

**Trouble in Paradise:
The Treadmill of Production and Caribbean Tourism**

Lauren Griffin, PhD¹

Department of Sociology and Criminology & Law, University of Florida, Gainesville, FL

Abstract:

In the past few decades, the tourism industry has grown dramatically, and now ranks as a major source of domestic economic activity and employment for many nations. As such, discovering the environmental impacts of tourism is becoming an increasingly important task for states attempting to balance the need for new economic revenue with the need for a healthy environment. These states have reason for concern: a variety of studies across disciplines have suggested that tourism is associated with many kinds of ecological damage and environmental degradation. The goal of this paper is to lay out a theoretical framework for analyzing the social and environmental impacts of tourism, drawing on the work of Allan Schnaiberg and the theory of the treadmill of production (TOP). I argue that many of the same social and economic changes explained by the treadmill theory- including an increasing divide between workers and owners of industry, decreased stability for workers, governmental support for treadmill industries, and environmental harm caused by the system's need for expansion- can be seen clearly in the case of tourism. The Caribbean is particularly illustrative of these changes, as it is one of the most tourism-dependent regions in the world.

Keywords: Treadmill of production, Caribbean, tourism, environment

¹ Department of Sociology and Criminology & Law, University of Florida, Gainesville, FL, USA

Introduction

Beginning in the 1950s with the rise of modern mass tourism (McElroy and de Albuquerque 1998; Potter et al. 2004), the tourism industry has grown dramatically, and now ranks as the world's fourth largest export category (United Nations World Tourism Organization 2011). Tourism receipts reached \$1075 billion dollars in 2012 and tourism in developing regions is growing rapidly (United Nations World Tourism Organization 2013). As such, discovering the environmental impacts of tourism is becoming an increasingly important task for states attempting to balance the need for new economic revenue with the need for a healthy environment. These states have reason for concern: a variety of studies across disciplines have suggested that tourism is associated with many kinds of ecological damage and environmental degradation (Davenport and Davenport 2006; de Albuquerque and McElroy 1992; Gosling 2001; Hall 2001; Hawkins et al. 1999; Johnson 2002; Meletis and Campbell 2007).

While many regions benefit economically from tourism, the Caribbean is one of the world's most dependent on the industry (Davenport and Davenport 2006; World Travel and Tourism Council 2011; Mycoo 2006; World Travel and Tourism Council 2013). Despite declines in tourism levels in 2009, the Caribbean tourism industry is picking up again and is expected to continue growing (United Nations World Tourism Organization 2011). In 2013, travel and tourism contributed 14% to the Caribbean region's gross domestic product, more than in any other region (World Travel and Tourism Council 2013). Despite the importance of the tourism industry to the region, the Caribbean remains an ecologically vulnerable area, with its tropical landscapes and abundance of marine life easily damaged by tourist activities (Mycoo 2006; McElroy and de Albuquerque 1998; Scheyvens and Momsen 2008). Caribbean landscapes are, in many places, already damaged and struggling to recover from agricultural use during the beginning of the 20th century (McElroy and de Albuquerque 1998), and it is possible that without proper management the

growing number of tourists flocking to the region will have an adverse impact on the Caribbean environment.

The goal of this paper is to lay out a theoretical framework for analyzing the tourism industry, using the Caribbean region as an illustrative example. It draws on the work of Allan Schnaiberg and the theory of the treadmill of production (TOP). By explaining the similarities between the tourism industry and traditional manufacturing industries, and examining the driving forces behind the switch from a largely agricultural economy to one based on tourism, I will argue that tourism in the Caribbean can be productively viewed through the lens of the treadmill of production. This “tourists’ treadmill” may ultimately have the same negative impacts on the Caribbean environment as those predicted by Schnaiberg’s model, and its implications are worth considering as the region moves forward.

I will begin by explaining in brief the history and importance of Caribbean tourism, and will then move on to an overview of Schnaiberg’s treadmill of production model. I will explain how the tourism industry fits into the treadmill framework, and give examples of the environmental problems facing the region due to tourism. I will then offer some caveats to this approach, and will conclude with suggestions for further research. Before beginning, though, it is important to point out the inherent political and social diversity of the Caribbean region. Different governments and societies have different guidelines and expectations for the tourism trade, and painting the region with a single brush can oversimplify these relationships. These differences do not prevent us from taking a regional view of the tourism industry, but they do beg for caution in interpretation. Overgeneralizing can obscure many significant and interesting differences between nations.

The Treadmill of Production

Allan Schnaiberg proposed the theory of the treadmill of production in his 1980 book, The Environment: From Surplus to Scarcity. The theory was further examined and elaborated upon by

scholars such as David Pellow, Kenneth Gould, and Adam Weinberg (Buttel 2004). TOP theory has its roots in neo-Marxism, and focuses on the question of economic production (Buttel 2004; Foster 2005). At its most basic, TOP theory questions whether or not advanced capitalism is compatible with high levels of environmental quality. It suggests instead that capitalism's need for constant expansion inevitably leads to a compromised environment (Buttel 2004).

