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**Whence the twain shall meet:  
Weathering overtourism and  
climate change in small island  
tourism economies**

**Ryan R. Peterson, PhD**  
Division Manager  
Centrale Bank van Aruba



Whence the twain shall meet: Weathering overtourism and climate change in small island tourism economies.

Ryan R. Peterson, PhD

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Front and back cover photography by @RYRO. The dragonfly symbolizes change, transformation, adaptability, and self-realization. The dragonfly's flight across water represents an act of going beyond what's on the surface and looking into the deeper implications and aspects of life.

J.E. Irausquin Boulevard 8  
P.O. Box 18  
Oranjestad  
Aruba  
Telephone (297) 5252-100  
Fax (297) 5252-101  
Website: [www.cbaruba.org](http://www.cbaruba.org)

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*“...the task is large, the window of opportunity is short,  
and the stakes are existential.”*

Mark Carney  
Governor, the Bank of England

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## Executive Summary

It is a truism that tourism is part and parcel of the Caribbean socioeconomic fabric. With the advancement of industrial revolutions over the past century, tourism followed suit with every new wave of technology, transportation, and travel. Moreover, mounting socioecological pressures in small island tourism economies – due to resource consumption, construction, and crowding – are compounded by climate change and ecological shocks, thereby challenging traditional policies and livelihoods in the Caribbean.

This working paper explores the twin challenges of overtourism and climate change in small island tourism economies. Overtourism describes the adverse impact of uncontrolled tourism growth – an overshoot of tourism – that influences the well-being of citizens and the degradation of natural habitats and biodiversity, which may result in diminishing visitor experiences and expenditures. Overtourism reflects tourism growth that has moved beyond the level of acceptable change in a destination due to significant levels of tourism intensity and tourism density, resulting in increased economic vulnerability, social costs, and environmental degradation. In addition, changes in climate over time, whether due to natural variability or as a result of human activity, exacerbate an already precarious situation. Climate change through extreme weather events and gradual warming can intensify and aggravate the adverse effects of overtourism, especially in small island tourism economies where tourism is concentrated in coastal zones.

This investigation focuses on a small mature island tourism economy in the Caribbean. Specifically, the investigation discusses the case of Aruba; a small island tourism economy with over half a century of tourism growth. Based on a historical account of tourism growth and socioecological developments, the findings present a contextualized understanding of the complex and dynamic challenges of overtourism and climate change in a small island tourism economy.

The findings of this study indicate that Aruba, in addition to being highly tourism dependent, is one of the most tourism intense and tourism dense small island economies in the Caribbean. The mounting risks of overtourism are associated with increasing social costs of low labor participation, low productivity, and increasing income inequality, as well as significant loss of scarce natural habitats, coastal erosion, and environmental decay. The latter adverse effects are, furthermore, compounded by increasing occurrences

and impacts of storm surges, flooding, and rising seawater temperatures. The results extend previous studies by identifying both direct and indirect transmission channels of overtourism in small island tourism economies, especially in the case of mature tourism destinations. Moreover, this exploratory study shows that whereas the direct economic benefits of tourism are realized within the short to medium term, the socioecological costs of tourism accrue over the long term and may extend across several generations.

**To weather overtourism and climate change, structural reforms and transformation are urgently called for.**

The symbiotic development of overtourism and climate change poses substantial risks to sustainable economic development, which requires significant innovation and investments in both the pattern and pace of national policies and programs for sustaining economic development. A strategic and cohesive mix of policy-driven reforms for strengthening macroeconomic resilience and climate change readiness as well as building evidence-based policy robustness are pivotal. Moreover, it is paramount that institutional capabilities and tourism governance be strengthened. Whereas small islands tourism economies may not be able to control the climate, they are in control of – and responsible – for steering towards a more sustainable future. Akin to a dragonfly reflecting upon its pace and pattern of flight, small mature island tourism economies are urged to change, adapt, and transform.

Keywords: *Overtourism, Climate Change, Small Island Tourism Economy, Caribbean, Aruba*

## Chapter 1: Introduction

*“The world that you and I live in is increasingly challenged. Population growth, pollution, over-consumption, unsustainable patterns, social conflict, climate change, loss of nature; these are not good stories”*

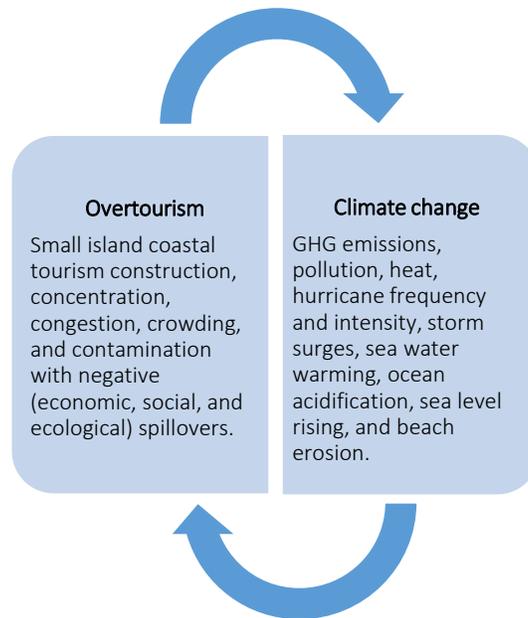
Jack Dangermond

**It is a truism that tourism is part and parcel of the Caribbean socioeconomic fabric with a long-standing relationship between global climate and international tourism cycles.** With the advancement of industrial revolutions over the past century, tourism has come to dominate much of Caribbean island realities, accounting for the highest degree of tourism specialization as measured by economic contribution (Cannonier & Galloway, 2019). Today, the Caribbean is one of the most tourism-intense regions of the world with one of the highest rates of tourism exports and consumption (World Travel & Tourism Council, 2019).

**Is too much tourism too much of a good thing?** Whereas tourism specialization is traditionally associated with economic production and growth (Cannonier & Galloway, 2019; WTTC, 2019), the adverse externalities thereof are, however, also well established (Daye et al., 2008; Duval, 2004; Gossling, 2002; Hall & Williams, 2008; McElroy, 2003; Peterson, 2009; Wilkinson, 1989). In fact, economic considerations and benefits of tourism specialization tend to induce ‘tourism myopia’ and trigger a gradual tourism overshoot of socioecological ceilings with significant costs in the medium to long-term (Marsiglio, 2017; Raworth, 2017, Ewing-Chow, 2019). Thus, coping with the short-term economic success of tourism growth is inextricably linked to managing and mitigating the risks of overtourism in contemporary tourism destinations (WTTC, 2017).

**Past and present industrial revolutions have, however, also induced significant climatic changes with adverse impacts on small island tourism economies** (Otker & Srinivasan, 2018; WTTC, 2017). Travel and tourism are one of the main contributors to GHG (Greenhouse gas) emissions and climate warming (Ewing-Chow, 2019; Gossling, 2002; Lenzen et al., 2017). Climate change is particularly relevant in small island tourism

economies in the Caribbean where much of the impact is concentrated in highly urbanized coastal areas (UNDP, 2010). Thus, as the largest industry in the Caribbean, tourism both contributes to, and is affected by, climate change (Ewing-Chow, 2019; Gossling, 2002; WTTC, 2017). The mounting socioecological pressures due to negative tourism spillovers are compounded by climate change effects, thereby threatening the livelihoods in the Caribbean (see Figure 1).



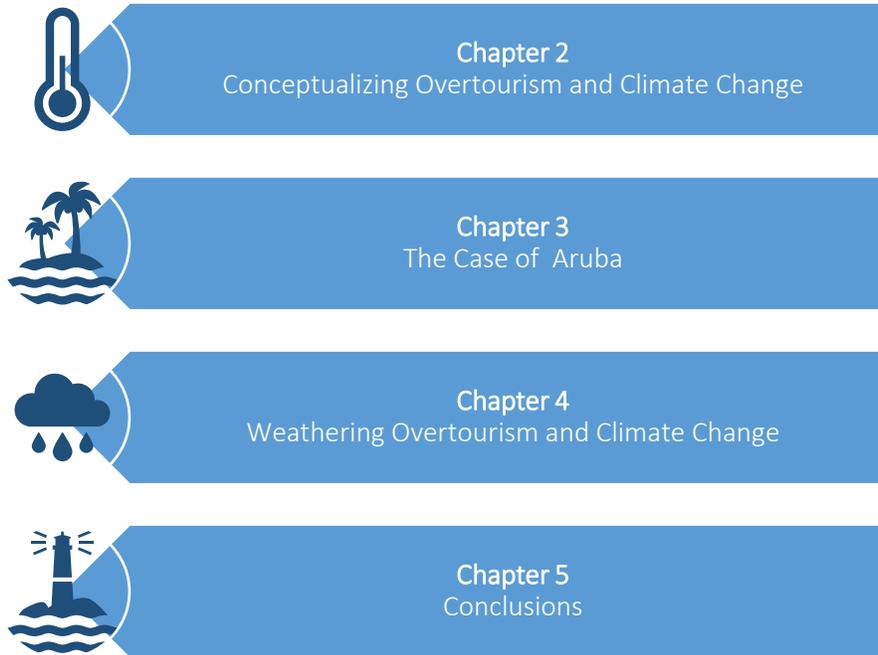
*Figure 1. Symbiotic relationship between overtourism and climate change in small island tourism economies.*

**Across the region, coastal zones and island ecosystems have experienced significant decay over the last decades** (UNEP, 2009). This environmental degradation of both terrestrial and marine ecosystems has been attributed to a combination of climate change, natural disasters, and multiple pressures from tourism growth, overconsumption, and the uncontrolled construction of coastal infrastructures (Duval et al., 2004; UNEP, 2009). Previous studies indicate that overtourism has a significant ecological footprint, one which cannot be easily amended once ecological thresholds have been surpassed (Gossling, 2002; Hunter & Shaw, 2007; Raworth, 2017).

**Considering the converging and mutually reinforcing developments in tourism growth and climate change, the Caribbean quest for sustainable tourism development remains one of the quintessential hallmarks of the 21<sup>st</sup> century.** The United Nations (UN) Sustainable Development Goals (UNSDG, 2018) define global sustainable development priorities and aspirations for 2030 that seek to mobilize global efforts around worldwide action among governments, business, and civil society to end poverty, and create a life of dignity and opportunity for all, within the boundaries of the planet. With reference to sustainable tourism, one specific goal (SDG 8) focuses on realizing inclusive and sustainable economic growth, and full and productive employment (UNSDG, 2018).

**In terms of climate change, strengthening the resilience and adaptive capacity to environmental disasters, as well as integrating climate action measures into national tourism policies remain a key directive, especially in small island tourism economies (SDG 13).** Conserving biodiversity and marine life (SDGs 14 and 15), as well as safeguarding reliable and renewable energy services (SDG 7) are likewise long-standing sustainable tourism aspirations in the Caribbean. However, despite increasing and concerted efforts across the Caribbean, yet with the surging exposure to climate change and natural disasters, most small island tourism economies remain prone and vulnerable to environmental and economic shocks (Peterson, 2019). Thus, fostering (ex-ante) structural and financial resilience as part of a national integrated disaster and climate resilience strategy is fundamental to strengthening small island tourism economies in the Caribbean (Otker, 2019; UNEP, 2009).

**This working paper explores the twin – interdependent – challenges of overtourism and climate change in small island tourism economies.** Drawing on previous studies of economic development and sustainable tourism, and recent conceptualizations of overtourism, the study focuses on a small mature island tourism economy in the Caribbean and discusses the specific case of Aruba. The theoretical background is presented in section 2, and the research methodology is described in section 3. In section 4, the main findings are discussed. The paper concludes with several policy implications and directions for future research in section 5 (see Figure 2).



*Figure 2. Structure of the working paper.*

## Chapter 2: Conceptualizing Overtourism and Climate Change

### 2.1. Introduction

When reviewing the history of tourism in the Caribbean, it is increasingly apparent that the quality of life for residents and in turn, the quality of experience for visitors have not always met the various principles of **sustainable tourism** (Daye et al., 2008; Duval, 2004; Peterson, 2009; Scheyvens & Biddulph, 2017). The political economy of Caribbean island tourism is oftentimes riddled by exclusion and extraction, rather than inclusion and regeneration. Several studies caution against the tourism sprawl of social crowding and ecological decay (Daye et al., 2008; Duval, 2004; Farrell & Twining-Ward, 2004; McElroy & Albuquerque, 2002). This chapter presents the theoretical background of this study and discusses the concepts of overtourism and climate change.

### 2.2. What is Overtourism?

Increasingly, small island tourism economies struggle with what has been coined ***overtourism***. Overtourism describes the adverse impacts of uncontrolled tourism growth – *overshoot of tourism* – that influences the (perceived) well-being of citizens and the degradation of natural habitats and ecologies, which result in diminishing visitor experiences and expenditures, and consequently, diminishing economic returns (UNWTO, 2018). Overtourism portrays relentless tourism growth – frequently unregulated – that has moved beyond the level of acceptable change in a destination due to significant levels of tourism density (tourism exports-to-GDP), tourism intensity (total visitors-to-population), and tourism density (visitors per km<sup>2</sup>) resulting in destruction of the natural environment, wear and tear of infrastructures and (cultural) architectures, and the negative impacts on residents and tourists (Center for Responsible Travel, 2018). The World Travel & Tourism

*Overtourism describes the adverse impacts of uncontrolled tourism growth that influences the well-being of citizens and the degradation of natural habitats and ecologies, which result in diminishing visitor experiences and expenditures, and consequently, diminishing economic returns.*

Council (WTTC, 2017) describes several adverse effects of overtourism, including pressures on infrastructure (i.e., transportation and energy), resource consumption and pollution (i.e., leakage and waste), spatial and cultural alienation (i.e., real-estate and social identity), and deterioration of the tourist experience (i.e., congestion and service quality).

**In the Caribbean, several small island tourism economies are prone to overtourism and the associated costs and risks thereof** (see Table 1). Based on an overtourism risk index<sup>1</sup> of selected small island tourism economies, the findings indicate that the Dutch Caribbean island states of St. Maarten (1) and Aruba (2) are considered two of the most tourism intense, dense, and dependent small island tourism economies, followed by the Cayman islands (3), the British Virgin Islands (4), Anguilla (5), and the US Virgin Islands (6). St. Maarten and Aruba also enjoy relatively high population densities as a result of significant tourism-induced labor migration over the past two decades. Previous studies show indeed that sub-national island jurisdictions (SNIJs) exhibit a higher degree of tourism specialization and warrant empirical scrutinization as small sub-national island tourism economies (McElroy & Pearce, 2006).

