

Project factsheet information

Project title	Using technology to improve citizen science monitoring of coral reefs in Indonesia
Grant recipient	CoralWatch Queensland Brain Institute The University of Queensland (UQ) St Lucia QLD 4072 (phone) 07 33653127 www.coralwatch.org and http://id.coralwatch.org/
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Country where project was implemented	Australia and Indonesia
Project leader name	Diana Kleine d.kleine@uq.edu.au
Team members (list)	Kyra Hay k.hay@uq.edu.au Krisantini krisantini@yahoo.com.au Angela Dean a.dean@uq.edu.au Justin Marshall justin.marshall@uq.edu.au
Partner organizations	Prof. Jane Hunter, school of Information Technology and Electrical Engineering (ITEE), The University of Queensland (UQ) j.hunter@uq.edu.au Andika Wahyu, Metroweb Bogor Web Design, andika@metroweb.co.id
Total budget approved	AUD 26,550
Project summary	CoralWatch integrates volunteer monitoring of coral reefs with education about coral reef conservation. Volunteers worldwide collect data on reef health using the Coral Health Chart and then submit this online to our global database. Indonesia is home to the world's most diverse reefs and raising awareness about threats to these reefs, has been a key focus of CoralWatch. Through this project we developed new mobile phone interfaces that improve the availability of education materials in both Bahasa Indonesia and English. The new apps also provide enhanced opportunities for people in Indonesia to upload Coral Health Chart data to the CoralWatch database without the need to access computers. In addition, an improved data feedback system for stakeholders and users of the CoralWatch database was developed in this project. A new map on our website provides a global overview of Coral Health Chart data indicating surveys with a potential bleaching risk. When a survey that indicates potential coral bleaching risk is submitted online, a new semi-automated system provides coral bleaching email alerts, encouraging local action. The CoralWatch team travelled to Indonesia to run workshops (attended by >225 people) to launch the apps in the final month of the project.

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Project Summary

Tips: It is recommended to **complete this section once you have finalized the text of the report**. It will be easier to go back through to build the summary based on the highlights of the report the project team just put together.

The Project Summary can be up to **one page long**.

It should include a brief justification; an outline of the project objectives to be achieved; the project real timeline and the main activities conducted.

The abstract of the project written when ISIF Asia initially approved the project and the objectives listed in the Grants Agreement signed by APNIC and your organization should be useful inputs when preparing this section of the report.

CoralWatch integrates volunteer monitoring of coral reefs with education about coral reef conservation. Volunteers worldwide collect data on reef health using The Coral Health Chart and then submit this online to our global database. Indonesia is home to many of the world's reefs and is a key focus for our work.

This project '*Using technology to improve citizen science monitoring of coral reefs in Indonesia*' has improved opportunities for data upload and accessing education materials, by creating mobile interfaces supporting these activities. Both apps are developed in Bahasa Indonesia to eliminate a possible language barrier and in English to increase uptake of the program. Our new user friendly apps support the growth of data collection and removes the barrier of requiring computer and internet access to data upload. The continuous need to provide data feedback to users has not only been applied within our app but also on our website. We implemented a new system where automatic feedback is provided when people enter a survey that indicates bleaching risk as well as displaying these surveys (potential bleaching risk and bleaching map) separately on our website. This overview and email alerts will enable users to initiate more rapid responses to coral bleaching.

Project real time line with main activities conducted

This project had a delayed start due to administrative and contractual difficulties that arose from the central University of Queensland management. Funding was received end of May 2014 and the project effectively commenced in June 2014. During the period of delay we began liaising with our technology partners in Indonesia (MetroWeb) and at the school of Information Technology and Electrical Engineering (ITEE) at The University of Queensland (UQ). During this period CoralWatch also began initial promotion of the project while conducting workshops in Indonesia as part of a previous Australia Indonesia Institute grant.

Even though in July 2014 the first version of the app was released, it took a full year to finalise and distribute all apps through Google Play Store and iTunes. Many rounds of edits and testing were required and additional features were developed to achieve well-designed end products. To make the app user friendly, functionality upgrades in our global database were required such as linking GPS automatically to existing reefs, pop-up confirming locations and automated thank you emails to contributors.

CoralWatch has developed an evidence-based approach to classifying our data. Validation analysis were conducted comparing 10 years of our data to well-established bleaching events described in the literature. Based on our analyses, each of the surveys listed in our new bleaching risk list has a 70% likelihood of representing a small bleaching event. We designed an email alert were the initial surveyor receives a request to conduct additional CoralWatch surveys, spread the word via social media and/or inform your local reef management group so additional investigations can be carried out to determine if a true bleaching event is occurring. In June 2015 CoralWatch launched all new products during workshops and events in Indonesia building on existing and new partnerships and promoting reef conservation through our new tools. In this era of technology, tools that can assist with data entering, uploading, viewing and editing are essential for increasing capacity of citizen science projects such as CoralWatch.

Background and Justification

Tips: The reader should be reminded of the **context** your organization is working, and where the project has been developed in.

This section provides a window to **understand the challenges** faced by the community you are working with.

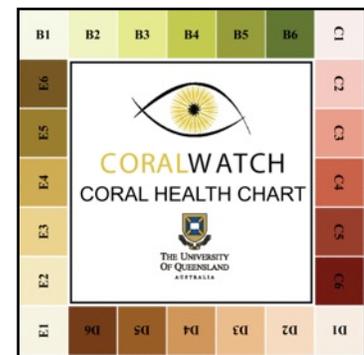
Include a detailed description about the situation **before the project start**, describing any relevant aspects that make the project relevant in such a particular scenario.

The reader should be provided with a clear description about the problem(s) to be addressed through this project and the motivation from your organization and team members to get involved and offer a solution.

CoralWatch integrates volunteer monitoring of coral bleaching and reef health, with education about reef conservation. CoralWatch is based at The University of Queensland (Brisbane), Australia, and works with volunteers from more than 74 countries.

In 2002, CoralWatch developed and validated a tool that enables volunteers to measure coral bleaching using a simple colour matching system -The Coral Health Chart. This chart has a 6-point scale, which standardises changes in coral colour associated with bleaching, providing a simple way for volunteers to quantify bleaching and monitor coral health.

CoralWatch volunteers ('citizen scientists') collect data opportunistically from reefs around the world and upload their data to the CoralWatch database via our website. Participants receive an immediate visual data summary of their survey and the website provides basic information about how to interpret the information. Data collection is ongoing, and continues to expand. CoralWatch currently has over 2000 members and the database contains more than 13 years of data from more than 1000 reefs.



The Coral Health Chart

Based on the close relationship between Australia and Indonesia, and the importance of Indonesian reef ecosystems, Indonesia has been a focus of our work over the last five years. Through previous collaborations with Indonesian partners, we have delivered a number of important outcomes: our 'Coral Reefs and Climate Change' guide for education and awareness was translated into Bahasa Indonesia ('*Terumbu Karang dan Perubahan Iklim*', May 2011); we developed and distributed a Reef Education Package for Indonesian educators (2012), delivered more than 10 reef management workshops for students and educators (attended by more than >1500 people) and developed an informative website in Bahasa Indonesia that provides free access to CoralWatch education materials in Bahasa Indonesia.



Since 2011 CoralWatch has conducted workshops and seminars at various places in Indonesia.

Rationale for effective reef monitoring

Indonesia is a priority area for CoralWatch's work - it is one of Australia's closest neighbours, and home to >2,600,000 hectares of reefs. This equates to 8% of the world's coral reefs. Indonesian reefs are also among most diverse reefs and home to 76% of the world's coral species. In addition to their ecological significance, the reefs of Indonesia are a productive asset for the Indonesian economy. It is estimated that healthy reefs contribute more than US\$1.6 billion to the Indonesian economy and are an essential source of food and livelihoods for more than 10,000 villages.

Similar to reefs around the world, the reefs of Indonesia are under threat from human influences and climate change. One serious threat to reefs worldwide, including Indonesian reefs, is coral bleaching. Coral bleaching occurs when corals are exposed to stressful conditions, such as elevated sea temperatures. Local stressors such as sediment, nutrient and waste dumping to the sea can also increase the chance of coral bleaching. During bleaching events, corals expel the small algae that live inside the coral tissue. These small algae normally provide the corals with food and give corals their colour. This means that when corals bleach, they not only lose their colour, but also the food from the algae they normally depend on. Severe bleaching events can lead to high rates of coral mortality. These mass coral bleaching and mass mortality events can cause a cascade of ecosystem effects which ultimately undermine the benefits that reefs deliver to society, including the fisheries that millions of people in Indonesia are dependent on.



A healthy coral before a bleaching event (left) and the same coral during a bleaching event (right).

Scientists predict that bleaching events will increase in frequency and severity with climate change. Monitoring patterns of coral bleaching on large spatial scales is necessary to identify which reefs are most at risk of bleaching and identify factors associated with mortality or recovery. Currently there are few large scale data sets on coral bleaching. The National Oceanic and Atmospheric Administration (NOAA) in America is currently the largest contributor in the field of coral bleaching. NOAA produces predictions of coral bleaching events based on satellite imagery and compiles information on actual coral bleaching events from various data sources (eg. Eakin et al 2010). However, NOAA still publically states the need for more observations of coral bleaching and non bleaching events. CoralWatch engages volunteers to collect data on coral health across many regions including Indonesia and the Coral Triangle and our database is freely available to scientists worldwide.