Economic Production under the Treadmill

Under TOP theory, industries gradually replace labor-intensive forms of economic production with more technologically-advanced means. These changes require more extractions from the natural environment (Gould, Pellow, and Schnaiberg 2004; Schnaiberg and Gould 2009). As economies evolve, capital gradually accumulates in the hands of business owners and investors who benefit from the extraction of natural resources. TOP theory states that these owners begin investing their surplus capital into labor-saving technologies, increasing their profits by cutting labor costs. The rest of the production field is forced to adopt these changes, too, in order to remain competitive. Work begins on additional labor-saving technologies, "speeding up" the treadmill. TOP theory says that these technologies use more raw materials and produce more waste than their forbearers. The more businesses jump on the treadmill, the more the environment suffers (Gould, Pellow, and Schnaiberg 2004; Schnaiberg and Gould 2009).

Gould, Pellow, and Schnaiberg write that "the nature of capital investment [leads] to higher and higher levels of demand for natural resources for a given level of social welfare" (Gould, Pellow, and Schnaiberg 2004, 297). The increased pressure from new production methods on a finite environment reduces the resilience of ecosystems and stresses them, ultimately making them more prone to disruption. The communities that depend on the environment, too, become more vulnerable through this process, and the potential for social problems increases (Schnaiberg and Gould 2009).

Social Consequences of the Treadmill

The treadmill of production divides society into two groups: shareholders (individuals who manage and invest in businesses) and stakeholders (individuals who live and work in the environment) (Gould, Pellow, and Schnaiberg 2004). The treadmill increases shareholders' power, as they use their growing economic leverage to gain concessions from labor and governments (Foster 2005; Gould, Pellow, and Schnaiberg 2004). Stakeholders, however, lose power. Their employment status becomes increasingly precarious, and they are less able to affect government policy.

Additionally, the degradation of the environment harms stakeholders more than shareholders.

Shareholders use their increasing prosperity to move away from environmentally compromised locations, but stakeholders often do not have the financial means to relocate, even if they desire to do so. As a result, shareholders benefit from processes that degrade the environment, while physically separating themselves from the consequences.

Political Changes under the Treadmill

TOP theory also predicts that politicians and governments will be pressured to support treadmill-friendly policies. Shareholders use their newfound economic power to encourage lax restrictions on treadmill activities. Unions and workers lend their support to policies favoring treadmill developments, as they “[support] virtually any and all kinds of ‘economic development’” in hopes of increasing their own levels of prosperity (Gould, Pellow, and Schnaiberg 2004, 297).

Governments, seeking new tax revenues, fall in line and support treadmill-friendly policies (Schnaiberg and Gould 2009). As such, TOP theory anticipates a rise in the number of policies that favor treadmill developments, and a decline in the number of policies which slow the treadmill.

Overview of the Caribbean Tourism Industry

A Brief History of Caribbean Tourism

Tourism in the Caribbean has its roots in the mass tourism boom of the 1950s (Potter et al. 2004). The rise of non-stop jet travel, combined with growing prosperity for the middle classes in Europe and the United States, opened up wide areas of the world to vacationers (Potter et al. 2004; Pattullo 2005). Prior to this time, Caribbean economies were heavily dependent on small-scale agricultural production (Palmer 2009). The rise of trade liberalization schemes and global free-trade agreements, however, meant that small islands suddenly had to compete with large-scale agricultural producers in places like Brazil, and the Caribbean began to lose its competitive advantage (Potter et al. 2004). The downturn was offset, at least at first, by preferential trade agreements with European nations that had formerly colonized the region (Scheyvens and Momsen 2008; Palmer 2009; Timms 2006), but changes to global trade rules signaled the end of this era (Palmer 2009). This put Caribbean agriculture at an even greater competitive disadvantage.

As the agricultural industry declined in profitability, Caribbean governments began looking elsewhere for development opportunities. Traditional manufacturing has always been difficult on Caribbean islands due to their small size and relative remoteness (de Albuquerque and McElroy 1992; Scheyvens and Momsen 2008). While Trinidad and Tobago export oil and gas, and Jamaica mines bauxite (Palmer 2009), most other Caribbean islands have few resources appropriate for extraction and selling (Scheyvens and Momsen 2008; Pattullo 2005). As a result, Caribbean governments began encouraging development of the tourism industry (Scheyvens and Momsen 2008; Mowforth and Munt 1998) to supplement other forms of economic development like offshore banking and product assembly (Palmer 2009).

Foreign Ownership of Caribbean Tourist Facilities

A unique characteristic of the Caribbean tourism industry is the degree to which foreigners both invest in and own tourism developments. Across the region, ownership of tourist facilities is dominated by wealthy foreigners and international companies (Scheyvens and Momsen 2008; Palmer

2009; Mowforth and Munt 1998; Cater 1993; Conway and Timms 2010; Stonich 1998; Weaver 1993). The airlines and cruise companies that bring tourists to the Caribbean, as well as the companies operating the tours on the islands, are largely foreign-owned (Pattullo 2005). The same is true for many of the major hotels on the island, with up to three-quarters of lodging on some islands owned by foreigners. Some scholars have traced the roots of this condition to the historical scars left from colonialism (Scheyvens and Momsen 2008), and, to a large extent, economies in the Caribbean are “characterized by the dominance of minority ethnic groups in business” (Palmer 2009, 45). Contributing to the trend of foreign ownership of tourist facilities is the ease with which foreign owners can acquire capital and credit for new businesses (Scheyvens and Momsen 2008; Palmer 2009). Large, foreign firms can take advantage of economies of scale that smaller, locally-owned businesses cannot (Andriotis 2002).

