# The role of coral triangle initiative on coral reefs, fisheries, and food securities in Indonesia’s environmental conservation

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**Abstract**. This study aims to assess the role of CTI-CFF in handling marine ecosystem problems that include coral reef conservation, fisheries, and food security in Indonesia. To achieve the objective, the research method used is a qualitative study using library research data collection techniques. The result of this study indicates that the role of CTI-CFF in environmental conservation in Indonesia can be divided into three aspects of CFF itself namely on coral reefs, fisheries and food security. A number of conservation efforts have been carried out with the implementation of national action plan and have significant impacts on the sustainability of society and the environment. On coral reefs issues, CTI-CFF runs particular programs namely CTI-COREMAP and Marine Protected Areas (MPA). On fisheries issues, CTI-CFF has a particular program called Ecosystem Approach to Fisheries Management (EAFM). CTI-CFF in Indonesia plays an important role in implementing the strategic steps of the regional action plan which is later adopted into the national plan of actions. These plans are used as a parameter of the involvement of the CTI-CFF in efforts to save marine ecosystems in Indonesia.

## 1. Introduction

Indonesia, as an archipelagic state, consists of more than 17,000 islands and a vast sea territory. With a great number of islands, Indonesia is considered as a country with the fourth longest coastline (95,181 km) in the world after Canada, USA, and Russia Federation. Besides located between Pacific Ocean and Indian Ocean, the archipelago of Indonesia also lies within the so-called Coral Triangle, a roughly triangular area in the equator Pacific, covering marine waters of Indonesia, Malaysia, Philippines, PNG, Timor Leste, and Solomon Island. This geographical fact also makes Indonesia having a large marine biodiversity and natural resources, and the livelihood of many Indonesians consequently relies on the provision of marine resources. Despite the fact of the importance of marine resources to Indonesian people, the country's marine biodiversity particularly that of coral reefs is largely under serious threats.

A report from Greenpeace in 2012 revealed that only 5.30% of Indonesia's coral reefs were in excellent condition, and about 27% in good condition. Meanwhile, the considerably large portions were considered in fair and poor conditions, which are 37.25% and 30.45% respectively. Moreover, it is also reported that the degradation of coral reefs in Indonesia has increase from 10 to 50 percent the last five decade [1]. The massive coral reefs damage in Indonesia is due to many causes including sewage discharges from activities at sea and land, coastal reclamation and development, sedimentation, and the most common one is destructive fishing methods using cyanide, bombs, or

other illegal fishing gears. The impacts of global warming are another major factor that may lead to coral reefs bleaching.