**As a concept, overtourism is rooted in development economics and discussions on overdevelopment and overconsumption** (Kohr, 1977; Meier & Stiglitz, 2001). From a post-development theoretical perspective (Cowen & Shenton, 1996), overtourism refers to the social inequality and the environmental destruction due to excessive tourism consumption and tourism-related infrastructure expansion. Although not a new phenomenon (Capocci et al., 2019; Doxey, 1975; Koens et al., 2018), overtourism is conceptually embedded in the study of how economies grow and societies change over the course of history (Meier & Stiglitz, 2001).

**Historically, overtourism extends previous theoretical frameworks and models of tourism lifecycles and complex adaptive tourism systems.** The tourism-related origins can be traced back to notions of the tourism destination lifecycle (Butler, 1980) and tourism carrying capacity (Mathieson & Wall, 1982), which have been widely discussed in the Caribbean (Island Resource Foundation, 1996; Pattullo, 1996; Sheller, 2003). The overtourism phenomenon underscores the nonlinear, interdependent, and dynamic nature of tourism

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<sup>1</sup> The overtourism index is a risk-based measure of tourism growth. It is adapted from the WTTC (2017) and describes the risk propensity of overconsumption, overcrowding, and overcongestion due to tourism and tourism-related activities.

systems, which encompass several interacting social, political, economic, ecological, and digital subsystems, especially within the small(er) scale – both social and spatial – of island economies (Peterson, et al., 2017). These complex adaptive tourism systems (CATS) are ‘nested’ or embedded within island social ecologies and often evolve in distinct ways with extensive cascades of uncertain, and oftentimes irreversible, long-term effects (Farrell & Twining-Ward, 2004).

*The overtourism phenomenon underscores the nonlinear, interdependent, and dynamic nature of tourism systems.*

Table 1. Overtourism in select small island tourism economies in the Caribbean (CTO, 2018; FCCA, 2018; WTTC, 2017; UNWTO, 2019).

| Select small island tourism economies in the Caribbean | Sovereignty* | Population Density Index (Population per km <sup>2</sup> ) | Tourism Intensity Index (Total visitors to population) | Tourism Density Index (Visitors per km <sup>2</sup> ) | Tourism Dependency Index (Total tourism contribution to GDP) | Overtourism Index (Average of sub-indices) |
|--|--------------|--|--|---|--|--|
| St. Maarten  | D            | 0.93   | 0.89   | 1.00  | 0.88   | 0.92                                       |
| Aruba  | D            | 0.45   | 0.48   | 0.29  | 1.00   | 0.59                                       |
| Cayman Islands   | D            | 0.17   | 1.00   | 0.21  | 0.22   | 0.48                                       |
| British Virgin Islands                                 | D            | 0.13   | 0.43   | 0.08  | 0.77   | 0.43                                       |
| Anguilla   | D            | 0.10   | 0.41   | 0.06  | 0.66   | 0.38                                       |
| US Virgin Islands                                      | D            | 0.21   | 0.39   | 0.11  | 0.62   | 0.37                                       |
| Average  |              | 0.29   | 0.33   | 0.16  | 0.44   | 0.31                                       |
| St. Kitts and Nevis                                    | I            | 0.13   | 0.61   | 0.11  | 0.18   | 0.30                                       |
| Antigua and Barbuda                                    | I            | 0.15   | 0.24   | 0.05  | 0.52   | 0.27                                       |
| Bahamas  | I            | 0.00   | 0.27   | 0.00  | 0.47   | 0.25                                       |
| Bermuda  | D            | 1.00   | 0.28   | 0.40  | 0.05   | 0.24                                       |
| St. Lucia  | I            | 0.24   | 0.09   | 0.04  | 0.39   | 0.17                                       |
| Barbados   | I            | 0.49   | 0.07   | 0.08  | 0.37   | 0.17                                       |
| St. Vincent and the Grenadines                         | I            | 0.19   | 0.00   | 0.01  | 0.44   | 0.15                                       |
| Dominica   | I            | 0.05   | 0.13   | 0.01  | 0.27   | 0.14                                       |
| Grenada  | I            | 0.23   | 0.05   | 0.03  | 0.13   | 0.07                                       |
| Martinique   | D            | 0.23   | 0.01   | 0.02  | 0.00   | 0.01                                       |

\*D: Dependent island state I: Independent island state (sub-national island jurisdiction).

**Overtourism is the result of several interconnected conditions and reciprocal changes.** In reflecting on tourism life-cycles in the Caribbean, Cole (2007) indicates that an overshoot in tourism arises from several interdependent factors, including e.g., (a) surpassing physical limits of beachfront or coastal areas for resort construction, (b) increasing labor migration due to limited local workforce, (c) growing visitors' sense of overcrowding, and (d) an escalation in residents feeling overwhelmed or displaced by visitors and/or immigrant workers. The latter describes intensifying sentiments of visitor annoyance and apathy by local communities (Doxey, 1975). The unfolding of these events triggers a spiral of demise where surging small island coastal tourism causes increasing crowding, congestion and contamination (McElroy & Albuquerque, 2002). Frequently, this leads to irreversible ecological destruction, social decay, and aesthetic repulsion, and a further uncontrolled spiral affecting tourism, which then induces a new cycle (Dehoorne et al., 2010).

**Conceptually, overtourism is closely related to several other constructs** (see Table 2). It is often defined in negative terms as the mutually constitutive reverse of inclusive growth, inclusive development, and inclusive tourism (Gupta & Vegeling, 2016; UNSDG, 2018; World Bank, 2018). *Inclusive growth* focuses on productive employment as a means of increasing income as well as raising standards of living and economic well-being (World Economic Forum, 2018). Inclusive growth is, thus, not only about growing economies but also, and more importantly, about ensuring that citizens are part of that growth. The quality of opportunity and participation in growth, with a special focus on the working poor and the un(der)employed are integral to inclusive growth (Ianchovichina & Lundstrom; 2009; Rainir & Ramos, 2013). Unlike classical economics, which views inequality as a trade off with economic growth (Kuznets, 1955), in development economics it is not only the rate of real GDP per capita growth that matters, but more importantly, the pattern of labor force participation and income distribution in growth (Meier, 2001).

**The notion of inclusion or inclusiveness is central to both sustainable tourism and overtourism.** Rauniyar & Kanbur (2010) distinguish between inclusive growth and *inclusive development*, with the latter referring to non-income (economic) effects. Gupta & Vegeling (2016) emphasize the social and ecological aspects of inclusive development. Whereas social elements address citizen well-being and participation in labor and consumption markets, ecological elements concentrate on the conservation of local ecosystems, the management of ecosystem services, and the regulation of environmental resources. Inclusive development

stems from the realization that relentless economic growth often gives rise to negative externalities, extractive resource depletions, and exploitative labor practices (Raworth, 2017), which are readily acknowledged in small-island tourism economies (Duval, 2004; Scheyvens & Biddulph, 2017).

*Table 2. Overtourism: related concepts and focus.*

| <b>Related concepts</b> | <b>Focus</b>  | <b>References</b>   |
|-------------------------|---|---|
| Economic development    | Focuses on dynamic non-linear growth, in which the rate and pattern of economic growth are important. Emphasizes income distribution and income equality, labor force quality and participation, and the role of institutions.  | Meier & Stiglitz, (2001), North (1990), Acemoglu & Robinson (2012), Romer (1990), Aghion & Howitt (1998), Meier (2001)                |
| Inclusive growth        | Aims to raise the pace and pattern of growth with increasing productive employment. Productive employment is based on income equality and labor participation. Emphasizes raising overall standards of living and economic well-being of host population.                                 | Kakwani & Pernia, (2000), World Bank (2018) Ianchovichina & Lundstrom (2009), Ranieri & Ramos (2013)                                  |
| Inclusive development   | Focuses on non-income aspects of inclusive growth, concentrating on social and environmental aspects of inclusive growth, including, labor participation, education, and environmental conservation.  | Gupta & Vegelin (2016) Rauniyar & Kanbur (2010); UNSDG (2018)   |
| Inclusive tourism       | Focuses on inclusive tourism development and the role of tourism in fostering inclusive and sustainable economic growth. The emphasis is on tourism labor market participation and income equality, as well as the conservation of tourism ecosystems, natural habitats, and marine life. | Capocci et al. (2019), Daye et al. (2008), Duval (2004), Hampton & Jeyacheya (2013), Koens et al. (2018), Scheyvens & Biddulph (2017) |

**Previous studies indicate that unsustainable growth of tourism bears negative consequences for the socioecology of small Caribbean islands** (Daye et al., 2008; Duval, 2004; Hampton & Jeyacheya, 2013; Peterson, 2009). According to Scheyvens & Biddulph (2017), one of the most enduring critiques of tourism is its non-inclusive development. They contend that tourism oftentimes provides opportunities for the privileged, creating profits for international (non-local) resorts, and building exclusive enclaves for the rich, thereby excluding the indigenous community, marginalizing local cultures and lifestyles, and depleting scarce natural resources (Scheyvens & Biddulph, 2017). Daye et al. (2008) and Duval (2004) conclude that if left uncontrolled, Caribbean tourism often leads to environmentally extractive and socially exclusive developments, despite its economic contributions, which in the long run undermine future economic contributions.

This is in stark contrast to *inclusive tourism*, which is defined as transformative tourism in which citizens are engaged in responsible production or consumption of tourism and the sharing of its benefits (Scheyvens & Biddulph, 2017). Inclusive tourism describes “a destination that offers a tourism experience based on its own, singular attributes, transforms the industry by boosting its competitiveness, creates decent employment, and promotes equal opportunities for all” (UNWTO, 2018). Overtourism, on the other hand, induces a fast-paced, yet unbalanced and unequal growth, which in the long run undermines future economic benefits. Thus, beyond the pace of tourism growth, overtourism focuses on the pattern and (by) products of tourism growth, including primary and secondary socioecological effects, which, conversely, are fundamental to sustaining small island tourism economies.

*Beyond the pace of tourism growth, overtourism focuses on the pattern of (by-) products of tourism growth...*

### 2.3. Transmission Channels of Overtourism

**Overtourism effects small island economies by means of different transmission channels.** Based on previous studies (Capocci et al., 2019; Daye et al., 2008; Duval, 2004; Hampton & Jeyacheya, 2013; Koens et al., 2018; WTTC, 2017), the following main transmission channels of overtourism are identified in small island tourism economies (see Table 3). *Direct channels* of overtourism transmission describe diminishing or negative tourism contribution to GDP, declining average per-visitor expenditures, increasing import leakages, growing resource consumption, high tourism export concentration, and tourism price inflation.

**Overtourism also transmits through *indirect channels* which effect local communities and natural habitats.** Indirect channels of overtourism transmission include stagnant labor participation rates, limited or declining income equality, uneven income distribution, foreign-ownership concentration of tourism industry, spatial concentration of tourism industry, real-estate price inflation, environmental degradation, loss of natural habitats, and diminishing contribution of tourism ecological services. More importantly, the tourism industry is one of the main producers of CO<sup>2</sup> emissions (Ewing-Chow, 2019; Gossling, 2002, Isik et al, 2017; Lenzen et al., 2018); *directly* – due to travel and transportation – as well as *indirectly* – as a result of tourism infrastructures, deforestation, construction activities, energy consumption, food imports, and waste. Previous studies indicate that a 1 percent increase in tourism expenditures is associated with a 0.12

percent rise in CO<sup>2</sup> emissions (Isik et al., 2017). It is estimated that for every single US\$ of tourism-related consumption in Caribbean destinations, one kg of CO<sup>2</sup> is produced (Ewing-Chow, 2019). Unlike direct transmission channels of overtourism, indirect effects often transpire and materialize over extended periods of time and may even span several generations.

*Table 3. Transmission channels of overtourism in small island tourism economies.*

|                          |                   |   |
|--------------------------|-------------------|---|
| Overtourism Transmission | Direct channels   | Diminishing or negative contribution to GDP, declining average per-visitor expenditures, increasing import intensity (leakage), high tourism export concentration, increasing tourism employment, surging tourism (and real estate) price inflation   |
|                          | Indirect channels | Stagnant labor participation, stagnant median income equality, uneven income distribution, foreign-ownership concentration of tourism enterprising, spatial tourism concentration, real-estate price inflation, environmental decay, climate change, diminishing tourism ecological services. |

## 2.4. Climate Change Impacts

Whereas overtourism has both direct and indirect socioecological impacts, climate change also affects the socioecology of tourism. Small island tourism economies are exposed and susceptible to climate change and ecological shocks, which may exacerbate the negative effects of overtourism. Climate change describes any change in climate over time due to both natural variability and as a result of human activity (Kelman & West, 2009). Climate change comprises sudden events and gradual processes, including geophysical events, hydrological events, meteorological events, and climatological events. Beyond natural – short and long term – cycles of climate change, there is considerable evidence suggesting anthropogenic climate change, i.e., the acceleration of climate change due to human activities (IPPC, 2014).

*Climate change describes any change in climate over time due to both natural variability and human activity.*

**Extreme weather and gradual warming have a significant impact on the traditional ‘sun-sand-sea’ tourism destinations in the Caribbean** (Acevedo et al., 2017; Bueno et al., 2008; ECLAC, 2011; Moore, 2010; UNDP, 2010). The economic impact of climate change in Caribbean small island tourism economies is estimated at well over US\$ 20 billion for the period 1950 to 2016, accounting for an estimated 3 to 4 percent of Gross Domestic Product (GDP) annually (Otker & Srinivasan, 2018). Over the past decade, hurricanes have cost some Caribbean economies well over 200 percent of their GDP (IMF, 2019). In addition to hurricanes and tropical storms, small island tourism economies are susceptible to sea level rise, ocean acidification, coral bleaching, increased precipitation (and drought), beach erosion, and coastal floods (ECLAC, 2011; Kelman & West, 2009; UNDP, 2010).

**The composite effect of climate change on economic output in small island tourism economies in the Caribbean is significant.** Bueno et al. (2008) conclude that annual costs of increased hurricane damages, loss of tourism revenue, and infrastructure damages could accrue to almost one quarter of the Caribbean economy. The brunt of these socioeconomic impacts would be carried especially by the small island tourism economies, including, St Kitts & Nevis (89 percent), Dominica (77 percent), Antigua & Barbuda (58 percent), Cayman Islands (53 percent), and St Lucia (49 percent). In the US Virgin Islands, the Bahamas, Barbados, and Aruba damages would amount to an estimated 22 to 32 percent of GDP.

