

EXPLORING THE ECOLOGICAL FOOTPRINT OF TOURISM IN ONTARIO

by

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Abstract

THE ECOLOGICAL FOOTPRINT OF TOURISM

Once considered a 'green' industry, tourism and its associated ecological impacts are now widely acknowledged. Focus within tourism planning has aimed to reduce the ecological burden placed on a destination area, and move towards a more sustainable tourism industry. This research proposes the use of the Ecological Footprint (EF) as a tool to compare the ecological costs of different types of tourism. The EF shows the relative amount of productive land appropriated by the activities and choices of an individual tourist.

The main goal of this study was to analyse and compare the ecological resource use of tourism in Ontario. Surveys were conducted with tourists staying at 9 different types of accommodations throughout Ontario. Additional data were collected from personal interviews with accommodation managers at each location and incorporated into the EF calculation. Four areas of tourism ecological impact were identified; tourists' personal consumption, transportation, activity, and accommodation costs. These four components contributed in varying degrees to each tourist Ecological Footprint, and this variation became the main area of analysis.

The findings of this research demonstrated that air travel contributes significantly to the total ecological cost of a particular tourism experience. Comparably, travel by personal car made a much smaller contribution to the tourist EF. Thus, local area tourists who could drive to a destination had a smaller EF than those long-distance domestic and international tourists who flew. Accommodation ecological costs were primarily a factor of the amount of built space available, and total energy usage per guest. Accommodations that had a large number of occupants for a given area and level of energy consumption achieved a scale of efficiency. In this manner, larger, more efficiently constructed accommodations often made smaller contributions to the tourist EF than small-scale, but inefficient accommodations.

The main conclusion was that the ecological impacts of tourism can be quantitatively recorded, and that a complete trip view of tourism ecological resource use is necessary. When considering practical applications in the tourism industry, an Ecological Footprint analysis could be used by tourism managers as an evaluative tool to compare the ecological outcome of various construction, programming, and operational changes. For the tourist, the EF can serve as an 'eco-label', to distinguish one type of 'green' tourism from another, creating a more informed consumer. Ultimately, the Ecological Footprint serves one purpose- to demonstrate that less ecologically consumptive tourism choices are possible for both tourists and tourism managers.

Acknowledgments

I feel privileged to have had this opportunity. These last two years have made me a more humble, if not wiser, individual. Education is not a solitary exercise, and many have contributed both directly and indirectly to this work. Firstly, I would like to thank my advisor, Dr. Judith Cukier, for her valuable insight, endless patience, and constant support. I greatly appreciate her time and effort on my behalf, and for guiding me throughout this opportunity. As well, I would like to thank my committee member, Dr. Paul Parker, for his input, guidance, and always open door. In the field, I would like to thank every hotel operator who allowed me on to their premises for an interview and to question their guests. And really, I'm not selling anything, honest!

A very special thank you to my parents and family, for their lifelong support in helping me to succeed. Without the loving support and daily smiles from Meaghan Gibbons I surely would not have made it here.

I am extremely lucky to have met a remarkable group of friends over the last 2 years. Your contributions are many, and I hope that these bonds continue to strengthen after our time at Waterloo. An enormous 'thank you' and high-five goes out to Derek Robinson and Jon Oraziotti, for always being willing to talk, listen, and do it up, but more importantly, for being 'the brothers' (see Robinson, 2003). More shout-outs to Lorri Krebs for letting me distract her from her dissertation with countless questions, Patricia Fitzpatrick for the constant encouragement, the UMD Library and Ziggy's Cycle for funding my research, and Dr. Kate Connolly for suggesting this all in the first place.

It seems like I've been sitting and typing non-stop for the last two years, and honestly, I think I need a break. I hope you understand, but after a certain point, everyone needs to see what's out there beyond these familiar frames of view that we are all too comfortable with. The last thing I think any of us want is for our world to be defined by a 17" monitor, a t.v. screen, and especially the 8 ½ by 11 stock of *annals of tourism research*. Regardless, in a few short weeks it's all going into boxes, 6 years of university thoughts and things, to be trucked across the country, and opened up on a new coast, to face new challenges and weather. As I pull things down from my walls-yellowed newspaper articles, years worth of 'must do this week' notices, I come across a faded pink sheet of paper, almost buried, scrawled in my chicken-scratch handwriting. The paper dates from a time before I could even image being where I am now. It's an excerpt from Douglas Coupland's *Girlfriend in a Coma*, and in fact it's the last paragraph from the book. The rest of the book is mostly trash, fine reading for a lazy summer day, or a decent pick up from a 3.99\$ bargain bin, but the first time I read that last paragraph I almost fell over. I read it about five times in a row before closing the book, and whenever I read it now, I get chills. For one reason or another it makes me think of the positive effects that university has on young people; that it instils a sometimes-outrageous idealism that will hopefully last an entire life.

"You'll soon be seeing us walking down your street, our backs held proud, our eyes dilated with power and truth. We might look like you, but you should know better. We'll draw our line in the sand and force the world to cross our line. Every cell in our body explodes with the truth. We will be kneeling in front of the Safeway, atop out-of-date textbooks whose pages we have chewed out. We'll be begging passerbys to see the need to question and question and question and never stop questioning until the world stops spinning. We'll be the adults who smash the tired, exhausted system. We'll crawl and chew and dig our way into a radical new world. We will change minds and souls from stone and plastic into linen and gold-that's what I believe. That's what I know."

Dedication

This work is dedicated in loving memory of Margaret Johnson and Annie Cowden, two women who would have been proud to see this thesis finished.

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Chapter One

1. INTRODUCTION

The growth of tourism in many regions of the world has ignored concerns of increasing ecological resource use. Hotels, attractions and other tourism-related infrastructure are now recognised as sites of resource over-consumption (De Kadt, 1976, Hughes, 1994, Ayala, 1995, Mowforth & Munt, 1998, Akama, 1999, Honey, 1999, Cole & Sinclair, 2002, Hunter 2002, Sharpley, 2002). The tourism industry is divorced from ecological accountability, expanding as demand, not resource availability, dictates (Mowforth & Munt, 1998). Recent focus in tourism planning has shifted towards reducing the draw of tourism on the global environment. This desire for mapping the boundaries of sustainable tourism is founded on the realisation that;

“...the case against tourism is well known - that it pollutes and disfigures, corrupts traditional cultures, and overburdens local resources. But the case all too frequently is an emotive one, founded in our own prejudices and preconceptions. Precious little science has been brought to bear, largely because there is precious little science available” (Hughes, 1994, p.3).

As one of the world's largest industries, tourism plays an important role in the creation of sustainable livelihoods throughout the globe. How can the tourism industry become more ecologically sustainable? Are there specific types of tourist behaviours and tourism infrastructure that are particularly unsustainable? Could an indicator be used to measure the ecological impacts of tourists and tourism? If so, what would this indicator be? To answer these questions, and move the tourism industry towards a sustainable state, an examination of the ecological resource use of tourists and the industry that supports and exploits this resource use is necessary.

The Ecological Footprint can be used as a method to compare the resource use of different types of tourist behaviours and choices. The Ecological Footprint examines the amount of natural resources required to support a specific type of behaviour, business, or process (Wackernagel & Rees, 1996). The Ecological Footprint holds promise as a tool for tourism managers and political decision makers, as it aggregates many areas of ecological impact into a single indicator. The EF is measured by the area (ha) of productive land needed to support an individual for an indefinite period of time. This common value allows for comparisons between different types of tourist facilities, transportation methods, infrastructure, services and even specific behaviours. With this tool, a nation, region, or

individual business can identify the relative resource consumption of their tourist operations, and estimate their greater ecological impact on the host area. Based on the results of this indicator, policies and initiatives to promote sustainable activities and industry can be developed.

Research discussed herein is based on survey data collected from a wide range of tourists, segmented by accommodation choice. Surveys collected demographic data and responses to a series of Ecological Footprint questions (see Appendix 1). Personal interviews with tourist accommodation managers were also conducted and provided measurements of accommodation resource consumption. Once aggregated, these sources of data were used in the creation of an Ecological Footprint for each tourist. The similarities and differences in resource use for each style of tourism, accommodation, transportation and activity were then compared. Additional analysis based on demographic factors, such as age, family unit, income, expenditure, nationality, and level of education, were included to add further detail.

1.1 Problem Statement, Goals and Objectives

In order for any discussion of sustainability to progress from the theoretic towards meaningful action and results, a method and scale of measurement must be available for use. In a broad sense, this research attempts to quantify the ecological resource use of different types of tourism. It is recognised that before any meaningful policy or change can be enacted, a greater understanding of the current state of the tourism industry is necessary. The goal of this research project is to quantify, evaluate, and compare the ecological resource use of different tourist choices, including; accommodation, food, transportation and activity. This goal is addressed by the following objectives:

1. Outline the pertinent academic discussion on sustainability, tourism and sustainability, and the Ecological Footprint.
2. Create and compare Ecological Footprint (EF) models for a variety of tourist types within southern and central Ontario.
3. Evaluate the effectiveness of the Ecological Footprint model, and its application to a time-limited human behaviour, namely tourism.

1.2 Thesis Outline

The thesis is organized into five chapters. Chapter One presents the basic outline of the research, identifying goals and briefly introducing the study. Chapter Two, the review of literature, explores the

key ideas within sustainable development, and seeks to connect these to a discussion of sustainable tourism. A brief outline of the Ecological Footprint model, its major characteristics and assumptions is also discussed. Two case studies of previous research on sustainable tourism and the Ecological Footprint are outlined. Chapter Three explains the mechanics of this project; the research approach, methods of data collection, assumptions, and limitations. Chapter Four presents the results of the data collection, focussing first on the demographic characteristics of the sample, then Ecological Footprint data, organized by type of tourist accommodation. Chapter Five will connect the results from Chapter Four with the academic literature from Chapter Two, and expand on several key themes of the research. Also included in Chapter Five are broader academic implications, directions for future academic research, and a discussion summary. Chapter Six will conclude this thesis.

2. STATUS OF RESEARCH

2.1 Sustainable Development

In its broadest sense, sustainable development is “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (WCED, 1987, p.43). This reference, widely cited, has become an important definition for a generation of environmental resource managers and has led to a spate of arguments over its vague implications. The multiplicity of factors affecting the social, economic and environmental makeup of an area has led to only a general definition of sustainable development (Mitchell, 1997).

Two major schools of thought have emerged, firstly, the definition of sustainable development by a set of ecological *critical limits* (Sagoff, 1988), and secondly, as a complex interplay of the *competing objectives* of ecology, economy, and society (UNDP, 1994, Carvalho, 2001). These two mainstream ideas of sustainable development will be explored in further depth. Each of these schools of thought contains both positive and negative attributes, but effective management decisions can only be made with the fusion of both (Mitchell, 1997).

2.1.1 Critical Limits Approach to Sustainable Development

The idea of sustainable development as the identification of a set of critical ecological limits was one of the earliest attempts to define and operationalise the concept (Sagoff, 1988). Building on a long history of carrying capacity research beginning with Thomas Malthus and more recently the ‘limits to growth’ movement of the 1970’s, this view of sustainable development has met with both praise and criticism (Norgaard, 1988). This viewpoint holds that there exists an ultimate ecological limit to the natural environment and that sustainable development involves reducing the human use of natural resources to below this limit (Sagoff, 1988, Carvalho, 2001). “The essence of sustainable seems to be to limit development. Instead of ‘more is better’, a slogan was launched claiming that ‘sufficient is better’” (Joseph, 2001, p.219). In order to become ‘sustainable’, an industry, country, or individual lifestyle needs to prove that they are consuming no more than their ‘fair share’ of a resource (Meadows et al, 1972). This assignment of a numerical value to human ecological resource use has

the benefit of allowing more precise management initiatives and increasing the scientific legitimacy of the concept of sustainable development (Wackernagel and Yount, 1998).

Despite its quantitative advantages, the use of this critical limits approach has been widely criticised (Carvalho, 2001). The measurement of environmental limits is a process open to a variety of interpretations and methods, and although many notable attempts have been made, academic opinion has found little agreement on the topic (Carvalho, 2001). The recent development of indicators such as the Ecological Footprint have addressed previous shortcomings by attempting to comprehensively measure a variety of consumption areas within one indicator (Wackernagel and Rees, 1996). This Ecological Footprint tool will be further explored in a later part of this chapter.

A major criticism of the critical limits approach is that it is uni-dimensionally focused on ecological aspects of sustainable development. “Criteria for sustainability should include not only environmental stability and improvement, but social, political and economic justice, improvement in the quality of life of vulnerable sections of the population at low cost, and an improvement in the overall status of women” (Parayil, 1996, p.952). While the idea of ecological limits research is valuable for quantifying the impact of human activities on the natural environment, the underlying problems of humanity require an interdisciplinary view. In this sense, any examination of the ecological impact of tourism should be considered as a starting point only for further research into the overall sustainability of tourism development. The research conducted in this study, while seeking to clarify the ecological resource use of tourists, would be ideally placed within a framework that explores the social and cultural impacts of tourism. This interplay of ecological, social, and cultural factors and the development of sustainable tourism are further discussed in sections 2.1.2 and 2.1.3.

2.1.2 Competing Objectives View of Sustainable Development

“The problem with development is that it implies movement towards a goal. Through the years, this movement has focused primarily on economic growth.” (Constantino-David, 2001, p.232).

Seeking to refute the economic focus of global development, the competing objectives approach provides a holistic view of sustainable development. This school of thought takes into account the interplay of social, economic and environmental factors within a humanistic context (UNDP, 1994; Carvalho, 2001). A major indicator for this type of sustainable development is quality of life, measured by the Human Development Index (HDI) and Human Poverty Index (HPI), both

measures produced by the United Nations Development Programme (UNDP, 1994). Quality of life is used as a measure of relative development instead of Gross Domestic Product (GDP), widely recognised as an inadequate and economically biased measure of overall development (UNDP, 1994).

“Economic growth and its consequent patterns of consumption cannot be equated with an improvement in the quality of life. In fact, while the pursuit of economic growth has indeed produced increases in trade, investment, and output in general, it has also resulted in widening disparities and inequalities among people and nations. The transactional and utilitarian nature of the market has further disempowered large numbers of people and marginalized their environments.” (Constantino-David, 2001, p.233).

From the view of competing objectives, sustainable development involves a rethinking of established global systems, and requires a focus on political, cultural and quality-of-life issues.

2.1.3 Sustainable Tourism

In recent years the initial broad concepts of sustainability have been incorporated into an ongoing discussion of tourism development. The potential for sustainability within tourism can be defined in a number of ways. Perhaps one of the more inclusive definitions is that provided by the World Tourism Organization, which states that:

“Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems.” (World Tourism Organisation, 2003).

This definition, a refinement of Bruntland Commissions’ general treatise, can be considered to follow a competing objectives view of sustainable development. Not only is tourism identified as an economic activity with local benefits, but also that this can be provided with neutral global costs, for an indefinite period. While this definition of sustainable tourism development has only recently emerged, the need for increasing the sustainability of the global tourism industry has long been identified. As one of the more prolific world industries, tourism has fallen under pressure in many locations to quantify its resource impacts. In the early days of mass international travel, tourism was considered an ideal vehicle for investment and development (Sharpley, 2002). Not only was tourism seen as a thoroughly “green” industry, “free of the environmental impacts attributed to manufacturing, mining, logging and intensive agri-business”, but also as a valuable economic contributor (Lane, 1994,

p.19). Several locations experienced remarkable success, turning what appeared to be a dismal future into a viable industry (deKadt, 1976). All was not perfect in these resort lands dominated by Marriott, Hyatt, and Hilton. Tourism was not simply "...about redistribution or switching effects: spending money earned in one place in another" (Craik, 1995, p.92). The existence of a "dark side" to tourism had been documented and has become a topic of great interest to researchers (de Kadt, 1976). While tourism may have a number of positive outcomes, negative impacts do exist (de Kadt, 1976; Craik, 1995; Mowforth & Munt, 1998; Honey, 1999; Sharpley, 2002). The natural environment is one of the areas that can be hardest hit by tourism development. Not only in a local sense, but also in a global manner, tourism activities and infrastructure represent a significant draw on ecological resources (Mowforth & Munt, 1998, Hunter, 2002). Despite the many benefits of tourism, from economic revitalisation, to an increased level of cultural understanding, it still remains a decidedly consumptive industry (de Kadt, 1976; Butler, 1993; Mowforth & Munt, 1998).

There is little doubt that tourism, much like any human activity, consumes natural resources. Hotels, restaurants and attractions draw on local resources, such as electricity, sewerage and food stocks, in a much more dramatic fashion than the homes of long-term residents (Mowforth & Munt, 1998). Increasing demand may also be placed on local agricultural capacity, with tourists siphoning off premium-grade produce, leaving shortages and inferior product for local consumption (Martin de Holan & Phillips, 1997). This may in turn lead to local overproduction to meet demand and accelerate environmental degradation of what was once a renewable resource. By trying to support a large number of consumptive tourists in addition to the local population, it is no wonder that movement towards tourism sustainability is difficult (Mowforth & Munt, 1998). In essence, a tourist area is expected to carry the extra ecological burden of the visiting holidaymaker. The demand for products and resources for tourist use must be satisfied, and if local production fails, operators must turn to other sources. Thus, an increasing reliance on imported goods from other areas occurs to satisfy tourist demand for consumption. In addition to this demand, energy and capital costs are required to import goods, making catering to tourists both environmentally and economically taxing (Robinson, 1999).

Recent criticism has been levelled at some tourism products such as alternative tourism, nature-based tourism, and ecotourism. In many cases, these terms are used interchangeably to indicate forms of tourism that are more sustainable, and have a claimed lower level of ecological resource use (Hunter, 2002). The overall positive effect that such types of sustainable tourism have on a destination, compared to the potential benefits of conventional forms of tourism have been questioned

(Sharpley, 2002). The ability of small-scale or alternative forms of tourism to fit the apparent mould of sustainability can result in a situation where sustainable tourism becomes "...both a prescriptive and restrictive perspective on tourism development which limits the potential for development through tourism" (Sharpley, 2002, p.333). All too often tourism is seen as not simply one of many possible approaches to achieving sustainable development, but rather as the default solution to all development problems (Hunter, 2002). Negative outcomes related to the development of sustainable tourism abound, as some 'sustainable' tourism practices can appear decidedly anti-progress and anti-development, contributing little to the local economy, quality of life, or economic development (Sharpley, 2002). This debate centres on whether there can be a form of tourism that is both a worthwhile investment from an economic and development perspective, yet ecologically and socially sustainable. The creation of an indicator to allow a comparative measure of different styles of tourism development and their associated ecological costs is one step towards a firmer understanding of the role of tourism in sustainable development (Hunter, 2002).

2.1.4 Tourism as a Component of a Sustainable Lifestyle

Sustainable tourism is often discussed in the context of the destination. Specifically, sustainable tourism is seen as a way to achieve the environmental, social, and economic goals of sustainable development at the site of tourism consumption. This destination-focused outlook ignores the contribution of the tourism experience to the overall yearly ecological impact of the tourist.

Western lifestyles have been roundly criticized as materialistic, over indulgent, and environmentally damaging (Wackernagel & Rees, 1996; Chambers, Simmons, & Wackernagel, 2000). The ecological cost of the everyday Canadian life (including tourism) has been calculated using the Ecological Footprint (EF) at 8.8 hectares per person (World Wildlife Fund, 2002a). This Ecological Footprint, to be explained in later chapters, is the amount of land continuously required to support the average Canadian. This value of 8.8 hectares places the Canadian lifestyle as one of the most consumptive in the world, far above the hypothetically sustainable level of 1.9 hectares (World Wildlife Fund, 2002a). This research seeks to measure the contribution that tourism makes to the total Canadian EF, as well as the hypothetically sustainable global EF. Tourism is a vehicle for consumption, whether through travel from place to place, at the site of accommodation, or through a variety of tourist activities (de Kadt, 1976; Mathieson & Wall, 1982; Hunter 2002). With the Ecological Footprint, resource use is examined at the level of each individual, and specific choices (transportation type, accommodation type, food) are reflected in a personal footprint. If measured at

the individual level, could tourism be considered a component of a sustainable lifestyle, or is it simply another way in which western society exceeds the ecological boundaries of the planet? These are the questions to which the Ecological Footprint aims to provide clarification.

2.2 Measuring Sustainability

“...there are no satisfactory indicators of carrying capacity or the ability of environments to sustain tourism. All too often, the first indicator of non-sustainability is the decline of attractiveness perceived through a decline in visitor numbers, or undesired change in the human physical environment of the destination area. In many cases such indications come too late for satisfactory remedial action, even if that had been possible (Butler, 1993, p.39).

This quote underscores the desire for an instrument that measures the ecological impacts of tourism. In order for policy and structural changes at a destination, information on the relative resource use of different types of tourism and tourist behaviour is essential. This thesis deals with the adaptation of the Ecological Footprint concept, originally intended for measuring the general ecological impact of an individual lifestyle, to tourism.

2.2.1 Ecological Footprinting: The Concept

Often considered a primary focus of sustainable development, the reduction in resource use and environmental degradation is key to the preservation of natural capital. Integral to this goal is a system of measuring the draw of human activity on the environment. Many sustainability indicators have been proposed, ranging from those based on key global events (an end to aquifer depletion, for example) (Ayers, 1995), to those that incorporate economic well-being and ecological performance (Rennings and Wiggering, 1997), while still others question the use of assigning wild estimates to the indefinable value of natural resources (Toman, 1998; van den Bergh and Verbruggen, 1999). While each of these methods of indicating resource use, or progress towards sustainability has value, the Ecological Footprint has emerged as a one of the more tested and implemented methods of ecological resource accounting. The following section will explore the foundations of the Ecological Footprint and its potential for application in tourism.

The Ecological Footprint is a measure that aggregates data to compare the resource use of one lifestyle versus another (Wackernagel and Rees, 1996). Simply put, “Ecological Footprint analysis is an accounting tool that enables us to estimate the resource consumption and waste assimilation requirements of a defined human population or economy in terms of a corresponding productive land

area.” (Wackernagel and Rees, 1996, p.9). The Ecological Footprint (EF) calculates consumption and waste assimilation based on a number of factors, from fossil fuel use to composition of diet. The end product is a measure of hectares of continually productive land, with world average productivities, using prevailing technologies, required to support the lifestyle of one citizen of a specific population. For example, in 1999 the world average footprint was calculated at 2.3 global hectares per person. This means that 2.3 hectares of continuously productive land and water with world average productivity were required to support each human on the planet (Wackernagel et al, 1999; World Wildlife Fund, 2002a). This same study calculated the available bio capacity of the earth's productive land (cropland, forests, productive water, minus deserts, ice caps, and built up land) as 1.9 global hectares per person. Comparing these two numbers shows the world in a state of ecological overshoot. One can quickly understand that humanity in general is consuming resources in an unsustainable fashion, and is using the natural capital of the earth to support this over consumption. Resources are being depleted faster than they can be replaced, and the ability of the earth to renew its resources is compromised.

The footprint of humanity (average 2.3 hectares per person) is not evenly distributed throughout the globe. When one looks at the Ecological Footprint on a country-by-country basis, severe disparity is evident. For example, the Canadian footprint is estimated at 8.8 ha./person, the Costa Rican footprint at 1.95 ha./person, and the Indian footprint at 0.77 ha./person (Wackernagel et al, 1999, World Wildlife Fund, 2002a). This simple comparison immediately gives an idea of the level of resources consumed by citizens of different countries, with a wide range of lifestyles. The essential message of the EF is that “...a world upon which everyone imposed an over-sized Ecological Footprint would not be sustainable-the EF of humanity as a whole must be smaller than the ecologically productive portion of the planet's surface.” (Wackernagel and Rees, 1996, p.9). With this statement, the EF seeks to apply limits to the levels of human resource use, based upon a balance between consumption, waste assimilation and available land to support these activities. The EF is not solely based on reducing ecological consumption. Many countries of the world have severely undersized footprints, and in this sense the EF is used as an indicator of under consumption. This is a key part of the Ecological Footprint; that it promotes global equality in resource use, as a way of promoting an equal quality of life for all (Wackernagel and Rees, 1996).

The Ecological Footprint model is most useful as a tool for management when used to highlight a gap between two or more individuals or groups, and suggest areas for movement and

change. Equality in global resource use is one of the driving messages that underscore many individual EF analyses.

“To recognise that not everybody can live like people do in industrialised countries today is not to argue that the poor should remain poor. It is to say that there must be adjustments all round and that, if our ecological analyses are correct, continuing on the current development path will actually hit the less fortunate hardest. Blind belief in the expansionists’ cornucopian dream does not make it come true-rather it side-tracks us from learning to live within the means of nature and ultimately becomes ecologically and socially destructive.” (Wackernagel and Rees, 1996, p.16.)

In a cruder sense, the Ecological Footprint is about staking claim to the earth’s resources in an equitable manner. Some citizens of the world have over-sized footprints and others are dramatically undersized, so much so that survival is questionable. The equalisation of resource use, while maintaining a respectable quality of life is one primary goal of sustainable development (Wackernagel and Rees, 1996). The EF concept then is an indicator of current-state sustainability (or lack thereof), placing all humans within a common scale. In this way, the EF not only raises awareness of currently unsustainable behaviour, but also highlights where action could be taken (Wackernagel and Rees, 1996; Costanza, 2000). “Ecological footprints can become an easy-to-read measurement tool for ecological sustainability. By summarizing the diverse ecological impacts in an ecologically meaningful way, it helps to communicate the magnitude of the issues and provides a context for tangible action.” (Wackernagel et al., 1999, p.389).

The process of deriving this hectare figure is admittedly imperfect. Mathis Wackernagel and William Rees, inventors and key proponents of the method, acknowledge that the EF is only a rough approximation of the amount of environmental support demanded by humanity, as many key factors such as the cumulative impacts of air and water pollution are not taken into account. As well, because “...footprints do not measure people’s quality of life, the other imperative for sustainability, they need to be complemented by social indicators to cover progress toward sustainability comprehensively.” (Wackernagel et al., 1999, p.389). A key limitation to the EF is its inability to measure beyond raw resource use, to incorporate the complex underlying social and cultural factors of sustainability.

“Nor does it prescribe solutions. Rather it provides a framework for making decisions that are consistent with the idea of living on the (ecological) interest of our planet rather than liquidating the capital. In short, it aims to; generate the relevant questions that policy circles need to address if they are serious about sustainability; detail the ecological costs and benefits of particular decisions; and identify intervention points for action for sustainability.” (Redefining Progress, 2002).

Thus, the Ecological Footprint is most suited as a starting point to further investigation on the sustainability of tourism, a discourse that must include topics of society and culture as well as the environment.

2.2.2 Ecological Footprinting: The Calculations

As a tool for measuring the sustainability of a specific human lifestyle, the Ecological Footprint has a number of positive features. The EF can "...track energy and resource throughput and translate them into biologically productive areas necessary to produce these flows." (Wackernagel et al., 1999, p.376). This in turn creates a level field on which dissimilar commodities can be compared. In calculating the EF, the variable measured is the amount of nature (in global hectares of continually productive land, at world average productivity) that is required for one individual to live their chosen lifestyle. This nature takes the form of energy, land space, fossil fuels, food, and dozens of other items. For the purposes of the EF, all of these items are amalgamated into "...the biologically productive and mutually exclusive areas necessary to continuously provide for people's resource supplies and the absorption of their wastes, using prevailing technology." (Wackernagel et al., 1999, p.376). Thus, the EF produces an area value that is unique and wholly owned by the individual under study, as one's footprint space cannot be shared, and is instead competitively won from all other living organisms in the world (Wackernagel and Rees, 1996).

In order to provide a foundation, the "Ecological Footprint calculations are based on five assumptions:

1. It is possible to keep track of most of the resources people consume and many of the wastes people generate.
2. Most of these resource and waste flows can be converted into the biologically productive area that is required to maintain these flows.
3. These different areas can be expressed in the same unit (hectares or acres) once they are scaled proportionally to their biomass productivity. In other words, each particular acre can be translated to an equivalent area of world-average land productivity.
4. Since these areas stand for mutually exclusive uses, and each standardized hectare represents the same amount of biomass productivity, they can be added up to a total—a total representing humanity's demand.
5. This area for total human demand can be compared with nature's supply of ecological services, since it is also possible to assess the area on the planet that is biologically productive." (Redefining Progress Website, June 14th, 2002).

