Journal of Ecotourism
Vol. 8, No. 1, March 2009, 1–17

Routledge
Taylor & Francis Group

Bringing ecotourism into focus: applying a hierarchical perspective to ecotourism research

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(*Received 22 January 2008; final version received 9 June 2008*)

Ecotourism is a complex phenomenon that has grown rapidly in the last three decades. The emerging field of inquiry based on this phenomenon has followed a similar trajectory of growth. Understanding the dimensions of its impacts can pose great challenges to researchers. As a result, ecotourism literature is characterised by continued debates of definitions, bias towards small-scale, one-shot case studies, and overall lack of coherence, and a dearth of explanatory theory. We discuss how hierarchy theory may be used to address these issues. Hierarchy theory has been applied in other disciplines to organise research inquiries, characterise the conclusions drawn from them, and reconcile competing definitions and theories. We explain how key concepts from hierarchy theory are of relevance to levels of analyses of ecotourism whether conducted on individual people or destinations or on the global phenomenon as a whole.

Keywords: ecotourism research; hierarchy theory; levels of analysis; scale

Introduction

Ecotourism is a complex phenomenon that has emerged rapidly over the course of the last two decades. Widespread use of the term coincided with the paradigm of sustainable development and publication of the World Commission on the Environment and Development's report *Our Common Future* (Brundtland, 1987). By calling for economic, social, and environmental sustainability in tourism, ecotourism became the golden egg of conservation and development agencies (Hawkins & Maun, 2007). Thus the 1990s saw an explosion of growth in this sector of tourism that continues today (Watkin, 2003; Nyaupane & Thapa, 2004). Research on ecotourism followed with a similar trajectory of growth. This research has been conducted from a variety of perspectives including the traditional fields of anthropology, biology, sociology, economics, forestry, geography, political science, and from emerging non-traditional disciplines such as tourism studies. However, the variety of perspectives used to examine the phenomenon, highlighted by a continuing lack of consensus on an accepted definition (see Diamantis, 1999; Sirakaya, Sasidharan, & S. Sönmez, 1999; or Fennell, 2001 for analyses of ecotourism definitions), has hindered the development of unified theory on ecotourism (Weaver & Lawton, 2007). Likewise, a reliance to date on a case study approach, while performing an important exploratory role in the initial establishment of the field, has yielded a distinct bias towards this

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ISSN 1472-4049 print/ISSN 1747-7638 online

DOI: 10.1080/14724040802283202
http://www.informaworld.com

methodology in the literature on ecotourism (Agrawal & Redford, 2006) and tourism in general (Hall, 2007). As a result, evaluations of ecotourism have produced mixed results and contradictions (Higham, 2007).

Today, ecotourism is not just a phenomenon but also an emerging academic field. The Social Science Citation Index includes 1 publication on the topic of ecotourism between the years 1980 and 1989, 188 publications between 1990 and 1999, and 403 since the year 2000. Google Scholar reports 76; over 4,600; and over 13,600 for these respective time periods. Peer-reviewed scientific journals are now dedicated specifically to ecotourism, and many others offer avenues for publication of ecotourism-related research. Accompanying this academic work is a substantial body of policy literature (Fennell, 2002). Many large international non-governmental organisations (NGOs) have branches specifically supporting research on ecotourism, including Conservation International, The Nature Conservancy, and the World Wide Fund for Nature.

In order to solidify this emergence, researchers need to move towards consensus on terms and definitions, develop theory, and reveal both biases and deficiencies within the body of research on ecotourism. Other disciplines are replete with examples of such distinctions. The field of cellular biology, for example, has theory and methods that are unique to that field and that are distinctive from both molecular biologists working at a finer level of analysis, and botanists, entomologists, or herpetologists working at larger levels of analysis on entire families, classes, or phylum. Some fields such as landscape ecology are dedicated to the examination of effects occurring at different levels of analysis ranging from organisms, populations, and ecosystems, to landscapes, biomes, and even the entire biosphere. Even simple analyses conducted at one level typically cannot be applied to other levels of analysis (Burt, 2006), as the geographical example in Figure 1 demonstrates. The seemingly obvious determination of direction yields completely different results when performed at different levels of analysis. If ecotourism is to continue to self-realise into a distinct field with a unifying theory of its own, it must establish the analytical levels at which its theories will operate. Not only will this distinguish ecotourism research from the larger body of work in tourism studies, but also unite the body of research coming from the various traditional disciplines under the umbrella of ecotourism as a field of its own.

