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Resilience at risk: epistemological and social construction barriers to risk communication

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This paper is about the persistent failure of social scientists to bring into the Environmental Impact Assessment (EIA) process socially constructed environmental concerns held by potentially impacted communities. The failure to communicate perceived risks results from a two-communities divide based on both epistemological differences and obfuscation due to vernacular communication. The analysis provides robust modeling variables that can bridge this social-environmental divide. The case involves data collected from members of traditional communities regarding their perceptions of the potential impacts of proposed Marine Protected Areas (MPAs). The study is situated in the Bahamas where the government has approved setting aside 30 No-take MPAs to protect their sea. This analysis is based on 572 interviews conducted during eight field trips with members of six traditional settlements in the Exuma Islands and Cays in the central Bahamas. Confidence in the findings is high because the sample involves 34% of the census population of these settlements and the findings have repeatedly been returned for review and approval by the members of these settlements.

Keywords: risk communication; social impact assessment; traditional communities of Bahamas; marine protected areas

Introduction

This paper is about the communication of perceived risks from potentially impacted communities to social scientists charged with documenting and weighing these impacts in an Environmental Impact Assessment (EIA). Two-Communities theory (Caplan 1979) is offered as a heuristic frame for both studying and discussing this problem. The Two-Communities theory was formulated to explain why scientific knowledge produced by academic-based researchers is not used by government policy makers. The theory assumes that these kinds of people live in separate worlds with different and often conflicting values, different reward systems, and different languages. Caplan concludes that the resultant communication difficulties are culturally based and Kerr (2007, 1415) shows that Two-Communities communication is a persistent problem. Although some have argued that the theory is more of a metaphor than a model (Dunn 1980), the Exuma analysis documents that the theory can be operationalized for risk communication research on the relationship of risk bearing communities and the scientific community.

Local communities often perceived risks to their relationships with the environment, but social scientists frequently are intellectually and procedurally blocked from bringing these impact concerns to an EIA. It is argued here that

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complex nature–society co-adaptations tend to be conveyed by local people with surrogate imagery that masks more than illuminates the perceived risks. Complex co-adaptations, even once translated into social science variables, are normally ignored because they are beyond most extant EIA models. So this analysis indicates that there are robust variables for modeling the interface between natural and social dimensions of the EIA process. These research findings are most useful in situations where a traditional community is co-adapted with its natural resources and the relationships between the two are potentially altered by a proposed development or conservation project.

Social-ecological modeling

Social Impact Assessment (SIA) has a responsibility to bring critical human variables into the EIA process. Even though it is analytically possible to study social impacts apart from associated natural impacts, it is clear to human ecologists and others that these two are inseparable. The EIA process through regulation and practice has ghettoized human and natural studies and thus provides few models for integrating the two. Recent EIAs have moved to resolve differences in research and analytical methods so as to produce a holistic model of potential project siting impacts that more accurately reflects what can occur to people and nature together.

Social and natural variables are used in decision models to help design, site, evaluate, and monitor Marine Protected Areas (MPAs). Often the natural variables are better understood and more robust than are the social variables. Despite the efforts of social scientists to provide guidance that would bring critical social variables into the modeling process (Bunce et al. 2000; Mascia et al. 2003), little progress is evident. Three examples illustrate this modeling problem and the social science responses: (1) Sala et al. (2002) modeled MPA placements in the Upper Gulf of California, Mexico and was critiqued by Sanchirico et al. (2003), (2) Roberts et al. (2001) modeled the famous Soufriere MPA in St. Lucia, West Indies and was critiqued by Christy et al. (2003), and (3) Mumby et al. (2006) documented the social value of increases in the natural fish stocks outside a Bahamas MPA, but the social science data are much weaker than the biology.

The present analysis argues that even though there is a fundamental divide between scientists and communities at risk from MPAs, these risks can be communicated and ultimately modeled. The analysis compares recent field data with the Bahamas national MPA modeling and thus addresses both this model and the implications of modeling choices. The Commonwealth of the Bahamas is a special case of coral reef and marine ecology protection because the government adopted into law the recommendations of a science-based report that evaluated approximately 30 No-take Marine Protected Areas (MPAs) using a model that equally weights social and natural variables (Stoner, Hickson, and Dahlgren 1999).

