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Tourism Destination Water Management Strategies: An Eco-Efficiency Modelling Approach

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Abstract. Faced with intensifying demand for and diminishing supplies of water, the sustainability of many tourism destinations is dependent on using innovative eco-efficient strategies to manage water resources. However, the task of assessing the relative merits of various management strategies is challenging due to a complex array of water consumption and wastewater issues in tourism destinations. This research describes a systematic framework for identifying the key components of water management in tourism destinations and describes a "bottom-up" modelling procedure for assessing the relative eco-efficiency of various strategies for conserving this essential resource. It then applies the model to strategies being considered for implementation in Whistler, British Columbia—one of North America's leading mountain resort destinations. The research contributes to sustainable planning theory and practice by describing a forecasting model for assessing the eco-efficiency of water management strategies in tourism destinations, and then illustrating its practical application in the context of emerging water management practices.

Keywords: destination planning, water management, eco-efficiency

Résumé. La durabilité des destinations de tourisme dépend souvent de stratégies d'efficacité écologiques innovatrices qui contrôlent et minimise les impacts sur les ressources naturelles comme l'eau, au moment même ou ces destinations et leurs ressources sont confrontées par une demande d'intensification et une diminution d'approvisionnements. Cependant, l'évaluation des mérites relatifs du tourisme est compliquée par des diverses stratégies de gestion de consommation d'eau et l'aménagement d'eaux résiduelles. Cette recherche décrit un cadre systématique qui identi-

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fie les facteurs composants de la gestion de l'eau dans des destinations de tourisme, et fourni un modèle dont la procédure évalue l'efficacité écologique relative de diverses stratégies pour conserver cette ressource essentielle. Nous appliquons ensuite ce modèle aux stratégies de conservation considérées par Whistler, en Colombie-Britannique—une des principales destinations touristiques de montagne en Amérique du nord. En décrivant un modèle de prévisions qui évalue l'efficacité écologique des stratégies de gestion de l'eau dans des destinations de tourisme cette recherche contribue à la théorie et à la pratique en matière durable de planification et puis illustre sont application pratique dans un contexte spécifique.

Mots-clefs. planification de destination, gestion de l'eau, d'efficacité écologique

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Introduction

Eco-efficiency is a concept that prescribes using innovative strategies to reduce the amount of energy, water, and other materials employed, as well as wastes and pollutants discharged in the production of goods and services (Ayres, 1998; Cleveland & Ruth, 1999; DeSimone & Popoff, 1997; Hinterberger & Schmidt-Bleek, 1999; Reijnders, 1998). The concept assumes traditional economic production systems are unsustainable because they depend on excessive inputs of energy and other resources that are returned as waste to the ecosphere—contributing to the continued exploitation of the earth's finite stocks of natural capital (Ayres, 1998; Goodland & Daly, 1996; Rees, 1995; Weizsäcker et al., 1997). The eco-efficiency concept is particularly relevant to tourism destinations because such areas have traditionally been characterized by intensive use of energy, water, and other natural materials in the production of tourist products and services (Becken & Simmons, 2002; Becken et al., 2001, 2003; Bode et al., 2003; Draper, 1997; Gossling, 2000, 2001, 2002; Kent et al., 2002). Eco-efficient strategies offer tourism destinations opportunities to reduce costly energy, water, and other material inputs, as well as reduce the negative effects of such production systems on surrounding natural and built environments.

Opportunities for employing eco-efficient strategies seem especially appropriate in tourism destination settings where the final product produced is essentially experiential, rather than material in nature (Klenosky et al., 1993; Pine & Gilmore, 1999; Prentice et al., 1998; Smith, 1994). For instance, a growing number of alternative travel businesses associated with ecotourism and cultural tourism demonstrate destinations can produce competitive products and services that do not rely on the intensive consumption of natural resources. Even in more traditional tourism destinations, opportunities exist to significantly decouple the visitor's experience from intensive natural resource consumption processes with-

Natural wastewater treatment options can also be implemented at many tourism destinations to reduce chemical residues produced by more conventional treatment processes (Gossling, 2001). In rootzone systems, for example, wastewater is discharged into the root area of certain plant species (Sweeting et al., 1999). The plants purify the wastewater by consuming organic material in the waste. Another example of natural wastewater treatment is a wetlands system, in which wastewater is transmitted through a series of ponds lined with impermeable linings to prevent leakage of pollutants into soil and groundwater (Sweeting et al., 1999). In each pond, bacteria growing on plant roots consume the organic material in the waste. Such systems require a large amount of space and relatively warm weather, making them well-suited for many tropical destinations. Less harmful alternatives for tertiary treatment are also available. These include ultra-violet lamps that kill bacteria with an intense light, or ionization, which uses an electrical current to kill off pathogens (Draper, 1997; Sweeting et al., 1999).

Destination planners generally have considerable control over the design and operation of infrastructure for water supply, as well as sewage disposal, mainly because these systems are generally owned and operated by the public sector. The development of such practices within the borders of destination regions can potentially not only reduce negative environmental and health impacts, but also create destination financial savings, local employment opportunities, and greater self-sufficiency for the resort area.

Method

To examine the eco-efficiency of proposed destination water management strategies, this study developed a three-phased research method and illustrated its applicability in the mountain resort community of Whistler, British Columbia, Canada. Whistler is a four-season mountain resort community located about 120 kilometres from Vancouver. It attracts an estimated two million visitors annually to its mountains for a range of winter and summer activities. Recognizing the importance of maintaining its high quality natural resources for visitor and resident appreciation, the community recently made a strong commitment to become a more sustainable destination via a range of sustainability planning strategies (RMOW, 1999, 2004). These commitments are accentuated in the destination's comprehensive sustainability plan called *Whistler—It's Our Future* (RMOW, 2004). The plan includes goals and directives for achieving the community's sustainability objectives for water management.

They translate into several potential programs for encouraging more sustainable water consumption patterns, sourcing sufficient and reliable water supply, ensuring excellent water quality, and maintaining sustainable wastewater quality and flow rates.

With this strong policy foundation in place for encouraging more sustainable forms of sustainable water management, Whistler provided a unique case-study environment in which to systematically evaluate proposed water management options. Eco-efficiency is a primary criterion on which to base such an evaluation, given the overriding importance of well-managed environments for the resort's success.

The research phases employed in this case study included: (a) developing an overriding framework and approach for inventorying water flows in destination areas; (b) identifying key strategic planning options for reducing water resource flows; and (c) forecasting the effects of these water management options using a "bottom-up" modelling procedure. A description of these methods and how they were applied in the context of the Whistler case study follows.

Inventory of Water Flows

The first step in the research established a systematic framework for inventorying the key drivers of water use associated with tourism destinations. Based on a review of existing literature, the primary dimensions and drivers of these water flows were identified. These related to water use associated with residential and commercial buildings and facilities, municipal infrastructure, and parks (Figure 1). This framework helped establish standardized and comparable measures of water consumption and wastewater generation for the study's base year.

The Resort Municipality of Whistler provided data on water consumption for all buildings and parks internal to Whistler. These data detailed records of water consumption for residential, institutional, commercial, industrial, and municipal buildings. The data also included levels of water consumption for irrigating parks. Data from the community's Wastewater Treatment Plant were used to determine total wastewater generation internal to Whistler.