2010 Aceh Indonesia bleaching event
Healthy reef before bleaching (left) and the same reef during bleaching (right).
(Photos credit Wildlife Conservation Society Indonesia)

Rationale for improving data upload and engagement systems

Before the ISIF Asia grant, volunteers typically downloaded an information brochure that outlines procedures required for data collection (a Do it Yourself Kit / DIY Kit), collected data either in their own time or as part of a group, and then uploaded it to the CoralWatch website via a computer. This requires both computer access and internet access (and a printer for use of the DIY Kit).

During initial CoralWatch workshops in Indonesia, we discovered that limited computer or internet access often acts as a barrier to participants uploading their data. Additionally, limited computer access can act as a barrier to downloading DIY kits and other educational materials. We have also discovered that people are normally excited and keen to collect Coral Health Chart data in the field, but are less motivated to sit behind a computer once they have returned home to upload their data. Consequently, CoralWatch has had a less than optimal level of data return. This issue is not limited to CoralWatch volunteers in Indonesia and we require a more engaging way for people to upload their data.



Act Now for the future of our reefs

Rising water temperatures are a major contributor to mass coral bleaching events. Get involved in CoralWatch to monitor and protect coral reefs around the globe.

What is CoralWatch?

CoralWatch is an international multi-disciplinary project at the University of Queensland in Brisbane, Australia. CoralWatch uses the Coral Health Chart as a global, simple, yet complex method for the monitoring of coral bleaching, and assessment of coral health in the field. We provide complete copies of the kit with instructions on the field collection recording system. We also provide help by using our 'Do It Yourself' (DIY) kit to monitor your local reefs, or by that person. The Coral Health Chart can be used when doing monitoring or recording.

How do I get involved?

Complete your checklist in a regular reef monitoring program. To help collect more data, set up your Coral Health Chart as a CoralWatch data point. Visit our website and request your Coral Health Chart kit. The kit is currently available in English, Chinese, Spanish, Indonesian and German. Downloads and other recording and collection materials are available in a variety of languages and can be downloaded for free.

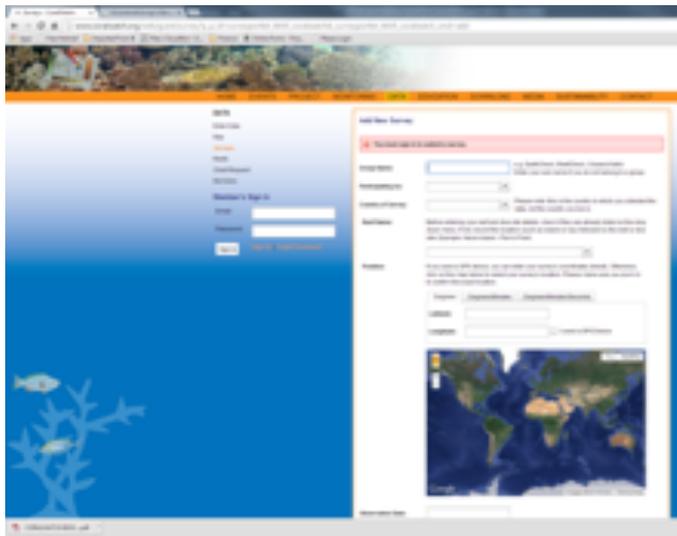


The utility of our database for volunteers and reef managers alike has also been limited. The database is large and not very user friendly. Before the grant, the entire database needed to be actively downloaded and then searched to identify potential bleaching events and no thorough data interpretation was available to users when they submitted data. This made it virtually unused by our Indonesian stakeholders. During previous workshops it was revealed that a more instant and in-depth data summary would help make the database more useful to reef managers.

This project was structured to address these concerns, enhancing people's access to resources, increasing data return, and improving data feedback systems to volunteers and reef managers.

'Do It Yourself Kit' with instructions for data collection available to download from www.coralwatch.org

Initial situation before the ISIF-Asia project start



Data entry

Data entry only possible online www.coralwatch.org

Computer and internet access required

Data entry portlet not very engaging

Biggest challenge is not collecting data but data return

Although the DYI kit is available in 12 languages, the online data portal is only available in English

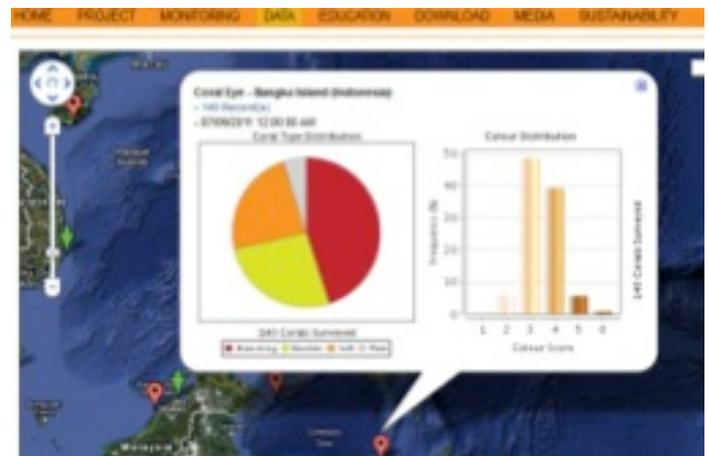
Global Database

Computer and Internet access required for feedback on surveys

Too much staff time required to check all surveys in the database

Overwhelming amount of data available but difficult to interpret

Too slow and not user friendly enough
Many errors in GPS location



7	Reef Name	Lead & GPS	Latitude	Longitude	Observation Date	Time	Light condition	Depth (m)	Depth (feet)	Water Temp. (C)	Water Temp. (F)	Air Temp.	Moisture	Wind Type	Light	Dark	Comments
15	01a May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
16	01b May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
17	01c May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
18	01d May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
19	01e May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
20	01f May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
21	01g May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
22	01h May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
23	01i May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
24	01j May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
25	01k May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
26	01l May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
27	01m May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
28	01n May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
29	01o May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
30	01p May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
31	01q May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
32	01r May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
33	01s May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
34	01t May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
35	01u May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
36	01v May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
37	01w May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
38	01x May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
39	01y May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			
40	01z May's Reef - BNC	LES	-01.0104	107.3774	27/02/2014	18:50	Full Sunlight	9.0	29.0	28.0	82	84	02	04			

Data results

The entire database needed to be actively downloaded as an excel sheet and then searched to identify potential bleaching events

No feedback on coral bleaching to users apart from initial graphs

Currently minor uptake of data results by reef managers, scientists and other stakeholders

Project objectives

Tips: Please include here the **original objectives** as listed on the Grant Agreement.

If any objectives were modified, added or removed during the reported period this should be explained/justified.

This project aims to:

1. Enhance engagement in CoralWatch education and monitoring by providing education materials in Bahasa Indonesia in the form of an ebook suitable for iPhones and Android mobile devices

Modification: the education materials are in the form of an app rather than ebook. This was suggested by our partners at Metroweb as a more appropriate format given the timeline and financial commitment available.

2. Enhance engagement and CoralWatch monitoring and upload of volunteer data by providing an interface for data upload using iPhone and Android mobile devices (in Bahasa Indonesia)
3. Enhance utility of data collected in Indonesia by developing automated and semi-automated data feedback systems that will return data and data summaries to reef managers and other stakeholders in Indonesia.

Users and uses

Tips: Discuss with your project team who would be the future users and how they would use the findings throughout the project lifecycle. The uses identified should relate to the theory of change that you have discussed with your project team. The discussion about theory of change, users and uses, will be a very important input to your communication strategy: depending on who the user is and of what use will be the findings, a communication strategy can be developed. For example, if the users of the findings are policy makers and the use is to influence a change in the regulatory framework, which communication approach will work the best?

Who will be the user of these findings?

What are the more relevant things the project team wants to learn about or evaluate through the lifecycle of this project?

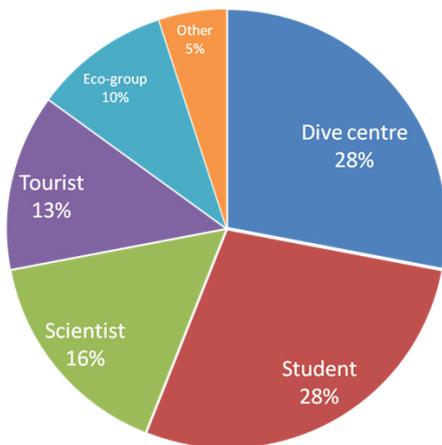
Users

CoralWatch identifies users as our members, currently over 2000 worldwide. These members are involved in monitoring reefs using the CoralWatch method or any other form of participation such as using the wide range of learning resources developed by CoralWatch.