Footprint components are measured as impacts on one or more of the following land use types; fossil energy, arable land, pasture, forest, built-up land, and sea. The five latter categories represent the generalized location of appropriated land area that constitutes the Ecological Footprint (Wackernagel and Rees, 1996). The fossil energy category is reserved for the ecological space required to replace the biochemical energy of used fossil fuel and the absorption of its waste products (Wackernagel et al. 1999). The actual footprint calculation itself, in its most basic form is *total consumption of a product divided by average yield per hectare for that same product*. This simple concept works well for biologically produced and consumed products, such as food and timber. For manufactured products, or those that require the use of fossil fuel energy, the calculation becomes more complex. For this more detailed examination, the Ecological Footprint involves a series of component calculations to determine total footprint size. The following example of a footprint calculation for car use in the U.K. is taken from Chambers, Simmons, and Wackernagel, (2000).

“The majority of the footprint is concerned with the energy used in manufacturing, maintaining and fuelling the car. These figures are then translated into CO₂ emissions and converted to the associated land area needed to sequester the carbon.

One estimate of manufacturing and maintenance energy is that given by Wackernagel and Rees (1996). They estimated the equivalent of 15 per cent of the fuel energy use is needed to manufacture and maintain a vehicle with an extra 30 per cent for the construction and maintenance of the road infrastructure. The authors refer to this as the ‘uplift factor’. Turning to fuel consumption, in the UK 99 per cent of cars are petrol and 1 per cent are diesel. Here we use the petrol consumption of the average car, which is reported as 11km/litre. Therefore, one estimate of the energy footprint per car-kilometre is:

Fossil Energy Land: $(1/11) * 1.45 * 2.36 * 1.92 = 0.62$

$0.62 * 1.17 = \mathbf{0.73m^2}$ per car-kilometre per year, where:

1/11 converts kilometres per litre to litres per kilometres of petrol

1.45 is the uplift factor

2.36 is the weight of CO₂ in kilogrammes produced per litre of petrol

1.92 is the area (m²) of average forest land required to sequester one kilogram of CO₂ per year

1.17 is the equivalence factor for forest land” (Chambers, Simmons, and Wackernagel, 2000, p.85).

The total EF for car travel is not yet complete. The value for built up land due to roadways must also be calculated and added to the total. The web of resource use must be fully taken into account, yet not double counted. For example, once a value for roadway built up land is calculated under car use, it must not be included in the cost of food delivery vehicles, because all motor vehicles

use the same set of roadways. Instead only fossil fuel use is added to footprint values for food delivery vehicles, and all road construction and maintenance costs are calculated for car use only. With all of these calculations, when there is some doubt or the researcher has the option of multiple data values, the conservative value is used (Wackernagel and Rees, 1996). Thus, the EF calculation is always considered an understated estimate of ecological resource use.

2.2.3 The Ecological Footprint of Tourism

Recent academic articles have called for investigation into the use of the Ecological Footprint as a tool to compare the sustainability of various types of tourism (Hunter, 2002). The ultimate goal of such an exercise would be to establish a measure of what is and what is not sustainable tourism. Supporting this idea is the work of Wackernagel and Yount (2000) who suggest the use of the Ecological Footprint to assist decision makers in identifying sustainable options. This idea is expanded by Hunter (2002), who makes a case for the use of the Ecological Footprint to clarify the status of sustainable tourism. Hunter views the current academic debate over sustainable tourism as falling into two categories, those with 'light green', or 'dark green' views. Light green (also called 'weaker') views refer to those who imagine sustainable tourism to "...focus on the importance of continued economic growth in the tourism sector and the maintenance of sufficient environmental quality at the destination area to ensure the continued survival of existing tourism products and the development of new products at exciting and new locations" (Hunter, 2002, p.10). Sustainable tourism, according to this viewpoint, is seen more as product and is exemplified by specific types of tourism, such as nature tourism or ecotourism. On the other end of Hunters' scale, dark green (also called 'stronger') views of sustainable tourism "...espouse the need for proactive or anticipatory tourism development planning, and the systematic monitoring of changes to the natural environment/capital stock of natural resources" (Hunter, 2002, p.10). Hunter acknowledges that these ideas are "...simplifications, but do, nonetheless, capture (it is suggested) the essence of the emerging pluralism in academic sustainable tourism thinking" (Hunter 2002, p.11). Where the Ecological Footprint comes in to play is in quantifying the difference between these two types of tourism development, in such a manner as to be useful for decision makers and for academic discussion. This is one of the key goals of this research; to compare the Ecological Footprints of a variety of tourism types. The following paragraphs explore academic research where the Ecological Footprint has been used as an indicator of tourism ecological resource use.

The application of the Ecological Footprint concept to the study of tourism has been explored by a very small number of researchers in recent years (Hunter, 2002; Cole and Sinclair, 2002; World Wildlife Fund, 2002). Two of the more widely available examples include The World Wildlife Fund's "Holiday Footprinting: A Practical Tool for Responsible Tourism" (2002), and Cole and Sinclair's "Measuring the Ecological Footprint of a Himalayan Tourist Centre" (2002). Each work uses the Ecological Footprint model to compare different aspects of the tourism experience. The World Wildlife Fund example looks at the specific resource use of two different resorts, one in Majorca, and the other in Cyprus. These two package holidays are analysed to provide an initial measure of the ecological cost of Mediterranean resorts. Cole and Sinclair use the Ecological Footprint to measure the change in resource use over time for the village of Manali, in the Himalayan region of India. Both of these studies illustrate the potential for the application of the Ecological Footprint in tourism planning. These research initiatives will be explored in the following paragraphs, and their contribution to tourism planning detailed.

In an attempt to quantify the ecological resource use of a typical package holiday, the UK branch of the World Wildlife Fund sponsored an environmental consultant firm, Best Foot Forward, to create a method of tourism ecological accounting. Their research uses the Ecological Footprint concept to compare components of ecological impact (bio-reproductive land, bio-reproductive sea, built land, energy land, and area for biodiversity) for both a family and couples-style resort vacation. This total ecological value is expressed in hectares per bed night, and in total hectares for a year of resort operations. This analysis takes aim at the resort and package holiday company in order to find ways to decrease the ecological resource use of its operations. The Ecological Footprint of each resort is broken down into a number of key areas of ecological impact; air travel, waste, food, and hotel energy use. Each of these sectors is then discussed in regards to areas for improvement. Suggestions range from waste minimisation (recycling and other waste diversion) to the development of renewable energy sources, all hallmarks of the greater, non tourism-specific sustainability debate (World Wildlife Fund, 2002b). It is noted that this analysis is of a preliminary nature, and is marketed towards the conscientious resort or tourism operator with an eye to increasing sustainability and reducing costs through efficiency.

The majority of data used in this analysis was provided by Thompson Holidays, a UK tour operator. Due to the all-inclusive and reasonably contained nature of resort tourism, data on resource use was readily at hand. Tourism-specific activities (such as day excursions) were all organized by the resort, and thus the fuel used, vehicle type and distance travelled were easily available. Food was

calculated as tonnage based on origin (local, national, or imported) rather than by specific type (beef, pork, veggies) due to the uncertainty of what guests were actually eating. Commodities purchased by the resort and energy used were adjusted to yield a hectare value and divided by the number of total visitors per year. Considering the scope of running a resort (over 200 rooms each), the quantity and quality of data collected attempts to address as wide a range of resource consumption as possible, including many tourism-specific areas.

This report calculated that the average Ecological Footprint per bed night was 0.03 hectares for Majorca and 0.07 for Cyprus (World Wildlife Fund, 2002b). The larger footprint size of the Cyprus vacation was primarily due to the longer air travel from the United Kingdom. In order to make a case for the sustainability of tourism, the authors discuss this number as a percentage of an individual's 'Fair Earth Share', or the globally sustainable footprint size (approximately 1.9 hectares). The conclusion is made that nearly half of an individual 'Fair Earth Share' could be used up in a two-week vacation to Cyprus (World Wildlife Fund, 2002b). Great effort is made by the authors to state that this report is simply a starting point for further investigation. To that effect, the report closes with the introduction of a free interactive tool for other resorts interested in estimating their own Ecological Footprints, as a precursor to a full (and potentially costly) audit by the consultant team. In this manner, the EF is promoted as both an evaluative and an educative tool for resort managers.

Victoria Cole and John A. Sinclair approach the use of the Ecological Footprint model from a decidedly different standpoint than the World Wildlife Fund, in their 2002 article "Measuring the Ecological Footprint of a Himalayan Tourist Centre". Using the Indian town of Manali as a case study location, the authors explore the change in Ecological Footprint of the town from 1971 to 1995. These dates were chosen because they represented a time in Manali before widespread tourism development (1971), and the present state of tourist ubiquity (1995). The majority of the data used to calculate the Ecological Footprint was based on the average consumption of an Indian citizen, according to the United Nations Food and Agriculture Organisation (Cole & Sinclair, 2002). The Ecological Footprint was then constructed using the average footprint size for an Indian citizen to represent each permanent resident of Manali in both 1971 and 1995. The total EF for an Indian citizen in 1971 was 1.1 hectares, and in 1995, 1.3 hectares (Cole & Sinclair, 2002). The Ecological Footprint of tourists and seasonal residents was divided to represent the average amount of time spent in Manali (2 months for seasonal residents, 3 days for tourists) (Cole & Sinclair, 2002). Thus, the comparison between the footprint of Manali in 1971 and 1995 was largely based on the differences in size of the community. While the number of permanent residents grew from 1,800 to 2,604, the number of tourists (mostly domestic)

increased from 18,500 to 382,569 (Cole & Sinclair, 2002). Accordingly, the authors found that the size of Manali's Ecological Footprint, especially that of the tourists, increased as well.

This EF analysis of Manali is used to highlight several areas where tourism has caused unsustainable development. Fossil fuel use, deforestation, and waste production are tagged as issues that need to be dealt with to improve the sustainability of Manali. This research uses the Ecological Footprint to ably demonstrate not only how the consumption of tourists can outstrip that of the hosts, but also how tourism can cause negative change over time to the ecological character of a specific place. The Ecological Footprint is used to evaluate the impact of tourism, providing a tool for managers and planners upon which to base policy decisions.

In summary, these two studies show the potential for the Ecological Footprint as an indicator of ecological resource use in tourism. The specific types of tourism studied in both cases are very narrowly focused. The World Wildlife Fund report is limited to studying resource use within the all-inclusive resort industry, in a top-down manner. The value of this report is twofold; first, to demonstrate to the tourist the impact that their vacation has, compared to their total Ecological Footprint for an entire year, and second, to stimulate change from within the resort tourism industry, pointing towards a more sustainable type of operation. In this case, the EF is used primarily as an evaluative tool (for managers to improve operations). The article by Cole and Sinclair also examines only one particular type of tourism, mountain tourism in the Indian Himalayas. The focus in this study is on quantifying the direct ecological effects of tourism on one town, over time. The methodology used in this particular case outlined the effects of tourist carrying capacity for a small mountain town, but did not differentiate among individual tourist behaviours or variation within transportation, activities, or accommodation types. The value of this article is in that it takes a very holistic view of tourism development by examining effects over a larger area, and over time. In this context the Ecological Footprint could be used as an evaluative tool for use by planners and managers to compare and measure the impacts of potential purchase, operation, or management decisions.

2.2.3 Tourism, Transportation and Sustainability

The Ecological Footprint analysis attempts to break the tourism experience up into various components for comparison and analysis. Of many possible tourism components, transportation, and more specifically, air transportation, has been identified as a significant area of ecological resource use (Gossling, Hanson, Horstmeier, and Saggel, 2002; Hoyt, 2000; World Wildlife Fund, 2002b). A

recent study conducted by Gossling, Hanson, Horstmeier, and Saggel, examined tourism development in the Seychelles, and concluded that "...the major environmental impact of travel is a result of transportation to and from the destination: more than 97% of the energy footprint is a result of air travel" (Gossling et al, 2002, p.208). The significant contribution of air travel to the total Ecological Footprint of the tourist is echoed in the work of the World Wildlife Fund, and their Holiday Footprinting Report, where air travel was identified as the largest component area of ecological resource use (World Wildlife Fund, 2002b). Both of these studies use the Ecological Footprint to present air travel as an unsustainable, yet growing, component of a rapidly globalizing tourism industry. The negative environmental effects of increasing levels of air travel are dire, when one considers the input of aviation to atmospheric concentrations of CO₂ and NO₂ that contribute to climate change (Gossling, 2000).

The ecological costs of air travel severely detract from the potential for sustainable tourism development, and may indeed call into question the utility of the term itself. "As long-distance travel contributes substantially to global warming, the current understanding of tourism as a sustainable economic activity needs to be revised" (Gossling et al., 2002, p. 207). While ecological efficiency gains become a priority at the local or destination level, the global environmental costs of air travel, undoubtedly a more difficult challenge with which to deal, goes under explored.

"Current efforts to make destinations more sustainable through the installation of energy-saving devices or the use of renewable energy sources can only contribute to marginal savings in view of the large amounts of energy used for air travel. Any strategy towards sustainable tourism must thus seek to reduce transport distances, and, vice versa, any tourism based on air traffic need per se to be seen as unsustainable" (Gossling et al., 2002, p.208).

Air travel has created many positive local benefits, and allows for redistribution of money throughout the globe. However, reducing the flow of tourists travelling via unsustainable air transportation could inadvertently deliver a crippling economic blow to the international tourism industry, and those who depend upon it. The unsustainable transportation of individuals has become a firmly entrenched part of tourism economics, and as such, change to the status quo is questionable (Hoyer, 2000).

"Tourism cannot be detached from mobility and transport means. Reduced mobility will result in reduced tourism volumes. A basis of bicycle, bus, and train will, in particular, lead to other types of tourism than those founded on the car and plane. In this respect, we are faced with fundamental challenges in terms of developing the aims and means to realise a policy for sustainable tourism. This demands a coupling of the two concepts. A tourism which is developed

detached from the restrictions implied in a sustainable mobility, will not be in accordance with the demands for sustainable development” (Hoyer, 2000, p.156).

With no immediate replacement for air travel, and barring a great technological leap forward in airplane efficiency and capacity, tourism destinations based on air arrivals are of an unsustainable nature, regardless of the progress achieved at the destination level. The environmental impacts of tourism transportation, such as climate change, are global in nature, and as such, a global perspective is required when planning for the development of sustainable tourism.

2.3 Examples of Sustainability: “Green Hotels”

Of recent interest in the context of sustainable tourism is the idea of a green hotel. “An environmentally sensitive hotel, ecotel or ecohotel alter its equipment, policies and practices to minimize the strain of its presence on the environment, particularly in the areas of energy and waste management, water conservation, and purchasing” (Ayala, 1995, p.351). Increasing interest in ecotourism has spurred the development of this type of accommodation, leading to the development of both dedicated eco-lodging, and a general increased level of awareness of environmental issues in the hotel industry (Ayala, 1995). This type of development has spin-off benefits for tourism in an entire region. As an integral part of the tourism landscape, hotels and accommodation play a significant role in the resource use of the guests they support. It has been suggested that “...sustainable hotels lead to sustainable destinations which in turn lead to successful hotel businesses. That is, integration of parts in the larger system of tourism makes the former functionally supportive and the whole complete and thus stronger.” (Marin & Jafari, 2002, p.267).

Ayala (1995) identified three key areas that can be used to propel tourist accommodation towards the idea of sustainability. First is the incorporation of *ecotechniques*. Ecotechniques involve the use of technology to improve efficiency, reduce waste, reduce costs, and create a ‘green’ corporate image (Ayala, 1995). A change in purchasing to favour environmentally friendly suppliers is also a key part of the ecotechnique initiative. Examples of ecotechniques in practice range from a new Eco-Lodge being built from locally available materials, to a major hotel chain installing reduced flow showers and toilets. *Environmental sponsorship* is the second area identified as key to a sustainable hotel. This sponsorship involves “...a commitment to the environment of the very communities in which a hotel operates” (Ayala, 1995, p.353). In this way, the existence of a hotel makes a direct and positive contribution to the local people and environment. This can take the form of various guest donation or sponsorship programs, and through educating the tourist as to proper behaviour and

raising awareness of local environmental issues (Ayala, 1995). *Eco-packaging* is the third component in the move towards sustainability. This process involves altering the currently available tourism product to one that specifically appeals to ecotourists, or more environmentally conscious travellers (Ayala, 1995). By linking itself to nearby ecotourism attractions, and then re-marketing the hotel experience, a hotel can cement its position as a springboard for ecotourism. This serves the purpose of creating a sustainable resort-destination relationship, a symbiotic relationship of sorts (Ayala, 1995).

The idea of creating greener or more environmentally friendly hotels is one that has found broad acceptance in the tourism accommodation industry. Increasing efficiency goes hand in hand with decreasing operation costs, an objective that makes not only smart business sense, but also shows an interest in ecological responsibility. Measuring the impact of initiatives such as the ecotechniques proposed by Ayala (1995) can be done using the Ecological Footprint. Wackernagel and Yount (2000) discussed the potential applications of the Ecological Footprint, and key amongst their recommendations was the use of the EF to compare and choose amongst available management or industrial manufacturing options. Although their idea was not explicitly targeted at tourism accommodations, it is not a radical departure to see the benefit that the EF may have in measure and quantify the impacts of hotel practices. This topic is discussed in further depth, with reference to the results of this project in the discussion chapter 5.

2.4 Summary of Literature Review

Tourism is widely regarded as a major world industry. Recent interest within tourism research has focused on the development of lower ecological cost forms of tourism. Although a single definition of sustainable development has yet to find widespread acceptance, the general principles, approaches, and indeed overall desirability of sustainable tourism are positively regarded. A key component of sustainable tourism is the amount of ecological resources that tourism and tourists consume. In order to quantify this level of resource use, the Ecological Footprint is presented as one possible indicator. The Ecological Footprint is an area-based indicator that amalgamates many different areas of ecological resource use into one number; the amount of land (ha) required to support the lifestyle of one individual. The Ecological Footprint creates a value for a specific set of human activities and behaviours that can be directly compared to others. This indicator could be used in a tourism context to compare different types of accommodation, transportation, activity, and tourist food choices. This adaptation of the Ecological Footprint to tourism has been both recommended (Wackernagel and Yount, 2000, Hunter, 2002), and implemented in recent case studies (Cole &

Sinclair, 2002, World Wildlife Fund, 2002b). Despite these worthy initiatives, the use of the Ecological Footprint as an indicator of ecological resource use in the tourism industry is still in its infancy and its further development and application should be discussed

3. RESEARCH APPROACH

Within the greater sustainability debate, the Ecological Footprint has emerged as one particularly accessible method for demonstrating and comparing the ecological resource use of human activity. This research seeks to adapt the Ecological Footprint to tourism and produce an estimate of the ecological resource use of various types of tourism. This chapter will outline the data collection methods and procedures, as well as key assumptions followed during the course of this research.

In carrying out this research, the principal investigator spent 4 months conducting surveys with travellers at various types of tourist accommodations throughout central and southern Ontario. As well, surveys/interviews were conducted with managers and owners of these same tourist accommodations. These primary sources provided the data for Ecological Footprint models for 9 types of tourism, as delineated by accommodation type. In order to construct the Ecological Footprint profiles for each tourist surveyed, secondary sources of data (conversion formulas, average values) were required. The complete process of collection and interpretation of data is further explained in following sections.

3.1 Tourism and the Ecological Footprint

Currently the subject of much academic discussion, the sustainability and ecological desirability of tourism warrants further investigation. In order to calculate the resources required to support individual tourist behaviour one must look at a number of areas, such as; accommodation, activity, food, transport, and personal consumption. The complexity and variability of human behaviour, especially during discretionary time, demands the use of a flexible measurement tool, such as the Ecological Footprint. This project does not suggest that the Ecological Footprint is a scientific tool of unflinching rigour, detail and accuracy. Instead, this type of analysis shows that a numerical value can be assigned to individual behaviour, a value that allows comparison between levels of resource use. For this research, the Ecological Footprint is a great equaliser, reducing the ecological cost of the tourist experience to a single value, enabling comparison and analysis. As discussed in chapter 2, the Ecological Footprint is not intended to achieve an unquestionable level of accuracy (Wackernagel and Rees, 1996). It is instead expected to produce a 'snapshot' of ecological resource use by a certain population under study (Wackernagel and Rees, 1996). Thus, the focus of the

research approach used was not to record every detail of tourist consumption, over a large population, but instead to gather enough information to provide a basis for comparison within a select area.

3.2 Unit of Measure: The Tourist Stay

In order to create an Ecological Footprint for the individual tourist, a standardised unit of measure, “the tourist stay” was employed. This unit of measure consists of data drawn from a number of sectors; the tourist’s personal food consumption, transportation costs, activities, and the resource use of the tourist’s accommodations (land area, energy, etc.). These sectors represent two broad categories of impact; personal use (including transportation, food, and activity) and accommodation (housing), which have been identified as areas of significant consumption in the everyday lives of the average North American (Wackernagel and Rees, 1996). Thus, through examination of these same types of consumption, but in the context of a time-limited tourism experience, the relative contribution of tourism as a component of total individual resource use was determined.

For the purpose of this project, the tourist stay represents one complete series of data, collected from a number of sources. One complete tourist stay consists of; the tourist’s food consumption, the site of accommodation, tourist activities, and the methods of transportation used. In this manner, a composite figure of tourist resource use was assembled. Ideally tourist data could have been collected through participant journals, kept for the duration of the tourist experience, recording every activity, resource use, and ecological input and waste in detail (Babbie, 2001; Hunter, 2002). This method would result in a detailed Ecological Footprint, but also interfere with a tourist’s vacation time. This journal method, despite its benefits, is logistically difficult, and was not considered as a viable data collection method. As a substitute, each type of data was collected with one of two instruments; the first, a researcher-administered survey for tourists, the second, a survey/interview with accommodation managers. These data collections instruments will be discussed in greater detail in the following paragraphs.

3.3. Methods of Data Collection

In order to study the ecological resource use of different types of tourists, a variety of quantitative and qualitative data were collected. Quantitative data consisted of items used to create an Ecological Footprint (EF) for each particular tourist stay. These items, such as food consumed by the tourist, size of accommodation, and energy consumption, can be viewed in their entirety in Appendix 2, the Ecological Footprint calculation spreadsheet (Wackernagel, Dholakia, Deumling, and

Richardson., 2002). Additionally, Table 3.2 shows EF data sources and manipulations for each area. The following section will discuss how the study sample was selected, and where data for each segment of the tourist stay was obtained, as well as assumption, and limitations within the data collection.

3.3.1 Selecting the Study Sample

Accommodation choice was used to segment the sample in order to allow a comparison of different types of tourist choices. This approach to segmenting tourists differs from the more commonly used distinction based on tourist motivations, as suggested by Cohen (1972) and Smith (1977). For the purposes of this research it was felt that motivational categories would not create a suitable base for comparing ecological impacts of one tourist versus another. This is due to the wide range of travel behaviours found within each of the broad motivational categories. For example, a “mass tourist”, identified by Cohen as one who seeks the familiar comforts of home could structurally be a tourist who stays at a chain hotel and visits Disney World as the main focus of their travels (Cohen, 1972). This very same tourist could also choose to stay at a local bed and breakfast, and spend their vacation time taking in local theatre shows. Under a motivation-based typology, both of these tourists would likely fall into the same category, the mass tourist, despite their very different structural tourism choices. Thus, this research uses a structurally based tourist typology, more specifically, accommodation choice, as a basis for segmenting tourists. Throughout this document, tourists are defined and referred to by their accommodation choices. The object of this approach is not to challenge the value of a motivation-based typology, as indeed two decades of academic research has supported this distinction, but instead to propose that when looking at sustainability indicators, a more tangible classification is necessary. As we look at ways of reducing the ecological draw of individual choices (of which tourism accommodation is but one of many), it becomes important that those choices define the individual under study.

In order to distinguish different types of accommodation, a classification system used by the Ontario Tourism Marketing Partnership (Ontario Tourism Marketing Partnership, 2002) was consulted to gain a general idea of the available range of tourist accommodations in Ontario. While visiting this website the potential tourist selects the type of accommodation they are seeking, and are provided with a list of addresses and contact numbers. These accommodation groupings, with number of listings in brackets are; Bed and Breakfast (150+), Country Inn (81), Hotel (150+), Housekeeping resort/cottages (150+), Motel (150+), Motor Hotel (91), Resort (150+), Wilderness Lodge (34), Apartment Hotel (8),

Conference Centre with Rooms (10), Farm Vacation (14), Hostel (15), Houseboats (1), Motor homes (1), Native Reservations (1), Residence/Dormitories (14), Retreats (2), Spa with Accommodations (7), and Vacation Homes (10). While this listing does not contain every business that offers tourist accommodation in Ontario (campgrounds in Provincial and National Parks being a notable omission), what it does provide can be considered a listing of the range, types, and amounts of accommodation available in Ontario.

For the purposes of this research, nine types of tourist accommodations from the above list were surveyed, to provide a broad cross-section of tourism types that occur in Ontario. These particular types of accommodation were selected largely because they represent the most numerous types available, as listed on the Ontario Tourism Marketing Partnership website. These nine types of accommodations were combined into small, medium, and large-scale operations, based on the number of available spaces and general size of the infrastructure. Small-scale accommodations that were surveyed included Bed and Breakfasts, Backcountry Camping areas and Cottages. These accommodations typically had space for 2-5 tourists, and consisted of one small (2500 square foot or less) building with little other developed property. Backcountry Camping is included in this category due to its small number of physical structures and the non-permanent nature of tourist accommodation (i.e. tents). Medium-scale accommodations that were examined include Wilderness Lodges, Eco-Lodges, and Trailer Parks/Campgrounds. These types of accommodations supported anywhere from 20-80 tourists. One exception was the public Trailer Park/Campground, which had space for over 500 individuals, although much of this space is field, rather than serviced buildings. As this type of accommodation relies on non-permanent forms of shelter for tourists (tents and trailers), it was considered inappropriate to place it in the same category for comparison as a major hotel. Therefore it was compared against other medium-scale types of accommodation, which better mirror the amount of infrastructure development. Large-scale tourist accommodations surveyed included Resorts, Mainstream Hotels, and Budget Hotels, which all supported over 100 tourists, and in some cases over 500 (Table 3.1). Accommodations in this category were characterized by a greater amount of infrastructure when compared to medium-scale accommodations, and in some cases, the presence of amenities (pools, restaurants, etc.) for guest use.

In order to provide grounds for comparison between these groups, a roughly equal number of tourist respondents were sought at each type of accommodation. The total tourist survey response was 88: 34 from large-scale accommodation, 29 from medium-scale accommodation, and 25 from small-scale accommodation (Table 3.1). Of the 101 tourist surveys that were handed out, 88 were

completed, an overall survey response rate of 87%. In several cases (most notably the small-scale accommodations, where few guests were present at one time), a number of different accommodation centres were visited to gather the number of surveys required.

The selection of tourist respondents while at the survey locations was done using convenience sampling (Babbie, 2001). This method of respondent selection draws from subjects who are readily at hand, in the case of this research, those who are found in the lobby or check-in area of a particular accommodation. As well, those accommodation guests who were visibly not inclined to filling out a survey (i.e. those in a rush, tending crying babies) were passed over. Accommodation managers were selected in a similar fashion. The researcher travelled to locations with a reasonable concentration of a particular type of accommodation (Wilderness Lodges in the Huntsville area, Bed and Breakfasts in the Stratford area), and employed convenience sampling techniques. Accommodations where no manager was present, or were closed (many Bed and Breakfasts, for example) at time of contact were not included, while those that were open and able to spare sufficient time, were included. As previously noted, this accommodation sample is intended to provide a cross-sectional analysis of tourism types in Ontario. It is not intended to represent all types of tourism accommodations, nor is it proportional to the types of accommodations found in Ontario. As well, the geographic distribution of the sample was not controlled, as certain types of tourism accommodation were more plentiful in specific locations (Wilderness Lodges in the near north, Bed and Breakfasts in festival country). Future studies should give thought to restricting geographic focus, as this would allow for greater comparison of transportation distances.

