

PEOPLE LIVING IN PROTECTED AREAS:  
A COMPARATIVE STUDY OF THE SOCIAL IMPACTS OF CONSERVATION IN  
LATIN AMERICA'S MAMIRAUÁ SUSTAINABLE DEVELOPMENT RESERVE  
AND RÍA CELESTÚN BIOSPHERE RESERVE

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## Table of Contents

Introduction.....	3
Chapter 1: Theoretical and Conceptual Framework.....	7
Chapter 2: Mamirauá Sustainable Development Reserve, Amazonas, Brazil.....	21
Chapter 3: Ría Celestún Biosphere Reserve, Yucatan, Mexico.....	34
Chapter 4: Analysis.....	50
Conclusions.....	63
Works Cited.....	66

## **Introduction**

Understanding the ways in which the establishment and management of protected areas impact local communities is critical given the pervasiveness of the protected area model in conservation initiatives worldwide. Not only does the protected area model for biodiversity protection and conservation have a defining impact on the composition of wild areas remaining in the world, but it also has a significant impact on the way in which local people interact with protected lands. Local peoples and indigenous groups have often been subject to social injustices, human rights violations, and economic and social marginalization following the establishment of parks. Furthermore, opposition from local communities and high rates of noncompliance with regulations regarding resource use have contributed to the widespread failure of many conservation goals. Thus, the social and ecological failures associated with protected areas demand closer analysis to determine the causes of such pervasive shortcomings and underscore the need to generate ideas and strategies that will be instrumental in improving conservation initiatives.

In recent years, the incorporation of local participation in protected area establishment and management has sought to address some of the problems described above. More inclusive forms of governance and the development of management plans detailing strategies for the sustainable use of natural resources have been cited as potential remedies for the problems plaguing conservation initiatives. Furthermore, a move away from the traditional model of parks as areas devoid of human settlements towards multiple-use zones and spatial planning in biosphere reserves has also shown promise in addressing issues of displacement and constraints on human livelihoods. While every case is unique and place-specific, lessons regarding the

impacts of such changes can be learned, which can serve to inform those involved in the establishment and management of protected areas and the communities impacted by them.

This paper addresses several questions associated with the wide-ranging problems of protected areas and reserves. Particularly, what impacts have protected areas had on human livelihoods? How do different forms of protected area management, design, and governance ameliorate or exacerbate the negative social impacts associated with protected areas? What are some of the salient factors driving the success or failure of protected areas in terms of social development and conservation goals? I hope that the results of this research will be informative for local and state governments, conservation practitioners, non-governmental organizations (NGOs), scientists, and local communities seeking an improved framework for the conservation of biodiversity and sustainable development initiatives.

In order to conduct the research, I used discourse and textual analysis to compare two in-depth case studies. I analyzed literature regarding the shortcomings of protected area strategies in terms of negative impacts on local societies. Textual analysis was employed to analyze two cases of reserves that have been implemented and their effects on local communities and conservation goals.

Information was drawn from formal journal articles and grey literature, including project reports, information available on the websites of NGOs, and news sources. After gathering information regarding underlying problems associated with protected areas, I analyzed two case studies that represent a “success” and “failure” in terms of achieving social development goals to determine the driving factors that have led to their relative successes and failures. The cases selected represent extremes in the impacts of protected areas. I chose the case of Mamiraua Sustainable Development Reserve in Brazil because of its high rates of success in curbing the

unsustainable use of natural resources and in improving local economies and livelihoods. The case of Ria Celestun Biosphere Reserve in Mexico was identified because it has largely been perceived as a failure in terms of community interactions, conflict, and deteriorating environmental conditions. It is important to consider that the majority of cases lie somewhere in between the two discussed in this paper in terms of achieving successes in some regards, while failing to address other issues. Finally, I have made some general conclusions and identify important lessons that have been learned from this study that can be applied to future conservation projects.

This methodology is limited by the absence of fieldwork and original data collection. Conclusions were made based on the analysis of sources described above, which may contain some inaccuracies and make assumptions about the nature of protected areas and their impacts on communities. Despite these limitations, I have reconstructed these cases as accurately as possible with the information available.

The results of this study indicate that the incorporation of strong forms of participation and an emphasis on the creation and maintenance of alternative and sustainable livelihood strategies are critical components of successful protected areas. Many of the negative social impacts of strictly preservationist protected areas can be ameliorated by creating multiple-use zones and strong spatial planning. Some of the most severe effects of protected areas, which come in the form of displacement and forced migration, can be mitigated by allowing communities to reside within protected areas while addressing unsustainable resource use. Approaching conservation through the establishment and expansion of protected areas is likely to continue well into the future and as such its strengths and shortcomings must be addressed. This study has focused on identifying key underlying factors that play a major role in contributing to

the successes and failures of protected areas and has been completed in hopes that its conclusions will be instrumental in creating more meaningful and beneficial ways to promote ecological sustainability and social development.

## Chapter 1: Theoretical and Conceptual Framework

Although the concept of protected areas is by no means a new idea, it is important to understand what is meant by the term. According to the International Union for the Conservation of Nature (IUCN), a protected area can be defined as, “A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values” (IUCN, 2010). The idea of parks and protected areas has evolved over hundreds or even thousands of years and still means a number of different things to different people. Some historians claim that tracts of land were set aside in India over 2,000 years ago in order to promote the protection of natural resources (UNEP). The idea underlying the protection of places is universal and land that is considered to be sacred or spiritually significant is often placed under some type of protection (UNEP).

The modern movement in the establishment of protected areas on a global scale began in earnest during the 19<sup>th</sup> century. Initially, the creation of parks was confined to the “new nations” of Australia, Canada, New Zealand, South Africa, and the United States, as the protected area model spread from Europe, where it was historically used by royals to create space for recreation (UNEP). During the 20<sup>th</sup> century, the idea of protected areas truly became a global phenomenon, as parks sprang up all over the world. The majority of these parks were based on a conservation model described by Brockington (2002) as “fortress conservation” (as cited in Igoe, 2004). Fortress conservation is based on the premise that the only way to preserve the natural character of the environment is to remove all human influence from the area, often forcibly, in order to create wilderness areas.

In 1962, the first World Parks Congress marked the initiation of the modern parks and protected area movement, during which time approximately 1,000 official protected areas existed worldwide, covering an area of around 1 million km<sup>2</sup> (Borgerhoff Mulder & Coppolillo, 2005). Since that time, the number of parks has skyrocketed and in 2008, 120,000 protected areas covered an area of 21 million km<sup>2</sup><sup>1</sup>, which is an area nearly twice the size of Canada (UNDP). Currently, 12.2% of the earth's land area, 5.9% of territorial seas, and 0.5% of extraterritorial seas are designated as protected areas (UNDP). The scale and extent of protected areas worldwide indicate their significance as what has been the dominant approach to conservation, although this is beginning to change, as will be discussed later in the chapter.

Not all protected areas are characterized by a uniform set of rules and regulations and the concept of a protected area means different things in different places. Officially, the IUCN has defined six categories of protected areas, ranging from a Strict Nature Reserve, in which human activities are tightly controlled and primary purpose is to conserve biodiversity, to Protected Areas with Sustainable Use of Natural Resources, which are dedicated to both conservation and social development initiatives (IUCN). Thus, the term protected area contains a variety of different approaches to conservation that vary in a number of ways. However, the wide range of protected areas are still connected by an approach to conservation that is dependent on the idea of protected a confined area and the implementation of rules and regulation restricting behaviors and activities in such an area.

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<sup>1</sup> Includes both terrestrial and marine protected areas



## **Benefits of Protected Areas**

Protected areas encompass some of the most wondrous and spectacular natural places left in the world. The benefits of these areas are numerous and impact a range of users across a multitude of spatial and temporal scales. Such benefits can be defined in ecological terms and include the protection of vital ecosystems and the preservation of plant, animal and habitat biodiversity. They also confer a huge number of other ecosystem goods and services to people, such as revived fish stocks in the case of marine protected areas, access to potable water due to improved watersheds, and economic benefits from park entrance fees, tourism revenue, and hunting licenses (Stolton, 2010). Recently, economic assessments of protected areas have sought to include valuation of intangible benefits that previously had not been considered. Such benefits include recreational values, spiritual values, cultural values, identity values, existence values, artistic values, aesthetic values, educational values, research and monitoring values, peace values, and therapeutic values (Putney, 2003). Thus, the establishment of protected areas is justified by the diverse array of benefits they provide in ecological, economic and social terms.

## **Displacement**

One of the most severe negative impacts of protected areas and reserves on local residents has historically been displacement. Local residents are frequently forced off their land with little or no compensation, denied access to resources, and are victims of dispossession and extreme marginalization (Brechin, West, & Harmon, 1991; Brockington, Duffy, & Igoe, 2008). Commonly known as conservation refugees, these people have been removed from their lands involuntarily, either forcibly or through less coercive measures such as soft eviction or “voluntary” resettlement (Dowie, 2005). Although it is unknown how many conservation

refugees exist, some studies estimate that over 14 million exist on the African continent alone (Dowie, 2005). Entire villages and communities have been evicted, leading to loss of rights to residence, land, and resource use and a foreclosure of rights to future use (Adams, 2007).

Studies reveal that in a number of cases, the creation of a national park or protected area has resulted in increased risk of impoverishment, landlessness, joblessness, homelessness, economic marginalization, food insecurity, increased morbidity and mortality rates, and loss of access to common property and environmental services (Adams, 2007). Despite the wide-ranging impacts of displacement due to conservation initiatives, few individual studies look at the economic costs and social effects on those who are displaced by protected areas (Dugelby & Libby, 1998; West, Igoe, & Brockington, 2006).

The establishment of protected areas invariably affects the livelihoods of people living in surrounding communities or within park boundaries. Although there are winners and losers, the regulations associated with protected areas constrain people's lives and activities, despite the fact that, according to Brockington and Igoe (2006), many "people are highly dependent on natural resources for their livelihoods and risk facing impoverishment because of these regulations" (p. 426). Little is actually known about the livelihood impacts of protected areas and very few systematic studies seek to analyze these interactions (Igoe, 2006). Thus, parks are frequently established with little consideration given to their impacts on human livelihoods.

Rules regulating the use of protected areas can have numerous impacts on people's livelihoods. Restrictions on land use, for instance, can deprive agriculturalists of farmland and restricted access to forests can prevent people from collecting firewood or gathering food. Restricting access to resources can also result in the criminalization of local people due to land-use practices that have been in place for generations (West, Igoe & Brockington 2006). Hunting

bans or increasing the size of animal habitat can result in burgeoning populations of wild animals. When wildlife enters agricultural land outside the boundaries of a protected area, results can include damages to crops or livestock, prevention of the cultivation of arable land by farmers because of fear of crop losses, and injury or death to people (Pathak & Kothari, 2003; Wang, Curtis, & Lassoie, 2006). Moreover, local conflict may develop as surrounding communities become dependent on the same resources due to resource use restrictions within protected areas (Pathak & Kothari, 2003). There have also been instances of the use of fear and violence in enforcing reserve regulations. For instance, some community leaders have been threatened with imprisonment if they refuse to cooperate and there have been cases of park personnel beating local people who break park rules (Fortwangler, 2003). Protected areas can therefore lead to physical or structural violence, created by constraints that prevent local peoples from meeting their basic human needs.

### **Cost Benefit Distribution and Power Dynamics**

The distribution of such benefits is nearly always uneven and it is important to consider the way in which the costs and benefits are allocated among user groups. Many argue that protected areas benefit local people in a number of ways, which, in addition to those benefits listed above, can include local involvement in protected area management and operations (Dugelby & Libby, 1998). Local people are often hired in jobs relating to park protection or extension services and as guards, rangers, accountants, and field biology assistants (Dugelby & Libby, 1998). However, many of the gains associated with protected areas are appropriated by local elites, wealthy environmental enthusiasts in developed countries, or regional users of ecosystem services (Adams & Hutton, 2007). Global conservation values and the international

emphasis being placed on conserving biodiversity incur local costs that are often ignored by conservation advocates (Sayer, 1999). A number of projects ultimately fail socially because locals bear most of the costs and yet receive an inadequate portion of the benefits (Chan et al., 2009). Thus, it is crucial to analyze the ways in which the costs and benefits of protected areas are distributed among different user groups.

Some of the heaviest costs of parks, including physical and economic displacement, are typically borne by poor and politically weak rural groups, who are subsequently further marginalized and disempowered in terms of local resource management (Brockington, Duffy, & Igoe, 2008). Both legal and illegal benefits derived from protected areas, “tend to reproduce existing economic inequalities within local communities and wider societies” (Adams & Hutton, 2007, p. 161). For instance, a cooperative of small farmers in Mirafior, Nicaragua fought to have their land recognized as a protected area in order to curb detrimental agricultural practices and to prevent resourceful people from buying up land in the area. However, wealthy landed elites managed to manipulate the formation of the regulations, which ultimately disadvantaged small farmers (Munk Ravnborg, 2008). Thus, it is important for conservation practitioners to assess the power dynamics underlying the process of creating and managing protected areas.

