

An aerial photograph showing the massive flow of water over the crest of Niagara Falls on the left. To the right, a wide, paved pedestrian walkway runs along the edge of the falls, crowded with many people. In the foreground, there is a green lawn area with several black lampposts and two Canadian flags on tall poles. The background shows the turbulent water of the Niagara River.

Tourism in the Niagara Region: Environmental Impacts and Planning for Sustainable Tourism

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August 8/2023

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Acknowledgments

My deepest appreciation to Professor Les Lavkulich, my project supervisor, for his ongoing support and mentorship. It is clear how deeply Les cares for his students, and I am beyond grateful for his dedication. A special thank you to my program coordinator, Julie Wilson, and to the rest of the MLWS team. I also wish to thank my classmates for their motivation and friendship, I am very thankful to have met all of you.

I would also like to thank my friends and family for their patience and encouragement throughout the academic year. And a heartfelt thank you to my Mum for her unconditional selflessness that opened every door in my education.

Executive Summary

As one of the largest industries worldwide, tourism yields many economic benefits for host destinations by generating revenue, providing jobs, and stimulating economic growth. In addition to these advantages, several disadvantages arise when the amount of tourists becomes more than the destination can handle, including environmental damage, overcrowding, and cultural disruptions. The negative effects resulting from tourists exceeding the carrying capacity of the destination is known as overtourism.

The Niagara Region in Ontario, Canada is world famous tourist destination for its breathtaking views of Niagara Falls. With millions of visitors annually, Niagara Falls and Niagara-on-the-Lake (NOTL) are highly susceptible to environmental overtourism. These two Municipalities experience all four types of tourism stressors on the environment: permanent environmental restructuring (urbanization, habitat loss), waste generation (emissions, solid waste, wastewater), tourist activities (outdoor recreational activities), and effect on population dynamics (seasonality influencing natural resource demand). These four stressors cause declining ecosystem health and negatively influence the plants, animals, and ecosystem services.

Given the economic importance of tourism and the simultaneous critical need for ecosystem protection, it is recommended that Niagara Falls and NOTL create a municipal plan for sustainable tourism. The sustainable tourism plan will address future tourism development, existing municipal infrastructure, and green tourism practices.

To plan for future tourism development, it is recommended that the Environmentally Based Tourism (EBT) Planning Framework is used to create a land use zoning map. This includes critical ecological zones and economically essential tourism zones for coexistence in the region. Then, to adapt existing unsustainable infrastructure and prepare for climate change and overtourism, the enhanced Regional Tourism Sustainable Adaption Framework (RTSAF) is recommended. The RTSAF provides a plan for climate-resilient infrastructure upgrades to current municipal infrastructure (e.g., public transport, tourism facilities). Finally, to account for non-government tourism stakeholders (tourists, businesses, residents), it is recommended that policy tools to promote green tourism are implemented. Incentives can be offered for businesses to introduce low-carbon operations, and education and outreach programs can be provided for all community stakeholders to raise awareness.

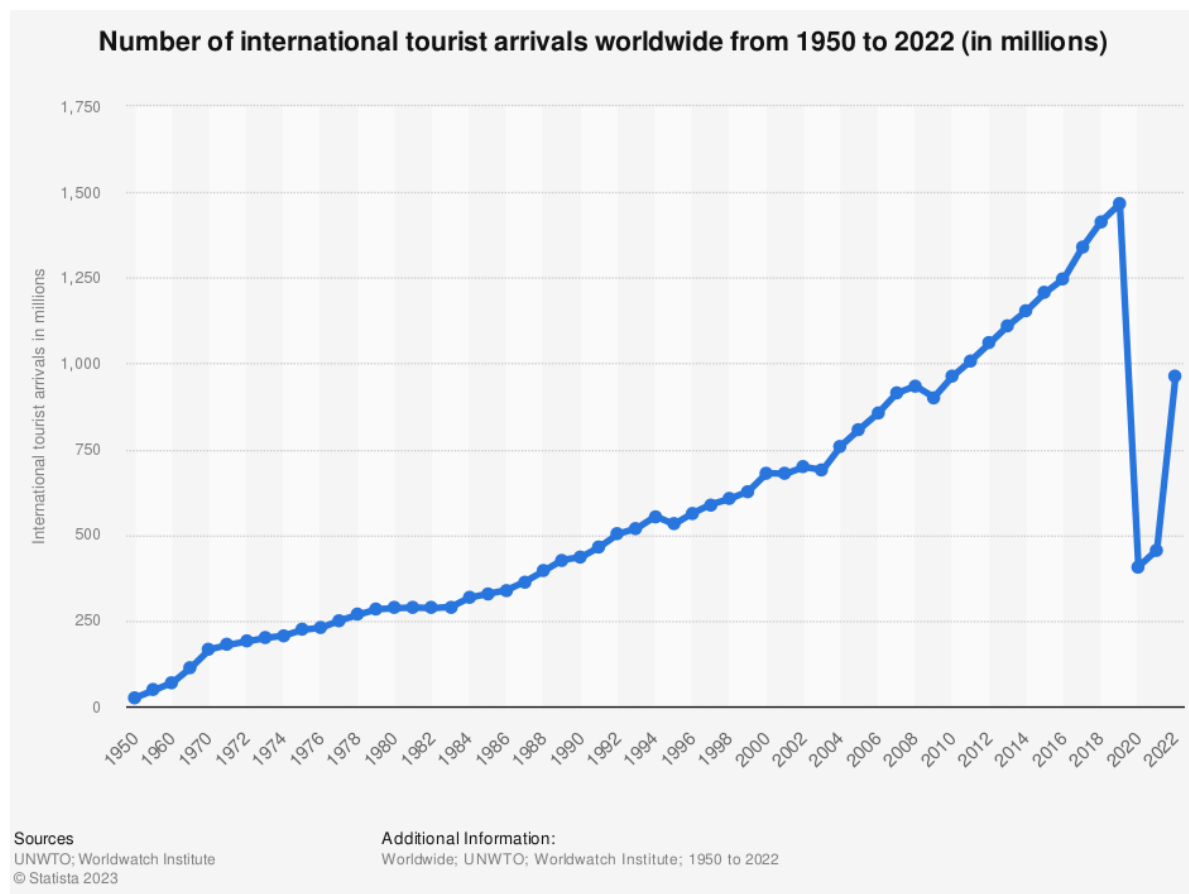
1.0 Introduction

1.1 Tourism

The number of worldwide tourists has steadily increased since technological developments and decreasing airfare have allowed for cheaper and easier travel (Capocchi et al., 2019). From 1950 to 2018, the average global annual growth rate of international tourists was 6.6%, as 25 million tourists in 1950 increased to 1.4 billion in 2018 (Fennell, 2020). Figure 1 shows this steady growth of international travel and tourism, with the exception of the sharp decrease during the COVID-19 pandemic. Given the past growth rate, global revenue for tourism is projected to reach \$1015.7 billion in 2027 (Matheisl, 2022).

Figure 1

The growth of international tourists from 1950 to 2022



Note. From “Number of international tourist arrivals worldwide from 1950 to 2022 (in millions)” by UNWTO, 2023, (<https://www.statista.com/statistics/209334/total-number-of-international-tourist-arrivals/>). Copyright 2023 by Statista.