Table 3.1 Accommodation Sample Distribution		
Accommodation Type	Number of Beds	Sample Size
Large-Scale		
Resort Hotel	700	6
Budget Hotel	178	18
Mainstream Hotel	192	10
Total		34
Medium-Scale		
Wilderness Lodge 1	88	5
Wilderness Lodge 2	44	3
Private Trailer Park/Campground	53	8
Public Trailer Park/Campground	557	7
Eco-Lodge 1	40	2
Eco-Lodge 2	40	4
Total		29
Small-Scale		
Backcountry Camping	N/A	6
Bed and Breakfast 1	4	3
Bed and Breakfast 2	4	7
Cottage 1	5	8
Cottage 2	5	1
Total		25

3.3.2 Location and Time Frame of Research

This research took place in the province of Ontario, during the peak tourist season (July to October) of 2002. Ontario was chosen as a site for a number of reasons. Most obvious is the geographic proximity of the researcher to a large number and wide variety of tourism accommodations. International locations were initially considered, but later rejected due in part to their uniformity in tourism types, and potential difficulty in gathering data. The seasonal timing of this research (summer/early autumn 2002) also necessitated a location that would be ‘open for business’, and be populated with tourists. Ontario was also chosen due to a minimal amount of anticipated language and cultural-conflict issues between the researcher (an Ontario resident) and accommodation managers (the gatekeepers of needed information). The selection of Ontario as a study location also seeks to comment on the resource use of western consumer societies, widely considered as over consumptive to the point of global detriment. Sustainable tourism is a concept that in academic literature is often applied to developing countries, rather than the developed world, and represents, in this researcher’s mind at least, an unequal sharing of the task of developing sustainable global industries.

3.3.3 The Tourist Survey

In order to collect data on the ecological resource use of the individual tourist, a researcher-administered survey was used (Appendix 1). This survey gathered both quantitative and qualitative data, on topics ranging from daily food consumption to demographics. A researcher-administered survey was selected as an instrument for a number of reasons. First, a survey is a quick and efficient manner in which to capture data (Babbie, 2001). As the research subjects are tourists, whose vacation time is at a premium, they were unlikely to commit large amounts of time to unpaid research. Second, as this research seeks to generalize the behaviour of the subjects to the larger population of tourists, the ability of the survey to characterize frequency of behaviour was deemed important (Babbie, 2001). From a logistical point of view, the researcher-administered survey can substantially reduce respondent confusion, “I don’t know” answers, and ensure a higher response rate. The ability of the researcher/interview to provide on-the-spot clarification to respondents was considered an important benefit of the survey method.

The Ecological Footprint model is based upon a high degree of generalisability within a given population. If conclusions are to be made from this research, the uniform definitions and carbon copy delivery of the survey is ideal (Babbie, 2001). In a similar sense, the contextual weakness the survey exhibits when confronted with questions of human social interaction was not considered a drawback when dealing with quantitative concepts, such as the EF (Babbie, 2001). Thus as a topic of study, the Ecological Footprint, and more specifically a tourist’s resource use, lent itself well to examination through the survey.

After receiving permission from the accommodation manager, tourists were approached in the lobby or common area of their accommodation and asked to participate in the study. Tourists were asked for their length of stay at the accommodation, on their average consumption, in approximate servings of various foods, as well as transportation distances, type of activities, expenditures, and demographics (see Appendix 1). If a tourist was near the beginning of their vacation, they were asked to estimate the type and quantity of food that they would consume, and the activities that they had planned. If a tourist was staying at multiple types of accommodation, they were asked to list all types and the length of stay at each. If these types of accommodation were similar (i.e. two bed and breakfast’s) they were calculated as one, using accommodation data from the tourist’s location at point of contact. If the tourist did not know where else they were staying (a frequent response at the Budget

Hotel), they simply left the area blank, and the EF was calculated for their expected time at the current accommodation.

3.3.4 The Accommodation Survey/Interview

As a major contributor to ecological resource use, the household or place of residence became an obvious area for investigation (Wackernagel and Rees, 1996). By extension the tourist's 'home away from home', is a key component of the tourist stay (Marin & Jafari, 2002). In order to gather both Ecological Footprint data and qualitative data concerning potential impacts, a survey/interview was arranged between the researcher and management. Initially accommodation managers were contacted by email, but when this failed to generate any response, a more direct approach was taken. Phone calls to accommodation combined with in-person visits resulted in a 100% response rate for this portion of the data collection, allowing the researcher access to accommodation data. As seen in Table 3.2, the type of data required to footprint this sector (such as kWh of energy used per month) could not be gathered without the assistance and permission of accommodation managers. Monthly energy usage, occupancy rates, and total area, are all items that were easily available, and thus a personal interview with a number of pre-set questions became an ideal way to gain access to this information (Babbie, 2001). Additionally, open-ended questions concerning environmental practices and policy were posed. These set questions allowed each survey to be compared with others, and place the accommodation within a broader context than the EF numbers could indicate (Babbie, 2001).

In total, 14 unique types of accommodation were surveyed, which were grouped into 9 categories for the purpose of this research. Interviews generally were completed in 20 minutes and written notes were kept. In certain cases, such as at the Budget Hotel and Resort Hotel it was quite easy to amass a suitable number of tourist surveys on the same day that the manager interview/survey was conducted. This depended largely on the day of the week (weekends, of course bringing more tourists) and the occupancy of the accommodation at that time. In other cases, such as the Bed and Breakfast, very few tourists were ever present, due to the small capacity of the accommodation itself. Because of this, multiple survey locations were used to obtain the critical number of tourist surveys for some accommodation types.

Tourism in Ontario is a highly seasonal industry. Many operations that are bustling in the summer season close down for the winter, and likewise, many tourism businesses that are snow dependent obviously do not operate outside of the winter season. The effects of variable levels of

operation are not taken into account in this Ecological Footprint study. The EF is a static measure, showing only a snapshot of ecological resource use at a particular point in time. It is likely that for most of the tourist accommodations under study, occupancy rates would be changed from those recorded during the peak season. This change in occupancy will affect the amount of built space and amount of energy per guest, two key components of the accommodation EF.

3.3.5 Embodied Energy and Building Materials

Accommodation is a key area of measurement within this research, and as such, the origin of construction materials, and the manner in which they are used can greatly affect the total Ecological Footprint value of a particular accommodation. Assigning an ecological cost to building materials is not a straightforward procedure. Many variables conspire to affect the amount of embodied energy contained in a structure. Transportation costs, construction costs, amount of waste, and the potential for recycling all play a role in determining the embodied energy of a building (Lawson, 2000). First and foremost, the transportation distance from the location of the resource to the construction site can vary considerably (Lawson, 2000, Thormark, 2002). These factors were not taken into account when assessing the Ecological Footprint of various types of tourist accommodation, partly because the EF Calculator did not allow for it, and partly due to the difficulty in identifying the construction materials and processes used on such a wide variety of buildings.

An important assumption of the Ecological Footprint Calculator is that structures made from wood create a larger ecological footprint than those constructed of brick (Wackernagel, Dholakia, Deumling, and Richardson., 2002). Embodied energy, that is the total ecological cost of harvesting resources (aggregate or timber), processing, transportation, and construction of a building, vary considerably depending on materials and procedures used (Lawson, 2000). In general, “light building construction, such as timber frame is usually lower in embodied energy than heavyweight construction (i.e. brick or steel)” (Australian Building Energy Council, 2002, p.4). This statement seems to contradict the lower ecological cost for heavier (i.e. brick) construction materials assumed in the Ecological Footprint Calculator. However, other variables are at play, as building material choice needs to take into account the local climate and function of the structure. Depending on location and design purpose, the lowest gross ecological cost material (such as timber) may not have desirable long-term qualities. For example, a building in Canada needs to endure changing seasons and temperature extremes, thus the need for durable construction materials that possess a larger amount of embodied energy (such as brick and steel). The greater initial ecological cost of construction is then

paid off over a longer lifetime of energy savings and improved durability. “In many cases a higher embodied energy level can be justified if it contributes to lower operating energy. In climates with greater heating and cooling requirements and significant day/night temperature variations, embodied energy in a high level of well insulated thermal mass can significantly offset the energy used for heating and cooling” (Australian Building Energy Council, 2002, p.3). This is the assumption that is used by the creators of the Ecological Footprint Calculator (designed for use in North America); that brick may have a greater initial ecological cost, but that over time, this initial embodied energy is paid for through energy savings, greater durability, and a higher potential for recycling the materials (Thormark, 2002).

3.3.6 Data Manipulations for the Ecological Footprint

The data gathered from tourists and accommodation managers was not always in the desired format for input into the EF spreadsheet. This meant that several types of data needed to be manipulated from their raw form (section 3.4). A brief outline of the manipulations can be seen in Chart 3.2. In some cases, these adjustments were simply a matter of multiplication. For example, food was recorded as total number of servings, and was multiplied by the average weights per serving, based on the United States Food and Drug Administration list of “Reference Amounts Customarily Consumed per Eating Occasion” (United States of America Code of Federal Regulations, 1999). This resulted in the total weight of each general food commodity consumed by the tourist. Other types of manipulations required several more steps. Occupancy rates were used to determine the average number of guests present at each place of accommodation. This number of guests was then used to calculate the amount of built space and yard area per person. The total building and yard area (appropriated land) was converted to square meters, and divided by the number of guests currently at the accommodation, to yield the per-person amount.

Energy deregulation in Ontario added a new dimension to the energy numbers collected from tourist accommodations. In many cases the information collected from accommodations was in the form of a dollar cost per billing period (one month, in most cases). Under the new hydro scheme, this charge reflects not only the cost of power per kilowatt hour, but also the cost of transmission and servicing on the debt accumulated by the former Ontario Hydro. Each of these secondary costs is related to the amount of energy consumed (kWh), meaning the larger the kWh consumption, the larger the transmission and debt servicing costs. In a hydro bill estimation tool provided to Ontario residents to help plan for billing changes, the total cost of energy and secondary charges was estimated at 8.417

cents (Hydro One Networks, 2002). While the actual cost of energy fluctuates in response to market forces, this number represents what the average Ontario customer was paying during the summer of 2002. By dividing the total cost of energy by the cost per kilowatt hour (8.417 cents) the number of kilowatt hours of energy consumed was calculated. This number was then divided by the number of days in the billing period, and then by the number of visitors at an accommodation, resulting in a kWh/per person/per day value (Table 3.2). This number was then multiplied by the number of days a tourist stayed at a particular accommodation. Energy use measured in this analysis consists of the amount of commercially purchased electricity, and the cubic meters of propane consumed, although this latter type of energy was a rarity. The embodied energy of energy-producing machinery (windmills, solar panels) was not included in this analysis, thus allowing alternative energy users to obtain an energy use of zero. Energy consumption in the form of burning wood was added under the tourist consumption category, in the form of kilograms of wood burned.

In the province of Ontario, our commercial energy comes from a variety of sources. For the purposes of the tourist Ecological Footprint calculation, the source of main grid energy makes a significant difference. Energy usage was calculated in this project as comprising 73% thermally produced (coal and nuclear), 26% hydro electric, and 1% renewable, in this case, wind generation (Ontario Power Generation, 2002).

3.3.7 Transportation Costs and Calculations

Transportation costs to and from the site of tourism consumption were considered to be of prime importance in the calculation of tourist Ecological Footprints. The information required to create an EF value for transportation was very dependent on the form of transportation. This data was collected as part of the tourist survey, and involved respondents indicating the type of vehicle used (private car, airplane, train, etc.) and the distance travelled or destinations travelled to. For air travel, the hours in flight were required for calculation of the EF. All respondents who travelled by air responded with an hour figure, as prompted by the survey.

Tourist automobile travel was decidedly more difficult to reduce to a common unit. Car travel needed to be input into the EF calculator not in kilometres, but as the total number of litres of fuel consumed for transportation. This necessitated gathering information on the model of automobile, in order to calculate the efficiency differences of the wide variety of models available. The United States Department of Energy produces a fuel efficiency comparison tool that allows car buyers to determine

the average fuel economy of a wide range of cars from 1985-2003 model years (United States Department of Energy, 2002). This tool was used to determine the efficiency of each vehicle. Fuel efficiency was a combined measure of highway and city driving, and if the survey respondent gave no particular model year, the most recent year (excluding 2003) in which that model of car was produced was used. It is possible that this would have resulted in lower levels of fuel consumption, assuming that newer cars have benefited from progress in technology.

When comparing age difference for one of the most popular vehicles in Canada, a 1985 Honda Civic, and a 2003 model, the difference in fuel efficiency, according to the U.S Department of Energy, is 7.4L/100km to 6.9L/100km. Considering that this time frame represents a number of re-designs in the Civic, such differences in fuel efficiency are minor. Where several different engines and transmission choices were available, the automatic transmission and larger sized engine were selected, for the sake of consistency. It is important to note that the fuel efficiencies collected are based on ideal conditions, not on actual real-world tests. Wind resistance, tyre inflation, driving style, and temperature can affect the total fuel consumption of any vehicle. Despite this, using an 'ideal' measure for fuel efficiency fits in with the Ecological Footprints' policy of understating ecological resource, and always using conservative, or 'best case' data (Wackernagel & Rees, 1996; Chambers, Simmons, & Wackernagel, 2000).

Table 3.2-Ecological Footprint Component Sources and Calculations				
Tourist Survey				
Data Collected	Unit Collected	EF unit required	Manipulation/Formula	Source of Information
Length of Stay (days)	Days	Days	None	
Distance Travelled by Air	Hours	Hours	None	
Distance Travelled by Bus/Train	Kilometers	Kilometers	None	
Distance Travelled by Car	Km/Location	Kilometers	Origin to Destination Distance/Return	Official Road Map of Ontario
Efficiency of Private Car/Person	Model and Make	L/100km	Efficiency*Distance/Number of Passengers	U.S. Department of Energy
Occupancy of Private Vehicle	Number of Persons	Number of Persons	None	www.fueleconomy.gov
Consumption of Food				
Data Collected	Unit Collected	EF unit required	Manipulation/Formula	Source of Information
Veggies, potatoes, and fruit	Number of Servings	Kilograms	Number of Servings *.085kg	Section 101 United States
Bread	Number of Servings	Kilograms	Number of Servings *.050kg	Food and Drug Administration-
Rice, cereals, noodles, etc.	Number of Servings	Kilograms	Number of Servings *.140kg	Reference Amounts
Milk and yogourt	Number of Servings	Litres	Number of Servings *.240L	Customarily Consumed Per Eating
Ice cream, sour cream	Number of Servings	Kilograms	Number of Servings *.085kg	Occasion-General Food Supply.
Cheese and butter	Number of Servings	Kilograms	Number of Servings *.030kg	""
Eggs	Number of Servings	Number	None	""
Cigarettes	Number of Servings	Kilograms	Number of Servings *.005kg	""
Beans	Number of Servings	Kilograms	Number of Servings *.130kg	""
Pork	Number of Servings	Kilograms	Number of Servings *.085kg	""
Chicken/Turkey	Number of Servings	Kilograms	Number of Servings *.085kg	""
Beef	Number of Servings	Kilograms	Number of Servings *.085kg	""
Fish/Seafood	Number of Servings	Kilograms	Number of Servings *.085kg	""
Juice/Wine/Beer	Number of Servings	Litres	Number of Servings *.240L	""
Sugar	Number of Servings	Kilograms	Number of Servings *.005kg	""
Tea/Coffee	Number of Servings	Kilograms	Number of Servings *.005kg	""
Accommodation Survey				
Data Collected	Unit Collected	EF unit required	Manipulation/Formula	Source of Information
Total Number of Beds	Number	Number	None	
Size of Buildings	Square Feet	Square Metres/Person	m ² /Number of Guests	
Size of Property/Yard	Square Feet	Square Metres/Person	m ² /Number of Guests	
Occupancy Rate	Percent	Number of Guests	Total Number of Beds/Occupancy Rate	
Energy Consumption	Cost	Kilowatt Hours/Person	Total Dollar Cost Per Month/8.417 cents (cost of hydro)/30(days in month)	Hydro One Networks Estimate of Heating and Cooling

Where tourists listed distances travelled in private automobiles in hours, the distance calculator table included in the Official Road Map of Ontario was used to calculate the distance travelled in kilometres. When destinations did not appear on the distance calculator table, the most direct route between departure and destination was selected, and manually plotted using road segment distance references printed on the Official Road Map of Ontario. For travel through areas outside of Ontario, the Rand McNally Road Atlas of North America was used to calculate distance. In the rare event that respondents did not list one or part of their destinations, but simply the hours that they travelled, 1 hour of travel was considered to equal 80km of distance, assuming that the tourist was travelling on a mix of highway and city roads and encountering little traffic. All distances were rounded to the nearest 10km. Once distance travelled and fuel consumption were calculated, the total amount of fuel used on a trip could be established. If more than one person was travelling in the vehicle, then the total amount of fuel used was divided up evenly, with each passenger and driver sharing the ecological cost of transport.

3.3.8 Tourist Activity

In an effort to examine tourist activity, participant observation techniques were used. A wide variety of tourist activities were observed, ranging from sightseeing, to hiking, to shopping, and cultural events. This diverse range of activities defied the use of a standardised survey to measure ecological impacts (Babbie, 2001). Therefore, once a certain activity was identified as part of a tourist stay, the researcher gathered data based on a typical experience with that activity. The researcher acted as a detached observer, in order to maintain an objective view (Babbie, 2001).

On the tourist survey, respondents were asked to list the primary activities that they participated in during their vacation. Clarification as to the type, frequency, and general characteristics of the activity were also solicited. This more specific information concerning the tourist activity was gathered in order to facilitate the activity data collection. The researcher did not observe the actual survey respondent engaged in her or his specific activity. This was considered too invasive for the level of consent obtained for this survey, and the logistics of recording this type of information proved unworkable. Using the information supplied by the tourist in the initial survey, the researcher sought out other tourists who were engaged in a similar activity, and observed and recorded their activity resource use.

Several examples of resource use that were calculated in the Ecological Footprint model from this activity are: distance travelled from accommodation to site of activity, food consumed during activity, and the cost of the activity itself. While the collection of this type of data went smoothly, converting it to useful EF form proved difficult, and was eventually abandoned. Many outdoor activities, such as hiking, swimming, and sunbathing had very little resource use. Indeed, how can one quantify 'relaxing' or 'reading' as resource consumptive? The ecological impact of large tourist attractions such as the CN Tower and Stratford Festival were poorly recorded by the survey instrument, and had little effect on the Ecological Footprint. Since attractions of this type are visited by hundreds of thousands, or in the case of the CN Tower, 2 million tourists per year, the per capita share of the land area and energy required to run such attractions is very low. For future EF studies, a more detailed method for capturing the ecological resource use of such highly visited attractions is needed. As a way of still accounting for the tourist activity, despite this shortcoming, activities that required the payment of an entry fee or ticket price had this value (the dollar cost) accounted for in the EF spreadsheet under the "Entertainment" section. This measure was originally intended to account for the money one spent on personal entertainment, and considers the energy cost of all entertainment to be 2KW/\$, regardless of type. While this approach could be considered to reduce the differences in activity to mere dollar value, which is not equally applied (what of federally subsidised museums?), it still serves the purpose of creating a benchmark for the comparison of many different activities.

3.3.9 Tourist Waste

The amount of waste produced by tourists (cans, bottles, packaging, food scraps) was not included in this project. The exclusion of this sector of ecological impact is regrettable; yet no satisfactory method of gathering this type of data could be established within the financial and time constraints of the study. The EF calculator spreadsheet used in the creation of EF values does not incorporate the bulk amount of garbage, and instead records the weight of recyclables, namely: glass, plastic, aluminium, cardboard, and magnetic metal. During the survey, tourists were asked to reflect on the amount of garbage they threw out during their stay, in much the same manner as they were asked about their food consumption. This question was met with great confusion as many respondents had little idea of their waste production, and was eventually removed from the survey. Accommodations were also asked for the rough dimensions of their recycling containers and the frequency with which they were emptied. One major problem with

this approach was that in many cases, containers were emptied on a regular basis, whether they were full or not. This made it extremely difficult to estimate the volume of material recycled by an accommodation. One method of calculating waste for Ecological Footprint analysis could be to divide the total weight of waste collected by a municipality by the number of visiting tourists and local residents. While this approach would be appropriate for those tourists staying in only one location (an all-inclusive resort, for example), it does not translate well to a study where tourists visit multiple locations.

For a baseline comparison, several Ecological Footprint ‘tests’ were created using numbers based on a selection of test samples. The weight of recyclable material needed to effect a change in the total EF using the EF calculator values was not easily accumulated in a short time period (3-4 days) of regular household consumption. While the cumulative effect of waste and recyclable materials is unquestionable, for the purposes of this research, and the generally shorter duration of the tourist experience, the impact of waste and recyclables was not included.

3.4 Limitations of the Survey

As with any data collection instrument, there are strengths and weaknesses associated with every approach. Several key limitations of the survey bear mentioning, most obvious being the small sample size. While this research was intended to be limited in scope, due to time and financial constraints, a larger sample would have had many benefits. With a sample size of 30-40 tourists per accommodation type (270-360 respondents in total), a greater degree of generalisability would have been obtained. Rather than focus the results and discussion of this thesis on providing insight into the ecological resource use of tourism at a general level, more specific statements on the fact or fiction of tourism’s ecological impact could have been made. A larger sample size would also have allowed for statistical comparison of ecological resource use sub components. For example, in the discussion of accommodation EF components, a statistical comparison of the relative percentage contribution of energy use and accommodation size costs would have added another dimension of analysis. However, with the small study sample, analysis of this level was not possible.

As mentioned earlier, geographic restriction of the survey area would have allowed for further comparisons between common factors (transportation distance, activity types). Instead, this research attempts to compare tourism types at varying distances to major tourist markets.

Thus, remote types of tourism generate a greater transportation footprint than those drawing on local area residents. As an exploratory study, this research seeks to outline the main areas of and variables that affect the ecological resource use of tourism. In future studies, an effort should be made to focus on comparing tourism types from a more focused geographic area.

Many of the qualitative aspects of the survey were eventually cut before analysis, because virtually all of the tourist respondents either ignored or incompletely answered the questions. The source of this confusion likely rests in the quality of the survey design, as it is possible that the researcher simply tried to collect too much information covering too many topics on one survey instrument. Tourist accommodation managers provided more complete and usable qualitative responses, likely due to the interview style collection method.

As this research stands, with such a small sample size, these general results are of a preliminary nature only, to be used to direct future, more in depth studies. The recommendations and discussions raise many pertinent issues, which could be better understood with more detailed research.

3.5 The Ecological Footprint Calculation

Using the EF Household Evaluation spreadsheet version 2.0 by Redefining Progress and Mathis Wackernagel, Ritik Dholakia, Diana Deumling, and Dick Richardson, (Appendix 2, Wackernagel, Dholakia, Deumling, and Richardson., 2002), a tourist EF calculator was created. This spreadsheet is one of the more detailed ‘fill-in-the-blank’ EF calculators currently available to the general public. The original intent of the EF Household Evaluation was to allow individuals to examine areas of their own household consumption, reflect on their ecological impact, and make changes to reduce their footprint accordingly. This is the same premise on which this research operates; that knowledge of our own ecological impact, and its global and local effects, can lead to positive action. Several more simplistic types of EF calculators were initially considered, only to be rejected based on their inability to be separated into components. The EF Household Evaluation spreadsheet can be broken down into key factors for further analysis (i.e. transportation, accommodation). Formulas used by the EF Household Evaluation spreadsheet are based on North American data, and while it is not 100% complete or current, it provides a very detailed EF, compared to other options. This EF calculator and also used actual amounts of resources consumed per person, rather than ‘indicator’ questions. Several of the EF

calculators considered for this research used these ‘indicator’ questions to gauge ecological resource use (such as how long a commute one had today), rather than the actual quantity of resource consumed (litres gasoline burned by a particular type of car). While these indicator questions were used to a limited extent in the EF Household Evaluation, this use is restricted to activities (as partially indicated by dollar amount spent). In general, the EF Household Evaluation calculator provided a tool that could be broken down into components, used data that was particularly detailed amongst freely available calculators, and thus was chosen to create the tourist EF calculator.

The main product of the tourist EF calculator is the size of an individual footprint. This measure can then be broken down into categories, namely; food, housing, transportation, activity, and per-day footprint. The breakdown of these first four categories can be seen in the land-use consumption matrix provided with the EF calculator. This matrix itemizes the results of the EF assessment, showing the amount of fossil energy land, arable land, pasture land, forest, built-up land, and sea sequestered by each tourist. For example, airplane flight impacts are part of the transportation category, and add impact in the matrix area of fossil energy land. Fossil energy land is required to absorb the carbon dioxide produced from the burning of jet fuel. This matrix was used to calculate the EF contributions of various tourist choices. A sample consumption category/land-use matrix is shown in Table 3.3. In this matrix, the total individual EF would be 3,315 square meters (.3315 hectares), with transportation costs making the largest contribution (.2039 ha), followed by accommodation (.0794 hectares), food (.0326 ha), and activity (.0157 ha). In this manner, the ecological cost of tourist choices was calculated for each individual surveyed.

CATEGORIES	I) FOSSIL ENERGY LD.	II) ARABLE LAND	III) PASTURE	IV) FOREST	V) BUILT-UP LAND	VI) SEA	TOTAL
1.-FOOD	79	126	121	0	0	0	326
2.-ACCOMMODATION	599	0	0	0	194	0	794
3.-TRANSPORTATION	1,983	0	0	0	56	0	2,039
4.-ACTIVITY	141	0	0	0	16	0	157
TOTAL (square meters)	2,803	126	121	0	266	0	3,315

3.5.1 Limitations of the Ecological Footprint

Many assumptions are used in calculating an Ecological Footprint. The Redefining Progress EF Household Evaluation calculator was set up using average land productivity and manufacturing efficiencies found in North America. This limits the use of the spreadsheet to Canada and the United States, although with several fundamental adjustments, other countries could be foot printed. As with any model, the Ecological Footprint is a simplification of a very complex item, namely human ecological impact. Thus, all possible areas of resource use are not identified, and individuals who lead atypical lives will not be represented fairly by this model (Wackernagel and Rees, 1996). Also, this model assumes that individuals behave the same, and have similar resource use patterns throughout the year. This is perhaps the largest assumption of the Ecological Footprint; that humans are not allowed to possess intrinsic or unique characteristics beyond what is briefly captured with the EF. Individual differences are masked, and group attributes are assigned to the individual. With the Ecological Footprint, the average level of consumption becomes the marker by which comparisons are made.

The Ecological Footprint firmly attempts to standardise the measurement of human impact. This is both its strength, in that it creates a universal measure to which all of a certain group (such as the hotel tourist) are judged, and its weakness, in that the model will never reflect the complexity of nature and human behaviour. When seeking to make general statements about individual resource use compared to another, a fine level of detail is not considered necessary (Wackernagel and Rees, 1996; Wackernagel and Yount, 2000; Hunter 2002). The importance of the EF is not in accurately measuring all facets of resource use, but instead to demonstrate that resource use can be affected by certain individual behaviours (Chambers, Simmons, and Wackernagel, 2000). This research takes the point of view that although a certain level of quantitative detail is necessary, complete scientific knowledge of a phenomenon is not required for positive action. In the search for sustainable forms of tourism, delaying change until it is proven necessary beyond a doubt ignores the ecological impact of modern lifestyles. Thus, a tool that allows for a proximate comparison becomes useful.

The Ecological Footprint is not a static formula. Since its inception, constant revisions of the method and ever-improving data collection have broadened the number of categories of ecological impact covered by the EF. Also, as the EF has gained in popularity, more researchers and agencies have adopted and modified it for their purposes (this research included). Because of

this constant revision and adaptation, it is difficult to compare EF values from one study to the next. What one study included, another abandoned, where one researcher used global data, another used North American. This is one of the greatest limitations of the Ecological Footprint model, that it is not a stable instrument. For example, one can track the increase in a particular nations' published EF from the first EF studies, to the more recent, as more categories of impact and finer methods were developed. The average Canadian EF has grown from 4.3 ha in 1991 (Wackernagel and Rees, 1996), to 7.2 ha in 1995 (Chambers, Simmons, and Wackernagel, 2000), and finally 8.8 ha in 1999 (World Wildlife Fund, 2002a). This growth in EF represents a continuous refining of the model, and the inclusion of more categories of ecological resource use. While comparisons between EF studies will invariably be made, it is important to realise that these are products of different, albeit related, methodologies.

