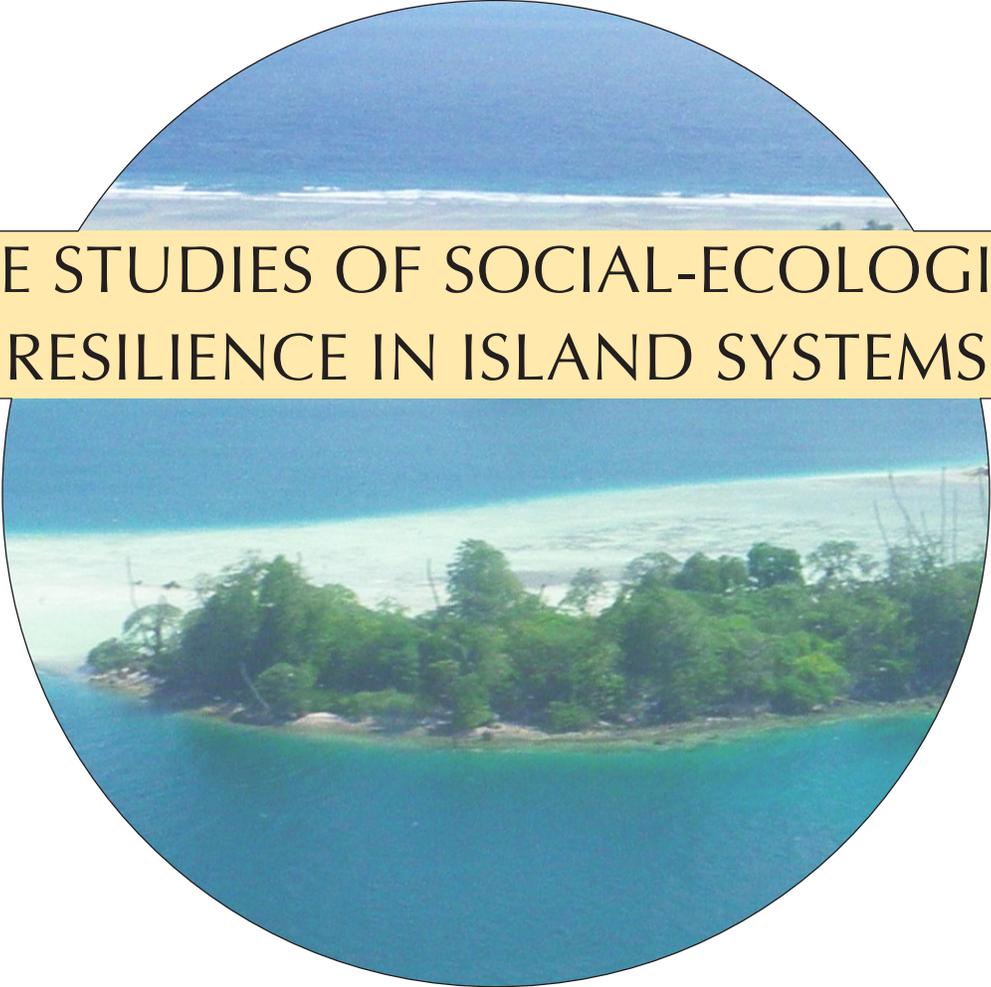


RESILIENCE SOURCEBOOK

INSPIRED BY THE 2013 MILSTEIN SCIENCE SYMPOSIUM
UNDERSTANDING SOCIAL AND ECOLOGICAL RESILIENCE IN ISLAND SYSTEMS
INFORMING POLICY AND SHARING LESSONS FOR MANAGEMENT