This model assumes that the presence of a small coastal community is a positive advantage for siting and managing the proposed MPAs. This modeling decision reflects a common assumption that establishing successful MPAs requires local support and cooperation (B. Stoffle et al. 1994; R. Stoffle et al. 1994; Keller and Recchia 1998; National Research Council 2001; Berkes 2004; Aswani and Lauer 2006). This study supports that assumption.

A second modeling question addressed by this research is what dimensions of community are most robust for predicting their response to nearby MPA conservation. The Bahamas MPA modeling uses simple social demographics; however, this study argues for the use of three more complex and robust social variables (agency, resiliency and identity) for predicting the community-level responses to MPA siting.

A third modeling assumption is that MPAs are more likely to impact communities that are economically dependent on cash from marine products, but that a shift to other economic sectors like ecotourism can off-set the loss of commercial fishing. This study suggests that subsistence-based traditional communities are very threatened by MPAs, and economic sector shifts are not an appropriate mitigation for either the natural or social impacts of MPAs.

Methods

Especially important to the siting of MPAs in the central Exumas are 20 traditional coastal communities, typically less than 200 in population, located in the Exuma islands and cays where three large No-take MPAs were proposed by the Bahamian government. Six traditional communities were selected for study, with the approval of the Bahamas Department of Fisheries and after the political and social leadership of each settlement was approached with a study description and agreed to proceed. Each community is near and thus potentially impacted by one of the three proposed MPAs (Figure 1). Before this study began, each community had publicly responded to the nearby MPA proposal – with the two northern communities being strongly against the MPA, the two central communities being neutral, and the two southern communities being strongly positive. Interviews were designed to understand what MPA impacts were perceived by these sets of communities and how potential impacts contributed to why communities responded differently to their proposed MPA. In the first round of interviews it became clear that local people were expressing themselves in vernacular language and expressions that would have to be unpacked in order to make their perspectives accessible.

This analysis derives from 572 interviews conducted over six years. Twenty-eight students and three professors participated in the study. Interviews were guided by the Sea Attachment instrument which focused on seven knowledge domains, each related to one kind of potential relationship between the people and the sea. A series of follow-up instruments (Quality of Life, Diachronic Sea/Land Mapping, Grubbing, and Tourism) were designed to provide specific data on what emerged as key issues. Extensive oral histories with community elders strengthen diachronic knowledge of natural resource and social adaptive processes.

Each interview was conducted in private and guaranteed to be held confidential. Approximately one third of all census registered members of these settlements were interviewed at least once. Oral histories were developed over multiple field sessions and involved dozens of hours of interview time plus feedback-confirmation sessions.

Interviews were conducted in iterative waves as the field teams returned eight times. These mixed methods (Tashakkori and Teddlie 1998; Beebe 2001) permitted new insights to emerge from the analysis of previous field data before returning with

Figure 1. View of Exuma island and cays with five of six study communities marked.

expanded follow-up queries and new instruments. All major findings were triangulated (Campbell and Fiske 1959; Jick 1979) by multiple survey questions, oral history, and documents. Key findings were hand delivered to most people who had been interviewed and discussed openly in each settlement so as to receive feedback and confirmation. The findings are viewed as having a high confidence level, as this non-statistical version of the concept is understood in cultural anthropology.

Results

The research supports the following: (1) the community is the best unit of social analysis, and these are traditional communities having continuity back to slavery, (2) three social variables - agency, resilience, and identity – robustly predict community responses to MPAs, and (3) a wide-spread pattern of vernacular communication of risk perception obfuscated underlying risks which in turn had to be unpacked by systematic data collection.

Community as unit of SIA analysis

The Two-Communities theory must be operationalized to fit into specific research situations. Much has been written on the definition of the *science community*

(Goldman 1999, 221–71), so this analysis focuses on kinds of *local risk communities*. Social Impact Assessment (SIA) is the proper term of reference for studies that predict impacts from potential MPAs and assess human responses (Goldman 2000; Weiant and Aswani 2006). The SIA literature on the impacts of conservation projects variously argues for a focus on the individual resource user, the household of the resource user, and the resource dependent community. Each of these approaches has analytical utility, but in the past decade the emphasis has shifted away from individual stakeholder and household analysis to the study of the local risk community. In general, the community analysis approach works best when the community is small in scale, old in place duration, stable in membership, and composed of people who share a sense of history, have a common identity, and are culturally co-adapted with their land and sea. The members of the community should not have *ontological insecurity* (Giddens 1990), but should instead believe that their future generations will have sustainable access to natural and social resources. Indeed, Conroy et al. (2001), building on Ostrom (1992), suggests that for conservation studies and consultations the term *community* be restricted to those having shared beliefs, stability of membership and complex, multilayered, long-term interactions with each other.