Almost a decade ago, The United Nations Development Program (UNDP, 2010) concluded:

*“Caribbean coastal communities in particular will be severely threatened by the direct and indirect impacts of climate change, e.g., sea surface temperature, sea level rise, coastal erosion, extreme events, and the loss of aesthetics, which are projected to accelerate in the coming decades and compound the existing threats to natural systems and society. If the Caribbean countries fail to adapt, they are likely to take direct and substantial economic hits to their most important industry sectors such as tourism, which depends on the attractiveness of their natural coastal environments, and agriculture (including fisheries), which are highly climate sensitive sectors.” (UNDP, 2010).*

The compounding effect of extreme weather events, storm surges, and sea level rise in the Caribbean would affect – on average for small island tourism economies – an estimated 10 percent of the population and at least 50 percent of tourism resort infrastructures (UNDP, 2010). More specifically, almost 25 percent

of the population in the Bahamas would be affected, whereas over 85 percent of tourism resort infrastructures would be damaged in St. Kitts & Nevis; at least ten airports across the Caribbean would be severely damaged (UNDP, 2010). The Inter-American Development Bank (IDB, 2011) indicates that close to one-third of Caribbean tourism resorts are at flooding risk from sea level rise of 1 meter, and almost all small island tourism economies would lose their environmental assets, including biodiversity, beaches, mangroves, and coral reefs, from a combination of sea level rise and warming sea temperatures.

**International tourism demand is sensitive to the adverse impact of climate change.** Research indicates that for the ‘sea-sun-sand’ tourism in the Caribbean, an estimated 80 percent of international tourist would abstain from travelling to Caribbean tourism destinations if sea levels would rise, corals would bleach, and beaches would erode (Uyarra, 2005). In the case of Aruba, ECLAC (2011) indicates that under different scenarios of climate change, minimum losses would amass to an estimated US\$ 12 billion over the next decades – representing an annual loss of between 1.5 percent to 2 percent of GDP, with over US\$450 million in annual losses to tourism infrastructures, properties, and revenues (Bueno et al., 2008).

**Previous studies indicate that climate change effects fiscal and external balances, physical and natural capital stock, as well as labor productivity and social inclusion** (Batten, 2018; Krogstrup & Oman, 2019; Otker & Srinivasan, 2018). In the case of small island tourism economies, both tourism demand and tourism supply are adversely affected. In general, macroeconomic transmission channels of climate change in small island tourism economies include both aggregate supply and demand impacts (see Table 4), and comprise risks stemming from unpredictable extreme weather events – *environmental shocks* in the short to medium run –, as well as gradual degradation of ecological systems and services – *environmental slow burn* in the medium to long run (Batten, 2018).

**Significant uncertainty remains, however, as to the size of these impacts, especially for environmental slow burn.** The gradual decay of ecosystems may have a permanent effect over the longer run after reaching and surpassing critical ecological ceilings (Batten, 2018; Raworth, 2017). The effects of climate change are, furthermore, moderated by the institutional context and capabilities, i.e., the societal norms and values, the quality of public and tourism governance, which are the structural determinants of tourism performance and economic development (Acemoglu & Robinson, 2012; Daye et al., 2008, Duval, 2004; North, 1990; Peterson, 2017).

Table 4. Macro-economic impacts of climate change in small island tourism economies (Adapted from Batten, 2018; Krogstrup & Oman, 2019; Otker & Srinivasan, 2018).

|                     |   | Type of Impact   |  |
|---------------------|---|--|--|
|                     |   | Supply   | Demand   |
| Macroeconomic Risks | Extreme weather events<br>(Environmental shocks,<br>short to medium run)            | <ul style="list-style-type: none"> <li>- Fiscal deficits and increase in debt burden</li> <li>- Contraction in international reserves and reserve inadequacy</li> <li>- Erosion of financial assets, increased loan delinquency, increase in insurance claims and premiums</li> <li>- Depletion of capital stock (physical and natural); damage and costs incurred due to extreme weather, diversion of resources</li> <li>- Loss of worked hours, unemployment, labor displacement</li> <li>- Energy and food import contraction</li> </ul> | <ul style="list-style-type: none"> <li>- Weakening of corporate and household balance sheets</li> <li>- Increase in (commercial and residential) properties (water and wind damages)</li> <li>- Decline in household consumption</li> <li>- Reduced business investments</li> <li>- Decrease of foreign direct investments (inflow)</li> <li>- Current account shock (export contraction)</li> <li>- Fall in tourism arrivals and exports</li> </ul> |
|                     | From gradual temperature rising<br>(Environmental slow burn,<br>medium to long run) | <ul style="list-style-type: none"> <li>- Diversion of infrastructure investments to mitigation and adaptation capital, loss of natural capital</li> <li>- Loss in productive hours (due to extreme heat), labor migration</li> <li>- Insecure food supply resulting increase in food import costs</li> <li>- Increasing energy generation capacity</li> </ul>  | <ul style="list-style-type: none"> <li>- Stagnant or declining real GDP per capita</li> <li>- Contraction in consumption due to decline in labor force participation, withering labor markets</li> <li>- Increased energy demand</li> <li>- Diminishing tourism arrivals and income (due to sea-level rise, extreme heat, beach erosion, coral bleaching)</li> <li>- Loss of natural capital</li> </ul>  |

## Chapter 3: The Case of Aruba

### 3.1. Introduction

The purpose of the study is to explore tourism growth from a socioecological perspective in Aruba, which is a small mature island tourism economy of the Caribbean. Considering Aruba's tourism history, dating back to the early 1940s, the case of Aruba presents an opportunity to understand how tourism and the impacts thereof have evolved over time and space through direct and indirect transmission channels (see Illustration 1). The case study of Aruba is based on the collection and analysis of (historical) quantitative and (contemporary) qualitative data, thereby yielding an initial description and explanation of overtourism and climate change in a mature and small island tourism economy in the Caribbean.



*Illustration 1. Tourism through time: Aruba 1960s – 2010s (ANA, 2018).*

**Case study research involves a detailed empirical inquiry that investigates a contemporary phenomenon within its real-life context.** The main purpose of a case study is to provide an analysis and an understanding of the context and processes involved in the phenomenon under study (Yin, 2009). A single embedded case study is an appropriate research methodology in order to explore new multi-faceted concepts with limited empirical evidence. Although conceptually rooted in previous studies, overtourism remains elusive and under-scrutinized in empirical research in small island tourism economies. Furthermore, the empirical study of overtourism in combination with climate change in Caribbean small island tourism economies remains relatively absent in the literature. As a single case study, however, the results and conclusions cannot be generalized to other small island tourism economies.

### **3.2. A Small Mature Island Tourism Economy**

**Aruba is geographically located in the Southern Caribbean Sea on the peripheral of the Caribbean hurricane belt.** Aruba is a sub-national island jurisdiction within the Kingdom of the Netherlands and part of the Dutch Caribbean. With a population of an estimated 112,000, Aruba has a total surface area of 180 km<sup>2</sup> and a coastline of an estimated 69 km. Geologically, the South-West coast of Aruba is largely built from Quaternary Late Pleistocene limestone terraces, reefs, calcareous dune sand limestone, and alluvial sandstone, which are the remaining evidence of coral reef deposits and sedimentations (CBS, 2016). In general, limestone is highly permeable and sensitive to ocean acidity and seawater temperatures. Its relative alkaline and absorptive capacity are conducive to coastal erosion— over time and especially during storm surges and swells – as witnessed by the formation of coastal inlets (so-called “boca’s”) surrounding Aruba’s coasts.

**Aruba is a mature small island tourism economy with over 70 years of experience with tourism.** From a tourism brand perspective, it is the ‘One Happy Island’ in the Caribbean (Aruba Tourism Authority, 2018), Today, Aruba is ranked amongst the top Caribbean tourism destinations (WTTC, 2019) and is considered one of the most trade and tourism-dependent small island economies (see Figure 3), which makes it particularly vulnerable to external shocks (Peterson, 2019).

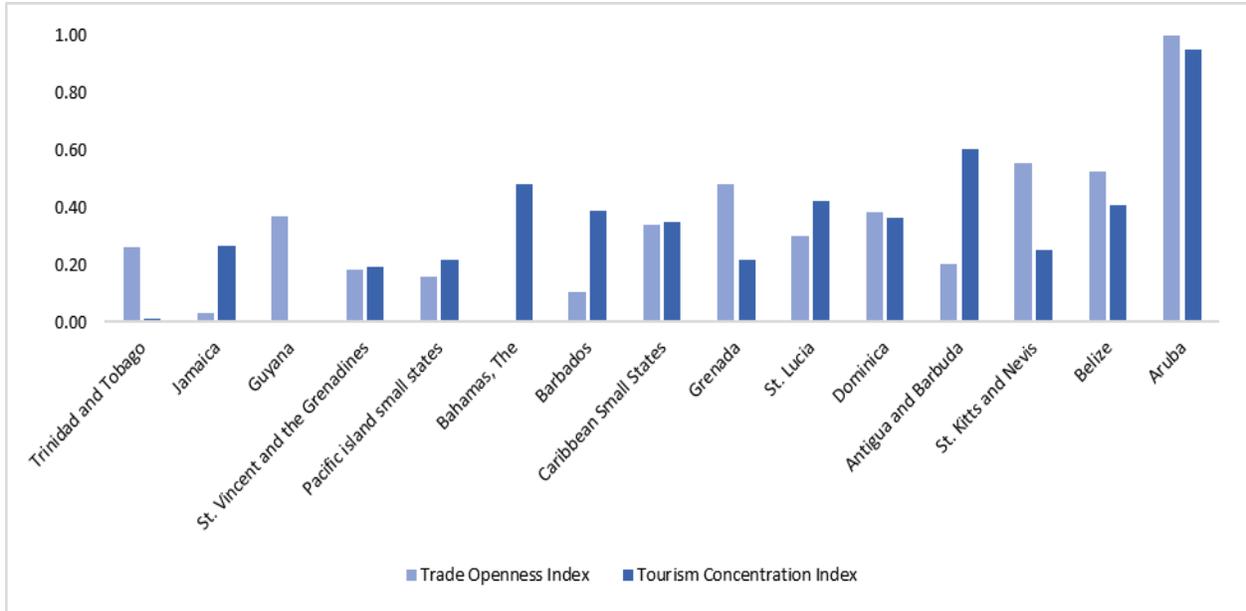


Figure 3. Trade and tourism dependency in small island economies (Peterson, 2019).

The birth of the Aruban tourism industry dates to 1934 when the first guest house was opened in Oranjestad, the capital of Aruba. The official opening of the Aruba Caribbean Hotel as the first luxury resort of Aruba ushered in a new epoch in the development of tourism in the early 1960s. During the 1970s, Aruba witnessed a strong expansion of international tourism, which received an extra push with the closing of the oil refinery during the late 1980s. Since the 1960s, the island’s tourism policy has been geared at attracting large hotels and soliciting international investments for tourism resort constructions and infrastructure expansions (Cole, 2007); a tourism policy that still holds today.

The island of Aruba is historically attributed with a rich socioecological history, including multiple nationalities and several endemic species. Given the rich environmental and social endowments, tourism was an almost instinctive and natural course of action, which accelerated with continued investments, growth, and expansions during the 1990s and well into the 2010s (see Figure 4). Future tourism growth is expected to surpass 3 million visitors by 2030 with the expansion of tourism infrastructures and new tourism resorts (Aruba Gateway 2030, 2018).

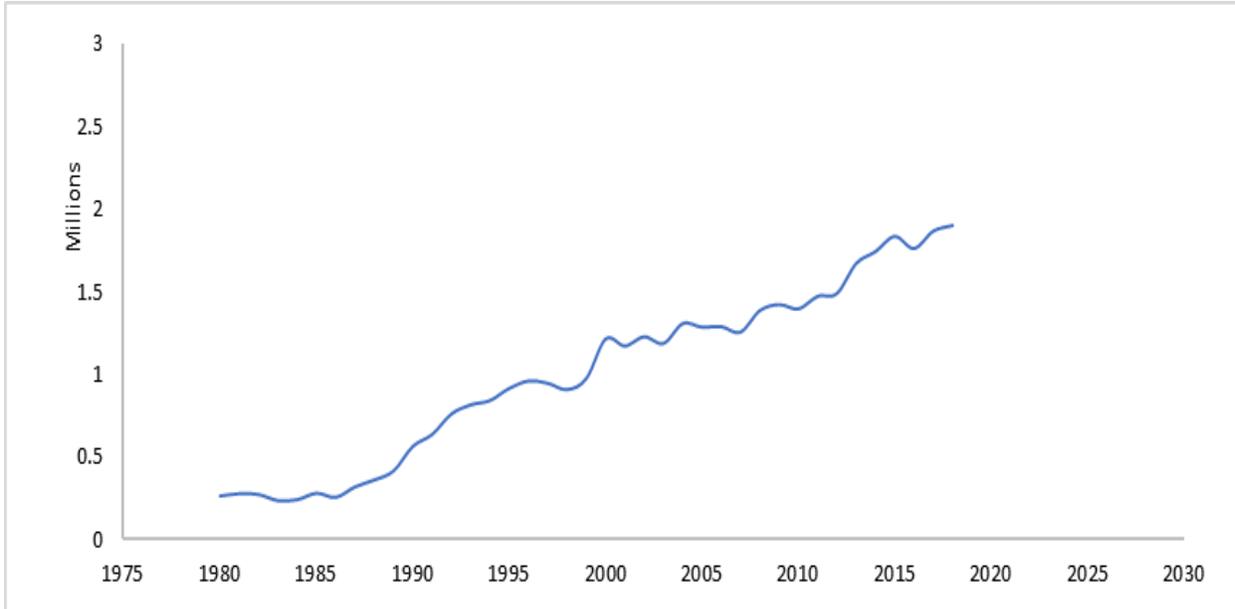


Figure 4. Total visitors to Aruba 1980-2018 (CBS, 2018).

Today, the Aruban economy is almost exclusively dependent on tourism as its main economic activity and income, with more than 80 percent of Gross Domestic Production (GDP) generated directly and indirectly from tourism service exports, which have tripled over the past half-a-century. Annually, the Aruban tourism economy generates an estimated US\$ 2 billion from almost two (2) million stay-over and cruise visitors, with one of the highest tourism intensity and density ratios in the Caribbean<sup>2</sup> (see Figure 5). The tourism industry employs well over one third of the workforce and is a significant source of tax revenues for tourism authorities.

Whereas ‘the one happy island’ brand may conjure up images of socioeconomic well-being, several studies indicate that tourism may have reached or surpassed its optimum growth. Although limited, previous economic studies suggest that Aruba is experiencing a ‘tourism exhaustion’ effect (IMF, 2013; 2019) and may have become ‘tourism saturated’ (Pereira & Croes, 2018), in which tourism growth is no longer

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<sup>2</sup> Initial cross-sectional analysis yielded no significant relationship between tourism dependency and tourism intensity and density, respectively ( $R^2 = 0.17$ ;  $p > 0.10$ ). Although circumstantial and limited, the results corroborate previous studies that the volume of tourism is not unequivocally associated with the contribution of tourism to economic output.

delivering value-added with diminishing economic returns. Previous tourism studies have indeed questioned how far and fast tourism can and should expand (Cole & Razak, 2009; Peterson, 2006).