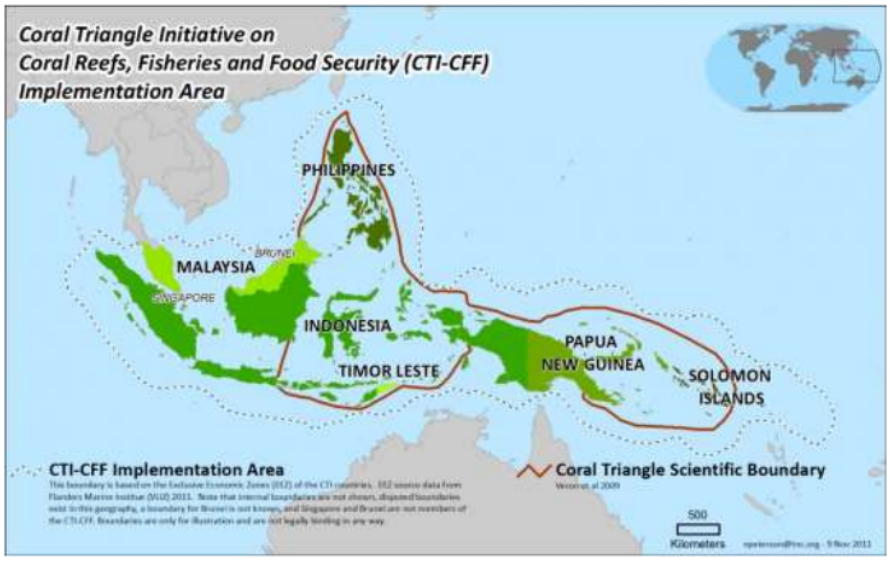


**Figure 1.** Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF)

source: www.coraltriangleinitiative.org

Realizing such the urgent of Indonesia's coral reef situation, Indonesian government took several actions with advocacies from local and international civil societies to prevent the country's marine and coastal resources from further destruction. In 2009, President of Indonesia, Soesilo Bambang Yudhoyono, inspired national leaders in the Coral Triangle area to build a multilateral partnership in addressing the region's environmental problems. As the result, the leaders of six custodian countries of Coral Triangle area sign a declaration and launched the Coral Triangle Initiative on Coral reefs, Fisheries, and Food Security (CTI-CFF) in the same year. The CTI-CFF regional plan of actions (CTI-RPOA) was then adopted with five objectives: (1) strengthening the management of seascapes; (2) promoting an ecosystem approach to fisheries management; (3) establishing and improving effective management of marine protected areas; (4) improving coastal community resilience to climate change; and (5) protecting threatened species. Since the problems of environmental degradation have strong relationship with human economic activities, the governments of the six countries, subsequently, agreed to apply people-centered biodiversity conservation, sustainable development, poverty reduction and equitable benefit sharing through the CTI-CFF. After almost a decade of the CTI-CFF implementation, it is important to know what have been done in Indonesia through the CTI-CFF framework, and to what extent it works effectively in conserving the country's natural environment.

## 2. Methods

This study is a qualitative research which can be categorized as descriptive-analytic. The research uses a pattern of describing the state of empirical facts with relevant arguments. Then, the results of the description are followed by analysis to draw analytic conclusions. This type of descriptive-analytic research is intended to provide an overview of the phenomena that occur and are relevant to the

problem. Descriptive methods are used to illustrate facts about the role of the CTI-CFF in addressing efforts to conserve coral reefs, fisheries, and food security in Indonesia.

The type of data used in this study is qualitative based on secondary sources. The qualitative data is obtained from several literatures related to the object of this study such as books, journals, documents, and internet sites related to the topic of the research. Data analysis technique employed is a qualitative analysis technique. The findings are then presented in descriptive analysis based on the data collected.

## 3. Results and discussion

Climate change has caused erosion and immersion of coastal areas, infiltration of sea water which is getting farther into the land, depletion of freshwater layers, death of marine biota, and destruction and extinction of coral reefs whose growth cannot pace with their damage speed. The damage to coral reefs can be considered as the initial sign of other problems such as shortage of fish provision at sea which may lead to human food security problems [2]. At the same time, climate change has been a major challenge in the conservation of coral reefs. Unlike other threats, the impact of climate change on coral damage has very little presence to be prevented. The impact of the increase in earth temperature certainly has a negative impact on the sustainability of coral reefs in the CTI region. In 2007, a report from the Intergovernmental Panel on Climate Change (IPCC) stated that the increasing levels of carbon dioxide had an impact on increasing earth temperatures, which led to the increasing volumes of seawater and decreasing sea bases [3]. These climate change phenomena consequently have significant impacts to the marine and coastal environment.

The coral reef damage in the CTI region has been a serious concern for the countries in the region since coral reefs are life-sustaining resources for most of the people in the region. Therefore, the present environmental problems in the CTI region require immediate actions so that the problems do not increase and widespread. Multilateral cooperation through the CTI-CFF is one way to address the environmental problems by looking at the uniqueness of environmental conditions of the countries in the region while still being interconnected and having links one another. Thus, cooperation between the CTI-CFF member countries is a real action that can be implemented in all member countries in accordance with the marine environment problems they face.

