

Providing Access to Marine Protected Areas Data and Marine Related Research in Indonesia, through www.konservasi-laut.net

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Abstract

Information on marine protected areas (MPA) and research in Indonesia are still difficult to obtain. Ironically, there are a lot of institutions which deals with these issues. Therefore time, effort, and resources are wasted; decision making becomes difficult; and sometimes crucial data can not be located. In fulfillment of the need, TERANGI Foundation and WCS – Indonesia Marine Programme developed <http://www.konservasi-laut.net> as a single point of access to MPA data and marine related research in Indonesia. The content of MPA data and information include general information (i.e. MPA names, status, and legal designation), spatial (coordinates, maps, and satellite images), ecological information (mangroves, coral reefs, sea grass beds, and oceanography), management (managers and stakeholders), MPA status analysis, and identified threats to MPA. Research information content consist of location, spatial (coordinate and map), time, abstract, and reference. The website also hosts information on coral reef resilience. Currently, the database has gathered 108 MPAs, 200 research studies, and 159 coral reefs surveys. The data are gathered from the contribution of Department of Forestry (DEPHUT), Department of Marine and Fisheries Affair (DKP), Reefcheck, TERANGI, and WCS-IP. MPAs in Indonesia have comprised to 8.7 million ha, with 62% are managed by DEPHUT, and 38% are managed by DKP. DKP managed a lot of small MPAs (58), while DEPHUT managed big MPAs (42). The most common MPA type is Locally Managed Marine Conservation Areas (30), followed by Marine/Mangrove Protected Areas (28), while the smallest being Marine Managed Area (4) and Fisheries Sanctuary (4). The database mostly documented coral reefs research related to coral percentage cover. Coral bleaching and disease are not yet well documented. Even so, the website is an excellent source of information and a site for data sharing that will assist marine conservation in Indonesia.

Keywords: marine protected areas, information, and research.

1. Background

Indonesian waters have been experiencing over fishing and destructive fishing practices that have resulted in environmental degradation and depletion of fish stock which will affect economic activities [1]. Therefore, the government, local communities, and other stakeholder have initiated a lot of research and have developed marine protected areas (MPA) [2].

Critical habitat and ecosystem were designated as an MPA for having high productivity and biodiversity or because it serves a special ecological function like a spawning and/or feeding ground for one or more marine species [3,4]. Therefore, according to The Convention on Biological Diversity, there should be 10% of the world marine areas designated as MPAs by

2012. Since 2000, Indonesia has also participated in designating new MPAs, with targets for 2010 and 2020, being 10 million and 20 million hectares respectively [5].

Never before has the need for rapid access to data at regional and global scales been so important [6]. Sadly, information on MPAs and research in Indonesia is still difficult to obtain. Marine biology data are usually difficult to find because mostly are remained scattered and often unpublished [7, 8, 9]. Information on coastal resources, their status and threats is essential for effective management, but, managers and policy makers can often be forced to make rapid decisions without taking full advantage of the information and experience already exist because unorganized or lack of accessible information [10].

The internet has reduced costs of data publication, and marine biology has entered the information age with other sciences [11], thus making it a good solution to address the problems above. There is also a development of Web GIS/Database (WebGD) framework which can support bridging location and other attribute data. Even though there are several international databases available such as Reefbase, there is a need to develop localization of content and interface.

Therefore, TERANGI in cooperation with WCS – Indonesia Marine Programme have developed a WebGD (<http://www.konservasi-laut.net>) in order to help information sharing and dissemination related to marine conservation such as MPA and research.

2. Methodology

2.1. Data and information on marine conservation

Konservasi-laut.net is an online resource that provides data and information on marine conservation in Indonesia. The content includes text, maps, satellite images, and e-books related to marine conservation.

The data and information is divided in to several datasets, namely, MPAs, research, coral reef status, reference library, and database contributors. MPA data are the main focus of the database. The MPA dataset contains general information (name, status, and legal designation), spatial (coordinates, maps, and images), ecology (mangrove, coral reef, sea grass, and oceanography), management (managers and stakeholders), status review, and threats.