Distribution of costs and benefits can also be uneven within households. Women are typically more directly dependent on access to natural resources in order to secure fuel for cooking, traditional medicine, and building materials (Igoe, 2006). Moreover, women may have a more difficult time coping with changes to their livelihoods or attaining other forms of employment, as they face additional constraints accessing markets, credit, training, and good land (Spielloch, 2007). Men can also be confronted with additional burdens. Following the establishment of the Jigme Singye Wangchuck National Park in Bhutan, the number of

incidences of crop damage by wildlife rose dramatically (Wang, Curtis, & Lassoie, 2006). Guarding agricultural fields was a coping mechanism employed largely by families without access to great deals of financial assets (Wang, Curtis, & Lassoie, 2006). Although entire families were involved in guarding, men were disproportionately responsible for this task (56%), and spent an average of 59 days a year (for maize) guarding crops (Wang, Curtis, and Lassoie, 2006). Hence, it is a mistake to assume that protected areas and conservation projects will affect all people within a specific community or even within a certain household in the same way.

### **Social Categorization and Identity**

Social categorization and identity issues often lead to conflict in conservation activities. Access to protected areas, for instance, is generally restrictive. However, the displacement of people is often based on identity. Park managers tolerate and often encourage the presence of tourists and scientists within parks while excluding local populations, creating a perception among locals that the needs and goals of wealthy outsiders supersede their own (Adams & Hutton, 2007). This leads to a question of how the problem of unsustainable land use is framed. Based on current trends, it appears that use by wealthy elites for non-consumptive purposes is acceptable, while use by illegal squatters occupying lands prior to the establishment of parks is detrimental to conservation goals (Fortwangler, 2003).

Current conservative and development literature emphasizes the importance of including local communities in planning, management, and benefit sharing. Yet definitions of what constitutes a “local community” vary. Several small communities may be located in proximity to protected areas and managers must decide which communities to include and how to allocate benefits derived from conservation (Adams & Hutton, 2007; Robinson & Redford, 2004).

Vague notions of incorporating the needs of “people” into biodiversity planning have little meaning unless the category of “people” is effectively disaggregated into more specific components (Chan et al., 2009). A recent trend in conservation development calls for a heightened recognition of indigenous rights and claims to land. Yet, terms such as “traditional societies,” “native peoples,” and “indigenous peoples” are often used interchangeably and are not well defined (Brechin, West, & Harmon, 1991) and some groups can be considered “more indigenous” than others (West, Igoe, & Brockington, 2006). Furthermore, focusing solely on indigenous communities leads to the exclusion of other local groups that may have legitimate claims to land-use and creates conflict between communities competing for benefits (Adams & Hutton, 2007). While many choose to focus on indigenous issues, indigenous groups are not necessarily the most marginalized and impoverished people impacted by protected areas (West, Igoe, & Brockington, 2006). This question surrounding the significance of indigenous titles also begs the question of whether nonindigenous people living in protected areas prior to their establishment should be given the same rights and attention as indigenous groups (Fortwangler, 2003). Thus, the ways in which different groups of peoples and various communities are categorized will the roles they play within debates surrounding protected areas and social justice.

The theoretical basis for many conservation plans is often based on assumptions regarding the relationship between local peoples and their land. Typically, these assumptions tend to lump local peoples into one of two groups: that of the environmentally destructive ignorant poor or, as Redford (1991) referred to it, as “ecologically noble savages,” living in harmony with the land (West & Brockington, 2006). The former categorization forms part of the basis for the preservation movement. People and their activities are viewed as inherently “unnatural” (West & Brockington, 2006), and they therefore should be excluded from wild lands

that should remain unblemished by human activities. On the other hand, others make gross assumptions about indigenous people living in perfect harmony with nature, perceived to have entirely sustainable land-use practices (Brechtin, West, & Harmon, 1991). The argument that indigenous groups live in harmony with nature in the absence of outside interference is a romanticized viewpoint that obscures the complexities of reality (Adams & Hutton, 2007). Confusion exists regarding differences in subsistence practices and the relationships characterizing the interaction between people and their land (Fortwangler, 2003). Hence, it is crucial not to make assumptions about the relationship between local groups and their environment. Instead, practitioners should seek to gain a deeper understanding of individual situations and contexts.

## **Participation**

Central to discussions regarding protected areas, participation is one of the most hotly debated and contested concepts in the formulation of contemporary conservation schemes. The ability to participate in decision-making processes that are relevant to a person's life and livelihood is a critical component of democratic practices (Baker 2006). Early attempts to promote biodiversity conservation through protected areas were often ineffective because they failed to include local communities. Incorporating some type of local participation is now viewed as critical to the success of conservation projects. Reasons for including local people vary, however. Amartya Sen (1999) views the expansion of freedom as both the principal means and the primary end of development. Along these lines, participation strategies in biodiversity and development are both a means to enhance the success of such programs and satisfy an ethical imperative to empower people. Although most literature regarding protected areas cites

participation as a crucial component, the reasons underlying the extension of this principle are varied. Furthermore, there are many different understandings of what constitutes participation and the role it should play in the design and management of parks and protected areas.

The empowerment of people that enables them to assume a greater role in decision-making processes often leads to positive changes regarding the security of their livelihoods. However, although environmentalists are increasingly concerned with the social implications of conservation, such concerns are frequently based on utilitarian rather than ethical justifications. Indeed, the traditional and romanticized view that protected areas are “islands isolated from surrounding areas and neighboring communities is superseded by the reality that effective management in and around protected areas must account for human use of natural resources” (DeFries, Hansen, Turner, Reid, & Liu, 2007, p. 1034). The attitude that participation is an undesirable but necessary evil in the fight to save the environment is palpable in many instances. Anthropologist Jim Igoe (2006) observed that, “local people believed that community-based approaches to conservation were simply a new ploy for limiting their access to the natural resources,” and that, thus far, “I haven’t seen anything that would contradict that notion” (p. 72). Hence, if conservationists are to realize their goals, they must attempt to work with communities and give them the tools they need to improve their livelihood and environment on their own, rather than working around them.

Why is participation such an integral component of biodiversity conservation? From a pragmatic standpoint, including local people in decision-making processes legitimizes the standing of protected areas. Conflict can arise when locals perceive conservation projects as programs of outside elites and participatory inclusion can help to diffuse such tension (Chan et al., 2009). Moreover, traditional ecological knowledge possessed by locals can be extremely



beneficial in the scientific understanding of ecosystem functioning and biological interactions (Robinson & Redford, 2004). Natural scientists that manage protected areas often lack a thorough understanding of social issues and are unable to respond properly to conflict (Adams & Hutton, 2007). Allowing communities to participate in decision-making can help managers to identify the needs of local people that must be addressed. Strong local institutions and the support of communities increase the likelihood that rules and regulations will be enforced and that locals will not resort to the illegal extraction of resources from protected areas.

Participation is also valuable because it promotes social justice and equity, principles that are frequently brushed aside in the rush to promote conservation. Broader participation of local people in decision-making is a goal of sustainable development advocates in and of itself, regardless of its impacts on the efficiency of conservation. In addition, local inclusion and planning is indicative in broader decentralization and devolutionary development strategies (Robinson & Redford, 2004). Despite the fact the local empowerment and the redistribution of power is such a critical component of sustainable development, most literature focuses on participation as a means to successful conservation and places little emphasis on ethical justifications.

Although the majority of experts agree that protected area projects must incorporate some form of participation, they disagree as to what form such inclusion should take. In their discussion of resettlement initiatives, Margolius, Beavers, and Paiz (2002) argue that resettlement must be voluntary or have local consent. However, decisions regarding the logistics of resettlement rest primarily with outsiders. Some scholars feel that local compensation, transparency, and public accountability of outside NGOs are sufficient to prevent injustices (Chan et al., 2009). While some experts support local management authority, land ownership,

and economic benefits, others favor more limited forms of participation in order to prevent local corruption and because local communities often lack the institutional capacity necessary to effectively manage parks (Chan et al., 2009). Often, support to local institutions and local inclusion in decision-making processes are raised as more participatory alternatives to park management (Robinson & Redford, 2004), but detailed frameworks for implementing such ideas frequently fail to materialize. Finally, participation can be defined in terms of economic inclusion under the argument that local peoples must have an economic interest in the survival of certain species or habitat areas in order for protected areas to be effective conservation tools (Adams & Hutton, 2007). Thus, while there is widespread support for the concept of participation in general, defining the conditions and the extent of participation remains a challenge.

The assumption that greater participation necessary leads to greater environmental protection is problematic. The argument that indigenous groups live in harmony with nature in the absence of outside interference is a romanticized viewpoint that can obscure the complexities of reality (Adams & Hutton, 2007). Furthermore, many NGOs tend to assume that any level of interaction and dialogue with local people will give their project legitimacy and accountability. In reality, most of the joint conservation and development plans are organized, implemented, and managed by outsiders. Thus, although participation includes the voices of many that would otherwise be silent, it does not always yield desired effects and alone is not sufficient to ensure the success of a project.

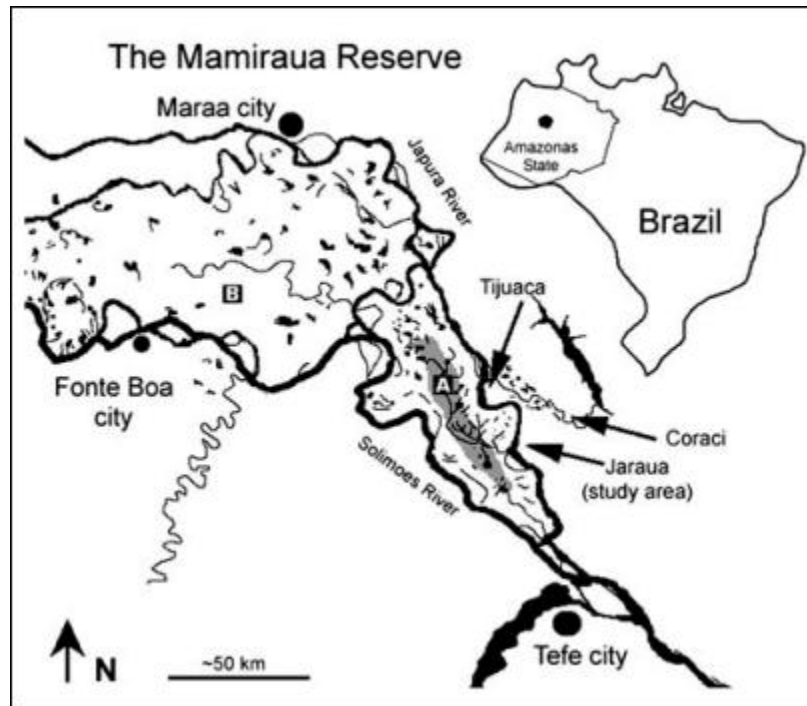
## **Community Based Conservation Strategies**

The increasing emphasis being placed on participation and local-level management by the international development community and human rights advocates has led to a rise in the use of community-based conservation (CBC) strategies and integration conservation and development projects (ICDPs) as alternatives to top-down, one-size-fits-all preservation practices. Such projects take a number of forms and range from incorporating extremely weak forms of participation to full empowerment. They generally operate under the assumption that if local people have a stake in management and are supported by livelihoods that are directly linked to conservation, there will be higher levels of local support for projects and increased compliance with park regulations (Wilshusen, Brechin, Fortwangler, & West, 2003). Regarding protected areas, a number of CBC projects recognize the need for local support, co-management structures, and a built-in framework for conflict management (Brechin et al., 1991). Some organizations encourage community based activities in order to build trust and good relations between a conservation organization and community members (Dugelby & Libby, 1998). Recently, many projects have tried to blend local knowledge and traditional practices with sustainable development activities promoted by international conservation organizations (Dugelby & Libby, 1998; West & Brockington, 2006). Furthermore, attempts have been made to ensure that benefits derived from protected areas are distributed more equitably among local stakeholders, with particular emphasis being placed on the rights of the poor (Dudley, Hockings, & Stolten, 2010). Thus, the concept of participation and community involvement in protected areas management have been incorporated into nearly every project in recent years and local rights and social issues have become issues that must be addressed.

## **Conclusion**

Problems associated with protected areas have severely impacted both their efficacy and their legitimacy as a meaningful method with which to promote the conservation of biodiversity. The following chapters present two case studies of protected areas in the form of biosphere reserves. Biosphere reserves originated from UNESCO's Man and the Biosphere (MAB) project that promoted an approach to conserving nature through the development of new strategies of human resource use that were more compatible with conserving the integrity of natural ecosystems (Borgerhoff Mulder & Coppolillo, 2005). Biosphere reserves emphasize conservation, sustainable utilization, and a strong focus on education, monitoring, and research (Borgerhoff Mulder & Coppolillo, 2005). Such an approach represents a significant shift away from fortress conservation models in that it attempts to integrate human and ecological health and places a larger emphasis on spatial planning methods. The impacts of using the biosphere reserve model as a strategy to promote conservation and sustainable development and as a way to ameliorate problems associated with traditional protected areas will be examined in closer detail in the subsequent chapters.