In many of the indicated traditional fields of study, a *conceptual* hierarchy is used to structure the different levels of analysis that distinguish one subfield from another and to organise research within the subfields. Conceptual is emphasised here because while in some cases a hierarchical structure relates directly to differences in a quantitatively defined scale, in many cases it does not. It is often possible for an entire population or ecosystem (e.g. insect colony) to be smaller than a single organism (e.g. blue whale). Yet the study of geometry serves as an example of the dangers of discarding purely conceptual approaches. An abstract, conceptual approach is an extremely valuable tool for understanding the reality around us, even if the lines, shapes, and angles are never as perfect in real life as they are in geometry's abstract confines of Plato's Paradise. Ecotourism research likewise stands to benefit greatly from the establishment of a conceptual framework that allows us to organise the body of research, resolve issues of definition, develop unified theory, and ultimately determine what makes a piece of research truly *ecotouristic*.

This paper proposes the application of hierarchy theory to ecotourism research as a means of addressing such issues. This theory, established by Noble laureates Simon (1962) and Prigogine (1967) while working in economics and chemistry, respectively, was further advanced by Piaget in the field of psychology (1967) and has since been used across the gamut of fields of study from engineering to ecology (Ahl & Allen, 1996). Many of these fields have been used as a basis from which to study ecotourism, and there is every reason to believe this approach will serve the field of ecotourism as well. We will first present the fundamental, generic principles of hierarchy theory,

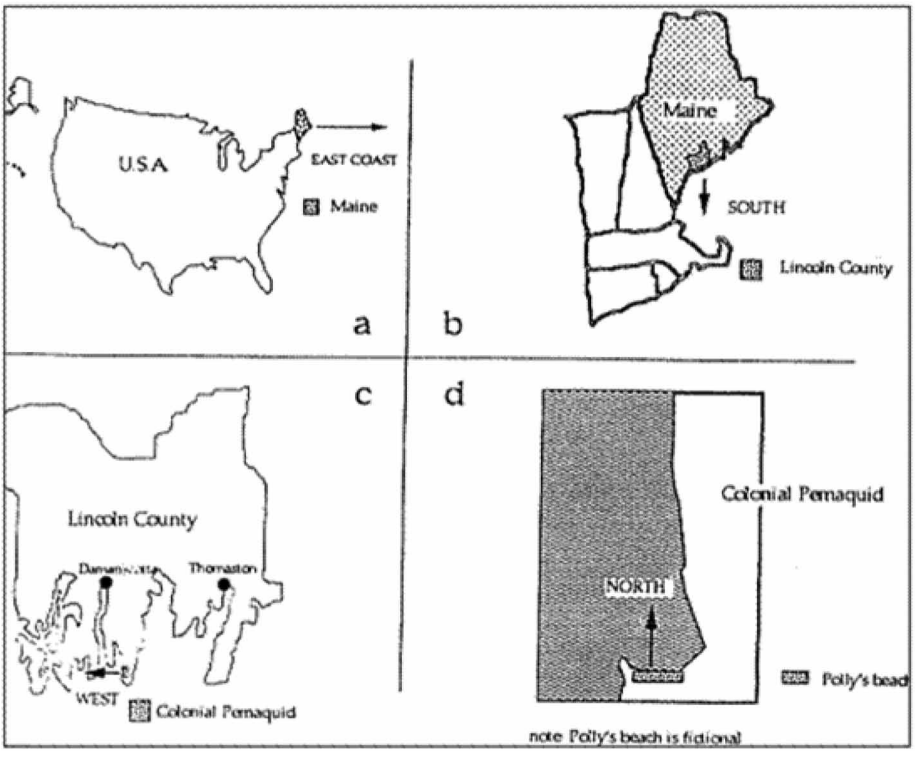

Figure 1. Determining cardinal directions at different levels of analysis.

which is used to conceptualise a multitude of phenomena and processes in the numerous academic disciplines in which it has been applied. We will then review some issues in ecotourism research that demonstrate the need for the organisation of this emerging field. Hierarchy theory will then be applied to ecotourism research in order to address the lack of definitional consensus, the inconsistent findings, and the bias towards particular methodologies. The paper concludes with a discussion of the hierarchical approach in relation to existing work on tourism and ecotourism, and some future research opportunities offered by this approach.