Research datasets contains location name, spatial (coordinate and map), description, and citation. The data for the research dataset come from various sources and field of study such as mariculture and ecology. Coral reef health datasets describe the reef resilience status with content includes cooling and flushing, shading, recruitment, management effectivity, bio-ecology, ecosystem, and fishery status.

The next dataset is the reference library dataset. This dataset helps users to get further information on each topic inside the database. The publications submitted to the database are readily available. The information inside the dataset includes title, publication type, abstract, references, and downloadable documents. The last dataset is database contributor dataset. Information on this dataset is useful for users if they want to get further information and contact to the contributors as the data owner. The dataset contains contact information such as contact name, address, phone number, fax, email, website, position, and a short description about the contributors.

2.2. Data collection, processing, and analysis

Data were collected through literature reviews, interviews, and for Karimun Jawa National Park and Seribu Island National Park field assessment has been made by WCS Marine and TERANGI. Data were then verified in order to ensure high quality data was being provided.

Verified data were then normalized to ensure data compatibility. Data were then processed to make several maps and summary tables which help users interpret these data. After one year, data were analyzed to see trends and status in marine conservation in Indonesia.

2.3. Data storage and interface

Programs used in the development of the information system are open source or free to avoid license problems. The database used is MySQL [12]. The programming language used is PHP [13]. In order to give user a clearer understanding on the location of an MPA or research area, a Geographic Information System (GIS) is developed [14]. To display spatial data a GoogleMaps mashup that combined data from different sources in to a single integrated tools is used. Spatial data from the database are combined with maps and satellite images from Google server [15]. Therefore, there is no need to prepare a basemap. Attribute data are shown on a detail page after users click on a marker.

3. Result and Discussion

Currently, the database already contains 108 MPAs, 200 research, and 159 coral reef surveys. The data comes from 5 contributors, which are Ministry of Forestry (DEPHUT), Ministry of Marine and Fisheries Affairs (DKP), Reefcheck, TERANGI, and WCS-IP, with DKP become the biggest data contributor.

3.1. Marine protected areas

By 2008, MPAs in Indonesia had reached 8,7 million ha. It expected to reach the target of 10 million ha in 2010 [5]. The MPAs is scattered equally all over Indonesia. The distribution of MPAs can be seen in Picture 1. The development of MPAs in Indonesia has been dramatically accelerated by the issuance of Law No. 31/2004, which entrusts DKP with the responsibility for conservation of ecosystems, species, and genetic diversity of marine life. Since 2004, DKP through various projects such as COREMAP I & II (Coral Reef Rehabilitation and Management Program), MCRMP (Marine and Coastal Resources Management Project), and COFISH (Coastal Community Development and Resource Management Project) initiated most new MPAs. On the other hand, no new MPA registered by DEPHUT since 2000.

The DKP manages 58 MPAs, representing 53% of the total number of MPAs, whereas DEPHUT manages 42 MPAs (representing 39%) (refer Figure 2). However, DEPHUT manages almost twice the area (61.5%) compared to that of DKP (38.4%) (Figure 3), primarily because the former manages seven large National Parks, whereas DKP only manages small MPAs. The most common MPA type is Locally Managed Marine Conservation Areas (30), followed by Marine/Mangrove Protected Areas (28), whereas the smallest are Marine Managed Area and Fisheries Sanctuary (4). The percentage of each MPA type is illustrated in Figure 4. The largest MPA cover is the coverage of seven National Parks, since they are designated to protect a wide array of habitat according to Law No. 5/1990. The area of each MPA type is illustrated in Figure 5. The number of Locally Managed Marine Conservation Areas has increased significantly since the issue of Law No. 27/2007 and Government Regulation No. 60/2007, which enables district authorities to develop and manage their own MPAs. Most of the newly developed MPAs are based on this law and regulation. This has also increased the participation of the district authorities.

Although there appear to have been a significant effort to increase marine conservation, on the other hand, the management of these MPAs is still questionable. Even some of the basic are still missing. For example, there are MPAs with unclear boundaries, and there are also MPAs

without management plan. Such problems should be addressed quickly since only properly designed and well managed MPA can meet various marine and coastal conservation needs [4].



Figure 1. The distribution of MPAs in Indonesia.

