MULTI-USE MARINE PROTECTED AREAS AND COASTAL CONSERVATION IN TROPICAL COUNTRIES

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Introduction

The establishment of Marine protected areas (MPAs) is becoming a main management tool for conserving biodiversity and for other purposes in most developing countries particularly from the Eighties onwards. They are usually created to in response to growing threats to the marine environments from habitat destruction, overuse of resources, pollution runoff, large scale aquaculture, oil exploration, high impact tourism and to conflicting interests over resource use.

Tropical countries, especially those with extensive coral reefs, are being strongly encouraged to expand and improve management of their MPAs. At present, there are some 1.500 marine protected areas of different categories that represent than 0.5% of the world's oceans and coastal areas. The International Union for Conservation of Nature (IUCN) recommends that by 2012 a system of representative networks of marine and coastal protected areas should be established, with roughly 20-30 % of the territory in each exemplary network demarcated as 'no-take' zones.

IUCN provides the most widely accepted definition of what an MPA is: "any area of interidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical or cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment" In practice, various terms are used to describe specific types of MPAs (marine parks, marine reserves, fisheries reserves, marine management areas, national marine parks, marine wilderness areas , marine extractive reserves, among others. However, this terminology can be broken down into what are essentially two main categories: *no take zones* and *sustainable/multiple use areas.* In the former, no human activity is permitted, while in the latter sustainable uses are allowed. (KELLEHER,G and KENCHINGTON, R 1992) .

The themes of this MARE Conference, and the focus of my talk on social science perspectives and opportunities for anthropological inputs especially in terms of developing viable, multi-use MPAs come at a time when events are swiftly changing the scope and course of marine management worldwide. In this case, I believe it is incumbent on social scientists to find ways to become more fully engaged in the multi-disciplinary scientific and resource management debates surrounding MPAs, and contribute to critical thinking, knowledge, policy-making assistance and services that can support traditional (artisanal) and indigenous fishing communities. These communities, their territorial rights and claims and culture heritage interests need to be strengthened so local initiatives and longstanding resource management practices and environmental knowledge systems don't get lost and have a chance to adapt to expanding scales of fisheries management and governance and to the globalizing MPA agendas of applied biodiversity science. (Cordell 2000; Polunin 1990). As the world's last tropical sea frontiers vanish, once remote indigenous, and traditional fishing societies are being increasingly marginalized or disappearing altogether, along

with many highly productive, potentially sustainable small-scale fisheries. Yet conservation impacts on biologically significant scales cannot be achieved by reinventing social marginality within single-issue, exclusively biodiversity-driven, coral reef action plans, for example. The point of view I want to get across in my presentation is that 'other culture' sea management concepts, property rights, and discourses merit much great appreciation and careful consideration than has so far been the case in establishing MPAs, alongside the 'master discourse' 'meta-narratives' and meta-databases of conservation science. (Cordell 2000; Diegues 1999).

I would like to thank John Cordell, from the Ethnographic Institute in San Francisco with whom I have shared most of these ideas during the Course on Traditional Knowledge and Coastal Management we ministered in 2002 for graduate students at the University of São Paulo and for the last revision of the text.

Some aspects of the current debate on the role of Marine Protected Areas

According to UNEP-United Nations Environmental Programme, (1995), the main objectives of a MPA are: to conserve marine biodiversity, to maintain productivity and to contribute to economic and social welfare. MPAs are being used to support other conventional forms of marine resource management where these methods have proved ineffective (Agardy 2000). MPAs are also used to hedge against management uncertainty and changing conditions of marine ecosystems, providing a buffer against management mistakes or unforeseen declines in environmental quality and marine production. (Dayton et al. 2000).

In spite of their increasing use for different purposes, MPAs are not without controversy and challenges.

