Environmental Implications of the Tourism Industry

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Abstract

This report analyzes the environmental impacts of the tourism industry, which is the third largest retail industry in the United States, behind only automotive dealers and food stores. In 1998, travel and tourism contributed $91 billion to the U.S. economy, supporting 16.2 million jobs directly and indirectly. While extensive research has documented the significant economic impact of such service industries as tourism, little has been written about their effect on environmental quality.

This study uses a framework developed from the industrial ecology literature to assess the impacts of the tourism industry on the environment. Three categories of impact are discussed: direct impacts, including impacts from the travel to a destination, the tourist activities in and of themselves at that destination, such as hiking or boating, and from the creation, operation, and maintenance of facilities that cater to the tourist; "upstream" impacts, resulting from travel service providers' ability to influence suppliers; and "downstream" impacts, where service providers can influence the behavior or consumption patterns of customers.

We have identified impacts from tourist-related transportation, including aircraft, automobiles, and recreational land and marine vehicles; tourist-related development, tourist activities, and direct impacts of the lodging and cruise industries. Although the direct impacts of the lodging and cruise industries and impacts of tourist-related transportation were not very significant, we found on the other hand that tourist activities can have significant impacts, depending on the type and location of activity. Tourist-related development can also have significant cumulative impacts on water quality and the aesthetics of host communities.

Opportunity for upstream and downstream leverage within the tourism industry is considerable. Hotels can exert upstream influence on their suppliers to provide environmentally sound products, such as recyclable toiletries. Similarly, the cruise industry can use its leverage to convince suppliers to improve the environmental quality of shipboard products. Opportunity for downstream influence exists as well. Travel agents can influence where and how a tourist travels, and tour operators can educate tourists about ways to minimize their impact on the environment.

The fragmented nature of the tourism industry is not conducive to regulation that encompasses all aspects of the industry. Therefore, educational efforts aimed at supporting existing regulations and encouraging environmentally responsible behavior where no regulations exist seem most promising as a management scheme. These educational efforts should be framed in accordance with the targeted audience (i.e., tourists and industry sectors). Tourists may be more receptive to educational initiatives that focus on the environmental benefits of altering their behavior, while industry sectors are more likely to be responsive to educational efforts that emphasize cost savings and an improved public image.

Key Words: tourism, environmental impact, upstream and downstream leverage, service sector, sector environmental profile

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S.1 Definition of Tourism

Tourism is the United States' third-largest retail industry, behind only automotive dealers and food stores. Although tourism was once thought of as a "smokeless" industry with few, if any, environmental impacts, recognition of its potential for adverse impacts is growing. Tourism consists of the activities undertaken during travel from home or work for the pleasure and enjoyment of certain destinations, and the facilities that cater to the needs of the tourist (Mathieson & Wall, 1982, p. 1; Power, 1996, p. 214).

It is often difficult to distinguish between tourism and recreation, as they are interrelated. Tourism implies traveling a distance from home, while recreation is defined as the activities undertaken during leisure time (McIntosh & Goeldner, 1990, p.10). Outdoor recreation is even more closely related to tourism. The overlap is partly dependent upon the length of time of the recreational activity. For example, recreational boating is both a recreational activity and a tourist activity, depending on the duration and location of the trip. A boater who uses his or her boat for a day can be considered to be participating in a recreational activity, while a boater who takes a longer trip can also be considered a tourist (if visiting other destinations). Therefore while tourism is the primary focus of discussion, selected recreational activities and their impacts are considered as well.

This discussion paper presents environmental impacts of tourism in three categories: direct impacts, including impacts from the travel to a destination, the tourist activities in and of themselves at that destination, such as hiking or boating, and from the creation, operation and maintenance of facilities that cater to the tourist; "upstream" impacts, resulting from service providers' ability to influence suppliers; and "downstream" impacts, where service providers can influence the behavior or consumption patterns of customers.

S.2 Direct Environmental Impacts

S.2.1 Resource Use

Energy Consumption

Preliminary figures from a draft Sustainable Tourism Roundtable Report indicate that the tourism industry uses 72.1 Gwhours of energy per year (International Institute of Tourism Studies, George Washington University, 1999, p. 7). This amount is only a very small percentage of total U.S. energy consumption—approximately 0.3% in 1997 (Energy Information Administration, U.S. Department of Energy (EIA/DOE), 1998, p.112).

Water Consumption

The preliminary figures from the above-mentioned report indicate that the tourism industry in the aggregate uses 93.9 billion gallons of water per year. This amount is 4.0% of total U.S. commercial consumption (including the chemical, pulp and paper, primary metals, and the textiles industries) (International Institute of Tourism Studies, George Washington University,

1999, pp. 7 and 42). Tourism-related water use in the lodging industry accounts for approximately 46.2 billion gallons of water per year. In 1995, total freshwater withdrawals in the United States for offstream uses (e.g., withdrawal of surface and groundwater for public supply; domestic use; agriculture, including irrigation and livestock watering; industry, including mining; and thermoelectric power uses) was 340 billion gallons per day. By contrast, tourism-related hotel water use accounted for under .04% of the total (Solley, 1997, p.1).

S.2.2 Pollution and Waste Outputs

Water Quality

The tourism industry impacts water quality through construction and maintenance of tourist infrastructure, recreational boating, and certain activities of the cruise industry. Tourist infrastructure increases the pressure on existing sewage treatment plants and can lead to overflows during peak tourist times. A more gradual impact is the leaching of nutrients from septic systems of tourists' waterfront homes, accelerating eutrophication of adjacent waterbodies, and depleting dissolved oxygen supplies. The construction of tourist facilities and infrastructure also increases the amount of impervious surfaces, which in turn increases the amount of polluted runoff reaching waterbodies.

The most significant problem from the standpoint of human health associated with recreational boating and water quality is the discharge of sewage into waterbodies with limited flushing, where the discharge occurs near the location of shellfish beds. Diseases that can be potentially transmitted through human contact with fecal discharge and/or ingestion of contaminated shellfish include typhoid fever, dysentery, infectious hepatitis, and nonspecific gastroenteritis (Seabloom, Plews, & Cox, 1989, p.1).

Spills and discharges of oil and toxic chemicals are other impacts that recreational boats and the cruise industry can have, although such impacts are not necessarily significant. In 1997, recreational vessels were responsible for 535 reported oil spills, comprising 6.2% of the total spill incidents in U.S. waters. The cruise industry was responsible for an even smaller percentage, at 1.6% of total spills in U.S. waters (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee, 1998, p.2).

Air Quality

Most tourism-related air pollution comes from automobiles (Andereck, 1993, p. 27). Automobiles emit by far the most carbon monoxide of all transportation modes. In 1997, they emitted 26 million short tons of carbon monoxide, compared with 1.7 million short tons from recreational marine vehicles, and 1 million from aircraft (U.S. Environmental Protection Agency [EPA],1998, December, Table A-1). Specific information on tour bus emissions was not available, but all heavy-duty diesel vehicles (most tour buses fall into this category) emitted 1.4 million short tons in 1997.

S.2.3 Habitat/Ecosystem Alteration and Fragmentation

Ecosystems and natural habitat can be damaged by tourist infrastructure, tourist activities, recreational boating, and the cruise industry. Recreational boats and cruise vessels can damage aquatic vegetation by cutting it with their propellers or otherwise damaging it when running aground. Wetlands have been destroyed in order to build tourist-related infrastructure, such as airports, roads, and marinas (Andereck, 1993, p. 29). For example, in Jamaica over 700 acres of wetlands have been destroyed since the 1960s for tourism development (Bacon, 1987, pp.105-6). When snorkeling and hiking, tourists can damage ecosystems by littering, and trampling coral and vegetation. This type of damage is cumulative in nature. One or two tourists may not cause visible harm, but hundreds over time can do substantial damage.

S.2.4 Impacts on Wildlife

Wildlife can be adversely affected by the construction and maintenance of tourist infrastructure, and by tourist activities. Impacts from tourist infrastructure can be direct, such as when development in lower elevations of mountain resorts restricts the migratory range of certain wildlife, or indirect, such as when marine turtles are disoriented by automobile headlights and resort illumination (Gartner, 1996, p.125). The two primary ways in which tourist activities disturb wildlife are by altering their eating habits and feeding patterns, and by altering their habitat. Feeding patterns are altered directly by tourists feeding animals, and indirectly by littering, which encourages wildlife to scrounge for food (Mathieson & Wall, 1982, p.109). Wildlife habitat is altered by tourists' trampling and by the use of off-road vehicles (ORVs).

S.2.5 Aesthetic and Cultural Impacts

Tourism can diminish the aesthetic appeal of a destination through the construction of buildings that clash with the surrounding environment, creating "architectural" or "visual" pollution (Andereck, 1993, p. 30; Mathieson & Wall, 1982, p.121).). The high-rise hotels along the coastal zone of Atlantic City and Miami are examples, as are several high-rise hotels in Jerusalem, whose construction arguably damaged the city's architectural beauty (Bosselman, 1978, pp. 26-7).

S.2.6 Impact on Gateway Communities Outside National Parks and Other Host Communities

Tourism affects the natural landscape and character of "gateway communities," which are adjacent to national parks, and other significant tourist destinations. Development related to tourist activity can be detrimental to cultural and aesthetic aspects of these communities if undertaken in an indiscriminate and/or scattered manner. For example, Tusayan, the town near the south rim of the Grand Canyon is "dominated by a gaggle of fast-food restaurants, motels, and trinket shops along the highway, [and] has been likened to a strip mall on the way to the Vatican" (Whitman, 1999, p. 19).

S.2.7 Positive Impacts

Despite its many adverse impacts, tourism can have positive impacts on both natural and artificially constructed environments, as well as on destination communities. In fact, tourism has motivated the preservation of such sensitive ecosystems as the Everglades National Park in Florida (Andereck, 1993, p.30). Furthermore, tourism that focuses on cultural and historic sites (sometimes referred to as "heritage" tourism) can be the impetus for the preservation and rehabilitation of existing historic sites, buildings, and monuments. For example, historic lighthouses and piers in Cape Cod, Massachusetts and historic buildings in Williamsburg, Virginia have been transformed and preserved for the purpose of tourism (Mathieson & Wall, 1982, p. 98).

In addition, the economic benefits of tourism partially balance its negative environmental impacts. For example, gateway communities adjacent to national parks exist primarily because of the economic benefits of tourism. The parks attract more visitors to these communities, resulting in increased employment opportunities and an improved standard of living.

S.3 Upstream and Downstream Impacts

In addition to direct environmental impacts, impacts from tourism occur at every point along the supply chain. The "supply chain" with respect to service industries refers to all the actors involved in the provision of a service, including the consumer. The supply chain in the tourism industry consists of those industries that provide accommodations, provide transportation, make arrangements for travelers, and supply equipment. It also includes the tourists themselves. The degree of environmental impact of tourism can be influenced by actors along the supply chain. (The reader is referred to figure 1 on page 20 for a visual presentation of this relationship.) For example, a hotel can exert "upstream" influence on its suppliers to provide products that minimize environmental impacts, such as recyclable toiletries. There are several existing initiatives within the private and nonprofit sectors to work with the lodging industry to reduce environmental impacts through supplier relations. The extent to which a hotel can leverage its suppliers depends upon several factors, including type of hotel (e.g., large chain or small independent) and type of supplies.

Similarly, travel service providers can have "downstream" impacts by influencing tourists through education and provision of options to reduce resource use. For example, hotels can give guests the option not to have their linens washed daily, and cruise lines can limit the number of tourists that go ashore at sensitive destinations. Downstream influence through tourist education is seen most clearly with ecotourism, defined as travel and tourism that attempts to minimize impacts on the environment. Tour operators specializing in ecotourism influence their customers through provision of environmental guidelines before and during trips.

S.4 Impact of Technology on Travel Services

The growth of the Internet has begun to influence the interactions among travel agents, suppliers, and consumers. The sophistication of information technology has already begun to allow tourists to bypass traditional methods of making travel arrangements. For example, Southwest Airlines now sells most of its tickets without the use of travel agents, using the Internet instead (Lewis, Semeijn & Talalayevsky, 1998, p. 21). The full impact of this technological change has yet to be realized. However, it has the potential to effect significant changes. The interactive nature of the Internet allows for the values of tourists to register directly with providers of tourist services. If there is a strong demand for environmentally sensitive services, it is likely that the demand will be met.

S.4.1 Regulation of Industry Activities

Regulation of the tourism industry reflects its fragmented nature. Different aspects of the industry are regulated by different (primarily federal) agencies, with some overlap. The Environmental Protection Agency (EPA) and the U.S. Coast Guard regulate oil and sewage discharges from recreational marine vessels. The EPA under the Clean Air Act (CAA) amendments now regulates air emissions from selected marine engines. Emissions from land vehicles are regulated under the Clean Air Act. The EPA also regulates smoke, hydrocarbons, nitrogen oxide, and carbon monoxide from aircraft engines. The Federal Aviation Administration

(FAA) in the Department of Transportation (DOT) is responsible for enforcing those emission standards. The FAA is also responsible for regulating noise pollution from aircraft under the 1990 Airport Noise and Capacity Act.

The cruise industry is regulated by both international and federal regulations. The primary international regulatory framework for the cruise industry is the International Convention for the Prevention of Pollution from Ships, commonly referred to as MARPOL 73/78. Three relevant annexes regulate the discharge of sewage, oil, and solid wastes. The U.S. Coast Guard is responsible for enforcing these regulations in the United States. The International Maritime Organization (IMO) has requirements for solid waste generation and incineration on board cruise vessels, NO_x emission limits, and guidelines to minimize transfer of non-native species.

Regulation of the development of tourist infrastructure occurs at the state or local level, through planning and zoning laws. The efficacy of these regulations varies depending on location.

S.5 Policy Implications

As indicated by the regulatory framework highlighted above, the fragmented nature of the tourism industry is not conducive to integrated, holistic regulation that encompasses all aspects of the industry. The dispersed nature of the tourism industry produces diffuse impacts that fall under the jurisdictions of different federal, state, and local agencies. Moreover, enforcement and compliance problems make it particularly difficult to regulate tourist activities. For these reasons educational efforts seem more promising than regulation to minimize many of the environmental impacts of tourism that are not now regulated. Education can be used to support existing regulations, and to encourage environmentally responsible behavior where no regulations exist.