3.5.2 The Tourist Footprint and Fair Earth share.

One significant difference between previous calculations of the Ecological Footprint and this project is the frequency and duration of the behaviour under study. In many traditional EF studies, consumptive behaviour is assumed to be constant throughout the year, or at least that periodic fluctuations in consumption will cancel each other out (Wackernagel & Rees, 1996, Chambers, Simmons, and Wackernagel, 2000). With tourists however, the behaviour measured is not constant throughout the year, and instead is a brief exception from 'regular' life. For this research project, the focus was on creating a footprint of each tourist stay for the duration of their stay at a specific accommodation. At first glance, this EF appears quite small compared to previously published footprint values. In fact, the Ecological Footprint Calculator needed to be modified to show EF values to the third decimal place, since the individual tourist EF was calculated for only a brief period, ranging from a weekend to a summer season. This footprint value is not directly comparable between tourists, as the amount of time required to produce the given EF is different for each person surveyed. This difficulty in comparison was overcome by the use of a per-day EF value. By breaking the total footprint down, comparisons could be made between the per-day ecological costs of different types of tourism.

Both per-day and total EF measures are important tools for comparing the ecological cost of tourism. Using total EF measures, the contribution of a specific holiday as a proportion of a (nationally averaged) footprint size (in the case of Canadians, 8.8 ha./person) and the commonly cited globally 'sustainable' footprint (1.9 ha/person) can be seen (World Wildlife Fund, 2002a).

The per-day tourist EF fulfils a similar goal, showing the impact of different types of tourism, standardised for length. In both cases, the ecological costs of tourism should be viewed as a component of the overall individual Ecological Footprint. Tourism is a component of ecological cost that is affected by individual choices, much in the same way as one decides what type of car to drive, what types of food to eat, or how to heat their home. Should the average Canadian want to shrink their footprint to near a sustainable size, the contribution of discretionary travel behaviour to their overall EF becomes important (World Wildlife Fund, 2002a). This concept of a “Fair Earth Share”, a state where the earth’s bio productive capacity, is equally shared amongst the citizens of the globe, will be used in the discussion chapter 5 to examine how a tourism experience can contribute to an individual’s total nationally averaged footprint, as well as globally average and sustainable footprint sizes (Wackernagel and Rees, 1996).

3.6 Ethical Issues

Due to the voluntary nature of the tourist survey and accommodation manager survey/interview, from an ethical standpoint this research posed little threat to participants. No names or other signifying marks were required from respondents. Each tourist survey was later coded with a simple designation written in the corner of the paper, consisting of the type of tourist accommodation (Resort Hotel, Eco-Lodge, etc.) and the order collected. Using this system, anonymity of respondents was assured. If survey respondents desired a copy of the results of this study, their name, email, and/or mailing address was collected on a separate page, and in no way connected to their responses. Anonymity was not guaranteed in the same manner for the personal interview portion of this research, but the accommodation managers’ name and place of employment were kept confidential.

4. RESEARCH FINDINGS

This chapter presents the results of the Ecological Footprint analysis, and related demographic data. These findings will be grouped into four sections. Firstly, a general qualitative profiles of each type of accommodation under study sets the context. Secondly, the 9 broad types of tourist accommodation have been classified into 3 categories; large, medium, and small-scale (see Table 3.1, and section 3.3.1). This classification is used to provide a critical mass of respondents within each demographic characteristic. This division is used to outline the demographic characteristics of the sample, highlighting key similarities and differences. Thirdly, frequency counts, bar charts, and cross-tabulation are used to examine the influence of demographic characteristics on Ecological Footprint values, based on the entire sample, for a given length of tourist stay. The fourth section of results provides a finer look at the Ecological Footprint, by comparing the four key components of ecological resource use, as well as per-day values.

4.1 Accommodation Profiles

In order to further explore the types of tourism under study, the following section presents a profile of each type of accommodation. As the site of tourism consumption, the specific type of tourist accommodation is a key area of comparison for this research. Additionally, this research segments tourists according to their accommodation style, and thus a contextual understanding of those accommodations is necessary.

4.1.1 The Budget Hotel

In the context of this research, a Budget Hotel is a type of tourist accommodation that targets young, long-term, independent, and cost-conscious travellers, often labelled as backpackers. Many of these tourists are from overseas and are travelling across Canada, sometimes spending a week or more in one particular location. The specific Budget Hotel under study is one of the few located in downtown Toronto, and as such has become a popular spot for backpackers arriving and departing from Canada. Amenities at this accommodation are sparse, rooms and common areas can be cramped and rates start and end at 25\$ per person, per night. Facilities for storing and cooking food are provided, as are communal television and games

rooms. Guests sleep in dormitory-style accommodation, often on bunks, with anywhere from 3 to 10 other guests per room. Basic linens are provided, but many guests also use personal sleeping bags or blankets. No laundry facilities are provided. The focus of the Budget Hotel is on cutting costs, but also providing a clean, if not particularly comfortable stay.

4.1.2 The Mainstream Hotel

Found in nearly every major Ontario city and town, the Mainstream Hotel is possibly the most identifiable of all the accommodation types included in this survey. This style of accommodation is one that provides a guest with a clean, comfortable stay, at a substantially higher level of service than the Budget Hotel, yet still far from the luxury of the Resort Hotel. Mainstream Hotels are often, but not always, part of a franchised chain of hotels (such as Best Western, Ramada Inn, Howard Johnson), providing travellers with a feeling of sameness from town to town. The Mainstream Hotel included in this study had been recently built and located in the major tourist area of the town of Stratford. This type of hotel does not cater exclusively to tourists, but also to business travellers, as well as hosting conferences, wedding receptions, and other such events. Although this hotel is not part of a national chain, it bears many similarities in size and quality to chain hotels. Amenities include a full room cleaning service, on-site restaurant, as well as colour televisions in every room. Rooms are priced starting at approximately 60\$ a night, and seek to provide a high level of service and quality for a moderate price.

4.1.3 Resort Hotel

The Resort Hotel strives to offer its guests a stay filled with programmed activities and decadent luxury. Located near Huntsville, Ontario, the resort under study consists of a sprawling main complex, sports facilities, two golf courses, private beach and extensive waterfront property. In addition to these high end offerings, the Resort Hotel also carries an emphasis on activity. This particular Resort Hotel specializes in golf, outdoor activities, such as canoeing, hiking and mountain biking in nearby Algonquin Park, as well as traditional resort favourites like swimming, sunning and racquet sports. All of this luxury comes at a price, and although costs for the guests vary considerably, depending on room types, an all-inclusive fall-season weekend for two runs over 500\$ per person.

4.1.4 Wilderness Lodge

Set in the prime cottage country of Ontario's Muskoka area, the Wilderness Lodge provides a rustic getaway from the rigours of city life. In many ways an adult version of summer camp, the Wilderness Lodge combines traditional log cabins, campfires and canoeing with saunas and catered meals. The majority of facilities at the Wilderness Lodge are seasonal, and can be considered quite simple-no air conditioning, heating only when absolutely necessary, and crude shower facilities. Alongside this backwoods charm are touches of luxury, with activities such as therapeutic massage, and expertly prepared meals. Catering to both couples and families, the Wilderness Lodges included in this research boast of a long history of close guest relations and many repeat visits-in some cases loyal families have been visiting the same week each year for generations. Costs for this type of accommodation and experience vary, depending on the level of service desired. Various options are available from 78\$ per person, per night, up to all-inclusive deluxe packages at 165\$ per person, per night.

4.1.5 Eco-Lodge

Environmental innovation plays an enormous role in the design, construction, and operation of the Eco-Lodges studied in this research. Both Eco-Lodges examined provide tourist accommodations in a unique and environmentally friendly manner. Innovations such as the use of solar panels and windmills to provide power, cooking with locally grown, organic produce, and constantly educating guests on how to live a lower-impact life, show a desire to provide an experience that is more than a simple vacation. The two Eco-Lodges examined in this research represent very different types of tourism, compared to most mainstream forms. The first Eco-Lodge is located near Algonquin Park, and specializes in wilderness trips, alternative therapies, and holistic living seminars. The second is located within 20 minutes of Kitchener-Waterloo, and caters to school and university groups, providing a setting for weekend retreats. Facilities at these Eco-Lodges could be considered minimalist, compared to larger hotels. Although comfortable and clean, the rooms and common areas are not luxurious, and have been created with a specific environmentally conscious clientele in mind. Costs for a stay at an Eco-Lodge vary depending on the type of experience that is sought. Prices can range from 255\$ for a basic weekend of canoeing, to 595\$ for a stay that is fully programmed.

4.1.6 Trailer Park/Campground

A standby of the Ontario domestic tourism scene, Trailer Parks and Campgrounds, either privately owned or operated by conservation areas, are plentiful. This research examines a Trailer Park/Campground from each of two broad categories, a privately owned and operated site near Barrie, and a public conservation area near Waterloo. These locations are generally large and semi-wooded, often close to a river or lake. A scattering of trailer and tent sites are linked by roadways and interspersed with mowed open space. This type of accommodation requires tourists to bring their own shelter-either an RV/motor home, trailer, or tent. In many cases electrical and water hook-ups are provided, as well as access to amenities such as pools and laundry facilities. Trailer Parks are unique in that they can attract long-term guests, as well as shorter stay visitors. It is common for many of the trailer sites to be booked for an entire season. This stability can form a tight-knit community amongst the long-term guests/residents of a Trailer Park. The cost for spending a night at a Trailer Park is approximately 25\$ (not including the cost of a motor home/trailer or tent). Seasonal licenses from Victoria Day to Thanksgiving can cost 1400\$ or more for a serviced (power and water) site.

4.1.7 Backcountry Camping

Backcountry Camping differs from other types of tourist accommodation studied, in that tourists stay in a very non-permanent form of accommodation; a tent. Backcountry Camping involves a group of tourists using canoes as a mode of transportation to travel from wilderness campsite to wilderness campsite. No physical infrastructure is provided, and amenities consist of a flat spot for a tent, a stone campfire ring, and a pit latrine. Food and equipment is provided by the tourist, or rented from a nearby outfitter. Backcountry Camping requires the preservation of wild spaces rather than the construction and maintenance of a building and infrastructure. Backcountry Camping is not only a type of tourism, but also a method of travel and the primary activity for those involved. In this research, Backcountry Camping experiences that take place in a provincial park are examined. Costs for access to the provincial park are approximately 8\$ per person per night, and parking for vehicles is included in this price.

4.1.8 Cottage

Cottaging is a firmly entrenched part of the Ontario tourism accommodation industry. Throughout the entire province, tourists flock to cottages on weekends to escape the confines and

stress of the city. Cottages are extremely varied in their type and style, ranging from non-serviced shacks to fully insulated 'summer homes', complete with every modern convenience. Thus, for this type of accommodation, the possible types of ecological resource use are broad. For this research, cottages from two areas of Ontario; the shores of Lake Huron, and the Muskokas, were examined. The first type of cottage is used only in summer, and is hooked up to municipal water, electricity, and sewerage. It is very modest in size, and hosts both short term (weekend) visits, as well as the occasional long-term (2-3 week) visit. The second type of cottage is an insulated cottage that has been recently renovated and expanded to approximately the size of a small home, and is used for mostly weeklong visits in the summer. Although many families own their cottages and operate them as a temporary residence, the cost of renting a cottage can range considerably, usually starting from 400\$ per week. For the purposes of this discussion, these cottages will be considered to be of a similar nature, that of temporary, seasonal dwellings, but with most modern amenities. It is likely that both rustic cabins, and elaborate summer homes (considered by many as cottages) would have a decidedly different Ecological Footprint that what is described here.

4.1.9 Bed and Breakfast

Located in charming, elegant and often historic homes, Bed and Breakfasts provide a classy and homey spot for travellers to stay. In most cases, the Bed and Breakfast is also the full-time accommodation for the hosts, and has many of the standard amenities one would find in the average home. B&B's do not host many guests; often their maximum capacity is two, and even the largest accommodations rarely exceed six. The price of a night's stay varies considerably from one B&B to another. Depending on the level of amenity, cost can range from 60\$ to 100\$ per person, per night, including breakfast. For the purposes of this research, the majority of Bed and Breakfasts surveyed were located in the thriving tourist centre of Stratford, Ontario, well known for its annual theatre festival.

4.2 Demographic Characteristics of the Sample

4.2.1 Age

The age distribution of the sample shows several variations from small, to medium, to large-scale types of tourist accommodation. Of note is the high percentage of young adults (18-31 years old) found at large and medium-scale accommodations (Table 4.1). 53% of the large,

and 45% of the medium-scale accommodation sample fell into this age category, compared to 24% for small-scale. One possible reason leading to this relatively younger concentration lies in the nature of the accommodations surveyed and their clientele. The Budget Hotel, where a large number of surveys were collected is a backpacker hostel operated by Youth Hostelling International. This is an accommodation type targeted towards international youth tourists, who typically are under 30 (Riley, 1988). Thus, surveys were drawn from a pool of respondents that through virtue of their accommodation choice were younger. It is very possible that the average age of respondents in the large-scale sample could have been pulled down by this set of younger Budget Hotel guests.

Compared to the large-scale accommodations, which primarily occupied by young adults, the small and medium-scale accommodations presented a more balanced age distribution. Small-scale accommodations had a nearly even representation of ages throughout the four categories, whereas the medium-scale accommodations were polarized in the young (18 to 31) and older (46 and above) categories.

Variable	Tourist Accommodation Type					
	Large Scale		Medium Scale		Small Scale	
	n=34	Percent of n	n=29	Percent of n	n=25	Percent of n
Age						
18-31	18	53%	13	45%	6	24%
32-45	8	24%	2	7%	7	28%
46-59	4	12%	9	31%	7	28%
60+	4	12%	5	17%	5	20%

4.2.2 Gender

When considering gender distribution in the tourist accommodation sample, each category, regardless of scale, had a larger percentage of men compared to women (Table 4.2). The difference between groupings ranged from a 65% / 35% male/female split for large-scale accommodation to a 59% / 41% male/female split for medium-scale accommodation, with small-scale accommodation at an even 60% / 40%. One direct bias that could have caused this imbalance was perceived during the data collection phase, when couples were approached to complete a survey, the task was generally accepted by the male first.

Table 4.2 Gender						
Variable	Tourist Accommodation Type					
	Large Scale		Medium Scale		Small Scale	
	n=34	Percent of n	n=29	Percent of n	n=25	Percent of n
Gender						
Male	22	65%	17	59%	15	60%
Female	12	35%	12	41%	10	40%

4.2.3 Travelling Unit

When comparing the travelling unit reported by the study sample, across all scales of accommodation, the majority of respondents travelled as a couple. 64% of the small, 62% of the medium, and 56% of the large-scale accommodation respondents were couples (Table 4.3). One exception is the 29% of large-scale tourists who were found to be travelling alone. The influence of the Budget Hotel and its young clients is evident, as a common characteristic of backpackers is a tendency to travel alone, thus leading to a large-scale concentration of this type of travel (Riley, 1988).

Table 4.3 Travelling Unit						
Variable	Tourist Accommodation Type					
	Large Scale		Medium Scale		Small Scale	
	n=34	Percent of n	n=29	Percent of n	n=25	Percent of n
Travelling Unit						
Alone	10	29%	1	3%	0	0%
With Friends	4	12%	5	17%	4	16%
As a Couple	19	56%	18	62%	16	64%
As a Family	1	3%	5	17%	5	20%

4.2.4 Country of Origin

Country of origin was predominantly Canadian. This phenomenon is especially apparent at the medium (90%) and small-scale (76%) tourist accommodations (Table 4.4). Large-scale accommodations showed a more evenly distributed pattern with tourists from Canada (26%), the USA (26%), and the United Kingdom and Europe (35%). The remainder of the large-scale accommodations are filled out with a small numbers of guests from Asia and Australia (12%). These results are not surprising, considering the location of the study and the nature of the accommodation sites. Accommodations near major Ontario tourist attractions that could garner international attention, such as Niagara Falls, were not sampled, and many of the accommodation

centres visited are marketed heavily towards domestic tourists. Local conservation areas, private cottages, and bed and breakfasts are all generally considered to focus on domestic and North American markets. One possible explanation for the presence of non-North Americans in the large-scale accommodation lies with the Budget Hotel. As this Budget Hotel caters to international youth travellers, it is no surprise that a number of the tourists surveyed there were from overseas, many on long-haul trips.

Variable	Tourist Accommodation Type					
	Large Scale		Medium Scale		Small Scale	
	n=34	Percent of n	n=29	Percent of n	n=25	Percent of n
Country of Origin						
Canada	9	26%	26	90%	19	76%
USA	9	26%	0	0%	6	24%
UK and Europe	12	35%	2	7%	0	0%
Asia and Australia	4	12%	1	3%	0	0%

4.2.5 Occupation

At all three scales of accommodation, often occurring occupations were “Professional”, and “Social Services” (Table 4.5). These categories are made up of a number of occupations, such as teacher, engineer, nurse, lawyer, and physician. These occupations have a greater presence in the large-scale and small-scale accommodations, with 44% and 36% of each sample holding these types of jobs. Other occupations were observed in varying concentrations for each scale of accommodation.

Variable	Tourist Accommodation Type					
	Large Scale		Medium Scale		Small Scale	
	n=34	Percent of n	n=29	Percent of n	n=25	Percent of n
Occupation						
Student	4	12%	6	21%	6	24%
Professional	6	18%	7	24%	6	24%
Retired	4	12%	5	17%	6	24%
Corporate/Business	5	15%	5	17%	3	12%
Social Services	9	26%	1	3%	3	12%
Skilled Trades	6	18%	5	17%	1	4%

4.2.6 Education

This sample of tourists is quite well educated. In all cases, a majority of respondents has greater than secondary-school education. For large-scale accommodations, 79% have an undergraduate degree or greater. A similar type of distribution is seen in the small-scale accommodations where 84% are university educated. The medium-scale accommodations show a slightly different distribution, with only 45% with a university education, and significantly higher percentages in the secondary school and technical school categories, when compared to the large and small-scale accommodations.

Variable	Tourist Accommodation Type					
	Large Scale		Medium Scale		Small Scale	
	n=34	Percent of n	n=29	Percent of n	n=25	Percent of n
Education						
Primary	0	0%	1	3%	0	0%
Secondary	2	6%	6	21%	2	8%
Technical School	5	15%	9	31%	2	8%
University Degree	27	79%	13	45%	21	84%

4.2.7 Income

Income distribution for each sample shows a few notable variations. In a similar fashion to education, both large-scale and small-scale accommodations show a higher income level than medium-scale accommodations. 50% of the large-scale and 32% of the small-scale sample earn over \$60,000, compared to only 17% for the medium-scale accommodations. At the other end of the spectrum, a combined 62% of the medium-sized sample earned less than \$39,999, compared to 32% for large-scale, and 24% for small-scale accommodations.

Variable	Tourist Accommodation Type					
	Large Scale		Medium Scale		Small Scale	
	n=34	Percent of n	n=29	Percent of n	n=25	Percent of n
Income (CDN\$)						
<\$19,000	6	18%	7	24%	4	16%
\$20,000-\$39,999	5	15%	11	38%	2	8%
\$40,000-\$59,999	6	18%	6	21%	11	44%
>\$60,000	17	50%	5	17%	8	32%

4.3 The Ecological Footprint and Demographics

For this section of analysis, the Ecological Footprint for the entire sample is compared with a number of demographic characteristics. This analysis explores any effects that demographic variables had on the total ecological resource use of tourism. For this analysis, the Ecological Footprint of each tourist was placed into one of three categories. This division was made due to the unique nature of the Ecological Footprint, namely that each tourist sampled had a different EF, thus making a tourist-by-tourist cross-tabulation impractical for drawing larger conclusions. The three categories of EF value are: .0-.2 hectares (ha), .21-.6 ha, and .6 ha and larger.

Chi-square tests for each cross-tab were calculated and used to test the strength of relationship between the Ecological Footprint and demographic information. The chi-square test was used to compare the observed cross-tab value to that which can be theoretically expected, based on the distribution of the observed sample. In this way, the chi-square tests for independence, by calculating a critical value of the relationship between two variables, based on a desired level of significance (for this research, .05). In this case, the two variables to be tested are the demographic variable (age, gender, income, etc.) and the total Ecological Footprint category. The null hypothesis to be tested by the chi-square, is that *there is no relation (independence) between demographic characteristics and Ecological Footprint, as recorded by this particular study and method*. The threshold of null hypothesis rejection is based on degrees of freedom $(\text{Rows} - 1)(\text{Columns} - 1)$, calculated at a .05 level of significance (Berenson, Levine, and Rindskopf, 1988). The alternative hypothesis would be that *there is a relation (dependence) between demographic characteristics and Ecological Footprint, as recorded by this particular study and method*. Again, the critical value of the chi-square that allows for the rejection of the null hypothesis is based on the degrees of freedom allowed for each particular demographic characteristic, measured at the .05 level of significance. For example, a comparison between gender and EF would have three degrees of freedom $(4 \text{ rows} - 1)(2 \text{ columns} - 1)$, thus setting the threshold of hypothesis rejection at 7.815 (Berenson, Levine, and Rindskopf, 1988). The greater the number of degrees of freedom, the larger the critical value needed to reject the null hypothesis, at a given level of significance. Thus, the chi-square test provides a measure of independence between demographic characteristics and Ecological Footprint.

4.3.1 Age and the Ecological Footprint

When comparing the age of the tourists sampled, to their total Ecological Footprint value for the duration of their stay, little correlation between these two characteristics can be found (Table 4.8). For all three categories of EF, greater proportions are found in the age range from 18-31, a reflection of the larger numbers of those ages represented in the sample (see Table 4.1). Other proportional relationships do not appear intuitively, suggesting a weak correlation between variables. This lack of dependence between age and EF is supported by a chi-square value of 7.7, with 6 degrees of freedom, which does not meet or exceed the critical value of 12.5 needed for null hypothesis rejection. As such, age and Ecological Footprint are independently related variables.

Table 4.8 Age and Ecological Footprint Category Comparison

		AGE				Total
		18-31	32-45	46-59	60+	
EF Category (ha per stay)	0.0-0.2	36.1%	27.8%	13.9%	22.2%	100.0%
	0.21-0.6	45.7%	17.1%	28.6%	8.6%	100.0%
	0.6+	47.1%	5.9%	29.4%	17.6%	100.0%

4.3.2 Gender and the Ecological Footprint

When cross-tabulating gender with the Ecological Footprint categories, results mimic the overall gender distribution of the sample, roughly 60% male, 40% female (see Table 4.2). This similarity is seen in all three EF categories (Table 4.9), with slight variations. It is unlikely then that gender has an effect on the EF. This independent relationship is reinforced by a chi-square value of .874, which when calculated with 2 degrees of freedom, is lower than the critical value of 5.9 required for null hypothesis rejection. Thus, gender and EF are not related, within the sample taken in this study.

Table 4.9 Gender and Ecological Footprint Comparison

		GENDER		Total
		Male	Female	
EF Category (ha per stay)	0.0-0.2	61.1%	38.9%	100.0%
	0.21-0.6	57.1%	42.9%	100.0%
	0.6+	70.6%	29.4%	100.0%

4.3.3 Travelling Unit and the Ecological Footprint

When comparing travelling unit and EF category, the category of “As a Couple” dominates the sample. As can be seen in Table 4.3, travelling unit is dominated by couples. This distribution is repeated in the cross-tab between EF and travelling unit, with well over 60% of those with an EF of 0-.2 and .21-.6 hectares, travelling in couples. Only in the largest EF category, those with a total trip EF of greater than .6 hectares, is the distribution more evenly spread between couples (29.4%), families (29.4%), and those who travelled alone (23.5%) (Table 4.10). Due to the large proportion of the sample concentrated in the “as a couple” category, a chi-square value could not be calculated. Greater than 20% of the cells had a value of less than 5 cases, thus violating the assumptions of the chi-square test. While no test of independence can be performed, the similarities between the general distribution of travelling unit (Table 4.3) and that of the cross-tabulated EF and travelling unit (Table 4.10), could indicate that these two variables are independent of each other. Any relationships that may appear (such as couples registering a low EF) should be considered to reflect the specific sample under study, and should not be generalized to the larger population of tourists in Ontario.

Table 4.10 Travelling Unit and Ecological Footprint Comparison

		Travelling Unit				Total
		Alone	With Friends	As a Couple	As a Family (adults and children)	
EF Category (ha per stay)	0.0-0.2	2.8%	22.2%	66.7%	8.3%	100.0%
	0.21-0.6	17.1%	5.7%	68.6%	8.6%	100.0%
	0.6+	23.5%	17.6%	29.4%	29.4%	100.0%

4.3.4 Country of Origin and Ecological Footprint

The connection between country of origin and Ecological Footprint manifests itself in the area of transportation types and ecological costs. The use of flight is very ecologically consumptive, even when compared to driving long distances. Accordingly, tourists who flew from the United Kingdom, Europe, Asia, and Australia has a larger EF than those who arrived from Canada and the United States. Tourists from Canada and the USA were able to drive (in some cases quite short distances) and show a correspondingly lower total Ecological Footprint (Table 4.11). This relationship between country of origin and EF is supported by the chi-square value calculated at 32.5. This value is above the critical value of 12.5 (based on 6 degrees of freedom), required for rejection of the null hypothesis. Thus, EF and country of origin show a

level of dependence, however the Ecological Footprint can be seen not as a factor of country of origin, but instead of the distance and methods of transportation that travelling from these areas entail.

Table 4.11 Country of Origin and Ecological Footprint Comparison

		Country of Origin				Total
		Canada	USA	UK and Europe	Australia and Pacific	
EF Category (ha per stay)	0.0-0.2	42.6%	80.0%	0%	20.0%	40.9%
	0.21-0.6	42.6%	20.0%	64.3%	0%	39.8%
	0.6+	14.8%	0%	35.7%	80.0%	19.3%
Total		100.0%	100.0%	100.0%	100.0%	100.0%

4.3.5 Occupation, Education, Income and the EF

Three demographic variables, occupation, education, and income bore little relation to the individual tourists' Ecological Footprint. For the sample under study, a wide range of occupations were identified, and showed no direct link to EF category. Occupations tended to influence income in predictable ways, with students reporting lower income levels, and professionals reporting a higher income, yet this relationship seemed to have little effect on the tourism EF. Education level was quite high, and showed no meaningful differentiation based on Ecological Footprint or accommodation scale. One possible way in which occupation, education, and income may have influenced the tourism EF is by allowing the tourist the chance to engage in leisure travel in the first place. In all cases, the chi-square test was impractical for use, as over 20% of the cells used in cross tabulation contained fewer than 5 cases, thus violating the assumptions of the chi-square test.

4.3.6 Length of Stay and Ecological Footprint

Although not a demographic variable, the length of a tourists stay was analysed in a similar fashion, and revealed some key results. Length of stay was categorised into 5 ranges; 1-3 Days, 4-6 Days, 1-3 Weeks, 1-2 Months, and Seasonal (May to October). The variable 'length of stay' was then compared with the categories of total Ecological Footprint size, in much the same manner as the demographic data. While the dispersion of data resulted in greater than 20% of the cell values being under 5, thus making the chi-square test unusable, some general correlations can be seen. For example, 41.2% of those with an EF of over .6 ha, were seasonal length visitors,

compared to none in the lower two EF categories (Table 4.12). Those tourists in the smallest EF category (0-.2 ha) stayed a very short time, with 97.2% staying for less than 1 week at their chosen accommodation (Table 4.12).

Table 4.12 Length of Stay and Ecological Footprint Comparison

		Length of Stay					Total	
		1 Day	2-3 Days	4-6 Days	1-3 Weeks	1-2 Months		Seasonal
EF Category (ha)	0.0-0.2	5.6%	61.1%	30.6%	2.8%	0%	0%	100.0%
	0.21-0.6	0%	37.1%	25.7%	28.6%	8.6%	0%	100.0%
	0.6+	0%	0%	29.4%	29.4%	0%	41.2%	100.0%

Length of stay is an important consideration in understanding a tourists total EF, but can at times be overshadowed by other factors. For example, the level of resource use of the Budget Hotel (through air travel) and the Resort Hotel (through a large, energy consumptive facility) conspire to overwhelm the influence of length of stay (see section 4.4). This could indicate that a shorter stay at one of these accommodations can be more resource consumptive than a longer stay at another type of accommodation. In this manner length of stay is overwhelmed by other components of ecological resource use, such as transportation and accommodation costs.

