

# **A Preliminary Investigation of the Relationships Between the Legislative Status and Ecological Impacts of Marine Protected Areas on the Socio-economic Status of Stakeholders in Jamaica and the Turks and Caicos Islands**

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## **ABSTRACT**

This paper examines the effects of legislative status, institutional arrangements for management, and ecological conditions of Marine Protected Areas (MPAs) on the socio-economic status of stakeholders. The study sites selected for investigation were the Negril Marine Park in Jamaica, and the Princess Alexandra Land and Sea National Park in Providenciales, Turks and Caicos Islands.

The socio-economic data were collected primarily through the use of a formal questionnaire instrument administered to the principal user groups. The questionnaire was used to collect information on demographics, capital assets and individuals' perceptions of the marine parks. The ecological evaluation involved comparative analyses of the coral reef benthic structure, urchin and fish censuses as well as a stakeholder interview survey to assess changes inside and outside the boundaries of the marine parks. The evaluation of the managerial regime of the MPAs involved a review of the legislative policies and institutional mechanisms incorporated in the management plans of the study sites.

Results indicated that variation in the institutional arrangements for management and different management plans has resulted in different effects on the social and economic characteristics of user groups. For the most part, the unofficially managed Negril Marine Park achieves its management objectives yet exhibits minimal economic and social impacts on stakeholders, concurrent with minimal ecological improvements. The Princess Alexandra Land and Sea National Park being designated a non-consumptive use area with little community participation, produces relatively more social than economic and ecological impacts on stakeholders.

In general, there have been minimal ecological changes associated with the implementation of the MPAs and minimal economic impacts on stakeholders. Despite this, there appears to be wide support for the MPAs among stakeholders and a desire for improved management and community participation.

**KEY WORDS:** Caribbean, Marine Protected Areas, Socio-economic Impacts

## **Investigación Preliminar de las Relaciones entre el Estado Legislativo y los Impactos Ecológicos de Áreas Protegidas Marinas en el Estado Socioeconómico y los representantes en Jamaica y las Islas Turk y Caicos**

Este trabajo examina el efecto de prácticas directivas y de impactos ecológicos de áreas protegidas marinas en el estado socioeconómico de tenedores de apuestas. Los sitios del estudio seleccionados para la investigación eran el parque marina de Negril en Jamaica, y la princesa Alexandra Land y parque nacional del mar en Providenciales, turcos y las islas de Caicos. Los datos socioeconómicos fueron recogidos sobre todo con el uso de un instrumento formal del cuestionario administrado a los grupos de usuario principales. El cuestionario fue utilizado para recoger la información sobre demographics, activos fijos y opiniones de los individuos de los parques marinas. La evaluación ecológica implicó análisis comparativos de los censos béticos de la estructura, del pilluelo y de los pescados del filón coralino así como comparaciones en los tamaños de las especies comercialmente significativas de los pescados dentro y fuera de los límites de los parques marinas. La evaluación del régimen directivo del MPAs implicó la revisión de las políticas legislativas y de los mecanismos institucionales incorporados en los planes de la gerencia de los sitios del estudio. Los resultados indicaron que mientras que había generalmente un impacto ecológico mínimo, los varios planes de la gerencia de MPA produjeron varios efectos sobre las características sociales y económicas de los grupos de usuario. Para la mayor parte, el parque marina unofficially manejado de Negril alcanza sus objetivos de la gerencia con todo económicos de los objetos expuestos y sociales los impactos mínimos en los tenedores de apuestas concurrentes con las ventajas ecológicas mínimas. La princesa Alexandra Land y el parque nacional del mar que era señalado un área no física del uso produjeron impactos relativamente más sociales comparados a los impactos económicos y ecológicos en tenedores de apuestas. Fue concluido que aunque el éxito de un parque marina se puede medir por variables económicas, sociales, ecológicas y directivas, la medida verdadera de éxito miente en encontrar un equilibrio de todas las variables para proporcionar ventajas equitativas a todos los tenedores de apuestas.

**PALABRAS CLAVES:** Áreas protegidas marinas, impactos ecológicos, prácticas directivas

### **INTRODUCTION**

Within the Caribbean region, Marine Protected Areas (MPAs) have been widely implemented in support of fisheries management, conservation, sustainable resource use, and tourism. However, in a number of cases, implementation has not translated into active management (Geoghegan et al. 2001, Appeldoorn and Lindeman in

press). Furthermore, the typical approach to MPA implementation has revolved around the management and regulation of natural resource consumption with little attention given to the effects of the MPA on the social, cultural and economic concerns of stakeholders (Geoghegan et al. 2001). There are other cases where resource managers have incorporated a panacean approach to MPA implementation, only to fall short in achieving management objectives through weak institutional arrangements (UNEP 1996).