Members of the six communities immediately stipulated in initial interviews that they represent a people who have always learned about and cared for their land and sea in the Exumas. They thus defined themselves as a kind of community (which is termed a *traditional community*) to be dealt with during the MPA siting, design, and management phases.

The African ancestry people of the Exumas arrived in 1784 as slaves of Loyalist citizens of the English crown. Some had been slaves in the American colonies (creoles), but others were recent arrivals from Africa. Both types of former African people arrived as unfree laborers for planters who were escaping the aftermath of the American colonial revolt. Because at this time there were no traditional American Indian people in the Exumas, both the Loyalist planters and the African slaves were confronted with learning and using a new ecosystem.

Most Loyalist planters failed at cash-crop and slave-based agriculture and left their lands and slaves alone within a decade or so. Plantation lands, adjoining marine ecosystems and the former slaves remained together, with the people often taking the name and the land of the former plantation owners. With few options for leaving and little competition for the local resources the former slaves, now self-identified as community members, stayed and converted knowledge of the marine ecosystem into sustainable environmental practices, and assumed de facto ownership (via usufruct) of their community's ecosystems.

The social-ecological systems developed by the traditional people of the Exumas persisted through time, surviving human (such as overseas labor) and natural (such as hurricanes) perturbations. It is argued here that through environmental learning, including acquiring knowledge of marine biodiversity, the traditional people of the Exumas made a resilient way of life which is valued today.

These six communities from the islands and cays of the Exumas meet Conroy's criteria for a local natural resource community. For various reasons these Exumian communities tend to act in unison on issues such as outside development and conservation. Community members, for example, were uniform in their support for establishing a nearby MPA. Despite overwhelming support for establishing a nearby

MPA, there were strong negative public responses by members of the two northern communities and many other respondents qualified their support.

SIA variables: agency, resilience, and identity

Community MPA responses included almost unanimous support for the idea of establishing a nearby MPA while at the same time resisting establishing certain kinds of MPAs. These apparently conflicting responses can best be understood in terms of three social variables: agency, resilience, and identity.

Agency: 'When you come into my house you show respect'

Members of local communities consistently said that they should be in charge of decisions regarding their traditional lands and seas, so outsiders should always respect this stipulation. The vernacular phrase 'When you come into my house you show respect' implies that outsiders must know about and acknowledge local history and resource ownership through usufruct. Failures to properly respond to this stipulation caused negative responses to the MPA proposals and proponents. Because the Bahamian national government does not recognize usufruct ownership of either land or sea, scientists have not seen the utility of understanding what risks MPAs present to 'my house'.

Agency is the contemporary term used to describe the sense that what is desired by the community will in fact occur. The QofL instrument asked about the person's perceived ability to influence the outcomes of events affecting them and their settlement and how this influence compares with that of the people in the community 30 years ago, and will compare with the people of the community 30 years in the future. When asked 'In comparison to members of my family and people living in this settlement 30 years ago, I have (1) much more influence, (2) a little more, (3) about the same amount, (4) a little less influence, (5) much less?', of the 128 respondents, the majority (57.6%) perceived themselves to have more influence, while 14.4% perceived themselves to have the same and 28% perceived less influence. When asked 'How satisfied are you with your ability to influence the outcome of events affecting your settlement these days?', 50% are satisfied, 25.7% are comfortable, and 24.2% are dissatisfied. Perceived positive trends in agency are viewed as causing the next generation to have more (70.3%) or the same (20.3%) ability to influence events. The QofL responses indicate that these communities have a strong sense of agency, which they say derives from working together as a community, being self sufficient, and having a local government system that gives them a direct voice in the Bahamas Parliament.