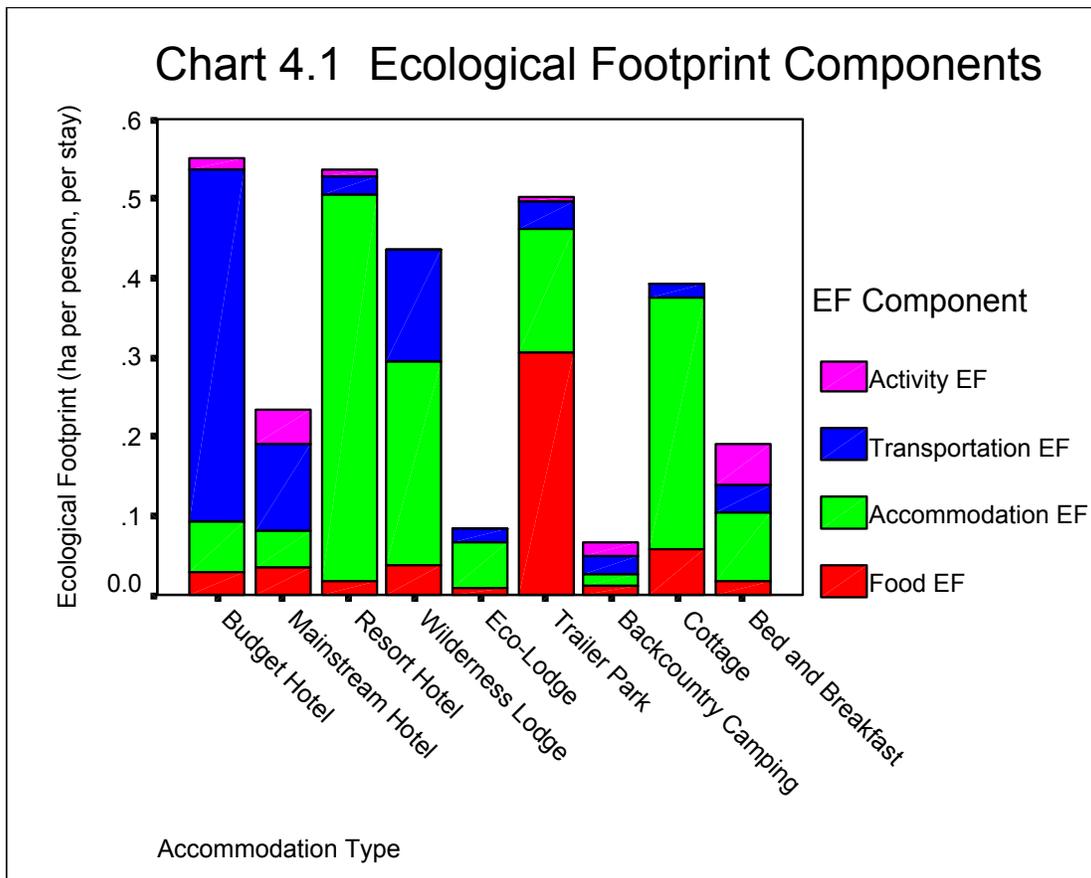
4.4 Themes of Ecological Resource Use

This section of results will examine the type and amount of ecological impact generated by the tourist experience. The types of ecological impact have been divided into five key sections; length of stay, accommodation, transport, food, and activity costs. Each of these sections presents an Ecological Footprint value, namely, the per-day EF, accommodation EF, transportation EF, food EF, and activity EF (Table 4.13). The quantitative Ecological Footprint measure will be expanded through the use of qualitative data collected during the survey and interview process. These results will provide the main source of information for further analysis. Direct comparison between tourism types, as well as key differences and anomalies will create the foundation for further discussion in section 5.

4.4.1 The Total Ecological Footprint

A simple comparison of the total Ecological Footprint values of the 9 types of accommodation under study provides only a preliminary analysis. The specific areas of ecological impact vary widely between each type of accommodation. In some cases,

transportation costs make up a large proportion of the Ecological Footprint, whereas for others it may be the tourist activity or tourist food choices. These multiple sources of ecological resource use means that relying on only the total Ecological Footprint value, rather than the component parts, would not provide a complete picture. One must also bear in mind that the total EF was calculated using the tourists total trip length. Thus, an individual with a two-week holiday and one who travelled for a weekend are evaluated on the same continuum. This inconsistency of time is addressed with the per-day EF value, where total trip EF is divided by the total number of days. The use of the per-day EF does not imply that the total ecological cost of tourism activities is any less, but simply provides a common ground for comparison between types of tourism. Regardless of whether it is total EF or per-day EF that is being discussed, it must be noted that these ecological costs occur in addition to those incurred at home. While the following section will present the results of this total EF value, it is important to compare this general statistic with the more specific components to follow.



When examining the total Ecological Footprints of the 9 types of accommodations under study (Chart 4.1 and Table 4.13), four general groupings based on size of EF can be made. Firstly, there are those types of accommodation where tourists produced a comparably large Ecological Footprint. The Budget Hotel, the Resort Hotel, and the Trailer Park/Campground all produced average total EF values of over one half (0.5) a hectare (Table 4.13). These accommodations come to this level of resource use in very different ways. In Chart 4.1, one can see the relative contribution of the components of ecological resource use. The Budget Hotel has a great deal of its total EF coming from transportation costs, which differs from the Resort Hotel, which has a large accommodation component, and the Trailer Park/Campground which has a large tourist component. One point to remember from this example is that an aggregate measure of ecological resource use, such as the EF, can hide many of the finer details of where the specific resource use comes from. Even though these three accommodation types are shown to be very similar in their total resource use, the many other factors, yet to be discussed, complicate this preliminary assessment.

Table 4.13 Mean Ecological Footprint Values						
Ecological Footprint Components						
Tourist Accommodation	Total	Per-Day	Food	Accommodation	Transportation	Activity
Large EF Accommodations						
Budget Hotel	0.550	0.085	0.030	0.063	0.444	0.013
Resort Hotel	0.537	0.208	0.018	0.484	0.024	0.009
Trailer Park/Campground	0.502	0.018	0.306	0.154	0.034	0.007
Upper-Mid EF Accommodations						
Wilderness Lodge	0.437	0.089	0.038	0.255	0.142	0.000
Cottage	0.393	0.081	0.057	0.317	0.019	0.000
Lower-Mid EF Accommodations						
Mainstream Hotel	0.227	0.051	0.034	0.047	0.107	0.045
Bed and Breakfast	0.191	0.084	0.016	0.087	0.036	0.052
Small-Scale Accommodation						
Ecolodge	0.083	0.023	0.007	0.059	0.017	0.000
Backcountry Camping	0.067	0.020	0.011	0.014	0.023	0.019

A second grouping of accommodation types, the Wilderness Lodge and the Cottage, produced an average EF of .393 and .437 hectares, respectively. This grouping can be considered to form the upper boundary of a broad middle class within the 9 accommodations under study. The third grouping of accommodation types, the Mainstream Hotel and the Bed and Breakfast, with a total EF of .191 and .227 hectares, form the lower boundary of this middle class.

The final general grouping of total Ecological Footprint values for the 9 types of accommodation under study, are those with the smallest EF value. Two types of accommodation, the Eco-Lodge and Backcountry Camping, with total EF value of .083 and .067 hectares make up this small EF category (Chart 4.1, Table 4.13). While it was not entirely unexpected that these two types of accommodation have such a low EF, the manner in which this came to be is notable, and will be explored within each component results section below.

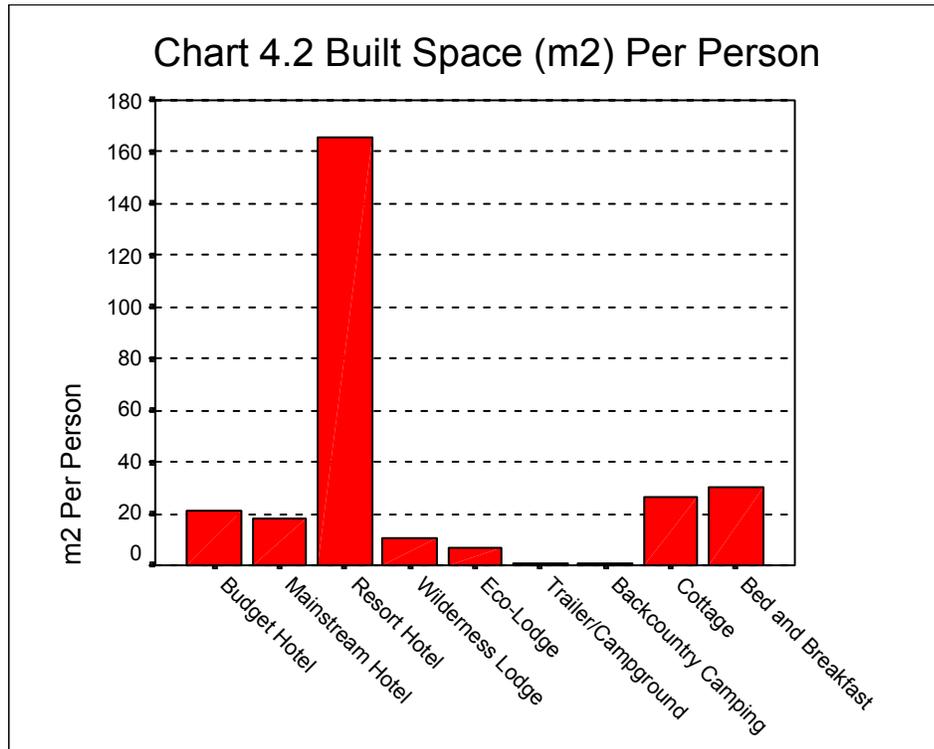
4.4.2 A Home Away from Home: Accommodation Ecological Footprints

The accommodation Ecological Footprint component is a factor of many different types of ecological resource use. The total size of an accommodation, number of guests, types of material used in construction, length of stay, as well as the amount and type of energy consumed by an accommodation, are all variables that contribute to the accommodation Ecological Footprint. These key factors will be explored in the following sections, and their specific contribution to the overall Ecological Footprint of tourism presented.

4.4.2.1 Total Accommodation EF and Size Per Person

The amount of built space per guest at an accommodation is a key contributor to an accommodation EF. The Resort Hotel provides an example of a tourist accommodation with comparatively large ecological costs as a result of accommodation components. The sheer size and scale of the infrastructure and property contributes to the total footprint. The physical structures of the Resort Hotel consist of over 1,000,000 square feet of built space (165.89m² per person, based on peak season occupancy), making it the most spacious accommodation in the sample (Chart 4.2, Table 4.14). Other types of accommodation have a more modest amount of space per guest, with the next largest being the Bed and Breakfast, with 30.19 m² per person. At the other end of the spectrum, the Trailer Park/Campground (1.04 m²) and the Eco-Lodge (6.45 m²) provide much more efficient accommodations (Chart 4.2, Table 4.14). While in certain cases the amount of space at an accommodation can be a factor of the style of accommodation (a Trailer Park/Campground, for example), what may make more of an impact is the occupancy rate.

Accommodation	Kwh	m2 Build Space
Budget Hotel	22.4	20.87
Mainstream Hotel	15.82	18.15
Resort Hotel	35.35	165.89
Wilderness Lodge	12.09	10.41
Eco-Lodge	0	6.45
Trailer/Campground	11.26	1.04
Backcountry Camping	0	0.67
Cottage	2.2	26.16
Bed and Breakfast	20.33	30.19



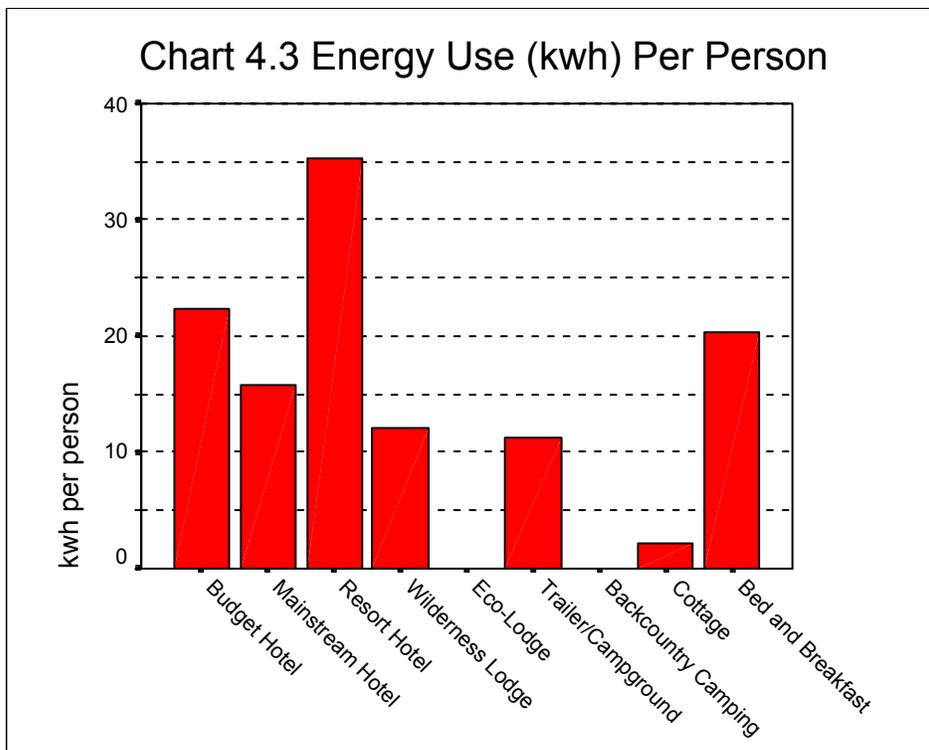
When considering the ecological impact per person of the built structure of an accommodation, the number of guests housed in a particular space becomes very important. If an accommodation can host a large number of people compared to the available space, then ecological impacts are shared between greater numbers of guests. Despite providing accommodation for 560 guests, the Resort Hotel does not achieve this scale of economy, as its built space per person dwarfs the next closest rival (Table 4.14, Table 4.15). Other types of accommodation, such as the Budget and Mainstream Hotels, manage to gain this level of efficiency. Both of these types of accommodation have a smaller amount of built space, with 20.87 m² and 18.15 m² per person, respectively (Chart 4.2). By diluting their space between nearly 200 guests, these two types of tourist accommodations have achieved comparably low accommodation EF components (Table 4.13).

Table 4.15 Occupancy			
	Number of Spaces	Occupancy	Number of
Type of Accommodation		Rate (%)	Guests
Budget Hotel	178	99	176
Mainstream Hotel	192	85	163
Resort Hotel	700	80	560
Wilderness Lodge 1	88	100	88
Wilderness Lodge 2	44	75	33
Eco-Lodge 1	40	25	10
Eco-Lodge 2	40	100	40
Trailer/Campground 1	557	75	418
Trailer/Campground 2	53	90	48
Backcountry Camping	1946	65	1265
Bed and Breakfast 1	4	80	3
Bed and Breakfast 2	4	100	4
Cottage 1	4	100	4
Cottage 2	6	83	5

Tourist accommodations with fewer total guests, such as Cottages and Bed and Breakfasts did not achieve the same level of efficiency with regards to built space per person, as did the accommodations with larger numbers of guests. All of the Cottages and Bed and Breakfasts surveyed had a total occupancy of 5 persons or fewer, and were more spacious per person (26.16 m² and 30.19 m² per person, respectively) than the larger Budget Hotel and Mainstream Hotel (Table 4.14). Occupying a median area are accommodation types with fewer than 100 guests, yet more than 10, such as the Wilderness Lodge and Eco-Lodge. These accommodations Ecological Footprints reflected the high ratio of guests to available space. The Wilderness Lodge had 10.41 m² per person of built space, and the Eco-Lodges 6.45 m² per person (Table 4.14). These two accommodations, through either intentional or accidental design have managed to fit a very large (if not comfortable) number of people into their built facilities. Still, other types of accommodation showed significantly lower amounts of built space per person, however the nature of these accommodations themselves likely contributed to this. For example, Backcountry Camping (.067 m² per person) and Trailer Parks/Campgrounds (1.04 m² per person) have the lowest amounts of built space of all accommodations surveyed (Table 4.14). This is of course attributable to the use of tents, compact motor homes and tent trailers, rather than the more permanent structures found at other types of accommodations.

4.4.2.2 Construction Materials and Ecological Footprints

The previous section has illustrated how the size of an accommodation and the number of guests housed there can affect the Ecological Footprint. The types of materials used in building a tourist accommodation can also have an impact on the ecological costs associated with that structure. It is possible that a physically larger structure made out of a lower ecological cost material may have a lower accommodation EF than a very small structure that uses ecologically costly material. This relationship is seen in several cases identified in this research. The best example can be seen when one compares the Mainstream Hotel and the Wilderness Lodge. The accommodation EF components are very different, with the Mainstream Hotel scoring a modest .047 hectares, and the Wilderness Lodge a much more substantial .255 hectares (Table 4.13). Also of note is that the Wilderness Lodge scores better in two key areas of the accommodation EF component, energy per guest (12.09 kWh per person per day compared to the Mainstream Hotel with 15.82 kWh) and amount of built space (10.41 m² per person compared to 18.15 m²) (Chart 4.3, Table 4.14). Even though the Wilderness Lodge would have a larger total energy use, due to a longer length of stay and the compound effects of energy use (a time sensitive ecological cost), this alone cannot explain the vast gulf between these two types of accommodation.



A contributing factor to the differing accommodation costs of the Mainstream Hotel and the Wilderness Lodge is the type of material used to construct the buildings themselves. A major assumption of the Ecological Footprint calculator spreadsheet is that buildings made of wood have a larger ecological cost than those made of brick. The reasoning behind this assumption is more fully explained in section 3.3.5 Embodied Energy and Building Materials. The Mainstream Hotel, as a brick structure, incurs a smaller ecological cost per square meter of space than the wooden Wilderness Lodge. The effects of a larger ecological cost for wooden structures are also seen in the Eco-Lodge and the Cottage, both wooden structures. In the case of the Eco-Lodge, despite using renewable sources of energy, and having a very small amount of built space per person, the accommodation EF component is .059 hectares, larger than that of the Mainstream Hotel (.047 hectares), a much larger, albeit less ecologically costly, brick structure (Table 4.13).

In this analysis, brick and wood are the only two general categories for building material types provided for in the Household EF spreadsheet calculator. In the case of the Mainstream Hotel, the ecological cost of the steel frame of such a building is not taken into consideration, and is instead treated as a brick building. Likewise with the Eco-Lodge, the wood building materials are assumed to be of a standard commercial grade. In reality, reclaimed wood and locally grown timber from small-scale, selective-cut operations were used in construction of the Eco-Lodge. In this case, adjustments to the method of calculating accommodation EF values would have likely resulted in a lower EF. As it stands, this finer level of precision was not available, and the Eco-Lodge is penalized, perhaps unfairly, for constructing its buildings out of wood, and the Mainstream Hotel is rewarded for constructions of brick only, rather than the high embodied energy steel frame likely used.

4.4.2.3 Accommodation Energy Use Per Person

Energy source and level of consumption were identified as contributing factors to the accommodation EF component. The majority of accommodations used energy available from the municipal grid, made up of a mix of coal, nuclear and hydroelectric power. The Eco-Lodge used renewable energy sources, and hence the ecological cost of energy consumed is not a factor (Table 4.14). As well, Backcountry Camping was considered to have a zero level of energy use generated by tourists. In this case the amount of wood and propane burned (both relatively minor costs) were included under the individual tourist consumption category, and the embodied energy of any generating equipment is excluded. Energy use by the access point facilities was included

in the activity calculation, based on the campsite charge. As discussed earlier, energy is a time sensitive ecological cost. This means that the longer the stay of the individual tourist, the greater the accommodation energy cost. Thus, accommodation types that had comparably long term guests, could also have a very large total energy contribution to their footprint.

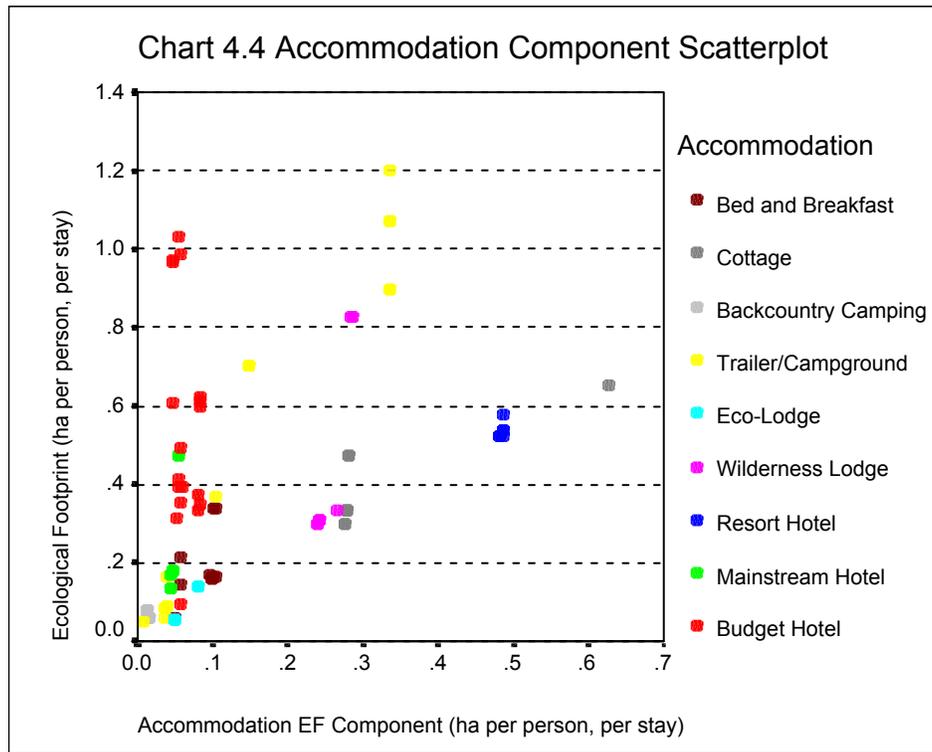
The amount of energy consumed per person, per day (kWh) was calculated for each type of accommodation. The Resort Hotel once again led the way with the largest energy use per person, per day, at 35.35 kWh (Table 4.14). While energy saving technologies and retrofits had been installed by hotel management, the total energy use per person for the Resort Hotel still eclipsed all other forms of accommodation included in this study. On the lower end of the spectrum, the Cottage was an exceedingly small user of energy, with a scant 2.2 kWh per person, per day (Table 4.14). While lacking the same level of energy saving technologies as the Resort Hotel, the Cottage benefits by saving energy through simplicity. Not a luxurious accommodation by any standards, the Cottage is designed to be rustic, simple, and through these virtues, less energy consumptive.

At the Budget Hotel, guest behaviour was credited with providing much in the way of energy savings. As a budget accommodation, there are very few ‘frills’ associated with a nights stay. Hotel management does not provide (and guests do not likely expect, for 25\$ a night) a four-star level of service, cleanliness, and amenity. Rooms are crowded (leading to the aforementioned economy of scale), there is no pool, hot tub, or other typical hotel facilities, but neither are these considered essential. “Our guests are usually very conservative with things (energy, water, etc.). They are used to living on a tight budget and don’t really require much above the basics”, stated the manager of the Budget Hotel. Thus, the focus at the Budget Hotel is on economy, and as a result, the conservation of energy and resources, creating a comparably low accommodation EF. A very different type of phenomenon can be seen at the Wilderness Lodge, where the attitude and actions of the guests may increase the amount of energy consumed. When questioned about energy use policies, one Wilderness Lodge owner stated, “Our energy usage is very much affected by our occupancy. Sadly, most tourists seem to care little, if at all, about saving energy”. At this particular Wilderness Lodge, energy use, including heating, was very much up to the individual guests, rather than being centrally controlled by management. The owners noted that this likely has led to increased energy bills, and energy saving renovation and guest education were planned to help reduce this ecological and financial cost.

While most accommodations employed technological fixes to reduce energy use, for those guests staying at an Eco-Lodge, energy use was a topic of daily conversation. At both Eco-Lodges included in this study, education of guests was a prime component of the tourism experience. Guests were introduced to many of the ecologically sound practices that constitute life at an Eco-Lodge. “We try to make education as much of a goal as relaxation”, stated one Eco-Lodge operator, “it is so important that they realise that our power systems out here (in this case, solar panels) can’t handle a hairdryer”. While in reality their solar power system could in fact handle multiple such devices, the larger point was to stress conservation of resources, not only while at the Eco-Lodge, but back at home as well. This introduction to or continuation of, a more eco-friendly lifestyle becomes an essential component of reducing the ecological cost of the Eco-Lodge experience.

In summary, the accommodation EF component represents one of the key areas of tourist ecological resource use. Accommodation size, occupancy, construction materials, energy type and level of usage all play important roles in the end Ecological Footprint value. For some types of accommodation, such as the Mainstream Hotel and the Eco-Lodge, a smaller amount of built space per person can reduce their Ecological Footprint, by achieving a scale of economy. Other types of accommodation can reduce their energy consumption through the use of renewable energy (Eco-Lodge) or by providing a relatively simple style of accommodation (Cottage, Budget Hotel). Finally, the materials used in the construction of the accommodations themselves can contribute to the total ecological cost. Locations where buildings were made of wood, such as the Eco-Lodge, Wilderness Lodge, and Cottage, incurred a much larger ecological cost than buildings that are made of brick.

The relationship of the accommodation EF to the overall Ecological Footprint can be displayed in Chart 4.4. In this chart, each tourist has been plotted to show the proportion of accommodation EF relative to the overall EF. Those types of accommodation that make little contribution to the tourists’ overall EF are clustered on the left hand side. Regardless of what the total EF is, the accommodation EF is very low. The further to the right that a case occurs, the greater the contribution of accommodation costs to the total Ecological Footprint. At locations such as the Resort Hotel, Cottage and the Wilderness Lodge, the accommodation EF component makes a large contribution to their overall EF. Comparably, for those tourists staying at the Trailer Park/Campground and Backcountry Camping, accommodation costs had little effect on their total EF.



4.4.3 Is Getting There Half the Problem?: Tourist Transportation Costs

Transportation is an essential component of the tourist experience. Tourism can be partly defined as time away from home, a movement from one geographic area to another. Thus, the ecological cost of transportation is an important facet of tourist ecological resource use. Key contributors to the transportation EF are the distance covered, and the type and relative efficiency of the transportation method.

4.4.3.1 Transportation Methods

Two transportation methods dominate the sample under study; air travel and the personal automobile. Air travel was used only by tourists staying at the Budget Hotel, Mainstream Hotel, and Wilderness Lodge (Table 4.16). Accordingly, these 3 types of accommodations had transportation EF components much larger than others (Table 4.13). The Budget Hotel, site of over 80% of all airplane trips taken, provides an excellent example of how air travel can increase the transportation EF component (Table 4.16). Those staying at the Budget Hotel had a transportation footprint of .444 hectares, larger than the Wilderness Lodge, with a value of .142

ha, and the Mainstream Hotel, with a transportation EF of .107 ha (Table 4.13). Accordingly, those tourists staying at the Wilderness Lodge and the Mainstream Hotel represented a much smaller proportion of air trips, at 9.5% each (Table 4.16).