The primary stakeholders of the region's MPAs are typically individuals from coastal communities with small incomes who subsist on local resources. As such, they are likely to be significantly impacted by implementation of MPAs, and their support will be crucial to the long-term success of any MPA. Stakeholder resentment towards MPAs can intensify in cases where stakeholders are unable to perceive or achieve the benefits proclaimed by MPA managers. Consideration of the impacts on low income stakeholders and improvement of MPA design and management to benefit these individuals is therefore considered important to the success of the region's MPAs, yet there is a dearth of information on this subject.

The specific objectives of the studies reported here were to evaluate the impacts of the institutional arrangements and ecological changes within two MPAs (Negril Marine Park in Jamaica, and the Princess Alexandra Land and Sea National Park in the Turks & Caicos Islands) on the socio-economic status of stakeholders. These studies (see Best 2002, Richards 2002, O'Sullivan 2002, and Francis 2002) are summarised and synthesised in this paper and form part of a larger project (DFID #R7976) examining the impact of MPAs on the livelihoods of local communities in the Caribbean.

## METHODOLOGY

Data on the institutional arrangements for the MPAs were collected through a review of policies and management plans, a management questionnaire, a user questionnaire administered to persons at each study site, and interviews with persons, other than managers, who may have direct or indirect influence on legislation, policy, or management of the particular MPA. Direct researcher observation at each MPA was also used to reach certain conclusions. Further details are given by Best (2002) and Richards (2002).

Impacts of MPA implementation on the local coral reef ecology were assessed primarily through underwater surveys and comparative analysis of benthic cover data, and urchin and fish abundance inside and outside the boundaries of the MPA. This was supplemented by a stakeholder interview survey to determine their perception of changes to the ecology of the area since implementation of the MPA (see O'Sullivan 2002 for full details).

Data on the current socio-economic status of MPA stakeholders and changes in status as a result of the MPA were collected primarily through the use of a formal questionnaire instrument administered to the principal MPA user groups, as

identified by the MPA managers. The socio-economic assessment was supplemented by data collected through informal discussions with park users, focus group meetings with user groups of the park and researcher observation of activities within the environs of the MPA (see Francis 2002 for more details).

## RESULTS

### **Negril Marine Park**

*Managerial Status* — The Negril Marine Park (NMP), the marine component of the Negril Environmental Protected Area, was formally declared on March 4, 1998 pursuant to section 5 of the Natural Resources Conservation Authority (NRCA) Act of 1991 (enacted April 29, 1991). As stipulated under section 5 of the NRCA Act, the designation of the NMP was on the recommendation of the Authority, after consultation with the Jamaica National Heritage Trust. Pursuant to Section 38 of the NRCA Act, the Natural Resources Conservation (Marine Parks) Regulation was passed in 1992 to provide guidelines to prohibited activities such as disturbance of corals and other marine organisms and artifacts within designated marine parks, including the NMP. The NMP has eight zone designations aimed at controlling fishing, recreational and boating activities. Fishing is not permitted in the narrow Swimming Zone, the coastal strips designated for Non-motorised and for Motorised Craft, the two relatively large Diving Zones, the four Replenishment Zones, the Anchorage Zone and the No-Fly (parasailing) Zone. However, fishing is allowed in the majority of the park area, designated as a Fishing Zone, while recreational activities are not allowed.

The National Environment and Planning Agency serves as the lead agency ultimately responsible for all protected areas but it has the power to delegate functions to any agent. The Negril Coral Reef Preservation Society (NCRPS), an NGO, has been undertaking the day to day management activities of the NMP since its implementation in 1998, although the official instrument of delegation from the Government was only received on October 9, 2002.

The management plan for the NMP supports a number of objectives including *inter alia*: the conservation of resources, information sharing with stakeholders, community participation, and most importantly, enabling the use of the NMP for multiple purposes with minimal damage to the natural resources.

*Ecological Status* — The survey sites chosen for the benthic analyses at the NMP study site were Top Sandy Cay (inside the park) and Cousin's Cove (outside the park).