## Chapter 2: Mamirauá Sustainable Development Reserve, Amazonas, Brazil



(Castello et al., 2009)

The Mamirauá Sustainable Development Reserve (MSDR) protects the Amazonian *várzea* floodplain forest, a unique habitat rich in biological and ecological diversity. Initially established as a protected area for the purposes of scientific research and biological preservation, a complex set of local, regional, national, and international factors combined to allow for the Reserve's transformation into a "people-oriented" park that combines the dual needs of development and conservation. Its establishment heralded the creation of an entirely new category of protected area in Brazil: the Sustainable Development Reserve. In such a model, local people continue to reside within park boundaries and a zoning system is established to determine the different types of resource use and activities allowed within specific sections of the Reserve. Management plans for vital resources located within the Reserve have been developed

in conjunction with local resource users with a strong emphasis on participatory forms of governance.

The Mamirauá case<sup>2</sup> illustrates a successful alternative to traditional forms of protected areas and conservation strategies that have repeatedly failed to achieve both conservation and development objectives. Costs and benefits associated with the creation of the Reserve are distributed relatively evenly among actors. Communities living within the Reserve are not responsible for bearing a disproportionate share of the costs of conservation without also receiving tangible benefits as is so commonly the case elsewhere. In addition to context-specific elements, factors leading to this success include the emphasis placed on traditional ecological knowledge, participatory governance strategies, the continuation of traditional livelihoods, and updating and enhancing the efficacy of traditional resource management strategies. This chapter will describe the evolution of the protected area at Mamirauá and will discuss the successes and remaining challenges associated with Brazil's first Sustainable Development Reserve. In a subsequent chapter, I will explore the potential for using this as a model for the development of sustainable development reserves elsewhere.

## **Background**

Located deep within the Amazon Basin in the Amazonas state of Brazil, the Mamirauá Sustainable Development Reserve covers a sweeping 1,124,000 ha of low-lying floodplain forest, locally known as *várzea*. It is located at the convergence of the Solimões and Japurá

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<sup>2</sup> The information regarding this case was gathered from a variety of sources, including journal articles, secondary materials from NGO websites, conference proceedings, and reports from government agencies. All materials were gathered from reliable sources. It must be noted that some sources may be biased in favor of the project as the organizations publishing some materials played a role in implementing projects within the Reserve.

rivers and the Auati-paraná channel and was established to help protect the *várzea*, which has been described as the world's largest floodplain (McKenzie, Baulch, Pisupati, & Dharmaji, n.d.). The area is subject to seasonal flooding that can last up to six months with water levels reaching as high as 10 to 12 m above water levels characteristic of the low season. At the peak of flood season, nearly all lands located within the Mamirauá Reserve are completely submerged, with only the highest reaches of canopy remaining visible above the water line (Redford & Fearn, 2007). The Mamirauá Reserve is the largest Brazilian reserve dedicated to conserving flooded forest and indeed is the only area protecting the distinctive *várzea* forest (Redford & Fearn, 2007).

The area protected within the Mamirauá Reserve is also prized for its high levels of biological and ecological diversity. Seasonal inundation contributes to extremely high levels of endemism and creates a unique composition of biodiversity as local wildlife has evolved specifically to adapt to these distinctive conditions. The Reserve is home to 11 endemic mammals including the famous white uakari monkey (*Cacajao calvus calvus*), whose protection actually inspired the creation of the Reserve (Redford & Fearn, 2007). Although mammalian diversity tends to be lower than in surrounding areas of Amazonian rainforest due to the difficulties associated with adapting to seasonal floods, the forests within the Mamirauá Reserve have the highest number of tree species per hectare found in any *várzea* habitat (Koziell & Inoue, 2006). The area is also home to an abundance of aquatic habitats created by seasonal flood cycles, such as rivers, river branches, lakes and perennial habitats such as backwater areas and temporary water holes (Redford & Fearn, 2007). Such varied habitats and fluctuating environmental conditions create enormous aquatic biodiversity. To date 340 species of fish have been recorded (Redford & Fearn, 2007) and aquatic mammals such as the pink dolphin (*Inia*

*geoggreensis*), the grey dolphin (*Sotalia fluviatilis*), and the endangered Amazonian manatee (*Trichechus inunguis*) are found in the area (Koziell & Inoue, 2006). Indeed, "Mamirauá" is actually the indigenous word for baby manatee (Koziell & Inoue, 2006). Hence, the floodplains of the Amazon protected by the MSDR contain a wealth of biological and ecological diversity unlike any other place on earth.

A number of communities still reside within the boundaries of the MSDR. Nearly 1,200 people live in 23 communities within the Reserve, with an additional 3,600 living in 37 communities immediately surrounding it (McKenzie et al., n.d.). Currently, indigenous groups living number less than 10% of the total (Redford & Fearn, 2007). Although prior to the 20<sup>th</sup> century the area was populated by Amerindian groups, these people were decimated by disease and war brought to the region by Portuguese explorers. Today, *caboclo* populations comprise the dominant ethnic group within the Reserve (Röper, 2001).

The people living within the MSDR depend on a variety of mainly small-scale activities to make a living. The Reserve is home to *ribeirinhos*, or riverine communities, who depend on small-scale fishing and other local resources for their livelihoods (Castello, Viana, Watkins, Pinedo-Vasques, & Luzadis, 2009). Most of the populations are linked with the flooded environments and ever-shifting and insecure environmental conditions cause *ribeirinhos* to be highly mobile, presenting challenges to the establishment of stable institutions and associations (Koziell & Inoue, 2006). Although local economies are dominated by a dependence on small-scale fisheries, livelihoods include various combinations of subsistence agriculture adapted to seasonal flood patterns and the extraction of natural resource products, such as game and timber, which are typically traded for consumer goods from visiting commercial intermediaries (Castello et al., 2009). People living within the *várzea* take part in a number of traditional management



systems and possess considerable traditional ecological knowledge regarding the ecosystem and locally adapted management techniques. Hence, the livelihoods of the inhabitants of the MSDR are closely intertwined with the natural systems of the Reserve.

Despite an abundance of biological resources, the majority of the local population within the Mamirauá Reserve remains mired in poverty. Residents have little to no access to social services and communities possess little infrastructure (Charity & Masterson, 1999). Average income is generally very low and internal and external relations are based on a system of patron-client relationships (Koziell & Inoue, 2006). The populations maintain an inequitable connection to regional and national markets and usually receive unfairly low prices for their extractive products with excessive rents charged by middlemen (Redford & Fearn, 2007). According to the Sociedade Civil Mamirauá (1996) the communities are characterized by a high rate of infant mortality (85/1000), a high birth rate, low life expectancy, and limited educational attainments (as cited in Gillingham, 2001). Low standards of living thus necessitate that projects that impact or inhibit local livelihoods address quality of life, economic opportunities, and access to basic social services.

### **Establishment of the Reserve**

The *várzea* ecosystem has been threatened in recent years by developmental pressures and unsustainable resource extraction. Unmanaged fisheries, predatory logging, and land cover change in which forests are cleared in order to create cattle and buffalo ranches all pose very serious threats to the ecological viability of the region (Ruffino, 2002). In response to mounting concern regarding the fate of the precious resources of the *várzea*, Mamirauá Ecological Station was established in 1990 at the behest of Brazilian biologist José Márcio Ayres, who was

particularly concerned with the fate of the white uakari monkey. The legal status of the initial protected area stipulated that its purpose was solely preservation, environmental education, and scientific research. Any direct use of resources located within the Reserve was prohibited. According to Brazilian law, the establishment of the ecological station should have resulted in the expropriation of the lands and the relocation of local communities, however such measures are rarely carried out in Brazil (Röper, 2000). Thus, at the outset it appeared that the Mamirauá Reserve was destined to become another “paper park,<sup>3</sup>” in which conservation-oriented laws and policies have little on-the-ground impact.

The regulations prohibiting residence and resource use within the ecological station were at odds with the reality of the situation, in which people continued to reside in and make their living from the resources within the Reserve. In 1992, in response to the social problems associated with the establishment of the ecological station, the NGO Sociedade Civil Mamirauá (Civil Society of Mamirauá- SCM) was established by a group of Brazilian scientists. The SCM was created in order to devise an approach for an integrated conservation and development strategy for the Reserve (Röper, 2001). In 1996, the area was reclassified by the Amazonas state as a Sustainable Development Reserve, a new category of protected area created *ad hoc* as a response to the situation at Mamirauá. Thus, concern for both the natural resources of the *várzea* and for the state of the residents residing within it prompted the reclassification of Mamirauá in order to rectify seemingly competing interests.

The creation of a new category of protected area that recognized the importance of both conservation and development needs proved to be a landmark in shaping the direction of protected area initiatives in Brazil. The regulations associated with the Mamirauá Sustainable Development Reserve allow for the continued presence of traditional human populations and

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<sup>3</sup> See Dudley & Stolten (1999) for further discussion

provide the framework for the establishment of a zoning system that determines the extent and type of resource use allowed within specific zones (Redford & Fearn, 2007). The Sustainable Development Reserve Decree is broad enough to allow for interpretation and recognizes the critical role of local populations as agents of biodiversity conservation (Koziell & Inoue, 2006). Thus, the establishment of the MSDR as the nation's first protected area committed to both conservation and development represented the commencement of an experiment set to test the compatibility of conservation and social goals.

### **Reserve Management**

The MSDR aimed to establish management plans for the natural resources found within the Reserve that were strict enough to protect local biodiversity but would also improve local livelihoods. Strong participatory techniques were used to ensure that the needs and voices of local people would play a strong role in the development of sustainable management plans. The organization structure for participatory resource management in the MSDR grew out of remnants of community organizations started in the region in the late 1960s by initiatives sponsored by the Catholic Church (Gillingham, 2001). Villages within the Reserve are still organized into political sectors of neighboring communities, which provide the basis for current modes of representation (Redford & Fearn, 2007). Each village and sector has representatives that help to organize and participate in bimonthly meetings for each sector, and for an annual assembly (Redford & Fearn, 2007). Thus, the prior social organization of communities within the Reserve facilitated the establishment of governance structures within the Reserve.

The governance structure of the MSDR incorporates strong principles of local participation into decision-making processes and community representatives play a substantial

role in the formation of natural resource management plans for each sector. During initial project discussions, residents were asked to discuss and decide upon resource management and zoning priorities within the Reserve (Charity & Masterson, 1999). By ensuring that local residents had a voice in the decision-making process, local management objectives were incorporated into planning. Furthermore, the input of local people into the zoning process allowed the management to determine what areas within the Reserve were vital to the continuation of local livelihoods and which areas residents would agree to pReserve. Thus, the incorporation of participatory decision-making at the outset of the establishment of the MSDR facilitated the formation of realistic management plans and zoning structures that accounted for the needs and desires of local residents.

The current governance structure of the MSDR has been shaped by this initial strong commitment to participatory principles. The management council consists of both community representatives and representatives of other stakeholder groups, including the government, universities, and relevant research institutions (Redford & Fearn, 2007). The management council is responsible for determining specific regulations associated with the zoning system and management specifics for specific natural resources (Redford & Fearn, 2007). The participatory framework allows conflicts to be reconciled in a positive manner and ensures the incorporation of the views and concerns of a number of relevant stakeholders.

The process for determining which natural resources are to be targeted by management plans by the council and the terms of such management is informed by strong considerations of local livelihoods. According to Queiroz (2007), the first step in such a process is to conduct an economic survey that identifies which species of fish, trees, and game animals are absolutely

critical for local livelihoods and the ecological significance of each of these species. Next, the traditional management systems governing the use of each of these resources are examined. If such techniques invariably harm local biodiversity, it becomes a priority to develop more sustainable methods in which to manage these resources. Thus, economic, ecological, and social considerations are incorporated into the prioritization of the creation of resource-specific management plans.