Method	Accommodation									Total Trips
	Budget Hotel	Mainstream Hotel	Resort Hotel	Wilderness Lodge	Eco-Lodge	Trailer Park/Campground	Backcountry Camping	Cottage	Bed and Breakfast	
Airplane	80.0%	9.5%	0.0%	9.5%	0.0%	0.0%	0.0%	0.0%	0.0%	21
Private Car	3.0%	12.2%	9.0%	9.0%	6.0%	22.8%	9.0%	13.8%	15.2%	66
Bus	84.6%	0.0%	0.0%	15.4%	0.0%	0.0%	0.0%	0.0%	0.0%	13
Train	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2
Other	33.3%	0.0%	0.0%	0.0%	66.0%	0.0%	0.0%	0.0%	0.0%	3

Although simply stepping into an airplane dramatically increases the Ecological Footprint, the distance travelled (and thus tourist origin) ultimately determines how large that impact will be. As discussed, the Budget Hotel attracts an international youth tourist. As these guests are arriving by airplane, their transportation footprint reflects the enormous amount of energy (fuel) and resources (airports, planes, and infrastructure) required to fly. A significant proportion of those tourists staying at the Budget Hotel are international visitors, the largest percentage (66.6%) from the United Kingdom and Europe, but also smaller numbers hailing from long-haul destinations such as Asia and Australia (Table 4.17). The geographic origin of guests at the Budget Hotel necessitates the use of air travel, and makes the resulting ecological cost unavoidable. This high proportion of international guests is not seen to the same extent in other types of accommodations where tourists arrived by airplane, indicating potentially shorter domestic flights. As such, the influence of air travel on the transportation EF of the Wilderness Lodge and the Mainstream Hotel, with their lower concentration of international guests, is noticeably less, resulting in lower EF values than the Budget Hotel (Table 4.13).

Accommodation	Country of Origin				Total
	Canada	USA	UK/Europe	Asia/Australia	
Budget Hotel	5.6%	5.6%	66.6%	22.1%	100.0%
Mainstream Hotel	20.0%	80.0%	0.0%	0.0%	100.0%
Resort Hotel	100.0%	0.0%	0.0%	0.0%	100.0%
Wilderness Lodge	75.0%	0.0%	25.0%	0.0%	100.0%
Eco-Lodge	83.3%	0.0%	0.0%	16.7%	100.0%
Trailer Park/Campground	100.0%	0.0%	0.0%	0.0%	100.0%
Backcountry Camping	100.0%	0.0%	0.0%	0.0%	100.0%
Cottage	100.0%	0.0%	0.0%	0.0%	100.0%
Bed and Breakfast	40.0%	60.0%	0.0%	0.0%	100.0%
% of Total	61.4%	17.0%	15.9%	5.6%	100.0%

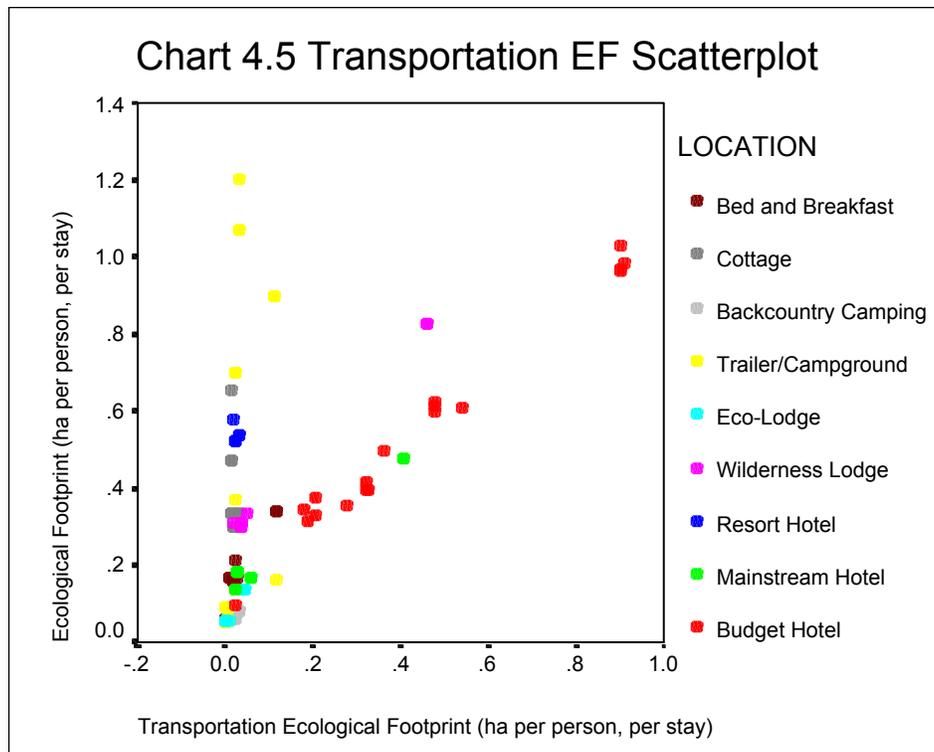
For those types of accommodation where auto travel was the only type of transportation used (Cottage, Backcountry Camping, Resort Hotel, Trailer Park/Campground, and Bed and Breakfast), transportation EF values ranged from .019 hectares to .036 hectares (Table 4.13). The majority of those surveyed were either domestic tourists, or from nearby areas in the United States (Table 4.17). Additionally, the size, type, and relative efficiency of each type of automobile were taken into account, however this fine distinction is not visible in the larger total Ecological Footprint. While distance travelled and vehicle efficiency varied considerably, the end contribution of car travel to the transportation EF was slight. This type of local area car travel, especially when shared with a number of passengers, did not result in a large ecological cost.

The transportation EF component of the Eco-Lodge (.017) is the smallest of the 9 types of accommodation sampled (Table 4.13). Two factors have influenced this very low transportation value. Firstly, one of the Eco-Lodges is very close (20 minute drive) to a major urban area, and thus a ready source of guests. 66.7% of those staying at the Eco-Lodge drove less than 99km, a very modest trip (Table 4.18). Secondly, on this short trip the tourists surveyed arrived in a high-capacity van. This ride sharing allowed tourists to divide the ecological cost of fuel between many passengers, reducing their transportation EF. This ecological gain through transporting many persons in one vehicle is very similar to the way in which efficiency gains are made by housing many guests in one accommodation.

Table 4.18 Driving Distances										
Distance	Accommodation Type									Percent of All Trips
	Budget Hotel	Mainstream Hotel	Resort Hotel	Wilderness Lodge	Eco-Lodge	Trailer Park/Campground	Backcountry Camping	Cottage	Bed and Breakfast	
0-99 km	25.0%	0.0%	0.0%	0.0%	66.7%	40.0%	0.0%	0.0%	10.0%	17.9%
100-299 km	6.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%
300-499 km	18.8%	25.0%	100.0%	25.0%	0.0%	33.3%	66.7%	55.6%	50.0%	38.0%
500-699 km	6.3%	0.0%	0.0%	50.0%	0.0%	6.7%	33.3%	44.4%	0.0%	14.3%
700-899 km	0.0%	75.0%	0.0%	25.0%	33.3%	6.7%	0.0%	0.0%	20.0%	15.5%
900-1099 km	18.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.6%
>1100 km	25.0%	0.0%	0.0%	0.0%	0.0%	13.3%	0.0%	0.0%	20.0%	9.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

In summary, transportation costs show a very wide range, from .017 hectares to .444 hectares (Table 4.13). Despite this broad range, the transportation EF component falls into two simple categories; those who fly and those who drive. The ecological costs of flight are immense, but for the international or long-distance traveller, there is little other choice. Local area

travellers have more choice, being able to drive personal cars, or take a bus or train. The ecological costs of car travel, while still meaningful, are substantially less than the costs of flight. Differences due to vehicle types, while being real and measurable, occur at too fine a level to be a factor in this particular Ecological Footprint analysis. For certain types of tourists, such as those staying at the Budget Hotel, Wilderness Lodge, and Mainstream Hotel, the transportation EF component makes a noticeable contribution to the total EF. This relationship can be easily seen in Chart 4.5, a scatter plot diagram of individual tourist transportation EF, and its relative contribution to each tourists total EF. In the case of the Budget Hotel, Wilderness Lodge, and Mainstream Hotel, transportation costs play a significant overall role. Rather than forming a reasonably straight vertical line on the left hand side of the chart, many of these plots were on the right hand side, indicating that transportation costs make up a larger proportion of the total EF. The implications of transportation method provide one of the key areas for discussion, to be pursued in Chapter 5.

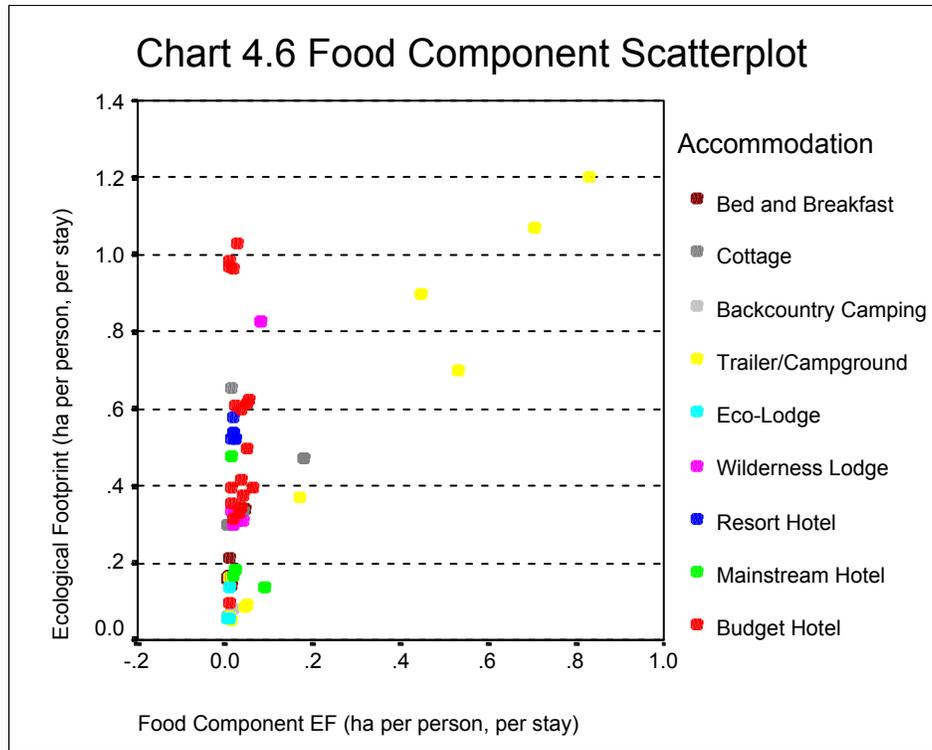


4.4.4 Food Choices: Tourist Consumption Costs

The primary element of the food EF component is the amount and type of food consumed by the individual during their stay. Obviously, the amount of food consumed depends on the

length of stay of each tourist, their budget, and their personal eating habits. Several examples from the research will be used to illustrate this area of ecological resource use.

In general, the longer the length of stay, the larger the food consumption EF. In the case of the Resort Hotel, tourists did not stay long-often only for a weekend (Table 4.15), thus result in a small food consumption EF (.018 ha). Other types of accommodation with short stay periods, most notably the Bed and Breakfast, displayed similar levels of food EF, whereas locations with a longer length of stay, such as the Trailer Park/Campground, have a larger food EF. The food component of ecological resource use for those staying at Trailer Park/Campgrounds is by far the largest of the sample at .306 hectares (Table 4.13). The length of stay for Trailer Park/Campground guests is significantly longer (68.93 days) than all other types of accommodations (Table 4.19), accordingly, the large size of the Trailer Park/Campground food EF component should come as no surprise. As length of stay increases, so does the amount of food consumed, as well as ecological impact. When one examines Chart 4.6, this relationship becomes evident. The dots representing the Trailer Park/Campground (yellow) show that the food EF comprises a very substantial portion of each tourists total EF. The Trailer Park/Campground dots (yellow) are found dispersed on the right hand side of the chart, rather than the straight vertical line on the left formed by those tourists for whom the food component contributed little. What is also interesting is that the other accommodations (except a handful of long-term Cottagers) show that food costs do not constitute a major portion of the total EF, indicating that for shorter stays, the ecological cost of food is not as significant as other types of ecological costs.



Some exceptions are to be found to the relation of time and tourist EF component. Despite the fact that Budget Hotel tourists are relatively longer-term guests (8.44 days on average), the total ecological cost of food consumption is low. The average size of the food component of the footprint was .030 hectares for Budget Hotel guests, compared to .034 ha for Mainstream Hotel guests, who stay at their accommodation for an average of 4.2 days (Table 4.15). As cost-conscious tourists, it is possible that those who stay at a Budget Hotel are concerned with restricting their spending, and thus consume less of the high cost (both ecologically and financially) foodstuffs, such as beef and seafood.

Another exception to this general trend of time and food EF is found at the Eco-Lodge. Many Eco-Lodges extend their environmental ethic into all areas of the tourist experience, including that of the food that is served. Tourists staying at the Eco-Lodges had the smallest food EF component of the sample, at .007 hectares (Table 4.14). The impact of length of stay on tourist component EF is not as straightforward at the Eco-Lodge. Possessing both a low food EF component and a shorter length of stay (3.33 days), the Eco-Lodge achieves a lower food EF, over the same or longer period of time (Table 4.19). Both the Bed and Breakfast (.016 ha in 2.40 days), and the Resort Hotel (.018 ha in 2.67 days) accumulated a larger food EF in a shorter period of time (Table 4.13, Table 4.19). This may indicate that tourists staying at the Eco-Lodge

eat an alternative diet compared to those staying at other types of accommodation. This result is supported by interviews with the management of the Eco-Lodges surveyed. At both Eco-Lodges, food choice played an important role in the guest experience. Both Eco-Lodges had on-site gardens, which produced some food for the guests. Additional efforts were made to provide a low-on-the-food chain dining experience at every meal by serving only vegetarian dishes. In the Ecological Footprint calculator used, higher on the food chain commodities, such as beef, poultry, and especially fish incur a substantial ecological cost when compared to non-animal sources of nutrition. By removing this area of high ecological impact altogether from the Eco-Lodge experience the food EF component was kept small, despite a longer length of stay than other types of accommodation.

Table 4.19 Length of Stay				
Location	Mean	N	Minimum	Maximum
Budget Hotel	8.4	18	4	14
Mainstream Hotel	4.2	10	3	7
Resort Hotel	2.7	6	2	3
Wilderness Lodge	5.4	8	2	8
Eco-Lodge	3.3	6	3	4
Trailer/Campground	68.9	15	2	165
Backcountry Camping	3.7	6	3	4
Cottage	9.1	9	2	25
Bed and Breakfast	2.4	10	1	3
Total	16.3	88	1	165

In summary, although exceptions do occur in the form of the Budget Hotel and the Eco-Lodge there is a general connection between the length of stay of a tourist and their food EF component. Food consumption seems to be a relatively homogenous consumable and despite the wide range of personal tastes and appetites amongst those surveyed, for the purposes of the Ecological Footprint, these differences have a minimum of impact. As the length of stay of a tourist increases, then logically so does their food consumption, and the ecological costs associated with that consumption. The only exceptions may be those especially frugal travellers staying at the Budget Hotel, and those staying at the Eco-Lodge who are intentionally fed a low-ecological cost range of meals.

4.4.5 Relaxing, Reading, and Golf: Tourist Activity Costs

Initially it was thought that a tourists' activity would make a significant contribution to the total Ecological Footprint. This proved not to be so, as the largest activity EF recorded was .052, at the Bed and Breakfast (Table 4.13). While this particular value is not inconsequential, and in fact is larger than select other components, the majority of tourists surveyed had a much smaller activity EF. Tourist activity EF was very much a factor of the specific activities that tourists chose to enjoy. Table 4.20 shows the types of activities that tourists participated in. Many of these activities, such as Outdoor Activities, or Sightseeing, have little or no ecological impact, or are difficult to quantify with the Ecological Footprint. One example is 'Sightseeing', which was commonly characterized by tourists with such phrases as "walking around the city", "exploring" or "window shopping". As such, there is little ecological impact from these activities, if one discounts the energy and resources required for the construction of the attraction itself, in this particular case, the city of Toronto.

Activity	Accommodation Type								
	Budget Hotel	Mainstream Hotel	Resort Hotel	Wilderness Lodge	Eco-Lodge	Trailer Park/Campground	Backcountry Camping	Cottage	Bed and Breakfast
Sightseeing	51.3%	33.3%	0.0%	10.5%	0.0%	12.0%		12.5%	28.6%
Outdoor Activities	10.8%	0.0%	81.8%	84.2%	100.0%	64.0%	100.0%	87.5%	9.5%
Theatre/Museums	21.6%	44.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.3%
Nightlife	8.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Major Attractions	8.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Golf	0.0%	0.0%	9.1%	0.0%	0.0%	4.0%	0.0%	0.0%	9.5%
Driving	0.0%	11.1%	0.0%	5.3%	0.0%	8.0%	0.0%	0.0%	0.0%
Shopping	0.0%	11.1%	9.1%	0.0%	0.0%	12.0%	0.0%	0.0%	19.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

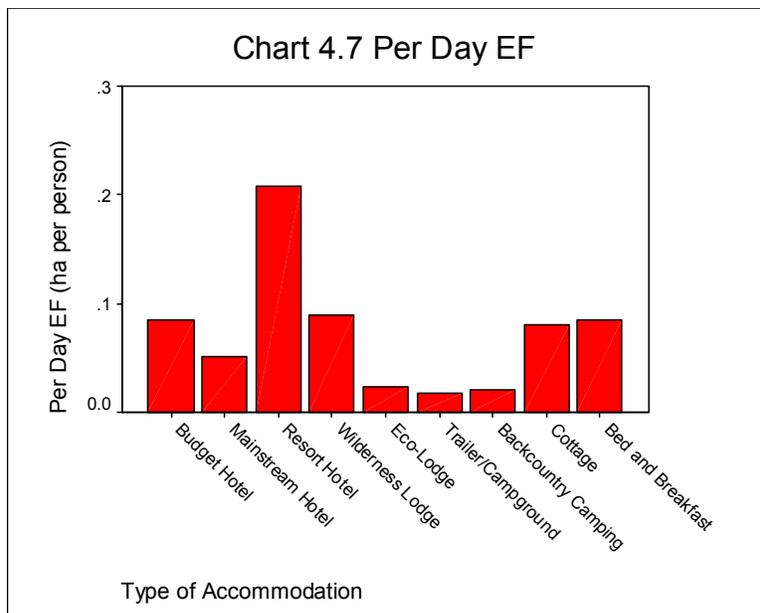
When looking specifically at the Mainstream Hotel and Bed and Breakfast, two types of accommodation with large activity EF components, attending Theatre/Museums was the most popular activity (Table 4.20). Many of these tourists were in Stratford to attend one or more performances of the Stratford Festival. This major cultural event consists of a large playbill divided up amongst three theatres, running for 8 months of the year. The ecological costs of mounting such a series of productions is very difficult to quantify. In an attempt to do so, the average ticket price was considered to reflect the financial costs, per seat, of each play. In this manner, the activity EF is an attempt to include the myriad of ecological resource uses inherent in the Stratford Festival. The activity EF component for the Mainstream Hotel and Bed and Breakfast is the largest activity EF component recorded (.045 and .052 hectares, respectively),

and can be seen as a useful comparison to other activities that were identified, if not as an accurate reflection of the true ecological cost of the Stratford Festival. The ecological cost of other types of consumptive activities was recorded in a similar fashion. For those few respondents who chose to golf, the price of a round of golf was used to calculate the ecological resource use. It is recognised that this value may not reflect the true cost of golf, but is simply intended to provide a method of comparison between activities. The difficulties in obtaining a more precise measure of activity EF are noted in section 3.3.7. Thus, the activity EF component must be taken as only a relative measure.

4.5 Weekend Getaways and Seasonal Stopovers: Length of Stay and Per-Day Ecological Cost

The duration of a tourists' stay plays an important role in the total size of the Ecological Footprint. This research collected data based on the time that a tourist was 'on vacation'. This time period varied from one overnight stay to an entire summer season. In order to represent the differing length of stay of each respondent, the per-day EF value was created. This value is simply each total EF divided by the number of days of the tourists' trip.

The per-day EF (Chart 4.7) is a direct factor of length of stay (Table 4.19). This relation can be clearly seen in a number of examples, but perhaps most distinctly at the Trailer Park/Campground. Those tourists who stayed at this type of accommodation had a per-day EF of .018 hectares per day, the lowest value of all the accommodation types (Table 4.13). This low per-day value may seem counter-intuitive, considering that the Trailer Park/Campground has one of the largest total EF values. However, as indicated earlier, the total EF value ignores length of stay. Tourists at the Trailer Park/Campground had the longest length of stay in the study, at 68.9 days (Table 4.19). Thus, in this case, a large total EF is being spread out over a considerable time span, to create a very low per-day EF. The exact opposite result can be seen in the Resort Hotel. The Resort Hotel has a similarly large total EF, compared to the Trailer Park/Campground (.537 hectares, Table 4.13). However, the length of stay for those tourists staying at the Resort Hotel is a very brief 2.7 days, resulting in the largest per-day EF value in the sample, at .208 hectares per day (Table 4.13, Table 4.19). This comparison ably illustrates the effect of length of stay on both the total and per-day Ecological Footprint values. At first glance it seems that both the Resort Hotel and the Trailer Park/Campground had very similar levels of ecological resource use. Once length of stay is taken into account, it becomes apparent that a three-night stay at a Resort Hotel could consume more resources than two months at a Trailer Park/Campground.



When considering the relation between lengths of stay, per-day EF and total EF, it is reasonable to conclude that those tourists who travelled for a longer period of time had less ecological impact than shorter stay guests. However, this conclusion would ignore that ecological costs are derived from a number of components, each of which behaves differently. One result that emerged from this research is the presence of two types of ecological costs; those that are sensitive to time, and increase accordingly (food and accommodation energy) and those that decrease with time, or are fixed costs that can be amortised over the length of stay (transportation, and the structure of an accommodation). For example, many tourists who stayed at the Budget Hotel arrived by airplane. This is a very large transportation cost, and one that is fixed-meaning that no matter how long one stays at a destination, the ecological cost of getting there and back is static. If one were to extend their stay at the Budget Hotel, the per-day EF would fall, as the impact of transportation is spread over a larger number of days, while the total Ecological Footprint remains unchanged, other than additional time sensitive costs, such as food and accommodation.

4.6 Summary of Results

This chapter has presented the findings of this study, through analysis of tourist surveys, accommodation manager interviews, and Ecological Footprint calculations. These sources of data have produced information on the demographic profile of those tourists under study, as well as how these demographics relate to ecological resource use. The key components of ecological

impact for a variety of types of tourism have also been identified, in the areas of accommodation, transportation, tourist consumption, and activity. The use of the Ecological Footprint model to compare the wide variety of tourist ecological impacts by tourism type provided a major area of analysis. These results can be summarised in the following points.

Tourist Demographics:

- tourists were very well educated.
- most tourists were from Canada.

The Ecological Footprint and Demographics:

- tourists from international or long-distance locations had a larger EF than local area tourists.
- generally, the longer the length of stay, the larger the tourist EF.
- demographic characteristics had little correlation to Ecological Footprint size.

Total Ecological Footprint Size:

- this measure does not take into account the variation in length of stay, thus making it less useful than the per-day EF value.
- four general groupings of total ecological impact can be made; large (Resort Hotel, Budget Hotel, Trailer Park/Campground), large-middle (Cottage, Wilderness Lodge), small-middle (Mainstream Hotel, Bed and Breakfast), and small (Backcountry Camping, Eco-Lodge).

Per-Day Ecological Footprint:

- length of stay plays a key role in determining relative ecological impact. A better way to compare types of tourism is by using per-day Ecological Footprint values.
- two types of ecological costs were identified that relate to length of stay; time sensitive costs (costs that increase with each day, such as food consumption), and fixed costs (those that are the same, regardless of length of stay, such as accommodation structure).

Accommodation EF Component:

- accommodation EF was a factor of built space and energy use per guest, as well as construction materials.
- accommodations with a large amount of built space per guest were the Resort Hotel, Bed and Breakfast, and Cottage. Those with a very low amount of built space per guest were Backcountry Camping, Trailer Park/Campground, and the Eco-Lodge. The scale of economy created by

hosting a comparably large number of guests for a given space helped to reduce the EF for several accommodations.

-the Resort Hotel had the largest amount of energy use per-guest. This type of ecological cost was one that escalated for each day the tourist spent at the accommodation. For types of accommodation with a very low level of energy use (Eco-Lodge, Backcountry Camping, Cottage) this was not a factor.

-construction materials played an important role in the ecological cost of the built accommodation facilities. In keeping with established EF calculations, wood structures, such as the Eco-Lodge and Cottage, were penalized for their constructions of wood.

Tourist Transportation Costs:

-travel by airplane added a very large amount to the tourist Ecological Footprint.

-the efficiency of tourist automobiles did not make a significant difference in the transportation component.

Food Consumption Costs:

-Food consumption is a factor of length of stay. Those tourists who stayed for a longer period of time, ate more food, and thus produced a larger food EF component.

-Exceptions were noted at the Eco-Lodge, where tourists ate vegetarian meals. These meals have a lower Ecological Footprint.

Activity Consumption Costs:

-Many activities had very small Ecological Footprints (hiking, swimming, and reading).

-Activities that did have an EF, such as theatre going, shopping, driving, and golf, in most cases contributed a small amount to the total EF.

The following chapter will discuss the results of the study, in reference to the current body of literature on Ecological Footprinting, sustainable tourism, and tourism planning.

Possible applications of the Ecological Footprint, and directions for future research will also be covered.

5. DISCUSSION

The results chapter of this thesis has presented data collected during this study. This simple presentation does not address the underlying issues of the ecological resource use of tourism in Ontario. This discussion chapter will expand on the key findings of the study and place these results within a broader context of sustainability, the Ecological Footprint and tourism development. First, the overall application of the Ecological Footprint as an indicator of sustainable tourism will be discussed, in reference to both a sustainable level of consumption and that of the average Canadian household. Second, the main components of those types of tourism identified in this research to have a small Ecological Footprint will be presented. Lastly, potential uses of the tourism Ecological Footprint will show how the method can be put to practical use in the tourism industry, and to advance academic discussion. Directions for future research will follow, as well as a concluding summary.

5.1. The Tourist Ecological Footprint and Sustainable Tourism

In recent years the nature and definition of sustainable tourism has become a hotly contested topic in tourism research. The lack of a widely accepted definition, a universal method of measurement and evaluation, as well as the fuzzy boundaries of the tourism industry itself, have complicated our understanding of sustainable tourism and its contribution to the goals of sustainable development. A workable definition of sustainable tourism has been extensively debated (Mowforth and Munt, 1998; Butler, 1999; Honey, 1999; Robinson, 1999; Hunter, 2002; Sharpley, 2002). The simple adaptation of the Brundtland Report and its now infamous “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” is much too general and open to interpretation (WCED, 1987, p.43, Butler, 1999). Various other definitions of sustainable tourism have ranged from a focus on ensuring the long-term economic viability of tourism, to minimising the ecological impacts of the industry on a host destination (Butler, 1999). In an attempt to provide a starting point for meaningful discussion, Butler, in his sustainable tourism “state-of-the-art” review, boldly states that;

“It is unlikely, therefore, that there will ever be a totally accepted definition of sustainable tourism that is universally applied, because the very success of the

term lies in the fact that it is indefinable and thus has become all things to all interested parties. To the tourist industry, it means that development is appropriate; to the conservationist, it means that principles articulated a century ago are once again in vogue; to the environmentalist, it provides a justification for the preservation of significant environments from development; and to the politician, it provides an opportunity to use words rather than actions. Only to the tourist does it really mean or provide nothing other than, in most cases, as Wheeler (1993) has bitingly observed, an opportunity to feel good while enjoying oneself.” (Butler, 1999, p.11).

Hunter (2002) has promoted the idea of the Ecological Footprint as a potential indicator of sustainability in tourism, a key goal of this research. Where exactly does the EF stand as an indicator of sustainability, if such a state could be identified? The Ecological Footprint does not provide an assessment of the sustainability of specific parts of the tourism industry itself. Instead, what it provides is a comparison of the ecological costs of various options within the tourism industry, leaving the evaluation of what is sustainable in the hands of others. Thus, the Ecological Footprint is best used to provide a quantitative footing to further discussions of ecological resource use in tourism. In turn, the debate over what is and what is not sustainable can be furthered, drawing on the comparisons provided by the EF.