The prevalence of foreign ownership of tourist resources can give rise to tension on the islands. Local populations are expected to cope with the social changes and environmental challenges brought about by tourism, yet they see comparatively few of the benefits of the tourist economy (Stonich 1998). The degree to which the tourist economy is detached from the local economy is illustrated by the tourism industry’s high rate of leakage. Leakage is an economic situation in which money flows out of local economies despite being physically spent there (Timms 2006; Mowforth and Munt 1998; Conway and Timms 2010; Neto 2003; Stronza 2008). Leakage occurs partially because of the prevalence of foreign ownership of tourist facilities, and partially as a result of the large number of products requested by tourists that cannot be produced on the islands and must be imported (Scheyvens and Momsen 2008; Pattullo 2005; Palmer 2009; Neto 2003; Beekhuis 1981). Data on the tourism industry remains patchy, despite its importance to the regional economy (Mycoo 2006; Pattullo 2005), making it difficult to estimate leakage rates consistently.

However, studies done within the past few years have reported leakage rates of anywhere from fifty (Pattullo 2005) to eighty-five percent (Conway and Timms 2010).

Caribbean Tourism as the Treadmill of Production

Theoretical Justifications

There are clear differences between tourism and production industries like manufacturing and mining. However, tourism shares many important features with these classic forms of production, and these similarities allow tourism to be analyzed as a modified form of the treadmill of production. Both tourism and traditional manufacturing require raw inputs from the environment (Stonich 1998). An island wishing to nurture its tourism industry must build and maintain infrastructures like airports, highways, cruise ports, and telecommunications systems (Scheyvens and Momsen 2008; Pattullo 2005). For example, in 1994, the Dominican Republic built the Gregorio Luperon International Airport at a cost of approximately \$20 million US. The airport is capable of bringing up to 1,800 visitors to the island an hour (Pattullo 2005).

As tourists begin to frequent an island, consumption of energy and water rise. Even though their personal physical location has changed, tourists frequently maintain the same usage patterns of these resources as they do at home (Neto 2003). Tourists are estimated to use up to six times the amount of fresh water as Caribbean locals (Pattullo 2005). Many of the most important resources to the tourism sector- energy, fresh drinking water, land, biodiversity, marine resources- can only be found on the islands themselves (Pattullo 2005; Neto 2003). This results in necessary extractions from the Caribbean environment to support the tourism industry.

Additionally, tourism creates wastes which the environment must absorb. An average cruise ship produces nearly a million gallons of greywater weekly (Johnson 2002). Many Caribbean islands face sanitation issues (Beekhuis 1981) that are exacerbated by the seasonal influx of visitors (Mycoo 2006). Improperly disposing of sewage causes a variety of environmental troubles (Potter et al.

2004), from increased seaweed and algae growth (Gossling 2001; Hall 2001; Beekhuis 1981; DeGeorges, Goreau, and Reilly 2010), to the transmission of disease (Stonich 1998), to water clarity problems (Mycoo 2006). While the tourist industry does not result in physical products that can be packaged and sold, its environmental impacts are similar in kind (albeit less damaging in many ways) than those of traditional production sectors.

Caribbean Economic Production Under the Treadmill

TOP theory suggests that changes in the methods of production from labor-intensive forms to technology-intensive forms cause environmental degradation as a result of the new technology's thirst for raw materials (Gould, Pellow, and Schnaiberg 2004; Schnaiberg and Gould 2009). When Schnaiberg developed TOP theory, he was thinking about the shift in manufacturing in the United States after the Second World War, but his theory can also be applied to the shift from agricultural production to a tourism economy in the Caribbean.

In both cases, older forms of production became less profitable, causing businesses to search for new ways of creating profit. In Schnaiberg's example, the ceaseless drive of technological innovation made it possible for business owners to save money by investing in labor saving machines. The engine of the treadmill is technological innovation. In the Caribbean, globalization was in the initial impetus for the treadmill, decreasing the profitability of agriculture and causing a shift towards the tourism sector (Palmer 2009). For the Caribbean, then, the engine of the treadmill is foreign investment, which drives the industry forward and demands an increased throughput of tourists to recoup its investments. Like Schnaiberg's manufacturing industry, tourist ventures seek to save on labor costs, but unlike manufacturers, the tourism industry reduces these costs by paying its workers less and moving to areas where high unemployment helps keep wages low (Scheyvens and Momsen 2008; Palmer 2009).

Importantly, just as Schnaiberg posited that manufacturing industries had created a treadmill that extracted more resources from the environment to feed its ever-increasing drive towards more technology, the tourists' treadmill in the Caribbean exacts ever more resources from the environment to move more tourists through the system. The economics of tourism demand that the industry expand to maintain profitability. In 1977, Caribbean islands saw an estimated 4 million stopover visitors (Beekhuis 1981). In 2013, this number was 22 million (World Travel and Tourism Council 2013). The reasons for this increase are simple: the tourism industry must expand to remain profitable. Hotels and other tourist facilities must increase the number of visitors patronizing their establishment to recoup the (sometimes significant) costs of construction and upkeep (Mycoo 2006). Airlines and cruise companies must keep the number of empty seats on their vessels to a minimum to make up the overhead associated with traveling to remote Caribbean islands. Governments, too, depend on increasing tourism numbers to offset the extensive cost of investing in tourism infrastructure (Mycoo 2006; Neto 2003). They also have an interest in seeing numbers rise to increase revenues on an already heavily-taxed industry (Pattullo 2005). With both the public and the private sector in the Caribbean pushing for increased levels of tourism, the treadmill speeds up.