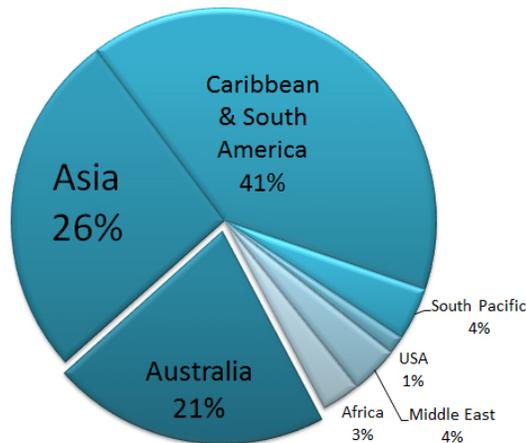
84% of our users are **citizen scientists** (28% dive centres, 28% students, tourists 13%, eco groups 10%, other 5%), people that might have only little or no knowledge about the reef. Their motivation to get involved in the program is understood as an opportunity to learn and to contribute to conservation. The level of involvement in CoralWatch monitoring varies from collecting data as a one-off event to intensive data collecting every two weeks. CoralWatch validation studies have shown that volunteers (citizen scientists) can provide valid data but the methods including data entry must be simple.

Scientists (16%) use CoralWatch as an additional method to their own research with in general little data return to the online global data base. Nonetheless, at least 25 published scientific papers refer to the CoralWatch methodology.

Environmental consultancy companies use CoralWatch methodology to record impact due to dredging of harbours (Hong Kong and Perth) with data results not published on the global data base but confidential.



84% of our users are citizen scientists



User distribution worldwide.

Uses

Initially CoralWatch users/members collect and enter data online and preliminary feedback is provided to the surveyor once a survey is completed. Our bleaching data records have immense historical value but due to staff shortage, time and limited technology opportunities, unfortunately not as much happens with the data afterwards as we would prefer. CoralWatch data currently has limited uptake by reef managers and scientists, due to the reservation and distrust in data accuracy. This is a common issue that many citizen science programs experience. However, data validation studies have shown that CoralWatch data effectively identifies bleaching events and recovery and can be used for research. Also – with the initial development of the chart - user perception has been tested and findings show little to no difference in findings between different data collectors.

CoralWatch global database Up-to-date 01/08/2015

- 2043 members
- 1043 reefs
- 5253 surveys
- 74 countries

Indonesia Stats Up-to-date 01/08/2015

- 134 members
(most members are from Australia, 2nd US, 3th Indonesia)
- 86 reefs
(most reefs surveyed in Australia, 2nd Honduras, 3rd Thailand, 4th Indonesia)
- 275 surveys

The CoralWatch database (registered users + surveys) is about 15 MB in size.



The following users will directly benefit from this project

- **CoralWatch volunteers** will be the primary users of the apps. The apps will be used to access CoralWatch resources and facilitate easier upload of data to the CoralWatch database without the need

of a computer. This will improve their engagement with CoralWatch. CoralWatch volunteers will also use the automated feedback email they receive to understand what their coral health survey results mean. They can use this information to lobby local reef management action and community awareness

- **CoralWatch** will use the apps to encourage greater participation in the CoralWatch program and greater data return. CoralWatch will also use the automatic feedback system to relieve the time constraint of feedback to participants. CoralWatch will also use the skills learnt here about working with international partners and developing mobile apps into the future projects.
- **Reef managers.** Reef management groups that conduct reef monitoring will use the apps but more importantly, reef managers will be able to use the new potential bleaching alerts and summary page to focus their attention where needed. Reef managers will also benefit from CoralWatch volunteers alerting them to potential bleaching areas as a result of the new feedback system. Greater community awareness for reef conservation achieved via the new CoralWatch apps will also provide greater support for reef management practices.

The following users will indirectly benefit from this project **Communities dependent on healthy reefs** it is estimated that more than 10,000 villages in Indonesia are dependent on healthy reefs for food and livelihoods. This project promotes healthy reefs which also promotes food security.

- **Scientists.** The new apps will enhance data upload from volunteers and increase the flow of data to scientific stakeholders. The variation in patterns of coral bleaching across spatial and temporal scales is an important scientific question and use of CoralWatch data will enhance the scientific understanding of coral bleaching issue.

Theory of change

The original CoralWatch idea (2003) was focused on data collection of coral bleaching.

There are not enough scientists to monitor all the world's reefs. This is where you can help! If many people around the world, like you, contribute to our global database, we will be able to answer questions about patterns of coral bleaching, severity of coral bleaching, and patterns of recovery. (Brochure text)

After the initial setup of the program the role of education became increasingly important. Education helps to raise awareness, if people are more familiar with the problem, they are more likely to take action. Greater awareness of science can create public support of conservation policies.

With limited staff available and an overwhelming amount of data online we could take the action of our volunteers a step further by not only engaging them in monitoring but by encouraging local management action. There is also a cultural component to this, when bleaching happens outside Australia, CoralWatch could advise but not endorse local policy.

So to develop a system where the data contributor receives a semi-automated response when survey results show potential bleaching we create more ownership, increased community awareness about local reef issues and the need for conservation and management.



New bleaching map on CoralWatch website showing all surveys from the last 12 months that indicate a 70 % chance of representing a bleaching risk. The map and list already shows over 269 surveys that indicate a bleaching risk from 12 general regions.

Indicators

Tips: Indicators help to measure project's progress.

Indicators help the objectives that were set by the project team to be affordable, tangible, and measurable.

They help to verify the success and rewrite the course in case we are not achieving it.

An indicator could be quantitative (percentage, amount) or qualitative (perception, opinion).

The ISIF Asia secretariat suggests the SMART approach to indicators:

- S** **Specific**
- M** **Measurable**
- A** **Achievable (acceptable, applicable, appropriate, attainable or agreed upon)**
- R** **Relevant (reliable, realistic)**
- T** **Time-bound**

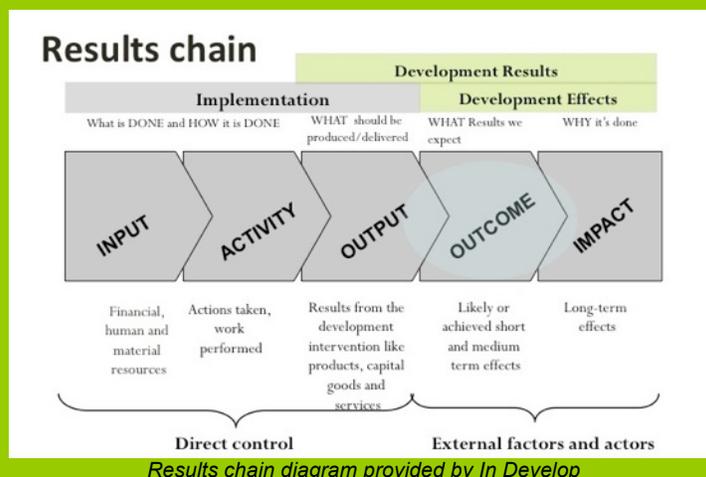
Baseline	Indicators	Progress	Assessment	Course of action
CoralWatch data upload currently only available online via the website and limited computer or internet access can act as a barrier to data upload	Number of times Data Entry apps downloaded	<p>July-Dec 14 App development slow due to international communication and lack of understanding from CoralWatch regarding requirements for app</p> <p>Jan-Jun 15 – Android data entry apps tested, edited and published on Google Play Store. Data Entry app installed 97 times. Memasukkan Data CoralWatch app installed 16 times</p> <p>May-July 15 IOS data entry apps developed by Metroweb, tested and edited by CoralWatch. Reviewed by iTunes and to be published in iTunes soon – latest by August 2015.</p>	<p>The distribution of the apps to date has been limited but this in part is due to the late completion/ incompletion of the apps. The android apps were only completed the week prior to our trip to Bali.</p> <p>We expected a greater number of participants from the workshops to download the android apps but we do not know how many people were limited due to having iPhones. Regardless, the promotion of the apps during our talks at the start of the trip (Udayana University) was not effective and we changed tactics for the last two workshops which was successful. Participants were able to use the apps without instruction from us and were excited to use them the field.</p>	<p>CoralWatch will keep on promoting the new data entry apps through social media, the CoralWatch websites, newsletters, future events and workshops to increase uptake. We will offer more hands on and directed sessions with the app as this proved successful during our workshop in Tulamben.</p> <p>We are ensuring our app developers in Indonesia have all the required information and edits from us to publish the IOS data entry apps as soon as possible.</p> <p>Once the iPhone apps are completed, we will begin our promotion activities.</p>
Limited computer access can act as a barrier to downloading DIY kits and other educational materials	Number of times CoralWatch information apps (content covers the DYI kit) downloaded	<p>June 15 - CoralWatch Info app (modified DIY kit) and Informasi CoralWatch app published on Google Play Store.</p> <p>Coralwatch Info app installed 19 times</p>	<p>The numbers of downloads for the Android Info and Informasi app is low compared. People at the workshops were provided with the information that is contained within these</p>	<p>As with the data entry apps, we will actively keep on promoting these apps. We also believe that in the future we are better to incorporate both the education and data entry aspects of the</p>