The primary product of this research has been Ecological Footprints of several tourism types, segmented based on accommodation. Some of these types have a much lower Ecological Footprint than others, but this alone does not allow a label of ‘sustainable’ to be conferred. No specific bar for measurement of what is a sustainable Ecological Footprint for tourism has been set (or, according to Butler, could ever be set), and as such, the EF of tourism must be measured in the context of its contribution to a tourists’ total yearly EF. The following section will relate the tourism EF to two full-year EF measures; the sustainable ‘Fair Earth Share’, and the average Canadian Ecological Footprint. These two benchmarks will be used to illustrate the impact of tourism as a segment of the larger yearly footprint. In this context, the Ecological Footprint can be used to support, discourage, or push for change in certain types of tourism, or, as Wheeler noted in the above quotation, simply the chance for the tourist to feel good (or poorly, as the case may be) about the choices they have made.

5.1.1 The Tourist Ecological Footprint as a Component of a National Annual and Sustainable EF

The idea of an established level of sustainability and the place of tourism within this boundary will be explained in regards to the Fair Earth Share (considered a sustainable level of

yearly resource use) and the average Canadian footprint (the current level of resource use) (see section 3.4.2). The Fair Earth Share is a measure of hypothetical sustainability where global resources are distributed in such a way so that all humanity lives off the natural interest of the earth (a footprint of 1.9 hectares per person, per year) (Wackernagel & Rees, 1996; Chambers, Simmons, & Wackernagel, 2000; World Wildlife Fund, 2002a). This benchmark of 1.9 hectares is the maximum amount of land available to continuously support one person in a sustainable fashion. This measure also considers that all of the earth's productive land is available for human use, rather than use by other species. Comparably, the Ecological Footprint of the average Canadian has been calculated at 8.8 hectares (World Wildlife Fund, 2002a).

These two EF values demonstrate the chasm that has formed between a hypothetically sustainable livelihood, and that accumulated by the average Canadian. But what are the factors or changes that constitute a more sustainable life? Examples can be drawn from nearly every area of our modern world. Choices made by the individual consumer have a cumulative effect in the reduction of ones' overall Ecological Footprint. But what type of lifestyle would be necessary to reduce ones' EF to the level of the Fair Earth Share? To what degree would the average Canadian need to change, and what would these changes be in a practical sense? To show that a lower EF is not contingent on a drastically reduced standard of living, in a 1997 study, a UK family of four who lived in a solar powered home were included in a household EF study (Chambers, Simmons, and Wackernagel, 2000). Their home was of slightly larger than average size, complete with modern appliances and comforts, except that it was designed to take full advantage of natural heat and light, and to be as efficient as possible. Additionally, the residents sought to reduce their ecological resource use by reusing products around the house, recycling, buying local produce, and using an electric car that was recharged from energy produced by the house. Researchers found that living in this type of accommodation produced an EF that was among the lowest recorded within the wider sample of conventional homes. The solar home and the actions of its residents generated an EF of 1.26 ha per-person, compared to the sample average of 3.6 ha, per person (Chambers, Simmons, and Wackernagel, 2000).

These EF values must be taken as approximate, and are products of a very different methodology than those used for the Fair Earth Share and average Canadian values, complicating any direct comparison. Regardless of the actual numbers, in this case the Ecological Footprint of the residents was reduced to 35% of the average household EF. This was obtained through a combination of technology (solar energy, electric car), and personal choices (purchasing, reusing

and recycling) (Chambers, Simmons, and Wackernagel, 2000). While a 65% reduction in the average Canadian EF of 8.8 hectares still does not equal the Fair Earth Share of 1.9 hectares, this example of the solar house shows that substantial reductions in EF are possible without dramatic changes in standard or style of living. Instead, a more sustainable lifestyle can be created through improved technological efficiency, selected changes in behaviour and by making informed personal choices.

Tourism is a component of an individual's total yearly ecological resource use and should be treated as a component area of ecological resource use, in a similar fashion to daily commuting, beef consumption, and home furnace efficiency, among other categories. In this sense, the types of tourism that are sustainable depend on how a specific tourism experience contributes to and expands the tourists' overall yearly EF. The tourism EF becomes useful for comparing the ecological impact of various types of tourism because it grades options on the same scale, which then can be seen as contributing to, or hindering progress towards, a larger goal, such as sustainability.

As a component of both the Fair Earth Share and the average Canadian footprint, the contribution of tourism depends on two main factors: the type of tourism experience and the length of stay of the tourist. When reduced to a per-day value, all 9 types of tourism studied have an ecological cost that fits within the limits of the Fair Earth Share. Some of these types of tourism leave substantially less room for other ecological resource uses than others. For example, this research shows that one day (24hr period) of Resort Hotel tourism contributes .208 hectares to one's Ecological Footprint (Table 4.13). Considering that the average length of stay for tourists at the Resort Hotel was 2.7 days (Table 4.19), this addition of over half a hectare to a Fair Earth Share EF of 1.9 hectares is significant. If one compares the EF of the Resort Hotel to that of the Trailer Park/Campground, it would take an 11-day stay at the Trailer Park/Campground to equal a 1-day stay at the Resort Hotel (Table 4.13). This type of disparity between tourism types underscores the wide variation in ecological resource use by different types of tourism. While it is still possible for an individual to 'make up' the ecological cost of the Resort Hotel holiday through 362.3 days of frugal living and still meet the sustainable level of the Fair Earth Share, it certainly would not be easy.

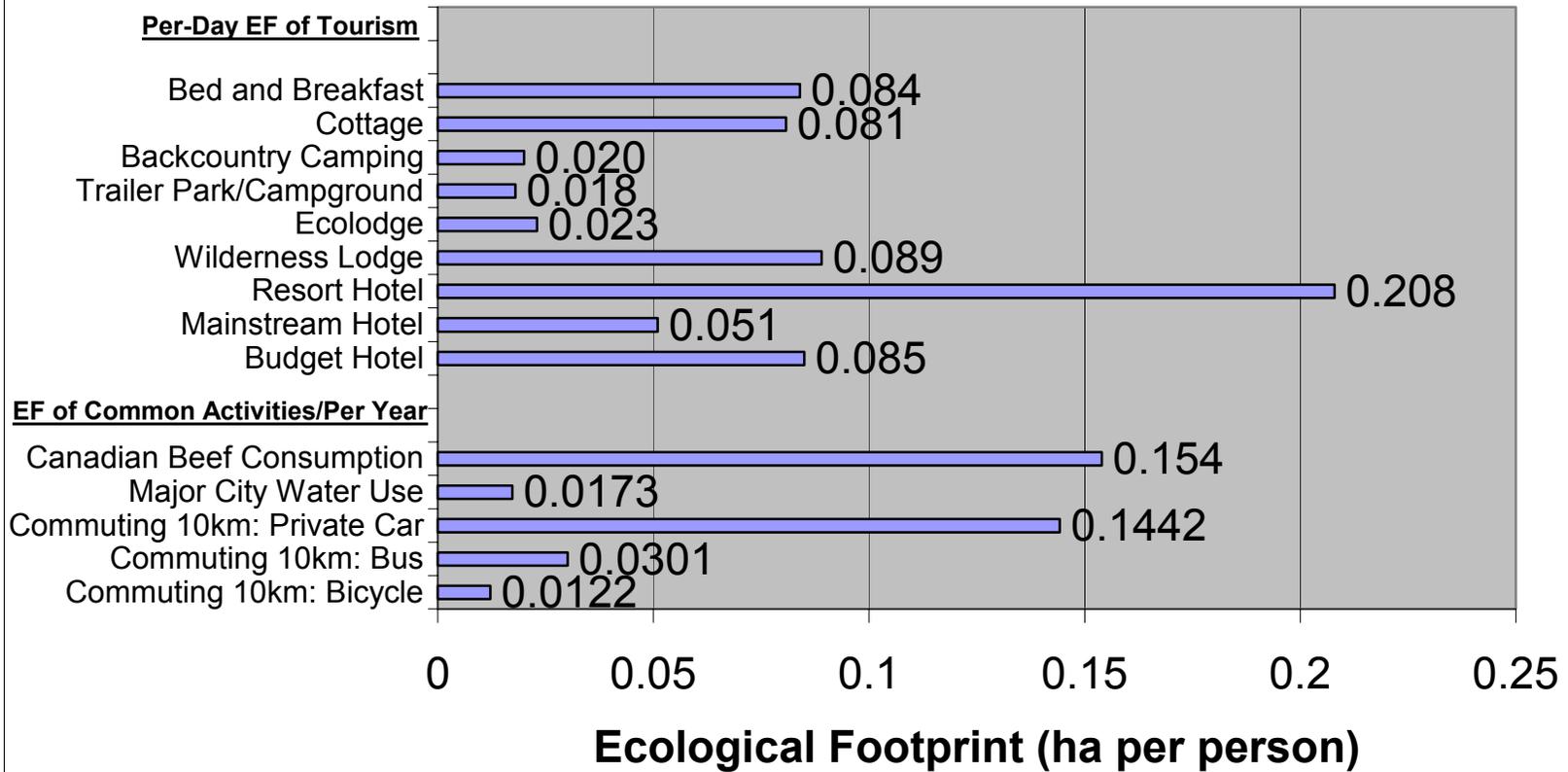
5.1.2 The Ecological Footprint of Tourism Compared to Other Costs

The discussion of the tourism EF as a component of the sustainable Fair Earth Share and the average Canadian EF can be expanded through a comparison to other types of resource use. Accumulated academic research on the Ecological Footprint has produced calculations for a selection of daily activities, many of them for westernized countries, such as the USA, Canada, the UK, and Australia. (Wackernagel and Rees, 1996; Sydney Water, 2002; Chambers, Simmons, and Wackernagel, 2002; Gossling et al, 2002; World Wildlife Fund, 2002b). Even though these calculations are products of different approaches, they can provide a general benchmark for comparing tourism to other components of the human lifestyle.

One of the first publications on the Ecological Footprint, “Our Ecological Footprint”, by Mathis Wackernagel and William Rees, provides an analysis of commuting costs based on mixed American and Canadian data. Wackernagel and Rees calculated the Ecological Footprint of a daily (230 working days) 10km round trip commute using three different methods; bicycle, bus, and private car. Those who travelled by bicycle incurred an EF of 0.0122 hectares, by bus 0.0301 hectares, and by private car 0.1442 hectares (Wackernagel and Rees, 1996). By comparing the per-day EF of tourism recorded by this research to the costs of commuting (see chart 4.8), a multi-day vacation could easily eclipse the EF of commuting by car. Indeed, a two-day Cottage vacation would have an EF of 0.162 hectares, and a three-day Mainstream Hotel vacation would cost 0.153 hectares. Even a week at the comparably low cost Trailer Park/Campground would almost equal the cost of commuting by car, with an EF of .126 hectares. Tourism then, when compared to a 10km daily car commute, has a larger ecological cost.

Much Ecological Footprint data has been calculated at a national or city level. One notable example comes from the city of Sydney, Australia, where the municipal water utility performs an annual Ecological Footprint analysis (Sydney Water, 2002). The Ecological Footprint per customer of water delivery, treatment, and the supply chain associated with the operation of the utility, was calculated as 0.0173 hectares per year (Sydney Water, 2002). This value is just slightly smaller than the Ecological Footprint of one day of Trailer Park/Campground tourism (.018 hectares per day) (Chart 4.8). Despite this capital-intensive process of pumping and treating water for an area of approximately 4 million residents, the cost is smaller than even the most ecologically benign form of tourism included in this study (Chart 4.8).

Chart 4.8 Per-Day EF of Tourism vs. EF of Common Activities and Consumptions



The Ecological Footprint of tourism can also be compared to that of commodity production and consumption. Several examples of the Ecological Footprint of food production have been created, mostly at the national level. For example, in their 2000 book, *Sharing Nature's Interest*, Chambers, Simmons, and Wackernagel calculated a global footprint for various food commodities. These footprints are based on European Union data, and represent global average yields. One tonne of grain has an annual footprint of between 1.7 to 2.8 hectares, whereas one tonne of beef has a footprint of between 6.9 to 14.6 hectares (Chambers, Simmons, and Wackernagel, 2002, p.89). Obviously, one tonne of these commodities is a very significant amount, but when this is divided based on average Canadian yearly consumption, the comparison becomes clearer. For example, Canadians consumed an average of 22.4kg of beef in 2000 (Statistics Canada, 2001). This consumption, divided by the low value provided for the EF of beef consumption, equals a per-person (22.4kg of beef consumed) EF of .154 hectares. This level of ecological resource use is roughly equivalent to 2 days of Budget Hotel tourism (.170 ha, .085 ha per day) or 7 days of Eco-Lodge tourism (.161 ha, at .023 ha per day), but still is less than one day of Resort Hotel tourism (.204 ha) (Chart 4.8). This type of comparison between annual consumption of a food commodity and the EF of tourism gives a context between the cost of tourism and other types of EF components. This provides a straightforward way for individuals to evaluate their tourism choices against other ecological costs with which they may be familiar. The following section will take a closer look at the specific characteristics that make a difference in determining the Ecological Footprint of tourism.

5.2 Characteristics of a Small Ecological Footprint of Tourism

For this section of discussion, key characteristics of types of tourism with a small Ecological Footprint will be presented. The three types of tourism with the smallest per-day Ecological Footprints, the Eco-Lodge, Backcountry Camping, and the Trailer Park/Campground will be used to provide examples of these characteristics. This discussion will indicate why these three types of tourism have a lower ecological cost than other types under study. The key characteristics of a small EF type of tourism are; a non-reliance on air travel, attracts local area tourists, low amounts of built space per-person, low energy costs per-person, and nature based, low consumption activities.

5.2.1 Air Travel and the Tourist Ecological Footprint

The Ecological Footprint of tourism takes a multi-sector view of the tourism experience, providing a snapshot of ecological resource use. By including transportation costs to and from the

home area, as well as costs accrued at the site of tourism consumption through accommodation, activity, and tourist consumption, the tourist EF shows a reasonably full breadth of tourism ecological impacts. Of these areas of impact, transportation costs to and from the location of tourism are both necessary for the activity of tourism, and, depending on type of transportation vehicle, a large contributor to overall Ecological Footprint size.

The ecological costs of transportation are directly related to two factors; the method of transportation, and the amount of geographic distance between tourist origin and destination. While this comment may seem obvious, as tourism is an industry that relies on the ability of tourists to move from one area to another, the exact method and extent of this ecological expenditure is fundamental to any discussion of sustainability. Previous studies, notably that of Gossling, Hansson, Horstmeir, and Saggel (2002), indicated that “the major environmental impact of travel is a result of transportation to and from the destination: more than 97% of the energy footprint is a result of air travel.” (Gossling et al, 2002, p.208). While their particular study focussed on long-haul flights from Europe to the Seychelles, the phenomenon of air travel as an overwhelming proportion of a tourists total Ecological Footprint is also noted in this current research. Simply stepping on to an airplane, even for a relatively short journey was often the largest component of ecological impact in the study sample. Even if a tourist stayed at a very efficient type of accommodation, and had an otherwise frugal vacation, their total Ecological Footprint became comparably large, due to their flight. This same type of trend prompted Gossling et al to state; “any strategy towards sustainable tourism must thus seek to reduce transport distances, and, vice versa, any tourism based on air traffic needs per se to be seen as unsustainable.” (Gossling et al, 2002, p.208).

The transportation of tourists to and from a destination is often overlooked during discussion of sustainable tourism development at a specific destination. The guest does not simply appear at the doorstep of an accommodation and similarly vanish at the end of their stay. If a tourism venture is ever to truly be considered sustainable, it needs to take into account the full breadth of ecological resource use, from the moment the tourist begins their travel, to the moment they return home, rather than simply impacts accrued at the site of accommodation. Destinations focus on marketing and creating a demand for tourists to visit, regardless of the geographic space between. Thus, the geographically distant tourist lured to a glossy destination can make a choice-fly (perhaps the only option for those with a limited time frame), embark on a lengthy drive (if it is even an option), or find a tourism experience closer to home. This creates conflict between the increasingly global nature of the tourism industry, and the ecological resources required to support the activity itself. Can an industry that is wholeheartedly

dependent on transportation with a large inherent ecological cost ever be considered sustainable? Voyage from one area to another is an essential part of travel and tourism, indeed this movement is a defining element of what is and what is not tourism, and most importantly, air travel remains the only time effective way to cover long distances and vast oceans. Air travel is an important asset, from a business point of view, allowing destinations to mine foreign markets for new tourists seeking the exotic and the unique. From an ecological viewpoint, air travel is perhaps the greatest barrier to reducing the ecological resource use of tourism. Such a large amount of energy and materials are required to provide air transportation, that for those tourists who choose this type of travel, any semblance of sustainability is removed.

The implications of this tension between ease of transport from one area to another and the ecological resources required to do so, could have a large impact on the claims of sustainability attached to international, or otherwise far-flung tourism destinations. For example, if a Canadian tourist plans to spend their holiday at an eco-lodge in Belize, the resources required for air transportation to and from the destination could easily eclipse the ecological cost of the time spent at the destination itself. Any positive ecological effects that come from supporting small-scale and alternative forms of tourism at the destination are accompanied by the resource over consumption of the jet-setting international tourist. These two forces, that of positive local, yet overall negative global effects, operate simultaneously and serve to highlight the logistical impossibility of a sustainable international tourism industry that relies on flight. Barring dramatic improvements in the fuel efficiency and capacity of airplanes, any positive ecological step forward at the destination level is accompanied by a substantial leap back at the global. The rather autocratic solution to this would be to heavily tax or otherwise create a disincentive around air travel (such as current travel security measures, and their underlying causes), thus encouraging tourists to seek out geographically closer destinations to which they can drive. Increasing the barriers around air travel could severely debilitate the international tourism industry, and in turn negatively affect the quality of life of millions who are employed by tourism, both directly and indirectly, potentially moving the world further away from resource equity. International tourism also has the potential to be a lower ecological cost industry when compared to other global industries, such as mining, and manufacturing, thus making it an improvement over other potential livelihoods, even with the large ecological cost of air travel (Mowforth and Munt, 1998). The ultimate solution then, is neither simple nor intuitive, and indeed may rest in the conscience of each and every tourist.

5.2.2 Domestic and Local Area Tourism

First, a distinction between domestic and local area tourism needs to be made. Domestic tourists are those who travel within their own country. These domestic tourists can also be, but are not exclusively, local area tourists. In a country of large geographic proportions, such as Canada, travelling from Vancouver to Halifax is considered domestic tourism, whereas travelling the same distance in Europe would qualify as international tourism. Local area tourists are those tourists who travel within an easily drivable distance of their homes-this distance is not fixed, and indeed may be proportional to the length of the tourists' journey. In the context of this research, local area tourism will be used to refer to those tourists who travelled from places of residence within Ontario or the Great Lakes States (Michigan, New York).

The Eco-Lodge, Backcountry Camping and the Trailer Park/Campground are all types of tourism product that attracted local area tourists. This characteristic had little bearing other than to dictate the type of transportation method employed, which in turn had a significant impact on the total EF. None of the local area tourists sampled at these types of accommodations travelled by airplane, the most ecologically costly method of transport. Instead they drove private cars, because of the relative proximity of their homes to the site of tourism consumption. These tourists were able to translate these reduced transportation costs into a lower overall Ecological Footprint. This stands in contrast to types of tourism such as the Budget Hotel, Mainstream Hotel, and Wilderness Lodge, which attracted international or dispersed domestic guests who invariably arrived by airplane, creating a large Ecological Footprint. Local area tourism should be considered to be of innately lower ecological cost than those types of tourism where guests arrive by plane. This relation of local area tourism to a lower Ecological Footprint is one that should not be ignored in the discussion of sustainable tourism development. Regardless of the ecological impacts accrued at the destination, international travel by airplane contributes enormously to the tourism EF.

In a similar sense to the ecological costs of air travel discussed earlier, local area tourists use fewer ecological resources due to the shorter distance to their chosen destination. These shorter distances allow tourists' to use personal automobiles, a type of transportation with a much smaller ecological cost, compared to air travel. This was perhaps one of the more surprising findings of this study, that automobile travel was not a major contributor to overall Ecological Footprint size. Auto travel, often demonized as ecologically irresponsible, is a significantly lower ecological cost option than flying, especially for moderate distances. Thus, tourism destinations that position themselves within

driving distance of their clientele and major markets create a lower ecological cost tourism experience. However, many tourism destinations may not be interested in attracting the local population. Many international tourism destinations try to attract tourists from around the world to their location, thus creating a demand for long distance travel. Local area tourism, while potentially lacking many of the novelties of an international holiday, is well positioned to provide a more sustainable option to tourists. By relying on the support and patronage of local area residents, rather than on imported guests, a local area type of tourism would create a decisively lower ecological cost tourism experience. Whether tourism could survive in many areas based only on local patronage is doubtful. International tourism is an integral part of the industry, and tourists desire the novel and the unfamiliar-a sometimes difficult find in your own backyard. However, in the search for a sustainable tourism industry, many locations may have to make a choice between attracting local area guests, and the more ecologically costly international tourist.

5.2.3 Low Amounts of Built Space Per Guest

The size of built accommodation per guest played an important role in determining the Ecological Footprint for the types of tourism under study. Physical structures that were efficient in their use of space gained a scale of economy compared to those that emphasised spaciousness. It is important to note that the gross size of an accommodation had little to do with the ecological costs, but more so the relative occupancy of that space. For example, the Mainstream Hotel had a very large facility, yet less space per guest than the significantly smaller Bed and Breakfast. Thus, the Mainstream Hotel would achieve a lower EF, because of the more efficient use of existing space.

The Eco-Lodge and the Trailer Park/Campground both provided accommodations with very modest amounts of per-person space. Although these types of accommodation were built from wood, an ecologically costly material, their minimal size per-guest overcame this, to create a comparably small accommodation EF. Backcountry Camping had a small amount of built space, which should come as no surprise, considering that tourists are housed in tents, and access point facilities are minimal. Other types of accommodation, such as the Budget Hotel and the Mainstream Hotel provided a reasonably small amount of space per guest, and used more ecologically sound building materials, showing that larger hotels need not be ecologically costly. This challenges the general belief that large-scale hotels are by their very nature ecologically costly. While the gross ecological impact of such a hotel, due in part to other factors, such as tourist transportation costs and other tourist behaviours, may be comparably large, the structure itself gains a scale of economy. As a way to house ever-increasing

tourist numbers, large-scale accommodations have the potential to provide an ecologically sound holiday, if built to optimize their available space, and if filled at a high occupancy. The ecological costs of accommodation are only one component of the tourism experience however, and the ecological savings at the site of accommodation can be offset by heightened transportation, food, activity, or other costs.

5.2.4 Low Levels of Accommodation Energy Use Per-Guest

A low level of accommodation energy use per guest is a characteristic shared by those types of tourism with a small Ecological Footprint. Although the effects of energy use on the total Ecological Footprint were less than that of built space and transportation type, energy use still bears mention. Naturally, tourists who were Backcountry Camping used little in the way of energy, relying on portable camp stoves and locally harvested wood for fires. The Eco-Lodge took a different approach, and went completely off-grid, using renewable energy sources. While not achieving the same low levels of energy use as the previous two types of tourism, the Trailer Park/Campground still was very efficient in its use of energy, especially when compared with more energy intensive forms of tourism, such as the Resort Hotel. Again, some types of tourism, such as the Cottage, had a low level of energy use, yet other factors, such as construction materials conspired to elevate the Ecological Footprint.

Low levels of energy use per guest, in much the same way as low amounts of built space per guest, are tourist accommodation characteristics that defy scale. Both large and small-scale types of accommodation can have low levels of energy use and low amounts of built space per guest. This challenges the assumption that larger-scale accommodations are more ecologically costly because of their higher gross usage of energy. While this may be true in an overall sense, once energy costs are divided up per-guest, the greater numbers of guests at large-scale accommodations create a lower per-person usage of energy. The implications of this for tourism development are that large hotels, as long as they house a sufficient number of tourists per level of energy use, are not necessarily over-consumptive. If a destination were trying to decide between constructing a number of smaller, less-efficient tourist accommodations, or one large, yet very efficient tourist accommodation, the ecologically responsible choice would be the larger accommodation.

5.2.5 Nature Based, Low Consumption Activities

Although tourist activities did not make an enormous contribution to the overall Ecological Footprint, certain types had more of an impact than others. Those tourists who chose Backcountry Camping, the Eco-Lodge, and the Trailer Park/Campground overwhelmingly participated in nature based, low-consumption activities such as swimming, hiking, fishing, relaxing, and reading. These types of activities had little measurable ecological impact. This shows that tourism products that focus on similar types of activities, such as ecotourism and nature tourism, would have a small portion of their EF attributable to activity. Comparably, higher ecological impact activities such as theatre going and golfing attracted tourists from the Resort Hotel, Bed and Breakfast, and Mainstream Hotel. These activities do have a measurable ecological impact and made a small, yet noticeable addition to each Ecological Footprint. Tourism products based around activities such as theatre, museums, amusement parks, and professional sports would have a larger EF due in part to these activities.

When developing or planning sustainable forms of tourism, activities that are the focus of the vacation should play a secondary role. The contribution of activity to a tourists' EF can be vastly overshadowed by transportation and accommodation costs. However, tourism products that focus on low ecological cost activities, such as nature tourism and ecotourism have been automatically associated with sustainable tourism. It is important that any claim of sustainability be based on more than activity, even if that activity is a defining characteristic of that type of tourism. The relative ecological resource use contribution of many cultural activities such as museum going and sightseeing, while greater than that of nature activities, are not large when compared to other aspects of the tourism experience, such as transportation or accommodation costs. Thus, rather than dismissing cultural and urban tourism products as unsustainable, simply because of the activities that they focus on, a more complete view of all areas of ecological resource use is necessary.

5.3 Towards a Smaller Tourism Ecological Footprint

Now that key areas of the tourism EF have been identified, questions of change and improvement can be raised. Within these components of the tourism Ecological Footprint, two main groups are in position to instigate change; the tourist and the accommodation provider. The accommodation provider can directly influence the physical structure of their accommodation; namely its size, spaciousness, energy use and, as well as finer level details, such as waste generation, purchasing, and technological upgrades. The tourist however, as the economic engine of the tourism industry, holds the power of choice over accommodations, transportation methods, and activity. Consumer demand is important to

institute change, and if tourists' were to demand tourism experiences with a low ecological cost, then the industry would likely seek to fill this demand. This relationship between supply and demand makes educating tourists to make informed and responsible decisions an important part of creating a more sustainable tourism industry.

One of the goals of this project was to compare tourist choices and the difference they can make in the overall ecological resource use of tourism. The specific components of a tourism experience can be selected in such a manner as to significantly reduce ones' tourism Ecological Footprint. A tourist can choose a location within driving distance, an accommodation with a small physical size per-guest, one that efficiently uses energy, and where activities are nature-based. These choices rely on a tourist who actually considers their ecological resource use while making their vacation decision, rather than exclusively focussing on price, destination, star rating, and other marketing hype. For the tourist the Ecological Footprint can serve as an educative tool, highlighting types and components of tourism, comparing their relative ecological costs in such a way as to promote lower EF choices. For the accommodation provider, the Ecological Footprint can be used as an evaluative tool, to show the current state of their operations, and changes to be made to achieve a desired level of ecological resource use. The following section will discuss these concepts and specific possibilities for the tourism EF in further detail.

5.3.1 The Ecological Footprint as an Evaluative Tool

A major goal of this study has been to compare the ecological resource use of various types of tourism options. This process ultimately involves grading one type of tourism against another to discover which type, or which combination of tourism options, has the lowest level of ecological resource use. Tourism is a product that is provided in many ways, with vastly different opinions on management, philosophy, technology and implementation. But what is the effect if a hotelier changes one aspect of their operation? Will a simple modification in one area have any real ecological benefit or cost? When tourism planners and managers make a decision and create change, tools for measuring and evaluating the effects of this change are needed. These are the questions to which the tourism Ecological Footprint can be applied. As discussed by Wackernagel and Yount (2000), "...there are several paths to Rome-and several ways to provide a given service. However, not all of these ways are equally desirable. Footprints can contrast the ecological demand of delivering a product or service using various competing management and manufacturing options." (Wackernagel and Yount, 2000, p.33). This use as an evaluative tool is one of the key practical uses of the EF when applied to tourism.