Biological benefits

Many authors have examined the biological effects and benefits of these protected areas. (Dugan and Davis 1993; Carr and Reed 1998; Palumbi S 2000). MPAs can protect marine ecosystems by conserving multiple species, critical habitats such as spawning areas and contrite to large populations through larval transport and adult spillover. (Pomeroy 2005)

> "In fact, there is a strong scientific evidence that MPAs are effective at preserving unique marine habitats, restoring fish populations that reside within the protected areas and as a way of ensuring that special treasures are preserved. However, their roles in supplying biodiversity, providing a hedge against poor management and acts of nature, offerent research opportunities, and as emigration sources for surrounding areas, depends on the scale, scope and location"… (Sanchirico, J ;Cochran, K and Emerson, P, 2002:p.18)

There are many studies about the biological and ecological benefits from MPAs, but potential social and economic costs have not received much attention. In a recent

paper, Sancherico, Cochran and Emrerson (2002), have pointed out some of social and economic befits and costs related to the implementation of these areas particularly for extractive and non-extractive users . One of the main conclusions of the above mentioned study is that protected areas do

> "not address the causes of excess effort that trouble many fisheries…political obstacles to adopting MPAs are likely to remain significant. Fishermen bear most of the costs in the short run when a protected area is set-aside, while improvements in catch size and composition may not be realized until the distant future". (19-20)

Yet serious deficiencies and gaps persist in strictly science-based 'no take zone' MPA strategies. In many cases, management plans that are compatible with newly identified biodiversity priorities, or coherent, practical training programs, and technical assistance for local managers in developing countries do not exist. Coastal protected areas tend to be especially problematic for a host of reasons: remoteness; location in complex land-sea transition zones or transborder areas with nebulous or competing jurisdictions; problems of boundary definition and zoning; inadequate provisions to control development, or to synchronize with subsistence and commercially significant fisheries.

Socio economic benefits and costs

As it was mentioned before there are few studies on social and cultural issues related to the set-aside of Marine Protected Areas, particularly in Third-World Countries where the vast majority of professionals and scientists dealing with these areas have a biological background. The lack of interdisciplinary approach, however, has been pointed out also in developed countries as it is mentioned in the NOOA- National Marine Protected Center study entitled *Social Science Research Strategy for Marine Protected Areas (2003):*

> MPA design has traditionally relied on natural science information about the ecology and oceanography of specific marine resources or ecosystems: however, it is now inescapably clear that the successful design, establishment and stewardship of any MPA do not rest solely on biological data. Instead, it is also an intensively human endeavour that is profoundly influenced by how society values the oceans and how we perceive our role in marine ecosystems, now and in future generations. To ignore or marginalize the human dimension of MPAs risks prolonged and counterproductive user conflicts, legal challenges, procedural delays, and ineffective outcomes for both the protected ecosystems and the human users they support." (NOAA, Wahle C Preface 2003).

The authors go further, affirming that

> "the inability to adequately address the human dimension of MPAs is perhaps the greatest single impediment to their broader and effective use in marine conservation today." (Introduction 2003).

NOAA ´s paper indicate six priority themes for a social science strategy: Governance, institutions and processes; use patterns, attitudes, perceptions and beliefs; economics, communities , cultural heritage and resources. It insists that the inputs of social

sciences (including Anthropology/Sociology, Economics, Geography, History, Archeology, Psychology, Law and Ethics) should be used in planning, monitoring, implementation and evaluation of MPAs.

If this gap of information exists in countries like the USA, it is even greater in Tropical countries, where in addition of an important marine biological diversity of species and habitats, there is a greater cultural diversity. In this connection, a core problem has to do with lack of knowledge or attention to cultural differences, community cultural property interests, resources and claims in coastal waters. Without provisions to more effectively integrate cultural and biological components in protected areas, prospects for mobilizing long-term community support are reduced, and the risks of social opposition, conflict, and eventual project failure increase. (Agardy, 2000)

There is a prevalent misconception that marine management--and matters that have to do with the sea generally--are techno-scientific and don't include people. Let me elaborate on what I see as the still largely untapped knowledge reservoir, methods, and inputs of social sciences in developing and managing MPAs geared to conditions in poor countries. This is an area where the international marine management community and its donors stand to benefit and learn as marine conservation efforts become more and more sophisticated and costly (far beyond conventional development agency, technical assistance in fisheries). MPA investments need to be assessed in a much more systematic, sensitive, and detailed fashion in terms of project feasibility and potentially far-reaching *socio-cultural impacts and consequences* (i.e. not only environmental impacts) on many of the world's tropical coasts where poverty remains endemic.