Factoring Out Tourism's Effect on Destination Resource Flows

The effects of the tourism industry on Whistler's internal water flows were estimated by disaggregating water consumption in each sector between tourism and non-tourism components. The tourism share included both direct effects (e.g., water resources used by hotels in providing accommodations to tourists) and indirect effects (e.g., water resources used

Figure 1
Resort Destination Resource Flow Model

PLANNING STRATEGIES
- Land use allocation
- Transportation
- Building design & construction
- Community infrastructure

Supply of infrastructure & services ▼

◄ Land use designations & building regulations

Potential market feedback ◄

Constraints on housing availability ▼

LOCAL POPULATION
- Permanent employees
- Seasonal employees
- Non-working residents

COMMUTING EMPLOYEES
- Permanent employees
- Seasonal Employees

Land use & transportation planning ►

VISITORS
- Day only
- Second home
- Friends & relatives
- Paid accommodation

EMPLOYEE COMMUTING
- Single occupancy vehicle
- Car pool
- Bus
- Train

INTRA-COMMUNITY TRANSPORTATION
- Personal vehicle
- Public transportation
- Corporate vehicle fleet
- Municipal vehicle fleet

TRAVEL TO/FROM RESORT
- Personal vehicle
- Bus
- Airplane
- Train

ENERGY SUPPLY SYSTEMS
- Electricity grid
- Propane/natural gas grid
- Wood
- Local renewables

WATER SUPPLY SYSTEMS

SOLID WASTE MANAGMENT SYSTEMS
- Landfill
- Reduction & reuse
- Recycling
- Community composting

RESIDENTIAL BUILDINGS
- Single family
- Duplex
- Multi-family
- Employee housing

COMMERCIAL, INDUSTRIAL, & INSTITUTIONAL BUILDINGS
- Hotel
- Other paid accommodation
- Retail
- Office
- Service
- Food / restaurant
- Bar
- Convention/conference
- Tourist/recreation
- Wholesale/storage
- Light & heavy manufacturing
- Public institutional

MUNICIPAL BUILDINGS & INFRASTRUCTURE

ENERGY CONSUMPTION
- Space heating & cooling
- Water heating
- Lighting
- Appliances
- Cooking
- Washing and cleaning
- Equipment & motors
- Transportation

WATER CONSUMPTION
- Drinking
- Cooking
- Washing & bathing
- Laundering
- Toilets
- Irrigation & outside uses
- Equipment (e.g., snow-makers)

SOLID WASTE GENERATION
- Construction
- Providing goods & services
- Direct consumption (e.g., food)

AIR EMISSIONS
- Greenhouse gases
- Common air contaminants

WASTEWATER GENERATION

SOLID WASTE DISPOSAL

Table 1
Tourism's Effects on Destination Water Use

Sector	Direct Effects (Included)	Indirect Effects (Included)	Induced Effects (Not Included)
Residential	Water resources consumed by tourists staying in residential dwellings	—	Water resources consumed domestically by resort workforce
Commercial, Industrial, and Institutional	Water resources consumed by businesses in directly providing tourists with products and services (e.g., accommodation or recreation services)	Water resources consumed by businesses in providing other tourism businesses with products and services (e.g., office or construction services)	Water resources consumed by businesses in providing resort workforce with products and services (e.g., restaurant services)
Municipal Buildings and Infrastructure	Water resources consumed in providing tourists with municipal services (e.g., parks)	Water resources consumed in providing tourism businesses with municipal services	Water resources consumed in providing resort workforce with municipal services

by businesses in providing services to tourism operators). Induced effects (e.g., domestic water use by resort employees and their families) were not considered part of tourism's direct contribution (Table 1).

Since existing data were not disaggregated between tourism and non-tourism elements, various secondary data sources were used to isolate the effects of tourism. In the residential sector, for example, secondary data from the destination's visitor intercept surveys were used along with population statistics to determine the percentage of residential dwelling occupants who were tourists (i.e. second homeowners or tourists staying with friends or relatives). This proportion provided an estimate of tourism's share of water consumption in the residential sector. Another example is the restaurant sector, where tourism's share of overall water use was based on the percentage of total restaurant visits made by tourists. This proportion was derived from existing survey information. Similar types of calculations were used to estimate tourism's contribution to water resource consumption in other sectors of the tourism industry (Table 2).

Identification of Planning Strategies
A range of strategies for reducing levels of water throughput in urban and tourism destinations were identified in the second phase of the research

Table 2
Estimated Contribution of Tourism to Whistler's Water Use

Sector	Building Type	Tourism's Effect (%)	Assumptions
Residential	Single Family Dwelling	22%	1
	Duplex	22%	1
	Multi-family	67%	2
	Restricted Employee Housing	14%	3
	Seasonal Employee Housing	14%	3
Passenger Transportation		54%	4
Commercial, Industrial, and Institutional	Hotel	100%	5
	Other Tourist Accommodation	100%	5
	Retail	70%	6
	Office	85%	7
	Service	85%	7
	Food/ Restaurant	70%	6
	Bar	70%	6
	Convention/Conference	100%	5
	Tourist/Recreation	85%	7
	Wholesale/Storage	85%	7
	Light & Heavy Manufacturing	85%	7
	Public Institutional	54%	4
Municipal Buildings and Infrastructure		54%	4
Public Transportation		13%	8

1. Assumes 8% of dwelling occupants were second homeowners and another 14% of them were tourists staying with friends or relatives (derived from Tourism Whistler's visitor surveys and population statistics).
2. Assumes 58% of multi-family dwellings were used for tourist lodging and 42% were used for residential housing (based on consultation with municipal planning staff). Also, assumes 8% of residential dwelling occupants were second homeowners and another 14% of them were tourists staying with friends or relatives.
3. Assumes 14% of dwelling occupants were tourists staying with friends or relatives (derived from Tourism Whistler's visitor surveys and population statistics).
4. Assumes 54% of total day population were tourists (derived from Tourism Whistler's visitor surveys and population statistics).
5. Assumes 100% of resource requirements were attributed to tourism.
6. Based on the percentage of total retail purchases/restaurant visits made by tourists.
7. Based on consultation with municipal planning staff.
8. Assumes 13% of transit riders are tourists (source: WAVE On-Board Passenger Survey conducted March 2000).

(Armstrong & Butler, 1996; Draper, 1997; Gossling, 2001; Kent et al., 2002; Mill & Theophilou, 1995; Sweeting et al., 1999). They were used to screen and select strategies proposed by Whistler's local government that would be modelled using this paper's water use forecasting model. In the case of Whistler, numerous options for reducing overall water consumption and wastewater generation have been proposed (RMOW, 1999, 2004). For the purposes of this paper, three water management strategies were selected for assessment. A brief description of each strategy follows.

Strategy 1: Increase New and Redeveloped Building Water Efficiencies
Significant opportunities exist to improve the water efficiency of new and existing residential and commercial buildings in Whistler. Such improvements can be achieved by implementing water conservation programs for building contractors, as well as for homeowners and property owners. These include implementing: more efficient appliances including dishwashers and washing machines; low flow toilets, showerheads and fixtures; more efficient irrigation systems in commercial developments; and low water use landscaping (xeriscaping). As a result of implementing these programs, the water efficiency of new and redeveloped buildings is expected to be at least 25% better than would have occurred in the absence of such actions (GVRD, 2002).