Social Consequences of the Treadmill in the Caribbean

The speeding treadmill shifts power- and benefits- from stakeholders to shareholders, while increasing the costs accrued to stakeholders (Gould, Pellow, and Schnaiberg 2004). Since Caribbean tourism is characterized by high levels of foreign ownership, a dramatic distinction exists between shareholders and stakeholders. This results in an equally clear divide between those benefitting from the tourist economy, and those benefitting less.

While the roots of foreign dominance in the tourism industry are partially historical, the speeding treadmill may be exacerbating these divides. Unionization rates in the hotel sector on many Caribbean islands are surprisingly high- an estimated forty percent of hotel workers in Barbados are

part of a union- and workers in upscale resorts which draw in visitors year-round tend to be fairly well-compensated (Pattullo 2005). However, most workers in the tourism industry work for relatively low wages (Pattullo 2005; Palmer 2009). The economic stresses of low income are exacerbated by the seasonal nature of tourism in the Caribbean (Mycoo 2006), which leads to a high level of employment uncertainty, seasonal lay-offs, and extreme vulnerability to fluctuations in the international tourism market (Pattullo 2005; Stronza 2008; Beekhuis 1981; Romeril 1989). Many of these workers do not receive unemployment compensation during the off-season, adding to the financial strain (Pattullo 2005). The economic stress of this situation makes it more difficult for Caribbean residents to raise the capital necessary to fund a start-up business.

In addition to fewer resources for new businesses, large tourist operations frequently benefit from the economies of scale, which make it more profitable to run a large resort than a small one (Palmer 2009; Andriotis 2002). Larger resorts typically purchase fewer local supplies than smaller ones (Scheyvens and Momsen 2008; Andriotis 2002). Another consequence of an expanding tourism sector in a given location is the rise in land costs (Cater 1993; Neto 2003), and this, too, adds to the costs of a small start-up business (Pattullo 2005). These factors make it more difficult for stakeholders to ascend to shareholder positions in the tourism economy.

Political Changes in the Caribbean Under the Treadmill

TOP theory predicts that a strong level of support for treadmill-friendly policies will emerge as governments respond to popular support for the policies and seek to augment tax revenues (Gould, Pellow, and Schnaiberg 2004; Schnaiberg and Gould 2009). The history of tourism in the Caribbean suggests that governments are willing to take drastic action to assist the industry's expansion (Mycoo 2006; Pattullo 2005; Stonich 1998). This leads to a rise in the number of policies which encourage investment in the tourism industry, and a willingness to work with businesses on

increasing development. Governments which seek to encourage further foreign investment develop policies that make it easier for foreigners to own and build in the Caribbean.

Governments like Jamaica have shifted much of their tax burden away from investment and corporate profits, and onto individual incomes and individual consumption (Palmer 2009). The Bahamas' original development strategy involved a variety of incentives to foreign investors, including "no income or corporate tax, capital gains tax, real estate or property tax, and no customs and excise duties (except for goods for personal use)" (Pattullo 2005, 44). On Honduras' Bay Islands, tourism investors pay no federal or local taxes and are freed from import duties on products related to their businesses (Stonich 1998).

Programs like these are fairly typical for governments hoping to encourage investment in the tourism economy. Other governments offer an "exemption from land tax and capital levies, tax holidays, sometimes lasting up to 35 years, and the repatriation of investment and profits" (Pattullo 2005, 43). Policies such as this shift the tax burden from those earning profits to those earning wages and those consuming (Palmer 2009). These changes result in higher tax burdens on workers and frequently "require large segments of the population already suffering from economic deprivation to endure a considerable amount of pain as the reduction of the budget invariably eliminates or scales down some social programs" (Palmer 2009, 81).

The desire of governments to encourage tourism development may also diminish the voices of stakeholders in the political process. Governments, eager to encourage investment, allow shareholders to wield increased political influence over decisions that impact both shareholders *and* stakeholders. In Barbados, government development procedures for new tourist ventures ostensibly allow for public participation in the decision-making process, but there are indications that political elites and shareholders sometimes bypass the public-approval stage to speed up developments (Mycoo 2006). On Antigua, an incident occurred in the early 1990s where local residents of an inlet

were not made aware of plans to build a resort in their neighborhood until bulldozers arrived and began clearing the area of foliage (Pattullo 2005).

These and other incidents suggests that, in some cases, shareholders and governments neglect planning procedures, resulting in stakeholders paying the social and environmental costs of developments they neither wanted nor had a say in (Mycoo 2006; Pattullo 2005). While the benefits of treadmill expansion are obvious and accrue to shareholders, the costs are more subtle, and tend to fall into two categories: 1) stakeholders must pay financially for developments they seldom or never use, and 2) stakeholders must adapt to the environmental damage resulting from tourism developments.