Given the attention international conservation groups are devoting to expansion of MPAs (especially in the realm of coral reef conservation), not to mention the money they are able to attract and pour into this—is their strategy actually working? To what extent, if at all, do existing MPA frameworks take into account local social constraints, impacts, and conditions? Moreover, can MPAs (individually, and / or as whole protected area systems or networks) *particularly those that embody multi-use concepts and values*, really offer a viable alternative (to prevailing preservationist campaigns and philosophies) in terms of how coastal seas and resources ought to be managed to meet social betterment needs along with biodiversity conservation priorities? Finally, what role(s) can social scientists play in the design and implementation of new (especially multi-use) MPA frameworks?

The question is: are voices from distant reefs and coasts and impoverished communities being heard as sweeping new marine conservation strategies go forward? Anthropological and cultural perspectives clearly take a back seat to science and economics, those reputedly more dispassionate fields in the global environment debates. The evaluative economic and environmental policy apparatus has been little influenced by traditional understandings of human-environment relations and knowledge. Although social science projects with a humanistic, theoretical or advocacy bent are (sometimes) sought, it is most often to soften the impacts of development and conservation interventions, not to help set policy, or to empower fishing or protected area communities to actively become resource managers.

Terrestrial Protected strategies transplanted to coastal/marine environment

Marine protected area is a relatively new concept and strategy in many Tropical Countries like Brazil, although the establishment of continental parks and reserves has

started in the first decades of the XX Century. In the 80´s, there the first marine national parks were created, but until now very few have a management plan. Conflicts involving traditional communities over forest resource use were transferred to coastal/marine areas where these parks were established.

Up to that time the business of identifying and setting aside areas of land (or sea) with nature conservation value had been a part-time interest of a few government officials, as often as not in response to powerful lobbying from local enthusiasts and various community conservation and recreation organisations. The parks and reserves that had been established were, by and large, managed by untrained rangers, if they were managed at all. None had any published management plan, and few if any had been the subject of any resource surveys. In the 1980s concepts such as sustainable development, island biogeography, population dispersal and extinction theories ultimately evolved into the current focus on biodiversity.

Today, the IUCN at least recognizes and accepts the principle that cultural diversity and biological diversity need to be conserved together if they are to prosper. Protected areas cannot co-exist with communities that do not support the conservation purposes for which these areas have been established.(MacDonald 1998; Diegues 1998). The success or failure of biodiversity conservation projects will in large measure depend upon the ways in which local people are brought into the protected area management process. A far greater effort must therefore be made to gain the understanding and active participation of local people in the establishment, management and monitoring of protected areas. This requires a better understanding of the cultural context of local communities and a greater responsiveness to their concerns, aspirations, and needs. Consideration of 'socio-cultural' issues (the rubric that subsumes 'indigenous' issues) associated with protected area management is now very much in vogue. But have these guidelines been extended to the sea and MPAs?

It is something of a paradox that this model of nature conservation, which dichotomizes people and nature, has gained such worldwide acceptance, and has been adopted (largely uncritically) by many Third World countries. MPAs are no exception. In fact, repercussions of creating MPA systems (until recently, even the Great Barrier Reef which was often promoted as the world's superlative 'multi-use' system excluded Aboriginal groups) have in some cases been devastating for traditional populations.