Strategy 2: Install Greywater Recycling Systems
Significant reductions in potable water consumption can be achieved by installing on-site greywater recycling systems in new and retrofitted buildings, as well as using two-pipe systems that allow for sharing of greywater at the block or neighbourhood level (Soroczan, 2002). These systems re-use greywater (e.g., water from baths, showers, bathroom sinks, and washing machines) for purposes that do not require water to be potable (e.g., toilets and irrigation). With suitable plumbing construction to prevent cross-contamination or cross-connections, these on-site and neighbourhood technologies have the potential to provide about 95% of toilet water and outside water use (GVRD, 2002).

Strategy 3: Implement Rainwater Capture Systems
Rainwater capture systems provide another means of using non-potable water for uses that do not require potable standards. These on-site systems collect and distribute rainwater for internal uses, such as clothes and dishwashing. As with greywater recycling, rainwater capture systems require new plumbing construction in buildings to separate potable from non-potable water supply. As a result of installing these systems in new

and redeveloped buildings, it is estimated that about 25% less potable water would be required for laundry and dishwashing purposes (GVRD, 2002).

Elements of each of these preceding strategies were used to inform the development and application of a model for forecasting water consumption and wastewater generation associated with Whistler.

Development and Application of Water Use Model

A water use model was developed to assess the relative effects of various strategic planning scenarios on water consumption and wastewater generation. The model used a bottom-up approach that explicitly accounted for water use associated with different categories of buildings and infrastructure currently and potentially available to residents, visitors and businesses in Whistler. Bottom-up models were originally developed in the late 1970s in the form of energy end-use models designed for load forecasting (Robinson, 1982). These models are based on the concept that the fundamental purpose of resource use is to satisfy demand for end-use services (Gardner & Robinson, 1993). Total resource demand is derived by multiplying the demand for end-use services by the amount of resources required to provide one unit of these services. Initially developed for energy analysis, bottom-up models are also adaptable for material and water use estimations (Michaelis & Jackson, 2000; Ruth, 1998). In tourism and recreation, only a few applications of bottom-up models have been developed to analyze energy consumption (Becken et al., 2001; Deng & Burnett, 2000), but no existing research has used the approach to forecast water resource flows.

The water use model developed in this research was based on an adaptation of a prototypical approach used to evaluate destination energy conservation strategies (Kelly & Williams, 2007). A bottom-up approach was selected because of its suitability for predicting the impacts of specific technological improvements on water resource flows.

Several categories of buildings and facilities were incorporated into the model. These included: restricted employee housing, single family, duplex, multi-family dwellings, hotel, other paid accommodation, retail, office, service, food/restaurant, bar, convention/conference, tourist/ recreation, wholesale/storage, light/heavy manufacturing, and institutional. New development of each building type was assumed to increase by a fixed annual rate until available capacity was reached. In addition, it was assumed that a fixed percentage (3%) of existing buildings would be redeveloped each year. This rate was determined through consultation with municipal planning staff.

The model estimates water consumption for each building type as follows:

$$Water\ Consumption_{kt} = Existing\ Floor\ Area_{kt} \times Existing\ WUI_{kt} \\ + New\ Floor\ Area_{kt} \times New\ WUI_{kt} \tag{1}$$

where *Water Consumption$_{kt}$* is the water consumption for buildings of type k in year t; *Existing Floor Area$_{kt}$* is the floor area of existing buildings of type k in year t; *Existing WUI$_{kt}$* is the water use intensity (water consumption per unit of floor area) for existing buildings of type k in year t; *New Floor Area$_{kt}$* is the floor area of new buildings of type k in year t; and *New WUI$_{kt}$* is the water use intensity for new buildings of type k in year t.

The existing Water Use Intensities (WUIs) were taken from an existing municipal study that used water meter data to calculate WUIs for different building types in Whistler (RMOW, 2003). The forecasts of water consumption were calibrated to ensure the base year estimates for 2000 were consistent with the actual amount of water consumed in that year.

Wastewater generation was estimated from total water consumption by adjusting for irrigation and infiltration. The net effect of irrigation and infiltration was estimated by multiplying total water consumption by a fixed proportion (7.3%). This rate was determined through consultation with municipal planning staff and by analyzing government documents and planning reports (RMOW, 2003). The forecasts of total wastewater generation were calibrated to ensure that the base year estimates for 2000 were consistent with the actual amount of wastewater generated in that year.

Findings

Base Year Water Consumption and Wastewater Generation

Whistler's current water supply consists of both municipal and private sources, including surface water from three local creeks and groundwater from several wells. Approximately five million cubic metres of water were distributed from these sources in 2000 (Table 3). About 800,000 cubic metres of water were lost through leakage: water that exited the municipal network but was not used for any consumptive purposes. The remaining 4.3 million cubic metres were consumed for a wide range of uses at the destination. About 52% of the water consumed was attributable to residential use; 47% was linked to commercial, industrial, and institutional consumption; and 1% was used for maintaining parks.

Table 3
Estimated Water Consumption and Wastewater Generation

		Quantity (m³)	%	Tourism's Effect (%)
Total Water Distributed		**5,113,629**		**~60%**
Water Consumption	Residential	2,235,974	52%	~35%
	Commercial, Industrial, and Institutional	2,026,197	47%	~88%
	Parks	48,618	1%	~54%
	Total	**4,310,789**	**100%**	**~60%**
Leakage		802,840		
Irrigation/Other		484,728		
Wastewater Generation		**3,826,062**		**~60%**

Approximately 11% or 480,000 cubic metres of water were used for irrigating parks, golf courses, and other landscaped areas in Whistler. The water used for irrigation was discharged directly to the environment. The rest of the water-consuming activities in Whistler generated 3.8 million cubic metres of wastewater. This was treated at the community's Wastewater Treatment Plant. The treated wastewater was discharged into a local river system, which has significant environmental and fisheries values and is used for other purposes downstream.

Approximately 60% of Whistler's internal water consumption and wastewater generation was attributable to tourism. The industry's impact was greatest in the commercial sector, where about 88% of the water consumed was allocated to tourism users. In comparison, only about 35% of water consumption in the residential sector was directly attributable to tourism activities. The overall impact of tourism would have been even greater if induced effects, such as the domestic water consumption of resort employees and their families, were considered part of tourism's contribution.