If an MPA proposal assaults agency, what will result? The northern communities were presented with an MPA proposal that they soundly rejected by personal, community, and political responses. When this study began, the northern MPA proposal had been taken out of consideration by the Department of Fisheries, so in one sense this was an agency victory for the northern communities. When, however, the QofL responses are presented by region of settlement, the northern were less satisfied (44%) with their ability to influence events than central (54%) and southern (48%) communities. People from the north report that confidence in their ability to influence the outcome of events was shaken by the northern MPA proposal and the proposal process which by-passed the communities.

Having been through an unsuccessful MPA siting process, even when the final decision supported the local community position, appears to have had implications for future MPA proposals. When, during the QofL interviews, people were asked 'Who should design and control a local MPA (local people, national government representatives, or mixed local and national)?' 64.1% favored a partnership with the national government, rather than a local model (18.8%) or a national model (17.1%). Support for the national MPA model is lowest in the north (2.6%), and slightly higher in the central (6.8%) and the southern (8.8%) communities. Interviews document that after the northern MPA proposal failed, many northern people simply did not trust in an MPA proposal exclusively designed and managed by the national government and their science advisors.

Resilience: 'How we gonna live if you take our sea?'

The MPAs were designed by scientists to protect the sea and increase its biodiversity, but local people expressed the concern 'How we gonna live if you take our sea?' To the outside scientist, taking some of the sea as an MPA would protect the sea elsewhere, but local people neither use nor own through usufruct all of the sea. Also, science-based recommendations that people shift their production to other economic sectors fail to recognize the social and cultural implications of traditional natural resource uses. 'Gonna live' implies social support from community as well as food for an individual.

The people of these communities speak with pride about their common history as African ancestry people forcibly brought as slaves to this area in the late 1780s and then abandoned within a generation. By remaining on the lands of their former plantation settlement, these people co-adapted (some would call co-evolved) with this socially and physically isolated portion of an enormous archipelago island system. Together as a community, less as individuals and households, they built a resilient way of life involving redundancies in natural resource use strategies and webs of interdependent social relationships.

Resilience means the magnitude of disturbance that can be absorbed or buffered without the system undergoing fundamental change in its functional characteristics. When people become traditional, learn about their ecosystems, adjust their adaptive strategies to protect them from natural and social perturbations, they then can be said to have developed a resilient way of life (Stoffle, Toupal, and Zedeno 2003). The term *environmental multiplicity* builds on the narrower but established term *occupational multiplicity* (Comitas 1964), to describe their system of resilient adaptations. Conceptually these terms describe a range of multi-stranded and redundant connections among the members of a traditional community and between them and their primary natural use areas (Stoffle 1986).

There are too many adaptations to be fully discussed here, so these are organized by where they occur in natural and social space. There are six natural use spaces and two social spaces (Table 1) that constitute the core of environmental multiplicity. This table points to where people interact with each other and the natural resources (under community control through usufruct). Because of redundant natural use areas and social relations, there are alternative ways of socially and naturally achieving community goals. Everyone, for example, has the ability to fish, but at any given time or period the fishing can occur with a team of women who do hand

Table 1. Environmental multiplicity in natural and social spaces.

Natural use spaces		Social spaces	
		Reciprocity from subsistence	Wage labor
Marine	Littoral	Grubbing, sea weed collecting	
	Near shore coral reefs and cay cuts proximal deep water	Subsistence fishing alternate crew fishing	Bone fishing guides Lobster fishing
Terrestrial	Forests	Gathering medicine and spiritual plants for family and community healing	Collecting and weaving palm top
	Agricultural lands	Home gardens Clearing of lands	Cash crops
	Pastures	Domestic use animals	

fishing called grubbing or a small male crew in a boat. When all the males are available to fish, only a few crews will fish at a time and then share the catch with each 'cooking pot' in the settlement. Thus, crews who fish only catch sufficient fish for the evening meal for all the community. Different crews have different fishing areas, thus spreading fishing pressure over a wide area by taking turns fishing. Men who are not fishing often work with others on community projects that also benefit the families of the crew who is currently fishing. Natural resources can derive from both land and sea, thus assuring that crop loss due to drought can be offset by the marine resources, which in turn can be replaced with land products when hurricanes disrupt the marine ecosystem. The environmental multiplicity system established by these traditional communities assures that people do not starve or live in fear, but instead live well and secure being always supported by their nature and society.