This is definitely what has transpired thein Brazil where there has been widespread dislocation of 'extractivists', diverse artisanal fisherfolk, and indigenous peoples living in coastal forests, wetlands, and shoreline areas to make way for various types of MPAs. Although we should not regard these groups as practicing 'conservationists'--they do not deliberately adhere to Euro-centered, conservation science-based ideologies, or livelihoods--their technologically simple, low population pressure. Economies have been shown to have, on balance, positive impacts on local habitats and ecological processes—in marked contrast to destructive impacts of large-scale industrial enterprises tied to global markets. (Posey 1992).

So, unfortunately, in the Brazilian case, the establishment of coastal MPAs, based on no-take zone conservation philosophies and strategies, has gradually led to the displacement and disappearance of many environmentally sane, long established traditional fishing communities. (Diegues 1996, 2005) In the long run, many rural, territorially-committed, culturally distinct coastal populations end up migrating to urban and peri-urban slums, simply shifting and compounding the poverty burden in another sector. When traditional residents have resisted relocation, they are prohibited from planting, fishing and extracting raw materials for handicraft making. Young folk

might find menial work as park-guards, but this can lead to social conflicts where, as park employees, they end up having to denounce relatives for poaching or for " illegal fishing."

In some countries, like Brazil, where a pre-condition for receiving loans to establish national parks is that local populations be evicted from their traditional territories, extremely adverse social consequences have been documented (e.g. in my ongoing work with Caicara communities in the *Mata Atlantica).* Governments tend to view the establishment of no-take protected areas (MPAs especially) as a sign of international prestige and a potential source of income from foreign tourists, regardless of whether such developments invariably generate social conflict and privilege some groups while marginalizing others. Cash-strapped governments eagerly accept the assistance of wealthy transnational conservation organizations (WWF, Conservation International, Nature Conservancy) which have richly-endowed national branches and affiliates. (Ghimire 1994; Ghimire and Pimbert 1997)

Thus, international conservation NGOs, not national governments, increasingly determine what constitutes a "hot-spot", where the "hot-spots" and biodiversity conservation priorities lie, and what criteria must be used to establish protected areas in different countries. When natural scientists from developing countries are invited to conservation workshops, they are usually relegated to information providers to support the models and strategies previously defined by these transnationals. Seldom are social scientists invited to these workshops and when they do participate their role is essentially to provide information on how to deal with *human* threats to biodiversity.

Social Resistance and Emergence of Multi-Use Protected Area Concepts for Land and Sea

I don't claim to have any quick and easy, or broadly applicable answers, to these questions. But I would like to take a critical look at the issues, from the standpoint of a social scientist (anthropologist) living and working in Latin America. What I would like to do is share some of my experiences (and concerns) with you from many years of dealing with issues and debates surrounding protected areas in Brazil, and other poor countries. I would also like to briefly focus on a distinctive multi-use MPA framework that is evolving in Brazil: 'marine extractive reserves' (MER). (Diegues 1999, 2005; Glaser 2000) The MER framework may be of interest to other countries seeking to reconcile and integrate marine conservation, artisanal fisheries management, socioeconomic and social justice aims.

In many developing countries, difficulties encountered in creating more extensive inland protected areas are leading governments to target coastal areas where seas and islands are often considered to be 'national' or 'public property' which, in theory, can more easily be converted into protected areas than terrestrial, forested regions held as private property. The idea is that, unlike costly expropriation of forested areas from landowners to be converted into no-take protection areas (national parks) which has ended up increasing the external debt in some developing countries, this won't happen with MPAs. Yet, on the contrary, there is increasing evidence that costly resource and social conflicts in fisheries have escalated as national conservation priorities target inshore seas, coastal biodiversity, and the establishment of no-take protected zoning of MPAs. Even so, no-take MPA initiatives, creating off-limit zones and perimeters where no human uses are allowed, continue to attract enormous support from private foundations, bilateral and multilateral banks, as well as the major international conservation NGOs (Agardy 2005).