Educational efforts to promote environmentally responsible tourism should be framed in accordance with the targeted audience (e.g., tourists, industry sectors). Tourists may be more receptive to educational efforts that focus on the environmental benefits of altering their behavior than to regulatory prohibitions per se. For example, a sign that prohibits anchoring in a sensitive marine ecosystem could be more effective if accompanied by an explanation of the potential damage a boat can do to the ecosystem.

However, educational efforts geared towards industry sectors seem most effective when cost savings and the marketing benefits of “being green” are emphasized. A study of 13 corporate executives of hotel chains found that the two most important factors that contributed to their decision to implement a solid waste program were waste disposal fees and the betterment of public image (Shanklin, Petrillose, & Pettay, 1991, p. 67). Some hotels have found that their environmental initiatives have resulted in an increase in business. Although environmental awareness has had an important impact on the tourism industry, economic motives are still primary. Therefore, educational programs aimed at tourism service providers should emphasize the potential economic and marketing benefits of environmental stewardship.

ENVIRONMENTAL IMPLICATIONS OF THE TOURISM INDUSTRY

Terry Davies and Sarah Cahill*

1. INTRODUCTION

Environmental management in the United States over the past several decades has focused on regulating production industries, such as manufacturing and mining. However, there has been increasing interest in the environmental effects of the service industry. Generally speaking, a service is as an activity done for others (Goedkoop, van Halen, te Riele, & Rommens, 1998, p. 4). A perhaps even broader definition of a service is "anything sold in trade that cannot be dropped on your foot" (Rejeski, 1997, p. 27). The service industry therefore comprises a variety of activities, from restaurants to hospitals to financial institutions. It accounts for 75% of the U.S. gross domestic product ($3.8 trillion in 1997) (U.S. Census Bureau, 1998) and 80% of U.S. employment (Guile & Cohon, 1997, p. 76).

The service industry merits attention because of its large size and consequently its potential for environmental impacts (both negative and positive). There is a small but growing body of literature discussing the influence of the service sector on environmental quality (Allenby, 1997; Graedel, 1997; Guile & Cohon, 1997; Rejeski, 1997). Three categories of influence have evolved from these discussions:

1) direct impacts of the service itself,
2) upstream impacts, arising from the service provider's ability to influence its suppliers, and
3) downstream impacts, where the service provider can influence its customers' behavioral or consumption patterns.

It is necessary to look at all three categories to develop a complete picture of the influence of the service sector on environmental quality.

The tourism industry is one of the largest components of the service sector, and has considerable ability to influence environmental quality. Travel and tourism contributed $91 billion in revenue into the U.S. economy in 1998 (*World Airline News*, 1999), supporting 16.2 million jobs directly and indirectly (Travel Industry Association of America, 1998, p.1). Over forty-three million tourists visited the United States in 1998 (U.S. Department of Commerce, International Trade Administration, 1999). Furthermore, the tourism industry is projected to be the largest U.S. private employer by 2000, and now represents 10% of the national private gross domestic product (Goeldner, 1997, p. 58).

Tourist destinations tend to be places of the highest amenities, whether the amenities are social, cultural, or natural. These destinations, due in part to their high quality, are often in short supply relative to demand (Robert Healy, Nicholas School of the Environment, Duke University, personal communication via email, November 28, 1999). This scarcity leads to the potential for degradation of tourist areas, as they reach and in some cases exceed their carrying capacity.

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The tourism industry is complex; being fragmented into several industries that, taken together, constitute what is commonly referred to as the travel and tourism industry (McIntosh & Goeldner, 1990, p.16). It comprises components of other industries that do not cater exclusively to tourists (Power, 1996, p. 215); therefore a discussion of the environmental impacts of tourism needs to consider what percentage of use is related to tourism in each industry. Sectors of the tourism industry include transportation (e.g., airlines, buses, automobiles), lodging, restaurants, the cruise industry, amusement parks and resorts, and general retail and merchandise stores (Johnson, 1994, pp. 41-42). Included in the definition of the tourism industry is the associated development (e.g., tourist infrastructure) of tourist destinations, and tourist activities.

We have identified impacts from tourist-related transportation, tourist-related development, tourist activities including some recreational activities such as boating, and direct impacts of the lodging and cruise industries. Quantitative data help to illustrate impacts where available; otherwise qualitative data supported by relevant examples are used. Although this discussion focuses on environmental impacts in the United States, some international examples are drawn upon when applicable. After presenting these impacts, we analyze the influence that providers of tourism services can have on their suppliers as well as the tourist. While there are many more industries that provide services to tourists, this discussion focuses on the upstream and downstream leveraging potential of four service providers: the lodging industry, the cruise industry, travel agents, and tour operators.

Section 1 presents both beneficial and adverse environmental impacts of tourism, including tourist activities, development, transportation, and direct impacts of the lodging and cruise industries.

Section 2 explores the relationships among travel agents, tour operators, and service providers, and tourists. The structure of selected components of the tourism industry is presented, and opportunities for upstream leverage on suppliers and downstream leverage on tourists are discussed. Finally, this section briefly analyzes the impact of technology on travel services.

Section 3 discusses steps within the tourism industry as well as government to lessen the adverse environmental impacts of tourism. This section concludes with a brief presentation of the benefits of educational efforts to minimize impacts.

2. ENVIRONMENTAL IMPACTS OF TOURISM

2.1 Definition of Tourism

Tourism is “the temporary movement of people to destinations outside their normal places of work and residence, the activities undertaken during their stay in those destinations, and the facilities created to cater to their needs” (Mathieson & Wall, 1982, p.1). It is often difficult to distinguish between tourism and recreation, as they are interrelated. Tourism involves traveling a distance from home, while recreation is defined as the activities undertaken during leisure time (McIntosh & Goeldner, 1990, p. 10). Outdoor recreation is even more closely related to tourism. The extent of the overlap depends in part on the length of time of the activity and its location. For example, a boater who uses his or her boat for one day and who stays near his or her home may be considered a recreational boater; while a boater who travels on his or her boat overnight to a destination may be considered a tourist. Therefore while this discussion paper focuses primarily on tourism, selected recreational activities and their impacts are considered as well.

The degree of environmental impact varies, depending on the type of tourist and the intensity of site use (Gartner, 1996, p.117). There are day tourists, who visit a destination for a day and then leave; summer residents who are in effect tourists for a season; and tourists on bus tours and other trips that may visit a location for a few minutes or a number of days. Day tourists have an impact on the environment through their transportation to their destination as well as their activities once there. This is true for summer residents, but these tourists also have a cumulative impact, as they are in one place for a longer period of time. For example, nutrients leaching from the septic systems of tourists' waterfront homes can accelerate eutrophication and contribute to depletion of dissolved oxygen supply of the adjacent water body. On the other hand, summer residents often are an important force in preserving the natural beauty of an area (e.g., the Adirondacks). Tourists who visit an area for longer than a day and choose to stay in hotels contribute to the impacts that the lodging industry has on the environment. In addition to the length of stay, tourist impacts depend on the type of activity undertaken. Passive activities such as birdwatching have different impacts than more active pursuits, such as snowmobiling or boating.

There are environmental impacts from the travel to a destination, the tourist activities in and of themselves at that destination, such as hiking or boating, and from the creation, operation, and maintenance of facilities that cater to the tourist, such as hotels (May, 1991, p.113). This discussion addresses impacts from tourism-related transportation, development, the lodging and cruise industries, and tourist activities including selected forms of recreation.

2.1.1 Transportation

Airlines

In 1995, twenty percent of U.S. commercial air travel was attributed to leisure, including rest and relaxation, sightseeing, and outdoor recreation (U.S. Department of Transportation, 1997, p. 5). Table 1 illustrates the total and tourism-related contribution of air pollutants from the air transportation industry. Aircraft emit the most carbon monoxide of any of the five listed air pollutants, but it is a small amount relative to other modes of transportation. In total, aircraft are responsible for approximately one percent of the total ground-level emissions from mobile sources (EPA, 1997, December, Tables 3-1–3-6); therefore tourism-related air travel is responsible for only .2% of total ground-level emissions. Furthermore, tourism-related air travel contributes less than 1% of total U.S. emissions of each of the listed criteria pollutants.

TABLE 1. AIR POLLUTANT EMISSIONS OF TOURISM-RELATED AIR TRANSPORTATION IN 1997

Pollutant	Total Aircraft Emissions (in million short tons, or mst)	Tourism-Related Aircraft Emissions (20% of total air emissions in mst)	Total U.S. Emissions (in mst)*	Tourism-Related Aircraft Emissions % of U.S. Total
Nitrogen Oxide	.178	.0356	23.582	.15%
Carbon Monoxide	1.012	.202	87.451	.23%
Volatile Organic Compounds	.187	.0374	19.214	.19%
Sulfur Dioxide	.012	.0024	20.369	.01%
Particulate Matter (PM-10)	.041	.0082	33.581	.02%

Source: National Air Pollutant Emission Trends Update, 1970-1997, (EPA, 1998, Tables A-1-A-5); and the 1995 American Travel Survey (DOT 1997, p. 5).

*Total U.S. emissions include emissions from fuel combustion, chemical and allied production, metals processing, petroleum and related industries, other industrial processes, storage and transport, waste disposal and recycling, on-road vehicles, non-road engines and vehicles (including aircraft), natural sources, solvent utilization, and miscellaneous.

Although aircraft contribute only a small amount to total air pollution, emissions from this source is increasing. Between 1970 and1995, hydrocarbon and NO_x emissions from aircraft sources have grown 53% (EPA, 1999, April, p.1-1). Projections to 2010 indicate that aircraft emissions will continue to increase. Aircraft emissions in nonattainment areas with large airport facilities in particular are projected to represent a growing percentage of regional sources of air pollutants (EPA, 1999, April, p. 4-1). The projections indicate an increase in the aircraft component of total regional emissions between 1990 and 2010 in ten metropolitan regions (nine of which are currently not in attainment of the National Ambient Air Quality Standards (NAAQS) for ozone; the tenth city has attained the ozone standard, but is considered an ozone "maintenance" area) (EPA, 1999, April, p. 2-2). The 2010 percentages are still relatively low, ranging from 0.2% volatile organic compounds (VOC) in Philadelphia to 5.1% VOC in Charlotte; and 1.8% NO_x in Philadelphia to 7.6% in Charlotte (EPA, 1999, April, p. 4-3). The percentages are higher in Charlotte in part because other sources contribute less.

The EPA has had regulations for smoke and hydrocarbon emissions from aircraft engines in place since 1984. In 1997, the agency promulgated new emission standards for nitrogen oxides and carbon monoxide. This rule was adopted to codify the existing voluntary emission standards of the United Nations International Civil Aviation Organization (ICAO) (EPA, 1997, April, p. 1). The DOT's Federal Aviation Administration (FAA) is responsible for enforcing these aircraft emissions standards.

Noise Pollution

In addition to air pollution, aircraft contribute to noise pollution. (Mathieson & Wall 1982, p.105). The FAA is responsible for addressing the noise abatement issue. The 1990 Airport Noise and Capacity Act authorized the FAA to reduce aircraft noise by requiring replacement of louder planes with quieter aircraft (EPA, 1998, October, p. 7). In fact, airlines have spent billions of dollars to address this problem. Stage 2 aircraft are now being replaced by Stage 3 aircraft, which are 50% quieter; and the goal was to have only Stage 3 planes flying by 2000 (Air Transport Association, 1997, p. 3). There are also noise impacts from air tour operators, such as those that take 800,000 passengers a year on scenic overflights of the Grand Canyon. In an effort to reduce unnatural noise, the FAA proposed new rules in August 1999 that would cap the number of overflights in the Grand Canyon ("A Cramped Grand Canyon," 1993). However, again, as tourism-related travel represents only 20% of commercial air travel, and airplanes are only one source of noise pollution, tourism's contribution to total noise pollution is minor.

Ground Transportation

Much of the tourism-related air pollution comes from automobiles (Andereck, 1993, p. 27). Thirty-five percent of people traveling for leisure in 1995 used personal automobiles as their means of travel (DOT, 1997, p. 5). Four-hundred million leisure trips are taken in automobiles per year in the United States; 80% of those trips are 250 miles or less (Goeldner, 1997, p. 60). In 1997, light duty vehicles (passenger cars up to 6,000 lbs. G.V.W.) emitted an average of 1.53 grams of exhaust hydrocarbons per mile, 19.86 grams of carbon monoxide per mile, and 1.51 grams of nitrogen oxide per mile (DOT, 1998, Table 4-33). Automobiles emit by far the most carbon monoxide, nitrogen oxide, and volatile organic compounds in comparison to other transportation. Personal automobiles emit 32% percent of the total national carbon monoxide emissions, and 12% of total national nitrogen oxide emissions (in 1996) (EPA, 1997, p. 3-2; EPA, 1998, December, Table A-1). However, it is difficult to separate the amount of tourism-related automobile travel from all automobile travel.

One area where it is possible to distinguish between tourism-related automobile travel and other travel is within national parks. Exhaust from tourists' cars affects air quality and vegetation in some national parks. Adverse impacts on vegetation have been attributed to automobile exhausts in Yosemite (Mathieson & Wall, 1982, p.104). Almost three-quarters of n national park superintendents surveyed cited exhaust from tourists' cars as a significant factor affecting air quality within the parks (Wang & Miko, 1997, p. 34). Indeed, one national park report noted that "the impact of automobiles (air and noise pollution, acreage for roads, gasoline stations) may be more significant than the impact of the visitors themselves." (U.S. National Park Service Steering Committee, 1992, p. 91).