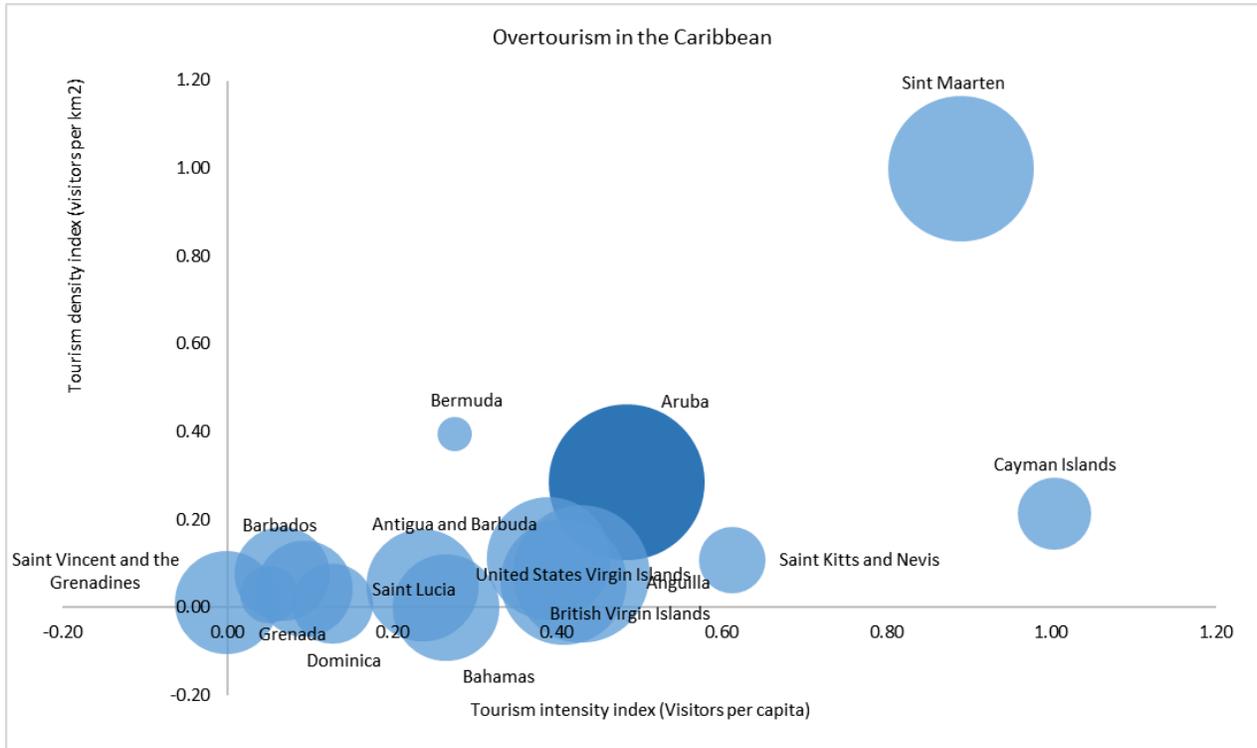


Figure 5. Tourism intensity, density, and dependency in select Caribbean small island tourism economies (Adapted from the WTTC, 2017).

### 3.3. Data Collection and Analysis

Data collection was conducted in a multi-phased approach spanning five years from 2013 to 2018. To explore the direct and indirect channels of overtourism and socioecological changes, a community study was conducted between 2013 and 2015 (phase 1). In total, 2,000 citizens were approached in which 1,255 actively participated by means of personal interviews. In terms of participant demographics, 56 percent were females and 44 were males, which is a representative distribution of the Aruban population (CBS, 2018). The median age was 34 years. In terms of employment, 31 percent of participants were directly employed in the tourism industry. Based on citizens' responses, the data was coded and clustered into

different themes and topics of ideas, concerns, and questions. Cluster- and pattern-matching techniques were organized to identify a hierarchy of themes in the qualitative data (Yin, 2009).

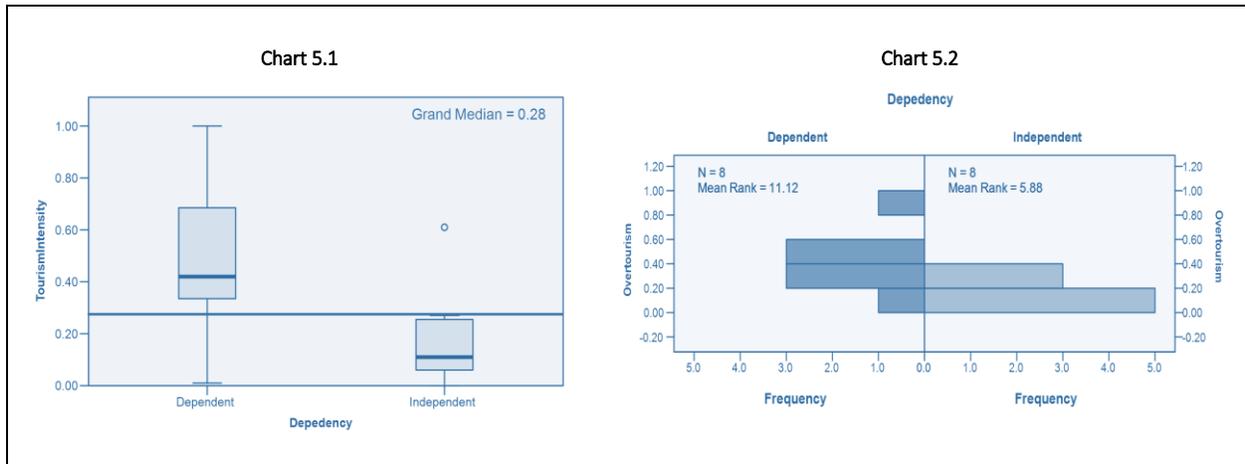
**Following the qualitative study, a quantitative study was conducted between 2016 and 2018.** The objective was to quantify the direct and indirect channels of overtourism. Data was collected by examining available and accessible statistical databases from national tourism and non-tourism authorities. National databases were surveyed to collect data on economic, tourism, labor, social, environmental and other relevant indicators spanning a time period between 1990 and 2018 (see Appendix A for a list of main variables and descriptions).

**Measuring overtourism was conducted in a stepwise fashion.** Following previous calculations (IMF, 2013, 2019) and the dynamic (non-linear) qualities of tourism growth (Butler, 1980; Farrell & Twining-Ward, 2004), quadratic regression analysis with a lag effect was conducted to assess the effect of overtourism on real GDP growth, tourism receipts per visitor, visitor experiences, labor participation, income inequality, resource consumption, and ecological pressures. Factor analysis confirms that overtourism is a multidimensional construct comprising tourism intensity (0.85), tourism density (0.86), and tourism dependency (0.68), with a Cronbach alpha reliability of 0.71. Based on the parameter estimates of the quadratic regression function, the overtourism vertex – threshold or tipping point – was calculated and subsequently compared to the current levels of tourism intensity and tourism density<sup>3</sup>. Further non-parametric test of median differences (Mann Whitney U test) for overtourism indicates (see Table 5) that dependent and independent small island tourism economies are distinct ( $U = 12.000$ ; Fischer Exact  $< 0.05$ ), i.e., dependent small island tourism economies are significantly more at risk of overtourism and the adverse effects thereof ( $p < 0.05$ ).

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<sup>3</sup> The vertex (v) of a quadratic function is the maximum of a parabola (i.e., inverted U shape) and is calculated with a lagged dependent variable by  $\log(y) = ax^2 + ax + bx + c(y_{t-n}) + d$ , with vertex (v) =  $-b/2a$ .

Table 5. Results of MWU test for overtourism in dependent and independent small island tourism economies.



Due to (historical) data limitations – either not available or nonexistent –, the findings are preliminary and indicative. At the outset of this study it should be noted that although Aruba’s tourism dates to the early 1940s, comprehensive data sets are limited, especially in terms of missing data and non-economic tourism data, including labor data, social data, and environmental data. Unlike the existing system of national accounts, Aruba has no system of environmental accounts (CBS, 2014). Due to data limitations and significant data gaps, quantitative analysis was limited to descriptive statistics, and caution is warranted when drawing causal inferences or future projections.



## Chapter 4: Weathering Overtourism and Climate Change

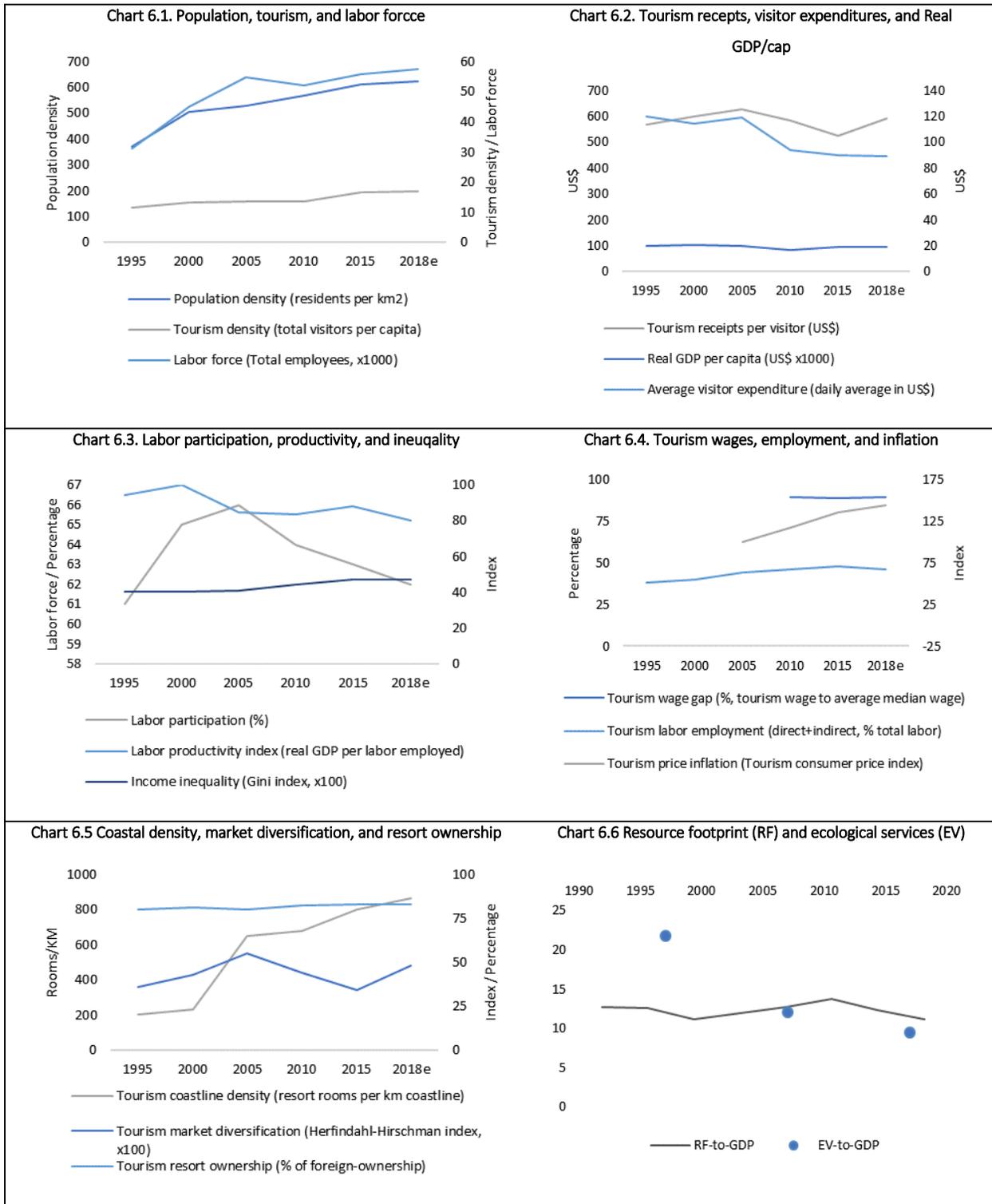
### 4.1. Overtourism in Perspective

Over the past two decades, Aruba's economic growth was mainly driven by tourism and ancillary industries, including restaurant services, real estate, and construction. Tourism dominates both export and import services (+80 percent), and foreign-direct investments are mainly driven by tourism and real-estate investments originating from North America (+65 percent). Tourism arrivals have doubled in less than twenty years, with tourism labor immigration and population density growing significantly by the turn of the century (see Table 6, Chart 6.1). The total amount of visitors per capita is currently estimated at 16.9 (up by 5.5 since 1995) with a tourism density of well over 10,000 visitors per km<sup>2</sup>.

Although tourism exports continue to grow, average visitor expenditures and tourism receipts per visitor growth rates have diminished (see Table 6, Chart 6.2). After experiencing a significant tourism boost during the 1990s, Aruba's economy stagnated with a weakening in real growth (from 6.4 percent to 1.3 percent) over the past decade. The long-run real economic growth is currently projected at 1.1 percent (CBA, 2019), which is below the sustainable development goal of 2 percent (UNSDG, 2018).

Regression analysis indicates that overtourism has a negative impact on real GDP per capita and real tourism receipts per visitor (see Table 7), with a tourism overshoot – beyond the overtourism vertex – of at +3.1 visitors. Analysis of available visitor satisfaction survey data (CBS, 2000-2016) reveals that overtourism is negatively correlated with visitor satisfaction and perceived quality of tourism services. The findings suggest that visitors are increasingly dissatisfied with the destination's cleanliness (-40.8 percent), hospitality and friendliness (-26.5 percent), and local transportation (-12.6 percent), which may be indicative of the negative effects of overtourism in terms of environmental pollution, workforce exhaustion, and traffic congestion.

Table 6. Tourism panel series with select stylized indicators (CBA, 2019; CBS, 2015, 2018).



Since the 1960s, Aruba's population expanded largely due to several industrial waves of labor immigration related to, respectively, the oil refining industry and the tourism industry. It is estimated that at least 45 percent of the population is foreign-born, with tourism immigration remittances close to 3 percent of GDP (CBA, 2018). Over the past five decades, the working age population surged with employment more than doubling and largely concentrated (+70 percent) in five (5) sectors: tourism services, wholesale and retail, real estate and renting, construction, and public services.

**Aruba's labor market remains sluggish; labor productivity and labor participation rates have deteriorated significantly over the past decade** (see Table 6, Chart 6.3). Consistent with the decline in real GDP per capita, labor productivity regressed between 2000 and 2018. It is estimated that at least 30 percent of the workforce is not active in the labor market (CBS, 2018). The accelerated aging of the workforce and the increasing dependency on older generations, particularly in the tourism industry, compound an already diminishing labor market. Regression analysis indicates that overtourism has a negative impact on labor force participation and a tourism overshoot of +2.5 beyond the overtourism vertex (see Table 7).