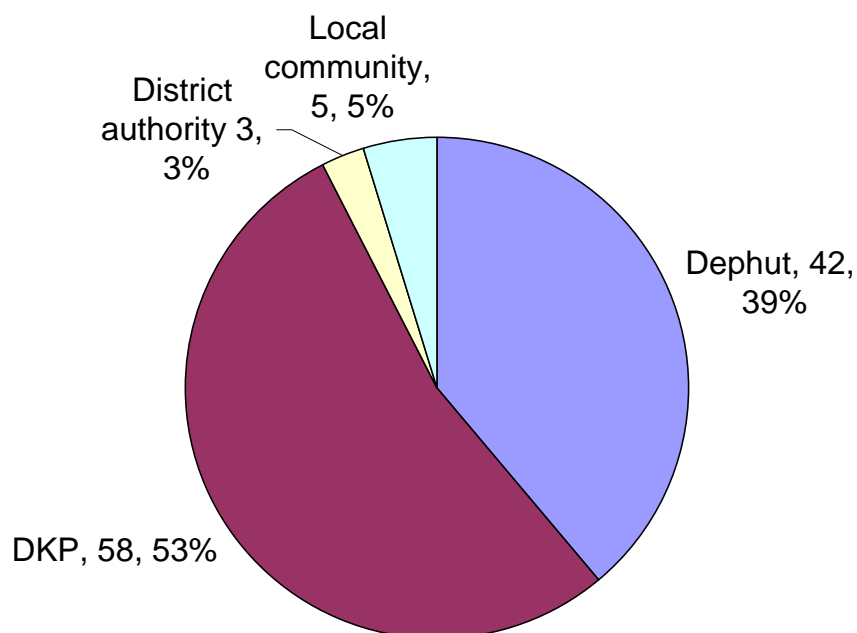


Figure 2. Comparison of the number proportion of MPAs managed by DKP, DEPHUT, local communities, and district authorities. Following the name of the authorities, the left number is the number of MPAs managed by that authority. The right number is number of MPAs as percentage of the total number.

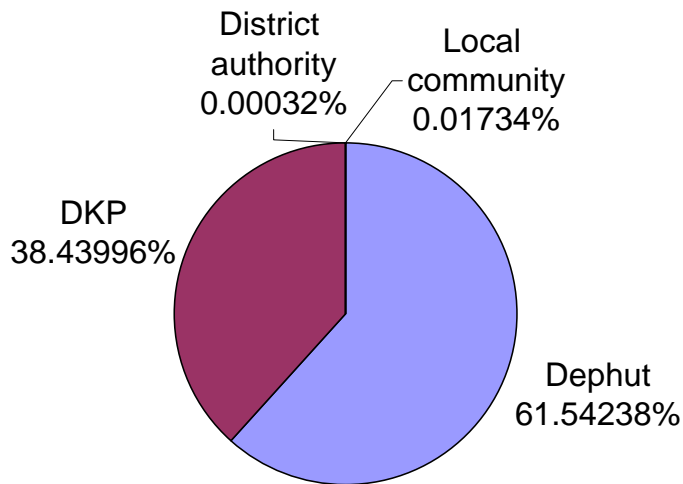


Figure 3. Comparison of the area proportion of MPAs managed by DKP, DEPHUT, local communities, and district authorities.