Tour buses have an impact on air quality as well. Often referred to as the motorcoach industry, the tour bus industry includes 3,000 companies and 25,000 vehicles. Companies are classified as inter-city or charter-tour. The latter constitutes more than 50% of the market (Gee, Makens, & Choy, 1989, p. 254). Charter-tour bus trips have increased, while inter-city trips have declined. Specific emissions data on tour buses are not available, but most tour buses belong in the category of heavy-duty diesel vehicles. In 1997, these vehicles emitted 1.468 million short tons (mst) of carbon monoxide, and 1.886 mst of nitrogen oxide. Table 2 presents pollutant emissions from automobiles and heavy-duty diesel vehicles.

TABLE 2. 1997 AIR POLLUTANT EMISSIONS OF LIGHT-DUTY GAS AND HEAVY DUTY DIESEL VEHICLES

Pollutant	Light-Duty Gas Vehicles (automobiles) in million short tons (mst)	Heavy Duty Diesel Vehicles (in million short tons)
Nitrogen Oxide	2.863	1.886
Carbon Monoxide	26.847	1.468
Volatile Organic Compounds	2.719	.221
Sulfur Dioxide	.128	.084
Particulate Matter (PM-10)	.056	.154

Source: *National Air Pollutant Emission Trends Update, 1970-1997,* (EPA 1998, Tables A-1-A-5).

Another form of ground transportation that has grown in the past twenty years is the recreational vehicle (RV) and off-road recreational vehicle (ORV) sector. Table 3 illustrates the amount of air pollutant emissions from these vehicles (labeled in the data as "non-road" recreational vehicles). These non-road recreational vehicles do not include sport utility vehicles, or SUVs. These data suggest that this segment of tourism-related transportation does not contribute significantly to air quality problems, as land recreational vehicles contribute less than 1% of U.S. total emissions of each listed pollutant.

TABLE 3. AIR POLLUTANT EMISSIONS OF RECREATIONAL LAND VEHICLES IN 1997

Pollutant	Recreational Land Vehicle Emissions ("non-road"* gasoline and diesel, in million short	% of Total U.S. Emissions**
Nitrogen Oxide	.009	.04 %
Carbon Monoxide	.392	.45%
Volatile Organic Compounds	.137	.71%
Sulfur Dioxide	N/A	N/A
Particulate Matter (PM-10)	.004	.01%

Source: *National Air Pollutant Emission Trends Update, 1970-1997,* (EPA 1998, Table A-1-A-5).

*This non-road designation does not include recreational marine vehicles, which constitute a separate category.

**Refer to Table 1. for a listing of total U.S. emissions.

Ground transportation can also have an impact on natural habitat. This impact occurs primarily through road construction. However, some vehicles such as ORVs can have a direct impact. As noted earlier, the distinction between tourism and recreation is a difficult one to make. While ORVs can be considered to be primarily recreational, some ORV users travel significant distances (e.g., from New Jersey to Cape Cod, Massachusetts) to participate in a

recreational activity. When ORV use occurs during a trip away from home (as part of a larger tourist trip), it can be considered a tourist activity as well as a recreational one.

Off-road vehicles have damaged dune systems and salt marshes in Barnstable, and Provincetown, Massachusetts. A study done by the National Park Service Cooperative Research Unit at the University of Massachusetts found that even low-level use can cause severe environmental degradation. (Willard, 1980, p. 323). Only 50 passes of an ORV at the foot of dunes halted growth of beach grass that stabilizes the dune. This causes erosion of the dunes, which in turn increases the risk of damage from flooding, as dunes provide natural flood protection. In addition, the use of ORVs by tourists has proven destructive to wildlife in some areas. Cape Cod National Seashore has had to initiate seasonal and spatial permits for ORV users to protect Piping Plovers during their nesting period. An ORV race across the deserts of California and Nevada has been permanently cancelled as a result of the damage the vehicles were doing to the desert tortoise populations (Gartner, 1996, p. 127).

Recreational Marine Vehicles

Recreational marine vehicles are included in this discussion because their use can be considered tourism when part of a longer trip. For example, recreational boaters who take their boats to Block Island from the coast of Connecticut can be considered tourists (because they are visiting a destination away from home). The impact of this activity occurs in transit to a tourist destination.

Recreational marine vehicles, can, therefore, affect air quality during transit to a destination and while their owners boat in and around that destination. Table 4 presents air pollutant emissions from this vehicular category. Recreational marine vehicles do not emit as much carbon monoxide as automobiles, but they do emit significantly more of it than recreational land vehicles (such as off-road vehicles) and aircraft. The EPA found that nonroad hydrocarbon emissions represent 10% of urban summertime HC emissions. Recreational marine engines were responsible for 30% of the nonroad engine emissions (EPA, 1996, August, p. 2). In addition, two-stroke engines, such as those found on personal watercraft, are rather inefficient and typically release 25-30% of oil and gas into the surrounding water (Robert Healy, Nicholas School of the Environment, Duke University, personal communication via email, November 28, 1999). However, emissions from marine recreational vehicles represent only a small percentage of total national emissions; therefore their effects are less pronounced than with automobiles (EPA, 1996, October, pp. 201-203).

TABLE 4. AIR POLLUTANT EMISSIONS OF RECREATIONAL MARINE VEHICLES IN 1997

Pollutant	Recreational Marine Vehicle Emissions (gas and diesel, in million short tons)	% of Total U.S. Emission*
Nitrogen Oxide	.066	.28%
Carbon Monoxide	1.793	2.1%
Volatile Organic Compounds	.467	2.4%
Sulfur Dioxide	N/A	N/A
Particulate Matter (PM-10)	.032	.10%

Source: *National Air Pollutant Emission trends Update, 1970-1997,* (EPA 1998, Tables A-1-A-5).
*Refer to Table 1 for a listing of total U.S. emissions.

The Clean Air Act Amendments of 1990 gave the EPA authority for the first time to regulate emissions from nonroad engines and vehicles (EPA, 1996, August, p. 2). The EPA set emissions standards for new spark-ignition gasoline marine engines in 1996, including outboard engines, personal watercraft engines, and jet boat engines. These are designed to reduce hydrocarbon emissions from these types of engines 75% by 2025 (EPA, 1996, October, p. 1). These emissions standards do not apply to inboard motors, as they emit fewer pollutants, but they do apply to outboard engines sold starting in 1998, and to personal watercraft (such as jetskis) engines sold starting in 1999 (64 *Federal Register* 62293, 1999).

2.2 Development and Land Use

The environmental impacts of the construction and development of facilities needed to support the industry are both immediate and gradual. Development associated with tourism includes accommodations, roads, retail stores and restaurants, tourist attractions, tourists' seasonal waterfront homes, water supplies, and waste disposal facilities. Cumulative effects over time are particularly problematic because the developer in question is often out of the picture before impacts become obvious (Gartner, 1996, p. 115). An example of a gradual impact is the leaching of nutrients from septic systems of tourists' waterfront homes into the waterbody, accelerating eutrophication and depleting dissolved oxygen supplies.

Tourist infrastructure can also adversely impact water quality because more wastewater is created in one place and reduced someplace else, putting more pressure on sewage treatment plants or septic systems in the tourist destination. When a sewage treatment plant receives more effluent than it can treat, the excess can flow directly into water bodies untreated, creating a potential health hazard. The sewage problem with tourist facilities is further exacerbated by the seasonal nature of many tourist areas. An area which off-season may have the capacity (either through septic systems or treatment plants) to properly treat sewage may be overburdened during the tourist season.

Sewage effluent can damage coral reefs because it stimulates the growth of algae, which cover the filter-feeding corals, hampering their ability to get food. Furthermore, the algae impede

the transmission of sunlight to the plant cells (zooxanthellae) living within the corals' tissue, hindering their ability to grow and provide the coral with needed nutrition (Edington & Edington, 1986, pp. 175-76). This damage has occurred on the Hawaiian island of Oahu, where the discharge of partially treated sewage effluent stimulated the growth of a particular algae, destroying parts of the reef (Laws, 1993, pp. 92-93). However, it is difficult to separate the effects of rapid urbanization of Oahu on the sewage treatment plants with the effects of an increase in tourists to the area. An area where the degradation of coral reefs due to sewage discharge can be attributed to tourism is in Jamaica. Damage to the corals there resulting from sewage discharge from tourist resorts along a 160-kilometer stretch of coastline was observed as early as 1973 (Barnes, 1973, p. 102).

Tourist facilities increase the amount of impervious surfaces, causing more runoff to reach water bodies. This runoff contains nutrients, suspended particles, and oil and gas. Excess nutrients added to a water body can accelerate the process of eutrophication, causing an overgrowth of algae, which in turn uses up excess dissolved oxygen as the algae decays, causing fish kills. The overgrowth of algae is also a nuisance to swimmers. Furthermore, if masses of algae wash up on shore, they can create a foul-smelling area and a breeding ground for biting flies (Edington & Edington, 1986, p. 173). A relevant example is the accelerated eutrophication of Lake Tahoe since the 1950s (Goldman, 1989, p. 7). Increased development to accommodate tourism and recreation contributed to the degradation of water quality for two primary reasons: (1) the increase of impervious surface, which in turn led to increased runoff of nutrients into the lake, and (2) the destruction of wetlands needed to filter those pollutants (Goldman, 1989, p.11).

Construction of facilities supporting the tourism industry can damage wetlands, mangroves, coral reefs, and estuaries. Wetlands have been destroyed to make way for roads, airports, marinas, sewage treatment plants, and recreational facilities (Andereck, 1993, p. 29). This destruction is problematic because wetlands provide many crucial functions, including acting as a nursery ground for a diverse aquatic community, and helping to buffer the impacts of pollutants to the water body. In Cancun, Mexico, the natural environment of mangrove wetlands was almost completely destroyed by the development of tourist hotels and their associated infrastructure (Bosselman, 1978, p. 52). Similarly, in Jamaica over 700 acres of wetlands have been destroyed since the 1960s for tourism development (Bacon, 1987, pp.105-106). In the Rocky Mountain National Park, the construction of a high-level road increasing human accessibility led to the destruction of 95% of the vegetation cover in some areas close to the road (Edington & Edington, 1986, p. 78).

Although tourism has been the impetus for much destructive development, it has also been the motivation for preserving sensitive ecosystems. Some of this motivation stems from economic benefits, as natural parks serve as attractions for tourists. An example on an international level is the Parc des Volcans in Rwanda, which provides ecological benefits through protection of the local watershed, and economic benefits, as it is the country's third largest source of foreign exchange (Boo, 1990, p. xiv). Everglades National Park in Florida is a domestic example of a sensitive wetland and estuarine environment where tourism has spurred preservation efforts (Andereck, 1993, p. 30).

Tourism with an emphasis on cultural and historic sites has been called "heritage" or "cultural" tourism, and is one of the fastest growing trends in the industry (Cass & Jahrig, 1998, p. 9). Heritage tourism focuses on sharing the historical and cultural resources of an area with travelers, while still maintaining the integrity of each site (Cass & Jahrig, 1998, p. 14). This type of tourism has been the impetus for the rehabilitation of existing historic sites, buildings, and

monuments, such as the facelift that historic houses, lighthouses, and piers received on Cape Cod in the name of tourism. Similarly, the 18th century capital of the former British colony of Virginia, Williamsburg, has been transformed from ruins to a thriving historic site and tourist destination (Mathieson & Wall, 1982, p. 98). Renovations to the Custer House at Fort Abraham Lincoln State Park in North Dakota were completed in part to attract additional tourists (Schroeder, 1993, p. 92). A final example where heritage tourism has been the catalyst for improvement is the rural, somewhat neglected farm town of Fort Benton, Montana. It was transformed into an international tourist attraction because of several historic sites that were restored, including a Lewis and Clark memorial, the Museum of the Northern Great Plains, and the Museum of the Upper Missouri (Cass & Jahrig, 1998, p. 8).

A related benefit of tourism can be the revitalization of derelict urban areas. Two examples are the Gas Lamp District of San Diego and the South of Market Area (SOMA) in San Francisco. The Gas Lamp District was transformed from an area resembling skid row to a thriving tourist area, thanks in part to municipal funding. City officials took advantage of the area's prime location between downtown and the city's convention center by building restaurants, clubs, and other tourist attractions that were subsequently also used by local residents. Similarly, in San Francisco's South of Market Area, an area dominated by abandoned warehouses grew into a thriving tourist destination due in part to the construction of a convention center there in 1983. The tourist development led to residential development, and now SOMA is considered a good place to live (Baltin, 1994, p.16B). Other urban centers such as Washington, D.C. and New York City have also benefited from an expansion of tourism. The revenue generated from tourists and their activities allows these areas to maintain sites and buildings that would not otherwise be as well kept.

Another benefit of tourism development is its role in fostering an appreciation and understanding of nature. Tourism development can facilitate an increasing awareness and appreciation of the natural world. For example, the development of mountain railroads and athletic resorts in Switzerland made it possible for people to visit and appreciate the previously unknown area. Similarly, tours into the Canadian tundra have increased their visibility to people other than hunters and scientists (Mathieson & Wall, 1982, p. 97).

Development undertaken to cater to tourists in coastal areas can have adverse impacts. Jetties and breakwaters built to create artificial harbors can increase erosion of those areas on the downstream side of the littoral drift (i.e., the movement of sand along the nearshore underwater propelled by the prevailing current). In addition to their physical impacts, these structures can detract from the aesthetics of an area. The construction of marinas can alter water levels and nutrient concentrations, as well as destroy habitat (Mathieson & Wall, 1982, p. 114).

However, tourism-related development can benefit a coastal zone as well as harm it. Public access, for example, often increases with tourism development, as some states have legislation requiring developers to maintain some public access with development. Furthermore, tourism injects the resources along a coast and adjacent waters with political and economic value, helping to ensure their protection (Gartner, 1996, p. 124). The political value stems from the significant constituency of summer residents and day tourists who want to maintain their recreation area. Slightly more obvious are the economic benefits from fostering tourism along the coast, as revenue is generated from entrance, parking, and other fees, as well as from sales and employment.