The creation of a scale of measurement for the ecological resource use of tourism allows for grading of tourism options. Hunter (2002) suggests that the tourism Ecological Footprint

“would allow the more environmentally conscious tour operators and tourists to choose particular businesses using a common ‘yardstick’. Formal recognition schemes, operated by trade organisations, might eventually incorporate Ecological Footprinting as part of their standard appraisal systems, so that the overall quality of the outlet would be judged using ecological performance criteria, as well as more common features.” (Hunter, 2002, p.16).

This idea of using the tourist Ecological Footprint as a marker of ecological quality, and adopting this into a standard and widely available form, is strengthened by this research and the identification of tourism component ecological costs. That different types of tourism can be compared on the basis of ecological cost, as well as traditional methods such as level of amenity, or ‘star’ ratings, is a positive step towards a tourism industry that is both aware of, and knows specifically where, to improve its ecological impact.

The application of the Ecological Footprint as an evaluative tool was proposed by the World Wildlife Fund in their Holiday Footprinting Guide (World Wildlife Fund, 2002b). Such an application to tourist accommodations could also be made with the same methods used in this research. The financial and time requirements for this process are quite reasonable as the Household Ecological Footprint calculator upon which this research is based is widely available for free download, and can be filled out with very little effort. The use of the Household Ecological Footprint calculator at a site of tourist accommodation could provide a quick and easy indicator of the average EF of the accommodation. This analysis would ignore the costs generated by tourists outside of the accommodation (transport, food, activity), and would only be of use when considering the EF of a particular accommodation. A more complete EF could be obtained, but would require the canvassing of guests, an intrusion many accommodation managers may not wish to make.

5.3.2 Eco-labelling and the Ecological Footprint

The Ecological Footprint can be used to compare ecological resource use scenarios and convey these ideas to tourists and managers. It can set a bar for measurement to show which tourism operations fail, meet, or exceed those standards. This strength of the Ecological Footprint could be used to expand on the initiative of ‘eco-labelling’ within the tourism industry. Eco-labelling is the recognition that a business has met certain environmental standards, and is allowed to use a meaningful label for

marketing purposes (Sharpley, 2001). In general, eco-labelling is used to indicate “green”, or sustainable types of tourism, often Eco-tourism or nature tourism products. Great interest has been shown in the tourism world toward the concepts of Eco-tourism and alternative tourism as more sustainable forms of tourism (Mowforth & Munt, 1998; Honey, 1999; Font, 2001; Hunter, 2002; Sharpley, 2002). The Ecological Footprint could be used as a form of eco-label, especially when comparing accommodation or activity types. Indeed, one of the more established forms of eco-labelling, the Australian NEAP program (Nature and Ecotourism Accreditation Program) focuses exclusively on impacts generated by accommodation, tours, and activities (Buckley, 2001, Ecotourism Australia, 2003). The contained and definable nature of tourism accommodation and activity is well suited to study with the Ecological Footprint, as “ it is easier for a company to verify its environmental performance because the company being examined has control over the delivery of its products” (Font, 2001, p.9). In this manner, the tourism business provides a very tangible area for analysis, and a product to which accreditation can be affixed. As an eco-label, an accommodation EF can be used by prospective tourists to select between many options, a type of tourism that fits within their ecological beliefs and morals.

The use of an eco-label assumes that tourists consider environmental criteria when selecting tourism products. Sharpley (2001), questions the value of eco-labelling, when in many cases the tourism decision is a factor of finances, facilities, and marketing. When considering the breadth of tourism types and experiences on offer it is likely that environmental performance may not be held in high regard by all tourists, especially if they come at a financial cost (Sharpley, 2001). Thus, the use of the Ecological Footprint as an eco-label would likely only find marketing potential within those types of tourism that specifically promote ‘green’ types of products. The other benefits of the Ecological Footprint, namely as an evaluative tool to choose between purchasing and policy options, remain regardless of the tourism product on offer. In this way, the Ecological Footprint can be seen as more useful than a uni-dimensional eco-label, designed largely for marketing or quality assurance purposes.

Some potential negatives to the use of the EF as an eco-label do exist. The use of the Ecological Footprint to compare only accommodations or activities could lead to a very narrow view of the ecological impacts of tourism. With this focus, it is possible that the cost of transporting the tourist to and from the site of consumption, possibly the defining characteristic of tourism, would be ignored. This research suggests that a broader view of the tourism experience must be taken, and the ecological costs of the tourism product, be it Eco-tourism or mass tourism, be calculated from the moment of departure to return home. As discussed in section 5.2.1, the ecological costs of transportation,

especially by airplane, contribute dramatically to the overall EF of tourism. Ignoring these impacts would present an incomplete view of the ecological cost of tourism.

5.4 Discussion Summary

This chapter has attempted to move the discussion of tourism resource use beyond a simple comparison of Ecological Footprint values. While this numerical comparison (as seen in chapter 4) can provide some insight, a wider discussion of the ecological resource use of tourism is essential. The Ecological Footprint is presented not as an indicator of sustainability (a very diffuse concept in and of itself), but as a simple way to account for the ecological impacts of various types of tourism. In conceptualising these costs of tourism, it is best to consider tourism as a component of personal lifestyle, much in the same manner as other daily ecological costs. Costs to which tourism was compared include a daily 10km commute by car, bus, and bicycle, the per-person cost of providing water and treatment in a major urban area, and the average Canadian consumption of beef per-year. This type of comparison places tourism in a familiar context, where relative ecological costs can be better understood by the business that provide the tourism experience, and the tourists that consume it.

The Ecological Footprint can serve as an evaluative tool, allowing tourists and tourism managers to weigh various options that may positively (or negatively) affect their Ecological Footprint. A number of key areas that contributed to a small Ecological Footprint were identified in the study. Those types of tourism with a small EF managed to avoid air travel, a very ecologically costly mode of transportation, attract local area tourists (again with lower transportation costs), host an efficient number of guests for a given accommodation size, and had activities that were nature-based or low impact. These characteristics should be considered as positive contributors to a small Ecological Footprint.

The Ecological Footprint was presented as a potential form of “eco-label”. The EF would provide a method for tourists to differentiate between types of tourism with a small ecological cost, and those with a larger ecological cost. The Ecological Footprint differs from many currently available forms of eco-labels in that it estimates the ecological cost of the entire trip, from departure to return, rather than the ecological impact of simply the tourist accommodation or activity. This broader view of the tourism experience is necessary to capture all of the ecological impacts that are associated with the activity.

6. CONCLUSIONS

“We must now focus on how to improve human welfare by means other than sheer growth. Even those at the centre of the sustainable development debate have tended to forget that growth simply means getting bigger while development means getting better. Having grown to the max, it is time that humanity began to concentrate on developing its full potential.” (Wackernagel and Rees, 1996, p.146).

The tourism industry, with its worldwide reach, has an important role to play in the development of sustainable livelihoods. Interest in the ideals of sustainable tourism has been expressed by governments, NGO's, and tourism planners, yet the creation of sustainable tourism destinations is a task fraught with difficulties. Progress towards the goals of sustainable development can be derailed by political, financial, philosophical, and motivational roadblocks. In an academic sense, what indicators should be used to determine if sustainable criteria have been met, and is such a state of sustainability even possible on a global scale? These questions of practicality, and the ultimate attainment of a sustainable tourism industry are of secondary concern. Rather, movement towards those goals, that of a competing objectives view of sustainable development, where ecology, economy, and society achieve a balanced exchange, is ultimately a positive step (UNDP, 1994; Carvalho, 2001). The introduction and use of an ecological resource accounting system, such as the Ecological Footprint, attempts to quantify the ecological requirements of various forms of tourism. This measurement of the component resource use of tourism, while only one area within the larger picture of sustainable tourism development, draws attention to the need for tourism to not simply grow larger, or more profitable, but to truly develop and become better, incrementally progressing towards a sustainable state.

The Ecological Footprint of tourism attempts to compare the ecological resource use of various types of tourism, and uses this comparison to draw conclusions about the relative sustainability of that specific type of tourism. This research builds on previous works in that it applies the EF to a relatively broad range of tourism types. Previous studies have focused on change over time (Cole and Sinclair, 2002), comparisons within a tourism type (World Wildlife Fund, 2002b), and examination of national tourism footprints (Gossling et al., 2002). The Ecological Footprint of tourism in Ontario, while still an exploratory study, presents a basic model for future EF studies seeking to compare specific tourist types on a number of ecological performance criteria.

6.1 The Ecological Footprint of Transportation

This research has compared the ecological resource use of various tourism types in Ontario using the Ecological Footprint (EF) model. While areas of resource use are very diverse, this project divided ecological impacts into four main areas; transportation, accommodation, tourist food consumption, and activity. Of these four components, the largest ecological impacts were created through transportation, specifically by air travel. Air transportation is a vital component to discussions of sustainable tourism, as the act of travel to and from a destination is a defining characteristic of tourism. One of the main conclusions of this research is that any type of tourism that depends on arrivals by airplane should be considered of innately larger ecological impact, and thus be distinctly removed from consideration as a sustainable form of tourism. While the specific percentage contribution of air travel to the total EF of a given tourist stay was not calculated, in all cases, travel by air was a primary component. This conclusion echoes those presented in the work of Gossling et al, the World Wildlife Fund, and Hoyer, where air travel was identified as comprising upwards of 93% of the total ecological cost of a given tourism experience (Hoyer, 2000; Gossling et al, 2002; World Wildlife Fund, 2002b). Comparably, the use of automobiles by local area tourists did not generate a large Ecological Footprint, compared to other areas of resource use. This finding shows that domestic, or more precisely local area tourism, where tourists arrive by car, is of a lower ecological cost than flight-based international or long-distance tourism. Destinations that focus on attracting long-distance tourists need to acknowledge the global ecological impacts of the air travel that supports their business. While much academic discussion has focused on achieving sustainable operations at the local level, the global impacts of tourism cannot be ignored. This research suggests that the ecological costs of transportation are an integral and dominant part of the measurement of tourism sustainability.

This analysis of the ecological costs of transportation as a component of the tourism experience raises the question of the possibility of sustainable tourism development. As previously noted in the work of Hoyer (2000), Gossling et al. (2002), and the World Wildlife Fund (2002b), air transportation makes a very large contribution to the total ecological impact of tourism. Is sustainable international tourism then simply a fictional goal, one that shall never actually be attained? While the answer to this lies far outside the scope of this research, this question is still a valid one to ask. It is suggested in the studies mentioned above, and echoed in this research, that tourism that relies on air transport cannot be sustainable, given our current level of technology. Local area tourism, where tourists can arrive by car, bus or train (lower EF types of transport), has greater potential for sustainability, because at the destination level it is possible to create a tourism experience that is sustainable, or at least has a minimal

amount of ecological impact. Local area tourism then, with shorter transportation distances, and less consumptive transportation methods, should be promoted as a lower EF alternative.

However, the allure of international travel is strong, and it remains unlikely that millions of global tourists will heed a call for sustainable transportation and willingly cease their air-travelling ways. As well, the positive local, global, and individual benefits of international tourism, including employment, foreign currency earnings, increased cultural understanding, and intrinsic enjoyment cannot be ignored. As an industry, tourism is anything but environmentally benign, yet, in a global sense, tourism may compare favourably against other industries such as resource extraction and manufacturing. Thus, while tourism that relies on air travel cannot be said to be sustainable, the positive benefits that occur as a result of tourism may outweigh the negative ecological concerns. With our current level of knowledge, replacing air travel with a less consumptive form of transportation, or replacing long-distance tourism with another industry is not practical. However, this should not prohibit the tourism industry from further exploring the idea of sustainable tourism, and develop strategies to move towards that goal, whether ultimately achievable or not.

6.2 The Ecological Footprint of Tourist Accommodation

Tourist accommodation was a key area of analysis during this research. Although the amount of space provided per guest at a particular accommodation was a prime contributor within the EF analysis, the gross size of the structure was not. Instead, the relative size economy of scale, per guest, at which a particular accommodation operates had a greater impact on the accommodation EF. During the peak tourist season, occupancy rates at many large tourist accommodations were very high. This maximal use of available space resulted in physically large accommodations such as the Budget Hotel and the Mainstream Hotel achieving very small amounts of built space per-person, per-day. This allowed these accommodations to perform better in the accommodation EF analysis than the significantly smaller, yet not as efficiently populated Bed and Breakfast and Cottage. Although these latter two types of accommodation have a much smaller total EF, the per-person, per-day EF created was larger than that of accommodations with a larger gross size, but greater number of guests per total available space. Although it is likely that in times of less than optimal occupancy rates (shoulder and non-peak seasons) that the smaller types of accommodation would produce a smaller EF (especially in the case of the Bed and Breakfast, which often had live-in owners), the potential for efficiently run, low EF, large-scale hotels is an attractive concept for tourism destination planners. With increasing tourist numbers, the large-scale, high-capacity hotel could provide a way to host tourists in an ecologically

sound manner. This research suggests that positive ecological performance is not solely the domain of small-scale accommodations, but that under the proper circumstances larger accommodations can achieve lower levels of ecological resource use.

6.3 Applications of the Ecological Footprint

As an indicator of the ecological costs of tourism, the Ecological Footprint can provide tourism managers with a decision-making tool. An EF calculator, similar to what was used in this research could be adopted by individual tourist accommodations to gauge the relative ecological impact of their operations, as well as the success of new programs, technology, or other changes. In a similar sense, the Ecological Footprint can be used to assist tourists in selecting an ecologically friendly holiday, much in the same manner as an eco-label. As an eco-label, the EF presents a quantitative overview of the relative level of ecological resource use of a tourist accommodation, which in turn can be used to market a destination, and as a decision-making guideline for tourists. The eco-label concept seeks to grade a tourism product (such as accommodation), rather than a complete tourism experience. When discussing the ecological impacts of tourism, the distinction between a specific tourism product (the marketed commodity, such as accommodation or activity), and the actual trip from departure to return should be made. This research promotes this need to view tourism ecological impacts as a round-trip, including as many key areas of ecological impact as possible.

The main conclusion of this study is that the ecological resource use of tourism can be documented in a reasonably detailed manner. This research, above all else, shows that options are available for those tourists who wish their travel behaviour to leave a smaller Ecological Footprint. It is the demand of the consumer that will instigate changes within supply, and in the case of tourism, promote an industry with a lower ecological cost. Although sustainability may not be a goal that is possible for many types of tourism, a reduction in the overall ecological resource use of tourism is ultimately a positive initiative, and one worthy of further study.

6.4 Directions for Future Research

Due to the limited scope and resources of this research project, many avenues for further development remain open and inviting. Simply reproducing this project on a wider scale, throughout an entire seasonal cycle would yield a more complete view of the ecological resource use of tourism in Ontario. By collecting data based on a 12-month cycle, seasonal differences in ecological resource use could be seen. As well, focusing on only one type, or several similar types of tourism would allow a

greater understanding of the ecological costs of various management program, and construction options for tourism products with a common clientele. Similarly, moving the study to different geopolitical contexts, such as in developing countries, would provide new insights. As with all Ecological Footprint studies, a finer level of detail is always a possibility. There are always more categories of resource use to include, but key ones that were omitted from this project that would ideally be included in future studies are; waste (recyclables and non), water and sewerage, reclaimed or recycled building materials, and including a full range of construction materials and methods. As well, the Household Ecological Footprint Calculator spreadsheet used in this research has been recently updated, and the use of new version would allow a greater level of accuracy.

In regards to the methods of data gathering, the use of a 'trip journal' where the respondent documents resource use may provide a more complete amount of data. This method would also have the twin benefit of demonstrating to actual tourists the amount and frequency of their consumption. This is another avenue for research with the tourism EF; gauging the tourist and industry reaction to their ecological resource use. A project that conveys these ideas to the public, and involves them in figuring out their own tourism (or lifestyle) Ecological Footprint would increase the understanding of steps towards creating a smaller EF lifestyle.

Restricting the geographic focus of the study would allow for a more detailed examination of a particular area. Creating a number of smaller case studies may provide further insights into the ecological costs of tourism, and simultaneously provide context for recommendations. In a similar vein to the research of Cole and Sinclair on "Measuring the Ecological Footprint of a Himalayan Tourist Center", applying the EF to a small area (in this case a village), and using it to compare the local ecological impact to that of tourists may prove useful (Cole and Sinclair, 2002). This process may also further highlight the global inequities between the developed and developing world, promoting a case for reduced developed world consumption, and improved developing world quality of life.

One of the most surprising findings of this research was the comparably low cost of automobile travel compared to both air travel, and other categories of ecological resource use. Further research could examine the potential for reducing international air travel, and the effects this would have on both the global economy, and specific destination economies. In a similar vein, future research could focus on the promotion of local area tourism as a more sustainable form of tourism. Research in this area could look at motivational and destination choice factors that influence the selection of a domestic or local area vacation over an international one.

APPENDIX A

Tourist and Accommodation Survey Questionnaires

Tourist Survey

1. Where will you stay during your vacation? (Please list **accommodation name** and **location**). How long will you stay at each place?

<u>Accommodation Name and Location</u>	<u>Length of Stay(days)</u>
_____	_____
_____	_____
_____	_____
_____	_____

2. Please divide up the total distance you expect to travel during this vacation, based on method of travel. If you do not know the actual distance, try and estimate how long this travel took.

<u>Method of travel</u>	<u>Distance travelled(km) or time (hours)</u>
Airplane	_____
Private Vehicle (list type below)	_____
Make and Model:	_____
Bus	_____
Train	_____
Other _____	_____

If you travelled using a private vehicle, how many people travelled in the same vehicle (including yourself)? _____

3. For the following food items, please estimate your **personal** consumption while on vacation. List amounts in number of single servings. For example, if you are vacationing for 7 days, and have 2 cups of coffee per day, this equals 14 servings of 'Tea/Coffee'.

___ Veggies, potatoes & fruit	___ Pork
___ Bread	___ Chicken/Turkey
___ Rice, cereals, noodles, etc.	___ Beef
___ Milk & yogurt	___ Fish/Seafood
___ Ice cream, sour cream	___ Juice/Wine/Beer
___ Cheese, Butter	___ Sugar
___ Eggs	___ Tea/Coffee
___ Cigarettes (total number)	___ Other (please list) _____
___ Beans	___ Other (please list) _____

4. Please estimate the total cost (in Canadian Dollars) of each of the following parts of your vacation for you and your companions.

Accommodation: \$ _____	Food: \$ _____
Transport: \$ _____	Souvenirs: \$ _____
Other Costs (please list) _____	

5. What major activities (such as swimming, sightseeing, fishing, theme parks, visiting museums, hiking, reading, tanning, wine tasting, seeing plays, etc.) will you participate in during your trip? Please describe what **type of activity**, the **location of the activity**, and **how often you will participate** in this activity.

Activity #1:

Type of Activity: _____

Location of Activity: _____

How often will you participate in this activity?

Every Day

More than 5 times

2-5 times

Once

Activity #2:

Type of Activity: _____

Location of Activity: _____

How often will you participate in this activity?

Every Day

More than 5 times

2-5 times

Once

Activity #3:

Type of Activity: _____

Location of Activity: _____

How often will you participate in this activity?

Every Day

More than 5 times

2-5 times

Once

6. Have you purchased any souvenirs or other products while on vacation? Please describe the product, (what the product is made out of: plastic, metal, leather, wood, clothing, etc.), and how much it cost.

Souvenir/Product

Cost (Canadian \$)

7. Do you feel that you have **more**, **less**, or roughly the **same** level of environmental impact while travelling, compared to when you are at home? _____

In what ways is your impact **greater** or **lesser**? _____

8. Please check all the boxes that describe your behaviour when you are at home.

- I bring empty bottles to a recycling bin.
- In the winter, I keep the heat on so that I do not have to wear a sweater.
- I wait until I have a full load before doing my laundry.
- If there are insects in my apartment I kill them with a chemical insecticide.
- Sometimes I buy beverages in cans.
- I often talk with friends about problems related to the environment.**

- I sometimes contribute financially to environmental organizations.
- Usually I do not drive my automobile in the city.
- When possible in nearby areas around my home, I use public transportation or ride a bike.

The following questions will allow comparison between your personal consumption patterns and demographic profile. This type of analysis will provide a deeper understanding of tourist types and consumption.

Age: _____

Male Female

Are you travelling?:

- Alone
- With friends
- As a couple
- As a family (adults and children)

Country of Residence: _____

Occupation: _____

Education:

- Primary (elementary)
- Secondary (high school)
- Technical School (post-secondary)
- University - Undergraduate
- University – Graduate or Professional Degree

What is your approximate annual income?

_____ /year (please state currency)

....or select from one of these categories

- <\$19,999 CDN Dollars
- \$20,000-\$29,999 CDN Dollars
- \$30,000-\$39,999 CDN Dollars
- \$40,000-\$49,999 CDN Dollars
- \$50,000-\$59,999 CDN Dollars
- >\$60,000 CDN Dollars

Additional

Comments: _____

Accommodation Survey

1. Accommodation name and address: _____

2. Have you taken any type of initiatives to reduce the amount of resources (materials, energy) used by this establishment? _____

If so, briefly describe them: _____

3. The following questions will help to determine the amount of resources used by this accommodation.

-What is the total number of beds in your establishment?: _____

-How large are the buildings that make up your establishment (sq.ft)? _____

-How large is the total yard area of this property (sq.ft)? _____

-What is your occupancy rate for this month? _____

4. What materials does this establishment recycle?

- | | |
|---|--------------------------------------|
| <input type="checkbox"/> Aluminium (pop cans) | <input type="checkbox"/> Cardboard |
| <input type="checkbox"/> Plastic containers and bottles | <input type="checkbox"/> Paper |
| <input type="checkbox"/> Glass | <input type="checkbox"/> Food Scraps |

-How large are your garbage dumpsters/collection containers? _____

-How often are these collection containers emptied? _____

5. Accommodation Energy Use:

Please list each source of power (i.e. hydro main power grid, diesel generator) and the amount of energy used per month, for your peak season. If this information is not readily available, please list the approximate energy costs for a typical peak season month.

<u>Type of Energy</u>	<u>Peak season kWh</u>	<u>Cost Peak Season (CDN\$)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Additional Comments: _____

Appendix B

The Ecological Footprint Household Calculator Spreadsheet

Assess your Household's Ecological Footprint

by Mathis Wackernagel, Ritik Dholakia, Diana Deumling, and Dick Richardson, Redefining Progress, v 2.0, March 2000

Choose whether you want to work with metric or US measurements. **m** : put "m" for metric, "s" for US standard

Register your monthly consumption in column D (or your yearly consumption in column E).

Optional: put the dollar amounts into column F. **1** Number of people in the household:

CATEGORIES	Units	AMOUNT per month	eqv. amount per year	Dollars spent (mth)	I) FOSSIL ENERGY	II) ARABLE LAND	III) PASTURE	IV) FOREST	V) BUILT-UP LAND	VI) SEA
1.-FOOD										
.Veggies, potatoes & fruit	[kg]	0.0	0	\$0.00	0	0				
.Bread	[kg]	0.0	0	\$0.00	0	0				
.Rice, cereals, noodles, etc.	[kg]	0.0	0	\$0.00	0	0				
.Beans	[kg]	0.0	0	\$0.00	0	0				
.Milk & yogurt	[l]	0.0	0	\$0.00	0		0			
.Ice cream, sour cream	[l]	0.0	0	\$0.00	0		0			
.Cheese, butter	[kg]	0.0	0	\$0.00	0		0			
.Eggs [assumed to be 50 g each]	[number]	0.0	0	\$0.00	0	0				
<i>.Meat</i>										
..Pork	[kg]	0.0	0	\$0.00	0	0				
..Chicken, turkey	[kg]	0.0	0	\$0.00	0	0				
..Beef (grain fed)	[kg]	0.0	0	\$0.00	0	0	0			
.Fish	[kg]	0.0	0	\$0.00	0					
.Juice & wine	[l]	0.0	0	\$0.00	0	0				
.Sugar	[kg]	0.0	0	\$0.00	0	0				
.Tea & coffee	[kg]	0.0	0	\$0.00	0	0				
.Cigarettes	[kg]	0.0	0	\$0.00	0	0			0	0
SUB-TOTAL-1				\$0.00	0	0	0	0	0	0
2.-HOUSING										
<i>.House [living area]</i>										
..brick house	[m2]	0	0	\$0.00	0					
..wooden house (US standard)	[m2]	0	0	\$0.00	0			0		
.Yard [or total lot size incl. building]	[m2]	0	0	\$0.00					0	0
.Electricity (also check composition--see <i>enter as fraction. ex. 25% = 0.25</i>)	[kWh]	0	0	\$0.00						
..thermally produced (fossil and nuclear)		73%			0					
..lower course hydro		26%							0	0
..high altitude hydro		0%					0			
..PV solar (on existing roof areas)		0%								
..PV solar (on newly built-up area)		0%							0	0
..wind		1%							0	0
<i>.Fossil gas (natural gas)</i>										
..city gas	[m3]	0.0	0	\$0.00	0					
.Firewood	[kg]	0.0	0	\$0.00				0		
SUB-TOTAL-2				\$0.00	0	0	0	0	0	0

Footprint Calculation Matrix for Households										
CATEGORIES	Units	AMOUNT per month	eqv. amount per year	Dollars spent (mth)	I) FOSSIL ENERGY	II) ARABLE LAND	III) PASTURE	IV) FOREST	V) BUILT-UP LAND	VI) SEA
3.- TRANSPORTATION										
.Bus/train	[pers.*km]	0.0	0	\$0.00	0				0	0
.Taxi / other's car	[km]	0.0	0	\$0.00	0				0	0
.Gasoline (if you have a car)	[l]	0.0	0	\$0.00	0				0	0
.Airplane	[pers.*hours]	0.0	0	\$0.00	0					
SUB-TOTAL-3				\$0.00	0	0	0	0	0	0
4.-SERVICES (rough estimates)										
.Entertainment	[\$]	0.0	0	\$0.00	0				0	0

CORRECTION FACTORS FOR THE U.S.	I) FOSSIL	II) ARABLE	III) PASTURE	IV) FOREST	V) BUILT-UP	VI) SEA
1.-FOOD	1.50	1.03	1.53			5.09
2.-HOUSING	0.92			2.30	1.53	
3.-TRANSPORTATION	0.99				0.95	
4.-SERVICES	4.50			2.30		

The Ecological Footprint per household member (presented as a land-use consumption matrix)							
CATEGORIES	I) FOSSIL ENERGY LD.	II) ARABLE LAND	III) PASTURE	IV) FOREST	V) BUILT-UP LAND	VI) SEA	TOTAL
1.-FOOD	0	0	0	0	0	0	0
2.-HOUSING	0	0	0	0	0	0	0
3.-TRANSPORTATION	0	0	0	0	0	0	0
4.-SERVICES	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0

Ecological Footprint Assessment: The Results	
<i>Your per capita footprint is</i> 0.0 hectares.	
	Equivalence Factors
I) FOSSIL	1.2
II) ARABLE	2.8
III) PASTURE	0.4
IV) FOREST	1.2
V) BUILT UP	2.8
VI) SEA	0.1
TOTAL	-

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GLOSSARY

(Wackernagel and Rees, 1996, Chambers, Simmons, and Wackernagel, 2000)

Ecological Footprint: “The land and water area that is required to support indefinitely the material standard of living of a given human population, using prevailing technology “(Chambers, Simmons, and Wackernagel, 2000, p.177).

Embodied Energy: “For a particular commodity, the energy used during the entire life cycle for manufacturing, transporting, using and disposing” (Chambers, Simmons, and Wackernagel, 2000, p.177).

Fair Earth Share: A hypothetical state where the earth’s bio productive capacity, is equally shared amongst the citizens of the globe.

Uplift Factor: Ecological costs that occur as a result of another ecological resource use. For example, with car travel “...if the equivalent of 15% of the fuel energy use is needed to manufacture and maintain a vehicle with an extra 30% for the construction and maintenance of the road infrastructure,” the uplift factor for car use would be 1.45 (Chambers, Simmons, and Wackernagel, 2000, p.85).

Yield Factor (also Equivalence Factor, Correction Factor): The factor by which a country’s ecosystems are more productive than the world average. A yield factor of 0.5 indicates that local productivity is only half of the global average (Wackernagel and Rees, 1996, p.158).