Community relationships are facilitated by symmetrical reciprocity; which is an implicit, non-legal contractual obligation, unenforceable by any authority apart from one's sense of honor and shame. Social rules specify that natural resources be gathered and shared with others, who should in turn offer labor or other resources. Symmetrical relationships are designed not to be extinguished, thus potentially sustaining relationships between individuals and social groups over generations. Given the subsistence economy of these settlements over the past 222 years, most community support obligations do not involve cash exchanges. The main exception to this is the need for cash to purchase rum which is exchanged in reciprocity. Thus social structure of the community relies on materials from direct production, personal labor, and some cash.

A shift to a cash-base economy potentially threatens social reciprocity. In the QofL interview *community support* was defined as the ability and willingness of other members of the settlement to come to your aid as needed. Such support could come

from group organizations such as local churches, family members, or neighbors. When asked 'In comparison to members of my family and people living in this settlement 30 years ago, is there (1) much more support, (2) a little more, (3) about the same amount, (4) a little less support, (5) much less support?' of the 133 respondents, most said there was less support (57.1%), some said it was about the same (20.3%), and some said it was better than 30 years ago (22.5%). Follow-up interviews identified the increase in wage labor and a growing standard of living (consumption) as the reasons for declining community support. Still, when asked about trends most respondents (54.3%) believe that community members recognize this as a social problem that will be solved in the future by returning to past levels of direct production and community support.

Resilience is impacted in a positive way when an MPA restores the adaptive strategies formerly lost by a traditional community. These losses may have occurred because a resource declined below a sustainable level, outside fishers eliminated spawning aggregations, or foreign tourists purchased community usufruct lands. The MPA can restore fishing stock, restrict outside fisher access, and officially empower local communities as owners and managers of traditional resource areas.

Resilience is weakened to the extent that the MPA eliminates extant adaptive strategies. This can occur if the MPA mitigates the loss of a reciprocity-based subsistence fishery with cash and wage labor opportunities or if the MPA fails to protect traditionally used cays and mangroves from tourism and other developments. Traditional communities throughout the Caribbean use symmetrical reciprocal exchange based on direct production (Burpee, Morgan, and Dragon 1986); so, if an MPA reduces or eliminates access to natural resources needed in such exchanges it can weaken community social structure. Often MPA planners attempt to mitigate this impact by stimulating cash-based production, but this analysis shows that cash itself can weaken community support. A weakened community may lack the ability or will to support its members in times of crisis.

Identity: 'This project will kill us!'

'This project will kill us!' makes no sense to scientists who see no possibility that people will die just because they cannot use a portion of the sea near their community. Such vernacular expressions are easily dismissed as unfounded emotional outbursts (Wardman 2006). Humans, however, are social beings whose identity is tied in real ways to relationships with others and social organizations. Thus a threat to 'kill' a person can involve a risk to identity as well as to body.

Identity as it occurs at the individual, community, ethnic group, and national levels is an important cultural dimension for all people, but it is especially critical in the post-slavery former European colonies of the Caribbean (Munasinghe 2001). Caribbean people, especially those of African ancestry, live in societies that were not made for them (Alleyne 2002). Once independent, they were free to establish an identity not tied to the former colonial powers (Olwig 2002). This identity formation process is perceived by some as the key social process in the Caribbean today.

Community identity is recognized as a key variable in US Federal government guidelines, prepared in compliance with the Magnuson Stevens Fishery Management

Act (MSA) National Standard #8, which specifies that fishery dependent communities can be identified by data documenting that residents perceive fishing to be important to the continuity and self-identification of their community.

Identity is a complex human phenomenon (Gupta and Ferguson 1997a) and should be studied with a clear operational definition that makes sense in a specific research setting (Gupta and Ferguson 1997b). One approach to defining the identity of coastal communities is to measure the *cultural centrality* of the sea. The 14-page Sea Attachment instrument, which was administered in all six settlements, asked questions about seven knowledge and use domains including: Material Arts, Sea Biology, Underwater Landscapes, Land Biology, Expressive Arts, Identity Symbols, and Settlement Stories. The resulting 69 interviews document that these community members were both knowledgeable of and emotionally connected with the sea. They write, and read in public, poetry about the sea, bring its products into their arts, and sustainably use it on a daily basis. The main church of each settlement is situated on the highest ridge where members can view the sea from its many windows, and the most popular hymns have a marine theme. They say without their uses of sea they would not exist.