CASE STUDIES OF SOCIAL-ECOLOGICAL
RESILIENCE IN ISLAND SYSTEMS

 AMERICAN MUSEUM OF NATURAL HISTORY
**CENTER FOR BIODIVERSITY
AND CONSERVATION**

COMMUNITY SURVEILLANCE AND ENFORCEMENT LEADS TO A DRASTIC REDUCTION IN DESTRUCTIVE FISHING METHODS

RAJA AMPAT, WEST PAPUA, INDONESIA

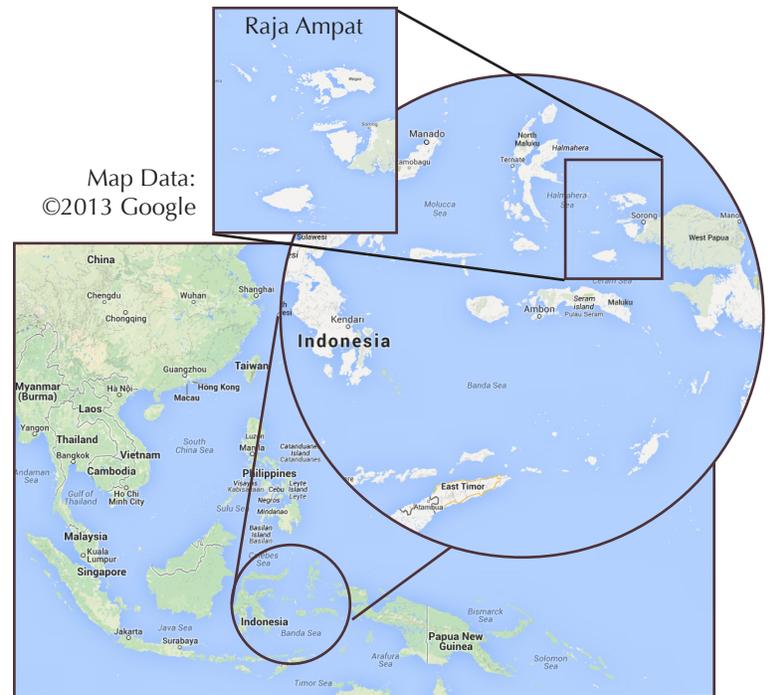
Purwanto¹

THE SETTING

Raja Ampat is an archipelago to the northwest of the island of New Guinea. Located at 0°22' S, 130°45' E, Raja Ampat is made up of over 1500 small islands but the majority of the islands' population lives on five main islands: Misool, Salawati, Batana, Kofiau and Waigeo. Raja Ampat is in the heart of the Coral Triangle (an area of the Pacific renowned for its high levels of coral diversity). The waters around Raja Ampat are teeming with rich biodiversity. This includes 1,437 species of fish, 699 species of mollusk, and 553 species of hard coral (*Scleractinia*). The islands of Raja Ampat are also known for their rich sea grass meadows, mangrove forests, karst islands and marine lakes.

Raja Ampat is a regency in West Papua Province of Indonesia. Each province in Indonesia is made up of regencies that can be further divided into districts and even smaller administrative villages. Indonesia recognizes traditional management. In 2006 the Raja Ampat Regency Government established seven marine protected areas (MPAs) that encompass one million hectares of coastal waters. The MPAs were established to address increasing threats of overfishing, destructive fishing methods and food security for the approximately 50,000 residents of the Raja Ampat Islands. As of 2011, fishing and tourism are the main activities in most parts of the protected areas with the exception of no-take zones.

Villages in Raja Ampat use a traditional management system based on local ecological knowledge to manage natural resources. The management is called *sasi*. *Sasi* are prohibitions and rules about harvesting natural resources on both land and sea. For example, *sasi* can dictate temporal and geographical fishing regulations.



Fishing is the mainstay of the subsistence economy in Raja Ampat. Hand lines were the traditional method of fishing and are still used by the majority of locals today. In more recent years, however, fishers from outside Raja Ampat have used more modern and efficient fishing technology like lift nets, seine nets, floating nets, bottom nets, portable traps, and spear guns, which have led to overfishing. In addition, the use of destructive fishing methods like cyanide and blast fishing threaten the reef ecosystems. People in Raja Ampat also harvest coconut, copra, cocoa, and sago palm for their livelihoods.

THE DISTURBANCE

Destructive fishing methods are common in Indonesia. Raja Ampat's coral reefs are affected by environmentally unfriendly practices like the use of cyanide and blast fishing. While both cyanide and blast fishing are illegal in Indonesia, this ban is rarely enforced. Possessing explosives or cyanide is not cause for arrest; a fisher must be caught in the act of practicing illegal fishing techniques to be prosecuted for the offense.

¹The Nature Conservancy



Blast fishing became a popular fishing technique for catching schooling fish like snapper (*Lutjanidae* family) after World War II. Originally, ammunition shells used during the war were dug up and used as explosives to bomb fish. Later, handmade explosives – made by putting readily accessible materials like kerosene and fertilizers in beer bottles – became the norm. Dynamite is also used and obtained from police and military operations, mining companies, or civil engineering projects. When blast fishing, fishers use boats to find a school of fish, and then throw a lit bomb into the center of the school. Once the bomb explodes, the fishers will dive into the water to collect the dead or stunned fish. The practice also causes the physical destruction of coral reefs.

The use of cyanide is another method for collecting live fish in the waters around Raja Ampat. Fishers use air compressors to dive to depths and then spray a sodium-cyanide-seawater mixture on different levels of the reef to “stun” the fish. Then the fishers can remove the comatose fish easily. Cyanide is used mainly for collecting reef fish like grouper (*Serranidae* family), Napoleon wrasse (*Cheilinus undulatus*), and rock lobsters (*Panulirus* spp.). Cyanide is lethal to other reef organisms, including hard corals (*Scleractinia*). This method requires ready funds; large Indonesian fish companies or foreign companies from places like Hong Kong often fund these operations.