Some of the most comprehensive and successful management plans that have emerged from the MSDR center on the sustainable use of local fisheries resources. Local fishing grounds are classified into 3 groups: those designated for fish reproduction only in which all fishing is prohibited, those in which subsistence fishing activities are permitted, and those that are open for commercial fishing to all residents and user communities (Röper, 2000). Traditional ecological knowledge and the skills of local fishermen were applied to Western science and management techniques in order to effectively monitor and manage fisheries resources within the MSDR, particularly in regards to managing pirarucu (*Arapaima gigas*) populations within the community of Jarauá (Castello et al., 2009). According to Queiroz & Sardinha (1999) the fishing of pirarucu, a large species of freshwater Amazonian fish, is the most important economic activity for the residents of Mamirauá and constitutes up to 40% of the total fish catch (as cited in Castello et al., 2009). An individual transferable quota (ITQ) system was established in which all fishers receive a standard quota determined through negotiations between fishers and representatives of the Mamirauá Institute (Castello et al., 2009). In order to incentivize adherence to assigned quotas, fishers caught violating regulations saw their quotas reduced. On the other hand, fishers who contributed to management and/or enforcement activities were the recipients of higher quotas (Castello et al., 2009). Following the initial success of the pirarucu

management program of the Jarauá community, several other communities within the Reserve have attempted to replicate the ITQ system with varying degrees of success (Castello et al., 2009). The management plan governing the fishing of pirarucu is a constantly changing strategy that has evolved over the years in accordance with the needs of local fishers and the gradual recovery of fish populations.

Recently, plans have been made to formulate management plans for an increasing number of species found within the Reserve. Overall, over ten species of fish are managed sustainably within the Reserve, all of which are used for subsistence and for sale to outside markets (Redford & Fearn, 2007). Although the most successful management programs have been implemented for fisheries and timber resources, more recent management plans have been enacted that govern the extraction of ornamental fish species (which have a high value in international markets) and game species, including river turtles and caiman (Redford & Fearn, 2007). Although the initial attempts at managing these species were not met with immediate success, it is hoped that recent developments in the design of management plans will improve the sustainability of the use of a plethora of resources within the Reserve.

## **Results**

Since the establishment of the MSDR, a number of accomplishments have been achieved regarding the sustainable management of resources and local development aims. The most notable successes have been related to the quota system implemented for the pirarucu in Jarauá. According to an in-depth study conducted by Castello et al. (2009), fish populations have increased 9-fold, harvest quotas have increased 10-fold, and the participation of local fishers in the management process has increased dramatically since the outset of the implementation of

experimental management plans in 1999. According to E. Moura (2002), the average annual income of families surveyed in Jarauá more than doubled between 1994 and 2000 (as cited in Koziell & Inoue, 2006). Furthermore, J. P. Viana (2002) reported that the gross revenue the pirarucu harvest increased from R\$16,903.44<sup>4</sup> in 1999 to R\$56,687.35<sup>5</sup> in 2001 (as cited in Koziell & Inoue, 2006). Hence, the fisheries management program implemented for pirarucu stocks in Jarauá has been extremely successful at facilitating the recovery of threatened fish populations and improving the livelihoods of populations depending on the fish.

Economic and social development goals of the MSDR have also been realized to some degree. The populations of managed resources within the Reserve are increasingly healthy and producers have secured higher prices, access to better markets, and increased production levels (Redford & Fearn, 2007). Following the creation of the Reserve, marked improvements were made in sanitation and community infrastructure, in addition to improvements in local health and educational services (Charity & Masterson, 1999). Furthermore, local governance structures have developed that provide Reserve residents with a forum for identifying and resolving conflicts (Röper, 2000). Pathways for meaningful participation are present in which all aspects of management plans are discussed and negotiated in meetings with residents and decisions must be legitimized by vote (Röper, 2000). In general, households within the protected area have improved their income by nearly 110% in only 10 years (from 1994-2004) and the MSDR is generally perceived as a place to have a better life (Redford & Fearn, 2007). In fact, one of the problems that has arisen in response to the success of the Sustainable Development Reserve is increased migration pressure from outsiders trying to move into Mamirauá (Redford & Fearn, 2007). Thus, the benefits associated with carefully managed extraction of key local resources

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<sup>4</sup> Equivalent to US\$10,620.94

<sup>5</sup> Equivalent to US\$35,618.36

combined with land-use zoning are tangible and have greatly contributed to improving the quality of life for Reserve inhabitants.

Despite the overwhelming success of many aspects of the MSDR, its progress has not been without challenges. Although current compliance rates are generally positive, at the outset compliance was relatively low, especially when regulations conflicted with immediate needs (Charity & Masterson, 1999). Furthermore, studies showed that compliance rates in terms of fisheries were particularly low during times of extremely high and extremely low water levels, when residents have limited options to obtain food and income (Charity & Masterson, 1999). Indeed, local patterns of resource use did not change directly after the start of public awareness and environmental education programs, nor following talks with local leaders regarding new regulations and the publication of management plans (Redford & Fearn, 2007). Rather, change began to occur after the implementation of productive management programs and as the financial benefits of fisheries harvesting plans were obtained (Redford & Fearn, 2007). Therefore, in this case compliance with Reserve regulations are directly linked to viable economic alternatives to unsustainable practices.

Another challenge that remains in the case of Mamirauá is inclusive participation and local support for the projects. Although the majority of communities located within the Reserve support resource management strategies, some communities have resisted the intrusion of outsiders and Reserve-related regulations and all user groups are not equally represented in decision-making processes. Furthermore, those who are opposed to conservation rules and project do not attend or participate in meetings, resulting in the absence of their perspectives from decision-making (Charity & Masterson, 1999). Power structures within communities also lead to the election of representatives who may not actually be representative of community



needs and concerns as a whole (Charity & Masterson, 1999). Women in particular have remained under-represented in the process. However, about half of the people who have recently become involved in pirarucu management are women, suggesting that women are also interested in the economic benefits of the scheme (Castello et al., 2009). Thus, although full and representative participation remains a challenge, positive steps have been made toward ensuring that all user groups and communities are represented in the decision-making process.

## **Conclusion**

The experience of the Mamirauá Sustainable Development Reserve illustrates a number of problems associated with the establishment and development of protected areas but also highlights a number of opportunities for improving the social impacts of conservation. Although the exact plan and process undertaken in Mamirauá cannot be blindly replicated in other contexts, some general factors that led to its success can be identified. First, the strong emphasis placed on integrating traditional ecological knowledge and Western science was definitive in leading to the success of pirarucu management. By using local methods to generate population estimates and gain insight into biological characteristics of the species, managers were able to establish fisheries quotas that allowed fish populations to recover while also gradually increasing local incomes from harvesting. Next, participatory governance is central to Reserve management, enabling broad support for management programs, the incorporation of local needs and concerns, and local capacity building. Furthermore, social organization that existed prior to the establishment of the Reserve facilitated the development of a viable institutional management structure. Economic conditions and market demand for extraction of resources from the Reserve also facilitated its success. Finally, management plans initially focused on the sustainable management of resources that have historically been used by communities in the Reserve.

Although alternative livelihood plans were introduced, Reserve managers have emphasized the management of traditional livelihoods, such as fisheries and timber extraction, which made it easier to gain public acceptance and support for plans.

Overall, the Mamarauá Sustainable Development Reserve is a model for progressive forms of protected area structure and governance that can inform future conservation efforts. Indeed, the MSDR is now perceived as a place that offers a chance for a better life in the region and migration pressure from outsiders trying to move into the reserve is increasing (Redford & Fearn, 2007). Such pressure illustrates a major shortcoming associated with the Reserve, however: management plans have failed to account for communities residing in proximity to Reserve boundaries who may have been disadvantaged by the establishment of the Reserve. And yet, considering the limited resources available and the relatively young age of the Reserve, it is understandable that management institutions have not yet been able to address the needs of non-residents. Mamarauá is a rare instance of the successful integration of conservation and development agendas in which the establishment of a protected area was able to protect both park resources from external commercial threats and the rights of local residents to continue to make their living off of these resources, albeit in a more sustainable manner. Although the future impacts of the Mamarauá Sustainable Development Reserve on local livelihoods and biological conservation remain to be seen, the case represents a positive step towards rectifying the seemingly incompatible goals of conservation and development.

### Chapter 3: Ría Celestún Biosphere Reserve, Yucatan, Mexico

Although the numerous successes and achievements in balancing dual goals of conservation and development in the case of the Mimirauá Sustainable Development Reserve are laudable, they are also extremely rare. Much more common are instances in which conservation goals and protected areas are poorly implemented in a manner that fails to address social issues and the factors driving environmental destruction and the unsustainable use of natural resources. The case of Ría Celestún Biosphere Reserve<sup>6</sup> has been selected to illustrate the widespread shortcomings of protected area design, implementation, and management. Although the priorities and activities of the Reserve have evolved in recent years, its failures far outweigh its benefits to both local communities and the natural world.

The examination of this case immediately following a discussion of Mimirauá will help to illuminate the major differences between the two Reserves and reasons underlying their respective successes and failures. Ría Celestún illustrates the ways in which a failure to incorporate the participation and needs of local residents into protected area planning and management can result in a failure to achieve conservation goals. In addition to context-specific factors, Ría Celestún serves to elucidate broader systemic problems associated with conservation practices in general, which are greatly hindering their attempts at success. Furthermore, the case exemplifies the ways in which the needs of people are often considered secondary to conservation goals. In many respects, the widespread failures of Celestún have caused it to join the ranks of other “paper parks,” in which the establishment of a protected area has done little to

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<sup>6</sup> The research used to present this case was primarily drawn from journal articles and secondary materials authored by NGOs who have previously worked in the region. All materials used are from reliable sources.

stem biodiversity loss and habitat destruction. This Chapter will describe the evolution of Ría Celestún Biosphere Reserve, its policies and regulations, and its impact on local communities and the environment. In the following chapter, I will discuss lessons that can be learned from this case in more detail in an effort to illuminate some of the underlying causes leading to its failure.

## **Background**

Located on the northwest coast of the biologically rich and ecologically distinctive Yucatan Peninsula, Ría Celestún Biosphere Reserve encompasses 81,482 ha of land in the Mexican states of Yucatan and Campeche. The Reserve is comprised of Yucatan dry forest and mangrove wetlands. Locally known as *la Ría*, the 24-km coastal lagoon bordering the Gulf of Mexico and the Celestún estuary are home to rich mangrove forests and estuarine habits that support the area's biodiversity. The estuary is a relatively narrow coastal lagoon that contains approximately 2,800 ha of open water (Barbour, 1998). In 2003, Celestún was declared a Wetland of International Importance by the RAMSAR Convention, thus cementing its status as an invaluable ecological resource.

In addition to its range of habitats, the Reserve is also home to a unique composition of biodiversity, most notably the greater flamingo (*Phoenicopterus ruber ruber*). Indeed, over 304 resident and migratory bird species can be found within the Reserve, which include marsh and coastal birds such as ducks, seagulls, and herons, and a variety of shore and migratory wading birds that migrate from Canada and the northern United States during the winter (Andrade, 1997). The area is a prime feeding and resting area for such birds. The Reserve also supports populations of protected species, including marine turtles (*Eretmochelys imbricata*, *Chelonia*

*mydas*), Morelet's crocodiles (*Crocodilus moreletti*), ocelots (*Felis pardalis*), jaguars (*Panthera onca*), and endangered palm locally called *nakax* (*Coccothrinax readii*) and *chit* (*Thrina radiata*) (Andrews, Migoya, Von Bertrab, Rojas, Sastré Méndez, & Rose, 1998).

Flora located within the Reserve is particularly diverse due to the wide range of habitats characterizing the region. The reserve contains a variety of types of vegetation, encompassing mangrove, savannah, low flooded forest, low dry forest, wetlands and reedbeds, and *petenes*, which are forested islands that surround a freshwater spring found among brackish coastal lagoons (Méndez-Contreras, Dickinson, & Castillo-Burguete, 2008). Red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*), and black mangrove (*Avicennia germinans*) can be found lining the lagoon (Barbour, 1998) and endemic Yucatan species, such as the *nacash*, or Mexican silver, palm (*Coccothrinax readii*) are located in the region (Méndez-Contreras et al., 2008). Thus, the Ría Celestún Biosphere Reserve contains a unique combination of diverse biological and ecological resources.

Residents of Celestún have long been supported by the plethora of resources available due to local biodiversity. Established in the 1700s, inhabitants of the fishing town of Celestún have been dependant on resources such as game, fish, fowl, plant, salt, wood, and limestone (García-Frapolli, Ramos-Fernández, Galicia, & Serrano, 2009). Regional population began to increase significantly in the 1980s in coastal villages throughout the Yucatan due to the collapse of the *henequen*<sup>7</sup> industry in the early 1970s (Barbour, 1998). Migration to the coasts was encouraged by government policies that sought to promote fisheries as a manner of absorbing jobless agricultural laborers from the interior of the Yucatan (Andrews et al., 1998). By the early 1990s, Celestún possessed the highest mean annual population growth rate in the state (more than 5.0%) and was receiving the second largest influx of immigrants in the Yucatan (Méndez-

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<sup>7</sup> *Henequen* is a type of agave whose leaves produce fiber that is used to make rope and twine

Contreras et al., 2008). Because the majority of immigrants during this time were former *henequen*-growers and ranchers, most lacked substantial knowledge of coastal and marine natural resources (Méndez-Contreras et al., 2008). The proportion of young people living in Celestún continues to grow, creating heightened needs for homes and daily supplies, further compounding pressure on resources (Méndez-Contreras et al., 2008).