**Tourism labor wages lag average median wages by at least 10 percent for almost a decade** (see Table 6, Chart 6.4). Income inequality as measured by the Gini coefficient grew from .38 (in 1995) to .46 (in 2018), indicating a relative deterioration of income equality. Moreover, real wages have remained stagnant across income distribution for over a decade. The level of vulnerable employment, measured by the relative poverty threshold of 60 percent of the median income, has deteriorated in recent years, especially in the hotel, restaurant, and construction industries (CBS, 2018). Regression analysis indicates that overtourism has a negative impact on income equality and a tourism overshoot of +3.8 beyond the overtourism vertex (see Table 7).

**Overtourism carries long-term costs for the public sector due to its indirect effect on government expenditures.** Whereas the growth in tourism drives government (tax) revenues in the short-term, in the medium to long-term, rising levels of tourism intensity generate public sector costs in terms of, e.g., social security, health care insurance, and education, and other public sector services and infrastructures. These

costs stem largely from rapid population growth, population aging, and residential urbanization. **Preliminary findings indicate that tourism growth and intensity are positively associated with government expenditures between 1995 and 2018 in Aruba.** The results suggest that over 50 percent of the surge in government expenditures over the past two decades is (indirectly) related to overtourism (Adjusted  $R^2 = 0.56$ ,  $p < 0.05$ ). These cost effects ensue, however, with a time lag of five (5) years. Thus, while the (government revenue) benefits of tourism growth are recorded within fiscal years, the (government expenditures) costs of overtourism emerge over an expanded period of time, oftentimes accumulating over generations and spanning several government cycles. In the case of Aruba, negative fiscal externalities of overtourism emerged after the turn of the century and continue to ‘slow burn’ an already limited fiscal space, thus limiting fiscal buffers against external shocks. Recent studies suggest that overtourism may also have an indirect long-term impact on the cost of doing business and cost of living due to relatively high levels of (employers’) social contribution and inflation (CBA, 2019).

**With reference to Aruba’s tourism infrastructure, the construction of the tourism industry is largely clustered along the northwest coastline, with an estimated 860 resort rooms per km<sup>2</sup>; a fourfold expansion in less than two decades** (see Table 6, Chart 6.5). Although a small island, other geographic districts in Aruba remain relatively void of tourism-related activities and expansive infrastructures. The tourism industry zone was established during the late 1980’s and represents an estimated 16 percent of the island’s total geography. Regression analysis indicates that overtourism is a significant source of ecological pressure, likely due to both high and increasing tourism intensity and density levels in a concentrated coastal zone. Overtourism is associated with significant ecological pressures and a tourism overshoot of +3.6 beyond the overtourism vertex (see Table 7).

**The results suggest that resource consumption and ensuing waste pollution and ecological contamination are affected by overtourism.** Although limited, initial evidence suggests that the overconsumption of tourism is partially responsible for the loss of ecological services, which is currently estimated at 10 percent of GDP (see Table 6, Chart 6.6). Although initial regional zoning and marine conservation plans were adopted in 2019, Aruba’s natural habitats and marine environment have remained unprotected for well over 100 years since the exploitation of the phosphate, gold, and oil refining industry during the 1920’s

(CBS, 2016). Environmental archives indicate that much of Aruba’s endemic flora and fauna, including wildlife, has gone extinct or is in imminent threat of extinction.

*Table 7. Results of regression and vertex analysis.*

| Dependent variables          | Independent variable: Overtourism           |             |                        |                  |                   |
|------------------------------|---|-------------|------------------------|------------------|-------------------|
|                              | Control variables: Population and Inflation |             |                        |                  |                   |
|                              | Adjusted R <sup>2</sup>                     | Coefficient | Overtourism vertex (v) | Significance (p) | Tourism overshoot |
| Real GDP per capita          | 0.37  | -0.59       | 12.3                   | < 0.10           | +4.6              |
| Tourism receipts per visitor | 0.36  | -5.04       | 13.8                   | < 0.10           | +3.1              |
| Visitor satisfaction         | 0.87  | -1.2        | 12.2                   | < 0.05           | +4.7              |
| Labor participation rate     | 0.87  | -.50        | 14.4                   | < 0.05           | +2.5              |
| Income inequality            | 0.81  | 1.31        | 13.1                   | < 0.05           | +3.8              |
| Ecological pressure          | 0.74  | 113.9       | 13.3                   | < 0.05           | +3.6              |
| Resource consumption         | 0.74  | 63.6        | 14.5                   | < 0.05           | +2.4              |

In general, the preliminary results describe a situation in which Aruba’s past and present tourism growth intensity is (a) negatively associated with economic productivity and social inclusivity, and (b) positively related to environmental decay. The initial findings indicate that overtourism thresholds or ‘tipping points’ have been surpassed for the all respective indicators (see Table 7). The uniform overshoot of tourism across economic, social, and environmental dimensions suggests that Aruba has surpassed its ability to absorb the intense and dense volume of tourism and is increasingly experiencing multiple and interdependent negative spillovers.

#### 4.2. Changes in Climate and Ecology

Ecological pressures and the depletion of natural resources are also intertwined with changes in climate and nature. In terms of temperature, available evidence indicates that the sea water temperature – although cyclical – has slowly risen over the past 60 years. It is estimated that sea water temperatures have increased with at least +1.3 Celsius since the 1950’s. Available energy consumption records between 1981 and 2016 (CBS, 2016) indicate that the effect of rising average temperatures is also reflected in the increase of average energy consumption per household (Adjusted R<sup>2</sup> = 0.37; p < 0.10) and the rise in relative household energy consumption expenses from 4.8 percent (in 1981) to 10.8 percent (in 2016). Despite the increasing renewable energy production (+17 percent), household energy consumption has also risen (ELMAR, 2018),

which suggests that persistent household energy consumption behaviors are at play in Aruba. Further analysis found no significant relationship between increasing temperatures and real GDP per capita ( $p > 0.10$ ).

**Available data suggests that the slow burn effect of temperature rising is reflected in increasing incidences of coral bleaching along Aruba's coastal reefs over the past decade.** In combination with the structural deforestation and dredging of marine and coastal ecologies (i.e., coral reefs, mangroves, palm trees, etc.) since the late 1940's, the slow and consistent rise in seawater temperature is likely also responsible for the loss of marine life and marine biodiversity (CBS, 2016). Moreover, although no significant historical data is readily available, the growing stress on the local marine ecosystem is also likely due to the incessant acidification of marine waters – resulting from past oil spills and leakages, polluted water runoff, and the non-treated coastal disposal of waste – as well as the growing population density and surging coastal urbanization (CBS, 2016).

**The emission of carbon dioxide is an additional component in the rise of temperatures, energy consumption, and environmental decay.** Historical archives show that between 1970 and 2012, the carbon intensity rose sharply to well over 2,500 million mT CO<sup>2</sup> in Aruba. This significant level and surge stemmed largely from four factors, i.e., (a) an energy supply based on fossil fuels<sup>4</sup> (HFO: heavy fuel oil), (b) the operation of the oil refinery, (c) the expansion in tourism infrastructures and services (+5000 hotel rooms), and (d) the subsequent growth of the labor force, the population, and the residential urbanization. With the closure of the oil refinery in 2012 and the push for renewable energy adoption, CO<sup>2</sup> emissions dropped significantly (-65 percent) by 2016. Consequently, the growth in HFO CO<sup>2</sup> emissions has tapered off substantially in recent years (see Figure 6).

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<sup>4</sup> Carbon dioxide emissions from liquid fuel consumption refer mainly to emissions from use of petroleum-derived fuels as an energy source (World Bank, 2018).

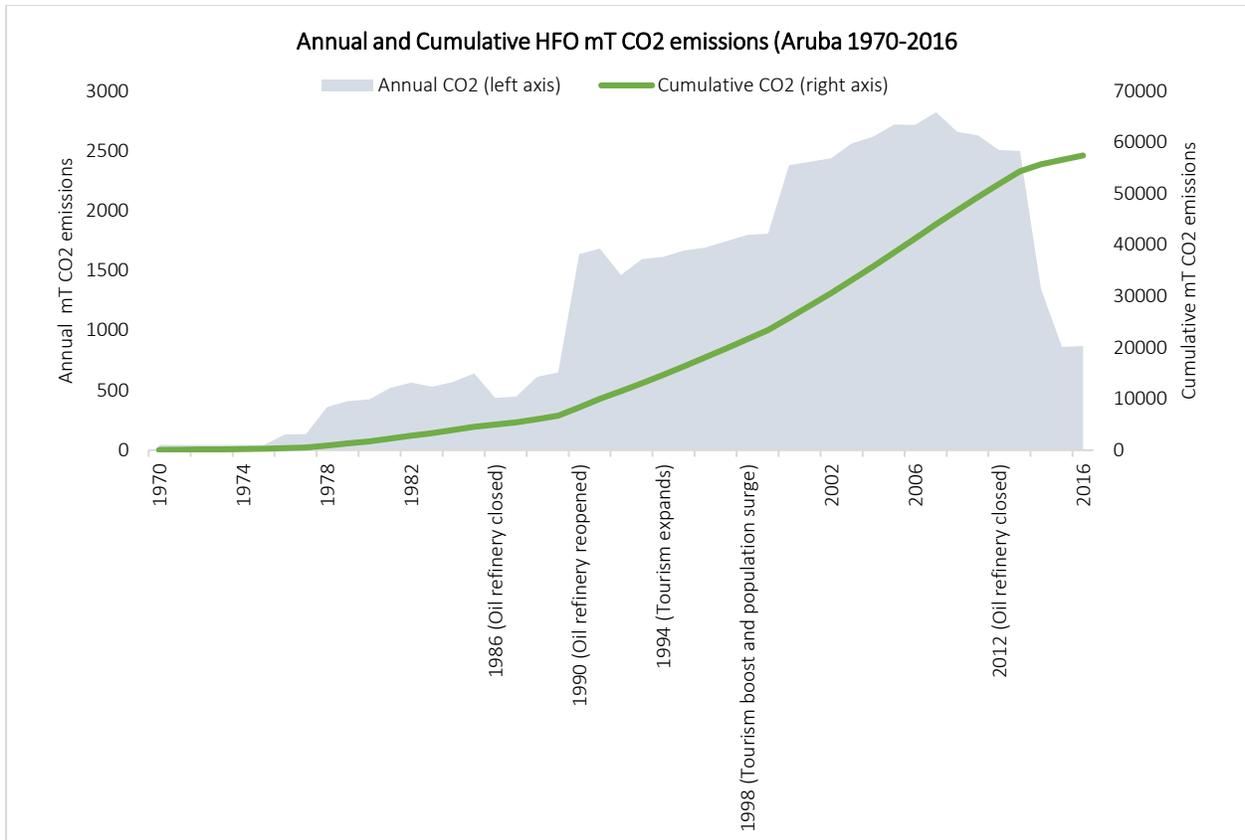


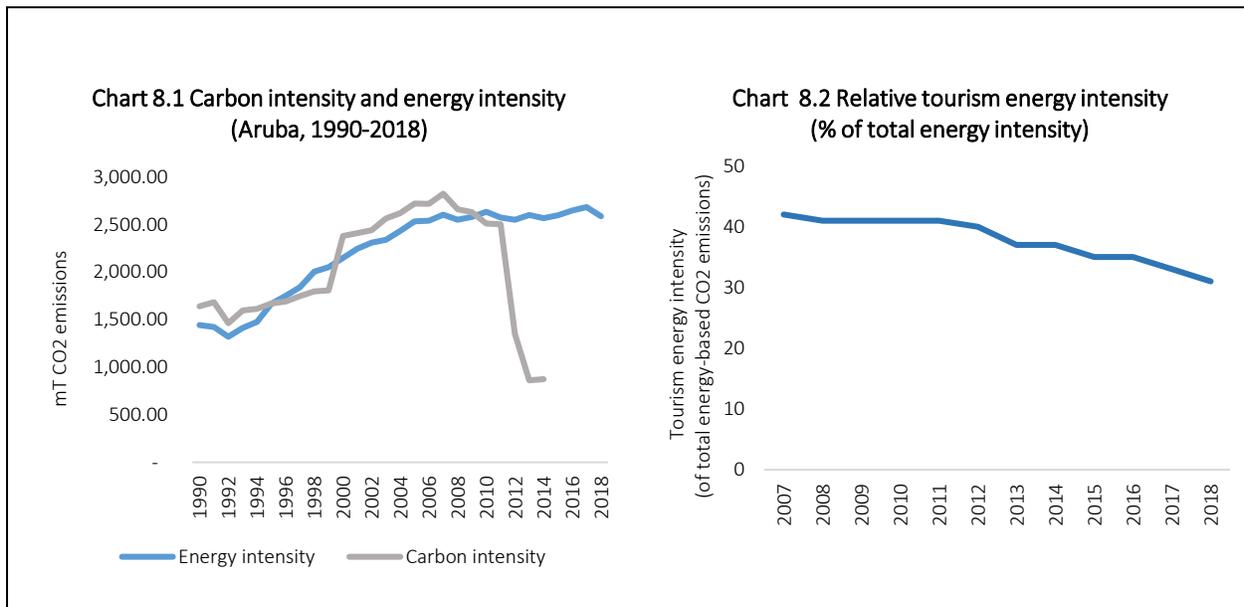
Figure 6. Carbon dioxide emissions from HFO consumption for energy generation (Aruba 1970 – 2014; World Bank, 2018).

In addition to fuel-based CO<sup>2</sup> emissions, energy intensity is also a significant source of CO<sup>2</sup>. Energy intensity emanates largely from private and public service infrastructures, including residential and commercial buildings, and business and civil services. Thus, beyond energy supply, energy demand and consumption behaviors are also integral to CO<sup>2</sup> emissions. Based on an analysis of two proxy indicators for energy-based CO<sup>2</sup> emissions, i.e., real private consumption and energy consumption, the results show that similar to the rise in carbon intensity, the energy intensity has increased significantly in Aruba (see Table 8, Chart 8.1).

The surge in energy consumption stems largely from the growth in tourism during the mid-1990s and the subsequent population and labor market expansions. Several interrelated tourism and socioeconomic developments explain a large extent of the energy consumption growth, including, i.e., the rapid and

continued rise in visitors and visitor nights over the past two decades, the subsequent labor and population growth that followed, and the expansion in residential and tourism infrastructures, which consequently triggered yet another wave of tourism growth. In fact, overtourism explains more than half of the growth in energy intensity and CO<sup>2</sup> related emissions over the past two decades (Adjusted R<sup>2</sup> = 0.71; p < 0.05). However, unlike the reduction in carbon intensity in recent years (2012-2016), energy intensity remained relatively stable (see Table 8, Chart 8.1), despite the decline in relative tourism energy intensity over the past decade (see Table 8, Chart 8.2). This gradual contraction in the energy consumption of the tourism industry is largely attributed to the adoption of renewable energy and the improvement in energy efficiency by several resorts and restaurants.