Evaluation of Planning Strategies

The preceding findings estimated existing levels of water resource flows at Whistler in 2000. However, the model's utility as a planning tool becomes more apparent when used to assess the relative effect of Whistler's proposed eco-efficient planning strategies. This section illustrates the model's ability to estimate the future effects of Whistler's three primary water conservation strategies. In this context, the estimated effects of

Table 4
Projected Water Consumption and Wastewater Generation

		Year 2000: (m³)	Year 2020: Business-as-Usual Scenario (m³)	Year 2020: Eco-Efficient Scenario (m³)	% Change from BAU
Total Water Distributed		**5,113,629**	**6,043,118**	**4,926,000**	**−18.5%**
Water Consumption	Residential	2,235,974	2,830,752	2,264,308	−20.0%
	Commercial, Industrial, and Institutional	2,026,197	2,214,979	1,839,693	−16.9%
	Parksᵃ	48,618	48,618	48,618	—
	Total	**4,310,789**	**5,094,349**	**4,152,618**	**−18.5%**
Leakage		802,840	948,770	773,382	−18.5%
Irrigation/Other		484,728	417,038	348,276	−16.5%
Wastewater Generation		**3,826,062**	**4,677,311**	**3,804,342**	**−18.7%**

ᵃ Forecasts of water consumption for parks were assumed to remain constant over time.

implementing all three of Whistler's "Eco-Efficient" strategies by 2020 are compared with the impacts of continuing with its current "Business-as-Usual" path.

Under the current Business-as-Usual (BAU) scenario, the model estimated that approximately 5.1 million cubic metres of water would be consumed in Whistler in 2020 (Table 4). In addition, about 4.7 million cubic metres of wastewater would be generated in 2020 in the BAU scenario. As in the base year, the direct impacts of tourism would account for about 60% of Whistler's internal water consumption.
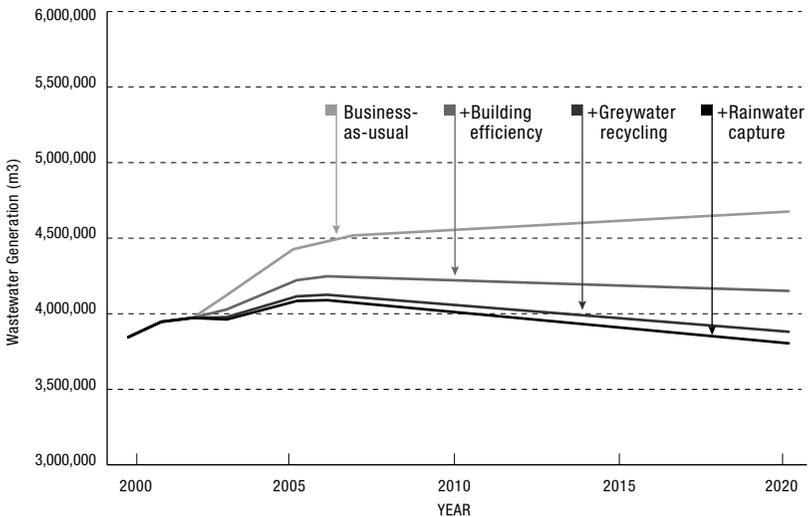
In the Eco-Efficient scenario, about 4.2 million cubic metres of water would be consumed in Whistler in 2020. This represented a reduction of about 18% or 900,000 cubic metres over the BAU scenario. A similar sized reduction was also expected for wastewater generation. Specifically, about 3.8 million cubic metres of wastewater would be generated in Whistler in 2020 in the Eco-Efficient scenario.

Of the three eco-efficient strategies examined, increasing building water efficiencies resulted in the greatest reduction of internal water consumption and wastewater generation (Figures 2 and 3). This strategy reduced water flows by about 11% over the BAU scenario. In comparison, installing greywater recycling systems reduced water usage by approximately 6% and implementing rain capture systems reduced flows by about 2% over the BAU scenario.

Figure 2
Impact of Strategies on Water Consumption

Business-as-usual   +Building efficiency   +Greywater recycling   +Rainwater capture
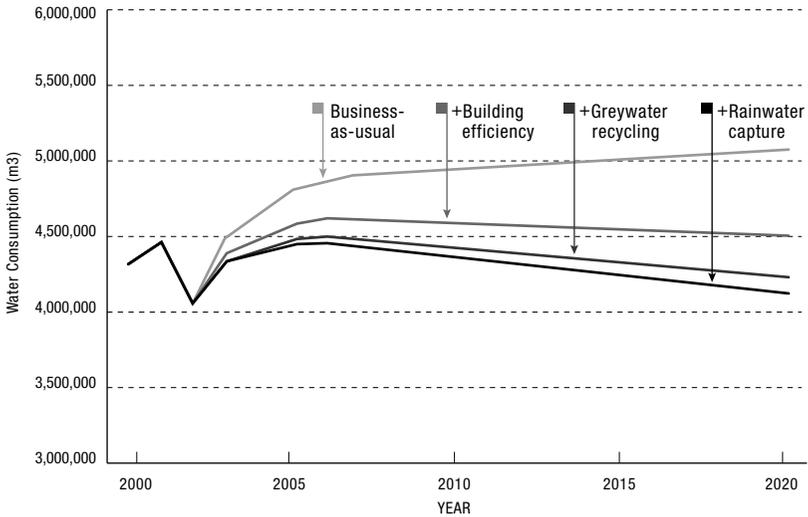
Figure 3
Impact of Strategies on Wastewater Consumption

Business-as-usual   +Building efficiency   +Greywater recycling   +Rainwater capture

Accounting for Uncertainty

The projections developed in this research represent one possible view of how the future could look like in Whistler. The accuracy of these projections rests on the validity of various assumptions related to both internal policy choices (e.g., future land use and development decisions) as

well as external forces (e.g., changing market demands). For example, if the municipal government decided to increase the available capacity of housing by 10%, then Whistler's internal water consumption in 2020 would be about 4% higher than projected. To account for such uncertainties, practical applications of the model should include a thorough sensitivity analysis to test various assumptions about future events.

Discussion

The presence and availability of abundant supplies of high quality water is undoubtedly an important attribute of competitive tourism destinations. In such locations, water is intrinsic to: enhancing scenic quality and attractiveness; providing basic tourist services; sustaining basic ecological systems; and supporting a range of leisure pursuits (e.g., water, snow, and ice based activities). In the presence of intensifying demand for, and ever diminishing supplies of water, the sustainability of tourism destinations is dependent on the use of innovative eco-efficient strategies for managing this essential resource. For tourism destination managers, the challenge is to select and implement water management strategies which are demonstrably more eco-efficient and appealing to stakeholders than "business as usual" scenarios. Decisions of this type are difficult when the implications of each potential water conservation option are not demonstrably clear. This paper's conceptual framework and water use modelling tool provides a useful means of demonstrating the relative eco-efficiency of various water consumption and wastewater management scenarios.

When tested in an actual destination planning context, the study's technical model offered valuable insights into the projected relative and absolute effects of proposed planning strategies on Whistler's future water use and wastewater generation. The model projected that a collection of innovative water conservation strategies currently being considered at Whistler would result in reductions in water consumption and wastewater generation of up to 20%, compared with "business-as-usual" levels. Although not tested in this research, similar-sized reductions in water use may be possible in other tourism destination settings.

While this "first generation" model has immediate applicability in a variety of contexts, it is intended as a framework for guiding the development of future eco-efficiency research and management initiatives related to water use. The following sections describe the main limitations of the model and future research directions that would help to refine and strengthen the model's utility.

In combination, research of this type would make the model a more robust and useful tool for informing tourism destination planners about the eco-efficiency effects of their strategic planning decisions.

