fishing vessel by EEZ

The regression analysis shows an $R^2$ value of 0.0002 indicating that the average under-reporting rate is not correlated with the average intensity of crimes and offences within the same EEZ. We tested the regression further to verify if under-reporting was correlated with specific offences within the same EEZ (See Table S7 below). Although the model explains less than 12% of the variation, there seems to be significant correlations between the level of under-reporting and forgery/fraud crimes (positive correlation), and fishing related offences (coded as IUU, negative correlation) at $p<0.05$. 

| Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|--------------|----------------|--------|---------|-----------|------------|-------------|-------------|
| Intercept    | 1.267451241    | 0.072313212 | 17.52724308 | 9.79066638 | 1.17221558 | 0.863501849 | 0.863501849 |
| Average of under-reporting | -0.030579977 | 0.177561842 | 17.52724308 | 9.79066638 | 1.17221558 | 0.863501849 | 0.863501849 |
Table S7. Regression analysis of average under-reporting and total number of maritime crimes and offences by category per EEZ.

|                  | Coefficients | Standard Error | t Stat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|------------------|--------------|----------------|--------|---------|-----------|-----------|-------------|-------------|
| Intercept        | 0.372041     | 0.059387       | 6.264668 | 4.81151E-09 | 0.254575 | 0.489506 | 0.254575 | 0.489506 |
| Average of Number (intensity) | -0.02859 | 0.043989 | -0.64994 | 0.516854817 | -0.1156 | 0.058418 | -0.1156 | 0.058418 |
| Sum of Forgery/Fraud | 0.029491 | 0.013663 | 2.158432 | 0.032689742 | 0.002466 | 0.056516 | 0.002466 | 0.056516 |
| Sum of Bribery/corruption | 0.016026 | 0.037799 | 0.423986 | 0.672261135 | -0.05874 | 0.090791 | -0.05874 | 0.090791 |
| Sum of Flag      | -0.00765 | 0.027859 | -0.27451 | 0.784115668 | -0.06275 | 0.047456 | -0.06275 | 0.047456 |
| Sum of Human rights | -0.00281 | 0.002153 | -1.3064 | 0.193670411 | -0.00707 | 0.001446 | -0.00707 | 0.001446 |
| Sum of Name/Identity | 0.034182 | 0.019619 | 1.742337 | 0.083761081 | -0.00462 | 0.072988 | -0.00462 | 0.072988 |
| Sum of Non Compliance | -0.00342 | 0.013075 | -0.26192 | 0.793786175 | -0.02929 | 0.022438 | -0.02929 | 0.022438 |
| Sum of Smuggling | -0.00178 | 0.004358 | -0.40809 | 0.683863562 | -0.0104 | 0.006842 | -0.0104 | 0.006842 |
| Sum of Transhipment | 0.002041 | 0.002784 | 0.733177 | 0.464740598 | -0.00347 | 0.007548 | -0.00347 | 0.007548 |
| Sum of Unauthorized | -0.00001 | 0.000111 | -0.91862 | 0.359958955 | -0.00032 | 0.000118 | -0.00032 | 0.000118 |
| Sum of Violent attack | -0.01979 | 0.070185 | -0.28194 | 0.778429503 | -0.15861 | 0.119036 | -0.15861 | 0.119036 |
| Sum of Waste dumping | 0.012294 | 0.057625 | 0.213336 | 0.831391799 | 0.10169 | 0.126274 | 0.10169 | 0.126274 |
| Sum of Embezzlement | -0.03769 | 0.041396 | -0.91038 | 0.364271587 | -0.11957 | 0.044194 | -0.11957 | 0.044194 |
| Sum of IUU        | -0.00162 | 0.000706 | -2.28924 | 0.023641061 | -0.00301 | -0.00022 | -0.00301 | -0.00022 |
Table S8. Regression analysis between the Press Freedom Index per EEZ (i.e. for the country where
the offence has occurred) and offence intensity. Press Freedom Index
Data source: obtained from
https://s3.amazonaws.com/datascope-ast-datasets-nov29/datasets/1000/data.csv

The regression analysis shows an \( R^2 \) value of 0.00576 indicating that the average Press Freedom Index
per EEZ is not correlated with the average intensity of crimes and offences within the same EEZ.
Although this model explains less than 1% of the variation, the Higher the Press Freedom Index (i.e. the
lower the actual press freedom) the higher the intensity of crimes.
Figure S3. Based country ownership of the companies listed in the criminal record of fishing vessels. Data extracted from the Criminal Record of Fishing Vessels for the period 2000-2020. The artisanal category was not conclusive for company base because registration and ownership could not be retraced for most of the artisanal fleet, bringing Canada, Guinea, and the United States to rank higher for company base, which is biased because of the lack of information.
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