Tourism has many economic and social benefits for the host destination. Primarily, tourism generates large influxes of money into the local economy of the destination and creates employment opportunities for the local residents (Khayrulloevna, 2020). Revenue generated from tourism is used to improve infrastructure, provide better local facilities and educational institutes, and protect local heritage monuments and structures (Khayrulloevna, 2020). Additionally, tourism increases the quality of life for residents by expanding social events in the area and bringing visitors from around the world to improve the cultural diversity of the region (Khayrulloevna, 2020). Furthermore, emphasis is placed on the aesthetic values of a tourist destination, which means these areas have more landscaped urban green space, urban trees, sitting and shaded areas, and outdoor recreation areas for resident and tourist enjoyment (Khayrulloevna, 2020).

1.1.1 Overtourism

While increased revenue from tourism is economically beneficial, popular tourist destinations also experience overcrowding, environmental degradation, and cultural disruptions (Capocchi et al., 2019). This phenomenon is called overtourism, which is a recently designated term and has only been in use since 2002. Prior to its origin, the concept of overtourism was sometimes referred to as mass tourism or irresponsible tourism (Capocchi et al., 2019). In the current definition, overtourism is described as the negative effects on the environment, community, and culture caused by an exceedance of tourists above the carrying capacity of the area (Capocchi et al., 2019).

Tourists are often drawn to popular, unique, or authentic locations. With the rise of technology and social media, certain locations gain popularity such as The Shire attraction in New Zealand, which became a popular destination after the success of the Lord of the Rings film trilogy. When tourists are drawn to a location, it increases the demand from local businesses to support the needs of the tourist crowds (Mihalic, 2020). A problem occurs when tourism businesses supply this demand by increasing tourist attractions and facilities without sufficiently managing the negative impacts to the community and environment (Mihalic, 2020). This is best

seen in cities known for having excess tourists, such as Barcelona, Venice, and Rome. The communities in these destinations are impacted negatively by increased product prices, traffic, crime, and cost of living (Dodds & Butler, 2019). Local residents find themselves pushed out of their city from increasing housing prices as a result of residential living accommodations transforming into short-term rental units such as Airbnb's (Dodds & Butler, 2019). Cultural values are also diminished as tourist populations grow. Areas that have strong local cultures are desirable destinations for travelers seeking authentic experiences, but as tourist populations increase, the local arts, crafts, and traditions are influenced by overpowering tourist culture (Capocchi et al., 2019). This is called the imitation effect, where destinations mimic tourist behaviours and ultimately adopt Western cultures (Capocchi et al., 2019). Finally, environmental impacts are common because of overtourism, including increased pollution, resource depletion, and natural habitat loss (Fennell, 2020). While overtourism is multidimensional, spanning community, cultural, and environmental impacts, this paper focused primarily on the environmental aspect of overtourism.

1.1.2 Alternative Tourism

Despite the term overtourism being a recent addition to the literature, concern about the impact of tourism has been around much longer. In 1978, Erik Cohen wrote *The Impact of Tourism on the Physical Environment*, which was one of the first written works that assessed the environmental impact and described factors that influenced the intensity of tourism effects (Cohen, 1978). Since then, alternative forms of tourism have arisen as solutions to oppose the rising popularity of mass tourism, which was causing social, cultural, and environmental complications. This has been given the name of 'alternative tourism', which represents all forms of tourism that work to minimize the effects of tourism and is the opposite of overtourism (Mihalic, 2020). The most popular types of alternative tourism relating to environmental concerns include ecotourism, green tourism, responsible tourism, sustainable tourism, low-impact tourism, and ethical tourism (Mihalic, 2020).

Ecotourism

Ecotourism was originally defined in the 1960s as travel to natural destinations for the purpose of education about the wildlife and environment, and to connect with nature (Fennell, 2020). As the concept evolved into the 2000s, the definition expanded to include ecotourism as

environmentally responsible travel that promotes conservation, minimizes impact, and respects social and cultural values (Cobbinah, 2015). The concept of ecotourism is focused on the tourist themselves and is considered a behavioural form of tourism (Fennell, 2020).

Green Tourism

Green tourism was originally intended as a type of tourism to have a low impact on the destination area (Furqan et al., 2010). Green tourism can be used to refer to tourists performing eco-friendly behaviour, or to tourism-based businesses that conduct environmental management practices (Furqan et al., 2010). While the concept behind green tourism is well intended, a recent issue arose where tourism businesses are using the term ‘green tourism’ to promote their business and appeal to the public without following through on their claims, a process known as greenwashing (Rolandia, 2023). Despite this negative reputation, green tourism is still a form of managing tourism practices on both the demand and supply side to be more environmentally conscious.

Responsible Tourism

Responsible tourism is a short-term action describing any form of tourism that acts responsibly towards the community, culture, or environment (Mihalic, 2016). Responsible tourism does not need to achieve perfection for every stakeholder, but instead describes general actions that result in less impact than traditional mass tourism (Dodds, n.d.). Due to the nature of this definition, responsible tourism often falls to the responsibility of the tourist, who is being held accountable for their own actions (Mihalic, 2016).

Sustainable Tourism

The idea of sustainable tourism refers to the long-term goal of the tourism industry as a whole (Mihalic, 2016). The goal of sustainable tourism is for the industry to minimize its impacts by balancing the needs of the tourists, community, and environment (Mihalic, 2016). Achieving sustainable tourism requires participation from all stakeholders, including governments, communities, tourists, and businesses (Hardy et al., 2002).

Responsible tourism, ecotourism, and green tourism are all forms of tourism performed by tourists or tourism businesses that work to actively reduce negative impacts caused to the

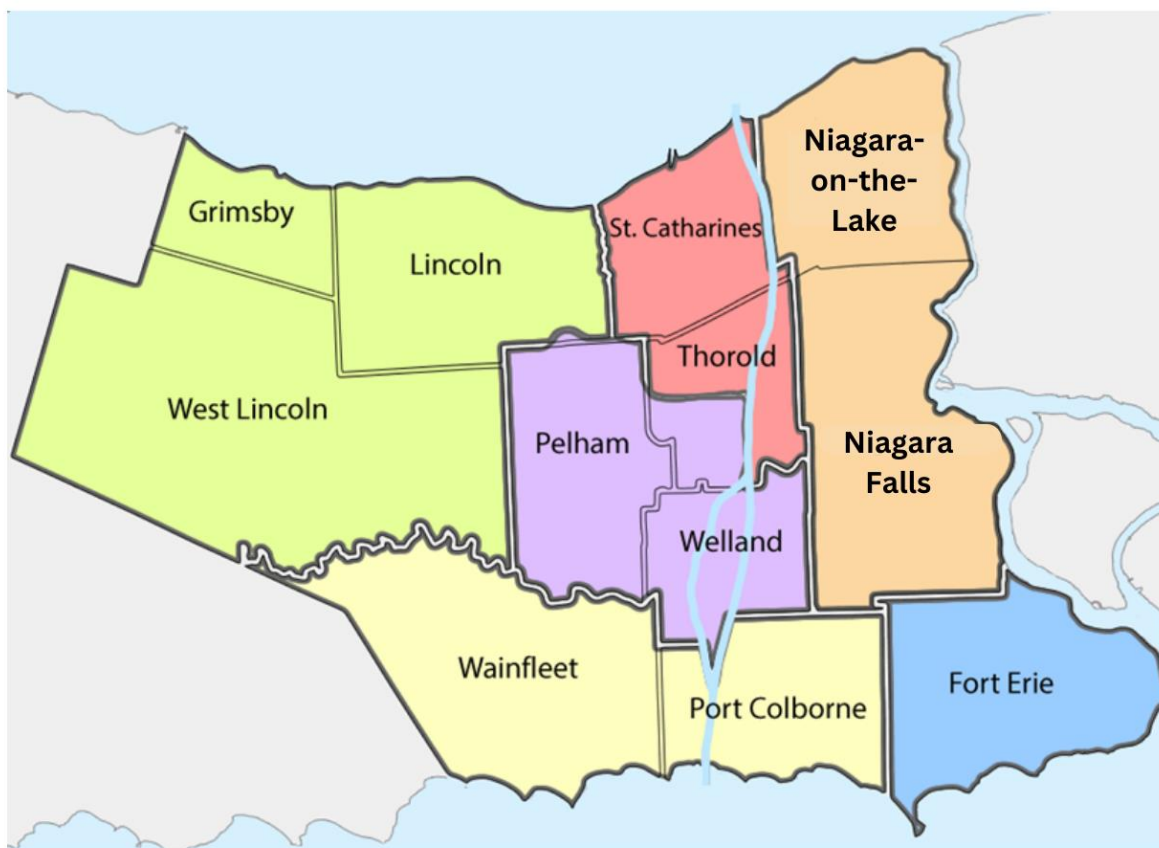
local communities and environment. These forms of tourism all work towards achieving the ultimate goal of sustainable tourism (Mihalic, 2016).