		<p>Informasi CoralWatch app installed 18 times</p> <p>July 15 – IOS CoralWatch Info and Informasi apps published</p>	<p>apps. This may have contributed to the low interest in these.</p> <p>Given the late release of the IOS apps, they have not been launched to our network yet.</p>	<p>different apps into the one.</p>
	<p>Number of times Bahasa Indonesia DIY kits downloaded from CoralWatch website</p>	<p>1969 downloads over the 12 month period of project</p>	<p>This increase shows the presence of CoralWatch in Indonesia is growing</p>	<p>We will continue to engage and work in Indonesia to raise awareness</p>
<p>CoralWatch global database contains lots of data but no clear outcome / overview of sites with potential bleaching</p>	<p>Automated email alert sent to users when a survey with a potential bleaching risk is submitted to database.</p>	<p>Dec 14- Statistical analyses that separate surveys with potential bleaching risk completed.</p> <p>May 15- ITEE upgraded database functionality and solved GPS location errors.</p> <p>Jun 15- email alert system activated.</p>	<p>The numbers of additional surveys - after initial email alert with bleaching risk identified - within a short timeframe by initial surveyor or other local reef management groups at a certain site.</p> <p>Hard to measure the monitoring uptake at this stage, since this has only just been implemented.</p>	<p>We will continue to monitor and promote the new feedback system where warning of bleaching identified by CoralWatch users can assist reef managers.</p>
	<p>Surveys represent a potential bleaching event clearly displayed on website.</p>	<p>May 15 - Map and list on website showing surveys classified as bleaching risks from the last 12 months and from the whole database.</p>	<p>The map and list already shows over 269 surveys that indicate a bleaching risk from 12 general regions.</p>	<p>We will assess the usability of the bleaching risk map and list as the number of surveys that show a bleaching risk grow. We can change the map and list to bleaching risk surveys more current time periods (i.e. the last month instead of 12 months).</p>

Project implementation: understanding the chain that leads to results

Tips: This is the most important section of the report. Here, the reader will **understand the processes and operational issues** of your project and how they contribute to the achievement of the objectives and the theory of change behind the project implementation.

Is possible that the project team's understanding of the development problems to be addressed with this project will have evolved or **changed** from those described when the project was originally submitted and approved. If that is the case, please share what motivated the change and what course of action has the project team identified.



Problem statement

The CoralWatch website has been designed to provide an easy way for volunteers to upload data - all data is freely available, and after data submission, users are provided with a graphical data summary. Indonesia is one of our primary contributors. Feedback from our Indonesian stakeholders and volunteers indicate that limited computer or internet access can act as a barrier to data upload; limited computer access can also act as a barrier to downloading free education materials; and there is a demand for improved data feedback systems to Indonesian stakeholders and reef managers.

Partnerships

CoralWatch has established an extensive network conducting workshops, seminars and meetings with stakeholders since 2011. Our education book '*Terumbu Karang dan Perubahan Iklim*', reef package and other monitoring materials have been distributed Indonesia-wide with the assistance of Ministry of Marine Affairs and Fisheries, NGO's (WWF, Terangi, TNC, Coral Reef Alliance, WCS, ReefCheck e.g.) Universities(Bogor, Manado, Makassar, Dipenogoro, UQ) Australian Embassy; Australia-Indonesia BRIDGE Project schools, teachers and individuals involved with reef conservation.

In March 2014 - with ISIF grant approval but prior to the official start of this project - CoralWatch visited Indonesia to launch '*Selamat Datang ke CoralWatch*' (Welcome to CoralWatch) our new CoralWatch website in Bahasa Indonesia. We took the opportunity and initiated new partnerships relevant to this project and began promoting the app development and data feedback system at various workshops and events.

1. March 2014, International Seminar: 'Community participation in the conservation of coastal resources' Christian University of Tomohon, Manado, North Sulawesi. Attendees: 108 participants; students and academic staff from 2 universities, representatives from provincial government (Marine Affairs and Fisheries), members of the local community (photo below).

2. March 2014, Workshop on Coral Reef Conservation and Monitoring, Faculty of Marine and Fisheries, Udayana University, Bali. Attendees 159 participants; Undergraduate and Master's students in marine science, Academics staff, Representatives from local NGOs, (Coral Reef Alliance, Conservation International, The Nature Conservancy. Yayasan LINI (Indonesian Nature Foundation), members of the local community. (photo below) Workshop materials online <http://id.coralwatch.org/presentations>
3. March 2014, Workshop: 'Getting involved in coral bleaching using CoralWatch', Gili Trewangan, Lombok. Attendees 48: members of the dive industry, including dive instructors, dive masters and students, staff from local conservation NGOs, Local and international tourists.
4. March 2014, meeting with one of our key stakeholders, Naneng Setiasih, from the Coral Reef Alliance, about improving data feedback to reef managers in Indonesia. Naneng also provided us with letters of support for our Indonesian grants.
5. May 2014, exhibition in World Coral Reef Conference 14-17 May 2014 (<http://wcrc2014.org/>). CoralWatch booth was very well attended and visitors have signed up for updates on CoralWatch publications and upcoming activities. CoralWatch worked with State University of Manado students and lecturers to disseminate information on the importance of monitoring coral reefs health for sustainable fisheries and uses of marine resources.
6. November 2014, distributing CoralWatch fliers, educational materials and Coral Health Charts in International Conference on Science and Technology Applications in Climate Change <http://www.staclim2014.org/> (no photo available)



1. March 2014, International Seminar, Christian University of Tomohon, Manado, North Sulawesi.



2. (left) March 2014, Workshop on Coral Reef Conservation and Monitoring, Faculty of Marine and Fisheries, Udayana University, Bali.

3. (right) 'Getting involved in coral bleaching using CoralWatch', Gili Trewangan



4. (left) Meeting with stakeholder Naneng Setiasih, Coral Reef Alliance

5. (right) May 2014. CoralWatch Booth at the World Coral Reef Conference, Manado, Indonesia. CoralWatch hired two local representatives. Guestbook records contact details of 76 visitors.

Development stage in time

The first 9 months of the project period was spent working with our partners at MetroWeb in Indonesia to develop the framework for the mobile apps, conducting the statistical analyses that form the basis of the feedback system, and working with ITEE at UQ to define their role in maintaining and upgrading the database and the establishment of the new automatic feedback system. Following some significant staffing hurdles, in March 2015 CoralWatch began working extensively with Metroweb to ensure the apps were delivered in time for our trip to Bali. Likewise, we spent a lot of time with our partners at ITEE to confirm the feedback system and website updates so they were in place by June. Over this period we worked also closely with our Indonesian partners to develop a program to deliver our new products during workshops June. Our Indonesian translator and consultant played a critical role during this phase and ensured smooth communication between all parties.

Adjustments

CoralWatch worked with an Indonesian company, Metroweb, to develop the mobile phone apps associated with this project. This is the first experience CoralWatch has had in developing apps and also with working with an international developer and consequently we found ourselves on a steep learning curve. Our limited understanding of the technical aspects required to develop apps coupled with initial communication difficulties lead us to greatly under estimate the complexity involved of developing a functional data entry app that CoralWatch volunteers would find engaging and easy to use. Once app development was under way, it became apparent we needed to add a number of additional features that we had overlooked to ensure its functionality.

The extra features included;

- a) Adding the ability to input survey data offline
- b) The addition of a confirmation of survey location to prevent errors entering the database
- d) The option to view survey results
- d) Include a user profile page
- e) The ability to select reefs from a drop down list as well as add new reefs.
- f) Existing reef GPS locations need to be linked automatically

These significant changes, caused a major change to our timeline. Communication issues during the process also lead to delays and required much more input from our team than anticipated. Our trip to Indonesia to promote this project was delayed until June 2015 to incorporate the delayed completion of the apps. The new android apps were published only the week before our Indonesia trip, but we did not have the iPhone apps.

Apps internal and external testing

July 2014 - App Beta 1 downloaded and tested.

August 2014 - CoralWatch workshop with Citclops app developer Hans van der Woerd. Citclops developed an app for monitoring water color by citizen scientists. Valuable discussions about user friendliness, GPS location issues and lesson learned by Citclops could be implemented by CoralWatch.

December 2014 - App Beta 2 downloaded, tested and advanced features ordered.

March 2015 – App Beta 3 released with advanced features.

CoralWatch invited individuals from ISIF grant mailing list, Marshall Lab members, Citclops and Indonesian users to provide app feedback by email. Invitees needed to download the app and install, perhaps anticipated as too time consuming and unfortunately feedback was very limited and patchy. Hoping to increase feedback we prepared a survey online. Feedback was still minimal (15 recipients, 3 replies) but together with some other email response (3 replies including great feedback from iSolutions Micronesia) earlier, combined feedback provided was productive.