Both locals and non-locals practice blast fishing

and cyanide fishing in Raja Ampat. Residents of Raja Ampat using these destructive techniques tend to use them outside of their own districts. These locals are also being employed by larger operations outside the province that use cyanide. Both locals and non-locals who use destructive fishing methods are therefore considered to be “outsiders” to the affected coral reef ecosystems.

Between 2007 and 2011, The Nature Conservancy (TNC) found that, on average, three vessels per day used destructive fishing methods like blast fishing and cyanide in Raja Ampat. Such frequent uses of these methods have long-term impacts on the whole coral reef ecosystem.

THE RESPONSE

The community in Raja Ampat was becoming increasingly frustrated with outsiders harvesting on their reefs. To make matters worse, the damaging effects from the use of explosives and cyanide were becoming more apparent. The Nature Conservancy (TNC) estimated that these practices had caused a 20-50% decline in coral cover.

TNC made a concerted effort to highlight the importance of local coral reef ecosystems and how destructive fishing methods affected them. The outreach was intended to educate and inspire the community to take a more active role in the established marine protected areas. In 2008 the local community made the decision to take action.

The community worked with The Nature Conservancy to enhance enforcement in marine



protected areas. The local community sought to participate in the surveillance of their protected areas. In 2008, TNC began helping the community implement a patrol system. They agreed to fund patrolling efforts and enforcement training. Community leaders were very supportive and urged the local government to establish an enforcement unit that adapted to community management. In 2011 the local government agreed and a local patrol system was established in Raja Ampat to enforce conservation.

RESULTS

Due to local increased enforcement, blast fishing and cyanide fishing were reduced by 90% in the area. Community members serve as part of these patrols, in Raja Ampat communities across Raja Ampat. Mobile substrate, or rubble, in reef systems has been stable in the past three years, indicating this decline in blast fishing.

In February of 2012, a local patrol caught a group of blast fishers in the protected area off of one of Raja Ampat's main islands, Kofiau. The fishers were prosecuted and found guilty.

Involvement in surveillance of their reef systems has empowered the communities in Raja Ampat and strengthens their connection to the environment.

Reef recovery

TNC is hopeful that coral reefs damaged from the use of destructive fishing methods will recover in the next 20-30 years provided that local enforcement continues in the marine protected areas.

RECOMMENDATIONS

- *Share knowledge with communities about local threats.* Once communities in Raja Ampat were more aware of the extent and the severity of the damage to their reefs from blast fishing and cyanide, individuals wanted to become more involved in the management process.
- *Communicate as much as possible in the local dialect.* Identify an individual who can speak the local dialect. Sometimes messages can become

lost because of language differences. In Raja Ampat, the Nature Conservancy was looking to educate and inform communities on many different islands with different dialects. TNC found that using local dialects put community members at ease and made outreach and communication more effective.

- *Identify an influential local leader.* When trying to get community buy-in, it is important to have a trusted community figure working with you. The community will be faster to address a disturbance if a village leader or a religious leader can help convey your message. Support from the local community is key to more easily work with local institutions and government.

LEAD ORGANIZATIONS

- The Nature Conservancy
www.nature.org

PARTNERS

- Conservation International
<http://www.conservation.org>

As told to Alexandra Donargo.

THE MILSTEIN SCIENCE SYMPOSIUM

The collection of this case study and others like it results from the April 2013 Milstein Science Symposium, Understanding Ecological and Social Resilience in Island Systems: Informing Policy and Sharing Lessons for Management. Held at the American Museum of Natural History, the Milstein Science Symposium convened local resource managers, researchers, educators, island leaders, policy makers, and other leading conservation practitioners to examine characteristics, qualities, and processes that may foster resilience for coastal and marine systems as well as explore interactions, linkages, and feedback loops in complex social-ecological systems and what this means for management. The Milstein Science Symposium was organized in collaboration with The Nature Conservancy, the Gordon and Betty Moore Foundation, the National Science Foundation, The Christensen Fund, the Coral Reef Alliance (CORAL), the Scripps Institution of Oceanography at the University of California San Diego, the University of California Santa Barbara, the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries, and Small Island Developing States (UN-OHRLS), and the Wildlife Conservation Society.

The 2013 Milstein Science Symposium was proudly sponsored by the Irma and Paul Milstein Family.



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To learn more about the CBC, please visit our website:

<http://cbc.amnh.org>



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Cases can be found online at:

<http://tinyurl.cbc-resilience-cases>

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