In Indonesia, the existence of this multilateral cooperation has been utilized to handle cases related to marine and coastal issues, and is expected to be able to become a forum to solve the environmental problems that are being faced by the country. Indonesia's coral reef area in total is acknowledged as one the largest coral reef area in the world. Stretched between Pacific Ocean and Indian Ocean, Indonesian archipelago has a total coral reef area of approximately 50,875 $km^2$, constituting about 18% of the world's total coral reef area. However, while coral reef and marine resources are instrumental in sustaining people's life, they are threatened by climate change and worsened by human economic activities at sea and land [3].

International efforts of Indonesian government in resolving the problem of coral reef damage reached its peak through the establishment of the CTI-CFF 2007. Through this multilateral framework it was hoped that international cooperation would become more effective in reducing the number of coral reef damage problems faced by Indonesia as well as the respective countries in region. Several programs were then planned to be implemented comprehensively on areas that have been designated as Marine Protecting Areas (MPA) in Indonesia.

Indonesia had actually run a coral reef conservation called COREMAP (Coral Reef Rehabilitation and Management Program) that began 1998. The establishment of CTI-CFF in 2007 as multilateral cooperation in the related issues made COREMAP programs were converged into the framework of CTI regional plan of action (RPOA) and focused more on coral reef conservation in the eastern part of Indonesia such as Papua, Maluku and Sulawesi. COREMAP is considered as one of the largest environmental-based projects in Indonesia and through this program, Indonesian government has assigned 400 marine spots as coral reef protection and rehabilitation areas in the eastern part of the country. COREMAP is a long-term program (15 years) that can be divided into three phases:

COREMAP I was initiation phase conducted from 1998 to 2001; COREMAP II was acceleration phase conducted from 2001 to 2007; and COREMAP III was institutionalization phase with a period of 2007-2013. This series of environmental conservation programs was supported by funding from various international institutions including World Bank, Asian Development Bank (ADB), Australian Agency for International Development (AusAID), and Global Environment Facility (GEF)

The implementation of COREMAP is generally considered successful. COREMAP I that was an initiation phase, had successfully built awareness and commitment of various coastal communities in Indonesia in promoting sustainable fishery practices and protecting marine resources on which their livelihood depends. COREMAP I placed community at the centre of coral reef management through Community Based Management (CBM) and shifted coral reef management to a program that incorporated environment and development aspects. The next phase, COREMAP II, was also considered successful since it had increased people awareness about the importance of coral reef, the biophysical live of the coral reef, and people socioeconomic condition in the participating areas. The first two phases of the COREMAP had been rated satisfactory by the Independent Evaluation Group [4].

With the establishment of CTI-CFF in 2007, COREMAP III was incorporated in CTI-CFF RPOA and called as COREMAP-CTI. As it was planned for COREMAP III, COREMAP-CTI was designed to achieve the goal that is to institutionalize the program as a viable, decentralized, and integrated framework for sustainable management of coral resources, marine and coastal ecosystem, and biodiversity for the welfare of the communities in the selected districts in some provinces in Indonesia. In this phase, the project was fund by the World Bank and specifically run by the Ministry of Marine Affairs and Fisheries, more particularly the Directorate General of Marine, Coastal, and Small Islands. In 2015, the Permanent Regional Secretariat of CTI-CFF was founded and its headquarter was established in Manado City of Indonesia.

Recently, several programs that are carried out by the CTI-CFF on MPA in Indonesia have achieved significant development. In this regard, the CTI-CFF focuses on coral reefs issues in Indonesia's outer regions, especially to small islands in the eastern part of Indonesia which including in Papua, Maluku and Sulawesi. The role of the CTI-CFF in handling problems related to coral reef in the country can be seen in the implementation of Indonesia's National Plan of Action (NPOA), which is part of the Regional Plan of Action (RPOA) initiated by the six countries incorporated in the CTI-CFF. In Indonesia, the management of MPA is run by two government bodies, the Ministry of Marine Affairs and Fisheries and the Ministry of Forestry.