Both survey sites were dominated by macroalgae cover, which was found to be higher (36 %) at Top Sandy Cay than at Cousin's Cove (29 %). By contrast, turf algae cover and hard coral cover were significantly lower at Top Sandy Cay than at Cousin's Cove (Table 1).

A large number and high species diversity of fish were found at both survey sites. Furthermore there was no difference in the overall density of fish between the sites (Table 1), and the top four families (Pomacentridae, Labridae, Scaridae, Acanthuridae) were the same for each site.

Urchins were abundant at both sites with mean densities of 179 per 80 m<sup>2</sup> at Top Sandy Cay and 143 per 80 m<sup>2</sup> at Cousin's Cove. Of the dominant species (*Echinometra viridis*, *Diadema antillarum* and *Triplaneustes ventricosus*) only the latter varied significantly in abundance between the two sites with highest values at Top Sandy Cay (Table 1).

Results of the interview survey of 40 users on their perceptions of changes in the area since implementation of the MPA revealed consensus with regard to decreased fish abundance and size both within and outside the park, decreased coral cover, increased macroalgae cover and increased urchin abundance.

*Socio-economic Status* — The principal user groups identified for the socio-economic assessment were watersport operators and fishers. Sample sizes and selected characteristics of these user groups are given in Table 2. Most users had been in their current occupation for a long time (average: 25 years for fishers, 14 years for watersport operators and did not appear to have been displaced from the park area, since their average time in the park was 24 years for fishers and 14 years for watersport operators (Table 2). Furthermore most fishers (77 %) and 25 % of watersport operators identified themselves as traditional users of the park area. Both fishers and watersport operators are highly dependent on the park area for their livelihoods, with most fishers (67 %) and all watersport operators deriving between 75 % and 100 % of their income from their activities in the park (Table 2).

Interestingly the majority of users (83 % of fishers; 75 % of watersport operators) did not see a change of salary with the establishment of the park (Table 3). Just three fishers (10 %) reported a decline in salary, whilst one fisher and 25 % of the watersport operators reported an increase (Table 3). The majority of fishers (63 %) were uncertain of the effect of the park on customer demand, although 33 % of the watersport operators did indicate an increase in customers after the creation of the park.

Qualitative investigations revealed that the fishers considered themselves as being displaced or excluded by the "foreign" hoteliers and watersport operators. Added enmity between watersport operators and fishers is fuelled by the fact that some fishers regard watersport operators as threatening their livelihood by damaging fish traps, while watersport operators blame the fishers for over fishing the marine life. A total of 67 % of fishers and 42 % of watersport operators have experienced intra- and inter-user conflict in the park (Table 3). Of these, the MPA does not assist in resolving conflict according to the majority (90 %) of fishers. This was contrary to the majority (60 %) opinion of watersport operators (Table 3). It was therefore not surprising that only 16 % of all fishers and 42 % of all watersport

operators saw the MPA as an avenue for conflict reduction among user groups (Table 3).

Ultimately, the majority of users supported the need for an MPA in the area (Table 3). Most fishers (60 %) felt that the Negril Marine Park was a successful MPA, in contrast to watersport operators, 75 % of whom felt that it was not. This is interesting, given that the majority of both user groups felt that conservation of resources was the key indicator of MPA success (Table 3). A substantial number of stakeholders were of the opinion that the community was a beneficiary of the Negril Marine Park and most of these believed that there was equal distribution of the benefit throughout the community. Of the few fishers who identified unequal benefit distribution, some identified sectors in the tourist industry as being the chief beneficiaries, with fishers and the general public as lesser beneficiaries. Likewise, watersport operators who saw the park as being unequally beneficial, all felt that the fishers were the lesser beneficiaries while 67 % identified themselves as being the main beneficiaries.

The majority of individuals in both principal user groups were dissatisfied with the current level of management of the park with virtually everyone (93 % of fishers and 100 % of watersport operators) stating that the MPA could serve a more beneficial role to themselves and their community (Table 3). Fishers identified community participation, improved regulations and improved information transfer as target areas. The majority of watersport operators on the other hand saw improved regulations as the greatest need, with improved management and community participation being secondary.

### **Princess Alexandra Land and Sea National Park**

*Managerial Status* — The Princess Alexandra Land and Sea National Park (PALSNP) in Providenciales was created in 1992 under the National Parks Ordinance CAP 89 of 1975, through the National Parks Order which designated thirty-three protected areas at once. The National Parks Regulations (1992) detail the activities that are banned within the park. These include *inter alia*, the taking of artefacts, the destruction of, or injury to any animal or plant, the removal of sand, rock, coral, coral-rag or any calcareous substance, and anchor damage to coral reef structures whether living or dead. As such the entire MPA is a no-take reserve.