1.2 Geographical Context

The Niagara Region is a Regional Municipality located in Southern Ontario. It consists of twelve local Municipalities, as seen in Figure 2. Two of the twelve local Municipalities are globally recognized as popular tourism destinations: Niagara Falls and Niagara-on-the-Lake. These two Municipalities are in the North-East corner of the Niagara Region, established along the Niagara River which runs from Lake Erie to Lake Ontario, and forms an international border.

Figure 2

Map of the Niagara Region, listing the twelve Municipalities



Note. From “District Operations – Police Stations Map” by Niagara Regional Police Service, 2019, (<https://www.niagarapolice.ca/en/what-we-do/districtoperationspolicestationsmap.aspx>). Copyright 2019 by Niagara Regional Police Service.

The Municipalities were selected for this paper based on the tourism trends in the areas, considering that international and domestic tourists typically spend over 2 billion annually on activities in the Niagara Region (Government of Canada, 2022). Niagara Falls gained its popularity for being a natural wonder of the world, having three large waterfalls with 3160 tons of water rushing over them every second (*Niagara Falls Facts*, n.d.). The waterfalls themselves were the original attraction of the area, but tourism businesses established around the Falls creating a larger destination with many different activities. As Niagara Falls became busier and busier, the neighbouring Municipality, NOTL, became the calmer destination with sprawling vineyards and peaceful neighbourhoods to escape from the hustle and bustle of the Falls.

2.0 Project Objectives

The objectives of this report include:

1. Synthesize existing literature to create a framework that describes the contributing factors to positive and negative relationships between tourism and the environment.
2. Use the synthesized framework to analyze the relationship between tourism and the environment in Niagara Falls and Niagara-on-the-Lake and identify key impacts.
3. Describe sustainable tourism management practices that would improve the relationship between tourism and the environment for Niagara Falls and Niagara-on-the-Lake.

3.0 Methods

A systemic literature review and a framework synthesis were conducted on the objectives listed above using grey and scholarly literature.

4.0 Discussion

While the issue of the ecological impact of tourism is mentioned periodically in the tourism literature, it wasn't until the 1970s and 1980s that the idea gained traction. In 1976, Budowski wrote about three relationships that tourism can have with environmental conservation:

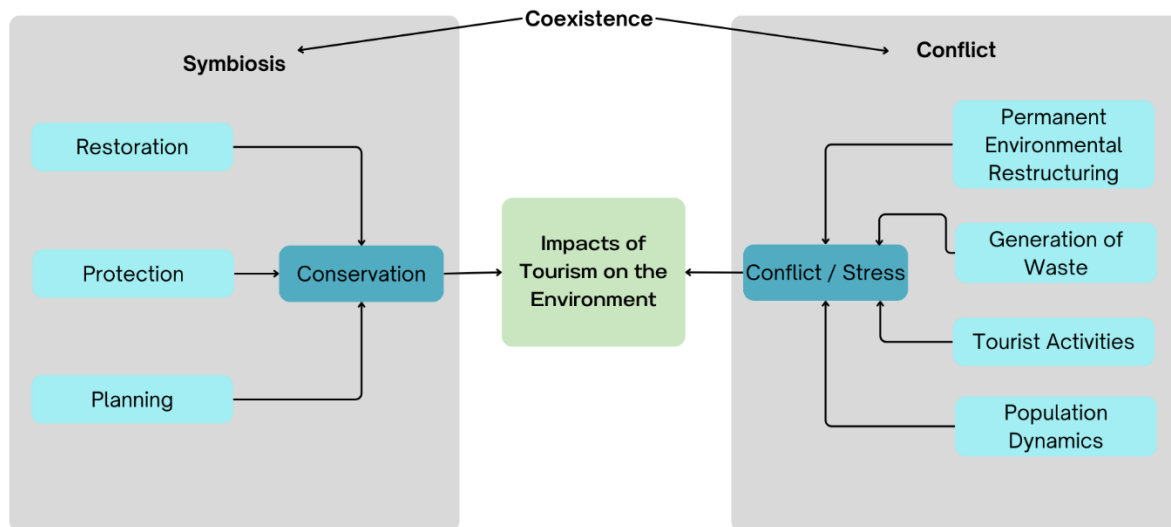
1. Conflict: if the presence of tourism harms the natural environment, then there is conflict between tourists and conservationists.

2. Coexistence: if an area is in a neutral state between conflict and symbiosis, then it has the potential to become either.
3. Symbiosis: if tourism and environmental conservation benefit from one another in a mutually beneficial way, then there is symbiosis.

In conflict relationships, the impacts of tourism are mainly caused by environmental stressor activities. In symbiotic relationships, the impacts of tourism are mainly caused by conservation actions. The diagram shown in Figure 3 depicts the influencing factors within the three relationships between tourism and conservationists: coexistence, conflict, and symbiosis. Coexistence is a neutral middle and will eventually become either conflict or symbiosis. The outmost factors seen in light blue are the tourism activities that influence the environment. These activities lead to either harmful stress (right) or beneficial conservation (left), as seen in dark blue. If stress outweighs conservation, then the relationship is conflict, and if the conservation outweighs the stress, then the relationship is symbiotic.

Figure 3

The influencing factors that determine the relationship between tourism and the environment



Note. This framework was created by combining the work of Pearce (1985), Budowski (1976), and Lea (1988). From “Tourism and Environmental Research: A Review” by D. G. Pearce, 1985, *International Journal of Environmental Studies*, 25(4), p.247-255 (<https://doi.org/10.1080/00207238508710233>). Copyright 2023 by Taylor and Francis Group. From “Tourism and Environmental Conservation: Conflict, Coexistence, or Symbiosis?” by G. Budowski, 1976, *Environmental Conservation*, 3(1), 27–31. (<https://doi.org/10.1017/S0376892900017707>).

4.1 Environmental Impact of Tourism: Conflict

Focusing on the right side of Figure 3, an analysis of the conflict relationship between tourism and the environment in Niagara Falls and NOTL is discussed.

The increase in global tourism has moved many formerly symbiotic and coexisting relationships into conflict. As tourism increases, so does the improper use of the ecological resources of that destination, and therefore ecological stress (Fennell, 2020). As seen in Figure 3, a conflicting relationship consists of four main tourism activities that cause ecological stress: destruction of ecological habitats, pollution, direct interactions between tourists and nature, and effects on the destination’s human population (Fennell, 2020; Pearce, 1985). Table 1 by Pearce (1985) summarizes these negatively influencing factors and their subsequent consequences on the environment.