In Indonesia, MPA can be considered to be the most widely used tool in coral reefs conservation and management, and can be defined as a marine area that is actively managed for conservation. MPA covers the whole areas that has a legal foundation and are used for maritime activities such as tourism, fishing, and coastal development with strict environment considerations. In addition, MPA can also indirectly mitigate coastal and thermal stress-related threats by increasing reef resilience and at the same time reducing the compounding effects of multiple threats. Indonesian Ministry of Marine and Fisheries collaborates with various working partners in the context of integrating MPA with fisheries area management, and the authority to obtain MPA management can be obtained from the central or regional government. MPA is very useful for research activities, education and raising awareness about the importance of the coral reef conservation. If managed effectively and sustainably, the MPA is able to maintain healthy coral reefs, and also helping to restore areas that have been damaged or affected by other environment threats.

In terms of the MPA space, Indonesia has achieved considerable successes in expanding its MPA. In 2007, Indonesian government pledged to conserve 100,000 $km^2$ of its marine territory by 2010, and succeeded to reach and even exceeded that objective in 2009. As 2011, Indonesia had expanded of the MPA area to 139,000 $km^2$ or about 90% of the total MPA of CTI countries, making Indonesia having the largest MPA. Indonesian government plans to continue the expansion to 200.000 $km^2$ by 2020. This is considerably necessary because MPA plays an important role in preventing the destructive fisheries that damage the fishery ecosystem itself. The expansion of the MPA is carried out in

collaboration with environment-based NGOs in Indonesia, including The Nature Conservancy and the World Conservation Society, which was then continued by the US Agency for International Development-Marine Protected Areas to develop standards and management for MPA itself and expand the capacity to carry out real actions including education both formal and non-formal. The target of implementing this MPA in Indonesia is to maintain and expand the functions of the Coral Triangle MPA system through steps: management and monitoring; community involvement; sustainable funding; education; and public awareness.

However, while Indonesia has a vast wide area of MPA, very few areas are managed effectively. According to *Reefs at Risk Revisited in the Coral Triangle* report, there is only 3 of the mapped 175 MPA or about 1% in Indonesia can be rated as being fully effective in managing fishing pressure. Those three MPA are all located in Raja Ampat Islands. Approximately 9% and 14% of Indonesia's reefs are rated as partially effective and not effective respectively. Moreover, the remaining 5% or 17 of Indonesia's 175 MPA are still not rated [5]. The problems of MPA management in Indonesia are arguably due to the lack of good governance and enforcement. The complexity and the multiple layers of Indonesian bureaucracy has been also a hindrance for the total implementation of MPA throughout the country. As stated earlier, MPA in Indonesia is managed by two ministries of the central government, namely the Ministry of Marine Affairs and Fisheries as the major coordinating body and the Ministry of Forestry. Beside these two ministries, local governments at the level of province and regency also play roles in managing MPA. With this multi-layered bureaucracy, overlapping jobs and authorities as well as conflicting interests often occur.

The CTI-CFF multilateral cooperation does not work only at the problem of coral reefs, but also continues on other aspects that are closely related to this problem, namely fisheries. The issue of fisheries is a serious concern for the CTI-CFF because at present the world's fish demand continues to increase, which on the one hand has provided a great economic opportunity for fish producing countries, but on the other hand has given a large boost to over-exploitation of marine fishery resources. If this continues to happen, the damage to fisheries resources will affect the sustainability the fishery economy. In the 2009 CTI-CFF RPOA, the six members formulated a so-called an "Ecosystem Approach to Fisheries Management" or EAMF as the second goal. It is considered as a preferred option and best management practice for the long-term sustainability of fisheries. In addition, the EAMF is also regarded as a participatory approach of sustainable fisheries since it involves various stakeholders to engage in effort striving to balance ecological well-being and human well-being through the use of good governance.