Online survey- questions and results

Are you already familiar with CoralWatch? (yes 100%) If yes, have you ever entered Coral Health Chart data on the CoralWatch website? (yes 33% no, never 66%) Before using the app, was it necessary to read the instructions 'how to use this app' (yes 33% no, never 66%) Is the app self-explanatory? (Quite 66% Moderately 33%) Does the app appear easy to navigate? (Very easy 66% moderately easy 33%) How easy is it to enter your data? (Extremely 33% Quite 33% Moderately 33%) How easy is it to find the GPS location of your survey? (Quite 100%) While testing this app, did you find any errors? (Yes 66% *I could not enter my own reef name there, strange reef names listed, request for drop down list enabling to select country and reef. NO 33%*) What changes would most improve this Coral Health Chart data entry app?

1) *It is already great. My compliments, it has a very nice feel to it. I like especially the confirmation map on the position. A great way to check the correctness of the position* 2) *Data entry icon looks like "search" function, make another one to replace with it, maybe?*

Do you have any other comments, questions, or concerns? Anything in particular that you like or don't like about the app? 1) *Opening screen with name and email address could be longer apparent (now only 1 second). Just go ahead. Once it runs you can try to update it. Well done. I hope to use it next time I am in Australia.* 2) *If possible, this app could add an optional function "take a photo" of the survey reef (e.g. reef walking) at (or before) the submit page. Collecting images from hundreds of app operators would make Coral Watch database become one of the most advantageous data centers with continuous coming updated frontline info.*

All comments were taken into consideration and explored further and some features were added, such as own reef name and drop down menu with list. After more internal testing, in June 2015 the Android apps for data entry became available on Google Play Store in English and Bahasa Indonesia. CoralWatch E-book app became available in June 2015 as well as an additional education and information source.

June 2015 - During our workshops in Indonesia we were able test the apps in the field with the different groups which turned out to be a valuable tool. In the future we would include field testing with groups during the development process as we discovered we had missed a few issues despite our intensive testing in the office. Since returning from Indonesia, our developers have been able to rectify these issues and have included these fixes in the iOS version of the apps.

June-July 2015 - Only after finalising the android apps, MetroWeb starting developing the IOS apps but since lay-out, functionality and additional features had all been decided upon, most of the hard work was done. New issues arising though, were in regards to iTunes being concerned about too many privacy information required to enter data. Testing the apps was more time consuming and seem complicated. With the Android apps, MetroWeb could provide us with a file to install on our phone. With iTunes the testing can only be done by invited users using a TestFlight app on iOS devices. Once the app testing was all good and approved internally, it was forwarded to iTunes for review. Apple staff review all app to make sure all is suitable with Apple policy. Each review took about 7 days, before publishing on iTunes. In early July, the CoralWatch Info and Informasi app were published on iTunes and late July CoralWatch Data Entry and Masukkan Data. Unfortunately after

publishing – and so much testing! – new users reported a bug. MetroWeb is currently fixing this and as a result we have not promoted our new app to the public, because of the iTunes review process it might take a few weeks.

Project outcomes – New partnerships

CoralWatch visited Indonesia to launch the new apps and feedback system and collaborated with existing and established new partners.

1. 19 / 20 June 2015, Workshop on Coral Reef Conservation and Monitoring, Faculty of Marine and Fisheries, Udayana University, Bali in collaboration with Nusa Dua Reef Foundation. Attendees seminar 137 participants; fieldtrip 90 participants, Undergraduate and Master’s students in marine science, Academics staff, Representatives from local NGOs, (Coral Reef Alliance, Conservation International, The Nature Conservancy. Yayasan LINI (Indonesian Nature Foundation), members of the local community.
2. 21 / 22 June 2015, Seminar and field event “Caring for Corals, Padang Bai”, Bali Attendees seminar 19 participants; fieldtrip 5 participants, members of the local dive industry, including dive instructors, dive masters, tourists.
3. 23 / 24 June 2015, Coral Health Chart - Training CoralWatch Methods In collaboration with ReefCheck Indonesia, Conservation International, Coral Reef Alliance. Attendees seminar 40 participants; fieldtrip 27 participants, local dive guides from various commercial dive shops Tulamben, Conservation Community group from Buleleng, Tulamben, Tejakula, Representatives from provincial government and members of the local community.

Project outcomes – Increased engagement

To help us understand how experience at reef education workshops influences engagement with environmental issues, researcher Dr Angela Dean has as part of her new study, asked all recent workshop participants to complete a survey ‘Reef Workshops – your experience’. The survey has 2 parts, one directly after the workshop and one two weeks later. Survey results are not available yet.

To provide free access to all education and monitoring materials in Bahasa Indonesia, CoralWatch Indonesia website was launched in March 2014. It includes, the Bahasa Indonesia edition of the book Coral Reefs and Climate Change (*Terumbu Karang dan Perubahan Iklim*), workbooks for educators, reef monitoring materials, presentations and videos. To measure uptake, we recorded downloads for various products from August 2014 until June 2015.

	August 2014	October 2014	December 2014	February 2015	April 2015	June 2015	August 2015
Book Coral Reefs and Climate Change	292	473	630	958	1274	1461	1556
Workbook	312	469	685	872	1115	1236	1284
Coral Reef Presentation	206	309	399	477	520	558	589

Download numbers on our English website for the Bahasa Indonesia version of the Do It yourself kits are the highest of the 12 languages available (after English).

- Bahasa Indonesia Jan 2015 - 4210 downloads July 2015 – 5507 downloads
- Japanese Jan 2015 - 3547 downloads July 2015 – 4057 downloads
- Italian Jan 2015 - 1741 downloads July 2015 – 1897 downloads
- Spanish Jan 2015 - 1709 downloads July 2015 – 2263 downloads

Download number of our apps are still low since these have only been just released (June 2015)

Android Data entry – Installs 100 - 500
 Memasukkan Data – Installs 10 - 50
 CoralWatch info - Installs 10 – 50
 Informasi CoralWatch - Installs 10 – 50

Another information source is the up-to-date stats on the right hand bottom corner our CoralWatch homepage
 11/02/15 - 107 members in Indonesia have conducted 235 surveys at 78 reefs.
 01/08/15 - 134 members in Indonesia have conducted 275 surveys at 86 reefs.

Input	Project activities	Outputs	Outcomes	Timeline	Status	Assessment
Consultant hired in Indonesia (MetroWeb) to develop APP for data entry and e-book	<p>Development of beta data entry apps for testing and editing by CoralWatch lab members, Citclops and other external users</p> <p>Implemented advanced features requested Dec 14</p> <p>Liaise with ITEE to ensure app and database features connect and update as required</p> <p>Development of ebook as Information app to be reviewed and edited by CoralWatch</p> <p>Development of IOS apps and publication of apps when complete</p> <p>App support and updates for 3 months following release</p>	<p><u>Android apps:</u></p> <p>Data Entry App</p> <p>Memasukkan Data CoralWatch App</p> <p>CoralWatch Info app</p> <p>Informasi CoralWatch app</p> <p><u>IOS apps:</u></p> <p>Data Entry app</p> <p>Memasukkan Data CoralWatch App</p> <p>CoralWatch Info app</p> <p>Informasi CoralWatch app</p>	<p>The apps allows volunteers to access information and upload data to CoralWatch without the need of a computer in both Bahasa Indonesia and English.</p> <p>Apart from sign-in and actual data upload, apps can be used in offline mode.</p>	<p>02-2014 Initial App ordered</p> <p>App Beta version 1 downloaded and tested on 18/07/2014</p> <p>12-2014 App Beta 2 downloaded and tested</p> <p>12-2014 Advanced features ordered</p> <p>Mar –May 15 Android apps with advanced features tested by external users and edited extensively</p> <p>June15 Android apps published June 2015 and used in Indonesia</p> <p>May-Jul 15 IOS apps in final stage of development</p> <p>Jul 15: CoralWatch Info and Informasi app published on iTunes.</p>	<p>Android apps complete</p> <p>IOS information apps complete</p> <p>IOS Data Entry apps approved by iTunes, unfortunately still one bug found</p>	<p>App development has been slower than predicted but the android apps worked well in Indonesia. Participants were enthusiastic about using them and we were able to conduct a data analysis session in Tulamben without the need of computers. This was a great milestone as the majority of these participants do not have access to computers, prior to the new apps they would not have been able to engage with CoralWatch. We anticipate the apps will become popular and increase our outreach significantly.</p>