PALSNP is one of three protected areas managed by the Coastal Resources Management Project (CRMP), which started in January of 1999. Up until this time, there had been very little active management. It has a management plan (Homer, 2000) that is neither legally binding nor a part of the Physical Development Plan for Providenciales. According to PALSNP's management plan, the management objectives revolve around the protection of natural and scenic areas stressing the significance of fishery stock management, recreation and "touristic purposes". User activities within the park have been regulated through the designation of specific use zones (Aquatic Sports, Swimming and Training Zones in four locations; Access Zones for boats; a Swimming Zone for swimming and snorkelling only; and a Water-ski Zone for water-skiing, paragliding and similar activities using motorised vehicles)

as permitted under the National Parks Regulations. Under the CRMP, several Park Wardens have been employed, but none of them is legally empowered to enforce the park's regulations.

*Ecological Status* — The survey sites chosen for the benthic analyses at the PALSNP study site were Sellar's Cut (inside the park) and Fort George Cut (outside the park).

Hard coral cover was relatively high at both sites (Table 1). Significant differences between the survey sites were found for turf algae cover, encrusting coralline algae cover, sand, rock, rugosity index and fish density (which were all lower inside the park), and macroalgae cover (which was higher inside the park), indicating a less healthy reef inside the park (Table 1). Despite a difference in fish density between the two sites, the three top ranking families were the same (Acanthuridae, Haemulidae and Labridae). Urchin densities were low and there were no differences between sites (Table 1).

Results of the interview survey of 22 users on their perceptions of changes in the area since implementation of the MPA revealed consensus with regard to no change in fish abundance, species composition or mean size of fish inside the park, although there has been a decrease in abundance outside. The majority of respondents also felt that coral cover has decreased and macroalgae cover has increased within the park. They were less sure as to the patterns outside the park.

*Socio-economic Status* — The principal user groups identified for the socio-economic assessment were watersport operators, beach vendors and hoteliers. Sample sizes and selected characteristics of these user groups are given in Table 2. The average length of time in their current occupation for the watersport operators, hoteliers and beach vendors was 14, 16 and 4 years respectively (Table 2). The differences among the user groups are reflected in the observation that no hotelier identified with being a traditional user of the park as compared to 9 % of beach vendors and 26 % of watersport operators. Most users (85 % of watersport operators, 100 % of hoteliers and 91 % of beach vendors) are exclusively dependent on park related activities for income (Table 2).

Interestingly, most users did not identify a change of salary with the establishment of the park (Table 3). Only 30 % of watersport operators and 13 % of hoteliers acknowledged a salary increase since the MPA was established and a small percentage of watersport operators (5 %) reported reduced income. In terms of business expansion, 70 % of water sports operators, 63 % of hoteliers and 80 % of beach vendors recorded no business expansion associated with establishment of the park (Table 3).

Table 1. Summary of key ecological characteristics of coral reef communities at study sites within and outside the Negril Marine Park in Jamaica, and the Princess Alexandra Land and Sea National Park in Providenciales. Significant differences as indicated by Mann-Whitney tests comparing the 10 transect mean values at each site are shown.

MPA	Mean Community Characteristic	Negril Marine Park		Princess Alexandra Land & Sea National Park			
		Top Sandy Cay (inside park)	Cousin's Cove (outside park)	Seller's Cut (inside park)	Ft. George Cut (outside park)		
	Hard coral cover (%)	8.4	17.6	22.0	20.5	No	Site of greater mean value
	Hard coral diversity index	4.4	3.7	2.92	3.64	No	Site of greater mean value
	Macroalgae cover (%)	35.7	26.8	44.1	7.8	Yes	Inside
	Turf algae cover (%)	7.7	27.7	17.9	36.5	Yes	Outside
	Coralline algae cover (%)	4.9	5.9	6.84	21.8	Yes	Outside
	Sand cover (%)	26.4	12.6	1.12	5.5	Yes	Outside
	Rock cover (%)	8.8	2.67	0	0.6	Yes	Outside
	Rugosity index	1.1	1.2	1.07	1.17	Yes	Outside
	All fish density (80 m <sup>-2</sup> )	71.1	91.8	86.2	127.2	Yes	Outside
	<i>Urchin density</i> (80 m <sup>-2</sup> )	118.5	69.4	0.6	0.6	No	Site of greater mean value
	<i>Echinometra viridis</i>	47.4	67.1	0.7	1.6	No	Site of greater mean value
	<i>Diadema antillarum</i>	10.1	5.0	0	0.1	No	Site of greater mean value
	<i>Trirasteres verticosus</i>					No	Site of greater mean value