Conclusions

The management of water supply in mountain regions has implications for not only local tourism destinations but also other environments down valley. In general mountain regions have been treated as a resource with few use restrictions. Indeed, there has been inadequate hydrological monitoring and poor dissemination of information concerning the linkages between mountain tourism water use and down-stream impacts in the literature. This situation is beginning to change and a few communities including Whistler are beginning to address these concerns in a comprehensive fashion (Waldron, 1993; Williamson, 1993; Vance & Williams, 2006). Typical responses have been to incorporate more advanced technologies and eco-efficiency oriented policies into local governance and management systems. Decisions concerning these alternatives require decision support systems which demonstrate the relative effects of one set of options over another. This paper presented a prototypical assessment tool that helps clarify the efficacy of various water planning options. While the planning strategies examined in this study were not exhaustive, they illustrate how various destination water policy and planning decisions could be assessed from an eco-efficiency perspective.

A more challenging reality is that despite local and individual initiatives to address tourism related water management issues, the dispersed nature of the industry is currently not conducive to a fully integrated and holistic approach. Tourism produces diffuse water impacts that fall under the jurisdictions of different federal, state, and local agencies. Moreover, enforcement and compliance problems make it particularly difficult to regulate water-related tourism activities. For these reasons, educational efforts seem more promising than regulation to minimize many of tourism's water impacts. Modelling systems such as the one described in this paper can help create the information needed to systematically guide such educational initiatives amongst both public and private sector stakeholders.

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Leisure Research and Social Change: A Millennial State of the Art

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Abstract. This paper reports on an effort by the authors to engender debate about the state of leisure research. We seek to respond to those in the field who have challenged us to think about whether our research and practice is actively engaging issues of social change. To do this, we developed an analytical framework based upon the major tenets of critical theory and used it to evaluate the abstracts from four leisure research journals from 2000–2004. By presenting our framework and evaluation criteria, we are in no way judging the quality of these articles or their respective journals. We are, however, seeking to provoke discussion about the direction of the field as we present the results of our assessment and offer suggestions for further evaluations and possible directions for future research.

Keywords. critical theory, emancipation, hegemony, life-world, system world, leisure research

Résumé. Cet article tien compte d'un effort par les auteurs d'engendrer la discussion au sujet de l'état de la recherche en loisirs et le changement social. En relevant ce défi nous cherchons à répondre à deux questions souvent posé. Est-ce que notre recherche est pratique? Encourage tel le changement social? Pour répondre à ces questions, nous avons développé un cadre analytique basé sur les principes principaux de la théorie critique et nous l'avons appliqué à une évaluation de quatre journaux de recherches de loisirs entre 2000–2004. En présentant nos critères d'évaluation, nous ne jugeons nullement la qualité de ces articles ou de leurs journaux respectifs. Nous cherchons cependant, à provoquer une discussion au sujet de la direction du champ pendant que nous présentons les résultats de notre évaluation, et nous suggérons d'autres possibilités de recherche.

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Introduction

The new millennium brought with it an aspiration by many disciplines in the academy to "take stock" of their progress and the field of Leisure Studies was no exception. Two important articles in the *Journal of Leisure Research* sounded a note of unsatisfied expectations and possible misdirection from the original purpose of the field. Each suggests that we have lost our way or perhaps, have fallen short of reaching our potential. First, Shaw (2000) asked the question, "if our research is relevant, why is nobody listening?" She argued that we have become myopic; researchers have come to view leisure as an end in itself rather than part of the larger social picture with a role to play in ameliorating some of the negative conditions that plague the social condition and to provide for equitable social development. She stated:

> … it is evident that the starting point of the analysis used is almost always leisure: that is, the focus is on leisure meanings, activities, constraints, satisfactions, or benefits. This attention to leisure first, and other issues second, may be limiting our vision and the potential application, breadth and social relevance of our research. (2000, p. 149)

Second, Hunnicutt (2000) presented the conundrum in a slightly different way in an article entitled "(o)ur reform heritage: recovering the vision of community leisure service." He pointed to a need to return to the radical view of leisure as "opening up astonishing new democratic vistas" (p. 59), as an alternative to the "perpetual economic growth of the marketplace and work that exploited and commercialized the finest, free experiences of life" (p. 60).

Both Shaw (2000) and Hunnicutt (2000) invited considerations of Habermas' work and, in particular, elements of critical theory. Swingewood (1991, p. 290) outlined the Habermasian warning that the, "social consciousness has become technocratic and structured in instrumental reason": exactly the indictment of Shaw and Hunnicutt. He argued further that, "institutions which normally function to articulate and communicate public opinion have become commercialized and depoliticized" (1991, p. 290), leading to an atomized mass society. Following these authors as well as others concerned with the fate of the field (see for example Hemingway, 1996, 1999) it can be argued that Leisure Studies has not been immune.

What, then can be done to address this concern? Critical theory, as summarized below by Kellner, offers a useful approach both to social analysis and to social action:

> On the one hand, it involves a set of ways of looking at theory and the world and a set of investigative, research, textual, and political practices. On the other, it provides a substantive, comprehensive theory of the present age, as well as a methodological orientation for doing social theory and research and for relating theoretical work to radical politics.… Critical theory is guided by the conviction that all inquiry, all thought, all political action and all informed human behaviour must take place within the framework … which contains a synthesis of philosophy, the sciences and politics. (1989, p. 44, emphasis added)

The purpose of this paper is to report on a study in which the authors developed a framework using major tenets of critical theory, specifically notions of life-world, system world, hegemony and emancipation, in order to consider the current state of Leisure Studies. Given the recent and powerful calls for leisure scholars and practitioners to undertake more critical and socially engaged research, we argue that providing a "state of the art" of leisure research may help to identify whether the Leisure Studies field has, or can, set out a more progressive research program, and in so doing become relevant to society by more directly engaging in critical research on social problems and issues.

While this paper is by no means meant to be a treatise on the role or potential of critical theory in leisure research, we built on the work of Hemingway (1996, 1999) and present our analysis using its main tenets as one way of responding to the calls within the field for more relevant research. The first part of the paper draws brief attention to the heritage of Leisure Studies (before the millennial calls for reconsidering relevance in the field) as it pertains to asking questions about the relationship between leisure and social change. In short, we ask: How have leisure researchers thought about and engaged issues of social change? Next, after setting out a very brief outline of the key terms used in the creation of an analytical framework, the paper highlights our analysis of 318 article abstracts from four leading research journals in the field: *Leisure Sciences,* the *Journal of Leisure Research, Leisure Studies,* and *Leisure/ Loisir* as published from 2000 to 2004. The methods used, including the development and application of the framework, are then outlined and the results presented. The results suggest that while there is an identifiable body of what we would consider to be critical and socially engaged leisure research, the majority of articles leave unchallenged the power di-