Table 1

A framework for the study of tourism and environmental stress

Stressor Activities	Stress	Primary Response Environmental	Secondary Response (reaction) Human
1. Permanent Environmental Restructuring a) Major construction activity <ul style="list-style-type: none"> • urban expansion • transportation network • tourist facilities • marinas, ski-lifts, sea walls b) Change in land-use <ul style="list-style-type: none"> • expansion of recreational lands 	Restructuring of local environments <ul style="list-style-type: none"> • expansion of built environments • land taken out of primary production 	Change in habitat Change in population of biological species Change in health and welfare of people Change in visual quality	Individual measures <ul style="list-style-type: none"> • impact on aesthetic values Collective measures <ul style="list-style-type: none"> • expenditure on environmental mental improvements • expenditure on management of conservation • designation of wildlife conservation and national parks • controls on access to recreational lands

<p>2. Generation of Waste Residuals</p> <ul style="list-style-type: none"> • urbanisation • transportation 	<p>Pollution loadings</p> <ul style="list-style-type: none"> • emissions • effluent discharge • solid waste disposal • noise (traffic, aircraft) 	<p>Change in quality of environmental media</p> <ul style="list-style-type: none"> • air • water • soil <p>Health of biological organisms</p> <p>Health of humans</p>	<p>Individual defensive measures</p> <ul style="list-style-type: none"> • air conditioning • recycling of waste materials • protects and attitude change toward tourists • change of attitude toward the environment • decline in tourist revenues <p>Collective defensive measures</p> <ul style="list-style-type: none"> • expenditure on pollution abandonment by tourist related industries • clean-up of rivers, beaches
<p>3. Tourist Activities</p> <ul style="list-style-type: none"> • skiing • walking • trail bike riding • collecting 	<p>Trampling of vegetation and soils</p> <p>Disturbance and destruction of species</p>	<p>Change in habitat</p> <p>Change in population of biological species</p>	<p>Collective defensive measures</p> <ul style="list-style-type: none"> • expenditure on management of conservation • designation of wildlife conservation and national parks • controls on access to recreational lands
<p>4. Effect on Population Dynamics</p>	<p>Population density (seasonal)</p>	<p>Congestion Demand for natural resources</p> <ul style="list-style-type: none"> • land and water • energy 	<p>Individual defensive measures</p> <ul style="list-style-type: none"> • attitudes to overcrowding and the environment <p>Collective defensive measures</p> <ul style="list-style-type: none"> • growth in support services e.g. water supply, electricity

Note. From “Tourism and Environmental Research: A Review” by D. G. Pearce, 1985, *International Journal of Environmental Studies*, 25(4), p.247-255 (<https://doi.org/10.1080/00207238508710233>). Copyright 2023 by Taylor & Francis Group.

With reference to Figure 3, and using the four dimensions of tourism that are given in Table 1, an overview of the conflicting environmental impacts of tourism in the context of the Niagara Region are identified and discussed.

4.1.1 Permanent Environmental Restructuring

Permanent environmental restructuring is a stressor activity that occurs when natural environments are transformed for urban development related to tourism. Niagara Falls and NOTL are popular touristic destinations with much of the land area designated for tourist activities. The City of Niagara Falls has many urban features including recreational facilities (e.g., Skylon Tower, SkyWheel, Casinos), transportation paths (e.g., walkways and roads), hotels, Bed and Breakfasts, and paved viewpoints of the Falls. The impact of urbanisation has resulted in habitat loss, reduced ecosystem services, degradation of freshwater resources, increased human health problems, and other associated effects (Duh et al., 2008). NOTL is Ontario’s largest producer of wine, and much of its land is used for vineyards, golf courses, and greenhouses, as well as a picturesque downtown and residential area. This land use poses a different set of environmental problems than Niagara Falls, since agricultural fields often use pesticides and fertilizers that leach into the soil and water, causing contamination (Point et al., 2012).

The primary environmental response of these land use changes is loss of habitat and change in population of biological species (Pearce, 1985). In 2012, the Niagara Peninsula Conservation Authority (NPCA) assessed watershed quality in these Municipalities. The City of Niagara Falls was too urban to be assessed, although South Niagara Falls was shown to have 52% natural areas, which included 23% forest, 6% wetland, 36% swamp, and 35% successional (NPCA, 2012a). The same assessment was performed for NOTL where only 16.6% of the land is natural area, which included 53% forests, 3% wetlands, 1% swamp, and 42% successional (NPCA, 2012b). With even lower ratings than South Niagara Falls, NOTL received consistent reports of fragmentation throughout the Municipality, which is the separation of habitats into discontinuous patches (Mitchell et al., 2015; NPCA, 2012b). Fragmentation influences

ecological processes by limiting migration of wildlife and seed distribution (Mitchell et al., 2015).

As a secondary human response, each Municipality has an Official Plan that describes the objectives for short- and long-term municipal development. Section 4 of the City of Niagara Falls Official Plan describes the policies and plans for future urban advancement for tourist commercial areas (City of Niagara Falls, 2019). This includes a section on objectives that guide the policies, all of which are motivated by the economic need to increase employment opportunities since the tourism industry has become the leading employer in the city (City of Niagara Falls, 2019). Of the six objectives that guide the tourism policies, four objectives are urban development focused, one objective relates to resident satisfaction, and one objective is preservation of the Fall's visual appeal, none of which are focused on ecosystem protection or conservation (City of Niagara Falls, 2019). The Official Plan for NOTL also encourages tourism development, and particularly encourages the transformation of homes into Bed and Breakfast Homes (Town of Niagara-on-the-Lake, 2017).

Not all areas in Niagara Falls and NOTL are allowed for tourist development, since sections fall under the Greenbelt Plan and the Niagara Escarpment Plan. The Greenbelt Plan outlines an area of lower Ontario that is protected as agricultural land, with minimal commercial development (Greenbelt Foundation, n.d.). The Niagara Escarpment Plan is a land-use plan to conserve the Niagara escarpment biosphere and limit development in ecologically sensitive areas (*Niagara Escarpment Plan*, 2017).

4.1.2 Generation of Waste Residuals

Generation of waste residuals is the second stressor activity that Pearce (1985) identified in the environmental impact of tourism framework. This stressor includes pollution from tourist activities including emissions, effluent, solid waste, and noise pollution. These are all common sources of pollution found in Niagara Falls and NOTL.

The primary effects of these pollution and waste activities is a change in the quality of air, water, and soil (Pearce, 1985). In the Watershed Health Report Cards by the NPCA, both Municipalities are given low ratings for surface water quality, indicating exceeded provincial guidelines for levels of phosphorus and *E.coli* (NPCA, 2012a, 2012b). Another primary effect is

the decline in wildlife species' health, which has also been recorded in the Niagara River. Degradation of wildlife species is measured through decreasing waterfowl populations, which are regionally dependent on nesting (Green et al., 2021). Endemic dusky salamander populations have also greatly decreased, and various aquatic species have shown increased mutations and decreased fecundity (Green et al., 2021). This is indicative of contamination and pollution in the Municipalities.

The secondary human response to waste generation is seen as a change in attitude toward the environment and tourists by local residents. Residents in Niagara Falls and NOTL have voiced opinions to the Municipal Council about the increasing volumes of tourists that outnumber residents 200 to 1, and the impact that this has on everyday life for residents (Fox, n.d.). As well, residents in the areas show collective defensive measures, such as clean-up events where volunteers are asked to help clean local beaches and rivers from littering and pollution.

4.1.3 Tourist Activities

Tourist activities also directly impact the environment. In the context of Niagara Falls and NOTL, this stressor appears as trampling vegetation on trails, littering, introduction of invasive species, and disturbing species populations (Pearce, 1985).