Table 2. Summary of selected demographic and economic characteristics of primary user groups of the Negril Marine Park in Jamaica and the Princess Alexandra Land and Sea National Park in Providenciales. N represents the estimated total number of users, n is the interviewed sample size.

Characteristic	Negril Marine Park		Princess Alexandra Land & Sea National Park		
	Fishers [% responses] N ~180, n = 30	Watersport Operators [% responses] N ~14, n = 12	Watersport Operators [% responses] N ~24, n = 20	Hotellers [% responses] N ~12, n = 8	Beach vendors [% responses] N ~11, n = 11
Mean years in occupation	24.83	13.83	13.5	15.9	4.4
Mean years in park	24.10	13.89	7.8	3.6	5.4
Reason for working in park					
Income	5 [16.7]	2 [16.7]	5 [26.3]	5 [83.3]	5 [45.5]
Tradition	23 [76.7]	3 [25.0]	5 [26.3]	0	1 [9.1]
Interest in conservation	0	3 [25.0]	1 [5.3]	0	0
Other	2 [6.7]	4 [33.3]	8 [42.1]	1 [16.7]	5 [45.5]
Age of respondent					
<30	7 [23.3]	2 [16.7]	5 [25.0]	1 [20.0]	3 [27.3]
30 to 40	7 [23.3]	4 [33.3]	8 [40.0]	1 [20.0]	3 [27.3]
41 to 50	6 [20.0]	4 [33.3]	5 [25.0]	1 [20.0]	2 [18.2]
51 to 60	6 [20.0]	1 [8.3]	2 [10.0]	2 [40.0]	3 [27.3]
>60	4 [13.3]	0	0	0	0
No Answer	0	1 [8.3]	0	0	0
Percent salary from park					
100 %	11 [36.7]	5 [41.7]	17 [85.0]	8 [100.0]	10 [90.9]
75-100 %	9 [30.0]	7 [58.3]	2 [10.0]	0	0
50-75 %	7 [23.3]	0	0	0	0
25-50 %	3 [10]	0	1 [5.0]	0	0
< 25 %	0	0	0	0	1 [9.1]
Level of education					
None	5 [16.7]	0	1 [5.9]	0	3 [42.9]
Primary	12 [40.0]	0	1 [5.6]	0	1 [14.3]
Secondary	13 [43.3]	5 [41.7]	3 [17.6]	1 [50]	1 [14.3]
Tertiary	0	7 [58.3]	12 [70.6]	1 [50]	2 [28.6]

**Table 3. Summary of responses to selected questions regarding the impact of the MPA on the livelihood of primary user groups of the Negri Marine Park in Jamaica and the Princess Alexandra Land and Sea National Park in Providenciales.**

Question	Answer	Negri Marine Park				Princess Alexandra Land & Sea National Park			
		Fishers [% responses]	Waterport Operators [% responses]	Waterport Operators [% responses]	Hotellers [% responses]	Beach Vendors [% responses]			
Change of salary	Increase	1 [3.3]	3 [25.0]	6 [30.0]	1 [12.5]	0			
	Decrease	3 [10.0]	0	1 [5.0]	0	0			
	Unchanged	25 [83.3]	9 [75.0]	13 [65.0]	7 [87.5]	9 [90.0]			
Business Expansion	Yes	1 [3.3]	0	0	0	1 [10.0]			
	No	2 [6.7]	3 [25.0]	6 [30.0]	3 [37.5]	1 [10.0]			
	Unsure	27 [90.0]	8 [66.7]	14 [70.0]	5 [62.5]	8 [80.0]			
Was MPA a good idea	Yes	1 [3.3]	1 [8.3]	0	0	1 [10.0]			
	No	23 [76.7]	12 [100.0]	20 [100]	8 [100]	6 [60.0]			
	Unsure	1 [3.3]	0	0	0	3 [30.0]			
Increased customer demand	Yes	6 [20.0]	0	0	0	1 [10.0]			
	No	1 [3.3]	4 [33.3]	8 [40.0]	3 [37.5]	4 [36.4]			
	Unsure	10 [33.3]	3 [25.0]	11 [55.0]	4 [50.0]	3 [27.3]			
Indicators of MPA success	Conservation	19 [63.3]	5 [41.7]	1 [5.0]	1 [12.5]	4 [36.4]			
	More tourists	18 [58.1]	10 [82.5]	9 [27.3]	4 [30.8]	3 [25.0]			
	More economic benefits	2 [6.5]	0	2 [8.1]	0	0			
Enforcement/Community Participation Research	Enforcement	0	2 [12.5]	12 [36.4]	4 [30.8]	1 [8.3]			
	Community Participation	1 [3.2]	1 [6.3]	3 [9.1]	1 [7.7]	0			
	Research	8 [19.4]	1 [6.3]	6 [18.2]	4 [30.8]	5 [41.7]			
Other		0	0	0	0	0			
Unsure									