Methods

In this "state of the art" evaluation, an analytical framework was created and applied to a dataset consisting of journal article abstracts taken from research journals in the field. Overall, we assessed 318 journal article abstracts from 2000 to 2004 from (1) *Leisure Sciences*, (2) the *Journal of Leisure Research*, (3) *Leisure Studies*, and (4) *Leisure/Loisir* and undertook two rounds of analysis. Two of the journals selected are American-based (*Leisure Sciences* and the *Journal of Leisure Research*), one is European-based (*Leisure Studies)* and one is Canadian-based (*Leisure/Loisir*). Our deliberate selection of these research based journals reflects our desire to capture a variety of the publications available within the Leisure Studies field. While each of the journals has included articles from both positivist and interpretivist leanings, historically, the two American journals originally published research that has been primarily oriented towards post-positivism, especially work that was largely social/psychological in nature. *Leisure Studies* has been generally more receptive towards interpretive and constructivist research. Last, the Canadian journal is perhaps more eclectic in nature and has historically tried to speak to both the academic and the practitioner in the leisure field. Certainly, other journals, (for instance, *Loisir et Société* and the *Annals of Tourism Research*) could have been included in this assessment and, perhaps, will be added by ourselves or other researchers in the future in order to provide a more definitive review. However, an evaluation of the four main journals outlined above fulfills the main purpose of this study and this analysis presents a clear foundation on which to base our discussion. It needs to be clearly stated that it is not the intention of this work to compare or rate journals, but simply to provide a flavour for the type of research that is being published in the field today, and whether or not it has paid attention to the sentiments expressed by Shaw (2000), Hunnicutt (2000), and others, as outlined earlier.
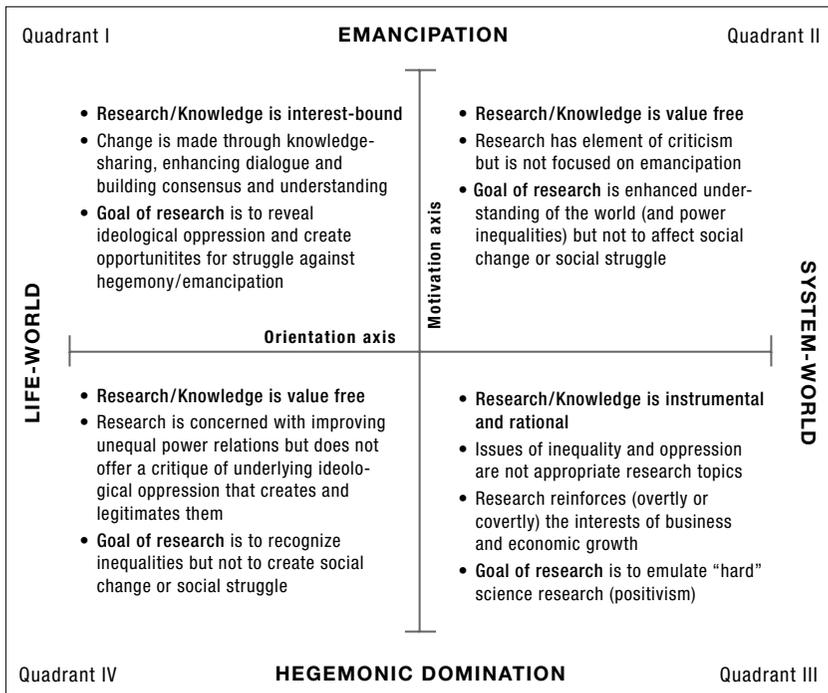
In addition, as we begin to explain our approach to this critical analysis, it will become clear that the evaluations are very normative and are undoubtedly informed by who we are as researchers, writers, teachers, and members of the Leisure Studies community. Working together and individually, we have both been concerned with developing, engaging, and thinking critically about questions of social change and the role of Leisure Studies therein. Specifically, we have been concerned with developing practical and conceptual approaches, which we hope help to address issues of power in tourism and leisure planning and development. If others wish to undertake a similar assessment of the field of leisure studies,

their goals, values, and experiences will also have a great influence on their findings.

It should also be noted that we also chose to look only at the papers' abstracts and not the full articles. Given the varying length and information included in these abstracts, it was a difficult choice to make. However, in this age of electronic indexing and table of contents alerts, abstracts will become increasingly important; not only in helping potential readers to ascertain the usefulness of articles and to differentiate them, but in terms of reflecting what the author(s) feel to be the most important (i.e., relevant) aspects of their project.

The basic analytical framework included four quadrants. Figure 1 represents the quadrant framework as well as the descriptors used to guide the allocations.

Figure 1
Abstract Evaluation Framework

Quadrant I — EMANCIPATION — Quadrant II	
• Research/Knowledge is interest-bound • Change is made through knowledge-sharing, enhancing dialogue and building consensus and understanding • **Goal of research** is to reveal ideological oppression and create opportunitites for struggle against hegemony/emancipation	• Research/Knowledge is value free • Research has element of criticism but is not focused on emancipation • **Goal of research** is enhanced understanding of the world (and power inequalities) but not to affect social change or social struggle
Motivation axis / **Orientation axis**	
• Research/Knowledge is value free • Research is concerned with improving unequal power relations but does not offer a critique of underlying ideological oppression that creates and legitimates them • **Goal of research** is to recognize inequalities but not to create social change or social struggle	• Research/Knowledge is instrumental and rational • Issues of inequality and oppression are not appropriate research topics • Research reinforces (overtly or covertly) the interests of business and economic growth • **Goal of research** is to emulate "hard" science research (positivism)
Quadrant IV — HEGEMONIC DOMINATION — Quadrant III	

LIFE-WORLD ... SYSTEM-WORLD

Orientation axis: How is knowledge created? How does change take place. Is knowledge objective or subjective?
**Motivation axis**: What is/should be the purpose of research in affecting social change?

As the descriptors at the bottom of the figure suggest, the vertical axis reflects the "motivation" of the research as it extends in one direction towards the goal of emancipation with hegemonic domination at the opposite end of the continuum. By creating this axis, we sought to assess the underlying research motivations of the projects being presented. That is, we tried to determine whether the author(s)' goal was to describe and thereby reinforce a particular situation or to challenge it by presenting opportunities for emancipatory change.

This motivation axis is intersected by a horizontal, "orientation" axis, providing a continuum from life-world to system world. By creating this axis, we sought to assess the overall orientation of the research. That is, we tried to determine to what extent the author(s)' orientation to social research reflected a system world orientation (i.e., a world of technical, instrumental knowledge) or a life-world orientation where there was a consideration of more interpretively oriented, shared understandings. Each axis is scaled from one to ten. Thus, the stronger the abstract was deemed to be in regards to reflecting one particular dimension, the "higher" the score. It should be noted that the "+" and "−" identify directionality and in no way indicate a positive or negative evaluation. Figure 2 illustrates the scoring along the two axes.

Given our efforts to evaluate the journals by their abstracts, we attempted to develop a practicable methodology and an analytical process. In doing so, we developed the following list of questions stemming from the critical theory literature and used them in the process of determining our assessments within the framework.

1. Who are the actors or agents in the study and what is their relationship to the social structures within which they are acting (i.e., are they powerful or powerless)?
2. What is the goal of the research (social change, emancipation, improved understanding, description)?
3. Whose interests are being served by the research?
4. How is leisure portrayed? Is it seen as an end in itself or some part of a larger social context?
5. Does the study focus narrowly on leisure (e.g., meanings, activities, constraints) or is there a broader focus on social reality, power and social change?
6. Is there an identified system of oppression/coercion?
7. In instances where there is some effort to address social issues, does the study attempt to use the research to bring the agents to the realization of their situation?