<p>Indonesian translator/consultant hired</p>	<p>Translated text from English apps to Bahasa Indonesia for developer</p> <p>Liaised with Indonesian partners to set up CoralWatch workshops and activities in Bali</p>	<p>Four apps available in Bahasa Indonesia</p> <p>6 days of CoralWatch activities in Bali organised (3 talks/ workshop days, 3 days of field activities)</p>	<p>Increased outreach and engagement with Indonesian volunteers</p> <p>Successful workshops and activities delivered by CoralWatch in Bali with a combined attendance of >300 people</p>	<p>Jan- May 15: Translation of app content</p> <p>Jan- Jun 15: Liaising and planning of CoralWatch events with Indonesian partners (Udayana University, Reef Check Indonesia, Coral Reef Alliance, Conservation International)</p>	<p>Complete</p>	<p>Completing the apps in Bahasa Indonesia is a key aspect of this project and was required to make the apps successful in Indonesia. We will continue to provide educational products and monitoring materials in Bahasa language to increase engagement of Indonesian people in reef conservation</p>
<p>Android device purchased as testing and demonstration device</p>	<p>Phone used for CoralWatch to test and provides edits to app developer</p> <p>Phone used during workshops in Indonesia which gave all participants the opportunity to try the app</p>	<p>Functional android apps</p> <p>30+ people got to use the app in the field in Indonesia during our workshops</p>	<p>Increased engagement of workshop participants with the android app.</p>	<p>Aug 14- Jun 15</p>	<p>Complete</p>	<p>Having the Android device was a critical step in us being able to develop a functional app. We both had limited knowledge of apps and android devices so this provided us with the informal training required to become confident in this area. We will continue to use the device to promote the apps at future events.</p>
<p>CoralWatch global data base available for analysis</p>	<p>CoralWatch staff performing statistical analyses on CoralWatch database data</p>	<p>Criteria identified to classify surveys as possible bleaching risk</p>	<p>Confidence in the CoralWatch database and the ability to provide more engaging and accurate feedback to volunteers.</p>	<p>June-Dec 2014</p>	<p>Complete</p>	<p>These analyses took longer than expected but provide us with the foundation for the important feedback system.</p>
<p>Consultant hired at UQ to improve www database features and develop data feedback system</p>	<p>New features added to minimise errors in location: GPS coordinates of existing reefs pop up automatically and additional pop-up window to confirm location, reducing GPS</p>	<p>Improved website usability</p> <p>Improved location information</p> <p>Bleaching risk list on website (surveys from last 12 months)</p>	<p>Less errors within the CoralWatch database.</p> <p>Database easier for users to use and access information about beaching</p>	<p>November 2014 IT tasks defined</p> <p>Dec-Jan 15 development of</p> <p>Feb-May15 - www improvements tested and released</p>	<p>Complete</p>	<p>The improvements to the database made here will continue to help reduce errors into the future. The feedback system has been successful but we will monitor it to ensure the time</p>

	<p>errors</p> <p>Drop down menu for country added along with existing reef names</p> <p>Generation of automatic email to users when the contribute data</p> <p>Development of feedback system that sends email alerts to users when they submit a survey that, based on our statically derived criteria, indicates a potential bleaching event</p>	<p>or from entire database that indicate possible bleaching events)</p> <p>Bleaching risk map on website (for last 12 months or entire database)</p> <p>Feedback system in place where users receive email alert when they submit survey that indicates a potential bleaching event.</p>	<p>events</p> <p>Thankyou emails increase engagement with CoralWatch volunteers</p> <p>Email alerts increase feedback to users and potentially long term engagement and local action on bleaching.</p> <p>Bleaching risk list and map provide easy access and feedback to bleaching data to reef mangers and stakeholders</p>	<p>June 20145</p> <p>Bleaching list available for stakeholders</p>		<p>period of displayed results remains meaningful given the size of the dataset.</p>
<p>Organisation of workshops in Indonesia by local partners</p>				<p>Jan-Jun 15</p>		<p>The workshops were a great success and we have learnt that having locals organise the events is the key in reaching out to a greater audience in an effective and efficient way.</p>

Project outputs, communication and dissemination activities

Tips: Take into account that the reader of your report has not been involved in project implementation, so readers do not have any further knowledge besides the information you are providing here.

This section of the report will allow you document the communication and dissemination efforts that the project team has conducted, which might be part of a specific communication strategy design as part of the project, or in place for the organization as a whole. When possible, please provide information about strategies in place and the rationale behind them.

Lessons can be learned from many aspects of project implementation, covering a wide variety of aspects such as technical, social, cultural and economical. Taking the rationale behind the project and its objectives can serve as a framework to draw your conclusions. Lessons can be identified by project partners, beneficiaries and general staff from the organization. A project diary and other activity records can serve as a tool to reflect during project team meetings and immediately after project activities are conducted.

Outputs are immediate, visible, concrete developmental change that is the tangible consequence of project activities, under direct control of the project team.

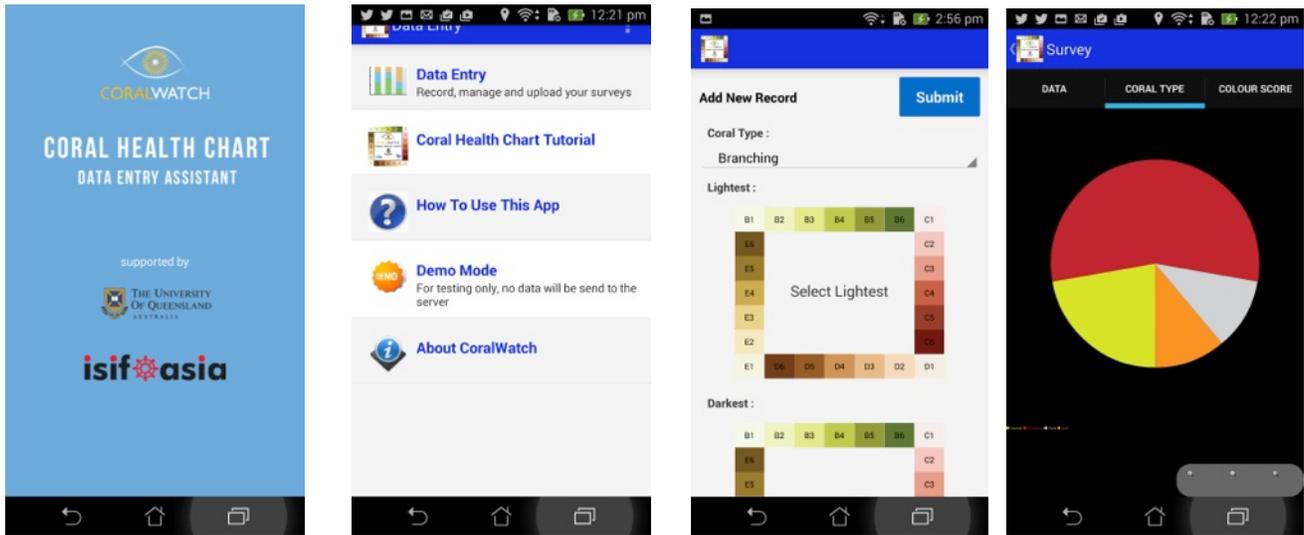
Example of possible outputs to report are:

- New products and Services (software, online platforms, applications);
- Information sharing and dissemination (publications, conferences, multimedia, social media);
- Knowledge creation (new knowledge embodied in forms other than publications or reports, such as new technologies, new methodologies, new curricula, new policies);
- Training (short-term training, internships or fellowships, training seminars and workshops) and
- Research Capacity (research skills; research management capacity and capacity to link research to utilization of research results).

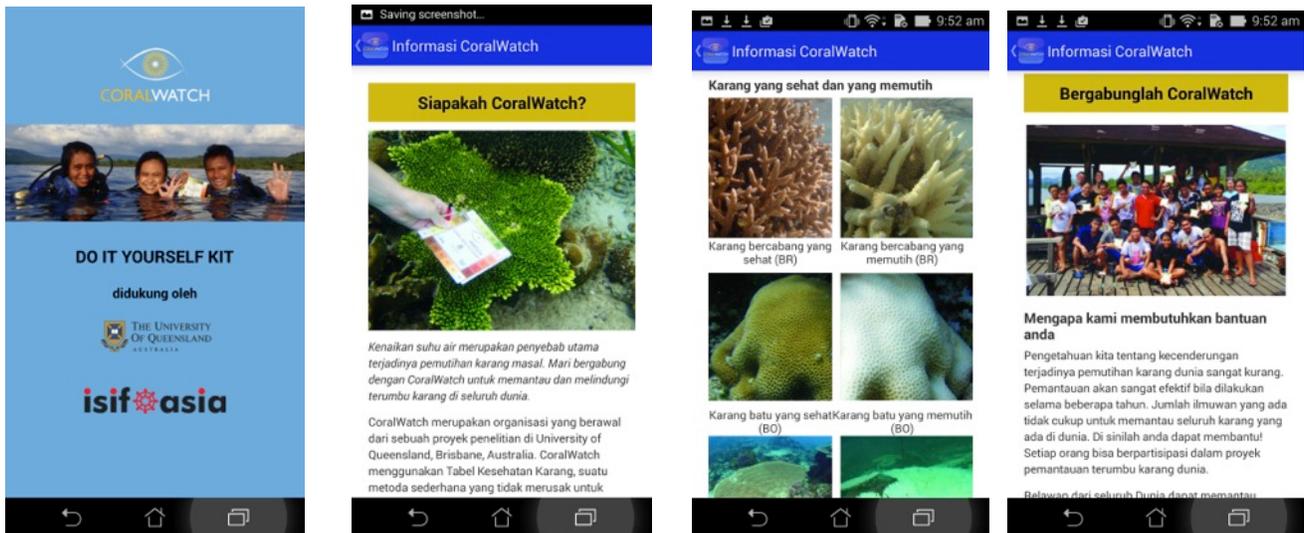
Project outputs	Status	Assessment	Dissemination efforts
Apps to support data entry, upload and info App type: Android and iOS mobile App App Language: English and Bahasa Indonesia	Complete	<p>Apart from the Initial sign-in process apps have shown they are self-explanatory.</p> <p>Features developed in regards to GPS location work well, contributing to location quality control.</p> <p>Reliability seems still challenging, sometimes apps stops working unexpectedly.</p> <p>Future challenge can be the maintenance, fixing bugs and keeping up with apple and windows updates.</p>	<p>Initial promotion of all products during conferences, workshops and meetings Indonesia trip, March 2014.</p> <p>July 2015 - All apps available on iTunes and Google Play Store</p> <p>Promotion via social media + website, CoralWatch e-newsletter (1361 recipients)</p> <p>Presented at Marine Teachers Conference, Heron Island 8-11 July 2015</p> <p>Presented in poster session at Australian Citizen Science Conference, Canberra 23-24 July 2015</p> <p>Upcoming 9 / 2015 Jakarta APNEC 40 presentation: CoralWatch - Using Mobile Technology to Improve the Capacity of Citizen Science Projects</p>
6 days of CoralWatch activities in Bali organised (3	Complete	<p>Workshops well received. Attendance varied between 170 and 4 participants.</p> <p>Target groups reached; divers and dive industry, university students and tourists</p>	<p>Launch of apps during promotional trip with training seminars and field workshops, Bali, June 2015.</p> <p>Online media article¹</p>

