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Environmental Change and Security Program

Troubled Waters: Anticipating, Preventing, and Resolving Conflict Around Fisheries

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Edited Transcript – Richard Pollnac

I'm going to be talking about cooperation and conflict between large- and small-scale fisheries, a Southeast Asian example. Okay. The basic premises that underlie what I'm going to be talking about are one, that Southeast Asians have a heavy reliance on fish for dietary protein - that goes without saying - and income generation. And we have in Southeast Asia at the present time rapid population growth, and along with this there's limited land and economic opportunity, and the open access that is generally practiced with regard to marine resources, despite the fact that there are laws on the books, has resulted in an increased demand for fish and increasing numbers of fishers. And this has resulted in decreasing fish populations.

Tomorrow Leona D'Agnes is going to be giving a presentation which has a diagram that shows the increase in population and the decrease in capture fisheries at the same time.

Now when you look at this model that I have up here, this rapid population growth, increasing fishing effort, all the things that I talked about so far are illustrated, and I put it in a model because there are relationships between all these variables. This is just summarizing what I originally said.

What we have are people who are moving to the coast from inland where there are limited resources, and we have people residing along the coastline. And they are continuing to fish despite the fact that the fish populations are decreasing in most areas. Now this results in migration of fishers from place to place. This migration of fishers is not slow.

I published a paper in marine and fresh water research in the early 2000s, I think it was 2001, where I was trying to look at the relationship between a number of socio-cultural and environmental variables and the health of coral reefs. I used as a measure of the health of coral reefs a mortality index. I broke my sample into two groups on the basis of a dividing



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line in mortality index that John McManus one of my co-authors gave to me. One of the things that I found out much to my surprise, and I was analyzing this data after I left the Philippines, and I was down in Indonesia in Bogor, and I have the data, and I look at it, and what do I find? Contrary to my expectations, healthy coral reefs were in areas where there was rapid population growth and greater fisher density.

And I thought, “Eh, I’ve calculated my mortality index incorrectly,” all right? No, I didn’t: I went back and checked it. Then I sat, and I thought, I’m sitting in a tropical area, what happens if you drop a little bit of sugar on the floor? The ants come. People were migrating to areas with richer coral reefs at such a rate that this would obscure any synchronic analysis of the data. So my results were correct, and I’ve rechecked them and rechecked them, of course it’s been published that areas with the healthy coral reefs were where the population was increasing most rapidly because fisherman were moving there.

In addition to that, one of my graduate students, she was a Filipina, she went to the Philippines to an area where fishers were migrating, and she substantiated my interpretation of the data.

So this results in the migration of fishers, sometimes rapidly. Fish populations continue to decrease; this results in reduced incomes, and also reduced food security, which is an important variable that some of you talk about.

Now in my coastal sample in the Philippines, my coastal sample was a little bit later, but in that sample 38 percent of the children were underweight, and this is versus 28 percent throughout the Philippines, that’s still a large number. But we have more children underweight in the coastal areas where we have these fishing communities.

Then just this morning when I was sitting down in the food court because I just have so much data, I remember, geez, well I have information on percentage of fishing families as well. So I ran that correlation, something that I hadn’t done before just this morning. What did I find? That the percent of children underweight was significantly correlated with the percent of fishing families in the communities, and the correlation wasn’t all that strong, .37, but it was significant at the .02 level. The sample was relatively small too, around 40.

Okay, this decrease in fish populations and decrease in fish being captured results in increased poverty levels. And this leads to the use of more efficient and/or destructive





fishing techniques, things that you've all heard about before so I don't have to describe them. And this leads to even greater reductions in fish populations. Remember this is localized too. There are still some areas where the fish populations aren't that bad. I know people like to generalize, but I've been in areas, and I've fished in areas in Southeast Asia where the fish populations are still good and you go to the markets and see it as well.

This results in Daniel Polley's model of Malthusian over-fishing. I've added some more variables to the model because the world is not simple like some people try to make it. It's complex: there are a lot of variables involved, and it's the attempt to simplify the relationships between these variables that results in the lousy projects that we have now with the lousy results that result in still declining fish populations and starvation in some of these coastal communities. I hope that there are some questions about that later.

Okay. Now what do we have? International demand for fishery products that even results in more pressure on the resource. Local fisheries respond to this international demand so we get the globalization of markets, larger industrial fleets start to spread worldwide. So we get globalization of effort. We've got more and more people going after fewer and fewer fish in areas where they weren't fishing before. Some of these areas that I said that I fished where the fishery was good enough for the local people to sustain their livelihoods. And then we end up with the people in these communities even using ever more efficient and more destructive fishing gears.