The primary environmental response to this stressor is change in habitat and change in biological species. Recreational trails around the forested area of Niagara Falls and NOTL are very popular tourist destinations, but also cause soil compaction, reduced forest density, and altered water balance (Bötsch et al., 2018). Biological species are also impacted by human presence on trails, such as the decrease in bird populations and other species near human traffic (Bötsch et al., 2018). Similar occurrences happen in swimming and fishing areas. Another change in regional biological species is the introduction of invasive species, which can be partly attributed to tourism since the rate of invasive species is higher in areas that receive the most tourists (Hall, 2010). Invasive species pose a threat to native species by outcompeting for sunlight or food sources, therefore changing population dynamics (Hall, 2010).

The secondary human response to this stressor is the designation of protected areas, such as the Niagara Peninsula Conservation Authority regulating various conservation areas in the

region. As well, human traffic is controlled in these areas through required payment for conservation area entry.

4.1.4 Effect on Population Dynamics

The fourth and final stressor identified in the framework is the effect on population dynamics (Pearce, 1985). The busy season for tourism in Niagara Falls and NOTL is May-September since some major tourist attractions, such as boat tours and outdoor wine tasting, can only operate during the spring and summer seasons. As tourist numbers decrease, hotels and other overnight accommodations reduce prices starting in October to incentivize tourism in the off-season, and the lowest prices occur from January to February (Seeman, 2023).

The primary environmental response to changing population dynamics is changing demand for natural resources including raw materials and energy. Niagara is fortunate to have hydropower from the Niagara River to accommodate the energy demands, although other resources are finite and contribute to the carrying capacity of the area (Healy, 2006). Niagara Falls particularly has had past issues with overuse and underinvestment in the area, meaning large crowds were located in an area too small to accommodate them (Healy, 2006).

The secondary human response to this stressor has been to increase service infrastructure to meet the tourist demand. Instead of decreasing the number of tourists in the area, the Niagara Parks Commission has gradually expanded the area since 1885 to spread tourists spatially (Healy, 2006). Overuse was partially solved by increasing transportation to and within the area to decrease traffic congestion, and increasing the number of attractions around the area to spread out the crowds (Healy, 2006). Investment in large tourist facilities and parking availability moved the crowds away from the Falls viewpoints, and into other areas to increase the carrying capacity of the area (Healy, 2006).

4.2 Environmental Impact of Tourism: Symbiosis

Focusing on the left side of Figure 3, an analysis of the symbiotic relationship between tourism and the environment in Niagara Falls and NOTL is discussed.

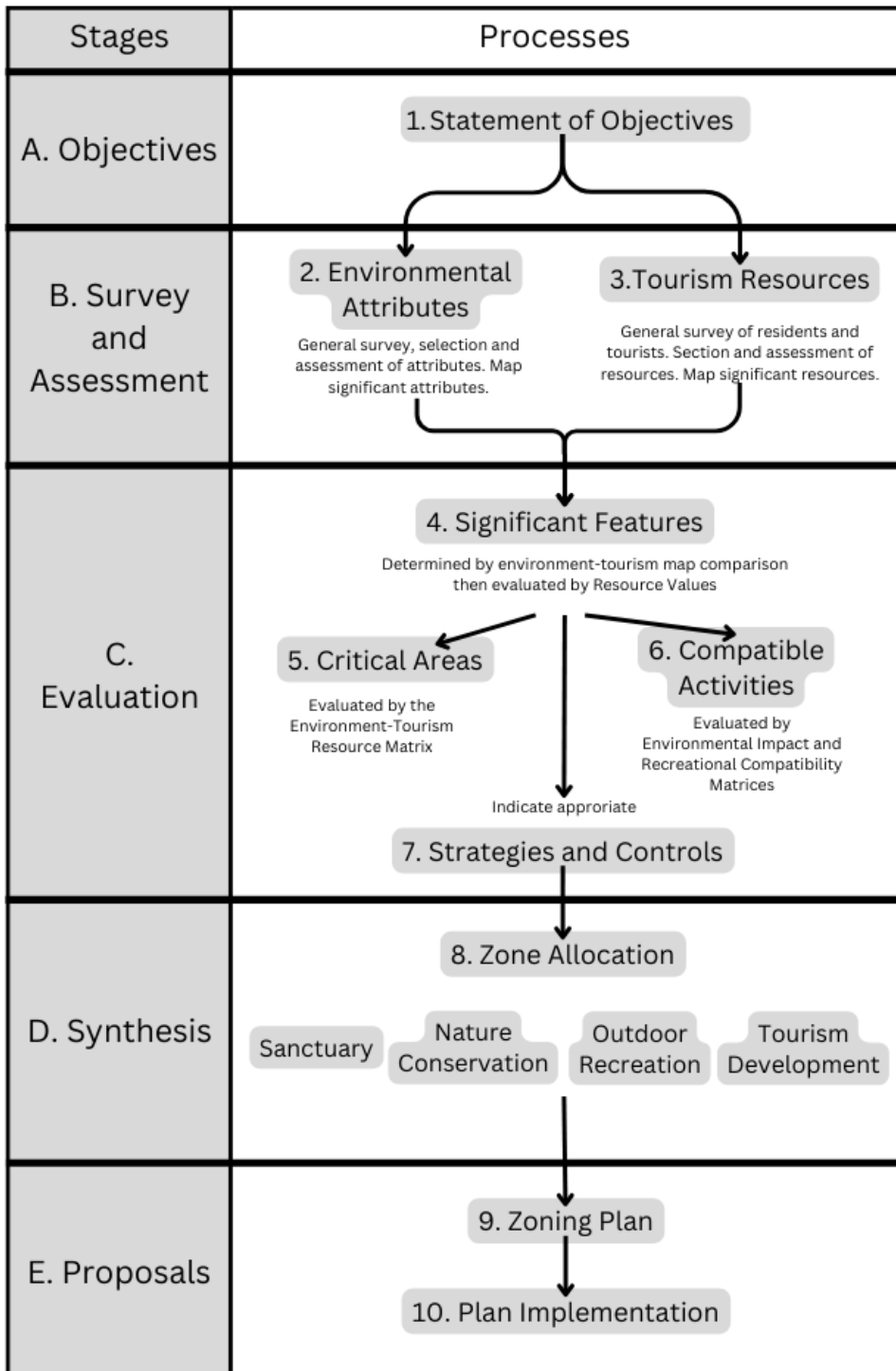
Symbiosis is when tourism and environmental conservation benefit from one another mutually, which is the desired relationship for tourism in Niagara Falls and NOTL (Budowski, 1976). As shown in Figure 3, symbiotic relationships have three influencing factors: restoration,

protection, and planning (Lea, 1988). Ecological restoration is the process of restoring degraded habitats to their original condition and restoring ecological function to damaged ecosystems. Protection is the process of preserving natural areas and protecting them from harmful human activities. Niagara Falls and NOTL have various restoration and conservation organizations that fall into these categories, such as the Niagara Peninsula Conservation Agency and the Niagara Parks Commission.

The third category, planning, is where there is the most room for improvement in Niagara Falls and NOTL. It is recognized that tourism is a vital component of the local economy in Niagara Falls and NOTL, and therefore it is not an option to decrease the amount of tourism in the area to solve the issue of overtourism. Instead, with proper planning and management, it is possible that the Municipalities can become environmentally sustainable, and the conflict relationship described in Section 4.1 can be moved towards a symbiotic relationship. Municipalities have three major responsibilities that influence tourism planning, including land-use planning, provision and maintenance of public infrastructure, and community support (Chili & Xulu, 2015). Therefore, the three components of municipal planning that need to be addressed are tourism land-use planning, adaptation of existing municipal infrastructure, and governing policies for tourists and tourism businesses.