First, as noted, governments frequently finance many of the infrastructure developments required by a robust tourism industry (Mycoo 2006; Pattullo 2005; Stonich 1998). This may occur directly, as in the case of Martinique's 2000 expansion of the island airport (Pattullo 2005), or indirectly, with governments giving tax subsidies to private investors who develop the land. While some investments (like those in sanitation and public transportation) benefit both shareholders and stakeholders (Pattullo 2005; Beekhuis 1981), others are largely or exclusively used by tourists and benefit shareholders. Despite paying for investments (in the form of taxes) in infrastructure like cruise docks, Caribbean residents rarely use these facilities (Pattullo 2005; Cater 1993; Beekhuis 1981). Scholars have also argued that the money being used by governments to increase tourist facilities could be otherwise put to use improving public services for locals (Scheyvens and Momsen 2008), many of whom lack even basic services like piped water (Pattullo 2005).

Second, the environmental costs of tourism in the Caribbean fall overwhelmingly on stakeholders, not shareholders. As noted, TOP theory predicts that shareholders will move away from polluted areas to environments physically separate from the ones impacted by their business (Gould, Pellow, and Schnaiberg 2004). Stakeholders, however, typically cannot afford to escape the

environmental consequences of the treadmill. This situation is especially true in the Caribbean, where stakeholders are Caribbean locals who live on the islands full time. Shareholders, on the other hand, are residents of a foreign country (Cater 1993; Stonich 1998; Weaver 1993) and reside on the island only for a few weeks a year, or not at all. Thus, these individuals are not directly faced with the environmental costs of development.

Increased Extraction of Natural Resources in the Caribbean

According to TOP theory, the economic changes of the treadmill inevitably lead to higher demands exerted on the natural environment (Gould, Pellow, and Schnaiberg 2004; Schnaiberg and Gould 2009). The Caribbean region's situation is particularly unique in this regard, since its main resource for drawing in tourists is its (seemingly) pristine environment (Palmer 2009). Caribbean nations must adapt to the fact that "expanding demand for access to these [natural] endowments [may] cause them to become polluted and, therefore deteriorate...reduc[ing] the wealth of the nation" (Palmer 2009, 43). The question of whether and how natural resources deteriorate when used by tourists has been the subject of much scholarship, both in the Caribbean and in other areas economically dependent on the industry. Many of these studies have come to the conclusion that tourism can have severe negative ramifications for the environment in which it functions (Gossling 2001; Hall 2001; Hawkins et al. 1999; Johnson 2002; Meletis and Campbell 2007), and that degradation increases as the number of tourists visiting a location increase (Davenport and Davenport 2006; Potter et al. 2004; Pattullo 2005). The next segments will examine two of these problems in more depth.

Degradation of Freshwater Resources

Ensuring that both tourists and residents in the Caribbean have access to clean, fresh water has been a long-standing challenge for many islands (Pattullo 2005; Neto 2003). The geographic variability of the Caribbean, as well as the lack of consistent governmental standards for reporting

water quantity and quality issues, make specifying the freshwater issues facing Caribbean islands difficult (Cashman, Nurse, and John 2010). Regardless, fresh water shortages are widely acknowledged to be problematic for some areas of the region.

Freshwater access problems arise inevitably from the fact that Caribbean islands are small land masses with little groundwater, surrounded by saltwater oceans (Gossling 2001; Neto 2003). Aquifers in the region are replenished solely by rainwater, and typically consist of a small freshwater “lens” floating on top of the salty seawater (Gossling 2001). The prospect of salt-water intrusion into the aquifer as a result of over-drawing freshwater resources is a constant concern for island residents (Gossling 2001; Hall 2001; Stonich 1998). Saltwater intrusion happens when an excessive amount of fresh water is pumped from the aquifer, causing salt water from the ocean to be drawn into the empty spaces in the ground (Barlow 2003). Saltwater intrusion damages local ecosystems, killing plants and disrupting animals, as well as making the ground unsuitable for agriculture and contaminating wells (Hall 2001; Neto 2003; Stonich 1998). Freshwater shortages in the Caribbean are likely to increase due to climate change, which is expected to decrease rainfall patterns and cause sea levels to rise (Cashman, Nurse, and John 2010; United Nations 2005; Mimura et al. 2007).

Caribbean governments have taken various approaches to dealing with the problems of freshwater shortages, although many of their efforts have been hampered by high levels of government debt (making investment in infrastructure more difficult) and the scale of the problem itself (Cashman, Nurse, and John 2010). Although the desalination process remains somewhat expensive and energy-intensive (Bremere et al. 2001), Antigua and Barbuda, Barbados, and Aruba have all built desalination plants to take some of the pressure off local aquifers (Cashman, Nurse, and John 2010). The government of Barbados instituted policies requiring large buildings to have rainwater-collection systems, and other Caribbean islands have programs designed to encourage the

recycling of water for outdoor use (Mycoo 2006). While these practices help with water conservation, freshwater usage remains a problem.