And so competition increases between the fishers. There was already competition, but the competition increases, and so we've got competition between people who are using different gear types. We've got competition of migrants versus locals. We've got competition concerning small-scale versus commercial fisheries.

And it's still going on. I was just in Thailand a little over two weeks ago, and the small-scale fisherman in the communities that I was in were complaining that they'd like to have the commercial fishers fishing even further off shore. I also was involved in setting up a baseline for a post-tsunami project in Thailand on the Andaman sea coast, and there they had kept the commercial fishers out of the inshore fishery by putting out artificial reefs; you know those big concrete tripods. Well, the Tsunami messed that up. And while I was there in the Northern part of the Andaman Coast very close to the Burmese border, there were commercial fishers once again fishing close to the shore. So we've got conflict in what we called in an article, "fish wars."





Here's the entire model now; it becomes even more complex. And this is simple in comparison to the reality because each of these points in this model can be composed of numerous other variables that are interrelated with each other. And our failure to take this into account results in the crappy projects that we have at the present time.

What can we do about conflict? How can we avoid conflict? How can we resolve this kind of conflict between fisheries? One way is with top down fisheries management. The other way is with co-management of fisheries; that is the government and the local fishers cooperating with each other, communicating with each other concerning the management of fisheries. The other one is cooperation between the various users, and I'm going to speak about each of these briefly.

This then is a model where we have conflict, and I'm showing that we can have top down management, co-management, or cooperation. I'll talk about top-down management and cooperation first.

Well, top-down management results in actions like the trawl ban in the Java Sea. This resulted from the fact -- and this is way back decades ago -- it resulted from the fact that there was real conflict between small-scale fisherman and the commercial fisherman, or the larger trawlers, operating in the Java Sea. This resulted in the fire-bombing of boats. There's a destruction of gear even going on today, I just used that as one of the early examples, and it didn't necessarily work because we have two groups of fishers who are still in conflict with one another.

The next is large boats banned from inshore areas. This was something that was instituted in many Southeast Asian countries, and Thailand is a good example, I just mentioned that: that boats are banned from the inshore areas. They don't necessarily have a Coast Guard that can keep them away, so they use techniques like putting in the artificial reefs so that the trawlers would get their gear hung up on them. Nevertheless, there was still conflict between smaller scale fishers and larger scale fishers.

Cooperation. Everybody likes to talk about conflict. It's like CNN News, then, and the various news magazines and sources that, "Oh, conflict that gets people interested," all right? "They're going to read about it, and they're going to buy our paper if it's conflict."





There isn't always conflict. Sometimes small-scale fishers and commercial fishers will cooperate with one another. And one example, just a recent example that I saw in Indonesia, I was working in North Sulawesi, and they have larger scale fishers that operate many perseins [spelled phonetically], and they have small-scale fishers, guys with boats with very small motors, sometimes without motors. In the communities where I was working, in one of the communities where I was working, there were only three of these large-scale, you know many perseiners in the community at the time that I worked there, and I was interested in fish-aggregating devices at the time because I had a little project concerning fish-aggregating devices, and it kept me interested in them and their role in the fishery. And I found out that the people in this community, even those that didn't operate the large mini-perseins, which was a larger scale fishery in contrast to most of the fishers in that area, and in the community, but they would put out fish-aggregating devices which were very inexpensive in comparison to the cost of the mini-persein and the gear associated with it. I mean a fiftieth of the cost for a shallow-water fish-aggregating device and at a certain time of the year those fish-aggregating devices would aggregate fish that the mini-persein trawlers could go after.

And so I'm interested in, well, you know what's the share of the catch, you know? What are the people getting that put out the fish-aggregating devices? I was told they got a third of the catch. I couldn't believe it because the economic investment was so slight in comparison. One third of the catch, and so what I always do in a situation like that is I run a hundred yards down the beach and ask somebody else before people can get together and get their story to coincide. And everybody said that: they got a third of the catch. Any economist would say that doesn't make sense, a third of the catch with that economic investment? So I talked to the people about it, you know, why? And they'd tell me things like, "Oh, it takes a lot of skill to make sure that the fish are still around, you know, the fish-aggregating device, and so we're being reimbursed for that skill." Other people said, "Well it's just fair." I'd ask questions like, "What would happen if somebody didn't pay, you know their third of the catch?" "Oh, they would just never fish here again." Because they told me whenever the fish are aggregating in this area, it looks like a bus parking lot off shore. There are so many of these mini-perseiners out there waiting for the fish to aggregate to come in.