Figure 2
Scaling of the Framework
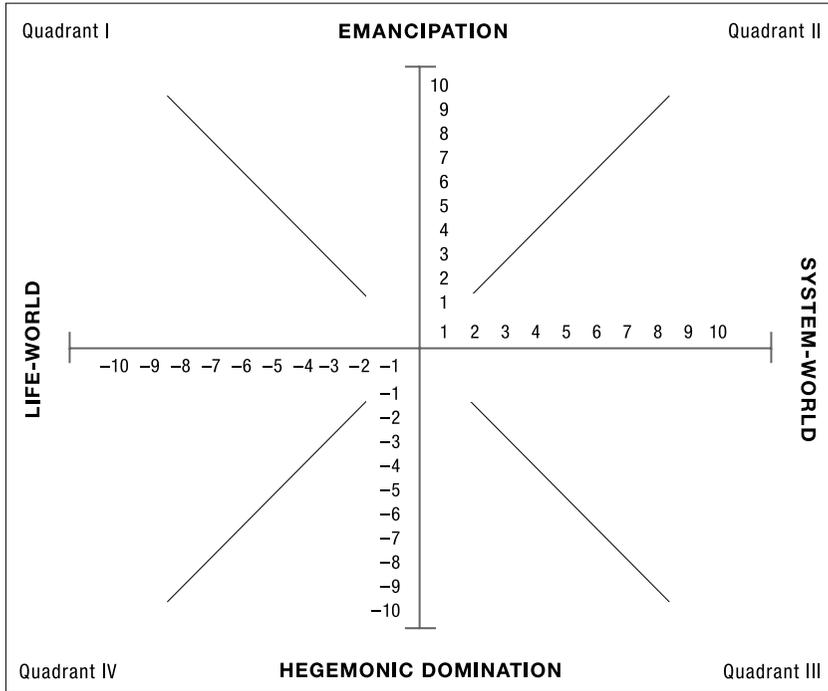
8. Does the article include reflection upon the worldview of either the researcher or the researched?
9. Does the article engage alternative forms of knowledge or ways of knowing?
10. Does the article challenge or legitimize the situation it is assessing?

Working individually, we each applied the framework to the abstracts on our own, using the evaluation questions to help allocate the articles to one of the four quadrants. In short, we asked these questions and applied a number reflecting our judgment as to the strength of the article in relation to the two axes. For instance, if an abstract appeared to be very concerned with issues relating to concerns about the life-world, it was given an orientation score of –8 (i.e., between –1 and –10 and positioned close to the life-world end of the orientation axis). On the other hand, if the abstract seemed to be very concerned with providing a technically oriented discussion of a situation or project and there was little or no critical reflection regarding the nature of the knowledge used to create and as-

sess the results, it was given an orientation score of +8 (i.e., between +1 and +10 and positioned closer to the system-world end of the orientation axis). Secondly, if it appeared to be very concerned with addressing issues of emancipation, it was given a motivation score of +8 (i.e., between +1 and +10 and positioned closer to the emancipation end of the motivation axis). By contrast, if the abstract was outlining a project that appeared motivated by describing a situation with little or no reflection on the larger political and social issues, the motivation score was –8 (i.e., between –1 and –10 and positioned towards the hegemonic domination end of the motivation axis).

Overall, these scores were combined to "place" the article in one of the four quadrants on the evaluation framework (see Figure 2). Thus, each abstract was assessed in two ways, both to determine in which quadrant it fit and on the strength of that article therein. Upon completion of the initial allocation procedure, we met for a second round of collaborative analysis. Although our individual assessments were certainly not identical, we were consistent in our quadrant allocation. The details of assessing the exact position within the quadrants (based upon our interpretations of the author(s)' motivations and orientations) led to stimulating debate between us about the nature and purpose of social research more generally as we discussed our individual evaluations and argued for or against their particular allocation until consensus was reached. The abstracts were then reallocated to a mutually agreed upon position within the respective quadrant.

Findings

Of the 318 abstracts evaluated, a total of 30.8% (98) were located in the upper left hand quadrant indicating a tendency to both engage issues of social change (predominantly in regards to unequal gender or race relations) and confront the nature of social research itself by describing some opportunity (or need) to use the results for more socially aware or progressive practice. In contrast, 46.5% of the abstracts (148) were located in the bottom right hand quadrant indicating that the research either left unchallenged or actively reinforced the status quo and did not question relations of power, control, or access to leisure services or research. This area captured the largest share of the abstracts. The remainder of the abstracts were somewhat evenly split in the last two quadrants (8.5% in the upper right and 14.2% in the lower left) thereby indicating a mix of efforts to question leisure research and practice in relation to issues of affecting social change and understanding inequality, but not both. Figure 3 illustrates the outcomes of our analysis.

Figure 3
Abstract Evaluation Results
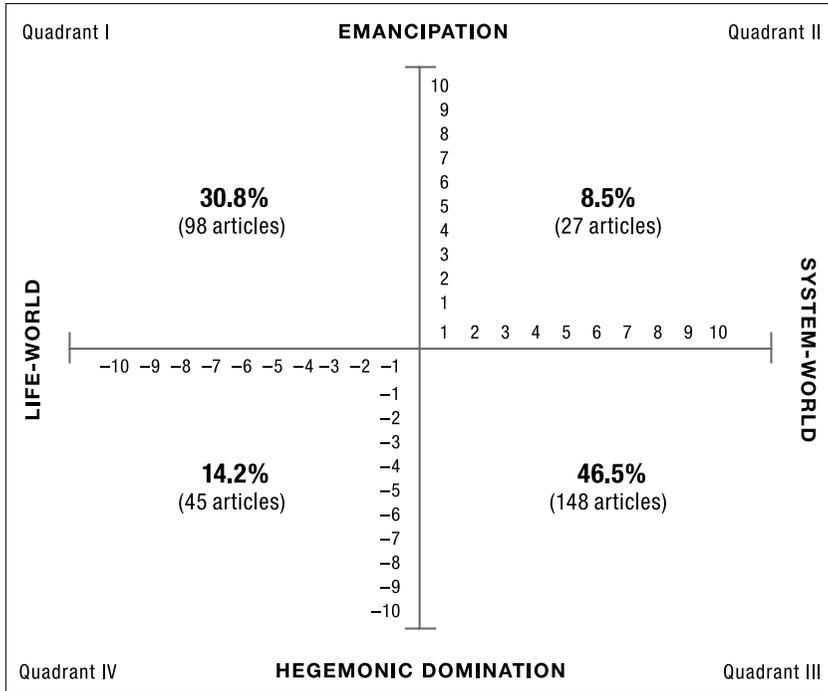
Further analysis of these data comparing the four journals with regard to their position within the framework reveals that in the life-world/emancipatory quadrant, 43% of the *Leisure Studies* abstracts were allocated there as well as 26% of those from *Leisure Sciences*, 23.1% of those in *Journal of Leisure Research,* and 33.3% from *Leisure/Loisir.* Using the orientation and motivation ratings as dependent variables and the four journals as the independent variable, ANOVA tests were administered to these data to determine if there was significant difference in placement among the journals. Significant differences were found among the journals (p < .05) and subsequent post hoc analysis using a Scheffé test revealed that *Leisure Studies* scored higher on the orientation scale and lower on the motivation scale than the other three journals. This would place the articles in *Leisure Studies* consistently and expansively more so than the other journals in the upper level of the emancipation/life-world quadrant on both scales.