Presently, populations residing within the Reserve are distributed in two settlements, Celestún and Isla Arena. The fishing town of Celestún, located in the state of Yucatan, had a population of 6,269 in 2000 (Méndez-Contreras et al., 2008) and Isla Arena, located in the state of Campeche, has a population of around 1,000 (Andrade, 1997). The level of education in Celestún is generally higher than the state average and only 6.4% of the population is illiterate (Méndez-Contreras et al., 2008). In 2000, Celestún possessed a nursery school, two elementary schools, a junior high and high school and one public library (Méndez-Contreras et al., 2008). The inhabitants of Celestún are predominantly of Mayan descent (Barbour, 1998). Prior to the development of local fisheries in the 1970s, timber extraction, agricultural production, and fishing comprised the region's dominant economic activities (Andrews et al., 1998). Currently, however, agriculture is of minimal economic importance within the Reserve (Andrews et al., 1998), with salt extraction, tourism, and fishing supporting the livelihoods of most residents. Salt extraction is one of the oldest livelihood activities on the peninsula and small-scale artisanal salt production currently employs a significant number of residents, especially seasonal laborers and immigrants (Andrews et al., 1998) because the people of Celestún tend to view it as work that is beneath them. Tourism in the region continues to expand and is focused on bird-watching tours within the lagoon, mainly centered on the pink flamingo.

Fisheries are by far the most important economic activity for local residents of Celestún. Indeed, it is the highest income generator among residents and the port is the second-largest fisheries producer in the state of Yucatan (Andrews et al., 1998). Marine species are the most profitable fisheries resource and small-scale fishing of shrimp and crab is confined to the lagoon (Méndez-Contreras et al., 2008). Due to increasing numbers of new fishermen and widespread failure to comply with fisheries regulations, several principal species such as octopus, lobster, blue crab, and shrimp are overfished (Andrews et al., 1998). The people residing within the Ría Celestún Biosphere Reserve are highly dependent on the availability of local natural resources and have been impacted tremendously by park regulations.

### **Establishment of the Reserve**

Like many protected areas, the current status and accompanying regulations of the Ría Celestún Biosphere Reserve evolved over decades of changing national and local priorities relating to conservation and the role of development. Initially established in 1979, the 24-km coastal lagoon and surrounding wetlands of Ría Celestún were declared a Wildlife Refuge. According to the SEMARNAT, the Mexican Ministry of the Environment and Natural Resources (2000), the purpose of the Ría Celestún Wildlife Reserve was to, “protect the colonies of Greater Flamingos that regularly feed in the area and the many other resident and migratory bird species” (as cited in García-Frapolli et al., 2009). In 1988, the Refuge was reclassified by a General Law on Ecological Equilibrium and Environmental Protection and categorized as a Special Biosphere Reserve (Barbour, 1998). This new category of protected area within Mexico was based on emerging models of Biosphere Reserves implemented worldwide and sought to increase protection for fauna present within the Reserve by regulating the collection of animal resources

(Barbour, 1998). Following its listing in 2003 as a Wetland of International Importance by the RAMSAR Convention, in 2004 the area was reclassified as the Ría Celestún Biosphere Reserve (García-Frapolli et al., 2009) and was included in the UN Man and the Biosphere (MAB) Program.

### **Reserve Management**

The Reserve is administered by CONANP, the National Commission of Natural Protected Areas, which is a unit of SEMARNAT, the Secretary of the Environment and Natural Resources. Management of the Reserve consists of a minimal staff including a director, subdirector, an administrative employee, a department head, and an operative technician (ParksWatch-Mexico). The Reserve operates on a federal budget of \$80,000 per year allocated to operating expenses and employee salaries (ParksWatch-Mexico). Initially, the predominant philosophy dictating policy within the Reserve was solely focused on conservation and employed mainly restrictive policies governing the use of natural resources within the Reserve. Because local residents of Celestún and Isla Arena were not involved in any stage of the process determining the status of Ría Celestún, the dependency of local residents on the resources of the Reserve went unaccounted in the determination of park policies.

The association between Ría Celestún and the MAB Programme partially addressed some of the negative impacts and local backlash stemming from the Reserve's strictly preservationist policies, at least in terms of official policy. The Programme provided reserve managers with a model with which to structure future Reserve policy and zoning. According to the Programme, Biosphere Reserves are coastal and terrestrial ecosystems that attempt to provide solutions to conflicts between biodiversity conservation and sustainable use goals (Córdoba Azcarate, 2010).



Their goals are threefold: conservation, development, and logistics, which focuses on generating support for education, research, monitoring, and information exchanges (Córdoba Azcarate, 2010). Furthermore, the principles espoused by the MAB Program concentrate on the importance of zoning and the creation of multiple use zones. In accordance with this, the Management Plan of the Ría Celestún Biosphere Reserve distributed park lands between a *core zone* and a *buffer zone*. The core zone encompasses 37.2% of the Reserve and protects most of the ecologically unique habitat within the Reserve. The only activities permitted within the core zone are regulated scientific research and environment education (ParksWatch-Mexico). The buffer zone covers the remaining 62.8% and is organized into different units based on different uses. The purpose of the buffer zone is to insulate the core zone from exterior impact through regulating recreational, educational, productive, and research activities (ParksWatch-Mexico). 82.3% of the buffer zone is designated for the sustainable use of natural resources, located around the Ría and sections of Celestún's beach. The remaining land within the buffer zone is designated under categories of restricted use, public use, recuperation, and human settlement, where the community of Celestún is located (Córdoba Azcarate, 2010).

## **Results**

### *Changing Livelihoods*

The establishment of Ría Celestún Biosphere Reserve was accompanied by a number of restrictions on the use and extraction of resources within the Reserve. A variety of activities benefitting family welfare, such as hunting and the gathering of wood for home construction and cooking, have become less frequent following the establishment of the reserve (Méndez-Contreras et al., 2008). Massive prohibitions on fishing followed the declaration of the Reserve

(Córdoba Azcarate, 2010) and park policy tends to forbid the use of natural resources rather than creating resource management plans (García-Frapolli, 2006). Illegal extraction of natural resources is rampant and includes cutting down trees, including red mangroves, white mangroves, and the amate tree; poaching species such as the white tailed deer, peccary, spider monkey, and Baird's taper; the hunting of crocodiles, adult turtles, and eggs; and the extraction of plants, most notably palm trees (ParksWatch-Mexico). There appears to be an absence of alternative livelihood opportunities that do not directly depend on the resources restricted by the Reserve, which ultimately drives the illegal extraction of resources. According to a 28-year-old fisherman in Celestún interviewed by Méndez-Contreras et al. (2008), "If there were sources of work there wouldn't be so much [illegal extraction of natural resources, the people would respect the prohibitions and would do it happily." Hence, prohibitions placed on local livelihoods coupled with dwindling alternatives for local residents have been a source of conflict within the community.

### *Local Conflict*

Due to a general lack of consultation and inclusion of local residents in the process and restrictive policies dictating resource use, conflict has emerged between local people and the governing authorities of Ría Celestún. One of the most conspicuous conflicts associated with the Reserve erupted over the right to shrimp in the estuary. Prior to the establishment of the Reserve and subsequent bans imposed by federal authorities, residents of Celestún used to catch blue crab, shrimp, and various fish species in the estuary on a small-scale (García-Frapolli et al., 2009). Such small-scale fisheries were an important component of livelihoods for many residents and the products were mainly consumed in local restaurants (García-Frapolli et al.,

2009). Following the establishment of the Reserve, massive bans were placed on fishing practices in response to suspected over-exploitation of fishing resources, particularly octopus and pink shrimp (Córdoba Azcarate, 2010). Seasonal fishing regulations were introduced and the octopus could only be harvested between the months of August and December (Córdoba Azcarate, 2010). Shrimp fishing was banned entirely due to the fact that pink shrimp are a large portion of the diet of the area's prized pink flamingos (Córdoba Azcarate, 2010).

The shrimping ban proved to be a major hardship imposed on many residents of Celestún. Indeed, in 2003 90% of families in the communities were affected by the fishing of pink shrimp. In 2001, the controversy attracted national attention after a group of small-scale fishers were caught shrimping illegally in the estuary and were jailed for months (García-Frapolli, 2009). Many residents of Celestún were incensed by the arrests and blamed Reserve authorities for triggering the incident (Méndez-Contreras, 2008). They protested that, “Shrimping in the lagoon is part of community ‘uses and customs’ and should be honored as such, despite Reserve restrictions” (Méndez-Contreras, 2008). Ultimately the fishermen were released after a drawn-out process involving the Navy, anti-riot police, and large protests (Méndez-Contreras, 2008). The conflict, however, scarred the region and in 2002, Celestún was named on TV as “one of the most conflictive places in Mexico” (Córdoba Azcarate, 2010). Although physical confrontations and legal conflicts have subsided a bit, the issue still remains extremely contentious and leads to blatant violations of Reserve policies, fomenting extreme distrust among community members towards Reserve authorities.

*Absence of Community Participation and Awareness*

One of the main problems confronting Ría Celestún is the general lack of awareness regarding the importance and regulations of the Reserve among local residents. Interactions between park authorities and local residents are often hostile and the benefits of park policies to local residents are not clearly communicated. According to research conducted by Méndez-Contreras et al. (2008) through participant observation and semistructured interviews among inhabitants of Celestún in 2002, a number of problems characterized by general misconceptions, hostility, and an absence of information sharing exacerbated social issues created by the establishment of the park. The concept of zoning is poorly understood and, according to the study, the majority of local residents did not even know they were living in a protected area (Méndez-Contreras et al., 2008). Furthermore, residents have not been involved in the majority of the planning process and outsiders are brought in for reserve management positions. This has stoked perceptions that the officers, actions, and policies of the Reserve are completely foreign to the community (Méndez-Contreras et al., 2008). Lack of community involvement and awareness has created a number of problems for the Reserve, ultimately hindering its efficacy in conserving biodiversity and promoting sustainable livelihoods.

### *Ecotourism and Social Exclusion*

Tourism in Ría Celestún Biosphere Reserve is one of the few economic opportunities that has been expanded as a result of the Reserve. The pink flamingos living in the estuary are the park's main tourist attraction. According to the SEMARNAT (2000), over 20,000 visitors come to the Ría annually, with over 95% citing the pink flamingo as the sole reason for their visit to the community (as cited in Córdoba Azcarate, 2010). The majority of these visits are day-trips and part of organized tours originating outside of the community (Córdoba Azcarate, 2010). The

tourists are bused in, driven non-stop from the Ría to the beach, then back to their hotels outside of the Reserve (Córdoba Azcarate, 2010). This type of tourism provides very little economic benefit to only a small portion of community members.

Non-profits and government institutions have provided training and resources to some community members in order to enhance their ability to secure livelihoods from the local ecotourism industry. In particular, Pronatura Peninsula de Yucatan, a regionally based NGO, has collaborated with the Secretary of Urban Development and Ecology to provide training on the natural history of the estuary and the flamingos and has promoted low-impact visitation techniques designed to minimize disturbance to the flamingoes (Andrews et al., 1998). Currently, there are four Social Solidarity Societies that have received credit from the state government to promote tourism, however a myRíad of internal conflicts among them prevent effective collaboration (ParksWatch-Mexico). Tourism activities have placed major pressure on local resources and pink flamingo populations are disturbed when boats draw too near (ParksWatch-Mexico). Ironically, the promotion of flamingo tourism has actually fueled the illegal extraction of pink shrimp, as the species has become of the favored foods served at local restaurants geared toward tourism (Córdoba Azcarate, 2010). Thus, despite attempts at promoting sustainable tourism, increasing numbers of tourists have ultimately placed more pressure on dwindling local resources.

Another major drawback associated with the local tourism industry is that it fuels hostilities and tensions among local social groups. *Lancheros*, a group of 85 ex-fishermen, are the only people legally allowed to show flamingos to the tourists, as sanctioned by the government (Córdoba Azcarate, 2010). This small group is the main recipient of development assistance in the form of training and resources dedicated to the promotion of ecotourism

(Méndez-Contreras et al., 2008). Such an arrangement fosters hostility among local social groups, evident in the declaration of a fisher arrested for illegal shrimp fishing in the Ría: “If the Ría is closed to fishing, it is closed to tourism too” (Córdoba Azcarate, 2010, p. 106). Thus, the promotion of ecotourism as a sustainable, alternative livelihood strategy within the community of Celestún is fraught with problems and resultant social inequity.