¹ Online media article <http://balebengong.net/kabar-anyar/2015/06/29/coralwatch-aplikasi-pemantau-kualitas-terumbu-karang.html>

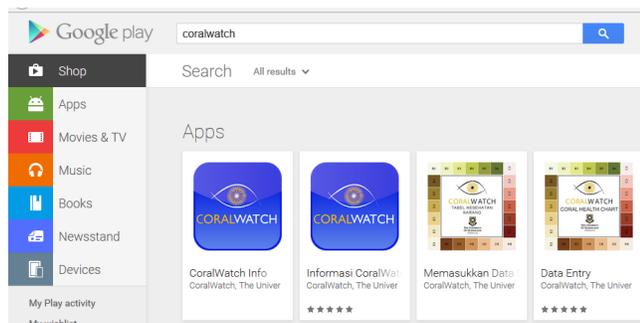
talks/ workshop days, 3 days of field activities)		Collaboration with local partners essential for success.	
Global database, Criteria identified to classify surveys as possible bleaching risk	Complete	Potential bleaching threshold are identified. Might have to be adjusted in time.	Promotion via social media + website, CoralWatch e-newsletter (1361 recipients) Presented at Marine Teachers Conference, Heron Island 8-11 July 2015
Website, improved useability, location confirmation	Complete	GPS location much more reliable. Useability improved dramatically for entering reef data for existing reefs.	Promotion via social media + website, CoralWatch e-newsletter (1361 recipients)
Bleaching risk list and bleaching map on website (surveys from last 12 months or from entire database that indicate possible bleaching events)	Complete	List and map are well received, and provide an easy visual overview. Performance has to be reviewed when more data comes in.	Promotion via social media + website, CoralWatch e-newsletter (1361 recipients) Presented at Marine Teachers Conference, Heron Island 8-11 July 2015 Presented in poster session at Australian Citizen Science Conference, Canberra 23-24 July 2015
Feedback system in place where users receive email alert when they submit survey that indicates a potential bleaching event.	Complete	Potential bleaching threshold are identified. Perception and follow-up action taken by users after email alert cannot be evaluated at this stage – too early for results.	Promotion via social media + website, CoralWatch e-newsletter (1361 recipients) Presented at Marine Teachers Conference, Heron Island 8-11 July 2015 Presented in poster session at Australian Citizen Science Conference, Canberra 23-24 July 2015



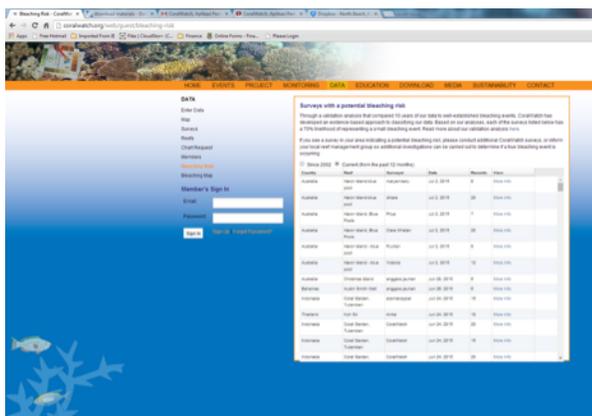
Mobile app to support data entry and upload



Mobile app to support education and monitoring activities.



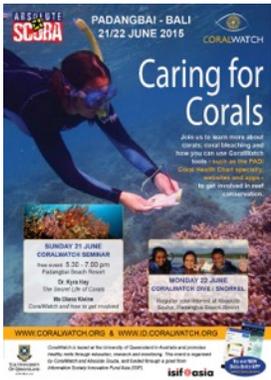
Apps to support data entry, upload and info all available on iTunes and Google Play Store.



Online Data feedback system. (left) List showing all surveys with potential bleaching risk (right) Map showing all surveys with potential bleaching risk. Both can be viewed for all data or only current data (last 12 months)



19 / 20 June 2015, Workshop on Coral Reef Conservation and Monitoring, Faculty of Marine and Fisheries, Udayana University, Bali. Attendees seminar 137 participants; fieldtrip 90 participants, Undergraduate and Master's students in marine science, Academics staff, Representatives from local NGOs, (Coral Reef Alliance, Conservation International, The Nature Conservancy, Yayasan LINI (Indonesian Nature Foundation), members of the local community. This event was a collaboration with Nusa Dua Reef Foundation.



21 / 22June 2015, Seminar and field event "Caring for Corals, Absolute Scuba and Padang Bai Beach Resort Bali
Attendees seminar 19 participants; fieldtrip 5 participants, members of the local dive industry, including dive instructors, dive masters, tourist



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Attendees seminar 40 participants; fieldtrip 27 participants, local diveguides from various commercial dive shops Tulamben, Conservation Community group from Buleleng, Tulamben, Tejakula, Representatives from provincial government, Members of the local community.
This event was a collaboration with ReefCheck Indonesia, Conservation International, Coral Reef Alliance.

Project outcomes

Tips: This section should be completed **ONLY** for the final report.

ISIF Asia expects you to report about the **outcomes** of the project as defined in the table below, based on the project implementation section of this report. Project team is encouraged to discuss the questions provided below to guide the reflection:

Can you identify and describe the relationships between the activities implemented and the social, economical, cultural and/or political benefits of your project implementation?

Outcomes can be defined as:

- *Medium-term effects*
- *Effect of a series of achieved outputs*
- *Should capture the changes for the beneficiaries*
- *Take place during the life of project/strategy*
- *Influence but not direct control*

Mobile apps

- Increase exposure across mobile devices has increased CoralWatch visibility to a wider audience
- Easier upload of data will increase the amount of data from Indonesia and elsewhere in the future
- Mobile apps are increasingly the dominant form of digital interaction and might become more important than the website. This will create a better connection with on-the-go-users.
- Since the mobile apps are now developed for two languages, applications for more languages afterwards might be simple.
- Promotional activities around this project will not only promote the new products but the overall program. Increase in accessibility will lead to more people participating. New products will support even more students, teachers and classrooms engaging in marine science and reef conservation activities.

Semi-automated feedback systems

- Upgrade of web functionality will lead to better data results and less errors in GPS position
- Our global data base is storing so much data but currently it is hard to view results, this new system will identify sites with potential bleaching, building loyalty of users.
- Once these sites are listed, data summaries can be send to key stakeholders and other reef health reporting systems. Providing functional data feedback to reef managers will support rapid response interventions and assessments of coral bleaching, and support management of bleaching events
- Ensuring more effective transfer of data to key stakeholders will support ongoing CoralWatch data collection and promotional activities.
- Less staff time needed to check data!

The outcomes described, will have effect long term. This grant provided us with the opportunity to enter the mobile technology 'world', reaching other and more users.

Project management and sustainability

Tips: Please comment on the general project **administration, staffing, procurement**, etc. specially those aspects contributing to the fulfilment of the project objectives as well as those that have delay project implementation.

Indicate **how the project team has strengthened its capacity** and work towards sustainability with the support provided by ISIF Asia? (new equipment, training, improved administrative skills, lessons learned from the project). Has the organization increased its research or administrative skills of the team involved? Has the project allowed for a particular contribution to capacity building of women or marginalized social groups? Special attention should be paid to the expected or unexpected impact on marginalized social groups.

Have you done **anything different** to provide administrative support for this project **besides your “business as usual”** processes and procedures? Has the project inspired change inside your organization?

Sustainability is to be examined not only in terms of staff retention and financial stability of the organization supporting the project but about the communities’ appropriation of benefits perceived from project implementation.

The ISIF Asia Secretariat is very interest to learn if this project has generated opportunities for future development (new funding from partnerships, sponsorships, investment or other funding mechanisms), please provide details.