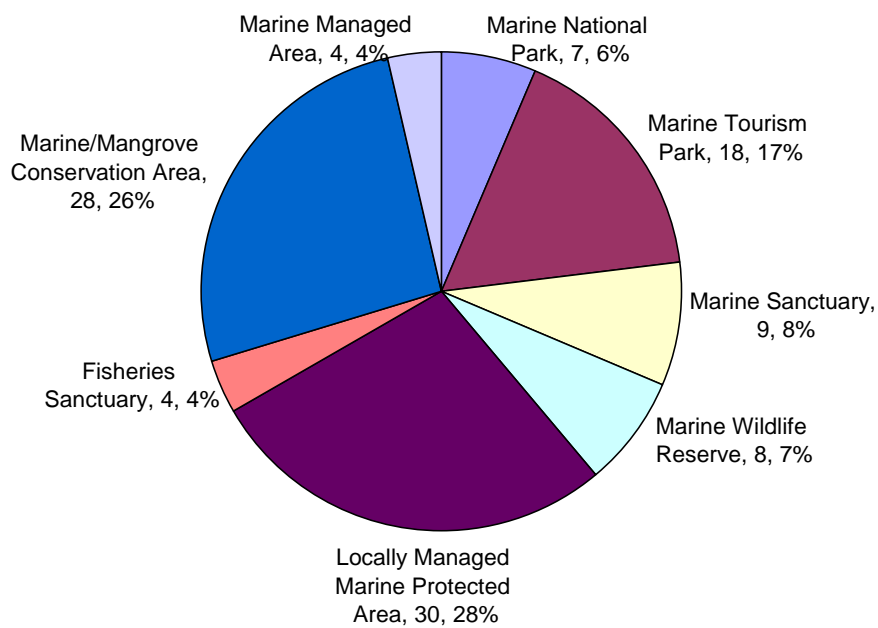


Figure 4. Proportion of MPA type in Indonesia. Following the name of the authority, the left number is the number of MPAs managed by that authority, the right number is number of MPAs as a percentage of the total number.

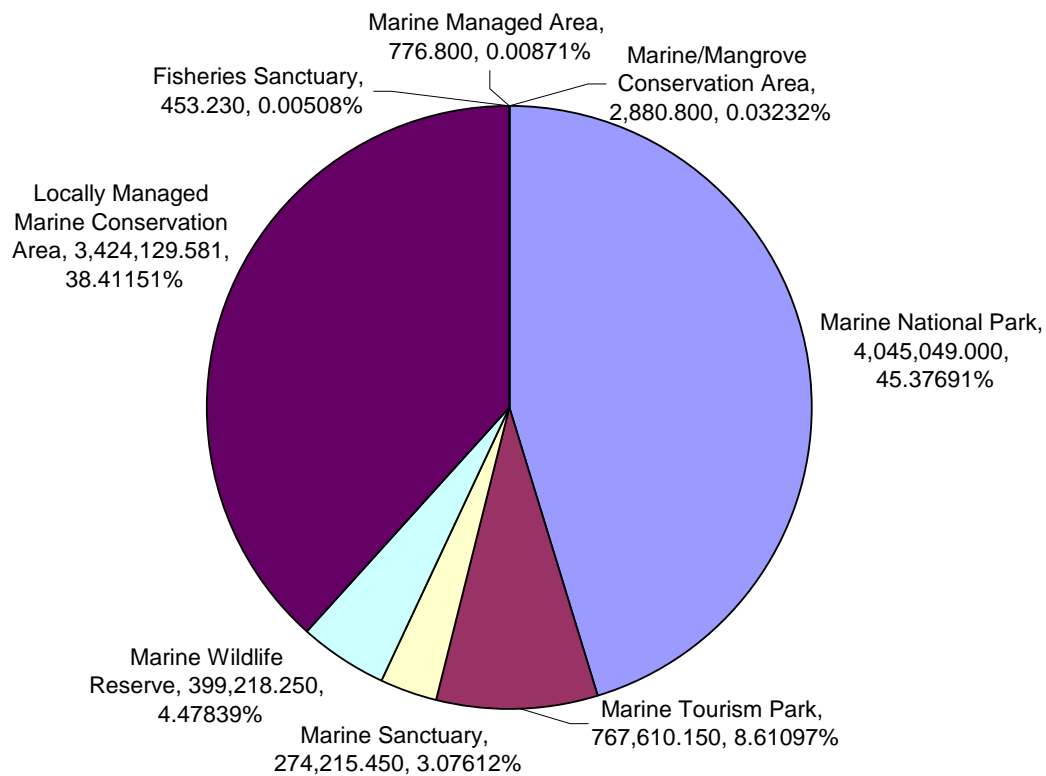


Figure 5. Area of MPA types in Indonesia. Following the name of the authority, the left (first) number is the area in hectares of MPAs managed by that authority, the right (second) number is number of MPAs as a percentage of the total area covered

3.2. Research and coral reef resilience

Various surveys on coral coverage in Indonesia show that the condition of coral reefs in Indonesia mostly ranging from poor to medium and it is equally distributed throughout Indonesian waters. Unfortunately, most research has only focussed on extent of coral cover. Research related to coral reef resilience, disease, and bleaching is not well documented and further research is urgently required

