

Title

National Sensor Network to Monitoring Fish Bombing

Grand Challenge Area

Saving Coral Reefs

Focus Area

Local Coral Protection

There is growing interest in the relatively time-consuming, complex and expensive process of growing coral fragments in nurseries for transplant back into the wild. Our organization in the Philippine has been operating coral nurseries and outcropping coral fragments for over 4 years. But what has been counterproductive to our efforts is the daily experience of feeling shock waves from fish bombing activity knowing each bomb is destroying many times more coral than we are able to replant.

Humanity needs to do everything possible to help coral reefs but our cost-benefit analysis clearly shows that the effort to regrow destroyed coral is far less efficient than stopping the healthy coral reefs from being blown-up in the first place. We need to move the big rocks in the road and there are many tropical countries around the world with similar severe fish bombing activity. To realize a net positive outcome our organization decided to split time and resource between combating fish bombing and active coral reef restoration. What we have learned over the last 3 years is that off the shelf low-cost underwater sensors work very well to record fish bombing from as far as 50 kilometers away. In addition, hydrophone technology can be used to detect fish bombing activity and transmit very accurate GPS location data in real time.

This is a design challenge to use existing commercially available hardware and software technology to create a two level monitoring platform first in Level 1 to record and report blast fishing activity and then use that data to determine where to deploy a Level 2 real-time location based system in combination with teams of professionals for enforcement.

1a. Problem Statement: What are the root causes of the problems in the space your competition is addressing?

The root causes of blast fishing in third world tropical countries are often a combination of the following factors: 1) overpopulation/poverty/hunger, 2) lawlessness/corruption, and 3) indifference/ignorance. Here in the Philippines, local government units are responsible for management of coastal resources in Municipal waters including

enforcement against illegal fishing but are generally unaware as to the extent of blast fishing activity and uneducated as to the long term negative impacts. This general lack of awareness due to very little objective data of blast fishing activity leads to a lack of accountability from policing agencies and a sense of hopelessness to stop the activity given the difficulties of monitoring.

Furthermore, convictions are dependent on physical evidence and hard to obtain eye witness testimony. Conclusive digital evidence combined with other technologies such as wearable cameras, drones, and marine radar provide irrefutable evidence that is very difficult to challenge.

1b. Problem Statement: What's already being done in this space

Very little is being done to stop blast fishing in the Philippines. Regionally, there are some success stories in small project areas but to our knowledge there are no technology solutions on a national level to end fish bombing. There are strict laws against fish bombing but most municipal Mayors and Provincial Governors are providing lip service in support for enforcement but then are in denial that it is occurring within their areas of responsibility.

There are a number of NGOs trying to create awareness about the long term negative impacts of blast fishing. Some coastal communities have established fish warden (Bantay Dagat) programs to watch and protect designated areas but most of these programs are not able to change the behavior of the career fish bombers.

1c. Problem Statement: Why aren't current efforts working?

Catch rates of reef fish have been steadily declining all over the developing world due to increasing fishing pressure, unsustainable fishing methods, and land based pollution. Alternative livelihood creation is not keeping pace with hook and line fisherman displaced from the collapsing fisheries. Fisherman are getting increasingly desperate to maintain their subsistence fishing way of life to earn enough to feed their growing families and, despite government claims, fish bombing is on the rise.

Fish bombers often operate at night, or in remote areas, making it even more difficult to catch them. When fish bombing is reported often the evidence is disposed of over the side of the boat as they see an enforcement vessel approaching making it even more difficult to get a conviction for lack of evidence. There is very little upside to a Mayor admitting his Municipality has a major fish bombing problem and even if he/she was willing to confront voting constituents they rarely have the resources or expertise to conduct enforcement at sea to get convictions in often a corrupt local judicial system.

Without transparency enforcement authorities are tempted to take bribes to let fish bombers go- or enter into a revenue sharing agreement to look the other way- to allow the practice to continue.

With a very very low probability of being caught fish bombing and even less chance of being convicted of a crime when caught there are no negative incentives from the local government for conducting fish bombing activity.

2. Winning Team Will Statement:

This \$5 million XPRIZE is a 3 year competition that will address the grand challenge of saving coral reefs. The winning team will be the first to monitor blast fishing activity on two levels across a minimum of 80% of the 37,000 kilometers of coastline in the Philippines. This XPRIZE is important because objective data will dramatically increase awareness, accountability of the LGU, and result in dramatic declines in fish bombing given the new transparency and chances of being caught.

3a. Rule Summary:

High Level Rules:

- The Level 1 system reports hourly blast fishing activity (0-15km from shore at a minimum) with animated heat maps representing individual fish bombing events. Results must be published publicly online 5 business days after the end of each month for the fish bombing activity recorded in the previous month. Reports must include access to the raw data from which the reports were generated and be in format to create a fish bombing data layer on the Global Fishing Watch Website.
- The Level I recording sensors must not exceed a cost of \$150/unit, have a minimum 6 month battery life, have an average usable lifespan of not less than 4 years, and be able to detect range, direction and general intensity within a 2 kilometer level of accuracy.
- The winning team must also create a Level II near real time system capable of measuring fish bombs events from a typical nitrate beer bottle sized bomb within 10 seconds of detonation at a maximum range of 25 kilometers with 90% accuracy within 50 meters.
- Historical data must remain online with a graphs showing trends of blast activity for the entire program period.
- Included in the monthly reports on the website are rankings of all 800 coastal Municipalities and 66 coastal Provinces in the Philippines from best to worst updated each month indicating most improved and least improved.
- Each Municipality and Province shall have a corresponding information sheet (with pictures) of Governors, Mayors, Town Counsels, and other key enforcement officials

from the Coast Guard, Municipal Police, Bureau of Fisheries, and Department of Environment and Natural Resources assigned in each area profile responsible for managing IUU fishing activity. In addition the full names and mugshots of fish bombers apprehended will also be published online for the duration of the project.