Please explain if the ISIF Asia grant has helped to consolidate your organization and how. If any of the project activities will continue after the end of the ISIF Asia grant, please describe how your organization is planning to support future developments.

Staffing

During the project CoralWatch experienced significant staffing difficulties. A project manager departed and following their replacement, the second project manager suffered an injury and was unable to work for an extended period of time (4 months). CoralWatch also experienced severe funding limitations and faced the discontinuation of salary for the team. This was a hard time period for the team but The University of Queensland stepped in at the last minute and offered salary support. Securing continuation of salary support past the end of 2015 is now the main focus of CoralWatch to ensure the sustainability of the program.

In regards to sustaining our project in Indonesia, ongoing activities are essential. To increase capacity in Indonesia one resolution could be to employ a local presentative or start our CoralWatch Ambassador Indonesia program. We are currently seeking funding to establish a CoralWatch Ambassadors program in Indonesia that builds capacity for local environmental leadership.

New versions or updates in Windows and Macintosh might affect the functionality of the app, requiring updates. We will have to find funding for this maintenance and other changes we will wish to make over time. Already now, while the app has only just been released, two features are on our wish list.

1) OpenID Integration. Sign in with Facebook/Google (3rd party technology - OpenID)
Dec 2014 - Quote by Metroweb 500 USD – this was beyond budget

2) Storage of all previous personal surveys on mobile device. Currently user enter data which uploads to the server. At that stage, all data has left the personal device and can only be viewed and edited through personal login in on the CoralWatch website.
Dec 2014 - Quote by Metroweb 1300 USD – this was beyond budget

Impact

Tips: This section of the report does not refer to the project activities, but about the “bigger picture”. It will be desirable if the project team can reflect on the **impact that the project has contributed to as part of other actions implemented by your organization and/or your partners.**

Impact refers to the influence the project may had on the way people does things through the use or adoption of the project outputs; changes in the context the project was implemented; changes in the community the project has been working with; and/or changes inside the organizations that have participated in the implementation or the relationships established through the project’s implementation.

Impact is often impossible to measure in the short term and is rarely attributable to a single activity. Impact can be linked to a vision or long-term development goal that your organization might be working towards.

It can be identified as a logical consequence of achieving a combination of outputs and outcomes.

Impact is usually measurable after the project life and is outside the direct control of the project team and the organization.

At this stage, is too early to measure our aim of increasing the level of engagement and awareness towards coral reef conservation within Indonesian communities.

In our proposal we anticipated to measure the level of engagement and practical outcomes monitoring numbers:

1. Number of times data entry app is downloaded (per month and per year)
2. Number of times educational app is downloaded (per month and per year)
3. Number of partners participating in data feedback network
4. Number of hits through social media sites while promoting our products
5. Number of workshop participants including their feedback.
6. Number of downloads of education materials on <http://id.coralwatch.org/> and www.coralwatch.org

Apart from no. 3 and 4, we have looked at these numbers and included them in the project implementation section. However, since our products have only just been released, those numbers are not very noteworthy yet.

Continuous engagement with Indonesia, through local workshops, conferences, collaborations with local partners and other educational activities are essential to make a difference. The difference, we really like to make is a change in attitude and environmental behaviour. Within our current reach, expertise and time, there are not much opportunities to measure this social impact but we could undertake a survey of project participants in the future. These will include existing CoralWatch volunteers in Indonesia, educators using CoralWatch materials in Indonesia, those who have downloaded apps, and those participating in data feedback networks. This survey will explore a range of issues, including user experience with the project, user perceptions of how these products have facilitated user engagement in science and conservation, and user motivation for engagement in science or conservation activities. Evaluation will be conducted by the project management team seeking assistance of perhaps a social scientist. From previous surveys we have learned that incentives should be provided for survey participation.

Overall Assessment

Tips: This section of the report is extremely valuable for the ISIF Asia secretariat as it provides evidence about the role and relevance of ISIF Asia contributions in the Asia Pacific region.

Tips: Briefly provide your own views on the value and importance of the project relative to the proposed innovation, investment of time, effort and funding involved. Include the strengths and weaknesses of the project

and the steps taken to strengthen the credibility and reliability.

*This is your opportunity to conduct a **team reflection about the value of the project for the organization.** The following questions might help you to prepare a substantive overall assessment.*

- *To what extent the project meet its objectives?*
- *What were the most important findings and outputs of the project? What will be done with them?*
- *What contribution to development did the project make?*
- *Were certain aspects of project design, management and implementation particularly important to the degree of success of the project?*
- *To what extent the project help build up the research capacity of your institution or of the individuals involved?*
- *What lessons can be derived that would be useful in improving future performance?*

This project assisted us to enter the area of mobile technology, an essential step forward within our program. Aiming to engage young people – our future decision makers – requires linking in with their interest and opportunities. Especially in Indonesia, mobile equipment is well within public reach.

The technology knowledge required for this project was a bit under estimated. Developing an app seemed so much easier then it turned out to be. It was a steep learning curve with a good outcome. At individual levels, the app development has increased our technical skills, overall understanding and has started ideas for future projects. Technology opportunities can be overwhelming and this project has helped to lower the barrier.

All products are completed and promoted to users via google play store and iTunes. From previous experience in Indonesia we learned that users will or cannot purchase products, so to promote maximum uptake, all apps are available for free.

During the project design stage the useability and visual design was high on the agenda, and during promotional workshops the outcome was were even better than anticipated. Apps seemed completely self-explanatory and have certainly increased enthusiasm for data input. In June 2015 we had our first field workshop where data was entered on the beach straight after data collection. Another milestone for CoralWatch! This direct data entry activity enabled us to provide also direct feedback on the survey on site.

Providing feedback and developing a feedback system required intensive data analysis and data validation. A re-occurring challenge within Citizen Science is data validation. The latest data analysis show again that CoralWatch citizen science data effectively identifies bleaching events and can be used for research. These findings have been presented at several conferences since and has raised our profile.

Our new automated email alert system encourages users for local action. This is an important step bringing data back to the users and guiding them what to do at a local level in case coral bleaching occurs. Since this has only just been implemented we cannot assess the outcome yet.

Overall our time management could have been better. Limited expertise and staff changes have slowed down progress. To improve future performance we should allow more time for testing and more time for working with overseas developers. Also collaborating with Indonesian marine groups is time-consuming but essential to increase uptake and recognition of the program.

Recommendations

Tips: *Include any recommendations in this section that you and your project team, the organizations supporting the project and the community you worked with, would like to make to other practitioners or researchers on the field facing similar problems or implementing similar solutions.*

Please take a minute to share recommendations with the ISIF Asia secretariat that might help to improve the

support provided.

The understanding and support we received from ISIF has been exceptional, we could not ask for more. The meetings we had in person in Brisbane and on skype were very useful and we received a lot of input and ideas not only on our grant outcome but also focusing on the bigger picture.

Some granting bodies provide money and want to see the final deliverables within strictly set milestones and deadlines. ISIF appears interested in the whole process and above all, open to share concerns or problems. We really appreciate the guidelines provided and assistance along the way.

We hope to present the outcomes and finding of this project in a bird of feather session 'Using Mobile Technology to Improve the Capacity of Citizen Science Projects' at APNIC 40, Jakarta 2015.

Not only CoralWatch, there are many citizen science programs worldwide that could benefit from mobile technology. To be able to develop tools that can assist with data entering, uploading, viewing and editing are essential for success. An exciting future time ahead!

Bibliography

Tips: Include complete bibliographic references to all sources (printed, on-line, quotes, etc) used to prepare the different sections of this report. The APA style guide offers examples about how to reference a variety of sources. <http://www.apastyle.org/learn/quick-guide-on-references.aspx>(as accessed on 3/7/2013).

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Media outreach



The screenshot shows a news article on the BaleBengong website. At the top, there is a banner for Thai Airways Boeing 787 Dreamliner. Below the banner is a navigation menu with categories like BERANDA, GALERI, GAYA HIDUP, LINGKUNGAN, OPINI, SOSIAL BUDAYA, SOSOK, and TEKNOLOGI. The article title is "CoralWatch, Aplikasi Pemantau Terumbu Karang" by Anton Muhajir, dated June 29, 2015. The article features a photo of a woman pointing at a presentation slide showing a diagram of coral reef monitoring. The text below the photo reads: "Pemantauan kualitas terumbu karang bisa melibatkan pemandu selam lokal. elama dua hari pekan lalu, belasan pemandu selam. oerwakilan kelompok". To the right of the article, there are social media sharing options (Twitter, Facebook, Google+, LinkedIn, Email, Print), a list of authors (Anton Muhajir), and tags (Bali, Karangasem, Lingkungan, Pesisir). There are also advertisements for "saka" and "MEDIA INDEPENDEN BERSAMA".

June 29, 2015 by Anton Muhajir
CoralWatch program and app promotion

<http://balebengong.net/kabar-anyar/2015/06/29/coralwatch-aplikasi-pemantau-kualitas-terumbu-karang.html>

View whole article and other media releases on
<http://id.coralwatch.org/media>

View photos of all workshops and events
<http://id.coralwatch.org/workshops>