Hierarchy theory

'Hierarchy theory examines closely issues of definition, measurement scale, and purpose in scientific models' (Ahl & Allen, 1996, p. 28). It is particularly useful for resolving competing theories by revealing their distinct levels of analysis. Instead of achieving predictability by reducing complex problems down into tightly controlled factors, hierarchy theory expands problems to include not only the observed but the observer (1996). The following passage from Ahl and Allen's *Hierarchy Theory: A Vision, Vocabulary, and Epistemology* highlights the main principles of hierarchy theory:

> Hierarchy theory is a theory of the role of the observer and the process of observation in scientific discourse. It is a theory of the nature of complex questions that focuses on observation as the interface

> between perception and learning. . .In order to describe adequately a complex system, several levels need to be addressed simultaneously. Complexity therefore involves relating structures and processes that are observed at different scales. . ..By focusing on issues of scale, levels of organization, levels of observation, levels of explanation, and relationships between these levels, hierarchy theory offers an alternative to mechanical, reductionist approaches to complex systems. (1996, p. 29–30).

The definitions of key terms of hierarchy theory used throughout this paper are presented in Table 1. These definitions were developed after a review of literature related to the application of scale to the social science research (Gibson, Ostrom, & Ahn, 2000) and include several categories of hierarchies.

Hierarchy theory proposes that by limiting complex problems to a single phenomenon and a single time-space scale, it is possible to define clearly and *choose* the proper *system* to emphasise (O'Neill, 1988). As noted by Koestler (1967, p. 48), "'wholes' and 'parts' in this absolute sense just do not exist anywhere, either in the domain of living organisms or of social organisations." Any given system, process, or phenomenon of interest will itself serve as a part of a higher level, while at the same time serving as the context for lower levels (O'Neill, 1988). Each level represents a whole in and of itself. At the same time, each level simultaneously composes a part of an upper level and is composed of lower levels (Figure 2). This relative perspective contradicts the alternative notion of a whole as something complete needing no further explanation and parts being fragmented or incomplete.

Levels of analysis may be further characterised in a number of ways. In ecology for instance, *levels of organisation* are used to create hierarchies of ecological integration. These levels ascend from individuals to communities to populations to ecosystems to biomes to the entire planet or biosphere. Since they are not empirically defined, levels of organisation can be problematic at

Table 1. Definitions of key terms related to the concept of scales.

Term	Definition
Scale	The spatial, temporal, quantitative, or analytical dimensions used to measure and study any phenomenon
Extent	The size of the spatial, temporal, quantitative, or analytical dimensions of scale
Resolution (grain)	The precision used in measurement
Hierarchy	Conceptually or causally linked system of grouping objects or processes along an analytical scale
Inclusive hierarchy	Groups of objects or processes that are ranked as lower in hierarchy are contained in or subdivisions of groups that are ranked as higher in the system (e.g. modern taxonomic classifications kingdom, phylum, sub-phylum, class, family, genus, species)
Exclusive hierarchy	Groups of objects or processes that are ranked as lower in hierarchy are not contained in or subdivisions of groups that are ranked as higher in the system (e.g. military ranking systems general, captain, lieutenant, sergeant, corporal, private)
Constitutive hierarchy	Groups of objects or processes are combined into new units that are then combined into still new units with their own functions and emergent properties
Levels	The units of analysis that are located at the same position on scale. Many conceptual scales contain levels that are ordered hierarchically, but not all levels are linked to one another in hierarchical system
Absolute scale	The distance, time, or quantity measured on an objectively calibrated measurement device
Relative scale	Transformation of an absolute scale to one that describes the functional relationship of one object or process to another (e.g. the relative distance between two locations based on the time required by an organism to move between them)

Sources: Turner, O'Neill, Gardner, & Milne (1989a, p. 246); Mayr (1982, p. 65); Allen & Hoekstra (1992) in Gibson et al. (2000).