4.2.1 Sustainable Tourism Planning

Regional tourism planning in Niagara Falls and NOTL in the past has focused primarily on economic development, and there is instead a need for tourism planning to also recognize environmental and social aspects (Dowling, 1993). Therefore, it is understood that in order to achieve symbiosis between the environment and tourism, the tourism planning process should seek to incorporate community and tourist values, and base development upon environmental protection and conservation (Dowling, 1993). In light of this, Dowling (1993) created an Environmentally Based Tourism (EBT) Planning Framework for local governments to utilize when planning for sustainable tourism development. The EBT Planning Framework is based on environmental protection, community well-being, tourist satisfaction, and economic integration to achieve a sustainable tourism system within a region (Dowling, 1993). The EBT Planning Framework that is provided in Table 2 would be beneficial to improve the tourism planning processes of the municipal governments in Niagara Falls and NOTL.

Table 2*An environmentally based tourism planning framework*

Note. Recreated from “An environmentally based approach to tourism planning” by R. K. Dowling, 1993, *Journal of Sustainable Tourism*, 1(1), p.17-37 (DOI: 10.1080/09669589309450698). Copyright 2023 by Taylor & Francis Group.

Stage A: Objectives

Setting objectives is the initial step of the EBT Planning Framework, where a comprehensive list of sustainable tourism goals for each municipality is formulated (Dowling, 1993). The objectives should encompass all three pillars of sustainable tourism, including economic viability, social and cultural equity, and environmental protection (Dowling, 1993). The objectives must consider the existing policies in place, and be supported by input from all key stakeholders, including the municipal government, local community, local businesses, and tourists (Fennell, 2020).

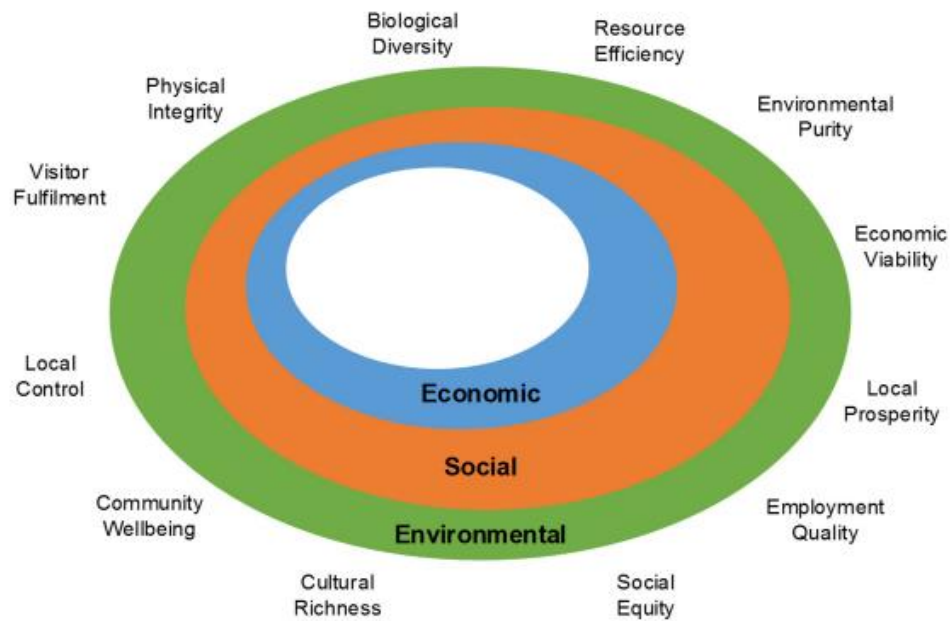
The primary objective of environmental sustainability is to align tourism development with environmental protection through the preservation of ecological processes, biological diversity, and biological resources (McKercher, 2003). McKercher (2003) identified some general objectives for sustainable tourism in a region:

1. Guidelines should be established for tourism development, design, and operations to decrease the impact of urban tourism activities.
2. Restoration and protection practices should be outlined in management plans to conserve and restore natural areas.
3. Education and outreach plans to promote responsible tourism behaviour to tourists should be identified.
4. Plan for long-term environmental monitoring and impact assessment reporting to evaluate progress and continually improve.

To further guide the development of objectives, the 12 dimensions of sustainable tourism development presented in Figure 4 should also be considered (Janusz & Bajdor, 2013).

Figure 4

Twelve dimensions of sustainable tourism



Note. From “Towards to Sustainable Tourism – Framework, Activities and Dimensions” by G.K. Janusz., P. Bajdor., 2013, *Procedia Economics and Finance*, 6, 523–529. ([https://doi.org/10.1016/S2212-5671\(13\)00170-6](https://doi.org/10.1016/S2212-5671(13)00170-6)). Copyright 2013 by The Authors. Published by Elsevier B.V.

Stage B: Survey and Assessment

During the survey and assessment stage of the EBT Planning Framework, significant features in the area are categorized into maps of environmental attributes and tourism resources. The map of the first category, environmental attributes, includes biological components (plants, animals), non-biological components (land, water, air), and cultural features (Fennell, 2020). This data is collected through environmental surveys to assess the landscape and the function of significant features. The map should include a detailed description of landscape categories such as environmentally sensitive areas, environmental corridors, and hinterlands (Dowling, 1993). The map should also rate the environmental significance of each area to act as a guide when comparing environmental significance to tourism significance within a particular area (Dowling, 1993).

The second category, tourism resources, are the attractions and services provided for tourists, such as facilities, tours, and maintained trails (Fennell, 2020). Like the previous map, both location of tourism resources and their perceived values should be included in the map. To accomplish this, residents and tourists in the area are surveyed to gain insight into the opinions

and attitudes toward tourism development in the area. The map will show the existing and potential tourism clusters, transportation corridors, community areas, and their perceived value (Dowling, 1993).

Stage C: Evaluation

In the evaluation stage of the EBT Planning Framework, the maps from Stage B are overlain to show the spatial relationship between the significant features (Dowling, 1993). Critical areas are sections on the map where there are overlapping areas with both high environmental importance and high tourism activity. Compatible areas are then features that have only one significant feature (environment or tourism), or areas where environment and tourism are co-existing and can continue operating without the need for intervention.

Stage D: Synthesis

In the synthesis stage of the EBT Planning Framework, the map of critical areas and compatible activities are labelled as land-use zones. The zones are based on degrees of naturalness of the area, beginning with the most natural zone called Sanctuary. This zone includes any areas of essential ecological processes, unique or fragile biota, and original indigenous landscapes where no tourism activity should happen at all. The next zone is Nature Conservation, where the landscape is relatively natural and should be protected from development or harm but allows for some extremely eco-friendly tourist activities. The next zone is Outdoor Recreation where the landscape is semi-natural, where it is used for outdoor recreation activities such as golfing, camping, hiking, biking, etc. The next zone is the Tourist Node, which is areas that are heavily modified and where major tourist attractions are found, such as Clifton Hill in Niagara Falls. The final zone, Other Zones, are areas that aren't designated for environment or tourism, such as agricultural fields or non-tourism urban areas (Dowling, 1993).

The ranking system from the previous stages are important for determining which zone the overlapping critical areas should be assigned to. For example, if an area has level 1 tourism significance and level 5 ecological significance the area will be a Sanctuary or Nature Conservation zone.

The goal of this stage is to create a map of the area that shows the specific zones within the Municipality (Fennell, 2020). This zoning map will show the necessary areas to keep the Municipality ecologically sustainable, including areas in need of restoration to provide ecosystems services (e.g., contaminated wetlands in need of restoration for proper water cycling) while also identifying areas with economically important or potential tourism activities.

