

**PEER Science Annual Report  
May 1, 2014-April 30, 2015**

**Marine Biodiversity of Raja Ampat Islands:  
the ARMS, Morphology, and Genetic approaches for  
inventorying and monitoring patterns of marine  
biodiversity**



**Partnerships for Enhanced  
Engagement in Research  
(PEER)**

**Project Title:**

Marine Biodiversity of Raja Ampat Islands: the ARMS, Morphology, and Genetic approaches for inventoring and monitoring patterns of marine biodiversity

**Principal Investigator(s):**

Abdul Hamid Toha

**Institution(s):**

State University of Papua

**Co PI**

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University of Brawijaya

**Reporting Period:** May 1, 2014-April 30, 2015

**Summary of Activities:**

*Overview:* Outcomes from this project include establishing the Genetics Laboratory of UNIPA as a site for a field station, the digitization of voucher specimens, a project web, and for databases of marine biodiversity. Other outcomes from this research also include a manuscript of Conservation Genetics and a newsletter.

Some activities (training, research and publication) during the third period have been done by our team. In **Educational** activities, we held some training for PhD students from Brawijaya University and State University of Malang. All training related with genetic data analysis.

In **Research**, we conduct an expedition to Raja Ampat to explore marine invertebrates. Students and lecturer of UNIPA join this event. Some of students have already finished their lab working and passed their study in Brawijaya University (UB) and UNIPA. There are three persons from UB and two persons from UNIPA. We also published one article at international journal and four articles at local journal.

In **Publications**, we have already published 12 monthly Newsletters "Konservasi Biodiversitas Raja4" or "Raja Ampat Biodiversity Conservation" from May 2014 through March 2015. Our website in [www.ibcraja4.org](http://www.ibcraja4.org) are still running well to socialize the MB-RAI project and other related by conservations, biodiversity, Raja Ampat, laboratory and field methods. We also attended national and international conferences to present our working.

Related with supplemental content for [www.ibcraja4.org](http://www.ibcraja4.org) in sharing the program and outcome of the Raja Ampat Project, we have added and revised some contents in the website. They are in HOME, EDUCATION, RESEARCH, and LINK pages. We put a book cover "Conservation and Diversity of Sea Urchin" at HOME page so that visitors could see and access the book easily. We also added a VISITORS icon to monitor how and where the visitors come from. Also, we added some new activities in EDUCATION and RESEARCH pages. LINK icons was separated in different pages, we moved to one page in CONTACT so that visitors could open network easily. Our website has linked in the journal of biological researches in home page especially in International Biodiversity Conservation (ibc Raja Ampat). This journal has existed since 20 years ago ([www.berkalahayati.org](http://www.berkalahayati.org)).

Highlights of our second period achievements are listed below.

May 2014: Students who joint with MB-RAI project did an expedition in Raja Ampat to explore the marine invertebrates on May 3-10, 2014.

June 2014: We hosted students of UNIPA for studying molecular techniques in our lab (till June, 2014). We also join a meeting with U.S. Ambassador and team of USAID on June 9, 2014 in UNIPA. Ambassador and team also visited our laboratory in UNIPA Genetic Laboratory.

July 2014: We attended a workshop to build Consortium for Indonesian Biodiversity and Indonesian Marine Biodiversity at Jakarta. This national workshop was held by Indonesian Institute of Science (LIPI) on July 17-18, 2014.

August 2014: Undergraduate students who join with MB-RAI project have passed their study. They are two persons from UNIPA.

September 2014: Some students of fishery department of UNIPA join with our laboratory at UNIPA Genetic Laboratory. They did research to finish their study in undergraduate program.

October 2014: MB-RAI held training on genetic data analysis for PhD students of Brawijaya University (UB) on October 10-28, 2014.

November 2014: We attended two international and national conferences at Bogor Agricultural University (IPB) on November 9, 2014 and at Inna Grand Bali Beach Sanur Hotel on November 17-19, 2014 respectively.

December 2014: We published a paper entitled *Amplifikasi Gen COI (Cytochrome C Oxidase Subunit I) pada Holothuroidea yang dikoleksi dari Kepulauan Raja Ampat* at local journal, Jurnal Biotropika Vol 2 No 4 (2014). Three undergraduate students of Brawijaya University and two students of UNIPA who join with MB-RAI passed their study.