Tourism-related development has an impact on wildlife, also. Development in the lower elevations of mountain resorts (where it usually is located) restricts the migratory winter range of

certain wildlife (Gartner, 1996, p. 125). Impacts on wildlife associated with tourist development can be indirect as well as direct. For example, automobile headlights, streetlights, and resort illumination on beachside roads can disorient marine turtles. This disorientation causes them to head inland instead of towards the sea (MacFarlane, 1963, p. 153). The growth of tourist communities can affect wildlife habitat. For example, residential subdivisions in Jackson Hole, Wyoming, adjacent to National Elk Refuge, have decreased the amount of habitat available for grazing by the elk (McMahon & Propst, 1998, p. 40).

2.2.1 Impacts on National Park Gateway Communities and Other Host Communities

Communities adjacent to national parks that cater to tourists are called "gateway communities." Development of these areas is often undertaken without consideration of the natural landscape. Indiscriminate and scattered development tends to detract from the local character of such areas and homogenizes the experience for the visitor. For example, Tusayan, the gateway town to the south rim of the Grand Canyon, is "dominated by a gaggle of fast-food restaurants, motels, and trinket shops along the highway, [and] has been likened to a strip mall on the entryway to the Vatican" (Whitman, 1999, p.19). An example of new development that is not integrated into the natural landscape is a resort community currently being built around an IMAX theater in West Yellowstone (Culbertson, 1997). It is important to note that development adjacent to national parks is a trade-off for less development within the parks. If it is a question of one or the other, then it is preferable to develop outside of the parks. However, there is no reason why areas adjacent to the parks cannot be developed in accordance with the natural environment and local character.

Many resorts have ribbon or sprawl developments that are unattractive and are not well assimilated into the surrounding area. High-rise hotels along the coastal zones of Atlantic City and Miami are examples of visual pollution. Hawaii was one of the first tourist destinations in the United States to experience this problem, prompting articles about it as early as 1969. Becker (1969, p. 501) noted that "statehood and the jet airliner have transformed the Hawaiian capital from a picturesque crossroads to something approaching an outpost of Southern California." The character and architectural beauty of Jerusalem was similarly marred by the construction of several high-rise hotels in an attempt to stimulate tourism (Bosselman, 1978, pp. 26-27).

A more subtle impact of tourist facility development is the gradual yet persistent transformation from a natural to a built environment. As the number of tourists in an area increases, the demand for facilities increases, and thus their supply. Eventually, the built environment almost wholly subsumes the natural environment, with contrived, artificial attractions becoming the focus of tourists. Relph (1976, p. 93) described this process as "the destruction of the local and regional landscape that very often initiated the tourism, and its replacement by conventional tourist architecture and synthetic landscapes and pseudo-places." For example, visitors to the Dells, Wisconsin initially went there to see the natural sandstone cliff formations. However, the increasing number of tourists every year led to an expansion of the built environment, and the attractions now receiving the most attention from tourists have names such as "Western World" and "Robot World," along with water parks and a greyhound racing track. The natural sandstone cliffs are a peripheral attraction, if they are seen at all (Gartner, 1996, p. 134).

There are positive economic impacts associated with tourism in gateway communities and host communities (Tooman, 1997, p. 35). More visitors can mean increased employment opportunities and an improved standard of living. Other economic benefits of tourism reported in

the literature include improvement of public utilities and transport infrastructure, and an increase in tax revenues (Ap & Crompton, 1998, p.122).

2.3 Direct Impacts of the Lodging Industry

2.3.1 Energy Use

The lodging industry consumed slightly below 0.5 quadrillion British thermal units (Btu) of energy in 1995 (DOE/EIA, 1998, p. 8). This amount was approximately 9.4 % of the total energy consumption of all commercial buildings. In that same year, the lodging industry consumed 125 thousand Btu per square foot, which was more than the average of 90.5 thousand Btu per square foot for all commercial buildings (DOE/EIA, 1998, p. 7). The lodging industry has the fifth highest rate of energy consumption according to principal building activity (out of 13 categories) (DOE/EIA, 1998, pp. 7-8). The lodging industry consumes less energy than both the health care and food service industries. While some hotels have been successful in reducing energy usage since the early 1970s, it remains a concern of the lodging industry. There is increasing pressure to reduce energy use further because of the greenhouse gas emissions associated with energy use (Stipanuk & Roffmann, 1996, p. 280).

2.3.2 Water Use

Water is used at lodging facilities for drinking, cleaning, recreation (if there are pools), fire safety systems, and bathing and sanitary purposes. Water usage depends on the size and type of the hotel. Larger hotels often offer amenities that use large quantities of water, such as swimming pools and extensive landscaping. Furthermore, large hotels are more likely to have a central chilled water plant, which consumes a large quantity of water (Redlin & deRoos 1990, p. 3). Stipanuk and Roffman (1996, p. 52) estimated that hotel water usage ranges from 101 gallons per available room per day in a hotel with less than 75 rooms, to 208 gallons per room per day in a hotel with 500 or more rooms. This amount averages out to 154 gallons per available room per day, or 56,210 gallons of water per room per year. Since tourists constitute about 30% of the total number of guests in U.S hotels (Gee, et al., 1989, p. 313), tourism is responsible for about 16,863 gallons of water per room per year. The entire lodging industry has been estimated to use 154 billion gallons per year (Stipanuk & Roffman, 1996, p. 51), with tourism therefore accounting for about 46.2 billion gallons per year. Total freshwater withdrawal for offstream uses (e.g., withdrawal of surface and groundwater for public supply, commercial, irrigation, livestock, industrial, mining and thermoelectric power uses) in the United States in 1995 was 340 billion gallons per day, of which tourism-related hotel water use was less than .04% of the total (Solley, 1997, p. 1).

2.3.4 Solid Waste Generation

The amount of solid waste generated is dependent upon the size and type of the hotel, as well as the existence of waste management facilities. A pilot study by the Florida Department of Environmental Regulations, the Central Florida Hotel and Motel Association, and the University of Florida found that the average rate of solid waste generation at hotels ranged from 132.7 pounds per room per month for a Comfort Inn to 220.3 pounds per room per month at an upscale Hilton in the Walt Disney World Village (Shanklin, 1993, p. 221). Therefore, waste generated from tourism would range from 40 pounds per room per month to 66 pounds per room per month (at 30% of total). Another study reported similar numbers, with the addition that the numbers doubled on checkout days (Shanklin, et al., 1991, p. 60).

2.4 Direct Impacts of the Cruise Industry

The cruise industry is the fastest growing segment of the tourism industry, moving from 500,000 passengers a year in 1970 to over five million in 1995 (Dickinson & Vladimir, 1997, p. 37). Industry statistics suggest an increase in those numbers to seven million passengers in 2000. The United States has an interest in the potential environmental impacts of the cruise industry in part because six of the world's eight leading cruise markets are in or adjacent to U.S. waters (National Research Council [NRC], 1995, p. 47). Direct impacts of the industry are presented below, as well as a discussion of the regulatory framework surrounding the impacts.

2.4.1 Solid Waste

As with recreational boats, the amount of solid waste (excluding sewage) generated by the cruise industry is difficult to document. A cruise ship carrying 2,700 passengers can generate at least a ton of garbage per day. An average passenger generates 2 pounds of dry garbage, 1 and a half pounds of food waste, and disposes of two bottles and two cans (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee 1998, p. 7). One estimate had the industry generating only 1.1% of the total annual garbage generation by U.S. maritime sectors (NRC, 1995, p. 37), with recreational boaters generating the most. However, the National Research Council developed its own estimates and found that cruise ships produce the second most garbage by weight (24% of the total), followed by recreational boaters (NRC, 1995, pp. 39-40). The NRC believed that Cantin, et al. (1990) underestimated the amount of garbage produced by the cruise industry because they underestimated the number of passengers, and because the fleet has increased substantially since 1990 (NRC, 1995, p. 47).

These discrepancies reveal the importance of assumptions in using data, and how different assumptions can lead to very different results. In addition, as with recreational boating, these figures represent the amount of garbage *generated;* it is even more difficult with cruise vessels to determine how much gets tossed overboard. It is nearly impossible to monitor the vessels, and (as with recreational vessels) it is difficult to distinguish shipboard waste from land-generated waste once onshore. Evidence of illegal dumping of solid waste must therefore come from passengers on board or other vessels. For example, passengers on board a Princess Cruise Lines vessel, the Regal Princess, witnessed the illegal dumping of 20 trash-filled bags overboard during the late evening in October 1991 5 miles off of the Florida Keys ("Expensive Rubbish Disposal," 1993, p. 295). Under the Marine Plastic Pollution Research and Control Act of 1987 (see below for more detail on this act), any willful discharges of plastic within 200 miles of the United States shoreline are punishable by up to $500,000 in fines for the company involved. Princess Cruise Lines received the maximum fine.

Cruise vessels have addressed the waste issue through the use of onboard waste incinerators that meet the requirements of the International Maritime Organization (IMO). The cruise industry is attempting to move towards zero discharge of these materials. Total waste on cruise vessels has been reduced by almost 50% over the past 10 years (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee, 1998, p. 8).

2.4.2 Air Pollution

The cruise industry has the potential to affect air quality through engine emissions. Most marine fuels are residual fuels with higher concentrations of contaminants such as sulfur. Recent studies have suggested that ocean-going vessels have the potential to affect air quality in coastal regions, port areas, and heavily traveled trade routes where annual sulfur emissions from ships equal or exceed land-based emissions (Capaldo, Corbett, Kasibhatla, Fischbeck & Pandis, 1999,

p. 744). However, passenger vessels (cruise ships) contribute only 5% of nitrogen emissions from ships and 6% of sulfur emissions from ships (Corbett & Fischbeck, 1997, p. 825). The cruise industry contributes the least of all categories of ocean-going vessels to total nitrogen and sulfur emissions. The IMO approved global emission limits in September 1997, with NO_x regulations applying to new ships or major ship conversions after January 1, 2000. Sulfur fuel levels are currently limited to 4.5% of the total fuel mixture (Corbett & Fischbeck, 1997, p. 826).

2.4.3 Oil and Chemical Effluent

Cruise ships also produce toxic chemicals and hazardous waste from dry-cleaning procedures, used batteries, and paint waste from brush cleaning (Malbin, 1999). Waste oil is produced from normal leakage from the main engines and generators, the cleaning of fuel filters, losses during maintenance, and leaks from hydraulic systems (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee, 1998, p. 6). In 1997 passenger vessels (cruise ships) had 136 oil spills in U.S. waters, totaling 1,778 gallons. This amount represents only 1.6% of the total oil spills in the United States that year (U.S. House of Representatives Coast Guard and Maritime Transportation Committee, 1998, p. 2). While this is a small percentage, it is important to note that these figures represent only incidents *reported* to the U.S. Coast Guard. It is more difficult to discern how many illegal discharges occur.

There has been a recent example of illegal discharges. The world's second largest cruise line, Royal Caribbean, recently plead guilty to 21 felony counts for dumping oil and hazardous chemicals from its cruise ships and then lying about it to the Coast Guard ("Cruise Line Paying $18M," 1999). The cruise ships used bypass pipes to illegally discharge these materials, usually in the middle of the night, and crewmembers constantly falsified logbooks. One of the chemicals the company admitted to illegally dumping was perc, a toxic dry-cleaning fluid ("Royal Caribbean Takes Steps," 1999). While this may not be the norm in the cruise industry, it is important to consider the unreported incidents that have an impact on the environment. Based on the available data for reported incidents, however, it does not appear that the cruise industry's impact on the environment through oil spills is as significant as other sources.

2.4.4 Introduced Species

The introduction of non-native species through discharge of ballast water is another potential environmental impact of the cruise industry. The Council on Environmental Quality found that over 130 non-native species have been introduced to the Great Lakes since 1800, with almost a third thought to have been carried by ships (EPA, 1996, October, p. 205). It is impossible, however, to distinguish how many of those ships were cruise ships. Introduced species cause problems because they can disrupt the food web of the ecosystem and clog the intake pipes of power plants and water treatment facilities (EPA, 1996, October, p. 205). The International Maritime Organization has recognized these problems, and promulgated guidelines to minimize transfer of organisms (available on line at *www.imo.org*).

2.4.5 Regulatory Framework of the Cruise Industry

The cruise industry is highly regulated. The International Convention for the Prevention of Pollution from Ships, or MARPOL 73/78 as it is called, is the primary regulatory framework for the industry (as well as other maritime transportation). MARPOL comprises five annexes that describe the discharge regime of certain substances. The three annexes most relevant to the cruise industry are Annex one (I), Annex four (IV), and Annex five (V). Annex one prohibits the discharge at sea of oil in designated "special areas," and limits other discharges to a specified percentage of the cargo. Bilge water can only be discharged outside 12 miles from the U.S.

coastline, established in the Law of the Sea Treaty. In addition, oil discharged from cruise ships must be no more than 15 parts of oil per million parts of oily water mixture (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee, 1998, p. 5). Oily waste that does not meet this standard must be kept on board and/or taken to a reception facility.

Annex IV prohibits the discharge of untreated sewage within 3 miles of the nearest land, and allows only treated and disinfected sewage to be released between 3 and 12 miles from land (EPA, 1997, September, pp. 44-45). Annex V prohibits disposal or dumping of any garbage (solid wastes, excluding sewage) within 3 miles of the United States. From 3 to 12 miles it is illegal to dump plastic, dunnage, paper, rags, glass, crockery, metal, or food not ground to 1 inch in diameter. From 12 to 25 miles it is illegal to dump plastic and dunnage, and it is illegal to dump plastic anywhere (Laws, 1993, p. 591). The United States ratified Annex V in 1987, and passed implementing legislation called the Marine Plastic Pollution Research and Control Act (NRC, 1995, p. vii). The Coast Guard is responsible for enforcing these standards, and has promulgated regulations to that effect (33 CFR Part 151). They inspect vessels four times a year to check for properly operating marine sanitation devices and oily water separators (Anthony Furst, lieutenant commander, U.S. Coast Guard Vessel Compliance Division, personal communication, August 13, 1999).

2.4.6 Positive Impacts of the Cruise Industry

It is important to comment on some of the positive impacts of the cruise industry. The industry contributes to the economy of destination areas. For example, Holland America line, which carried 178,822 passengers in 1995, estimated that their passengers spent $90 million in Alaska (primarily Anchorage, Juneau, and Fairbanks), their crew spent around $1.4 million on shore, and the combined in-state payroll of the Holland America partners was about $18 million ("Holland America: State Benefits," 1996).