Stage E: Proposals

This final stage of the EBT Planning Framework is the proposal, where the regional tourism management plan created throughout the framework is distributed internally throughout the regional or local government and amended based on any special exceptions. The final product is an ecologically sustainable tourism zoning map for the region.

The EBT Planning Framework is useful for the Municipal Governments of Niagara Falls and NOTL to guide future tourism development and actions toward symbiosis, as explained in Figure 3. The final zoning map would provide these Municipalities with a guide for the region, including areas of potential tourism opportunities and areas with needed restoration and protection. The benefit of the EBT Planning Framework over other planning frameworks is that it accounts for all stakeholders involved, including government, businesses, local community, and tourists. Other frameworks failed to include tourists in the process, which would make surveying the stakeholders incomplete.

This framework accounts for one of the three components of municipal planning: future development. The other two components are adaptation of existing municipal infrastructure, and governing policies for tourists and tourism businesses, discussed in Sections 4.2.2 and 4.2.3 respectively.

4.2.2 Sustainable Tourism Adaptation

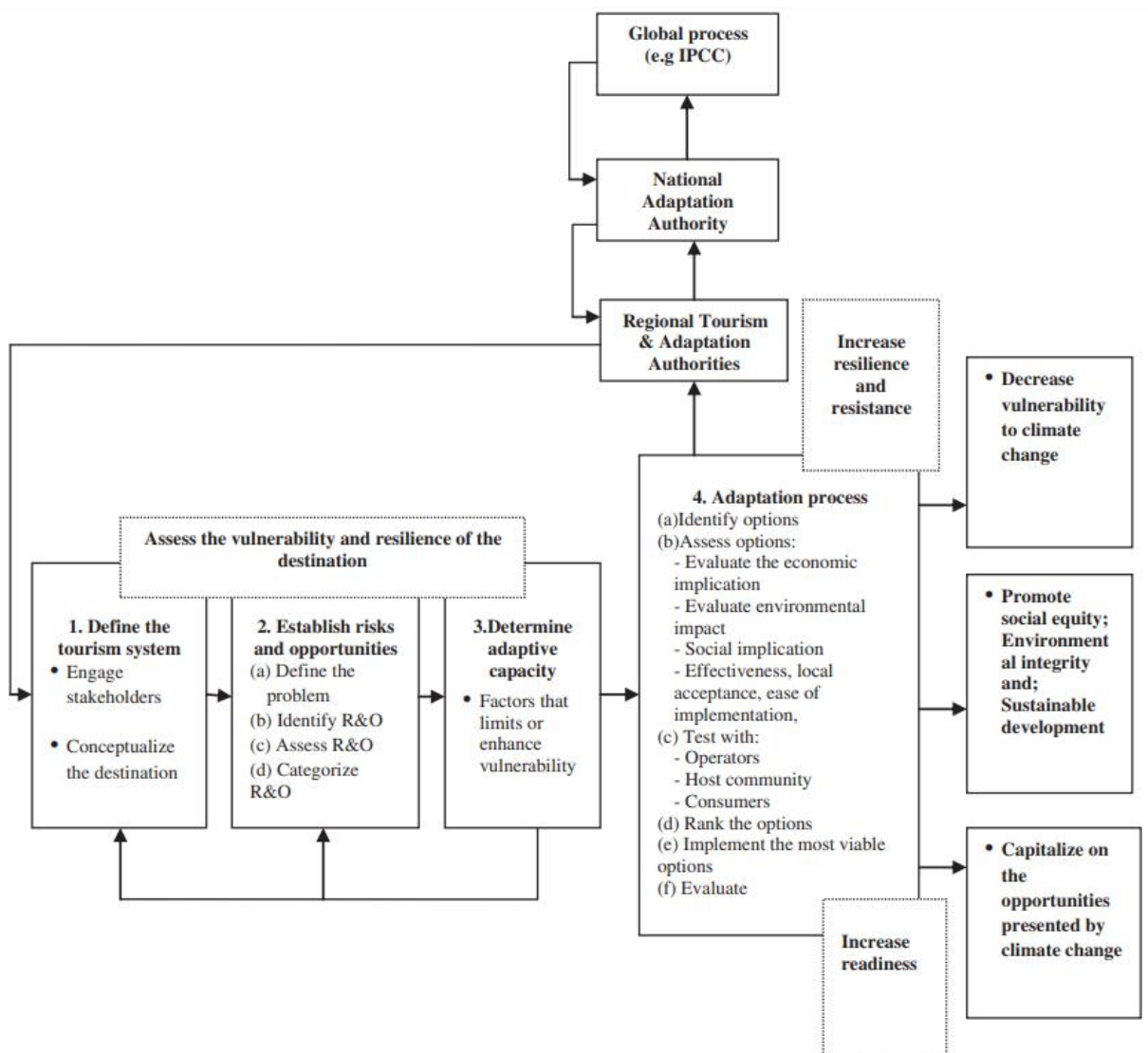
It is important to take climate change predictions into account when developing a regional tourism plan since actions that may be sustainable under current conditions could be vulnerable to the future effects of climate change. The tourism industry is considered a climate-sensitive industry, and is especially important for Niagara Falls and NOTL since many of the main tourist attractions operate under warm weather conditions (Njoroge, 2014). Climate change results in long-term shifts in temperature and weather patterns, which can bring about heat

waves, forest fires, and droughts (National Oceanic and Atmospheric Administration, 2023). These influences may affect tourism businesses such as crop loss from droughts decreasing vineyard productivity, or increased storm variability inhibiting outdoor recreation such as boat tours and hiking.

Sustainable tourism adaptation is a method of accommodating the effect of overtourism, and seeking opportunities to become climate resilient long term (Njoroge, 2014). An enhanced Regional Tourism Sustainable Adaptation Framework (RTSAF) was created by Njoroge (2014) to demonstrate the process of adapting tourism to climate change, which is provided in Figure 5.

Figure 5

An enhanced regional tourism sustainable adaptation framework



Note. From “An enhanced framework for regional tourism sustainable adaptation to climate change” by J. M. Njoroge, 2014, *Tourism Management Perspectives*, 12, 23–30. (<https://doi.org/10.1016/j.tmp.2014.06.002>). Copyright 2014 by Elsevier Ltd.

Stages 1-3

The first three stages of the RTSAF are defining the tourism system, establishing risks and opportunities, and determining the adaptive capacity of the region (Njoroge, 2014). Defining the system and the stakeholders in the region generally includes defining the tourists, the transit system, the tourism businesses, and the destination region (Njoroge, 2014). Then, local and professional knowledge is gathered to identify the procedural and structural climate change risks in the destination (Njoroge, 2014). Finally, assessing the capacity to adapt the region for climate resilience includes analyzing aspects such as social characteristics, existing technology, existing governing factors and policies, and resident education (Njoroge, 2014).

Stages 1-3 of the RTSAF can be performed simultaneously with Stages B and C of the EBT Planning Framework since both frameworks require regional evaluations. The regional evaluations survey key stakeholders (tourists, residents, businesses, government) to gather information about the status of the environment, the relationship between tourism and the environment, and the community attitudes towards tourism. Given the overlap between the information collected in the regional evaluations, these stages of each framework can happen simultaneously, and knowledge sharing is encouraged to save time and resources.

Stage 4

Stage 4 of the RTSAF is the adaptation process which has 6 essential steps:

1. Identify adaptation options to climate risk using input from local stakeholders.
2. Evaluate adaptation options to assess the effectiveness, ease of implementation, resident acceptance, and affordability.
3. Test adaptation options to determine the stakeholder opinions through surveys, interviews, etc.
4. Rank adaptation options to generate a list of best strategies.
5. Implement the highest-ranking adaptation options through local and regional planning.
6. Evaluate and monitor the adaptation options long-term to understand the strategy's success over time.

