

Evaluation method and application on marine gross ecosystem product: practice of Changdao, Shandong province

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Marine gross ecosystem product (GEP) is a calculation of the total value of the benefits provided by the marine ecological system to humanity in terms of being able to sustain economic and social development. It is defined as the total monetary value of marine ecosystem goods and services, where (1) value is calculated as the product of price and quantity, and (2) services include provisioning, regulating, and cultural services. Provisioning services include fishery products and oxygen release; whereas, regulating services include carbon sequestration, climate regulation, and waste disposal. Meanwhile, cultural services include natural resources for recreation. Based on the above framework, we evaluated the marine gross ecosystem product in Changdao, Shandong Province. The results show that the marine GEP in Changdao in 2019 was 50.525 billion yuan, and that the ratio of marine GEP to gross domestic product (GDP) was 6.79. The values of regulating service and cultural service account for about 90%. Valuing ecosystem services could greatly improve stewardship, which would yield a flow of vital goods and services when they were properly managed. It also could provide scientific basis for the local government's marine management and development, environmental performance assessment and marine ecological civilization construction.

Harmful algal bloom studies in Western Pacific Region

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In the past decades Harmful Algal Blooms (HABs) have expand globally and drawn great attention in coastal areas worldwide, because of their multiple effects on marine ecosystems as well as public health. Under the background of climate and ocean change, tropical harmful algal bloom species are expanding to the temperate zone. The Western Pacific Region are facing many same ecological problems. Harmful algal bloom has become a hot issue as it potential threat to the ecosystem, human health and marine aquatic economy. Due to the climate change and human activities, harmful algal blooms expand globally. Constructing the biogeographical distribution patterns of HABs species in Western Pacific Region, it will improve the ability to prevent the marine tropical harmful algal bloom species expedition in the future. We will also explore the toxicity of the target species, laying the foundation for the natural products development and application, and HABs toxicity monitoring.

Auto-detection of marine mammals from drone photos based on deep learning

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Aerial observation of marine mammals has been an important method that facilitated the research on these animals, while many researchers are turning to drones from conventional manned airplanes. The use of drones (Unmanned Aerial Vehicles, or UAVs) has expanded into various fields in the last decade because of the technology advances and cost reduction in both aircraft and sensors. However, visual-manual identification of target animals from large amounts of aerial photos acquired from drone surveys are time consuming and visually stressful. In order to improve efficiency, we developed an auto-detection software that is capable of identifying marine mammals visible in aerial photos using deep learning functions. The function was trained with manually identified photo sample sets and extracted features of certain species before generating an image dataset of object types and models that perform image prediction and identify objects. The software also features a size calculation function that measures the total length of identified animals based on photogrammetry principles. Case studies using this software indicated potential to replace visual-manual identification efforts, as processing time reached 2 s/photo at moderate identification rate, although detection accuracy was still lower than visual-manual identification and prone to negative factors including sun glint, inaccurate exposure, and floating objects. Further development for this software will target for higher accuracy with larger training sets and enhanced pretreatment of photos.

A checklist of fish species in Brunei Bay, Malaysia

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Brunei Bay has a high level of marine biodiversity, although data on fish diversity is scarce. This study represents a complete list of fish species of Bukit Sari and Awat-awat, Lawas of Brunei Bay based on surveys carried out on 12th February 2020 and 11th February 2020 respectively. A total of 93 species belonging to 41 families and 21 order were recorded. 75 species were caught and considered to be commercially valuable species. Three species were recorded as Near Threatened (NT) on the Union for Conservation of Nature (IUCN) Red List, which are *Brevitrygon walga*, *Harpadon nehereus*, and *Scomberomorus commerson*; *Aetobatus ocellatus* were listed as 'Vulnerable' (VU). *Engraulidae* and *Carangidae* were the dominant family with 7 species, followed by *Lutjanidae* (5 species) and *Ariidae*, *Apogonidae*, *Mugilidae* and *Haemulidae* with four species each. The other families were represented by one to three species only. In terms of habitat, the majority of juveniles are found inshore since it is adjacent to estuaries, which is the preferred environment for juvenile fish. However, open water is the most common among adult fishes. This checklist should be helpful for current and future investigations.

Red tide phenomena along the Eastern Gulf of Thailand

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Thailand has been facing the eutrophication and phytoplankton bloom in several coastal city areas and river mouths that are enrich of marine living resources and habitats, similar to other part of the globe. Intensity and often occurrence of the phenomena are more observed during recently years that have been concerning by Government and public. Department of Marine and Coastal Resources, Ministry of Natural resources and Environment gives a high priority on the management and mitigation of its impacts including support monitoring water quality and observing phytoplankton bloom programme, particular on the potential biotoxin producing species, to ensure that could assist mitigating the impacts on coastal ecosystem, particular on those related to public health, fisheries, and live and livelihood.

The Eastern Gulf of Thailand is the mainly area of phytoplankton bloom along of Thai coast in 2021 particular Chonburi Province. The microalgae both diatom and dinoflagellate frequently bloom along the coast. Blooms generally dissipate after a rain event. Some beaches can be considered to be potentially eutrophic on the basis of high levels of chlorophyll *a*, phytoplankton density, and nutrients that were measured during the monitoring programme.

Case reports of Erysipelas in two free-ranging dolphins (*Tursiops aduncus* and *Neophocaena phocaenoides*) stranded along the Gulf of Thailand

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Erysipelas is a bacterial infection that causes by *Erysipelothrix rhusiopathrix*. This disease is known as diamond skin disease that may affect a wide range of animals such as pigs, turkeys, and hens. In 2020, two emaciated dolphins stranded in Gulf of Thailand including a bottlenose dolphin (*Tursiops aduncus*) and a finless porpoise (*Neophocaena phocaenoides*). The bottlenose dolphin stranded alive with non-specific signs and weakness, while the dead finless porpoise showed the sign of cutaneous form as rhomboid-shaped skin lesions. Generalized lymphadenopathy, pulmonary congestion and frothy exudate in trachea were compatible macroscopic lesions, and ascites were found in bottlenose dolphin. Both cases were collected tissue samples for bacterial isolation and PCR sequencing, the analysis yielded *Erysipelothrix rhusiopathiae* which can be found in various species and important occupational zoonosis. This is the first report of Erysipelas infection in wild dolphins in Thailand.