Table 3 (continued).

Question	Answer	Fishers [% responses]	Watersport Operators [% responses]	Watersport Operators [% responses]	Hotellers [% responses]	Beach Vendors [% responses]
MPA is successful	Yes	18 [60]	3 [25]	7 [35.0]	3 [37.5]	5 [45.5]
	No	6 [20.0]	9 [75]	13 [65.0]	5 [62.5]	3 [27.3]
MPA benefits community	Unsure	6 [20.0]	0	0	0	3 [27.3]
	Yes	20 [66.7]	7 [58.3]	19 [95.0]	8 [100.0]	6 [54.5]
Community benefit distribution	No	10 [33.3]	5 [41.7]	1 [5.0]	0	3 [27.3]
	Unsure	0	0	0	0	2 [18.2]
	Equally	17 [81.0]	4 [50.0]	10 [52.6]	7 [87.5]	6 [100.0]
	Unequally	4 [19.0]	3 [37.5]	9 [47.4]	1 [12.5]	0
Incidence of conflict	Unsure	0	1 [8.3]	0	0	0
	Yes	20 [66.7]	5 [41.7]	6 [30.0]	4 [50.0]	4 [36.4]
Conflicting group	No	10 [33.3]	7 [58.3]	14 [70.0]	4 [50.0]	7 [63.6]
	Fishers	10 [50.0]	5 [100.0]	4 [66.7]	0	0
	Divers	8 [40.0]	0	0	1 [20.0]	0
	Recreational users	1 [5.0]	0	1 [16.7]	0	0
MPA assists in conflict resolution	Other	1 [5.0]	0	1 [16.7]	4 [80.0]	4 [100.0]
	Yes	2 [10.0]	3 [60.0]	1 [20.0]	2 [50.0]	1 [25.0]
MPA effect on conflict	No	18 [90.0]	2 [40.0]	4 [80.0]	2 [50.0]	3 [75.0]
	Reduce	5 [16.7]	5 [41.7]	2 [10.0]	1 [12.5]	1 [8.1]
	Increase	0	0	4 [20.0]	1 [12.5]	0
	No difference	24 [90.0]	7 [58.3]	14 [70.0]	5 [62.5]	7 [63.6]
Satisfaction with MPA management	Unsure	1 [3.3]	0	0	1 [12.5]	3 [27.3]
	Yes	13 [43.3]	4 [33.3]	7 [35.0]	2 [25.0]	4 [36.4]
	No	16 [53.3]	8 [66.7]	13 [65.0]	6 [75.0]	6 [54.5]
	Unsure	1 [3.3]	0	0	0	1 [8.1]

Conflict within the park was experienced by 30 % of water sports operators, 50 % of hoteliers and 36 % of beach vendors. The major conflicting group for the watersport operators was the illegal fishers who accounted for the conflict experienced by 67 % of watersport operators. Hoteliers (40 %) reported conflict with beach vendors and watersport operators and 20 % of hoteliers had conflict with divers. For beach vendors, all cases of conflict involved other vendors. Conflict resolution was attained by 20 % of water sports operators, 50 % of hoteliers and 25 % of beach vendors. The consensus among respondents (70 % of watersport operators, 63 % of hoteliers and 64 % of beach vendors) was that the MPA had minimal effect on the level of conflict (Table 3). Conversely, 10 % of watersport operators, 13 % of hoteliers and 9 % of beach vendors saw the MPA as an avenue for conflict reduction among user groups.