Adding to natural water shortages are increased water extractions resulting from the speeding up of the tourist treadmill. Tourists tend to use more freshwater than Caribbean locals (Gossling 2001; Scheyvens and Momsen 2008; Beekhuis 1981; Stonich 1998), resulting in a competition between tourists and locals for freshwater access (Gossling 2001; Stonich 1998; Cashman, Nurse, and John 2010). Tourist facilities draw vast amounts of water from Caribbean reserves (Gossling 2001; Neto 2003). Golf courses, in particular, have put a strain on water supplies (Scheyvens and Momsen 2008; Neto 2003; Romeril 1989), with each course requiring up to 600,000 gallons of water daily (Pattullo 2005).

Water shortages on Caribbean islands are exacerbated by the seasonal nature of tourism and water demands (Mycoo 2006; Beekhuis 1981; Cashman, Nurse, and John 2010). Since freshwater demands tend to increase all at once, occasionally overlapping with the islands' natural dry seasons (Pattullo 2005), it is more difficult for natural processes like rainfall to adequately replenish the aquifers. St. Vincent and the Grenadines, St. Lucia, and Grenada all experience freshwater shortages during the dry season, and governments have resorted to shipping in water to meet both the needs of both residents and visitors (Cashman, Nurse, and John 2010).

The lack of adequate freshwater resources on Caribbean islands has the potential to severely impair the region's long-term economic future. Saltwater intrusion can damage structures and decreases the quality of what freshwater remains (Gossling 2001), as well as hurting the ecosystems so critical to drawing in tourists. Freshwater shortages have already caused major problems for the tourism industry. During the region's last major drought in 1994, hotels were sued by visitors whose trips were interrupted by lack of water, and other resorts were forced to cut water access during the

night to conserve resources (Pattullo 2005). Freshwater shortages are an example of increasing natural resource extraction under the tourist treadmill, and have the capacity to cripple the region.

Degradation of Marine Resources

Marine resources are also impacted by increased tourism in the Caribbean. These changes have the potential to cause significant impacts on the health and safety of both tourists and Caribbean stakeholders. The region's beaches are one of its most significant draws to tourists, so addressing these problems is quickly becoming an issue of critical importance for Caribbean nations.

First, land-use change has led to erosion becoming a considerable problem on some Caribbean islands (Hall 2001; Stonich 1998). Most Caribbean development happens on and near the beach (Beekhuis 1981), and this involves clearing local vegetation to make room for structures (Mycoo 2006; Cater 1993; Neto 2003). Clearing the beaches of foliage destroys habitat for wildlife and leads to increased sedimentation and erosion (Potter et al. 2004), since there are no longer plant roots in the ground to hold the soil in place. Barbados' western beaches, for example, have been reported as receding at a rate of 1.5 meters every ten years (Pattullo 2005). Sedimentation smothers coral colonies, buries sea grasses, and leads to water clarity issues on affected beaches (Gossling 2001; Hall 2001; Mycoo 2006; Stonich 1998; DeGeorges, Goreau, and Reilly 2010).

Second, sanitation problems on Caribbean islands have been exacerbated by the influx of tourists, with many facilities being unable to keep up with the increased demand (Hall 2001; Neto 2003; Beekhuis 1981). In 2010, only about twenty percent of the regional population had access to "sewage systems with primary levels of wastewater treatment" (Cashman, Nurse, and John 2010, 49), and as recently as the mid-1990s, anywhere from eighty to ninety percent of sewage disposed of in coastal waters was not properly treated (Pattullo 2005). Inadequate sanitation procedures damage water clarity (Mycoo 2006) and lead to an increased transmission of diseases in both humans and wildlife (Stonich 1998). Research in the Florida Keys has suggested a link between improperly

treated sewage and an outbreak of white pox disease among endangered elkhorn coral (Sutherland et al. 2010). Nutrients in the sewage may also lead to increased algal growth on coral reefs, choking out coral colonies (Hall 2001; Beekhuis 1981; DeGeorges, Goreau, and Reilly 2010). Sewage is “generally believed to be the most serious land-based pollutant of the Caribbean’s coastal waters” (Potter et al. 2004, 432).

Third, run-off from the heavily-manicured grounds of tourist facilities has increased the amount of fertilizers and pesticides found in the Caribbean Sea (Potter et al. 2004; Stonich 1998; Gibson, McField, and Wells 1998). Pesticide run-off can sicken fish and other marine life, and fertilizer run-off leads to algal blooms which threaten reefs (DeGeorges, Goreau, and Reilly 2010; Gibson, McField, and Wells 1998). With few regulations in place controlling the use of agricultural and landscaping products on the islands, the problems of run-off increase as more developments spring up along the coast (Stonich 1998).

Conclusions

This paper argues that Caribbean tourism can be seen productively through the lens of Schnaiberg’s treadmill of production. TOP theory suggests that as businesses attempt to save on labor costs, they turn towards more technologically advanced, environmentally damaging forms of production. These changes divide people into shareholder and stakeholder groups, and result in more instability for workers. Governments are encouraged to support the treadmill as a means for increasing prosperity, and here, too, the power of stakeholders is diminished. As the treadmill speeds up, extraction increases, and results in disempowered stakeholders living in an increasingly degraded environment.

Caribbean tourism can be seen as an example of this trend. Tourism in the Caribbean is inherently an extractive industry, drawing from the environment to support itself. Once the treadmill is up and running, economic, political, and social forces combine to force the industry towards

perpetual expansion. Shareholders- mainly foreign owners of tourist facilities and transportation- are empowered, while stakeholders- Caribbean locals- suffer from increased employment uncertainty and the consequences of overdrawing natural resources.