Table 8. Energy intensity in Aruba and relative energy intensity of the tourism industry (ELMAR, 2018).



With reference to extreme weather events, analysis indicates that prior to the 1950s hurricanes and major tropical storms would graze the island every 75 to 80 years. Over the past five decades, the time interval between extreme weather events has shortened considerably to an estimated 6 to 8 years (see Table 9, Chart 9.2). Extreme weather events over the past 20 years coincide with major hurricanes and tropical

storms in the Caribbean, including e.g., Joan (1988), Bret (1993), Lenny (1999), Ivan (2004), Felix (2007), Omar (2008), and Matthew (2016). Whereas Aruba was not in the direct path of these hurricanes, the subsequent precipitation and storm surges caused significant flooding with average rainfalls of 795 mm (see Illustration 2); twice the annual average of 274 mm in Aruba (see Table 9, Chart 9.3). Conversely, the findings also indicate the occurrence of several periods of drought after the turn of the century. In general, the results suggest an increase in climate volatility with relatively more extreme weather patterns – involving both extreme precipitation and extreme drought – emerging over the past two decades.

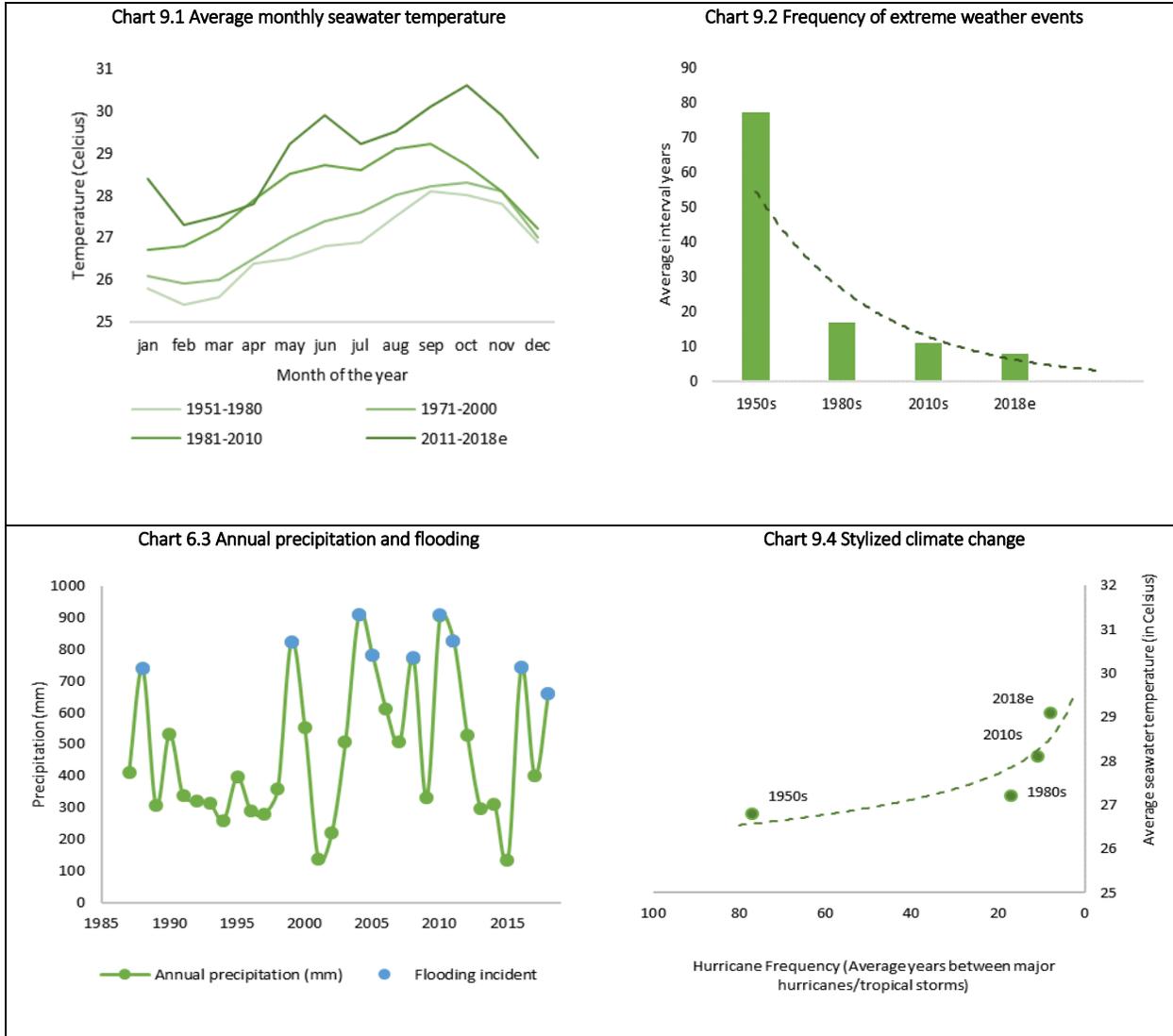


*Illustration 2. Extreme weather events and effects in Aruba (2004 – 2018).*

For the period 1995 to 2018, no significant relationship ( $p > 0.10$ ) was found for extreme weather events and, respectively, real output growth, real private consumption, current account balance, and real tourism exports. Within the limits of available data, preliminary estimates suggest that the economic costs of *past* extreme weather events – particularly hurricanes Ivan, Felix, and Omar – amounted to between 1.5 percent and 2.1 percent of GDP. Critical event analysis indicates that in the respective year and month of the

hurricane graze and associated flooding, and for at least four months thereafter, the net foreign assets (NFA) contracted between 7 and 10 percent. Despite the lack of (recorded) significant macroeconomic impacts, historical analysis of environmental shocks and slow burn do show an initial trend of accelerating climate changes between 1951 and 2018 (see Table 9, Chart 6.4).

Table 9. Stylized environmental and climate indicators (Aruba, 1951-2018; CBS, 2015, 2016; DNM, 2018).



National census records (CBS, 2016) indicate that over the past two decades, incidents of residential and commercial flooding have increased substantially (+82 percent). Findings from spatial data analysis show that an estimated 46 percent of all households are located in coastal residential areas with density levels well over 1,000 residents per km<sup>2</sup> as well as at least 10,000 tourists per km<sup>2</sup>. Moreover, these urbanized coastal zones are prone to storm surges and floods (see Figure 7: marked in dark and light blue square pixels).

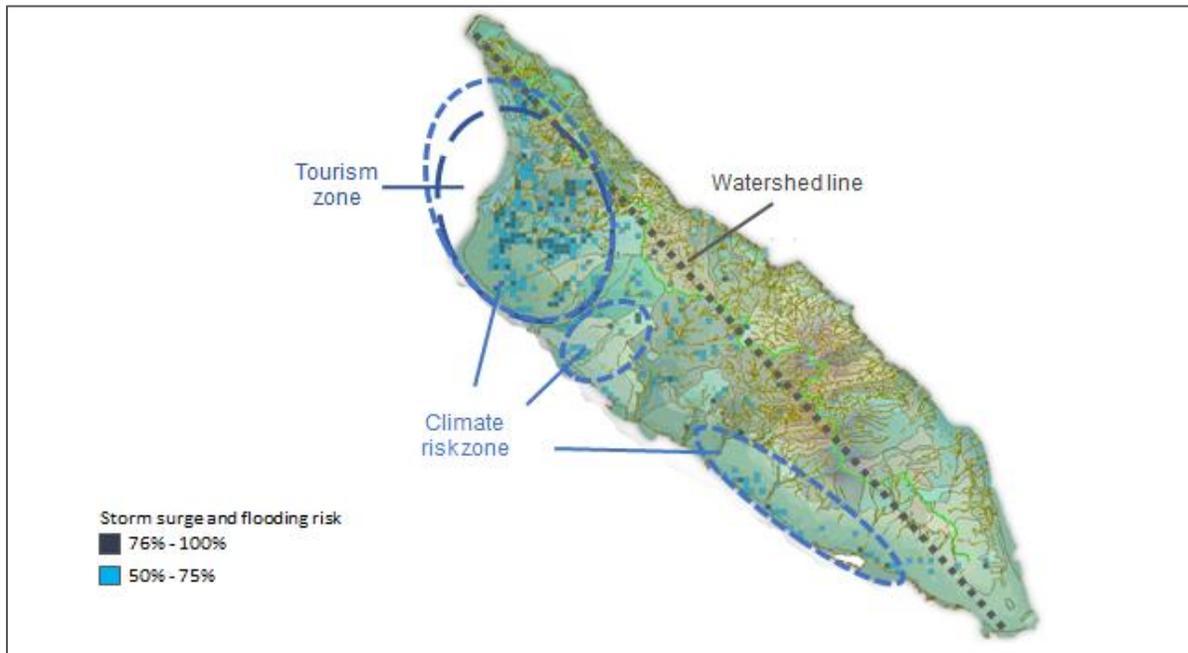


Figure 7. Climate risk zones and tourism zone (Adapted from CBS, 2016).

**Both environmental shocks as well as slow burn effects are at play in Aruba.** Analysis indicates that there are at least two significant climate risk zones in Aruba – the northwest region and the southwest region – that are susceptible (50 percent to 75 percent chance) to storm surges, flooding, and potential sea level elevation. These coastal areas are also prone to beach erosion due to their predominantly low elevation (< 5 meters) and limestone geological configuration, which is susceptible to ocean acidification and carbon emissions (see Figure 8).

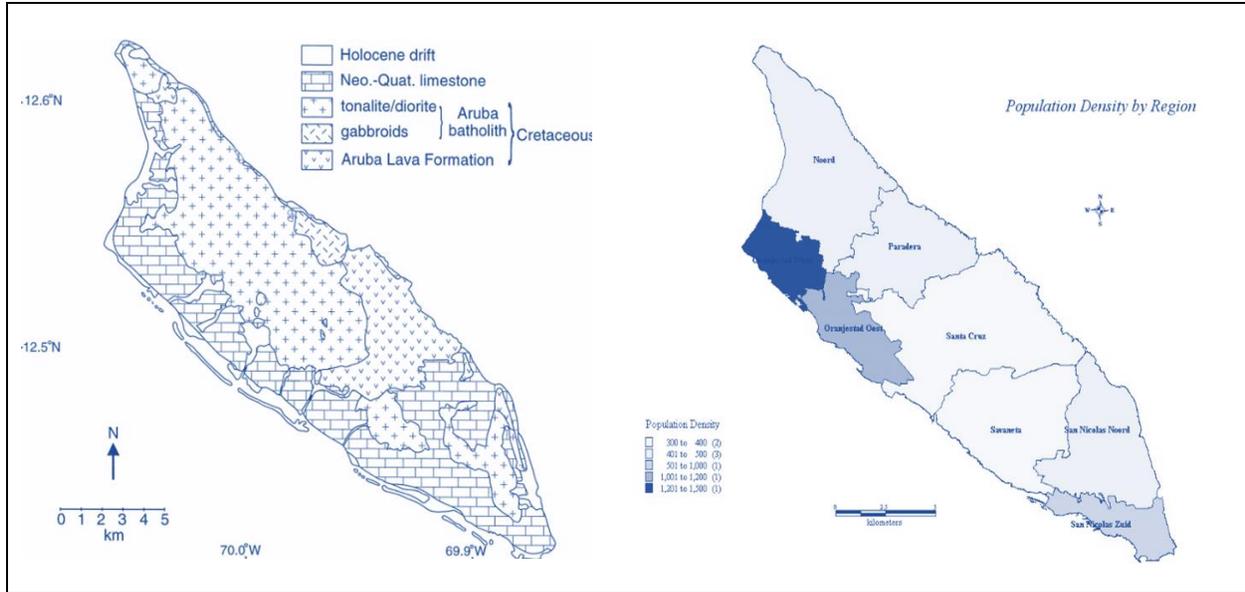


Figure 8. Geological foundation and population density zones in Aruba (CBS, 2016).

The construction and expansion of port and residential infrastructures have also left their mark on the Aruban marine environment. The dredging of several coastal zones for the construction of harbors and seaports since the late 1960's, in tandem with the deforestation of marine areas (e.g., coral reefs, mangroves, cays), have increased the risk of sea level rise and storm surges. Dredging and deforestation have also hindered the natural sedimentation and nourishment of coral reefs and beaches, consequently thrusting the erosion and loss of beaches since the late 1960's and 1970's when the first large scale beach resorts were built (Kohsiek et al., 1997).

Aruba's coastal zones have faced structural beach erosion over the past century. Available historical data records indicate that whereas coastal beach zones expanded with an average annual rate of 0.2-0.3 meters until the late 1950's, soon thereafter a reverse decreasing trend is observed with an average annual contraction rate of 0.5-0.7 meters. While the effect of sea level rise cannot be excluded<sup>5</sup>, previous studies suggest the compounding impact of coastal erosion and sea level rise (ECLAC, 2011; UNDP, 2010).

<sup>5</sup> At the time of this investigation, no data was publicly available on sea levels in Aruba.



*Illustration 3. Beach erosion over time (Aruba 2008 – 2018).*

**The converging and accelerating risks of overtourism and climate change pose a rising threat to the future of Aruban livelihoods.** The tourism zone is located in the northwest climate risk zone (see Figure 7). Considering the high and rising levels of tourism density and residential (spatial) concentration within the tourism-climate risk zone (i.e., risk impact), in addition to the increasing frequency and exposure to extreme weather events (i.e., risk likelihood), both tourism and residential infrastructures face significant and mounting hazards (in the short to medium run), which could have severe economic, monetary, and financial implications (in the medium to long run). More vitally, the community and social wellbeing would be at stake.

### 4.3. Community Perceptions

The community study uncovered a wide range of citizen perspectives regarding contemporary tourism and tourism's growth. The interviews provided an eclectic picture of community perceptions and their experiences with tourism. Based on the qualitative cluster analysis, eight different categories of items were identified (see Table 10). These eight categories are: (1) economic and financial; (2) social and community; (3) culture and heritage; (4) environment and nature; (5) labor, jobs and education; (6) infrastructure and architecture; (7) transportation; and (8) business and product-market development. The community findings reveal several themes related to overtourism, which underline the perceptions and perspectives of the community.

In terms of *environmental concerns*, the following items were identified: **quality of environment, beautification and zoning, architectural restoration, ecological preservation, infrastructure renovation, resource management, and energy efficiency**. These aspects capture a wide variety of environmental and ecological aspects and elements, which describe not only conservation of environmental resources, but also managing higher standards of product and service quality. They underscore the perceived extractive nature of tourism in Aruba. Most citizens were extremely concerned about the buildup of waste and trash, and the subsequent degradation of land- and marine-based ecosystems. Climate change and the adverse effects thereof – e.g., heatwaves, flooding, drought, storm surges, beach erosion, or sea level rising – were, however, not mentioned as alarming. While several citizens pointed out that there was less rainfall in Aruba, a minority complained that too many new residential areas were built in riverbeds (“rooi”) and were integral to solving the flooding problem.