January 2015: We held training on genetic data analysis for PhD students of the State University of Malang (UM). Trainer of this event is Abdul Hamid Toha. In total, there are 19 participants who attended this training from varies institutions in Indonesia. Also, in this month, the MB-RAI team who join with a research group of Indonesia got a grant from Higher Education Directorate of Indonesia (DIKTI).

February-April 2015: We continued held training on genetic data analysis for PhD students of UM from February through April. In the April 2015, our paper entitled "Christmas tree worms of Indo-Pacific coral reefs: untangling the *Spirobranchus corniculatus* (Grube, 1862) complex" has published by Coral Reefs.

#### Events:

We held some training from October, 2014 through April, 2015. They are 1) training on genetic data analysis for PhD students of Brawijaya University on October 10-28, 2014, 2) Training on genetic data analysis for PhD students of the State University of Malang (UM) from January, 2015 through April, 2015. Below is the summary of the event in this period.

Number of workshops	Number of conferences	Number of exchange visits with U.S. partners
2	2	0

We kept to supporting a PhD student from US (Ian Parker, Department of Anthropology, University of California, San Diego) who conducts dissertation research in Raja Ampat.

<b>Date of workshop, conference, or visit</b>	<b>Location of workshop, conference, or visit</b>	<b>Title of workshop or conference or name of visitor</b>	<b>Number of female participants</b>	<b>Number of male participants</b>
October 10-28, 2014	UB	Training on genetic data analysis	5	3
January, 2015 every week on Saturday)	UM	Training on genetic data analysis for drafting paper	8	8
February, 2015 (every week on Saturday)	UM	Training on genetic data analysis for drafting paper	3	3
March 2015 (every week on Saturday)	UM	Training on genetic data analysis for drafting paper	2	2
April 2015 every week on Saturday)	UM	Training on genetic data analysis for drafting paper	3	2

### **Educational Impacts:**

We have no degree programs and mentoring programs as a result of our project. However, we have a new course of biotechnology for marine science department of UNIPA. This course held in Fisheries and Marine Science Faculty of UNIPA, a new faculty in UNIPA.

<b>Number of mentoring programs started</b>
0

Researchers, students, and faculty from different backgrounds and institutions in and outside UNIPA get benefit from our project through three kinds of the activities (training and teaching, research, and publication).

We facilitate both lecturers and researchers from varies institutions in Indonesia to learn by training on genetic data analysis and prepared the result of training as a draft of manuscript to publication. They are PhD students from UB and UM. All doctoral students are lecturers and researchers who coming from some institutions such as State University of Jakarta, Pattimura University, Malang Islamic University, Sam Ratulangi University, UM, Malang Muhammadiyah University, Andalas University, Lampung University, Sriwijaya University, Kairun University-Ternate, Agriculture, Agriculture Research Institute-West Papua, Nusa Cendana University, Padjajaran University, State University of Medan, and UNIPA.

In this period, there are seven undergraduate students who passed their study in UNIPA and UB. There are four from UNIPA and three from UB. MB-RAI also kept to supporting four students to conduct their thesis research. Our lab (Genetic Laboratory of UNIPA) also hosted three undergraduate students to laboratory work practices. Fishery students of UNIPA also join in practicum to study genetic approaches in our laboratory.

<b>Educational Status</b>	<b>Number of Females</b>	<b>Number of Males</b>
Undergraduate (BS)	6	1
Masters Student (MS or M Phil)	0	0
Doctoral Student (PhD)	0	1
Postdoctoral scholars	0	0
Other junior collaborators	5	1
Laboratory Technicians	2	3

### **Infrastructure Development:**

We got a new research grant from Higher Education Directorate of Indonesia (RISTEK and DIKTI Ministry) in collaboration with researchers from IPB, DAAD Longterm Lecturer in Marine Sciences-IPB, UNIPA, University of Jena, and University of Oldenburg. The title of research is "Counteracting Loss of Biotechnological Resources & Ecosystem Functions caused by potentially Climate Change-driven Sponge Invasions into Indonesian Coral Reefs". This research began on January 2015 through Dec 31, 2015. The PI of this research is Hawis Madduppa (IPB), with researchers namely Abdul Hamid Toha (UNIPA), Dr. Carsten Thoms (DAAD), Prof. Dr. Georg Pohnert (University of Jena) and Prof. Dr. Peter Schupp (University of Oldenburg). We propose a research project conducted in four modules, aiming to: a) monitor the extent of the threat to coral reef biodiversity by the invasive sponge, b) identify patterns in invasion-driving factors, c). understand the complex symbiotic and allelopathic interactions of the coral-killing sponge with the coral reef biota, d). make use of the ecological insight gained by our investigations through a subsequent knowledge-based approach to discover novel bioactive compounds with anti-cancer and anti-microbial properties. In this period we add more lab materials with purchased some reagents for supporting our lab work.