Many important and fascinating questions remain for those hoping to understand the nature of tourism in the Caribbean and its potential impacts on the Caribbean environment. Currently, limitations on data and the difficulties associated with measuring specific ecosystem-level changes make research a challenge, but one well worth undertaking. Several specific questions arise as a result of adopting the tourists' treadmill paradigm.

First is the compatibility of the tourists' treadmill model with the emerging industry of ecotourism. Ecotourism is a somewhat amorphous term typically understood as tourism developed with the goal of being environmentally friendly (Meletis and Campbell 2007; Klak 2007). Ecotourism proponents understand conventional tourism's potential for environmental and social harm, but state that, with proper limits and consideration, there is nothing about tourism that necessitates these problems (Meletis and Campbell 2007; Romeril 1989). Thus, the economic benefits of tourism are preserved at the same time as the area's natural history (Klak 2007). Research is needed to examine fully the claims of ecotourism proponents, and to discover if ecotourism is, in fact, less environmentally destructive than conventional tourism, or if, as some researchers have suggested, it is simply the exploration phase of the tourism life cycle (Weaver 1993).

Second, there is little research examining the environmental attitudes and opinions of shareholders in the Caribbean. TOP theory predicts that shareholders will wield an increasing amount of influence politically as the treadmill speeds up. As such, it is important to understanding how these individuals perceive themselves and their relationship with the Caribbean environment. How often do shareholders see the environments in which their businesses operate? How aware are they of the changes happening as a result of their decisions? While the problems facing the region

are clearly cumulative and to some extent systematic, better understanding the specific nature of shareholders to the environment could illuminate ways for forward-thinking policy makers to minimize the damage done to the Caribbean's ecosystems.

Third, while the tourists' treadmill framework offers a starting point for understanding the changes taking place in the Caribbean, it is doubtlessly true that a variety of local factors influence the specific course which the treadmill takes. How do different political systems, economic forces, and social structures influence the development of environmental changes? How do popular understandings of environmental issues and attitudes towards the environment impact the policy process in individual countries? Further fleshing out the mechanics of the treadmill could provide vital information for nations only beginning their forays into the tourism industry, giving them at least a clearer understanding of the ways in which the industry propagates changes itself and creates changes to its environment.

Works Cited

- Andriotis, Kostantinos. 2002. "Scale of hospitality firms and local economic development- evidence from Crete." Review of. *Tourism Management* 23:333-41.
- Barlow, Paul M. 2003. "Ground Water in Freshwater-Saltwater Environments of the Atlantic Coast." In.: United States Geological Survey.
- Beekhuis, Jeanne V. 1981. "Tourism in the Caribbean: Impacts on the Economic, Social and Natural Environments." Review of. *Ambio* 10 (6):325-31.
- Bremere, Ingrida, Maria Kennedy, Allerd Stikker, and Jan Schippers. 2001. "How water scarcity will affect the growth in the desalination market in the coming 25 years." Review of. *Desalination* 138:7-15.
- Buttel, Frederick H. 2004. "The Treadmill of Production: An Appreciation, Assessment, and Agenda for Research." Review of. *Organization & Environment* 17 (3):323-36. doi: 10.1177/1086026604267938.
- Cashman, Adrian, Leonard Nurse, and Charlery John. 2010. "Climate Change in the Caribbean: The Water Management Implications." Review of. *The Journal of Environment & Development* 19 (1):42-67.
- Cater, Erlet. 1993. "Ecotourism in the Third World: problems for sustainable tourism development." Review of. *Tourism Management*:85-90.
- Conway, Dennis, and Benjamin F. Timms. 2010. "Re-branding Alternative Tourism in the Caribbean: The Case for 'Slow Tourism'." Review of. *Tourism and Hospitality Research* 10 (4):329-44.
- Davenport, John, and Julia L. Davenport. 2006. "The impact of tourism and personal leisure transport on coastal environments: A review." Review of. *Estuarine, Coastal and Shelf Science* 67:280-92.
- de Albuquerque, Klaus, and Jerome L. McElroy. 1992. "Caribbean Small-Island Tourism Styles and Sustainable Strategies." Review of. *Environmental Management* 16 (5):619-32.
- DeGeorges, Andre, Thomas J. Goreau, and Brian Reilly. 2010. "Land-Sourced Pollution with an Emphasis on Domestic Sewage: Lessons from the Caribbean and Implications for Coastal Development on Indian Ocean and Pacific Coral Reefs." Review of. *Sustainability* 2:2919-49.
- Foster, John Bellamy. 2005. "The Treadmill of Accumulation: Schauberg's Environment and Marxian Political Economy." Review of. *Organization & Environment* 18 (1):7-18.
- Gibson, J., M. McField, and S. Wells. 1998. "Coral reef management in Belize: an approach through Integrated Coastal Zone Management." Review of. *Ocean & Coastal Management* 39:229-44.
- Gossling, S. 2001. "The consequences of tourism for sustainable water use on a tropical island: Zanzibar, Tanzania." Review of. *J Environ Manage* 61 (2):179-91. doi: 10.1006/jema.2000.0403.
- Gould, K. D., David Pellow, and A. Schnaiberg. 2004. "Interrogating the Treadmill of Production: Everything You Wanted to Know About the Treadmill, But Were Afraid to Ask." Review of. *Organization & Environment* 17 (3):296-316.
- Hall, C. Michael. 2001. "Trends in ocean and coastal tourism: the end of the last frontier?" Review of. *Ocean & Coastal Management* 44:601-18.
- Hawkins, Julie P., Callum M. Roberts, Tom Van't Hof, Kalli De Meyer, Jamie Tratalos, and Chloe Aldam. 1999. "Effects of Recreational Scuba Diving on Caribbean Coral and Fish Communities." Review of. *Conservation Biology* 13 (4):888-97.
- Johnson, David. 2002. "Environmentally sustainable cruise tourism: a reality check." Review of. *Marine Policy* 26:261-70.