### **Future Management Strategies**

The Reserve’s official policies have evolved over the years from focusing singularly on conservation to espousing a broader spectrum of use and activities within park boundaries. The main objective of the Ría Celestún Biosphere Resource Management Plan, published in 2000 by CONANP, the Mexican National Commission on Protected Areas, was defined as, “Preserving and protecting representative ecosystems of the Yucatan Peninsula’s northwest hydrological basin, ensuring equilibrium and continuity in evolutionary and ecological processes through management and sustainable use of natural resources” (Méndez-Contreras et al., 2008). The Management Plan places a great deal of emphasis on involving local populations in the formation of regulations geared towards making preservation congruent with local patterns of resource use and exploitation (Méndez-Contreras et al., 2008). Thus, the official policies and goals of the Ría Celestún Biosphere Reserve recognize the need to provide support to both conservation and development goals and interests in hopes of rectifying past mistakes that have led to ineffective park management.

The Plan also recognizes the need to incorporate local participation and input into decision-making processes. A social development component of the Plan proposes incorporating the participation of local community members in the Reserve Advisory Council and its three sub-

councils: academic-scientific, regulatory-management, and social development-coordination (Méndez-Contreras et al., 2008). Other portions of the Plan include a campaign publicizing the importance of the Reserve, its policies, and its relation to the community; the creation of linkages between the community and various federal, state, and municipal programs; and the encouragement of stronger participation in research and environmental monitoring projects (Méndez-Contreras et al., 2008). The formulation of the Management Plan was a direct response to social conflict, deteriorating ecological conditions, and a pervasive lack of awareness among community members regarding the Reserve and its contingent regulations.

### **Remaining Threats**

Since its inception, Ría Celestún Biosphere Reserve has been plagued by problems, social conflict, and continually worsening environmental conditions. Despite official plans and policies, adherence to park regulations has been minimal and community members remain largely unaware of the importance, the policies, and indeed, in many cases, even the existence of the park and the location of its boundaries. While the root causes and underlying factors contributing to the failures of the park will be analyzed in the subsequent Chapter, it is useful to outline the scale and scope of such shortcomings in the context of this case study.

Despite attempts to protect the integrity of valuable ecosystems and resources within the Ría Celestún Biosphere Reserve, a number of threats continue to challenge the work of conservationists. Some of the most salient issues confronting the park include the depletion of aquatic and terrestrial resources, pollution, development, population growth, and increasing levels of tourism. Vegetation is lost at an alarming rate due to poorly planned development and aquatic resources are declining due to overfishing and noncompliance with Reserve regulations

(Andrade, 1997). The construction of highways and bridges disrupt regional water flows and the expansion of human settlements result in the filling of wetlands with solid waste (Andrews et al., 1998). Celestún is still experiencing rapid population growth, with a large number of immigrants continuing to enter local fisheries markets and tourism levels ever increasing (Andrews et al., 1998, ParksWatch-Mexico). Finally, controversy has erupted over final approval of the Management Plan, stymied by various conflicts between different user groups.

## **Conclusion**

Ría Celestún Biosphere Reserve is an example of a protected area that has ultimately failed to protect the livelihoods of its people and its valuable natural resources. The case illustrates a number of the problems inherent in biodiversity conservation schemes and the ways in which protected area managers lack a deep understanding of the ways in which humans interact with their surrounding environment. Although many of the problems associated with the Reserve are attributable to its specific context, a number of broader issues can be identified that were instrumental in the park's inability to satisfy both social and environmental goals of conservation. The ineffectiveness of the Reserve is directly related to a decisive failure of park managers to facilitate even nominal forms of participation among local residents, poor planning, and insufficient resources dedicated to projects and surveillance. Moreover, scant attention and resources were directed towards promoting alternative livelihood strategies among broad groups of community members, leading to noncompliance, hostility, and conflict in the region. Only recently have managers broached the topic of creating management plans for resources critical to local livelihoods and little has been done to encourage sustainable use of resources.



Another major problem exacerbating issues in Celestún are the poor relations between park authorities and local residents. Inhabitants lack awareness as to the purpose of the Reserve and its regulations and few communication channels exist to link the Reserve to its human inhabitants. Heightening tensions, poor levels of compliance with regulations, and deteriorating environmental conditions have resulted due to the inability of park authorities to positively engage the community and to foment understanding regarding the interconnections between people and the natural world. Without large-scale changes in the way the Reserve operates and interacts with community members, Ría Celestún Biosphere Reserve will continue to fail to promote sustainable development and biodiversity conservation.

## Chapter 4: Analysis

Although the experiences of Mamirauá Sustainable Development Reserve and Ría Celestún Biosphere Reserve are vastly different and are contextualized by a myriad of varying factors and surrounding conditions, the comparison of their relative successes and failures can provide some insight into the processes necessary to achieve viable sustainable development initiatives in the form of protected reserves. One of the most important differences separating these two experiences is the degree of local-level participation in planning processes and reserve management. The theme of participation is evident in nearly all of the topics described below and indeed is a common thread linking new ideas regarding conservation practices and initiatives. After analyzing the two cases, I have determined that the underlying factors critical to creating and maintaining viable reserves is participation in every level of the process, local organization and governance, spatial planning, the strength of enforcement and compliance, the presence of viable alternative livelihood strategies, an equitable distribution of costs and benefits, the incorporation of traditional knowledge into management and planning, and the strength and clarity of linkages between environment and social health.

### Participation

Participation can have a variety of meanings to different groups and can be exercised in numerous ways. High levels of active participation on the part of community residents in regards to the management of protected areas and reserves can have a number of positive results that impact the efficacy of the goals of parks. Participation in the planning, establishment, management, and enforcement strategies of parks can generate an increased sentiment of local ownership over protected areas, ensure that community needs and concerns are incorporated into

the decision-making process, provide a positive forum for conflict negotiation and settlement, and increase local compliance to park rules and regulations. It can also have positive impacts on social development in terms of increasing social cohesion, promoting the establishment of social organization, and can play a significant role in empowering local groups to meaningfully participate in decisions that affect their daily lives.

One beneficial impact of strong levels of participation is that residents gain a sense of ownership over the reserve and the resources. In the case of the Mamirauá Sustainable Development Reserve, community members participated in the mapping of local lakes to aid in the development of management schemes and worked together in communal map-making sessions (Koziell & Inoue, 2006). This resulted in stronger feelings of ownership over the Reserve and enhanced a sense of community responsibility for the Reserve's resources and policies (Koziell & Inoue, 2006). Activities that promote active communal participation in joint projects and research can play a large role in strengthening the relationship between community members and reserves, resulting in beneficial outcomes for both conservation and local development goals.

Conversely, failing to involve local residents in protected area governance and decision-making can result in a sense of alienation marring the relationship between reserves and their communities. In the case of Ría Celestún, not a single Celestún native plays an active role in Reserve administration (Méndez-Contreras et al., 2008). Local residents were not consulted in the process of establishing the Reserve and park officials still fail to promote any serious forms of community participation in natural resource preservation and management schemes in the region (Méndez-Contreras et al., 2008). The failure to incorporate residents in the governance process has caused inhabitants to feel disconnected from the Reserve and its employees.

Authorities and park managers are viewed as outsiders to the community and residents feel a sense of bitterness that their needs come secondary to those of the Reserve (cite and fix).

Participation can also play a large role in mediating conflicts that arise from the differing needs of various stakeholders. The governance structure of Mamirauá ensures that discussion forums are available for people to address various issues that arise from placing regulations on the use of resources. All elements of the management plan are discussed and negotiated in meetings with local residents, ensuring that they have a space to address conflicting needs (Röper, 2001). Furthermore, decisions are legitimized by a vote, thus guaranteeing that management decisions are generally accepted by user-groups before they are implemented (Röper, 2001). On the other hand, in Ría Celestún a number of different conflicts have erupted as a result of weak institutional efforts to bring involved parties together (Méndez-Contreras et al., 2008). Conflicts such as the imprisonment of fishers violating bans on shrimping could have potentially been avoided if community members were involved in the formulation of rules and regulations.

It is also important to discuss the concept of participation in relation to the generation of resource management plans designed to promote sustainable use of vital natural resources. The case of Mamirauá indicates that using established methods of resource management that are also familiar to local residents promotes increased acceptance of such plans and higher levels of participation, thus resulting in a greater chance of success and sustainability (Koziell & Inoue, 2006). Management plans generated with strong levels of participation result in increased levels of compliance and understanding, and also improve the likelihood that local needs are taken into account. In Ría Celestún, only a few weak management plans exist and prohibition on use of natural resources takes precedence over concepts of sustainable use. Residents were not

included in the generation of the most recent Management Plan, which has generated conflict that has prevented its approval and implementation as residents claim they were not consulted and oppose many of its attendant policies (ParksWatch-Mexico). Thus, participation in the generation of management plans is critical if they are to be accepted by local residents and if they are to meaningfully address both social and environmental goals.

### **Local Organization and Governance**

The effectiveness and development of local governance structures and organization appears to play a large role in determining the success or failure of a reserve. Local institutions play a critical role in organizing and representing the needs of stakeholders, disseminating information, and promoting the establishment of an agreeable system of policies and monitoring strategies (Koziell & Inoue, 2006). Preexisting structures of social organization present within a community at the time a reserve is established can play a key role in determining if sufficient local capacity exists for a community to play a strong local role in protected area implementation and management. In this sense, a number of differences exist in the cases of Mamirauá and Ría Celestún that partially explain their relative successes and failures in terms of effective governance. As discussed in Chapter 3, the Catholic Church played a large role in establishing institutional frameworks in the Mamirauá region in the 1960s and grouping sectors into a system of Annual Assemblies (Koziell & Inoue, 2006). Later, this historical organizational structure was used as the basis for structuring local-level participation in Reserve management (Gillingham, 2001). Conversely, social and economic conditions in Ría Celestún at the time of the establishment of the Biosphere Reserve were not conducive to the formation of strong local organizations and leaders (Andrews et al., 1998). The population of Ría Celestún is constituted

of highly diverse cultural groups and the majority of residents had migrated to the region a relatively short time before the Reserve was established. Thus, local institutions and organizations were relatively undeveloped and local communities lacked the internal capacity necessary for them to play a strong role in Reserve governance.

### **Spatial Planning**

Both the Mamirauá Sustainable Development Reserve and the Ría Celestún Biosphere Reserve are premised on spatial planning that creates a system of zones permitting different levels of resource use. The Reserves, however, followed very different processes in the creation of such zones, which has had a serious impact on their efficacy in promoting sustainable development and conservation. The creation of a zoning plan in Mamirauá was a process that involved close collaboration of park authorities with local residents. The use of zoning use to govern fisheries management in Mamirauá determined how lakes are to be designated and when they are to be rotated (Koziell & Inoue, 2006). During this process, conflict arose regarding a proposed preservation area in the central region of the reserve. Residents claimed that some of these lakes were indispensable to local livelihoods and ultimately a compromise was reached in which the core preservation zone was divided based on the agreement that in the future, after alternative sources of income were secured, the zones would be reunited (Röper, 2001). This process ensured that the needs of both conservationists and local residents were accounted for in the plan and resulted in higher levels of acceptance and compliance of zoning regulations among residents.

The zoning process in Ría Celestún was primarily based on a framework obtained from the Man in the Biosphere Program. The zones are mostly based on ecological rather than social

values and residents played no role in the process of determining the zones. As such, inhabitants remain largely unaware that differential zones actually exist within the Reserve and have little to no knowledge of the differing regulations that accompany such zones (cite). The differences in which these two reserves approached the process of spatial management and the outcomes in terms of conflict and compliance with regulations illustrate the importance of incorporating a variety of stakeholders in the planning process.

### **Enforcement and Compliance**

A salient problem in the experience of most protected areas and reserves is the difficulty of enforcing rules and regulations. Indeed, a strong set of regulations and meticulously designed management plans mean absolutely nothing if they are not enforced or if compliance is minimal. Often, scarce resources, vast expanses of terrain, and social cohesion make enforcement extremely difficult, if not impossible. In order to mitigate such difficulties, it is critical to provide residents with incentives to comply with regulations and to promote self-enforcement. Managers at the Mamirauá Sustainable Development Reserve struggled with such shortcomings in an effort to enforce fisheries quotas and management plans. Initially, enforcement was the responsibility of IBAMA and was ineffective because of large costs, a huge area of land to enforce, and limited funding available (Castello et al., 2009). Managers addressed such issues by creating a “kinship-based” approach to sanctioning (Castello et al., 2009). Fishers caught violating regulations received reduced quotas and those that played an active role in contributing to management and enforcement received the benefit of increased quotas (Castello et al., 2009). Such a system promotes self-enforcement as fishers see the value in adhering to their quotas and wish to avoid public sanctions if caught violating regulations.

Some problems with enforcement and compliance remain, however, as unsustainable uses have at times shifted to unsurveyed areas (Röper, 2001).