In addition, the exposure of tourists to beautiful, pristine areas such as those in Alaska can improve understanding of the need for conservation. To that end, both Holland America and Norwegian Cruise Lines (NCL) have programs to foster environmental awareness. Holland America has shore excursions that focus on ecology, nature, indigenous culture, and environmental responsibility, and NCL offers the same through their "Dive Into Adventure" programs (Lincoln, 1994, p. S17). Holland America donates time, money, medical materials, and other resources to the Alaska Raptor Rehabilitation Center; in addition they also donated 17 acres of recently purchased land to the center.

The cruise industry can aid in raising awareness of threatened or endangered species. For example, Discovery Cruise Line has adopted the "Manny T" as its mascot to increase recognition of the plight of the manatee. The line also donates money raised through shipboard sales of selected items and other shipboard events to the Save the Manatee Foundation, and is participating in a television public service campaign concerning the manatee (Lincoln, 1994, p. S18).

2.5 Tourist Activities

2.5.1 Hiking, Snorkeling and Diving

Many tourist activities occur in fragile ecosystems, such as coral reefs. While snorkeling and diving in and of themselves do not cause much damage, inadvertent related activities, such as stepping on coral do cause damage. With such activities, it is the cumulative nature of the damage that is most problematic. One or two tourists may not cause much harm, but hundreds of

them over time can do considerable damage to an ecosystem (Gartner, 1996, p. 112). Coral reefs are also affected by tourism as a result of the market for souvenirs. Tourists break off pieces of coral themselves, or the reef is dynamited by locals to sell the pieces. The cumulative effect is relevant here as well, as one tourist may not understand her impact when aggregated with other tourists. Damage to coral reefs from tourists in the above-mentioned manners has occurred in Tanzania, Kenya, and Madagascar, among other places (Salm, 1986, p.11).

Tourists hiking along mountain ranges can harm the ecosystem by littering and by trampling vegetation. The greatest impact of tourists on vegetation usually occurs during initial contact with an area, with the most sensitive species affected first. The cumulative impact of tourists on vegetation gradually shifts species composition, because only the most resilient plants can survive in an area under constant pressure from tourist activities (Mathieson & Wall, 1982, p. 102). Excessive hiking on trails has caused damage to the sequoia redwoods in California (Mathieson & Wall, 1982, p.102). Increased visitation at Arches National Park has contributed to the deterioration of the soil there, which can take up to 250 years to recover after being trampled (U.S. General Accounting Office [GAO], 1996). Alpine tundra in the Rocky Mountain National Park also has been damaged by human trampling (Willard & Marr, 1970, p. 181). Hiking on the soil can also damage wildlife habitat. Constant pressure can damage or destroy the burrows of reptiles, mammals, and underground-nesting birds (Edington & Edington, 1986, p. 14). Tourists' use of trees for firewood and tent poles has diminished tree populations, altering the age structure of the plant community. In addition, fires started by tourists for camping have caused major damage in the forests of California (Mathieson & Wall, 1982, p.102).

Littering not only contributes to visual pollution, but can also change the nutrient composition of soils and prevent light from reaching plants. Furthermore, tourists have unwittingly carried exotic species to ecosystems, thereby upsetting their balance (Gartner, 1996, p. 125). Littering by tourists has caused wildlife, such as bears, to frequent the garbage area of campsites to scrounge for food (Mathieson & Wall, 1982, p.109). As animals become accustomed to human food, their behavior becomes more aggressive and can be potentially dangerous to humans. When Glacier National Park implemented management plans to restore normal feeding patterns for bears, there was a decrease in injuries to tourists (Mathieson & Wall, 1982, p. 109).

2.5.2 Recreational Boating

The most significant problem associated with recreational boating and water quality is the discharge of sewage into waterbodies with limited flushing or nearby shellfish beds. Sewage contains pathogens (fecal coliform is used as an indicator of the amount of pathogens contained in the sewage) which can adversely affect human health and contaminate shellfish. Diseases that can be potentially transmitted through human contact with fecal discharge and/or ingestion of contaminated shellfish include typhoid fever, dysentery, infectious hepatitis, and nonspecific gastroenteritis (Seabloom, et al., 1989, p. 1).

Significantly higher fecal coliform counts have been found in waters with a high recreational boating population during peak usage (summer) (Chmura & Ross, 1978, p. 21). One study reported that at three different sites on Puget Sound 70%, 91%, and 62% of shellfish sampled had levels of contamination higher than that allowed at the commercial wholesale level (Seabloom, et al., 1989, pp.10, 14, 18). Two of the three sites failed to meet the Washington State Department of Ecology Class AA Extraordinary Water Quality Standard. The lack of other sources of contamination at these sites (all sites were used by recreational boaters) suggested to the authors that the contamination resulted from boat sewage discharge.

Under Section 312 of the Clean Water Act, the EPA requires vessels to have Marine Sanitation Devices (MSDs), that physically and chemically treat boat sewage before it is released into the water. The three types of MSDs each provide a different level of treatment, depending on the vessel's length. A vessel must be equipped with one of the three types of MSDs, if it has an installed toilet as of January 30, 1980 (EPA, 1994, August, p. 16).

In addition to sewage discharges, recreational boats can impact the environment through oil spills. In 1997, recreational vessels were responsible for 535 oil spills in U.S. waters with a total volume of 4,217 gallons, and an average spill of 8 gallons. This represents 6.2% of total spill incidents in U.S. waters (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee, 1998, p. 2). While this is a small percentage, it is important to note that the data represent spills *reported* to the U.S. Coast Guard. It is likely that some spills are not reported. However, given the available information, oil spills from recreational boats do not seem to be a significant threat to the environment.

Another way that recreational boating can adversely affect water quality is through the discharge of solid waste (garbage). The National Research Council has listed some of the adverse impacts of marine debris in the environment: (1) aesthetic degradation of surface waters and coastal areas; (2) physical injuries to humans; (3) ecological damage resulting from the interference of plastics with gas exchange between surface waters and deeper waters; (4) alterations in the composition of ecosystems because opportunistic organisms use debris as their environment; (5) entanglements of birds, fish, turtles, and cetaceans; and 6) ingestion of plastic by marine mammals (NRC, 1995, p. 52).

It is difficult to determine the amount of solid waste generated by recreational vessels. One study estimated that recreational boats generated 51.4% of the total annual garbage generated by U.S. maritime sectors (NRC, 1995, p. 37). However, the National Research Council estimated that recreational boats contributed only 19% of the total (NRC, 1995, p. 39). Furthermore, those figures represent the amount of waste *generated;* not how much of that waste is dumped overboard.

Although the amount of waste generated on a daily basis is minimal due to the relatively short duration of trips, the cumulative effect has the potential to be significant. There are approximately 7.3 million recreational boats in the United States, more than in any other maritime sector (NRC, 1995, p. 40). Recreational boaters operating within 3 miles of shore (that is, most of them) are required to store their garbage on board and dispose of it onshore.

Recreational boating can cause damage to marine habitat and animals such as coral by running aground or dragging anchor over the habitat. This damage has happened within some national parks with marine or freshwater components. For example, in 1997, 161 vessels ran aground in Biscayne National Park in Florida. These events damaged 8,000 square meters of submerged seagrass beds, which are important because they serve as a nursery for many commercial and sport marine species. In addition, seagrass beds help stabilize sediments, reduce wave energy, and filter pollutants. The manatee in Florida has been threatened by the propellers of powerboats (Edington & Edington, 1986, pp.13-14). The wash generated by motor boats can induce erosion of plant roots, and propellers can cut macrophyte growth (Liddle & Scorgie, 1980, pp. 187-189). Although there are no data currently available on the effects of wakes from boats, these impacts are confined to localized and sensitive areas (EPA, 1996, October, p. 204).

The movement of tourists' vehicles can also adversely affect wildlife by separating the young from their parents. It is possible that whale-watching boats have this impact because studies have shown that, if young whale calves lose contact with their mothers, they sometimes

attach themselves to the side of a ship. The noise made by these boat engines and propellers are also thought to interfere with the whales' communications systems (Edington & Edington, 1986, p. 45).

Recreational boating can have positive impacts on the environment as well. Recreational boaters provide funding indirectly for conservation and recreation efforts through a tax on motorboat and small-engine fuel. This tax is mandated in the Intermodal Surface Transportation Efficiency Act, which earmarks the funds for the Federal Aid in Sport Fish Restoration Program of the U.S. Fish and Wildlife Service. Revenue from this fund is used by states to stock fish, acquire and improve sport fish habitat, fund fisheries research and education, and to provide recreational access to water through boat ramps and piers (Farrell, 1998, p. 8).

2.6 Tourist Activities Within National Parks

2.6.1 Visitor and Traffic Congestion

Visitor and traffic congestion exists in many tourist destinations, and national parks have been greatly impacted by this problem. Over 2.5 million people visit Zion Canyon each year, with half of those driving in the park. A summer day can see 2,000 vehicles in the canyon corridor, creating congestion, air pollution from vehicle exhaust, and vegetation damage along overflow parking areas (Sidles, 1997, p. 17). To help alleviate this problem, the park plans to launch a shuttle system in 2000. Although this system is expected to reduce some of the traffic-related impacts and provide a higher quality experience, it could also have the effect of increasing the number of visitors to the park. The next management question will then be how best to manage the volume of people.

Similarly, the entrance to Yosemite National Park in California has had to be closed several times due to gridlock during the summer months when visitation is at its peak (Whitman, 1999, p. 19). With over 5 million visitors a year, Grand Canyon National Park suffers from congestion as well. The huge volume of traffic is more than just an inconvenience. There are physical impacts, such as air pollution from exhaust, and there are social impacts that also degrade the overall experience, such as honking horns and blaring radios. The superintendent of Grand Canyon National Park has commented that "we've taken this special place that is different from everything in your life and we've homogenized it so it's just like your life. It's full of cars, you're constantly looking for parking spaces, you're standing around in lines." ("A Cramped Grand Canyon," 1999).

An increasing number of tourists have been using snowmobiles as a form of recreation while visiting some national parks. Snowmobiles have the potential to adversely affect air quality over time because they use two-stroke engines that produce relatively high emissions of carbon monoxide and unburned hydrocarbons, and they are not equipped with pollution control equipment. (Fussell, 1997, p.1). Recent studies by state and federal agencies and the University of Denver found that snowmobiles account for 94% of the annual hydrocarbon emissions at Yellowstone National Park, 78% of carbon monoxide emissions, 37% of particulate matter, and 3% of nitrogen oxide emissions at Yellowstone (Llanos, 1999). Currently, no federal law regulates these emissions.

Tourist activities can alter the integrity of cultural resources. This damage includes vandalism and looting of sites of cultural significance. Historic structures and archeological sites were harmed by tourist activities at Gettysburg National Military Park (GAO, 1996). Damages to cultural resources can be more serious than those to natural resources, as the natural resources can recuperate over time.

While the environmental impacts on the parks from tourists and their activities are important and significant in some areas, it is important to note that many parks do not experience these problems. As always, there is scientific uncertainty about the effects of visitors on park ecosystems. Furthermore, some parks are underused, with low densities of visitors (U.S. National Park Service Steering Committee, 1992, p. 92).

3. UPSTREAM AND DOWNSTREAM INFLUENCE

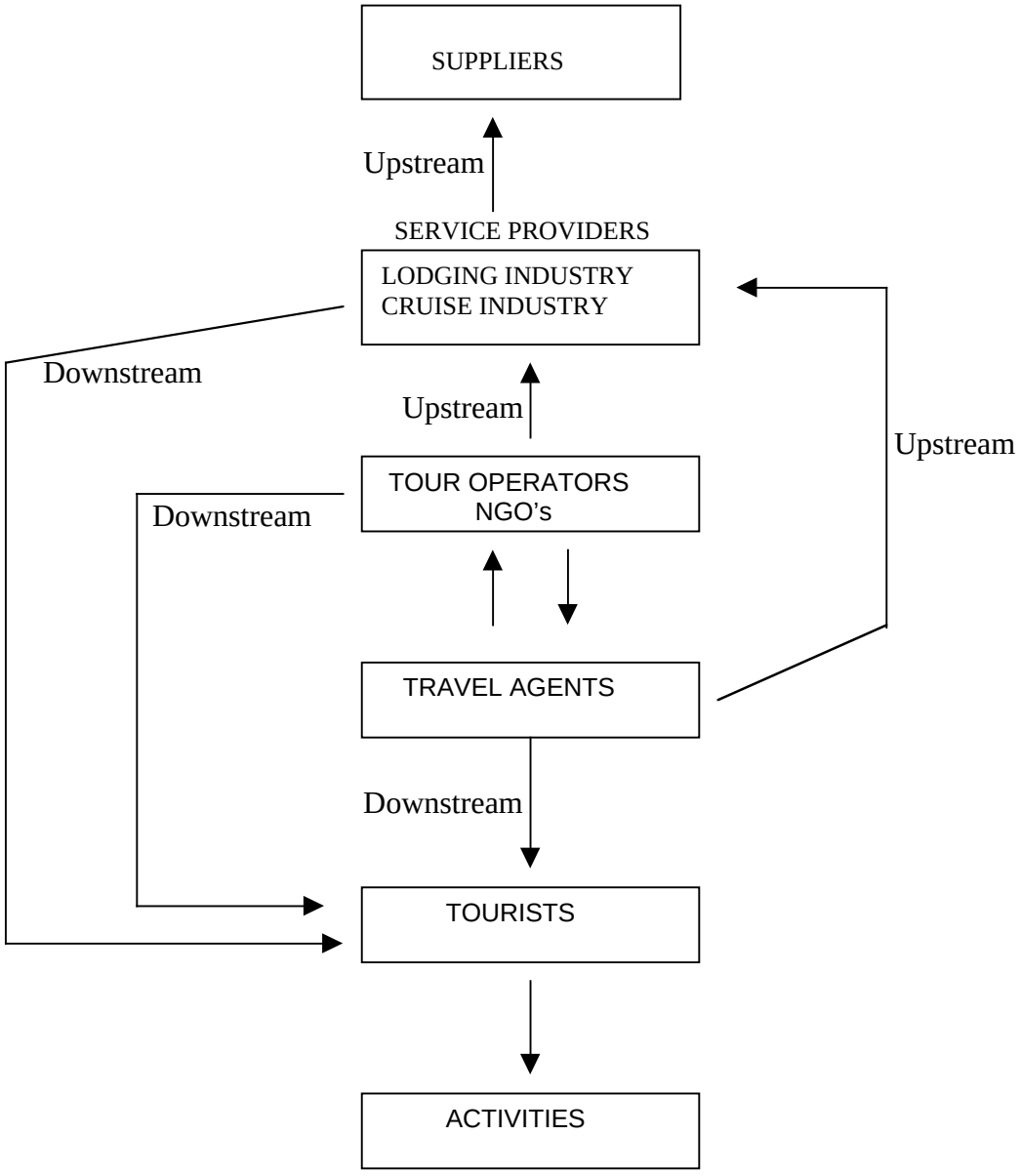
The previous section discussed the direct and indirect impacts of selected aspects of the tourism industry. This section first presents the structure of selected components of the industry, and then discusses how each sector can influence other parts of the industry as well as tourists. It is possible for tourism service providers such as hotels and travel agents to leverage their influence on other parts of the supply chain to encourage more environmentally responsible tourism. The "supply chain" in the tourism industry consists of those industries that supply accommodations, transportation, and make arrangements for travelers. "Upstream" influence refers to a sector's ability to influence an actor "above" them in the tourism services supply chain. A hotel's influence over a supplier's products is an example of upstream influence. "Downstream" influence refers to the influence an industry has over other sectors (including tourists) or industries "below" them in the tourism services supply chain. An example of this type of influence is a travel agent's influence over a tourist's choice of vacation type and destination.