And what it ended up being was that the mini-perseiners felt that this was a fair share for the people in that community. The fish was offshore of this community. The people in North Sulawesi, the people who live along the shoreline, who operate the mini-perseiners are for the most part Muslims, and North Sulawesi in contrast to the rest of Indonesia is about 95 percent Christian, but the fishers are mostly Muslims that this entire coastline was something





like one community. Fishers from other communities would pray in the mosques of other communities when they were fishing offshore.

So this is what some people have referred to as a moral economy, it was fair. It had nothing to do with how much was invested like an economist would like to, you know, question an interpretation like I had made.

Another way is that I have seen that small-scale fishers and large-scale fishers have worked together is that the large-scale fishers and some fisheries like shrimp fisheries don't want to keep thin fish in their holds because of the value of the thin fish, so they'll often sell it to the small scale fishermen who come out to the boats.

I just want to point out that there are numerous ways that small-scale fishers and large-scale fishers have cooperated with each other, and there isn't necessarily always warfare and conflict between them.

Now the other technique is through co-management and that this should also reduce the amount of conflict. Well we had a project several years ago. I know I was in Vietnam in 2004 for this project and Robert Pomeroy, John Parks, and I have an article that was published in 2007 in *Marine Policy* where we looked at this data. And we collected data trying to see if there's any relationship between co-management and conflict and fishing communities in Vietnam, Thailand, the Philippines, and Indonesia.

There are a total of 18 variables that we used because like I said these things aren't simple, and what we had to do was see how much variance was contributed by other variables to conflict in the community. So we selected all of the variables that we could find in literature concerning variables that influence conflict over resources as well as having a presence or absence of co-management in the community as one of the variables. And so we had a number of demographic characteristics. We had social stratification as a variable, security issues, and civil tension, resource condition, and harvest activity, community and resource conflict resolution, marine resource governance and tenurial arrangements as well as community organization. There were a total of 18 variables throughout these categories.

And then just to go rapidly and give you the results, we found that in all of the areas except in Thailand that co-management had a significant contribution to the level of resource conflict that is lowering the level of resource conflict. If co-management were present, the





level of resource conflict would be reduced. In Thailand the influence of co-management was not statistically significant at the .05 level was at the .1 levels, but as far as I'm concerned, there was no relationship in Thailand; but in Vietnam, Indonesia, and the Philippines there was.

So we feel that the results of this research indicate that co-management can also operate as a conflict resolution device concerning resource conflict. But the question is, if we're going to do co-management, and if we're interested in the relationships between population, and our dependent variable in this case as being resource, conflict over the resource, how are we going to get an effective co-management scheme?

People like to say, "Oh, all we need is co-management." Well it isn't that easy. So much of it has failed. Well I have a little term there called data-mining, and I have a project now at the National Center for Ecological Synthesis and Analysis where Patrick Christie and I and a number of colleagues are looking at a lot of data that we have concerning a scaling up of marine protected areas.

Anyway, I went back to some data that I had on marine protected areas that I collected in 2000 in the Philippines. And for this project I was focusing on variables that would be associated with scaling up to ecosystem management. Population is one such variable; the larger the resource management area, the larger the associated population in a country like the Philippines. So the research that I'm going to present here shows a relationship between population and success of a co-management regime in the Philippines -- these are all community-based marine protected areas -- I think we will illustrate some of the difficulties that we may face in trying to use co-management of the results that I have.

The sample in the Philippines was 45 MPAs, 14 in Bohol, 12 in Leyte, 8 in Sabu, and 11 in Negros Oriental. In this fieldwork I went to all of these marine protected areas and participated in the assessment. I got something like 300 variables for each of the marine protected areas; I had a dependent variable of marine protected area performance and the dependent variable that I'm using here. I had numerous different marine protected area performance variables. This is a composite variable that included biological performance as well as institutional performance and aspects of the MPA.

I get the same results; slightly different with respect to just biological performance, if that's all you're interested in. But a marine protected area, the success of a marine protected area





has more than biological components because it has a component of empowerment of the community and a number of other things that I can respond to later if you have any questions.