Although in most cases an MPA will only modify some local access to the sea, a large No-take MPA can impact community identity by preserving all customary access to the sea or eliminating all such access. For example, the proposed northern MPA encompassed almost all of the traditional marine and terrestrial resource use areas for the community of Barraterre (Figure 2). It should be noted that even though the Bahamian No-take MPA does not limit terrestrial uses on cays within its boundary, boaters cannot legally have marine products while in the MPA, so if they caught fish elsewhere they could not stop in the MPA on the way home to collect plants in the cays. A strict interpretation of no-marine-products-in-a-boat-in-the-MPA rule would preclude all Barraterre fishing because they could not return to their home which was completely surrounded by the MPA.

The leeward cuts involved in this MPA create unique underwater places that attract many species of marine animals. Due to their leeward position and proximity of these cays to the community of Barraterre, these cays and cuts traditionally are primary subsistence fishing grounds. The cuts between the windward cays have extremely strong currents and are difficult to fish. The leeward cuts with the slower currents have coral reefs on either ends with sea grass beds in the middle; there, fishers target snappers, groupers, grunts, and jacks. These cuts have been traditionally fished for food by both men and women; the latter traditionally frequented the leeward locations by sculling (single oar propulsion) their boats to a desired spot where they fish by line, dive for or hook conch, and even catch sea turtle. Women also use these leeward cays to gather medicinal plants and palm top for basket weaving material.

The northern MPA was so large and totally positioned over traditional marine use areas that it basically eliminated fishing and cay uses for the people of Barraterre. Their strong negative response to the MPA was (the issue of agency was also a factor) because they believed it would 'destroy them' – that is, by eliminating all subsistence fishing activities and associated reciprocity so they could no longer be the community they had become over the past 222 years. The community believed its identity was at stake.

Figure 2. Northern No-take MPA around the community of Barraterre.

Discussion

This analysis argues for the utility of studying risk communication as a process occurring between two communities: scientists and local people. Epistemological and social constructions obfuscate the communication and application of risk knowledge between these two communities. Exumian risk communities communicated their concerns about the potential impacts of proposed No-take MPAs, but these concerns were framed in vernacular terms that had to be translated into social science language and ultimately EIA models. Expressions like ‘this MPA will kill us’ are easier to dismiss than to model; however, with follow-up data collection all initial vernacular risk communications were made transparent and worked into variables that can be measured and modeled.

The marine environment was a lifesaver and a community builder in the past and it remains a *safety zone* in the minds of Exumian people today. Many of the marine and terrestrial use patterns developed after slavery have persisted simply because they are the foundation for a high quality way of life that has stood the test of time. As a *region of security* the marine environment has become a part of how people view themselves and where they teach the lessons of life to new generations. This region is viewed as belonging to the community it has given life.

The study did not have a research instrument that specifically studied the meaning of vernacular expressions of perceived risk from No-take MPAs. All survey instruments provided some useful interpretative insights, but critical to understanding what was being said was the presence of Bahamian students and faculty on the study team. The QofL interviews proved most useful for profiling the communities and understanding specific responses to proposed No-take MPAs. The field of QofL studies has become well established around the world, after having been developed at the Institute for Social Research at the University of Michigan (Campbell, Converse, and Rodgers 1976). Bandura (1999) documents that QofL is a strong measure of community agency. Still, other instruments are needed to contextualize the QofL responses, learn the history of the community, and measure the cultural centrality of the sea. Small samples and a few elder oral histories will suffice for profiling ideal communities; but more research is needed the less the community under study matches the Conroy et al. (2001) criteria.

The people in this study recognized that portions of their traditional way of life were being placed at risk by No-take MPA proposals and communicated these risks through vernacular expressions (only some of which are discussed here). Because marine scientists do not share this traditional culture and vernacular language (as explained in the Two-Communities theory) locally perceived risks were neither understood nor addressed by the siting process. This analysis argues that if MPA impacts to the variables of agency, resilience, and identity are specifically studied and if all vernacular risk expressions are fully understood, then common ground can be found and MPAs can be successfully sited.

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