Interestingly every watersport operator, every hotelier and 60 % of beach vendors supported the need for an MPA in the vicinity. However most watersport operators (65 %) and hoteliers (63 %) reported that the PALSNP was not a successful MPA, in contrast with the majority of beach vendors (45 %) who thought that it was a success (Table 3). This may be because the former groups judged success primarily on enforcement, whereas the vendors had other criteria (Table 3).

Interestingly, a large number of stakeholders (95 % of watersport operators, 100 % of hoteliers and 55 % of beach vendors) see the community as a beneficiary of the MPA. Of the respondents who associated the MPA with a benefit to the community, 53 % of watersport operators, 86 % of hoteliers and 100 % of beach vendors see the benefit distribution as being equal. Of the watersport operators who saw unequal benefit distribution, the tourism related industries (e.g. watersport operators and hotels) were identified as the main beneficiaries, whilst 89 % of watersport operators identified fishers and locals as the lesser beneficiaries. Locals were also identified by 100 % of the hoteliers as the least benefiting from the park, whereas 100 % of hoteliers responded that hotels were the main beneficiaries of the MPA.

The majority of individuals (65 % of water sports operators, 75 % of hoteliers and 55 % of beach vendors) were dissatisfied with the management of the Park. To facilitate improved park management, watersport operators identified improved regulations (46 %), improved management (32 %) and improved community participation (14 %) as being crucial. The hoteliers identified improved community participation (40 %), improved regulations (30 %), and improved information transfer (20 %) as essential elements of park improvement. The beach vendors identified improved facilities (27 %), improved information transfer (18 %), improved regulations (18 %), and improved community participation (18 %) as vital target areas for the Park authority. Virtually everyone (100 % of watersport operators, 100 % of hoteliers and 82 % of beach vendors) was of the opinion that the MPA could serve a more beneficial role to themselves and their community.

## DISCUSSION

### The Negril Marine Park

The majority of primary users are dependent on the MPA for their income. As such there is great potential for the MPA to have significant positive or negative effects on the stakeholders' economic standing.

Importantly, the majority of stakeholders support the need for an MPA, and most fishers and some watersport operators feel that the NMP is a successful MPA. A substantial number of stakeholders are also of the opinion that the community has benefited from the implementation of the NMP. Interestingly more detailed questioning revealed only a slight economic impact on the primary user groups. Fishers report minimal change in terms of business expansion, income or customer demand. It is no wonder then that the majority of them perceive negligible economic benefits ensuing from NMP's establishment. Watersport operators experienced some increases in these same areas, but the overall economic impact of the park is still relatively low.

The lack of positive economic impacts of the MPA on stakeholders emanating from changes in the ecology of the area is not surprising given lack of evidence of improvement within the park. In fact the reef site inside the park appears to be less healthy than the site outside the park (less hard coral, more macroalgae) and may have deteriorated because of tourism infrastructure development and heavier use associated with the park. Furthermore, fish densities appear to be no different within and outside the park, again not surprisingly since fishing (albeit under stricter management than outside) is allowed within a large area of the park.

The fact that very few stakeholders have suffered negative economic impacts is significant, and no doubt helps to explain their general support for the MPA, and their desire for improved management, particularly improvements to the implementation of regulations.

The current legislative status and institutional arrangement for management is constraining the effectiveness of the NMP as a conservation tool. For example, although the NMP was established in response to declining ecological conditions, the development plans advocated by the Urban Development Corporation can sometimes be entirely contrary to the principles of the NMP's management plan. Since the NCRPS is forced to accede to the UDC, this can lead to deleterious effects on the potentially positive ecological impacts of the NMP.

Another area for concern is stakeholder conflict. The social distinctiveness of each user group (as indicated by average level of education, length of time in occupation *inter alia*) plays a great role in their perceptions. There are also at least some stakeholders who believe that there is social inequity in the distribution of benefits emanating from the NMP and there are fishers who feel disenfranchised and displaced by 'foreign' hoteliers and watersport operators. These factors could evolve into greater hostility among user groups as well as towards the MPA, as the existence of the MPA potentially represents a change in the traditional system of

fishing practices and by extension the culture of the area. Therefore the MPA has a potentially important role to play in facilitating conflict resolution. Although stakeholders report little change in the level of conflict as a result of the NMP, they also report that the NMP has played a minimal role in conflict resolution to date.