In recent years, in some developing countries the imported conservation model of parks without people has come under fire. In Brazil, not only indigenous groups but traditional rubber-tappers and artisanal fishing organizations have reacted against the eviction from their homelands and home seas. In time, they developed their own approaches and categories of protected areas: in Brazil this took the form of strategies designed to merge conservation-based no-take rules applied to certain territories with other areas designated for sustainable use activities. In the case of coastal artisanal fishing communities these controlled-access, multi-use spaces are called *marine extractive reserves* (MER). Extractive reserves rely on local people actively participating in the establishment and management through councils in which government institutions, local NGOs, and traditional communities representative organizations collaborate (Cordell 2001; Glaser 2000)

In this process, co-management became an important tool in setting up reserve zoning provisions to determine no-take areas (e.g. to protect spawning habitats) as well as areas and resources which can be used sustainable to provide a continuing flow of economic benefits to 'communal property' users. Overall, extractive reserves illustrate how sound science can be combined with traditional practices and knowledge-- leading to 'adaptative' resource management.

Ethno-conservation: an alternative approach to hegemonic conservation strategies for Tropical Countries?

This alternative approach to the hegemonic conservation theory and practice is generally called *ethno-conservation.* (Ballick and Cox 1996). The basic assumption of this new approach is the idea that science is above all a social practice that is influenced by other social practices, including political and theoretical ones (Lewontin 2001). It criticizes the dichotomy between man and nature and the idea that man is intrinsically a nature destroyer, recognizing that are different types of relationship between human beings and nature according to different socio-cultural organizations. (Larrere and Larrere1997)

The Conservation Biology is also criticized as being influenced by the Deep-Ecology movement to which only wilderness should be protected as having an ontological value. (Sarkar 1998) At the same time, the hegemonic conservation approach does not include culture as a basic factor on *nature conservation* which should also be considered as a *social practice* and not a direct and exclusive result of the application of science. The ecosystem theory and approach is also under criticism as it appears even in some important convention as the Biological Diversity Convention as the main (and unique) approach to biodiversity conservation and does not incorporate properly its cultural and social dimensions.

According to this new approach extensive parts of the natural world has been domesticated and transformed by human populations and cannot be considered wilderness, (Gomez-Pompa and Kaus 1992) even in the coastal/maritime domain. It calls for non-reductionist approaches that are based on organic cooperation between natural, social and ethno-sciences. It criticizes also social sciences reductionism as nature is reduced only to social representations. (Redclift and Woodgate 1994). It also tries to develop new approaches to conservation based on co-evolution (Norgaard 1994) and landscape approach, including landscape ecology. (Larrare and Larrare 1997)

Science taken as a dogma is dangerous, particularly when some conservationists and even scientists from the North say that if people from developing countries are not able to make the conservation they preach they should be go to tropical countries to impose conservation practices they think are the best. (Jansen 1986). Most people of the South that suffered from economic and political colonialism will not accept a conservationist neo-colonialism. (Sarkar 1998; Guha 1997)

I am by no means implying that the task of building new, people-centered, alternative conservation approaches should be the exclusive responsibility of scientists, social science practitioners and traditional peoples organizations from the South. Things are not so cut and dry. For example, a number of alternative approaches for multi-use MPAs are being led by researchers from the North with extensive field experience in developing countries and in close cooperation and collaboration with researchers from the South. Culturally, socially and intellectually diverse shared efforts and comparative perspectives are essential if we want to build something new and more adapted to twin objectives of marine conservation and social justice.