Despite some outstanding issues that remain in terms of compliance in Mampirauá, their experience promoting compliance has been much more successful than that at the Ría Celestún Biosphere Reserve, which has experienced continuous problems in enforcement of regulations, resulting in a failure to achieve conservation goals. The Federal District Attorney's Office in charge of the environment (PROFEPA), which is ultimately responsible for enforcement, has only one inspector for the entire region (which includes two other protected areas), and thus has little to no presence within the reserve (ParksWatch-Mexico). Furthermore, Celestún inhabitants have actually attacked inspectors on several occasions (ParksWatch-Mexico), thus aggravating tensions between officials and local residents and creating disincentives for enforcement officials. Creating a positive system of enforcement and surveillance in order to ensure that Reserve policies are complied with is critical to the success of a reserve. Despite logistical and financial constraints associated with enforcement, effective systems are indeed possible if incentives to compliance exist and if policies can promote methods of self-enforcement.

### **Alternative Livelihood Strategies**

Because the establishment of protected areas and reserves invariably places constraints on traditional uses of natural resources and livelihood activities, it is critical to ensure that viable alternatives exist if local residents are to comply with regulations. Managers of protected areas may choose to focus on developing management plans for the sustainable use of resources that enables the continuation of traditional livelihoods. In other cases, that may not be possible and more attention may be focused on developing alternative sources of income for residents. Both



strategies were employed in the case of Mamirauá, leading to a significant decline in the unsustainable extraction of local resources. Although more attention was focused on developing sustainable management plans for local fisheries, a great deal of energy and resources were focused on providing residents with economically viable alternative livelihood opportunities. Efforts at developing ecotourism within the Reserve have focused on low-volume, high-value models of community based ecotourism (Koziell & Inoue, 2006). Although ecotourism projects do not yield enough money to support all of the communities, it is still a significant source of income for many within the Reserve and develops human capital through skills training (Koziell & Inoue, 2006). Concentrated efforts have also been made to move the local production of forest, agricultural, and fisheries products closer to regional markets, reducing reliance on inequitable systems of patronage, thus generating higher levels of income and securing greater access to the market economy (Méndez-Contreras et al., 2008Kenzie). Finally, residents of Mamirauá are beginning to exploit the higher profits and ecological benefits associated with the extraction of sustainably harvested forest products (Méndez-Contreras et al., 2008Kenzie). The development of alternative livelihood strategies and a strong focus on increasing the sustainability of traditional income-generating activities has played a large role in the social and environmental successes of Mamirauá Sustainable Development Reserve.

The record of Ría Celestún in promoting viable livelihood alternatives is dramatically different from that of Mamirauá. Little to no attention has been paid to supporting a transition to more sustainable sources of income generation and plans to make traditional livelihood activities more sustainable have been conspicuously absent from Reserve activities. Harsh restrictions have been placed on the use of natural resources within the reserve, such as shrimp fishing and the collection of mangrove wood for buildings or fuel, creating negative perceptions among

community members regarding the Reserve (Méndez-Contreras et al., 2008). The absence of alternative strategies for income generation has played a major role in causing huge levels of noncompliance with regulations. According to a resident surveyed by Méndez-Contreras et al. (2008), “If they gave us other alternatives we will happily respect the prohibitions, do they think it’s nice to endanger yourself to catch a little shrimp or go into the bush for wood?” (p. 117). Thus, it is apparent that the lack of attention and resources dedicated to alternative livelihoods in Celestún is not only leading to noncompliance, but plays a major role in fostering hostilities towards Reserve authorities and regulations.

### **Cost Benefit Distribution and Power Dynamics**

As discussed in Chapter 1, the creation of protected areas and reserves is accompanied by a variety of costs and benefits that are borne disproportionately by different users and stakeholders on a variety of spatial and temporal levels. The success of a reserve in terms of improving social and environmental conditions is contingent upon ensuring that these costs and benefits are allocated as evenly as possible. Dynamics of power are always instrumental in determining the distribution of costs and benefits and thus it is vital to consider local and regional distributions of power when analyzing the impacts of protected areas. While addressing all power imbalances and promoting complete equality is far beyond the scope of conservation work, it is necessary to understand power dynamics and the political role played by different parties.

One of the reasons that the Mampirauá Sustainable Development Reserve is considered to be so successful is that the costs and benefits of the reserve are distributed relatively evenly among local groups. Furthermore, by securing more direct routes to regional markets, Reserve

activities were able to partially address the inequities associated with the system of patronage that characterized the local economies of Mamirauá. On the other hand, the policies of Mamirauá protect and expand livelihood opportunities for residents of the Reserve, while constraining options available to neighboring communities located outside Reserve boundaries. Such problems are exacerbated when access is restricted to groups that are friends and relatives of those benefitting from the Reserve (Röper, 2001). In the future, Reserve officials must address issues associated with restricting access to outsiders in favor of residents, especially if outside groups have traditionally used Reserve resources to secure their livelihoods.

The benefits available to local residents of Ría Celestún Biosphere Reserve are limited and have mainly come in the form of increases in levels of tourism to view the Reserve's famous population of pink flamingos. Indeed, the "spectacularization" of the pink flamingo has led to the creation of a new system of power dynamics and controversies surrounding those that benefit from it (Córdoba Azcarate, 2010). As discussed in Chapter 4, *lancheros* have been the sole recipients a development aid coming in to support community development. As such, a great deal of local bitterness has been directed toward this exclusive group (Méndez-Contreras et al., 2008). According to a resident surveyed by Méndez-Contreras et al. (2008), many "don't know why there is a reserve at Celestún but it's brought tourism as a benefit but this mainly benefits the *lancheros*" (p. 118). By forcing the majority of residents to bear the costs associated with Reserve policies in the form of restrictions on the use of natural resources and funneling many local benefits to a select group of residents, imbalances of power are created and some groups are favored at the expense of others. This has led to increasing hostility and social divisions that ultimately hinder the effectiveness of the Reserve.

## **Traditional Knowledge**

The consideration of traditional knowledge (TK) in environmental activities is increasingly being recognized as a critical process. Berkes (1999) defines traditional knowledge as “the cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and their environment.” The integration of traditional knowledge with Western science is crucial to the creation of management plans and strategies that successfully address the ways in which local residents of a reserve interact with and use their surrounding natural resources. The process of sharing divergent forms of knowledge and incorporating them into reserve policies serves a number of positive functions, such as fomenting trust between park authorities and residents, correcting inaccuracies that may exist in either form of knowledge, and expanding the knowledge base that is available to decision-makers. In the case of Mamirauá, the development of fisheries management plans would have been impossible without the contribution of traditional knowledge to fish population surveys. It played a large role in the formulation of management plans and contributed greatly to the success of the project. It is important to note that TK is valuable source of information but on its own is often insufficient to supply decision-makers with the data needed for management decisions (Koziell & Inoue, 2006). Rather, TK and Western scientific knowledge should be viewed as complimentary sources of information and the inclusion of both knowledge bases greatly promotes the acceptance of reserve policies and regulations.

The efficacy of Ría Celestún Biosphere Reserve would improve greatly if the wide discrepancies in these forms of knowledge were meaningfully addressed. A number of local inaccuracies persist regarding knowledge related to the life-cycles of shrimp that are frequently

caught in the estuary. Because of such inaccuracies, residents do not understand the reasoning underlying regulations on harvesting shrimp within the estuary. Many residents also resist bans placed on harvesting mangrove wood and one inhabitant stated that, “The Reserve people don’t understand that the more you cut the mangrove, the more it grows” (Méndez-Contreras et al., 2008, p. 117). This statement highlights not only the gaps in knowledge that exist, but also the alienation that results from scientific misunderstanding and a lack of positive communication and knowledge sharing.

### **Linkages between Social and Environmental Health**

One of the main premises underlying the argument for sustainable development initiatives that seek to address both social development needs and ecological health simultaneously is the idea that the fates of both humans and the environment are inextricably linked. The health of one depends on the other. Thus, plans to promote conservation and social development can only be successful if both park authorities and local residents understand such linkages. The connections between environmental health and social productivity must be perceived by the stakeholders involved in conservation processes and conservation needs to be economically viable in order for it to be a valid option in environmentally oriented activities.

One of the main differences separating the experiences of Ría Celestún and Mamirauá is widespread understanding and perception of this critical link. In Mamirauá, fishers readily perceived how declining fish populations were negatively impacting their livelihoods and a course in stock management was given to Sector Associations in order to facilitate the understanding of the benefits of preventing overfishing (Koziell & Inoue, 2006). In Ría Celestún, there is a serious need to establish common goals connecting community interests to

natural resource preservation (Méndez-Contreras et al., 2008). Indeed, residents fail to understand the ways in which their activities are degrading their surrounding natural resources and park authorities have yet to realize that without securing sustainable livelihoods for residents, conservation activities have little chance of succeeding. Hence, the magnitude of creating tangible linkages between the health of communities and the health of the natural environment that are perceived and understood by all actors involved is a critical component of creating meaningful attempts at sustainable development.

## Conclusions

As threats to biodiversity and the integrity of nature continue to increase as a result of overconsumption, pollution, burgeoning human populations, and ever-changing patterns of resource use, the impetus to protect natural spaces and the myriad of benefits they provide is great. However, the rush to protect dwindling areas of nature cannot occur without proper foresight, planning, and a consideration for the human environment. Conservation plans that attempt to preserve nature as something that is wild and hence free from human influence are doomed to fail, as there are few places left on the planet that have not been touched by the hand of man in some way. Furthermore, the health of the environment and the health of populations that depend on it are inextricably linked and cannot be viewed as isolated systems. Despite major challenges associated with approaching conservation through the establishment of protected areas, positive lessons are emerging that should be taken into account when designing future conservation initiatives. Similarly, informative lessons can also be drawn from the failures of conservation, as they may be even more significant in formulating ways in which to improve environmental strategies. The cases analyzed in the paper represent contrasting experiences with stark differences. By comparing these differences and illuminating underlying causes that have contributed to their relative successes and failures, broader themes can be identified that should further direct future conservation work.

The significance of local participation in these two cases cannot be overemphasized. Indeed, despite the fact that participation is now the norm in management strategies rather than the exception, the degree to which it is actually implemented in conservation projects varies greatly. Participation should not be limited to simply collecting information about local communities and informing them of changes that are to be made to their lives. Rather, it must be

implemented in a way that meaningfully incorporates people into decision-making processes that will ultimately have significant impacts on their daily lives. By making local communities serious stakeholders in protected area design, implementation, and management, they are given the opportunity to influence rules and regulations in way that seriously addresses their needs and concerns. If communities participate meaningfully in such processes, there is a greater chance that they will accept the outcomes and will feel a greater sense of ownership over the reserve in which they reside. Protected areas will no longer be seen as an exercise of power by foreign, outside actors. Rather, they can be viewed as a dynamic strategy that may ultimately improve the future of both the communities and their natural environment.

Management strategies of protected areas must be transformed into dynamic practices that incorporate adaptive learning and change into governance practices. All projects will not be immediately successful and it is vital to have a framework for the monitoring and continuous evaluation of such processes. Furthermore, it is critical to provide stakeholders and park managers with a forum in which they can openly discuss the results of monitoring and evaluation, concerns, new ideas, and potential strategies for future improvement. By providing interested parties with a space of conversation and collaboration, conflict can be addressed in a positive way that encourages compromise and dispute resolution. Strategies for change can be formulated by a variety of actors, thus improving the chance that future projects and activities will be accepted by those involved in the process.

The biosphere reserve model of spatial planning and the creation of zones based on the premise of multiple use is extremely valuable in rectifying some of the past problems of protected areas. By integrating human settlements into parks and protected spaces, the biosphere reserve model more accurately reflects the reality of a planet in which humans are deeply linked



to their surrounding environments. By displacing people to areas located outside of park boundaries, the fortress conservation model of protected areas simply displaces unsustainable practices to areas deemed less ecologically valuable. Biosphere reserves have the capacity to at least partially address some of the underlying causes of environmental destruction. By focusing on improving the relationship between humans and the environment rather than severing it, biosphere reserves encourage the evolution and continuity of sustainable practices and ideals. They have the potential to increase understanding of the linkages between humans and the environment and to promote a holistic approach to dealing with environmental problems.

The potential for protected areas and natural reserves to seriously address the root causes of environmental destruction should not be overemphasized, however. Forces driving the loss of biodiversity and natural spaces expand far beyond the impacts of local communities and have their roots in larger processes associated with globalization, patterns of consumption, and the politics of power. It is critical not to rely solely on locally-based sustainable development projects to significantly change processes that are rapidly changing the constitution of the natural environment. Protected areas and reserves should be, however, a single tool of many designed to promote sustainable relationships between humans and the natural environment and as a method for improving the future of the planet.