### **The Princess Alexandra Land and Sea National Park**

Most of the primary users are exclusively dependent on MPA related activities for their income, making them socially and economically vulnerable to changes within the MPA. The PALSNP appears to have had a degree of impact on the economic status of the primary users, with some watersport operators and hoteliers reporting improvements. However, the majority of stakeholders report no change. Of special interest is the significant number of reports on increased customer demand and business expansion, tempered by minimal reports of increased income. The disparity may be attributed to strategic bias affecting the individuals' responses. It is possible that the critical attitude of stakeholders towards the PALSNP translated into responses aimed at detracting from any direct economic benefits of the park. However, the lack of any real economic gains may also be a reflection of the all-inclusive tourism that could prevent access to benefits by the primary user groups.

The ecological evaluation suggests that the unprotected survey site is healthier than the protected one. Several factors may have contributed to this outcome including *inter alia*, ongoing tourism infrastructure development and the inability of the park wardens to enforce conservation efforts. However, the consensus opinion that fish populations have not changed in the park, whilst they have continued to decline outside the park, indicates that the PALSNP is perhaps having a positive effect, which could be attributed to its no-take status. Dramatic improvements are not expected given that active management has only been in place since 1999.

PALSNP has not significantly affected the level of conflict among the park's user groups, though a few respondents suggested a post MPA increase. For the most part, individuals did not see the MPA as a means of reducing the level of conflict within the park, a factor of particular importance because one stated objective of the PALSNP management plan is conflict control and reduction.

Importantly, the need for a MPA has wide support among stakeholders, and most stakeholders see some community benefits accruing from the MPA. This perception was shared more so by the watersport operators than by vendors. A small number of users perceived unequal benefit distribution amongst the community, opining that the tourism industry was benefiting at the expense of the fishers, locals and non-tourist-based businesses. The fishers and locals appear to be the most disadvantaged because all consumptive use is prohibited in the park, setting the tone for future conflict between the different classes of stakeholders.

Few users regard the MPA as successful, and this can be directly correlated to the high numbers of users who were dissatisfied with how the park was managed. Indeed, the dissident watersport operators and hoteliers attributed the management shortcomings to an ineffectual regulatory framework. On the other hand the dissatisfied vendors were vociferous in denouncing the existing system of

discrimination whereby "tourists can break the rules with impunity", a system that perpetuates the belief that the MPA exists primarily for tourists. Thus, in terms of social, economic, ecological, and management variables, PALSNP still has a long road ahead before it reaches a state where it is seen to be benefiting stakeholders equitably.

### Commonalities

From the outset it would appear that the NMP and the PALSNP are dissimilar: the NMP is managed by an NGO, with stakeholder participation, whereas the PALSNP, which is government run, was established without stakeholder input and for the most part continues to operate in this way. Yet a close evaluation shows that the two MPAs are not so different.

With both MPAs the primary users are highly dependent on the parks for their income with the majority of users deriving their income solely from their park activities. Both MPAs are therefore in a position to dramatically alter the socio-economic well being of their stakeholders. However, only a minority of users in both cases report any positive or negative economic impacts from the MPA, and the majority report no difference.

Both MPAs have been established at least in part to conserve the marine ecology of the area, and yet in neither case has there been any marked improvement. In fact there has possibly been deterioration, particularly of coral reefs within the park boundaries. This highlights the fact that MPA management in the absence of integrated coastal zone management will not be able to control sources of pollution outside the park boundaries with deterioration of water quality and habitat more than likely. Neither the CRMP nor the NCRPS has a say in development planning. Therefore development could occur to the detriment of both the PALSNP and the NMP, putting them in a position where they are unable to achieve stated conservation objectives.

Both MPAs have some level of user conflict, with an inherent juxtaposition of the disenfranchised fishers and vendors on the one hand, and the watersport operators and the tourism industry on the other. Although the NMP is managed by an NGO, many of its users would argue that all stakeholders do not benefit equally nor have the same voice in how the park is managed. This is similar to the PALSNP. In both cases the traditional uses of the park seem threatened, indicating the potential for cultural dissipation. Both parks are likely to experience increasing levels of user conflict, particularly when it seems as if those at the lower echelons of society will continue to be disadvantaged in favour of the perceived upper class and tourists.

What is abundantly clear is that although the success of an MPA can be measured by economic, social, ecological, and management variables, the true measure of success lies in finding a balance of all variables, to provide equitable benefits among all stakeholders which will ensure sustainability of the MPA.

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