	<b>International</b>	<b>Local (in PI's country)</b>
<b>Number of research grants received</b>	0	1
<b>Number of patent applications submitted</b>	0	0

We have not yet the patent applications until now. However, we have published one book and got a copyright.

## Publications:

Our monthly newsletter “Konservasi Biodiversitas Raja4 or Raja Ampat Biodiversity Conservation” kept published by well (look at Supplementary Information). We published eleven editions from May 2014-March 2015. Our website at [www.ibcraja4.org](http://www.ibcraja4.org) was still going well. In this period, we published five articles in international and local journals. They are:

1. Willette DA, Iñiguez AR, Kupriyanova EK, Starger CJ, Varman T, Toha AH, Maralit BA, Barber PH (2015) Christmas tree worms of Indo-Pacific coral reefs: untangling the *Spirobranchus corniculatus* (Grube, 1862) complex. *Coral Reefs*. 1-6p. DOI 10.1007/s00338-015-1294-y.
2. Kurniasari RD, Soewondo A, Toha AH. 2014. Identifikasi Synaptula (Echinodermata: Holothuroidea) Raja Ampat berdasarkan gen COI. *Journal of Tropical Biology* 2 (5): 265-268.
3. Aprilia FE, Soewondo A, Widodo, Toha AHA (2014) Amplifikasi Gen COI dan 16s rRNA dari invertebrata laut *Plakobranchnus ocellatus*. *Jurnal Biotropika, Journal of Tropical Biology* 2 (5): 276-278.
4. Sahriyani N, Widodo, Toha AHA (2014) Amplifikasi gen COI (Cytchrome C Oxidase subunit I) pada holothuroidea yang dikoleksi dari Kepulauan Raja Ampat. *Jurnal Biotropika, Journal of Tropical Biology* 2(4): 232-234.
5. Toha AHA, Binur R, Suhaemi, Lutfi, Hakim L, Widodo N, Sutiman B. Sumitro (2014) Genetic aspects of the commercially used sea urchin *Tripneustes gratilla*. *Journal of Biological Researches*: 20 (12-17).

We also presented two papers entitled “close genetic relatedness of whale shark *Rhincodon typus* between Cenderawasih Bay, Indonesia and Indo-Pacific populations revealed by mitochondrial cytochrome oxidase C DNA: implication for conservation” and “DNA barcoding reveals genetic diversity of giant clams (Family Tridacnidae)”, respectively.

Type of Technical Publication	International Publications	Local publications (in PEER PI's country only)	Number of joint publications with U.S. PEER partner
Journal articles	1	4	1
Proceedings	2		
Technical reports	2		
Books			
Book chapters			
Book editor			

## Professional Development:

We have website in [www.ibcraja4.org](http://www.ibcraja4.org) since 2012. The web is still running well to socialize the MB-RAI project and other related by conservations, biodiversity, Raja Ampat, laboratory and field methods.

Number of awards/public recognition received	
Number of professional societies joined	
Number of Web 2.0 platforms created	1

We are also designing a working group at our website in research, education and publication for designing a scientist networking of Indonesia. In this period, there are three scientists from Khairun University and one lecturer of State University of Gorontalo who joins this group.

Our website has also opportunity to give many impact related with education, research, and publication for UNIPA especially and Indonesia in general. There are many visitors this website who comes from domestic and out of Indonesia every day. Our monthly newsletter is important part in the website. Because of this, journal of Biological Researches (formerly Berkala Penelitian Hayati) has link formally our website (see [www.berkalahayati.org/](http://www.berkalahayati.org/)) at current projects (as International Biodiversity Conservation, IBC Raja Ampat). Journal of Biological Researches is old journal in Indonesia who founded by Biological Association of Indonesian-East Java branch since twenty years ago.