3.1 Structure of Selected Components of the Industry

As mentioned previously, the tourism industry is not one industry, but rather a conglomeration of many industries and sectors. A full characterization of this complex and fragmented industry is beyond the scope of this paper. However, the structure of selected components of the industry is presented to demonstrate the potential for upstream and downstream influence. This discussion focuses on the lodging and cruise industries, travel agents, tour operators, and some nonprofit groups that offer trips. Figure 1 illustrates the relationship among the different sectors and indicates where upstream and downstream leverage is possible.

The tourism industry has changed substantially in the past ten to fifteen years, with more change likely. The airline industry is expected to consolidate further, along with continued decreases in fares (Johnson, 1994, p. 42). Development of new technology such as the Internet has already had some effect on the distribution of travel, and it is very likely that more change will occur. This change is discussed later in this section.

FIGURE 1. RELATIONSHIPS AMONG SELECTED SECTORS OF THE TOURISM INDUSTRY



3.1.1 The Lodging Industry

The lodging industry is in and of itself large, with over 51,000 establishments and over 3.1 million rooms in the United States (Patricia Griffin, president of Green Hotels Association, personal communication, October 21, 1999).

The industry employs over 1.6 million workers, and accounts for 1.3% of the gross national product (Vignola & Krutick,1990, p. 3). It comprises hotels, motor hotels, motels, bed and breakfasts, and condos. There has been a trend in the lodging industry over the past thirty years of consolidation, as the number of chain and franchise affiliations has increased and the number of independently owned and operated properties has decreased (McIntosh & Goeldner, 1990, p. 105). However, industry predictions suggest a decrease in the franchising trend, with a subsequent increase in control over properties by the chains. The fastest-growing segment of the industry is the bed and breakfast sector. This segment has the ability of generating tourism revenue in smaller communities where larger chains do not have a presence (McIntosh & Goeldner, 1990, p. 108).

3.1.2 The Cruise Industry

As mentioned previously, the cruise industry is the fastest growing segment of the tourism industry, moving from 500,000 passengers a year in 1970 to over 5 million in 1995 (Dickinson & Vladimir, 1997, p. 37). This growth is also reflected in the increase of the number of berths, with 5,000 new berths added during the first half of 1996 (Godsman, 1997, p. 1). The industry is planning on adding 41 new vessels by 2002, increasing passenger capacity by 57% (International Council of Cruise Lines [ICCL], 1999, p. 1). An average of 113 cruise ships visited or operated from U.S. ports between 1990-1995 (USCG, 1995, p.1 of Executive Summary). The industry has a significant economic impact, creating $11.6 billion in expenditures in goods and services in 1997, including passengers and suppliers (ICCL, 1999, p. 1). The most visited U.S. ports of call for cruise ships are all in Florida: Miami, Everglades, Canaveral, and Tampa. Other U.S. ports of significance are located in Alaska, California, Louisiana, New York, Texas, and Massachusetts (ICCL, 1999).

3.1.3 Travel Agents

There are currently around 39,000 travel agencies in the United States (Whitley, 1998, on-line). Traditionally, the industry has comprised many smaller agencies, with an average agency employing seven people (Mill & Morrison, 1985, p. 416). There is an increasing trend, however, of consolidation and concentration within the industry, as an increasing number of large networks of agencies act under a common brand name (Lassiter, 1996, p. S7). Two-thirds of travel agencies belong to co-ops or consortiums. While there are more small agencies (with sales less than $2 million), two-thirds of the sales are done by agencies with $2 million or more in bookings (Gee, et al. 1989, p. 200). The development of technologies such as the Internet has spurred this consolidation, as small agencies need to combine with others to make a profit (Lewis & Talalayevsky, 1997, p. 30).

Large travel agencies get the majority of their revenue from commissions paid by airlines, with airlines spending $6.4 billion each year on travel agent commissions (Lewis & Talalayevsky, 1997, pp. 26-27). Slightly less than 66% of the total dollar volume of travel agents comes from the sale of air travel (Mill & Morrison, 1985, p. 417). However, this allocation is changing as airlines move to cap commissions to travel agents. For example, instead of the previous flat rate of 10% for domestic trips, Delta airlines has limited commissions for these

tickets to $50 regardless of the ticket price. Airlines are doing this for economic reasons, as commissions are now the fourth largest operating expense for U.S. carriers after labor, fuel, and maintenance (Lewis & Talalayevsky, 1997, p. 27).

Travel agents book 95% of cruises, 90% of airline tickets, and only 25% of hotel rooms (Schulz, 1994, p. 45). There is an emerging trend in the travel agent industry where the larger agencies focus on corporate clients, and the smaller agencies focus primarily on tourists and small businesses. These smaller agencies are inclined to concentrate on revenues from tours and cruises, rather than airline revenues (Lewis, et al., 1998, p. 25).

3.1.4 Tour Operators

Tour operators have an interesting niche in the tourism industry because they act as an intermediary between travel agents and suppliers of travel services. Tour operators plan and organize all aspects of a vacation by putting down large deposits for block reservations (e.g., at hotels and other lodgings), and then usually sells them to the public through travel agencies or airlines. This industry has grown from around 300 operators in 1975 to over 1,500 in 1990, with the 50 largest having 50% of the business (Gee, et al., 1989, p. 211). It comprises three segments: the independent tour operator, the airline working with a tour operator business, and the travel agent that packages tours for clients (McIntosh & Goeldner, 1990, p. 101). Operators generate more than $10.5 billion annually in North America.

3.1.5 Other Organizations Functioning as Travel Agents/Tour Operators

Organizations such as the American Automobile Association (AAA) and nongovernmental organizations (NGOs) perform many of the same functions as traditional travel agents and tour operators. Although AAA is primarily known for its automobile services, it generated travel sales of $2.15 billion in 1995, with leisure travel accounting for 81% of that (Durbin, 1996, September 12 and 19, pp. 2, 8). It has significant potential for downstream influence on its customers, as it can reach a large audience. AAA has 960 agency locations and around 35 million members in the United States (Durbin, 1996, September 12, p.1). Industry representatives believe AAA has not yet realized its full potential as a travel agency (Durbin, 1996, September 19, p. 8). AAA executives hope to increase their hotel, airline, and cruise line sales through a Windows-based booking system that will allow easy access to its members travel data (Durbin, 1996, September 19, p. 9). They currently have 23 preferred cruise and tour suppliers, and three airline preferred suppliers. In fact, AAA signed a 5-year preferred supplier deal with Carnival Cruise Lines in 1996 (Durbin, 1996, September 19, p. 8). The organization could use its growing influence in the travel industry to work with and promote environmentally friendly suppliers.

NGOs that have ecotourism links and/or conduct nature, adventure, and eco-tours include the World Wildlife Fund, the Nature Conservancy, the Audubon Society, Conservation International, Africa Wildlife Foundation, and the Sierra Club (Honey, 1999, p. 8). These organizations use the trips as a way to raise money, and to increase awareness and understanding of natural systems. The Audubon Society offers trips to places such as the Galapagos Islands, Greenland and Hudson Bay, and the Pacific Northwest. World Wildlife Fund (WWF) takes travelers to Alaska, Antarctica, and Africa, among other destinations.

3.2 Upstream and Downstream Influence

Each of the above sectors of the tourism industry has potential for upstream and downstream influence on the environmental impacts of tourism. The three primary types of influence are supplier relations, channeling of activity, and education. Each is presented below, with a concluding discussion of the impacts of technology on the tourism industry.

3.2.1 Supplier Relations

The lodging industry can leverage its influence "upstream" on suppliers by demanding products that have less of an environmental impact. For example, a hotel chain can wield its influence on a supplier by requiring paper towels made out of recycled materials for their bathrooms. The extent to which a hotel can leverage its suppliers depends upon several factors, including type of hotel (e.g., large chain or small independent) and type of supplies. Some larger hotel chains have national corporate purchasing agreements with different vendors. Often these chains will purchase supplies based only on these corporate purchasing agreements for the sake of convenience or because it is less expensive to do so (Mark Petruzzi, program director, Green Seal, personal communication, October 5, 1999). It might be most effective, then, to exert upstream leverage at this national level because franchises follow whatever contract is negotiated by their larger chains.

An example of an organization exerting upstream leverage is the Green Seal program; an independent, nonprofit organization dedicated to protecting the environment by promoting the manufacture and sale of environmentally responsible products (*www.greenseal.org*). The organization has a pilot project underway to negotiate contracts where suppliers provide environmentally friendly cleaning products to large hotel chains and their franchises (Mark Petruzzi, program director, Green Seal, personal communication, October 5, 1999). The Green Seal program has also published an environmental purchasing guide for hotels, providing specific product and brand recommendations.

Another program underway to encourage environmental responsibility through supplier relations (among other things) in the lodging industry is the International Hotels Environment Initiative (IHEI). Created in 1992, this is a nonprofit organization developed by the international hotel industry that serves over 8,000 hotels. It is governed by an International Council of 12 multinational hotel company executives, whose goal is to promote the benefits of environmental management as an integral component of hotel business (*http://carryon.oneworld.org/pwblf/ihei/index.htm)*. The group influences supplier relations with hotels through its supplier program, created in 1998. This program facilitates hotels' leverage on suppliers in three ways:

1. by creating a "Registry of Industry Suppliers" who have an environmental policy and can also demonstrate that their products meet the best environmental standards (accessible to hotels through a CD-Rom, the *Green Hotelier* magazine (quarterly publication focusing on hotel environmental issues), and directly through IHEI to the corporate Vice Presidents responsible for purchasing in each member hotel group);

2. by establishing and publishing environmental specifications for products or product groups; and

3. through the creation and disbursement of a comprehensive buyers guide with a list of all registered suppliers, guidelines for purchasing of products that minimize their

environmental impact, and profiles of products (IHEI online at *http://carryon.oneworld.org/pwblf/ihei/index.htm*).

IHEI suggests several ways hotels can influence their suppliers. These include insisting on buying products made from recycled material or that are recyclable, writing to competing suppliers to explain why the hotel chose to do business with a more environmentally aware supplier, and demanding that suppliers minimize their packaging. In order to determine how environmentally friendly a supplier is, a survey can be distributed to them (International Hotels Environment Initiative, 1993, pp. 88-89).

A third organization dedicated to fostering environmental stewardship within the lodging industry is the Green Hotels Association (GHA). This mail order business and trade association was founded in 1993 to help hotels develop and maintain environmentally friendly practices (Patricia Griffin, president of Green Hotels Association, personal communication, October 21, 1999). Like the IHEI, the GHA facilitates hotels' leverage on suppliers through publication of a catalog of environmental products for the lodging industry, with items such as a toilet-tank fill diverter, which saves around three-quarters of a gallon of water per flush. The GHA currently reaches less than 1% of all U.S. hotels (it has about 170 member hotels; there are over 51,000 in the U.S.) (Patricia Griffin, personal communication, October 21, 1999).

The cruise industry has a similar ability to influence upstream suppliers. There are several large firms that supply products to cruise lines. A large cruise line such as Carnival Cruise Lines generally has a good deal of influence on its suppliers because competition for business is strong (Deborah Lauder, Carnival Cruise Lines, personal communication, October 7, 1999). Upstream leveraging efforts are focused primarily on the environmental quality of the shipboard products they purchase. They can encourage suppliers to use more environmentally friendly packaging. Recently, cruise lines belonging to the International Council of Cruise Lines have begun replacing plastic products such as cups, shampoo, and straws with biodegradable, reusable, or recyclable material (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee, 1998, p. 8). Carnival Cruise Lines has reduced the amount of plastic brought on board their ships through working with their suppliers. To further reduce the amount of plastic on board, Carnival has eliminated plastic from the shotgun shells used for skeet shooting and has completely eliminated driving golf balls off the ships (Lincoln, 1994, p. S16).

Royal Caribbean Cruises is another example of a cruise line using leverage with suppliers to encourage use of products that minimize environmental impact. Through a Quality Supplier Development Program (QSDP), the cruise line has convinced suppliers to reduce packaging and substitute more environmentally benign materials. In the last five years they have reduced packaging by 35% through several different routes including ordering ketchup and chili sauce in 5-gallon pouches instead of tin cans, ordering some beer in kegs rather than cans, putting fountain syrup in 5-gallon boxed bags, which saves 250,000 syrup cans annually, and purchasing soda in cans without plastic rings (*www.rccl.com/savethewaves*).