That looks complex, doesn't it? I said the models that I use are complex, and that's because they reflect reality. And if you can't deal with it, like I said before, you're going to end up with the same kinds of projects that you have right now and that you have had in the past. Anyway, the way I developed this model is that I first had MPA performance as my dependent variable, then I looked at all the other independent variables -- and this is just looking with the population because I have another model that's more complex than this that I'm not really going to show you because one of my colleagues said it just wouldn't be able to be absorbed at a short meeting -- and what I did is I went from marine protected area performance and went back into the correlation matrix looking at variables that explain more than 15 percent of the variance. That's a correlation coefficient of approximately .40.

And look at the largest predictor of marine protected area performance in this model here -- it's population. And the correlation between population size and this is village population size in marine protected area performance was minus .54. That's over 25 percent of the variance; .54 squared is what? About 30 percent of the variances explained by population. Also we had, once I got population, then I started to look at variables that were correlated with population at a degree that they would explain 15 percent of the variance or more.

Note I didn't use statistical significance. There's such a thing as practical significance. It has to be statistically significant, but you can have something that's statistically significant that explains one percent of the variance with a sample of about 150. And what's one percent of the variance? Nothing in terms of the variables that we're dealing with. Maybe if it's a cancer rate it's something, but not with these variables here.

So I then looked at population and then looked at variables that were highly correlated with population of course village area was, and also it was interesting the amount of dependence on fishing was, and it was also, this might be expected, correlated with a variable that I referred to as small island. You're going to ask me what's a small island. Well if you're working in the Philippines, they're all islands. A small island is an island off an island. In other words there are little islands off of the whole, they're small islands.

And the village heterogeneity was another variable in this model that happened to be related to monitoring by the community, which was also strongly related to marine protected area





performance. That is where the community would get together and monitor the MPA, and would influence MPA performance.

But now this is success of a community-based marine protected area. And the reason that I threw this in was because I was concerned about the fact that some people say, “Well we’ll just have co-management,” and I just wanted to show that the size of population also influences the level of success of a co-management program because the larger the population that you’re dealing with, the more difficult it is to get people to agree and to develop a co-management scheme.

So are we then caught in an endless cycle of negative feedback? We’ve got large population causing the problem, but because the population is large, it’s more difficult to develop techniques to try to reduce the amount of conflict. Not necessarily because we can try to determine ways to improve cooperation in larger populations to facilitate co-management; we have done research and there’s research in the literature that tries to indicate how cooperation can be improved in larger populations. The thing is we can’t just go out and say that because we’re running training programs and trying to introduce co-management in a community, that it’s going to work, and we’re going to solve all the problems. It just doesn’t work that way.

The other way that we might be able to do it is to combine co-management with appropriate aspects of locally development conflict resolution techniques. Like some of the cooperation that I’ve already demonstrated exists between commercial fishers and small-scale fishers. Of course you’re going to say, “Oh, the poor resources, you know the commercial fishers and the small-scale fishers start to cooperate with each other and it’s going to have even a more negative impact on the resources.” Well I’m interested in the resources, but if you want people to cooperate, their children are going to have to be fed. You’re not going to step into a community and set up projects that are going to require people to be thinking about the environment and the resources if they don’t have enough food, if they don’t have enough income. You’re have to solve that problem with something like appropriate alternative livelihoods, and I will underscore appropriate, and you can ask me about that later as well.

The other is population control, and I’m going to say nothing about that. I mean it’s sort of obvious that if the populations were lower, but that takes generation at least or generations to solve, and the resources aren’t going to wait for generations. Don’t think that I’m only





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interested in the resources; it's just the immediacy of the problem of feeding people and children in these communities where the resources are continuing to degenerate.

Right there are photographs from about three weeks ago in Thailand, in a community where the small scale fishermen were complaining about the fact that they would like to have the larger scale fishermen kept further off shore. And right there is a child in Zaragoza in the Philippines looking out into the area of the boat landings thinking that someday he's going to be a fishermen in this community, whether or not he's well fed, I don't know at the present time, but that's what this is all about providing food for people, providing food with the important Omega fatty acids that are involved in brain development.

If you want people to get involved in resource management, you're going to have to have people that are going to be able to accept and understand information. And if we have 38 percent from my sample of the children who are underweight in these communities, and if part of that is because they're not getting the proper animal protein, and we know right now that fatty Omega acids are involved in the early development of the brain, then we're going to set up an even more vicious cycle with negative feedback. So how are we going to solve it? Just let people starve to death, I don't know that's up to you guys, I'm done.



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