3b. Rule Summary Justification:

The rules were designed to deliver objective 3rd party measurement of fish bombing activity, to elicit a public anger and shock at the extent of fish bomb activity, and create accountability for individual leaders within the LGU to be part of a solution. The proposed two tier system is optimal because an underwater seismic recording device is far less expensive and easy to operate than the near real-time hydrophone system. The real time system is only effective if paired with a rapid enforcement team with the authority, training and resources to specifically apprehend fish bombers. So by collecting objective monthly data of fish bombing activity the spotlight is redirected back on local law enforcement and mayors whose responsibility it is to manage enforcement.

We have proven that we can reduce blast fishing by up to 80% by just by letting President Duterte's office know there is blast fishing activity occurring in a Municipality. Afterwards we share the reports with the Municipal Mayor's office so he knows his performance, and possible collaboration with fish bombing syndicates, is being scrutinized.

The Level 1 loggers need to be low cost, durable and long lasting. The data being collected should be open source to allow the online community to analyze other kinds of boat engine noise and biological acoustic information.

4. Goals & Objectives of the Competition:

The primary objective of this competition is to end the practice of fish bombing first in the Philippines, then in the Coral Triangle, and then where ever in the world fish bombing is destroying coral reef habitats. This prize is for the Philippines but once it has been successful a case has been made to scale the program to other countries around the world with similar fish bombing problems.

The general public in the Philippines remains unaware as the level of fishing bombing activity and the costs to national natural asset capital from the relentless bombing activity. A visual representation of fish bombing activity presented as an animation over time with a flash of light for each bomb and then heat map coloration for areas of high

bombing density would be a shocking demonstration to get the attention and resource allocation it deserves.

5. Paradigm Shift Intended by the Prize:

Fathers are passing the knowledge of bomb making and fish bombing to sons and we need to break the cycle of this destructive fishing practice.

It seems that most of the government offices and people in charge of enforcing destructive fishing practices are in denial that fish bombing is occurring or is a major problem. If we bring fish bombing back into the domestic and international spotlight it should be an embarrassment to the Philippines and help to rally international support for the problem.

6. Radical Breakthrough that is Intended:

After decades of blast fishing that has killed billions of tons of past and future marine biomass the intended breakthrough is an 80% reduction in blast fishing within 3 years resulting in a trend that continues to approach 100% reduction within 5 years. Assuming 800 coastal municipalities in the Philippines experiencing a combined 10,000 fish bombs per day in water shallow enough to destroy coral reefs, and each fish bomb is negatively impacting 100 square meters of coral reef, then an 80% reduction in blast fishing would equal saving 800,000 square meters of coral reef PER DAY from fish bombs.

On an annualized basis, assuming 50% repeat bombing activity on the same coral reefs, this program could eliminate fish bombing on approximately 15,000 square kilometers of coral reefs which is equal to over half of all the coral reefs in the Philippines or about 5% of the the coral reefs in the known universe.

7a. Prize Amount:

\$5,000,000 (Five Million USD)

7b. Why have you selected this prize amount?

\$2.4 million for purchase, deployment and monitoring of Level 1 recording sensors to cover 30,000 kilometers of coastline and Level 2 systems as needed for a total of three years.

\$1 million for community engagement, awareness campaigns, reporting, cloud based data storage, and management of the public facing website.

\$1 million in institutional corruption transactional costs required by the Philippine

government

\$600k as an incentive to the service provider for reaching the XPRIZE goal.

8. Post-Competition Impact:

Establish a case study of how to eliminate blast fishing on a national scale with detailed cost analysis then use the success in the Philippines to sell a bundled solution to other countries in the Coral Triangle targeting Indonesia, Malaysia, and PNG first. For economies of scope and scale, create a low cost back office analytics center in the Philippines to process global data for reporting for country clients around the world. By year five have fish bombing monitoring programs running in over two dozen countries to work towards eliminating the practice globally within a decade.

9. Potential Sponsor(s) and/or Funding Strategy:

The estimated economic value of a healthy coral reefs is as high as \$1 million per square kilometer. There are roughly 25,000 square kilometers of coral reef in the Philippines (approximately 9% of all coral reefs globally) . Assuming a very conservative natural asset value of \$2.5 billion of Philippine coral reefs it should be an easy argument to spend \$2.5 million per year of Philippine government funds to continue the monitoring and enforcement program beyond the three year XPRIZE term.

A cash incentive scheme funded by the Philippine Department of Environment and Natural Resources then could be introduced for those municipalities who remain 'fish bomb free' every quarter.

We could look to crowd source a fund from those who care about coral reefs globally to pool together funds and pay out success fees to those Mayors who manage to reduce and maintain low fish bombing statistics.

Each Municipality has a disaster relief fund and police enforcement equivalent to 22% of the total annual municipal budget. I can foresee the day when the costs of maintaining Level 1 and 2 fish bombing monitoring systems becomes a permanent line item on the annual budget.

Other Possible Sources of Funding:

\$43 Million loan to the Bureau of fisheries from the IFAD development bank for the FishCoral Program (\$27 Million unspent)

\$5.2 Billion Asian Development Bank climate change adaptation and mitigation fund.

10. Video Submission:

https://www.youtube.com/watch?time_continue=1&v=ZbTWpKfISro

Hackathon Attendance

Yes, I am able to attend in person.

Summit Attendance

Yes, I am able to attend in person.