Discussion

In light of our goal to determine whether leisure researchers have heeded the "millennial" calls by Shaw (2000), Hunnicutt (2000), and others, the results of the analysis indicate that this has only partially been the case. Indeed, there is a telling discrepancy between abstracts addressing issues of equity and social change and those that seem to uncritically reinforce the status quo.

The evaluation undertaken for this study suggests that the dominant orientation and motivation of leisure research at present seems to be towards the hegemonic/system world quadrant. This, it would seem, is contrary to the expressions of Shaw (2000), Hunnicutt (2000) and others outlined earlier in this paper. Nonetheless, this point can be tempered somewhat given that the second largest number of abstracts were allocated to the emancipation/life-world quadrant. As was noted above, critical theory, as outlined by Habermas (1987) and so clearly explicated in relation to Leisure Studies by Hemingway (1996, 1999) can lead to the encouragement of those in the field of leisure research to strive to develop research agendas that combine the orientations of the life-world with the system world, but where the bulk of research being undertaken is motivated by issues of emancipation and a movement away from so-called objective and neutral research. Figure 4 indicates what we would argue is the ideal location for the majority of articles in our field. That is not to say there is not a place for articles that fit all four quadrants but, if our goal is to be one of social action and change, then the greater part of what we do should be located in the circle represented in Figure 4.

Of course, it would take a tremendous shift in the field in order for that repositioning to occur. The circle in the figure represents an overall emancipatory orientation; thus an overt effort to focus on issues of access, inequality, poverty, marginalization and power. This encourages a concentration on life sustaining issues that also take into account the need to re-develop social systems, economic and political structures, as they can become mechanisms for enhancing equitable social change. Certainly, the question of whether the focus of leisure studies should be on generating social change (obviously a goal we both agree upon) is a topic for debate. What is the overarching goal of Leisure Studies? Indeed, should there be an overarching goal?

While analyzing 318 abstracts was not insignificant, further exploration of other journals would help to broaden this discussion. Perhaps most of all, we were concerned with developing a set of criteria for analysis that would afford a sense of the research being undertaken.

Figure 4
Balanced Research Orientation
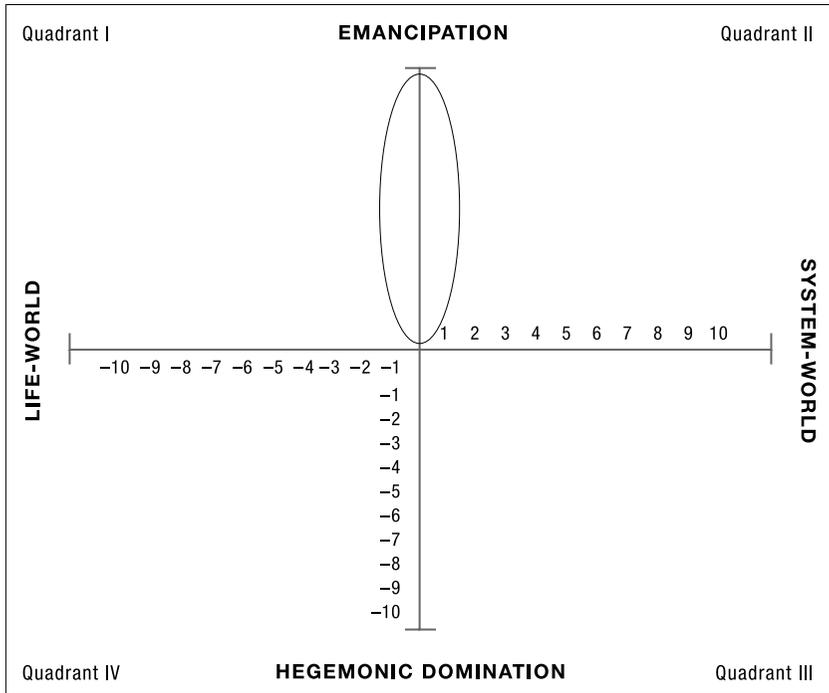
Thus, our particular interest in critical theory and critical social research more generally, inevitably framed our efforts to equate relevance to issues of social change with aspects of this particular ideological orientation. Further, we wanted to create a situation of open dialogue and debate about the field as it is represented in these journals. In this sense, even more than the results of the evaluation itself, it was the spirited debate about the abstracts that provided much fodder for discussion and reflection.

Conclusion: The Potential for Critical Leisure Studies

In terms of next steps, the methodological choices made for the development of the evaluation framework as well as the criteria for selecting the cases can be reviewed and expanded upon. This presents an opportunity to re-assess the field in a number of ways. First, an examination might be taken of papers written over a longer time-frame (i.e., beyond the 2000 to 2004 cut-off points) as well as from other journals in order to

more widely represent the field. Next, there is an opportunity to consider whether there are other identifiable trends besides the types of journals publishing this kind of research (e.g., are Americans publishing more of a certain kind of material than Canadians or Europeans? Is there a gender dimension in the sense that female researchers might be more likely to embrace these critical aspects? Is there one author in particular who seems to be most consistently undertaking this kind of research? Are there consistencies in terms of quadrant location over the course of large research projects undertaken by the same authors or groups of authors?) We might also begin asking whether some topics and/or methodological approaches lend themselves more to these kinds of considerations (e.g., are studies of poverty, race and gender more apt to embrace a deliberately critical approach than outdoor recreation and management studies?) and whether publication rejections are related to quadrant location.

As was noted at the outset of this paper, it is not our intention to judge the quality of the abstracts or the journals but to present one possible framework that might be used to assess whether leisure research, as represented by these abstracts in these four major journals, can be thought as meeting the criteria of social relevance, as has been asserted by some in our field. Ideally, this evaluation would push us all to engage more directly in questions of leisure research and practice as well as their roles as mechanisms for social change. Further, we have sought to encourage dialogue within the field as we reflect on the need to connect more directly with the worlds of those we research and their struggles with access, inequality, power, poverty, and marginalization. As Hemingway pointed out, critical theory is best placed to offer us both the theoretical framework and the political provocation to do this:

> Leisure studies has too often neglected the political element in leisure, thereby failing to confront one of leisure's more important connections to society as a whole.... It is a virtue of critical theory that it recalls this to our attention. Only a theoretic framework open to the political in the broad sense adequately addresses the emancipatory content and potential of leisure. Such a politically open framework is also necessary to unfold a radical democratic society based on the developmental conception of human activity. Leisure plays, or can play, a central role in the emergence of such a society. Critical theory is better suited to illuminate how this is the case than are the other paradigms of theory. (1999, p. 502)

Thus, there are at least three opportunities for further reflection and research. First, for researchers and practitioners, there is the chance to enhance our understanding of the direction of the field as well as to engage in and foster debate about that direction. Researchers and practition-

Acknowledgments

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