- Klak, Thomas. 2007. "Sustainable Ecotourism Development in Central America and the Caribbean: Review of Debates and Conceptual Reformulation." Review of. *Geography Compass* 1 (5):1037-57.
- McElroy, Jerome L., and Klaus de Albuquerque. 1998. "Tourism Penetration Index in Small Caribbean Islands." Review of. *Annals of Tourism Research* 25 (1):145-68.
- Meletis, Zoë A., and Lisa M. Campbell. 2007. "Call It Consumption! Re-Conceptualizing Ecotourism as Consumption and Consumptive." Review of. *Geography Compass* 1 (4):850-70. doi: 10.1111/j.1749-8198.2007.00048.x.
- Mimura, N., L. Nurse, R.F. McLean, J. Agard, L. Briguglio, P. Lefale, R. Payet, and G. Sem. 2007. "Small islands." In *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the International Panel on Climate Change*, edited by M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson, 687-716. Cambridge, UK: Cambridge University Press.
- Mowforth, Martin, and Ian Munt. 1998. *Tourism and Sustainability*: Taylor & Francis e-Library.
- Mycoo, Michelle. 2006. "Sustainable Tourism Using Regulations, Market Mechanisms and Green Certification: A Case Study of Barbados." Review of. *Journal of Sustainable Tourism* 14 (5):489-511. doi: 10.2167/jost600.0.
- Neto, Frederico. 2003. "A new approach to sustainable tourism development: Moving beyond environmental protection." Review of. *Natural Resources forum* 27:212-22.
- Palmer, Ransford W. 2009. *The Caribbean economy in the age of globalization*: Palgrave Macmillan.
- Pattullo, Patty. 2005. *Last Resorts: The Cost of Tourism in the Caribbean*. London: Cassell, Latin America Bureau.
- Potter, R.B, D. Baker, D. Conway, and T. Klak. 2004. *The Contemporary Caribbean*. Edited by R.B. Potter, D. Baker, D. Conway and T. Klak. Harlow, United Kingdom: Pearson Education Limited.
- Romeril, Michael. 1989. "Tourism and the environment- accord or discord?" Review of. *Tourism Management* 10 (3):204-8.
- Scheyvens, Regina, and Janet H. Momsen. 2008. "Tourism and Poverty Reduction: Issues for Small Island States." Review of. *Tourism Geographies* 10 (1):22-41. doi: 10.1080/14616680701825115.
- Schnaiberg, Allan, and Kenneth Alan Gould. 2009. "Treadmill Predispositions and Social Responses." In *Environmental sociology: from analysis to action*, edited by Leslie King and Deborah McCarthy, 51-60. Plymouth, United Kingdom: Rowman & Littlefield Publishers, Inc.
- Stonich, Susan C. 1998. "Political Ecology of Tourism." Review of. *Annals of Tourism Research* 25 (1):25-54.
- Stronza, A. 2008. "The Bold Agenda of Ecotourism." In *Ecotourism and Conservation in the Americas*, edited by Amanda Stronza and William H. Durham, 3-18. Cambridge, MA: CAB International.
- Sutherland, K. P., J. W. Porter, J. W. Turner, B. J. Thomas, E. E. Looney, T. P. Luna, M. K. Meyers, J. C. Futch, and E. K. Lipp. 2010. "Human sewage identified as likely source of white pox disease of the threatened Caribbean elkhorn coral, *Acropora palmata*." Review of. *Environ Microbiol* 12 (5):1122-31. doi: 10.1111/j.1462-2920.2010.02152.x.
- Timms, B. F. 2006. "Caribbean agriculture-tourism linkages in a neoliberal world: Problems and prospects for St. Lucia." Review of. *International Development Planning Review* 28 (1):35-56.
- United Nations. 2005. "Background Paper: Environmental Vulnerabilities of SIDS." In *International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States*.
- United Nations World Tourism Organization. 2011. "UNWTO Tourism Highlights 2011 Edition." In.: United Nations World Tourism Organization,.

- . 2013. "Tourism Highlights." In.: United Nations.
- Weaver, David. 1993. "Ecotourism in the Small Island Caribbean." Review of. *GeoJournal* 31 (4):457-65.
- World Travel and Tourism Council. 2011. "2011 Travel & Tourism Economic Impact: Caribbean." In. London: World Travel & Tourism Council.
- . 2013. "Travel and Tourism Economic Impact 2013: Caribbean." In.: World Travel and Tourism Council.