In Indonesia, the implementation of EAMF is led by the Directorate of Fishery Resources of the Ministry of Marine Affairs and Fisheries. The EAMF implementation is carried out through a roadmap that can be seen as the following table:

**Table 1.** Indonesia EAFM Roadmap 2010-2014

| Year | Activity |
|---|---|
| 2010 | Development of a set of EAFM indicators |
| | Conducted a preliminary assessment of EAFM indicators (desk-top exercise) onto 11 Fisheries Management Areas (FMA) |
| 2011 | Established an EAFM Expert Panel at MMAF |
| | Entered EAFM as part of the national budget lines of MMAF |
| | Conducted EAFM indicator refinement process (using expert consultation) |
| | Developed EAFM learning modules and survey/assessment questionnaires |
| | Conducted EAFM assessment (field testing) in several FMAs with universities and local agencies |
| 2012 | Conducted EAFM assessment in several FMAs with universities and local agencies (continued) |
| 2013 | Develop regulations to encourage EAFM implementation in Indonesia |
| 2014 | An EAFM is expected to be a basis for fisheries management in Indonesia |

As can be seen in the second year of the roadmap above, the ministry, in 2011, established an EAFM expert panel to guide the implementation of the EAFM. This panel is composed of staff from the ministry and other institutions with various expertise such as fish resources, marine habitats, fishing technology, and socio-economics. EAFM progress is supported by key stakeholders including the Ministry of Marine Affairs and Fisheries, Marine and Fisheries Research Agency, provincial and regency fishery agencies, universities and non-governmental organizations (NGOs) [6].

A significance achievement of EAFM activity in Indonesia was the development of EAFM performance indicators to support the government regulations on fisheries management. Indonesian government has two particular regulation on this issue, namely Law no. 27/2007 on coastal and small island management and Law no. 31/2004 on fisheries that was updated by Law no. 45/2009. These regulations are used by government bodies and agencies as basis for national implementation of EAFM. The EAFM performance indicators were formulated with inputs and consultation with key stakeholders in fisheries management. The performance indicators consist of six criteria, namely: habitat, fish resources, fishery, social, economic, and institutional; and were firstly used in 2010 and 2011 in a preliminary assessment of EAFM implementation in the country. This assessment was considered successful and then expanded to assess other aspects including MPA and species-based fisheries. All of the expanded aspects were assessed using the six indicators, for instance on the scenario of shark fisheries in Indonesia in 2013 it was found bad status were on the indicators of fish resource and fishery, and average status on the remain indicators. The application of EAFM was then continued with follow-up activities including developing training modules on data collections and analysis for EAFM indicators, and training for fisheries based on the EAFM indicators.

Overall, the development and the implementation of EAFM are a great leap in fisheries management in Indonesia, since it provides an assessment tool to ensure fishery activities in accordance with long term sustainability. However, the implementation of EAFM revealed several challenges, namely (1) lack of inter- and cross-sectoral coordination; (2) impacts from other forms of economic development (e.g., mangrove clearance for land development and aquaculture; discharges from industrial and agricultural activities, etc.); (3) limited assessment (biology, stock) and management of the resources; and (4) capacity development [6]. In the future, these challenges need to be overcome with specific policies and regulation by Indonesian government within the CTI-CFF framework.

## 4. Conclusion

Since its establishment in 2007, CTI-CFF has played important roles in environmental conservation in Indonesia. To achieve its goals, CTI-CFF formulates strategic steps called the Regional Plan of Actions (RPOA) that is later adopted in all respective countries into the National Plan of Actions (NPOA). In Indonesia, NPOA is implemented through several programs namely Coral Reef Rehabilitation and Management Program (COREMAP-CTI), Marine Protected Areas (MPA), and Ecosystem Approach to Fisheries Management (EAFM). Overall, these programs can be considered successful in conserving environment and marine resources in Indonesia, although some challenges were revealed through their implementation and need to resolved through specific policies.

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