Regarding *social aspects*, the following topics emerged from conversations: **quality of life, standard of living, security and safety, employment and education, identity and authenticity, culture and communication, equality and equity, values and respect, and regulation and governance**. The need for putting a halt to further hotel constructions, i.e., moratorium on new hotel constructions, was a strong and shared sentiment amongst the majority of citizens. Likewise, many residents felt that there was a need for stricter regulation and consideration of Aruba's cultural heritage due to the loss of Aruban authenticity. Residents also indicated that the tourism industry was no longer seen as an attractive career due to the irregular working

hours and the lower wages, arguing that the tourism industry would rather recruit cheap foreign labor rather than locals. Similar to the environmental aspects, the social aspects of tourism capture a relatively shared perception of exclusion and non-inclusiveness. Concerns about degradation, loss of quality, crowding, and too much construction suggest an increasing apprehension and a growing apathy towards further tourism growth. Anecdotal evidence suggests that anti-tourism posts on social media have increased significantly in recent years, whereas several public protests and have been organized against more tourism.

**While social and environmental aspects dominated the community sentiments, *economic concerns* were also mentioned.** Almost one-third of all items referred to the need for business development and tourism diversification. In terms of accommodations, there was a preference for small boutique hotels rather than large all-inclusive and condominium development. Furthermore, the need to diversify markets and rebrand Aruba as a quality destination – rather than a mass or adventure destination – was likewise prominent issue shared by the community. Some citizens raised concerns over the deterioration of service quality and genuine hospitality over the past decade, indicating that service quality was better during the early days of tourism (referring to the 1990s). In addition, most residents indicated a preoccupation with the rising costs of living, inflationary trends, and the overpricing of tourism products and services.

Table 10. Community dimensions, categories, and themes.

| Dimensions    | Categories   | Themes  | Participant quote   |
|---------------|--|---|---|
| Environmental | Environment and nature<br>Infrastructure and architecture            | Quality of environment  | “Tourism has destroyed most of our natural environment. We have already lost endemic species. So how much longer will this madness continue?” (Environmentalist, male, 63 years). |
|               |  | Beautification and zoning<br>Architectural restoration<br>Ecological preservation<br>Infrastructure renovation<br>Resource management<br>Energy efficiency<br>Health and hygiene    |   |
| Social        | Society and community<br>Labor and education<br>Culture and heritage | Quality of life   | “Do you think it’s normal that tourists have to wake up at 6am to assure a spot on the beach?” (Hospitality employee, female, 33 years).  |
|               |  | Security and safety<br>Employment and education<br>Identity and authenticity<br>Culture and communication<br>Equality and equity<br>Values and respect<br>Governance and regulation |   |
| Economic      | Economics and finance<br>Business development<br>Transportation      | Quality of service  | “Our service quality is no longer what it used to be” (Business owner, male, 57 years).   |
|               |  | Cost of business<br>Price competitiveness<br>Productivity<br>Innovation and diversification   |   |
|               |  |   | “We have more waste than white beaches in Aruba (Government employee, female, 41 years).  |
|               |  |   | “The only people that get a job in hotels are foreigners. There are no opportunities for Arubans” (Retail employee, female, 41 years)   |
|               |  |   | “Tourism was always by the people for the people. Today that’s changed to by the foreigner for the politician” (Business owner, male, 49 years)                                   |
|               |  |   | “We cater so much to the American tourists that we have forgotten who we are, our cultural identity as Aruba” (School teacher, female, 53 years).                                 |
|               |  |   | “We are playing Russian roulette with Aruba’s tourism, and if we are not careful, we will kill the goose that laid the golden egg” (Restaurant manager, female, 67 years).        |
|               |  |   | “We need to diversify into niche markets for health tourism or eco-tourism. Aruba is too small for mass tourism” (School teacher, female, 32 years).                              |

### 4.3. Discussion

The general results of this exploratory study indicate that Aruba is experiencing the negative and undesired effects of a mature and specialized tourism economy. The steadfast and intense growth of visitors and tourism infrastructures for more than 50 years has encroached on the economic, social, and environmental spaces, thereby producing a complex of negative spillovers. These adverse effects are combination of diminishing economic contribution, declining productivity levels, persistent income inequalities, and rising environmental pollution, and decaying (marine) ecologies and coastal zones (see Table 11).

The social costs of overtourism are also experienced by the community. The general perception of the community towards tourism and tourism growth is characterized by substantial concerns and complaints about the overconstruction of tourism infrastructures, the congestion and crowding (out) of beaches and public areas, the rising costs of living, and the loss of cultural authenticity, natural habitats, and ecological biodiversity. These findings, albeit qualitative, corroborate the results of the macroeconomic investigation. The perception of diminishing benefits of tourism in tandem with the escalation of socioecological costs are a clear and present sign that – the social experience of – overtourism can lead to antagonistic community sentiments towards visitors and the tourism industry in general (Doxey, 1975). Likewise, the findings suggest that visitors have experienced declining tourism service experiences. Thus, beyond the economic scales, physical boundaries, and ecological ceilings of small island tourism economies, these unravelling community realities underscore the relevance and role of social and psychological thresholds of both residents and visitors.

**Is too much tourism too much of a good thing?** The findings of this study suggest that while tourism provided significant economic benefits in the short term, the socioecological costs of overtourism generated considerable losses and increasing risks over the medium to long term (see Table 8). Preliminary estimates suggest that the indirect (long term) social costs of overtourism<sup>6</sup> likely outweigh the direct (short term) economic benefits; respectively, 25 percent versus 23 percent of GDP. This raises serious concerns about

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<sup>6</sup> Conservatively estimated by the cumulative losses and costs of productivity decline, economic leakage, and government expenditures over the past 20 years. Not included are the economic costs incurred due to the loss of ecological services.

the current state and sustainability of the Aruban tourism economy, especially when considering future projections of and plans for further tourism expansion and growth<sup>7</sup>.

Table 11. Framing overtourism and climate change in Aruba.

|   |   |  |
|---|---|--|
| Overtourism   | Direct channels (short to medium term)  | <i>Economic contribution</i>   |
|   |   | (+) Significant economic contribution and main economic pillar                 |
|   |   | (+) Main contributor to foreign exchange earnings                              |
|   |   | (-) Diminishing growth of average tourism income (tourism credits per visitor) |
|   |   | <i>Labor markets and productivity</i>  |
|   |   | (+) Main contributor to direct and indirect employment                         |
|   | (-) Increasing youth unemployment and aging tourism employment                              |  |
|   | (-) Declining labor productivity and persistent tourism income gap (median wage difference) |  |
|   | <i>Trade dependency and leakage</i>   |  |
|   | (+) Significant driver of goods import and service export growth (trade openness)           |  |
|   | (-) Limited local tourism ownership and local industry linkages (import leakages)           |  |
|   | (-) Weak supply and market demand diversification   |  |
| Indirect channels (medium to long term)   | <i>Income inequality</i>  |  |
|   | (-) Rising income inequality and vulnerable employment                                      |  |
|   | (-) Increasing social exclusion and loss of sociocultural identity                          |  |
|   | (-) Growing apprehension and antagonistic community sentiments towards tourism growth       |  |
|   | <i>Fiscal space</i>   |  |
|   | (-) Surging government expenditures and structural fiscal deficits                          |  |
| (-) Increasing costs of public sector services and infrastructure   |   |  |
| (-) Rising costs of doing business and cost of living   |   |  |
| <i>Environmental impacts</i>  |   |  |
| (-) Increasing energy consumption, CO2 emissions, environmental pollution, and beach erosion                        |   |  |
| (-) Escalating loss of natural habitats and coastal zone destruction  |   |  |
| (-) Growing loss of biodiversity, marine ecosystems, and ecological services  |   |  |
| <i>Climate change risks</i>   |   |  |
| (-) Increasing spatial concentration of tourism services and infrastructure (high density and concentration levels) |   |  |
| (-) Continuing decay of coastal areas due to waste landfills, ocean acidification, and beach erosion                |   |  |
| (-) Growing risks of storm surges and flooding in tourism zones and residential areas                               |   |  |

<sup>7</sup> Based on tourism growth targets of 3 million visitors by 2030, tourism density levels would rise to 16,500 visitors per km<sup>2</sup>; tourism intensity could surge to at least 21 visitors per capita.

More critically, the results indicate that climate change risks, although still limited, are increasing in Aruba due to both natural and anthropogenic factors. The increase in frequency of extreme weather events and incidents of flooding, in combination with rising temperatures and continued erosion of beaches and densely populated coastal areas, expose the island to significant and mounting climate hazards and ecological shocks. The further deterioration of (marine) ecologies and fragile environmental habitats, in addition to relatively high levels of energy consumption and associated CO2 emissions, are further compounding factors.

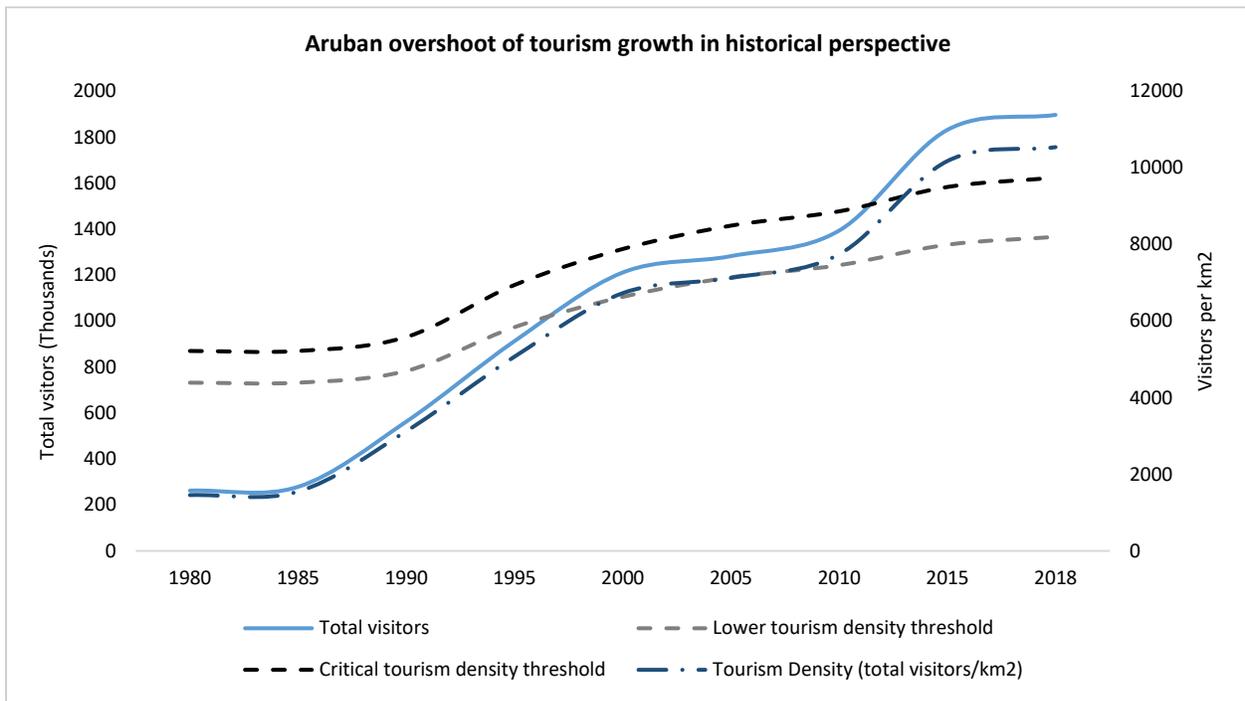


Figure 9. Overshooting tourism in Aruba.

Based on the minimum and maximum overtourism vertex estimates, lower and critical thresholds are calculated using population growth and density numbers, thus providing a historical overtourism bandwidth (see Figure 9). The findings indicate that the lower threshold was surpassed between 1995 and 2000, whereas the critical threshold was exceeded after 2010. The results corroborate earlier studies on Aruba’s tourism growth between 1990 and 2000 (Cole & Razak, 2009), and the subsequent re-emergence of comparable policy discussions after 2010 (ATA, 2018; Wolfs, 2018). In retrospect, it is noteworthy that

national tourism conferences and policies were organized and developed during the early 2000's and a decade later during the 2010's, which largely correspond with the initial and subsequent overshoot of tourism in Aruba.

In comparison to other small island tourism economies in the Caribbean, the findings illustrate that Aruba faces considerable risks from overtourism and relatively less risks from extreme weather events. Other small island tourism economies confront significantly higher risks from both climate change and overtourism, with St. Maarten, Cayman Islands, and St. Kitts and Nevis being exceedingly vulnerable (see Figure 10). Whereas Barbados, Bermuda, and the Bahamas seem relatively less exposed to extreme weather events and ecological shocks, the devastating effects of hurricanes between 2017 and 2019 are a clear and present reminder that small island tourism economies are not immune to climate change, regardless of their geological position and history with climate change. Environmental shocks and slow burn effects certainly do not discriminate.

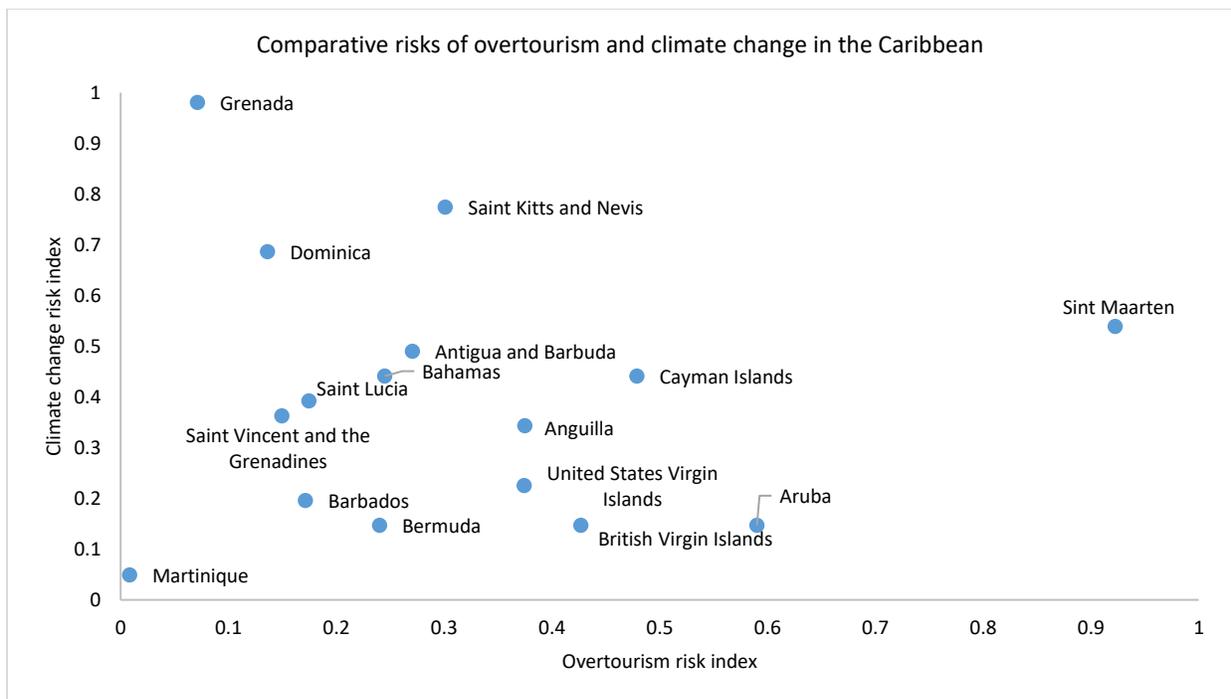


Figure 10. Benchmarking Aruba's overtourism and climate change risks (Adapted from UNDP, 2010; WTTC, 2017).