### Technical Research Presentations:

We attended two conferences in this period. The first conference is mini workshop enhancing marine biodiversity research in Indonesia (EMBRIO) at Bogor Agricultural University (IPB) on November 9, 2014. In this mini workshop, we presented a paper entitled “close genetic relatedness of whale shark *Rhincodon typus* between Cenderawasih Bay, Indonesia and Indo-Pacific populations revealed by mitochondrial cytochrome oxidase C DNA: implication for conservation”. The second conference is 1st 2014 International Conference on science and technology applications in climate change (STACLIM 2014) at Inna Grand Bali Beach Sanur Hotel on November 17-19, 2014. We presented a paper entitled DNA barcoding reveals genetic diversity of giant clams (Family Tridacnidae).

<b>Number of technical research presentations made</b>
2

### Linkages and Potential Development Impacts:

Training on genetic data analysis at UB and UM have any new linkages and development with different backgrounds and institutions. UNIPA have big chance and opportunity to cooperate in research, education, and publication in the future with lecturers and researchers of State University of Jakarta, Pattimura University, Malang

Islamic University, Sam Ratulangi University, UM, Malang Muhammadiyah University, Andalas University, Lampung University, Sriwijaya University, Kairun University-Ternate, Agriculture, Agriculture Research Institute-West Papua, Nusa Cendana University, Padjajaran University, and State University of Medan.

There is a significant benefit for national co-operation and collaboration among Indonesian universities. This partnership creates a strong platform for research, education, and publication into actionable biodiversity conservation. We shall also work with Wageningen University. Right now, we are drafting a MoU in partnership on research, education, and publication in Papua.

<u>Organization</u>	<u>Yes</u>	<u>No</u>
USAID	Yes	
Government agencies in your country	Yes	
Community groups or nongovernmental organizations	Yes	
Private companies	Yes	

### **Problems Encountered:**

Our PEER project has encountered difficulties with research permit of our US partners. Because of this, our partners have been prevented on coming to UNIPA to work with us. We intend to circumvent those difficulties by set up a MoU between UNIPA and our partners. By the MoU, our rector has power to push RISTEK in giving research permit to our US partners.

We have planned to recovery these ARMS in Raja Ampat and Cenderawasih Bay on 2016. The next step is analyzing the data on end 2016. Besides that, we also study marine biodiversity of Raja Ampat and Cenderawasih Bay with other method (without ARMS). By this method we have already collected many specimens from Raja Ampat.

### **Plans for Activities during the Coming Year:**

We intend to recovery the ARMS in Raja Ampat and Cenderawasih Bay on 2016. We will work together with many parties, Conservation International-Indonesia, UCLA, Smithsonian Institution, WWF-Indonesia, Brawijaya University etc who will recoveries the ARMS in Raja Ampat and Cenderawasih Bay. We also intend to analyze the data on mid 2016. In addition, we will publish activities and some of the result from field work practice in our website and newsletter. We also planned to publish our two books and three articles.

Some studies will run in the third year of this project. We intend to attend some national and international seminar to present our research results. We also will held a national seminar in Raja Ampat in coloboration with Journal of Biological Researches. Furthermore, we would like to increase both the number of seminar and the number of publications. We also will expand our research projects by partnering with various local



and international institutions that submit proposal in the national and international competitions.

In addition, we prepared a few papers for submitting to International and local journal. Three of them have submitted to journal and in review right now. They were 1) Long-term gene flow increased genetic diversity of *Tripneustes gratilla* in Cenderawasih Bay Ecoregion, Papua-Indonesia, 2). Color Diversity and Distribution of Sea Urchin *Tripneustes gratilla* in Cenderawasih Bay Ecoregion of Papua, Indonesia, 3). Close genetic relatedness of whale sharks *Rhincodon* in the Indo-Pacific region.

Writing some books are still running until now. We prepared three books related this project. They are 1) Molecular Genetics, 2) Sea Urchin *Tripneustes gratilla*, and 3) Raja Ampat Invertebrates. We intend to complete the books until end the project.

### **Additional Comments:**

MB-RAI project already approved the new ending date is May 31, 2016. We shall use this timing to finish all program of MB-RAI project. We also intend to continue and expand this project for long term with national co-operation and collaboration with many stakeholders for research in Indonesia. We also need international co-operation for supporting our program to conserve marine biodiversity of Indonesia in general.

### **Supplementary Information:**

Below is supplementary information of our project.