Marine ethno-science, ethnobiology, and maritime anthropology are burgeoning applied and scholarly research fields in Brazil and other developing countries exploring themes such as *traditional appropriation* of the sea by artisanal fishermen, and material culture as well as non-material, spiritual and sociocultural dimensions of fishers and the sea**.** Anthropological studies of fishing have long been open to broader interpretations of what constitutes resource management in fisheries. In many cases, anthropologists (Forman 1970; Jorion 1983; Cordell 1983; McCay and Acheson 1987; Maldonado 2005; Silva 2005) have documented traditional territorial systems used to appropriate and manage sea space which have been found to have a range of significant fisheries management functions and implications. Local tenure customs which control access to fishing grounds can have management impacts which are similar to the quota and limited entry provisions and restrictions employed in contemporary fisheries management frameworks. Traditional appropriation of marine resources in some cases ends up having noticeable effects on fishing pressure and production by establishing normative procedures to control fishery access and activities within socially demarcated sea space. Such cultural practices allow fishing communities to intervene in nature and in the life cycles and processes of marine species. In recent years anthropologists have found this to be an enlightening way to understand and explain why tenure systems develop and how they work in many tropical coastal areas which in the past have been perceived by governments, fishery entrepreneurs and by regulatory agencies alike as open-access areas. The prevailing wisdom behind imposition of most recent fishery management regimes and legislation stems from what is turning out to be a naive and erroneous perception about ownership status of inshore fisheries and coastal sea space as inherently free access, unencumbered by pre-existing tenure arrangements. (Diegues 2005)

Traditional appropriation of marine environment occurs within a broader framework of territoriality through which artisanal fishers on the Brazilian coast have marked areas of the sea that "belong" to them by virtue of their occupation and use. A major challenge for social scientists concerns how to develop better working relationships with management agencies that can assist local communities in articulating and representing their traditions, continue transmitting culturally-based environmental knowledge, and pursue visions for the future and discover new uses for local knowledge to strengthen modern-day management of MPAs and fisheries. (Maldonado 2005; Cordell 2000)

Local environmental knowledge domains characteristically include much valuable information about fish behaviour, location, distribution and availability of species, taxonomies and habitat classifications. Over time, as this knowledge is passed on to new generations of fishermen, it helps communities maintain a sense of place and identity and to constantly renew ties to fishing grounds for food supplies. Fortunately, ethno-conservation and production history knowledge and cognitive maps of the sea persist on many tropical coasts. In many cases these are the only sources of marine resource management data, as science-based biological data such as time series information on catch and effort, and fish population dynamics are scarce to non-existent. Spheres of local knowledge include not only species taxonomies but intricate knowledge of ecological processes, meterological data, principles of navigation, and how fishing techniques function seasonally in a range of micro-environments. Marine ethno-ecology systems also provide an index of maritime cultural diversity in terms of how people express in language and ceremonies sometimes centuries-old beliefs and connections with the spiritual world, for example, in demarcation of sacred sites in the sea, creation myths, and story places. (Berkes 1993; Ruddle 2001)

In the space of this presentation, I hope that I have at least been able to provide a sense of how crucial social science perspectives, research methods, and data (especially ethnographic approaches) can be in designing, establishing, managing, (and sustaining) MPAs—what can be gained from social assessment regardless of geographic location, biophysical features, specific uses, zoning, labels, etc. The flip side of the coin is of course what can be lost when social assessment provisions are not an integral part of ongoing MPA management plans and processes, or if consideration of social factors is minimal or not undertaken at all.

In closing, the question arises of where multi-use MPAs are going and where social scientists might best focus their energies and expertise to play a more robust, effective role in the increasingly specialized (and contested) domain of marine management? Off the cuff, I would say that the future looks fairly bright, laden with tantalizing possibilities, and that the demand for our research services, books, advice on community-based management of protected areas, maritime culture heritage documentation, community profiles, comparative and case study findings, ethnographic chronicles of changing fishing societies is on the upswing and going to increase.

However, this won't happen all by itself. Our work is still very much supply-driven. We as anthropologists in the South and the North, (and, who knows, maybe even the odd sociologist or two, or even political scientist!) have to and can do a lot more to create a greater demand for what social science has to offer the scientifically-entrenched conservation community, as well as the economically downtrodden protected area and artisanal fishing communities and vanishing indigenous coastal peoples of the Tropics who we work with. Just how such a transformation will come about, I cannot say. Perhaps we must do a better directed social change job on ourselves, not only on our clients.

