COASTAL FISHERIES IN THE PACIFIC ISLANDS REGION

IDENTIFICATION OF CANDIDATE FISHERIES FOR MARINE STEWARDSHIP COUNCIL (MSC) CERTIFICATION

The following is a summary of a report written by Bob Gillett in March 2008 for the World Wide Fund for Nature (WWF).

THE STUDY

In early 2008 a fisheries specialist was employed by WWF to identify coastal fisheries in the Pacific Islands that may be appropriate for starting on a process toward Marine Stewardship Council certification and those fisheries that would benefit from WWF engagement.

MSC CANDIDATE COASTAL FISHERIES IN THE PACIFIC ISLANDS

Important features that would readily separate candidate and non-candidate fisheries are whether:

(1) the concerned fishery produces a commercially exported product,
(2) the value of the exported product is substantial and
(3) the product is imported into a country where MSC has achieved considerable recognition, resulting in a higher price for the product. In addition, candidate fisheries should be small scale, or at least not industrial fisheries.

THE MOST APPROPRIATE CANDIDATES FOR MSC CERTIFICATION

Based on the above criteria, fisheries for trochus and deepwater bottomfish appear to be the most appropriate MSC candidates among the coastal fisheries of the Pacific Islands. In addition:

- Fisheries for these species presently operate (or considerable commercial potential exists) in many countries of the region.
- Several of the trochus and deepwater bottomfish fisheries are relatively well-managed — and among the best managed coastal fisheries in the region.
- There is a considerable amount of information on both fisheries, in some cases going back several decades. This includes stock assessment work.
- There has been recent interest in some form of environmental certification on the part of commercial interests for both types of fisheries.

THE WAY AHEAD

In many respects, the next steps in making progress towards MSC certification are best known to MSC staff. Nevertheless, there may be some value of providing the consultant's perspective on furthering the process. The present report was undertaken as a desk study — and there are obvious limitations as to what can be accomplished with respect to gauging interest in MSC of those people involved in a fishery, especially those located in a relatively isolated community. The immediate task is to engage in a dialogue with the major stakeholders. If the present study is considered Phase 1, Phase 2 could be considered as getting the fishery participants to the point of where they are able to make an informed decision whether to proceed with the MSC certification process.

NGOS AND FISHERIES IN THE PACIFIC ISLANDS

Some important issues associated with NGOs and fisheries in the Pacific Islands are:

- The proper role of the NGO.
- The food aspect.
- Working with the regional fisheries agencies.

It is suggested that an important niche for NGO involvement in fisheries in the Pacific is to alert national governments to developments that represent new or growing threats and take some initial action that may catalyse more comprehensive action on the part of government fisheries agencies. Another type of fishery issue that may benefit from NGO attention is, ironically, the opposite situation, old and chronic problems that persist despite years or decades of attention by governments and/or SPC.

FISHERIES THAT COULD BENEFIT FROM NGOS

Although there are many fisheries that could benefit from NGO engagement, two that may be especially appropriate for NGO attention are spearfishing and beche-de-mer fishing.

BOATS SHED THEIR OLD SKIN

The conventional way to deter aquatic organisms from colonising underwater equipment is to poison the offending organisms. Bacteria, unicellular algae, green algae, barnacles, sponges and marine worms are among the more than 2,500 species identified by experts as contributing to the process known as "fouling". One European project is counting on nanotechnology to revolutionise the sector.

Fouling is a scourge of all underwater structures (including boat hulls and industrial and scientific installations). In the case of ships, it increases fuel consumption by as much as 40%, incurring an estimated additional cost

of Euros 4.8 billion per year. The annual cost of maintaining underwater installations is more than Euros 9.7 billion. Although biocide paints are proving effective, they are now recognised as ecotoxic and increasingly they are being banned from use. Europe is the market leader for antifouling paints and is keen to boost its research to design effective new coatings, which are also environmentally friendly.

Toxic or hydrophobic surfaces

The Phoenicians, Greeks and Romans coated the hulls of their ships with copper or lead because these metals produce oxides or sulphates that are toxic to marine organisms. Nothing has changed since then and the conventional method for preventing fouling today is to cover surfaces with a biocidal coating that releases a continuous stream of toxins.

The most commonly used antifouling paint nowadays releases tributyltin (TBT), a tin-based organic compound that is known to be a powerful endocrine disrupter. Although highly effective, TBT is so ecotoxic than many countries have banned it. A worldwide ban is expected to be introduced in 2008.

As it is no longer permitted to poison colonising organisms, a new range of coatings has been developed with smooth, hydrophobic surfaces that reduce the adhesive properties of the organisms. All that is needed then is a flow of water to dislodge intruders. The silicone elastomers used today are proving highly effective in repelling macro-organisms (such as green algae and barnacles), whose adhesion power is not strong enough to withstand a flow of between 12 and 15 knots (22–28 kilometres per hour). However, silicone elastomers are not effective against microflora, which accumulate to form a thick biofilm on hulls, disrupting water flow and slowing down ships. Other drawbacks of silicone elastomers are that they are still expensive and not as robust as traditional biocide paints.

A matter of compromise…

"There is no such thing as a coating that is effective against all marine organisms. We need to find a good compromise between the type of organism and the navigation context", explains James Callow, coordinator of the European project AMBIO (Advanced Nanostructured Surfaces for the Control of Biofouling). The aim of the project is to design clean and effective antifouling coatings, taking into account different parameters such as navigation areas, frequency of use and ship speed. The candidate coatings are being studied and nanostructured to endow them with suitable properties in terms of surface energy (the interface tension between two substances), porosity, morphology and chemical and physical reactivity. Not forgetting, of course, compatibility with marine organisms. "Although we know that cells react to textures, we have yet to determine the precise influence of the different nanostructures and to formulate a set of design rules", explains James Callow. The "optimal" surface will need to be a compromise between these different rules, geared to the colonisation strategies and chemical resources of marine organisms.

… for composite surfaces

The coatings currently being developed are a mixture of hydrophobic and hydrophilic polymers. The morphology and topology of hydrophobic polymers have been designed on a nanometric scale to reduce algae's foothold to a minimum, while hydrophilic polymers contain enzymes that absorb and destroy the biological "glue" secreted by marine organisms. Other ideas are also being studied, including polymer/metal nanocomposites that prevent the formation of biofilms. A silicone elastomer incorporating a carbon nanotube structure is expected to come onto the market shortly. This silicone elastomer coating limits colonisation as its surface is rough on a nanometric scale, making it inhospitable to organisms, whilst silicone's low surface energy weakens their adhesive properties. In addition, the carbon nanostructure reinforces the coating, making it very tough and easy to apply.

As no single solution exists, AMBIO research teams are combining materials and nanostructures to make surfaces as inhospitable as possible to invasive marine organisms and to minimise surface energy to limit their adhesive power. This has resulted in antibacterial or enzymatic chemical reactions that are able to dissolve the biological glue.

Although copper- and zinc-based biocide paints are still authorised at present, James Callow believes that environmental legislation is evolving rapidly and that alternatives must be found. With the products developed by AMBIO, "no particle or product is released into the ecosystem" says Philippe Dubois, from Mons-Hainaut University in Belgium, who is responsible for developing silicone coatings containing carbon nanotubes. What is more, the programme is one of the few to have been commended by the European Parliament study to evaluate the use of nanotechnology as a substitute for chemicals.

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