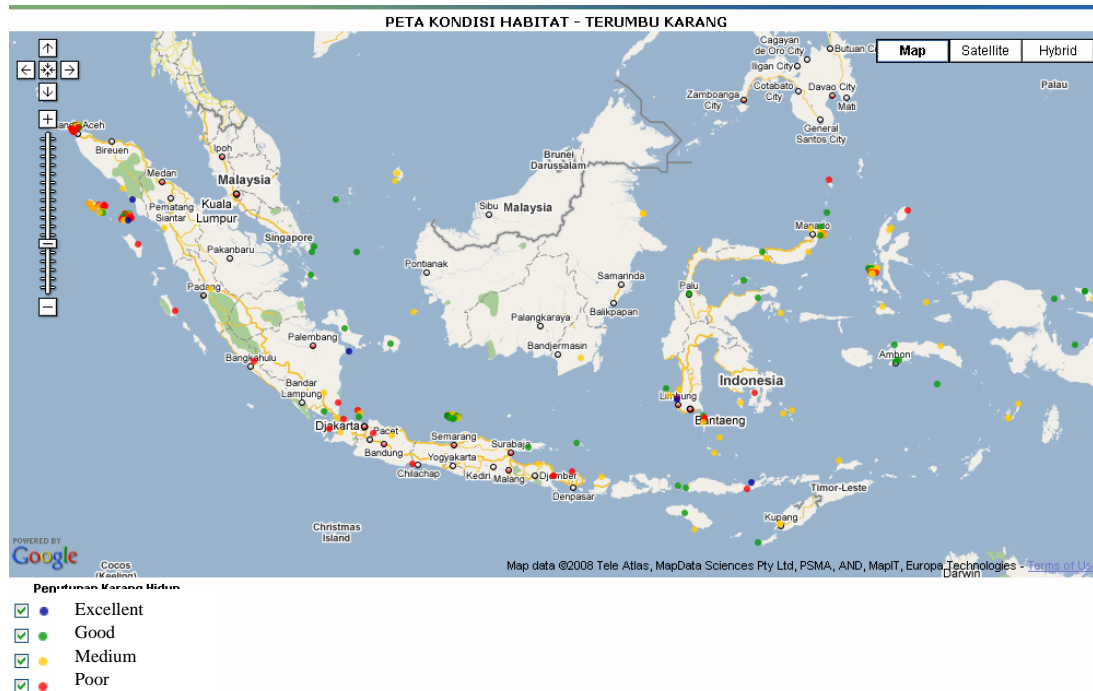


Figure 6. Map of coral reef status in Indonesia

3.3. Experience with information services at konservasi-laut.net

The development and management of the database have encountered several obstacles. First, there is a lack of attention towards the information systems from related stakeholders such as government, funding agency, NGO, and researcher. It seems that this problem happens irrespective of the type of information system and despite the recognition of the need for synthesis, compilation and organization of the growing volume of data and information. The increasing need for access to these data sources has arisen because of the increase in the number of related collaborative networks and partnerships. Therefore, the delivery of synthesized data has become a greater and more urgent challenge than the need for the generation of new data [16,17,18,19,20,21,22]. The acquisition of data for inclusion in the database has also proven to be problematic. For example, although government agencies may make data available as a service to users, they are not required to do so unless requested by funding agencies [6]. The result of this is that many datasets have currently not been made available to the database. On the other hand, more community groups demand access to data and information which was previously only available to professional scientists [23].

The quality of the data also varies, sometimes unclear, incorrect, or outdated. As an example, in some locally managed marine protected areas it is difficult to find the boundaries, making area extent unclear. Therefore, to ensure quality, the data are verified through extensive literature reviews. After verification, all data were normalized, in order to ensure data compatibility. The normalization took was time consuming because each contributor used their own data format and it was sometimes difficult to make them compatible with each other. These difficulties mainly occurred in the research and coral reef status dataset. Other problem is the limited human resources available. The development, processing, and management of the database were done in parallel with other activities.

In order to address the problems, there is a need to develop a network of scientist, since their use of data is a key aspect of quality control, and their involvement will improve the functionality of the systems, even though, developing awareness within this community will take time [6]. Therefore, the website can be a medium for sharing and become beneficial to marine conservation in Indonesia.

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