## Works Cited

- Adams, W. M., & Hutton, J. (2007). People, parks and poverty: Political ecology and biodiversity conservation. *Conservation and Society*, 5(2), 147-183.
- Andrade, H. M. (1997). Threats analysis, Pronatura Peninsula de Yucatan. Retrieved from [www.rmportal.net/library/content/nric/1236.doc/at\\_download/file](http://www.rmportal.net/library/content/nric/1236.doc/at_download/file).
- Andrews, J. M., Von Bertrab, R. M., Rojas, S., Méndez, A. S., & Rose, D. A. (1998). Mexico: Ría Celestún and Ría Lagartos Special Biosphere Reserves. In K. Brandon, K. H. Redford, & S. E. Sanderson (Eds.), *Parks in peril: People, politics, and protected areas*. (79-105). Washington, D.C.: Island Press.
- Baker, S. (2006). *Sustainable development*. London: Routledge.
- Barbour, H. K. (1998). *A preliminary examination of the effects of decentralization on the conservation of biodiversity in the biosphere reserves of Ria Celestun and Ria Lagartos in the Yucatan Peninsula, Mexico*. Unpublished master's thesis. George Mason University, Fairfax, VA.
- Berkes, F. (1999). *Sacred ecology: Traditional ecological knowledge and resource management*. Philadelphia, PA: Taylor and Francis.
- Borgerhoff Mulder, M., & Coppolillo, P. (2005). *Conservatoin: Linking ecology, economics, and culture*. Princeton: Princeton University Press.
- Brandon, K., Redford, K. H., & Sanderson, S. E. (Eds.). (1998). *Parks in peril: People, politics, and protected areas*. Washington, D.C.: Island Press.
- Brechin, S. R., West, P. C., Harmon, D., & Kutay, K. (1991). Resident peoples and protected areas: A framework for inquiry. In P. C. West, & S. R. Brechin (Eds.), *Resident peoples*

- and national parks: Social dilemmas and strategies in international conservation* (5-28). Tucson: The University of Arizona Press.
- Brockington, D., Duffy, R., & Igoe, J. (2008). *Nature unbound: Conservation, capitalism, and the future of protected areas*. London: Earthscan.
- Brockington, D., & Igoe, J. (2006). Eviction for conservation: A global overview. *Conservation and Society*, 4(3), 424-470.
- Brockington, D., Igoe, J., & Schmidt-Soltau, K. (2006). Conservation, human rights, and poverty reduction. *Conservation Biology*, 20 (1), 250-252.
- Castello, L., Viana, J. P., Watkins, G., Pinedo-Vasquez, M., & Luzadia, V. A. (2009). Lessons from integrating fishers of Arapaima in small-scale fisheries management at the Mamirauá Reserve, Amazon. *Environmental Management* 43, 197-209.
- Chan, K. M. A., Pringle, R. M., Ranganathan, J., Boggs, C. L., Chan, Y. L., Ehrlich, P. R., Haff, R. K., Heller, N. E., Al-Khafaji, K., & Macmynowski, D. P. (2009). When agendas collide: human welfare and biological conservation. In *Biodiversity and Conservation, Vol. IV* (668-685). London: Routledge.
- Corbera, E., Kosoy, N., & Martinez Tuna, M. (2007). Equity implications of marketing ecosystem services in protected areas and rural communities: Case studies from Meso-America. *Global Environmental Change* 17, 365-380.
- Córdoba Azcarate, M. (2010). Ecotourism and the restructuring of place at the Biosphere Reserve Ria Celestun (Yucatan, Mexico). *Tourist Studies* 10(2), 99-116.
- DeFries, R., Hansen, A., Newton, C. A., & Hansen, M. C. (2005). Increasing isolation of protected areas in tropical forests over the past twenty years. *Ecological Applications*, 15(1), 19-26. doi:10.1890/03-5258

- DeFries, R., Hansen, A., Turner, B. L., Reid, R., & Liu, J. (2007). Land use change around protected areas: Management to balance human needs and ecological function. *Ecological Applications*, 17(4), 1031-1038.
- Dudley, N. and Stolton, S. (1999). *Conversion of Paper Parks to Effective Management: Developing a Target*. Report to the WWF-World Bank Alliance from the IUCN/WWF Forest Innovation Project.
- Dugelby, B., & Libby, M. (1998). Analyzing the social context at PiP sites. In K. Brandon, K. H. Redford, & S. E. Sanderson (Eds.), *Parks in peril: People, politics, and protected areas* (63-75). Washington, D.C.: The Nature Conservancy.
- Fortwangler, C. L. (2003). The winding road: Incorporating social justice and human rights into protected area policies. In S. R. Brechin, P. R. Wilshusen, C. L. Fortwangler, & P. C. West (Eds.), *Contested nature: Promoting international biodiversity with social justice in the twenty-first century* (25-40). New York: State University of New York Press.
- Furze, B., De Lacy, T., & Birckhead, J. (1996). *Culture, conservation, and biodiversity: The social dimension of linking local level development and conservation through protected areas*. Chichester: John Wiley & Sons.
- García-Frapolli, E. (2006). *Conservation from below: Socioecological systems in Natural Protected Areas in the Yucatan Peninsula, Mexico*. (Doctoral dissertation, Universidad Autonoma de Barcelona). Retrieved from <http://www.ent.cat/images/stories/ENT/articles/Tesis.pdf>.
- García-Frapolli, E., Ramos-Fernández, G., Galicia, E., & Serrano, A. (2009). The complex reality of biodiversity conservation through Natural Protected Area policy: Three cases from the Yucatan Peninsula, Mexico. *Land Use Policy* 26, 715-722.

- Gillingham, S. (2001). Social organization and participatory resource management in Brazilian *Ribeirinho* communities: A case study of the Mamirauá Sustainable Development Reserve, Amazonas. *Society and Natural Resources* 14, 803-814.
- Harmon, D., & Putney, A. D. (Eds.). (2003). *The full value of parks: From economics to the intangible*. Lanham: Rowman & Littlefield Publishers, Inc.
- Harvey, C. A., Komar, O., Chazdon, R., Ferguson, B. G., Finegan, B., Griffith, D. M., Martinez-Ramos, M., Morales, H., Nigh, R., Soto-Pinto, L., Van Breugel, M., & Wishnie, M. (2008). Integrating agricultural landscapes with biodiversity conservation in the Mesoamerican hotspot. *Conservation Biology*, 22(1), 8-15.
- Hopkins, J. W. (1995). *Policymaking for conservation in Latin America: National parks, reserves, and the environment*. Westport: Praeger.
- IUCN (2010). Protected Areas- What are they? Why have them? Retrieved from [http://www.iucn.org/about/work/programmes/pa/pa\\_what/](http://www.iucn.org/about/work/programmes/pa/pa_what/).
- Igoe, J. (2004). *Conservation and globalization: A study of national parks and indigenous communities from East Africa to South Dakota*. Belmont, California: Wadsworth/Thompson Learning.
- Igoe, J. (2006). Measuring the costs and benefits of conservation to local communities. *Journal of Ecological Anthropology* 10(1), 72-76.
- Kemf, E. (Ed.). (1993). *The law of the mother: Protecting indigenous peoples in protected areas*. San Francisco: Sierra Club Books.
- Koziell, I. & Inoue, C. Y.A. (2006). Mamirauá sustainable development reserve, Brazil: Lessons learnt in integrating conservation with poverty reduction. *Biodiversity and Livelihoods*

*Issues No. 7*. London: International Institute for Environment and Development.

Retrieved from <http://pubs.iied.org/pdfs/9168IIED.pdf>.

Mascia, M. B., & Claus, C. A. (2008). A property rights approach to understanding human displacement from protected areas: Marine protected areas. *Conservation Biology*, 23(1), 16-23.

Margolius, C., Beavers, J., & Paiz, M. C. (2002). Relocating people out of private reserves: Voluntary resettlement as a conservation tool in Guatemala. *Conservation in Practice* 3, 30-33.

McKenzie, S., Baulch, H., Pisupati, B., & Dharmaji, B. (n.d.). *Biodiversity, adaptation, livelihoods and food security: Lessons from the field for policy makers*. Unpublished manuscript, IUCN Regional Biodiversity Programme, Asia. Retrieved from <http://regionalcentrebangkok.undp.or.th/documents/whatsnew/iucncasestudies.pdf>.

Méndez-Contreras, J., Dickinson, F., & Castillo-Burguete, T. (2008). Community member viewpoints on the Ría Celestún Biosphere Reserve, Yucatan, Mexico: Suggestions for improving the community/natural protected area relationship. *Human Ecology* 36, 111-123.

Munk, Ravnborg, H. (2008). Organising to protect: Protecting landscapes and livelihoods in the Nicaraguan hillsides. *Conservation and Society*, 6(4), 283-292.

Naughton-Treves, L., Holland, M. B., & Brandon, K. (2005). The role of protected areas in conserving biodiversity and sustaining local livelihoods. *Annual Review of Environmental Resources*, 30, 219-252.

Pagiola, S., Arcenas, A., & Platais, G. (2004). Can payments for environmental services help reduce poverty? An exploration of the issues and the evidence to date from Latin America. *World Development*, 33(2), 237-253.

ParksWatch-Mexico. Park Profile—Mexico: Ría Celestún Biosphere Reserve. Retrieved from [www.parkswatch.org/parkprofiles/pdf/rcbr\\_eng.pdf](http://www.parkswatch.org/parkprofiles/pdf/rcbr_eng.pdf).

Pathak, N., & Kothari, A. (2003). Community-conserved biodiverse areas: Lessons from South Asia. In D. Harmon & A. D. Putney (Eds.), *The full value of parks: From economics to the intangible* (211-226). Lanham: Rowman & Littlefield Publishers, Inc.

Pfeffer, M. J., Schelhas, J. W., & Meola, C. (2006). Environmental globalization, organizational form, and expected benefits from protected areas in Central America. *Rural Sociology*, 71(3), 429-450.

Putney, A. D. (2003). Introduction: Perspectives on the values of protected areas. In D. Harmon & A. D. Putney (Eds.), *The full value of parks: From economics to the intangible* (3-11). Lanham: Rowman & Littlefield Publishers, Inc.

Redford, K. H. & Fearn, E. (2007). Protected areas and human livelihoods (Working Paper No. 32). Retrieved from Wildlife Conservation Society website [http://www.ecoagriculture.org/documents/files/doc\\_40.pdf](http://www.ecoagriculture.org/documents/files/doc_40.pdf).

Rangarajan, M., & Shahabuddin, G. (2005). Displacement and relocation from protected areas: Towards a biological and historical synthesis. *Conservation and Society*, 4(3), 359-378.

Redford, K. H. (1991). The ecologically noble savage. *Cultural Survival Quarterly* 15, 46-48.

Robinson, J. G., & Redford, K. H. (2004). Jack of all trades, master of none: Inherent contradictions among ICD approaches. In T. O. McShane & M. P. Wells, *Getting*

- biodiversity projects to work: Towards more effective conservation and development* (10-34). New York: Colombia University Press.
- Röper, M. (2001). On the way to a better state? The role of NGOs in the planning and implementation of protected areas in Brazil. *GeoJournal* 52(1), 61-69.
- Ruffino, M. L. (2002). Proceedings from the International Symposium on the Management of Large Rivers for Fisheries: Sustaining Livelihoods and Biodiversity in the New Millenium: *Provárzea- a natural resource management project for the Amazon floodplains*. Phnom Penh, Cambodia.
- Sayer, J. A. (1999). Globalization, localization and protected areas. In S. Stolten & N. Dudley (Eds.), *Partnerships for protection: New strategies for planning and management for protected areas* (29-38). London: Earthscan.
- Sen, A. K. (1999). *Development as freedom*. New York: Knopf.
- Smith, J., & Scherr, S. J. (2003). Capturing the value of forest carbon for local livelihoods. *World Development*, 31(12), 2143-2160.
- Spieldoch, A. (2007). A row to hoe: The gender impact of trade liberalization on our food system, agricultural markets, and women's human rights. Publication. Germany: Friedrich-Ebert-Stiftung.
- Stolten, S. (2010). Protected areas: Linking environment and well-being. In S. Stolten & N. Dudley (Eds.), *Arguments for protected areas: Multiple benefits for conservation and use* (1-12). London: Earthscan.
- UNDP. Protected areas. Retrieved from [http://www.undp.org/biodiversity/protected\\_areas.shtml](http://www.undp.org/biodiversity/protected_areas.shtml).
- UNEP. Protected areas, biodiversity and conservation. Retrieved from <http://www.unep.fr/shared/publications/other/3084/BP8-2.pdf>.



- Wang, S. W., Curtis, P. D., & Lassoie, J. P. (2006). Farmer perceptions of crop damage by wildlife in Jhime Singye Wangchuck National Park, Bhutan. *Wildlife Society Bulletin*, 34(2), 359-365.
- West, P. C., & Brechin, S. R. (Eds). (1991). *Resident peoples and national parks: Social dilemmas and strategies in international conservation*. Tucson: The University of Arizona Press.
- West, P., & Brockington, D. (2006). An anthropological perspective on some unexpected consequences of protected areas. *Conservation Biology*, 20(3), 609-616.
- West, P., Igoe, J., & Brockington, D. (2006). Parks and peoples: the social impact of protected areas. *Annual Review of Anthropology*, 35, 251-277.