Travel agents are intermediaries between providers of the tourist product (including airlines, cruise lines, and hotels) and the tourist, and, as such, are able to influence the decisions of suppliers. Their influence is currently stronger with cruise lines and airlines, as they book the majority of those trips. However, the relationship between travel agents and hotels has strengthened, with travel agents' bookings constituting a growing segment of the hotel industry (Bush, 1989, p. 25). This growth has occurred for several reasons. The hotel business has become more competitive, therefore hotels need to explore more marketing avenues. Secondly,

the shift in business for hotels from large group sales to transient business has benefited travel agents because they are better able to target the transient client (Bush, 1989, p. 26).

Finally, automated systems (computer reservation systems, or CRS, currently more commonly called Global Distribution Systems (GDS)) are making the distribution of travel services (such as the purchase and disbursement of tickets) easier and more efficient. These computer reservation systems were first developed by airlines for their internal operations in the 1970s (in effect computerizing their telephone sales systems). As the efficiency of these systems became increasingly obvious, airlines opened them up to travel agencies (American Society of Travel Agents [ASTA], 1995, p. 9). GDS allow travel agents to access and compare centralized information such as flights, hotel descriptions, and seat and room availability on one screen (Open Travel Initiative 1998, p. 8). By 1994, four systems were providing computer reservation services to travel agencies. (These systems are shared by many firms; they are called Apollo, SABRE, System One, and WORLDSPAN). Ninety-five percent of existing travel agents are now automated with a computer reservation system (ASTA, 1995, p. 9), and over 80% of airline reservations are routed through one of the above four primary GDS (Open Travel Initiative, 1998, p. 8). Use of the GDS has expanded to include booking entire vacation packages electronically (Whitley, 1998, on line). Travel agents, therefore, may be able to exert influence on hotels by steering clients towards hotels that are known to have sound environmental management programs and policies.

The proliferation of travel suppliers provided the impetus for the development of "preferred supplier" relationships, where travel agents tend to book with a supplier known to be reliable (ASTA, 1995, p. 378). This relationship is often based on economic incentives. Commissions paid to travel agencies vary among suppliers (Gee, et al., 1989, p. 207). Thus travel agents sometimes steer their clients to suppliers that pay the highest commission. This could make it more difficult for travel agents to recommend suppliers that have demonstrated more environmental awareness, unless those suppliers can compete financially with other suppliers. However, travel agents' capacity to exert upstream leverage may be increasing as a result of the increase in the number of large networks of agencies. These larger networks can leverage their influence on travel suppliers because of their size (Lassiter, 1996, p. S7). One of the recommendations at a 1990 conference of the American Society of Travel Agents was to book clients into hotels and on cruise ships that properly dispose of waste material (Deady, 1990, p. 35). In addition, ASTA presents an ASTA/Smithsonian Environment Award to organizations that demonstrate "outstanding skill, originality, and effectiveness in preserving and/or protecting the environment" (*www.astnet.com*). Past recipients of the award include Inter-Continental Hotels and Maho Bay Camps in the U.S. Virgin Islands. ASTA also provides a link on its Website to ecotour operators and destinations.

3.2.2 Channeling of Activity

Sectors of the tourism industry have the opportunity to "channel" activities of both tourists and employees toward more environmentally responsible activities. This type of influence has been termed "downstream" leverage. The lodging industry exerts downstream influence on tourists by encouraging environmentally sound practices. Ramada International Hotels and Resorts distributed 20,000 copies of "50 Simple Things You Can Do to Save the Earth" to guests as a method to encourage environmentally responsible behavior. In addition, the hotel chain established a children's menu that encourages protection of endangered species (Bialkowski, 1991, p. 45). The Green Hotels Association provides member hotels with a towel rack hanger and a sheet-changing card to give guests the option of using their linens more than

once. The association estimates that this practice alone can save 5% on the cost of hotel utilities (GHA, 1999).

It has been suggested that an effective way to implement changes favorable to the environment is by starting with hotel employees in areas such as laundry, housekeeping, and engineering (Shanklin, et al., 1991, p. 65). These employees have first direct contact with some aspects of the hotel business that have an impact on the environment (such as washing linen and sheets). The Saunders' Hotel Group solicits employee input and recognizes their input through its SHINE program, or Saunders Hotels Initiative to Nurture the Environment. This program began in 1989 as a recycling program and has since grown into a much more comprehensive environmental program, with investments in energy-efficient lighting and windows as well as an improved recycling program (Stipanuk & Ninemeier, 1996, p. 94).

The cruise industry has a significant opportunity for downstream influence on the environmental behavior of its passengers, as the industry's vessels carried over 5.5 million North American passengers in 1997 (ICCL, 1999). Cruise vessels determine where their passengers travel, and they can exert downstream influence to minimize environmental impact by limiting the number of tourists that go ashore at sensitive destinations, and by avoiding environmentally sensitive areas. Orient Cruise Line limits the number of tourists for certain shore excursions, such as visiting an albatross colony (Lincoln, 1994, p. S19).

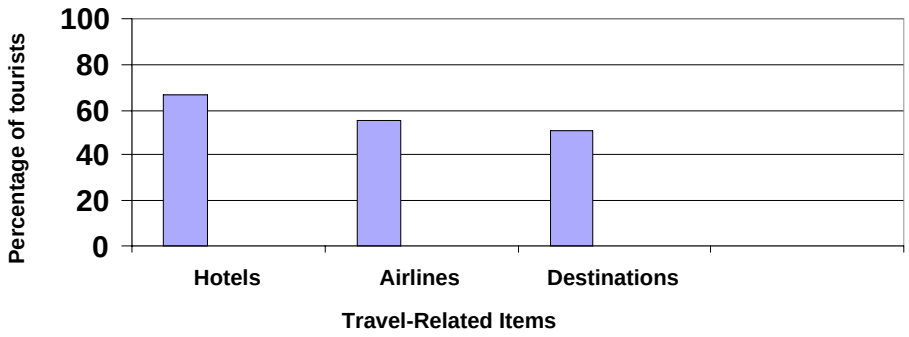
Cruise lines also influence personnel and passenger environmental behavior by: (1) making announcements over the public address system and putting daily notices in ship newsletters that caution against throwing trash overboard; (2) placing signs in crew and passenger areas encouraging environmental protection; (3) offering training programs in pollution prevention; (4) placing environmental information booklets in crew cabins and lounges; and (5) meeting with officers and crew of all departments to discuss more effective environmental protection (U.S. House of Representatives, Coast Guard and Maritime Transportation Subcommittee, 1998, p. 90).

Travel agents have the opportunity to have "downstream" impacts because they can influence where and how a tourist travels. Over 40% of tourists have only a general idea of their destination and mode of travel when they first visit a travel agent (Mill & Morrison, 1985, p. 418). Figure 2 illustrates the percent of tourists who seek travel agents' advice according to type of travel product.

The highest percentage of tourists seek advice from travel agents about hotels (Schultz, 1994, p. 47). This number suggests that travel agents have the most opportunity to steer their clients towards hotels that have established good environmental practices and policies. A U. S. Travel Data Center study found that 85% of travelers indicated they would be "very likely" or "somewhat likely" to support or patronize travel companies perceived to be environmentally friendly (Johnson, 1994, p. 43).

Given this receptivity, it is clear that travel agents have the opportunity to influence the type of travel and the company a customer chooses. The concept of "responsible tourism" was the focus of a 1997 New Travel Expo, where over 125 travel agents discussed how they might influence tourists. The segment of tourists who actually do choose travel suppliers based on environmental principles (as opposed to stating that they would be likely to) is small now, but will most likely increase as children who have received more environmental education come of age (Del Rosso, 1997, pp. 11-12).

FIGURE 2. PERCENT OF TOURISTS SEEKING TRAVEL AGENT ADVICE BASED ON TRAVEL PRODUCT TYPE



Source: Christopher Schultz, "Hotels and Travel Agents: The New Partnership", *The Cornell Hotel and Restaurant Administration Quarterly*, 1994: 35 (2), 44-50.

Because tour operators interact with all travel suppliers, such as lodging and transportation services, they, too, have an opportunity to exert influence on suppliers. Tour operators can leverage suppliers to provide a more environmentally friendly product by fostering demand for it among their clients. An international example of a tour operator exerting leverage is the boycott of Pattaya, Thailand as a destination by German tour operators because they objected to the environmental degradation in the area (Yee, 1992, p. 9).

As more tourists become aware of potential environmental degradation caused by tourism, the demand for more environmentally oriented trips (sometimes referred to as "ecotours") increases. This increase in turn leads to more visibility for groups offering environmentally oriented trips. A group called International Expeditions has reaped this reward, as travel agents increasingly seek information from them to meet tourists' increasing demand for such trips; in 1990 International Expeditions arranged trips for 300 groups a year (about 3,500 clients), compared with two tour groups in 1980 (Deady & Schwartzman, 1990, p. 106).

3.2.3 Education

The environmental impacts of the tourism industry can be partially mitigated through education of tourists and service providers. For example, efforts to educate about marine debris have targeted cruise line operators and owners. The Shipping Industry Marine Debris Education Plan, launched by the Marine Entanglement Research Program (MERP) of the National Marine Fisheries Service, educates cruise line operators and owners by writing articles for cruise trade journals, presenting MARPOL information at cruise trade meetings, producing and distributing brochures about the problem, and presenting workshops about MARPOL compliance for members of the cruise industry (NRC, 1995, p. 180).

Many educational efforts to minimize the environmental impacts of tourism are incorporated into ecotourism trips. Ecotourism attempts to minimize impact on the social,

cultural, and physical environment. It can mean the development of tourism facilities in an environmentally responsible manner, recreational programs that promote a greater awareness and appreciation of nature, and a mode of travel that is sensitive to the host community (Yee, 1992, p. 4). The Ecotourism Society calls ecotourism a nature-based form of specialty travel that is responsible, conserves the environment, and sustains the well being of local people (Ecotourism Society, 1998). Eight million U.S. travelers had taken at least one ecotourism trip, and 30% (35 million) said they were planning on doing so in the next three years (Ecotourism Society,1998). Samples of ecotourism have been used internationally to guide discussions of tourism's impact on the environment. For example, the 1992 United Nations Conference on Environment and Development produced Agenda 21, a document concerning sustainable development. In 1996 the World Travel and Tourism Council, the World Tourism Organization, and the Earth Council developed an Agenda 21 for tourism, called "Agenda 21 for the Travel and Tourism Industry: Towards Environmentally Sustainable Development." This document advises travel and tourism companies to incorporate the sustainable development concept into tourism. Priority areas include waste minimization, energy efficiency, fresh and wastewater management, hazardous substances, transportation, land-use planning and management, and involvement of staff, customers, and communities in environmental issues (*www.wttc.org*).

A potential benefit of ecotourism is the ability to raise revenues for protected areas (Robert Healy, Nicholas School of the Environment, Duke University, personal communication via email, November 28, 1999). For example, park entrance fees can be used to support management plans and ecological studies. However, currently this idea is for the most part unrealized, as most protected areas are unable to generate enough revenues to be self-sustaining (Boo, 1990, p. xv). One successful example is Ecuador's Galapagos Islands National Park, where international visitors are charged higher fees than Ecuadorian citizens.

The American Society of Travel Agents (ASTA) proposed recommending environmentally sensitive tours to their clients at a 1990 conference (Deady, 1990, p. 35). They have developed guidelines for travelers to minimize their impact on the environment (*www.astanet.com*). These are called the "ten commandments" on ecotourism, and encourage tourists to "respect the frailty of the earth," "leave only footprints, take only photographs," and educate themselves on the local customs. The guidelines are no more than general advice, and it is hard to determine how much they influence travelers. A perhaps more useful and pragmatic "commandment" is to ask the travel agent to identify those travel suppliers that subscribe to ASTA's Environmental Guidelines (*www.astanet.com*).

Tour operators also have an opportunity to influence customers through education. However, when discussing educational efforts of tour operators, it is useful to distinguish between those operators that cater to "mass tourists" and those that focus on a specific market, such as "ecotour" operators. Ecotour operators and tour operators that cater to mass tourists are both primarily economically motivated. The critical difference is in their clientele; people who seek out ecotours are more likely to care about their impacts on the environment, so it is in the best interests of the ecotour operators to take steps to minimize a trip's impact. Tour operators catering to mass tourists are less concerned with the needs of a particular destination because environmental protection is generally not a primary concern for the mass tourist (Carey & Gountas, 1997, pp. 426-427). Therefore, these operators are less likely to be concerned with the environmental impacts of tourism.

One of the ways ecotour operators attempt to minimize impacts on the environment is by using guidelines to educate tourists. These guidelines range from specific methods to preserve

and minimize impact to general platitudes that may have little effect on the tourist (Yee, 1992, p. 9). Other methods used by self-identified ecotour operators include pre-trip orientations, printed information packs, videos or slide shows, lectures, discussions, and talks during the trip (Yee, 1992, p. 10).

3.2.4 Problems with Ecotourism

The numerous names and definitions make it difficult to ascertain how environmentally responsible ecotourism is. There are important distinctions among nature tourism, adventure travel, and ecotourism. Nature tourism implies enjoyment and appreciation of nature, yet it often does not include protection of the environment. Adventure travel utilizes local resources often without consideration of impacts (Beeh, 1999, p. 46). Ecotourism, as the above definition suggests, is concerned with the concurrent enjoyment and preservation of the natural environment.

Aside from the uncertainty and discrepancies surrounding the labels, there are also problems with the term ecotourism itself. It is possible that some travel suppliers that call themselves “eco” are only paying lip service to a marketable concept that is gaining popularity. Some travel outfitters use the label “eco” for short-term economic gain without truly abiding by environmental principles (Beeh, 1999, p. 47; Sirakaya & McLellan, 1998, p. 43). One tour operator suggested in a survey that the label “eco-tour” should be given only to those tour operators that directly benefit the culture or environment; otherwise they should be known as “adventure travel” operators (Yee, 1992, p. 14).