Hopefully to help make marine conservation more of a lasting social reality (and less the downward-spiraling, out-of-control, global environmental crisis conservationists like to paint!) let me give you a dot-point summary of where I think more work could be usefully channeled, illustrated by some recent trends in Brazil:

Political ecology

We could use some hard-hitting research to make international development and environmental agencies (including private foundations) more transparent and

accountable--especially strategies and financing of the major international NGOs who have come to exercise what could be termed (undue) influence over national/local governments in the South, for example on the question of no-take zone % in MPAs. More convincing scientifically reliable evidence of why and how the target percentages were arrived at might help, too.

Support for vanishing coastal indigenous maritime cultures, their fishing rights and sea rights

Given that an estimated 40 percent of the world's 6,000 indigenous peoples have homelands and territories that encompass biodiversity rich coastal ocean and island regions, what can be done to empower and build the capacity of indigenous sea owners in asserting their rights, and to record, protect and manage their irreplaceable cultural and intellectual property and livelihood traditions within rapidly expanding MPA frameworks?

Assessing socioeconomic impacts and design considerations for MPAs at the land-sea interface

Through detailed ethno-conservation and ethnographic documentation, inter-disciplinary, social science research can do much to ensure that protected area frameworks are created which build on and reflect the full range and complex of mixed economies and corresponding habitat dependencies (agriculture, forestry, foraging, fishing) of tropical coastal populations which characteristically span the land-sea interface.

Co-management

In some Third World countries, co-management concepts are being introduced as a principal strategy for successful design and implementation of marine protected areas and developing sustainable fisheries. At the same time, in many countries, national environmental agencies are very centralized and reluctant to share power with local institutions. How can these local organizations be empowered to have more of a voice in co-management processes and how can more de-centralized power-sharing arrangements can be negotiated and implemented?

Integration of MPAs in more encompassing, extended , and integrated coastal zone management frameworks

A tall order, admittedly, but something worth thinking about on a social scientist's long dark night of the soul. In any case, it is not very useful to develop more MPAs without consider how the will be affected by onshore and off-site threats and ecological processes (a justification conservation groups are now using for proposals to create whole MPA 'networks'). It doesn't make a lot of sense to create a no-take zone MPA where your next door neighbor is discharging mining wastes or building a paper mill.

Nature tourism and its cousin eco-tourism

It is something of an irony that this fast- growing industry is attracting quite a following among 'no-take' zone MPA enthusiasts in that it is frequently being promoted as an environmentally benign and friendly activity that can be allowed in 'no-take' zones. The wisdom of this is debatable. Tourism, even ecotourism, can prove to be a double edged sword. On the one hand, it can be an income generator, but what are the trade-offs? Will increased income be distributed in ways that can lead to

poverty alleviation? The way some MPAs have been set up and are being run in Brazil is seen by local people as the epitome of social injustice. I see tourism, in its different modalities and relationship to protected areas as definitely a fertile field for social science research.

In analyzing recent trends associated with MPA development, from the vantage point of a social scientist from the South, I can't say how many others in Brazil IN tropical countries share the views I've put forward. I think a strong arguments need to continue to be made to contest the 'wilderness' images and preservationist thinking, and promulgation of the 'Yellowstone Model' that underlie the design and implementation of no-take MPAs and similar measures that exclude local residents who engage in 'artisan-scale' production and sustainable resource extraction activities, and who have a deep, culturally-embedded commitment to local sea territory.

In my view, social science has a vital, yet still largely unfulfilled role to play, and a quite a ways to go, to level the playing field with natural sciences in constructing MPAs. In the meantime, I think we can stress the following 4 strategies with the aim of curtailing the global loss of both marine culture heritage and biological diversity:

(1) helping to understand and preserve local knowledge, technologies and management practices that can contribute to sustainable fisheries
(2) helping communities contend with destructive coastal zone development conditions leading to over-fishing, resource and social conflicts
(3) helping communities, NGOs, and resource management agencies work together to find ways to integrate scientific and cultural knowledge in managing marine environments
(4) working to empower communities in all spheres of coastal fisheries and protected area management

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