Steps 1-4 of identifying, evaluating, testing, and ranking adaptation options are important to establish the best methods when planning for a climate-resilient tourism sector. Once these stages are completed, the implementation process in Step 5 would be presented alongside the zoning maps in the proposal from Stage E of the EBT Planning Framework.

In the context of Niagara Falls and NOTL, municipal responsibilities include land-use zoning, provision and maintenance of public infrastructure, and community support (Chili & Xulu, 2015). Therefore, the land-use proposal generated from the EBT Planning Framework will account for necessary regional zoning for a sustainable tourism network, and the RTSAF will complement this framework by providing potential adaptation methods to ensure long-term climate resilience in public infrastructure and provisions. The final responsibility, community support, is discussed in Section 4.2.3.

4.2.3 Policy Tools to Promote Green Tourism

Alongside land-use planning and government-operated infrastructure, the Municipalities are also responsible for providing programs and services that support sustainable tourism in the community. To successfully achieve sustainability within this responsibility, the regional government should provide a plan for encouraging eco-, green, and responsible tourism practices to privately owned tourism businesses and tourists.

As explained in Section 1.1.2, green tourism is tourism activities that are environmentally friendly, including both tourist actions and tourism business operating practices. Responsible tourism is similar to green tourism in the sense that it refers to environmentally friendly tourism practices, although responsible tourism is a broader definition that also extends to culturally and socially sustainable tourism practices as well. Ecotourism is the travel to natural areas with the intention of education and preservation. To promote these types of tourism, there are many policy tools the regional government can implement. Some of these policy tools include incentives, penalties, and education.

Positive and Negative Incentives

Positive economic incentives are financial rewards to encourage businesses to change a business practice towards a desired result (Vaidya, 2023). To encourage changes towards sustainable business practices from popular tourist businesses, the local government can offer

subsidies and grant funding (Vaidya, 2023). Subsidies can be offered for implementing high-cost environmentally friendly technology into tourism businesses. These technologies, such as energy and water-saving equipment, are important for environmental mitigation but usually have an expensive upfront purchase and installation cost (Ohene et al., 2022). Subsidies can make green technologies more affordable for tourism businesses and would increase the rate of implementation. Given the impacts identified in the Niagara Region, some beneficial green technology examples could be solar-powered water heaters for hotels, or rainwater harvesting equipment for golf course irrigation. Another positive economic incentive is grants, which are monetary gifts for achieving a desired outcome. For example, grants could be given to businesses that achieve certain levels of environmental standards or certifications for energy, emissions, and waste management.

Negative incentives work as the opposite, where tourism businesses are punished for environmentally damaging behaviour through fines and penalties (Vaidya, 2023). By placing strict environmental regulations and fines for non-compliance, businesses will have to adhere to environmental restrictions and therefore reduce their environmental impact.

Education and Outreach

Tourists and tourism businesses often exhibit environmentally damaging behaviours because of a lack of education about their environmental impact. Tourists are generally more focused on their experience than they are about their environmental impact, which leads to a higher carbon footprint than that tourist would typically produce while not on vacation. Additionally, tourism businesses will mimic poor behaviours to accommodate for tourists, such as selling lots of single-use plastic items and offering non-separated waste bins for simplicity.

To increase environmental awareness in tourists and tourism businesses, education and outreach programs may help influence eco-friendly behaviours. For example, educational materials about ecotourism and responsible tourism can be offered in tourist information centres located throughout the Niagara Region, or educational signs can be placed in popular tourist areas. Additionally, programs to help local tourism businesses locate grants and subsidies to implement environmental initiatives could be offered. This assistance in navigating complex government policies will help increase the rate of sustainable technology implementation.

Therefore, the three main municipal responsibilities (planning, municipal infrastructure, community support) are addressed. First, the EBT Planning Framework provides a process for the future planning and regional development aspect of local government responsibilities. Second, the RTSAF provides climate-resilient adaption options to transportation and other government-operated infrastructure. Lastly, policy tools such as incentives and education can help tourists and tourism businesses move towards green tourism practices. These frameworks and policy tools will increase conservation efforts and decrease environmental stressors, which would move the relationship between tourism and the environment from conflict to symbiotic, as seen in Figure 3.

5.0 Conclusion

This report described the existing relationship between tourism and the environment in Niagara Falls and Niagara-on-the-Lake and provided a plan for tourism management by assessing and synthesizing the available literature.

The existing relationship between tourism and the environment in Niagara Falls and NOTL is classified as conflicting, where the presence of tourism is harming the natural environment. This was explained using the four main tourism activities that cause ecological stress: permanent environmental restructuring, waste residuals, tourism activities, and population dynamics. To reduce the impact of these categories, the relationship should move from conflict to symbiosis, which is when tourism and the environment benefit from each other mutually. To achieve this, there are three recommended main activities that influence symbiosis: environmental protection, ecosystem restoration, and tourism planning. The third category, planning, was found to have the most opportunity for improvement.

In order to properly plan for sustainable tourism, the Municipal Government in Niagara Falls and NOTL should address future tourism development, existing municipal infrastructure, and non-municipal green tourism practices. To plan for future sustainable tourism development, the Environmentally Based Tourism Planning Framework is recommended. To adapt existing unsustainable infrastructure and prepare for climate change and overtourism, the enhanced Regional Tourism Sustainable Adaption Framework is recommended. Finally, to encourage

tourists and tourism businesses to practice green tourism, policy tools such as incentives and education are recommended.

With proper tourism management, Niagara Falls and Niagara-on-the-Lake can continue operating as popular tourist destinations, while also protecting the valuable ecosystems of the region. Without intervention, the effects of climate change and overtourism will eventually render the area uninhabitable for residents, ultimately destroying a once surreal destination.

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TOURISM AND THE ENVIRONMENT

IN NIAGARA FALLS AND NIAGARA-ON-THE-LAKE



PROBLEM: OVERTOURISM IN THE MUNICIPALITIES CAUSES STRESS TO THE ENVIRONMENT

Stressors

Effects

1. Tourism Development

2. Waste residuals

3. Tourism activities

4. Population dynamics

1. **Habitat loss for tourism:** e.g., Clifton Hill, transportation, vineyards.
2. **Pollution of the air, water, and soil:** e.g., high phosphorus & *E.coli* levels, littering.
3. **Degradation to plants and animals:** e.g., decreasing waterfowl and dusty salamander populations, and introducing invasive species.
4. **High demand for natural resources:** e.g., high demand for food, water, energy in the summer season.

SOLUTION: 3-PART MUNICIPAL PLAN FOR SUSTAINABLE TOURISM

1 Environmentally Based Tourism Planning Framework

Dowling (1993)

5 stage framework:

A: Objectives

B: Survey

C: Evaluation

D: Synthesis

E: Proposal

Creates a **regional zoning map** that identifies areas in need of ecological preservation while providing areas suitable for tourism development



2 Regional Tourism Sustainable Adaptation Framework

Njoroge (2014)

The framework identifies risks and **opportunities for environmental resilience** at the destination. Benefits:

- Increase climate change resilience, resistance, and readiness
- Decrease vulnerability to climate change
- Capitalize on opportunities presented by climate change



3 Policy Tools

Incentives: grants or subsidies offered to tourism businesses to implement green technology into their business practices

Education and Outreach: providing educational resources to tourists and tourism businesses to increase awareness of their environmental impact



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