The development of industry standards or regulations about the definition of ecotourism would be a productive first step in differentiating these groups. The Ecotourism Society (TES) established guidelines in 1993, which are fairly comprehensive and can be used as a starting point for developing an industry standard. These guidelines include educating travelers to minimize impact, ensuring that the tour company minimizes impact by example (by offering environmentally friendly accommodations), and contributing to the economy of the region visited (Woodring, 1994, pp. 50-51). The guidelines are voluntary and are therefore not monitored or enforced. One study suggested that tour operator compliance with the TES guidelines is strongly influenced by whether or not they can gain economically from them (Sirakaya & McLellan, 1998, p. 52). Therefore, emphasizing the potential for economic gain from abiding by these ecotourism guidelines would increase compliance with them. An accepted industry standard such as the TES guidelines can help identify the tour operators that conduct truly environmentally friendly tours. This identification would in turn aid travel agents in recommending qualified groups to interested tourists.

The Green Travel Network (GTN), a Washington, D.C.-based company that is partnered with Conservation International (a nongovernmental organization promoting international sustainable development), has on-line resources for tourists interested in environmentally friendly trips (*www.greentravel.com*). GTN attempts to ensure that ecotour operators are truly taking steps to minimize their impact on the environment by requiring that any that wish to advertise on its Web page complete a responsibility form. This form asks these operators several questions to ascertain their level of environmental responsibility, such as whether or not they have a waste management policy, and if visitation to fragile areas is monitored. GTN interviews clients of these ecotour operators to ensure that they are actually doing what they had indicated on the responsibility forms (Amaro, 1999).

Ecotourism can adversely impact the environment in the same way as traditional, mass tourism. Two examples are the destruction of coral reefs in the Caribbean and the disturbance of

breeding habits of birds in Antarctica (Sirakaya & McLellan, 1998, p. 43). In January of 1988 an Argentine naval vessel carrying paying tourists ran aground off the coast of Antarctica, spilling 250,000 gallons of fuel, damaging rookeries of 24,000 penguins (Deady & Schwartzman, 1990, p. 107). A less dramatic type of damage is the disruption of wildlife when ecotour operators get too close to their habitat. The Virginia EcoTourism Association suggests that educating tour operators is the first step in preventing this type of damage. To that end, they are in the process of developing a guide certification system (National Oceanic and Atmospheric Administration, Coastal Services Center, 1999, pp. 2-3).

Another problem with ecotourism is that it is often exclusive because eco-trips are usually more expensive. Therefore the "mass" tourist is less likely to participate. Wheeler (1995, p. 46) argued that "the 'green' concept allows the tourist industry to improve its own image while in reality continuing its familiar short-term commercial profits strategy." An example of an attempt to promote ecotourism to the mass tourist is the "green travel" campaign of an environmental nonprofit organization in Europe called Ark. Ark partnered with Manchester Airport, the European Commission, and Thomson Holidays to show in-flight videos and provide magazines that encouraged tourists to care for the culture and environment of their destination. The campaign reached three million tourists in 1992 (Wheeler, 1995, p. 46).

3.2.5 Impact of Technology on Travel Services

As yet, the Internet has had little impact on travel distribution methods, in part because there is not yet an easy way for customers or agents to access all the necessary information through one avenue. Therefore, the telephone still remains the preferred channel. However, the newly created Open Travel Alliance, an industry group comprising air, car, hotel, and travel agent industry representatives, is trying to change this by creating an industry-wide information standard, called the Open Travel Initiative (1998, p. 16). The goal is to create and promote electronic commerce standards that improve information exchange among travel suppliers, distributors, and consumers ("Consortium of Travel Suppliers," 1999). The group's proposal to create a multichannel distribution system would allow customers and travel agents to differentiate among alternatives. Such a system could make it easier for travel suppliers that are more environmentally aware to promote their policies, for travel agents to sell products, and for consumers to access those suppliers directly.

Initiatives such as these signify that although the growth of the Internet has not had a significant impact on the tourism industry thus far, it has begun to change the relationships among travel agents, suppliers, and consumers, and has the potential to have an even larger effect. In fact, the president of the U.S. Tour Operators Association noted that almost all relationships among suppliers, tour operators, travel agents, and tourists in the future will be electronic (Whitley, 1998). Some industry analysts feel that the emergence of the Internet will lead to a shrinking role for intermediaries (Lewis, et al., 1998, p. 20).

For example, the sophistication of information technology has already begun to allow tourists to bypass the travel agent. In 1976, 40% of airline tickets issued in the United States were written by travel agents; by 1985 this amount had increased to 80%, due in part to the increased competition and more complex fare structure created by the Airline Deregulation Act of 1978 (Lewis & Talalayevsky, 1997, p. 27). However, the rapid growth of the Internet has allowed and encouraged more prospective travelers to interact with airlines directly. An example of this is the ability of travelers to purchase tickets online ("ticketless travel") (Lewis & Talalayevsky, 1997, p. 27). Southwest Airlines now sells most of their tickets without the use of travel agents (Lewis, et al., 1998, p. 21). Another example is the Air Travelers Homepage, which

provides links to airlines, online reservation systems, and other tourist information (Noack, 1996, p. 82). The increased use of the Internet may decrease travel agents' ability to leverage upstream and downstream impacts because the consumer is interacting directly with the supplier.

On the other hand, the growing ease with which travelers can use the Internet for travel purposes can also strengthen the relationship between travel agents and tourists. For example, the Internet Travel Network (*www.itn.net/itn/*) allows travelers to book their trips through a travel agent (Noack, 1996, p. 83). The amount of upstream and downstream leverage that travel agents will be able to maintain, therefore, depends in large part upon their Internet presence and accessibility.

Similarly, the Internet's effect on the ability of tour operators to leverage upstream and downstream influence will depend in part on the extent of their presence on the Internet. As an increasing number of travelers shop for their vacations on the Internet, tour operators are attempting to capitalize on that market. This trend has the potential to make it easier for tourists to interact directly with tour operators (e.g., via Web sites), thereby potentially increasing the downstream influence of operators and the upstream influence of tourists. Overall, the interactive nature of the Internet allows for the values of tourists to register directly with providers of tourist services. If there is strong demand for environmentally sensitive services, it is quite likely that the demand will be met.

4. STEPS TO LESSEN ADVERSE IMPACTS

As the environmental impacts of tourism have become more obvious, efforts to minimize or avoid further impacts have developed. There are existing initiatives within the tourism industry to minimize impacts. Potential improvements include voluntary efforts by industry sectors and government initiatives, developers' initiatives to design and build tourist infrastructure with minimal impact on the environment, and nonprofit tours that espouse environmentally friendly travel ethics.

4.1 Voluntary Efforts by Industry Sectors and Government Initiatives

There has been growing recognition within the tourism industry as well as without of the need for tourism that is environmentally responsible. This recognition has been exemplified by industry and government initiatives aimed at fostering more sustainable tourism. The World Travel and Tourism Council (WTTC) developed a "Green Globe" program through which travel and tourism companies can commit to improvements in their environmental practice ("World Travel and Tourism," 1994). The WTTC membership consists of 70 corporate executive officers from all sectors of the tourism industry, including accommodation and transportation. Members commit to mitigating their environmental impacts using the WTTC "Environment Guidelines" published in 1991 or industry guidelines accepted by the Green Globe board. They participate in annual surveys, and pay a fee in exchange for access to publications and guidelines, an advisory network, a members directory, and promotional support (e.g., a logo and annual achievement awards) ("World Travel and Tourism," 1994).

The recreational boating sector has made some attempts to mitigate its environmental impacts. Regulation of this sector is not always effective because enforcement is difficult. More often than not, it is up to the goodwill of the individual boater to minimize potential impacts. A potentially effective strategy to encourage this goodwill is through boater education. Such a program is run by the National Safe Boating Council, a group of private citizens and boating

organization representatives who advise the U.S. Coast Guard on several matters (NRC, 1995, p. 179). During their National Safe Boating Week Campaign, the group teaches recreational boaters about safety and environmental issues.

The National Park Service has several initiatives planned or underway to help reduce visitor congestion and its associated impacts. Thirty-nine parks offer some form of alternative transportation, such as buses and vans. The National Park Service is planning to build a 3,500-car parking lot six miles south of the Grand Canyon in Tusayan, and by 2002 use a light-rail transit system to ferry people back and forth. In addition, two unappealing hotels will be replaced by a "heritage education campus," which will blend better with the surrounding environment. Once at the canyon's edge, visitors will have the option to walk, bike, or take alternative-fuel shuttle buses along the edge (Whitman, 1999, p. 18).

The Park Service is also trying to reconcile economic needs with aesthetics. Environmental groups have supported a proposed development in Tusayan, a gateway community to the Grand Canyon National Park, that would include 1,220 hotel rooms and 250,000 square feet of commercial and retail space. However, the space would also include a large interpretive and education center, incorporate "green building" practices, and use river water from 100 miles away to preserve groundwater (Whitman, 1999, p. 20). This type of development attempts to minimize the physical and aesthetic disruption that can occur from tourist development. It allows for retention of the community character of the landscape while still providing a healthy economy.

Some hotels recognize the need to reduce environmental impact and have developed various programs to that end. Efforts to minimize solid waste generation at hotels involve source reduction, waste transformation, recycling, and re-use. A Dallas hotel donates 250 sheets and 100 tablecloths three times a year to a local shelter, and Days Inns of America initiated a similar program called "Hotel-to-Shelter Recycling" (Stipanuk & Roffmann, 1996, p. 235). All new U.S. Hyatt Hotels and Resorts constructed after 1992 have on-site recycling centers (Bialkowski, 1991, p. 45). Hotels will most likely be willing to minimize waste if it can be demonstrated that such efforts will be economically beneficial. A study of 13 corporate executives of hotel chains found that the two most important factors that contributed to their decision to implement a solid waste management program were waste disposal fees and the betterment of public image (Shanklin, et al., 1991, p. 67). There are also efforts in place to minimize water use. 77% of U.S. hotels use low flow showerheads, and 33% use low consumption toilets. However only 4% of hotels reclaim their laundry wastewater, and 2% use their gray water for irrigation (Redlin & deRoos, 1990, p. 5).

4.1.1. Examples of Development that Minimizes Environmental Impact

Three examples of tourist infrastructure that minimize environmental impact and incorporate local people's needs are two eco-resorts in the U.S. Virgin Islands, and a riverfront park in Detroit, Michigan. Maho Bay Camps and Harmony Resort were built in the 1970s, and are two of the best known and successful eco-resorts (Honey, 1999, p. 5). Wooden walkways minimize soil erosion and vegetation damage from trampling. Communal toilets and captured rainwater reduce water usage, and reliance on solar and wind power along with computer monitoring of electricity and water use help reduce energy use (Honey, 1999, pp. 5-6). The "Detroit Linked Riverfront Parks Plan" is a good example of effective tourism planning. In lieu of indiscriminate development based solely on economics, planners first determined the needs of the local people, and then designed the area accordingly (McIntosh & Goeldner, 1990, p. 453).

4.1.2 Nonprofit Groups

The Audubon Society has recognized the potential for adverse effects of tourism, and has developed a "Travel Ethic" for tour operators that provide wilderness trips (*www.audubon.org*). The Travel Ethic encourages tour operators and cruises to stay on trails to protect vegetation, keep a minimum distance from wildlife, refrain from destruction of coral reefs, maintain and enforce an anti-dumping policy, and educate tourists about the types of souvenirs not to buy (such as sea turtle products and ivory) (*www.audubon.org*). The Sierra Club also educates its members on methods to minimize their impact on the environment. The club's concern about the potential impact of member travelers on the environment started as early as 1970, when its leaders commissioned a report from three professors about any adverse impacts Sierra outings had, and how they could be mitigated. These "Wilderness Manners" include traveling on durable surfaces, camping away from water bodies and trails, reducing litter by repackaging used food and carrying out all trash and garbage, minimizing use and impact of fires, and respecting wildlife and other travelers (*www.sierraclub.org*). The World Wildlife Fund uses the trips it sponsors as a way of fulfilling one of the tenets of ecotourism: using tourism to support conservation (*www.worldwildlife.org*). The WWF attempts to minimize the environmental impacts of their trips by selecting commercial tour operators according to their reputation as environmentally friendly (Janet Fesler, World Wildlife Fund, personal communication, September 16, 1999).

Educational efforts to promote environmentally responsible tourism seem more promising than regulation for several reasons. The dispersed nature of the tourism industry makes integrated and effective regulation difficult. For example, the EPA regulates certain tourism-related activities such as transportation emissions, but the development of tourist infrastructure is regulated at the state and local level through planning and zoning laws. The fragmentation of the tourism industry in turn leads to diffuse impacts, which further complicates regulation efforts. In particular, it is difficult to regulate tourist activities in part because of enforcement and compliance problems. Tourists can be told that littering is illegal, or not to drop anchor in a sensitive coastal ecosystem, but it is hard to force them to comply, and to monitor whether or not they have complied. Educating tourists about the environmental implications of their actions may help increase compliance levels. Furthermore, tourists may be more receptive to educational efforts than to regulation.

Educational efforts aimed at industry sectors seem most effective when cost savings are emphasized. For example, groups such as the Green Hotels Association first emphasize the costs hotels can save through energy and water saving measures (Patricia Griffin, president of Green Hotels Association, personal communication, October 21, 1999). In addition to cost savings, marketing is also important for tourism-related industries. Tourism service providers are even more likely to participate in environmental management programs if they recognize the potential for positive media attention. Some hotels have found that their efforts to reduce their environmental impacts have resulted in an increase in business, as people become aware of their efforts. For example, the Saunders Hotel Group in Boston attracted more than $750,000 in new convention business because of their environmental efforts (Stipanuk and Ninemeier, 1996, p. 94). Therefore, an effective educational program geared toward tourism service providers such as hotels should emphasize the potential economic and marketing benefits of environmental stewardship. Environmental awareness has had an important impact on the tourism industry, but, as with all other sectors, economic motives are still primary.

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