## Chapter 5: Conclusion

*“With so much evidence of depleting natural resources, toxic waste, climate change, irreparable harm to our food chain and rapidly increasing instances of natural disasters, why do we keep perpetuating the problem? Why do we continue marching at the same alarming beat?”*

Yehuda Berg

### 5.1. Introduction

The purpose of the study was to explore the development and impact of overtourism and climate change in a small mature island tourism economy of the Caribbean. The case of Aruba analyzes the evolution of direct and indirect channels of overtourism and sheds light on the socioecology of overtourism within the context of a small mature island tourism economy. From a theoretical perspective, the findings of this study support and extend previous conceptualizations of sustainable and inclusive tourism. The investigation provides an enriched framing of the symbiotic relationship between overtourism and climate change. In addition to corroborating previous studies on likely ‘tourism exhaustion’ and ‘tourism saturation’ effects, the case study of Aruba yields keen insights into the complexity and dynamics of different direct and indirect transmission channels of overtourism in a small mature island tourism economy facing increasing climate change risks.

In the case of Aruba, the relentless growth of tourism for over half a century, generated several exclusive, exploitive, and extractive developments. The pace and pattern of past and

*The pace and pattern of past and present tourism growth trajectories and policies have produced substantial negative spillovers...*

present tourism growth trajectories and policies have produced substantial negative spillovers for the economy, the community, and the ecology, which arise a decade after initial tourism booms. This ‘spillover delay’ effect is endemic to mitigating and managing the slow burn process of overtourism. The results confirm previous studies on the adverse externalities of uncontrolled tourism growth (Daye et al., 2008; Duval, 2004; Gossling, 2002; Hall & Williams, 2008; McElroy, 2003; Peterson, 2009; Wilkinson, 1989). When

small mature tourism island tourism economies fall victim to ‘tourism myopia’, it triggers the tipping over of delicate socioecological thresholds with significant costs in the medium to long-term (Marsiglio, 2017; Raworth, 2017, Ewing-Chow, 2019). Too often, as witnessed in the case of Aruba, tourism outgrows its socioecological boundaries, which eventually spills over into the economy. Beyond economic costs, the risks are existential.

**In contrast to classical maxims of economic and tourism growth, this study finds no evidence that economic growth is – automatically – good for social equality and environmental quality nor that tourism is intrinsically beneficial to sustainable development.** Whereas tourism has been and remains the main economic driver of growth and employment in Aruba, the impact in terms of socioeconomic and socioecological costs is substantial. This raises significant policy questions and development concerns about the future, especially when considering current activities to further grow tourism and expand tourism infrastructures in addition to climate change and environmental hazards. The current state and impact of overtourism in Aruba are tilted towards the downside with significant risks for the sustainable development of Aruba, which is threatened by increasing environmental shocks and slow burn.

## 5.2. Future Research

**Although restricted to a single case study with data limitations, the results provide an initial enriched historical description of the reciprocity between overtourism and climate change, which, subsequently, opens avenues for future research.** Research on multiple case studies across the Caribbean would add significant understanding to the complexity and dynamics of overtourism. Moreover, contingent upon sufficient data, the application of econometric analysis would provide empirical validation of the initial relationships uncovered in this study. A comparative case study would also offer a more rigorous explanation on the interdependency of overtourism vis-à-vis climate change in the Caribbean.

**Furthermore, building forth on the initial findings of this study, future research should consider and include microeconomic data from households and businesses, including commercial banks and insurance companies, in order to ascertain the microeconomic and macroprudential impacts of overtourism and climate change.** The implications of overtourism and climate change for monetary policy and financial stability in small

island tourism economies should also be included in future studies. Likewise, subject to data availability and sufficiency, ecological indicators and environmental data should be explicitly incorporated in future research. More importantly, further research is required to assess and quantify the total costs of overtourism and climate change in small island tourism economies, especially from a future oriented perspective. Simulation and scenario studies are, thus, highly recommended to build robust and future-proof evidence-based policies for mitigating and adapting to the risks of overtourism and climate change.

### 5.3. Policy Recommendations

**Acknowledging the delimitations of this study, the findings hold several policy implications for strengthening the resilience of small island tourism economies in the wake of overtourism and climate change.** First and foremost, the findings testify to the contextual and dynamic nature of overtourism, and more importantly, to the need to address social and ecological developments explicitly and extensively in tourism policies and institutional arrangements. One of the biggest risks to small island tourism economies is underestimating the adverse effects of overtourism and downplaying the risks of climate change, i.e., a ‘tourism myopia’ effected exacerbated with a syndrome of ‘not invented here’.

*One of the biggest risks to small island tourism economies is underestimating the adverse effects of overtourism and downplaying the risks of climate change...*

**Sustaining tourism in dynamic environments calls for a paradigmatic shift in values and governance.** Whereas institutional regimes and tourism policies may have been successful in the past, they are likely to induce similar policy responses to contemporary challenges, thus generating a negative spiraling effect. Thus, fostering small island tourism resilience requires structural reforms and systemic transformation encompassing a mix of policy considerations and measures across public, private, and civic constituencies (see Figure 11).

**The findings of this study underscore the critical importance of enhancing, aligning, and integrating national policies and development programs.** These include, but not limited to, disaster resilience strategies, for, e.g., fiscal, monetary, tourism, trade, labor, (marine) ecology, infrastructure, and climate change in a coordinated and inclusive fashion. More critical, social and environmental policies need to be set at the fore of future economic development, including both macroeconomic and climate change developments. To mitigate the risks and costs of overtourism and foster a more inclusive – less intrusive – model of tourism development, it is vital that labor market participation and income equality as well as environmental health and ecological biodiversity are restored.

**From a macroeconomic perspective, fiscal and monetary policies need to be strengthened by considering and incorporating the economic costs and risks of overtourism and climate change.** Creating fiscal buffers, limiting fiscal burdens, and safeguarding reserve adequacy are essential. Fiscal rules should encompass the increasing costs and risks of climate change. From a monetary policy perspective, consideration should be given to contingent budgets and lines of credit, disaster risk insurance, prudential liquidity, and reserve requirements. Likewise, economic diversification and the strengthening of the external sector through alternative sources of foreign exchange earnings as well as the adoption of renewable energy are highly recommended. Hereto, both energy supply and energy demand need to be considered explicitly and comprehensively. On the social front, labor market reforms are required to curb decreasing labor participation rates and increasing inequality trends, thereby fostering inclusion and inclusiveness, especially of vulnerable groups. The stringent enforcement of labor regulations should be improved to mitigate the risks of unequal wages and informal work.

*From a macroeconomic perspective, fiscal and monetary policies need to be strengthened by considering and incorporating the economic costs and risks of overtourism and climate change.*

**From a climate change perspective, consideration should be given to a series of policy reforms and (urgent) actions for strengthening the resilience and adaptive capacity to climate change.** This includes integrating climate risks and action measures into, e.g., fiscal, monetary, tourism, energy, infrastructural, and environmental policies. Whereas nature conservation and preservation, and the recent establishment of several nature reserves – both marine and land based – are necessary, they are insufficient for bolstering

climate change readiness. Hereto, concerted efforts are required to regenerate and reforest decaying marine and coastal zones, including coral reefs, and mangrove systems.

**The improvement and expansion of environmental monitoring are called for.**

Existing ecological data measurements and monitoring systems are limited, especially for marine habitats. Biodiversity and early warning are, thus, warranted. Similarly, the pursuit of a

*Whereas nature conservation and preservation, and the recent establishment of several nature reserves – both marine and land based – are necessary, they are insufficient for bolstering climate change*

carbon neutral economy should be fostered by promoting the adoption of renewable energy and enabling the improvement of energy efficiency for both (renewable) energy generation and energy consumption.

**Revisiting and redesigning existing building and transportation codes with explicit consideration of climate risks would also provide added value to climate change readiness.**

Application of circular design principles and best practices – from reducing and redesigning to retrofitting and recycling – should be explored by tourism resorts and business, as well as existing and new residential homes and rentals; especially in climate risk zones. Integral to circular tourism is the improved flow of visitors, especially in congested and crowded areas. The strict enforcement of land use and zoning rules, as well as the retrofitting of buildings and infrastructures should be pursued. Building codes and environmental zoning rules should be adapted with explicit consideration of overtourism and climate change risks. Hereto, the construction of (new) large-scale tourism and residential infrastructures in climate risk zones and fragile coastal ecosystems should be averted. Furthermore, a comprehensive Climate Change Policy Assessment (CCPA) should be conducted (in collaboration with the World Bank and the International

Monetary Fund) in order to develop a disaster resilience strategy, which is based on a systemic forward-looking evaluation of vulnerabilities stemming from climate change risks, and the adequacy of current capacities.

*a comprehensive Climate Change Policy Assessment (CCPA) should be conducted in order to develop a disaster resilience strategy...*

**Leveraging the United Nations Sustainable Development Goals (UNSDG) framework, sound and sustainable policies should be developed and implemented in collaboration with civic society and the private sector.** Several of the SDGs provide indicators and targets for measuring, monitoring, and managing multiple key performance indicators (KPI's), which are directly relevant to overtourism and climate change. These SDG KPI's could provide an initial policy framework for mitigating and adapting to the risks of climate change and overtourism. Additionally, they would ground the policy roadmap towards 2030.

**Participatory governance and institutional capabilities are pivotal to mitigating and adapting to the risks of overtourism and climate change.** Beyond sustaining the status quo, institutional agencies and actors should focus their concerted efforts on regenerating the rich social and ecological context that once characterized the one happy island. Rather than continue along the path of past policies, strengthening the resilience of small island tourism economies will require a strong predisposition towards leading from an emerging future, collaboratively and courageously.

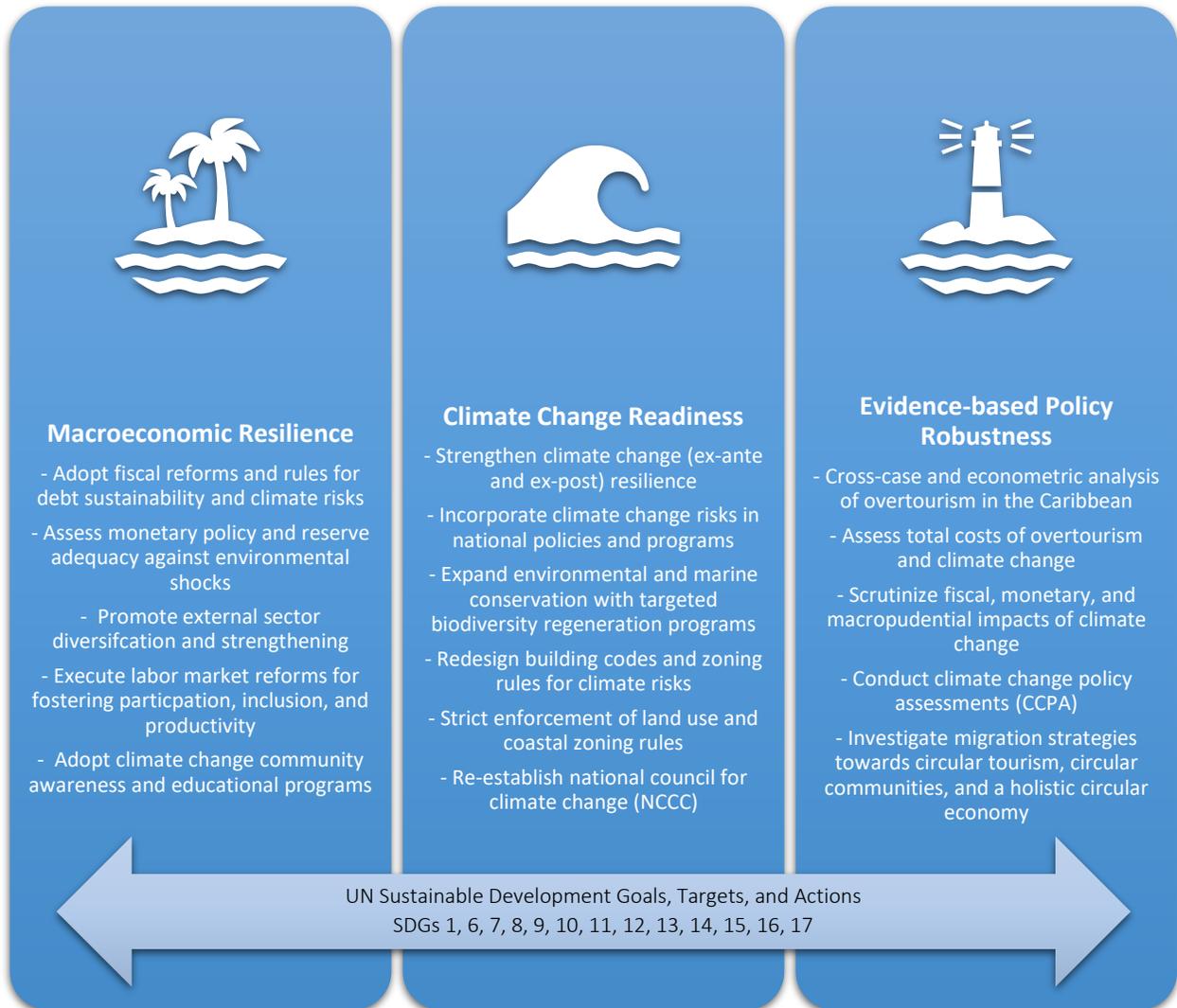


Figure 11. Policy recommendations and future research.



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