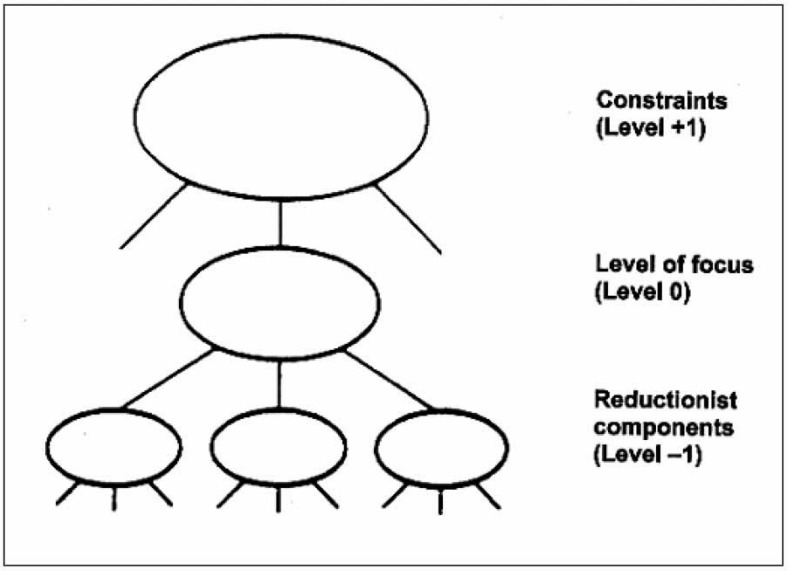

Figure 2. Hierarchy theory schematic (adapted from Dyer & Vinogrodov, 1990, p. 20).
Source: Gibson et al. (2000).

times. For instance, an individual elephant is much larger than a community of ants. Yet, conceptually this is often a powerful first step in organising processes or phenomenon. Using a metric to quantify the levels is usually preferred, as it avoids the issues of scale demonstrated in the previous example. This is the case in geography where spatial extent is measured in units of distance or area (Burt, 2006). When based on empirically determined frequencies or characteristic processes, *levels of observation* are said to comprise the hierarchies. While levels of organisation and levels of observation can at times be used interchangeably, this distinction of being either empirically defined or merely conceptual is quite important and certain disciplines may tend to refer to only one or the other type of level. This paper will often refer to the different types of levels collectively with the general term *levels of analysis*.

Due to their hierarchical nature, any given study must take into consideration a minimum of three levels: (1) the focal level, or level of interest, (2) the level above, which constrains and controls the lower levels, providing the context for the focal level, and (3) the level below the focal level, which provides the details needed to explain the behaviour observed at the focal level (Turner, Gardner, & O'Neill, 2001). Many times, the focal level is assigned a value of 0, and levels above and below assigned a $+1$ or -1, respectively. 'The general rule is: higher levels of organization are populated by entities that are spatially large, or whose characteristic behavior is low-frequency; and lower levels of observation are populated by spatially small or high-frequency entities' (Ahl & Allen, 1996, p. 91). The difference in rates or frequencies of characteristic processes is one of the most common ways that levels are distinguished in a hierarchical system (Turner et al., 2001).

On the one hand, upper level dynamics are considered much lower in frequency than the next lower level and therefore appear as constant or driving variable (O'Neill, 1988). They are characterised as constraining, binding, or controlling the lower levels. It is these characteristics that force us to refer to the higher levels to understand the significance of behaviours taking place at the focal level. O'Neill has provided the example of reproductive behaviour – it is difficult to explain at the individual organism level, but at the level of a population, is obviously very

significant (1988). By providing context, the upper levels help answer 'why?' questions. Lower levels, on the other hand, must be consulted for explanation. They provide the details needed to explain the behaviour observed at the focal level, and answer the 'how?' questions (Turner et al., 2001). For example, in order to explain the phenomenon of consciousness, the collective behaviour of neurons operating at a lower level must be examined. This property is not present at the level of individual neurons, yet through their collective behaviour the new property of consciousness emerges at the upper level.

Understanding any phenomenon therefore depends on referencing both the next higher and the next lower levels of analysis. Levels beyond one increment of resolution (less than −1 or more than +1) are either too large or slow as to be ignored, or too fast and small to appear as anything but background noise when observing the focal level (O'Neill, 1988). By maintaining an awareness of a minimum of three levels however, we can keep ourselves informed as to the 'how?' and 'why?' of any behaviour or process of interest. Hierarchy theory facilitates the scientific study of complex phenomenon by this focus on a particular subset of behaviour within a well-defined context.

A hierarchical perspective of ecotourism

The phenomenon of ecotourism is but one component of a larger tourism phenomenon, of the market economy, and of the global conservation effort. It is composed of networks of ecotourism initiatives, of individual lodges, and of numerous NGOs and agencies supporting such work. Ecotourism research can therefore cover a wide range of levels of analysis, from collective global impacts to impacts on individual persons or species. The choice of level will obviously determine the concepts of interest and the outcomes in that analysis (Cocklin, Blunden, & Moran, 1997). For instance, the properties of ecotourism that emerge at a global level and the metrics used to examine them are vastly different from those emerging at an individual level. Likewise, the metrics used to evaluate social impacts differ from those used to examine economic or environmental impacts (Figure 3). The dependence on context for meaning has impeded consensus on how to define ecotourism and how to generalise about its impacts.

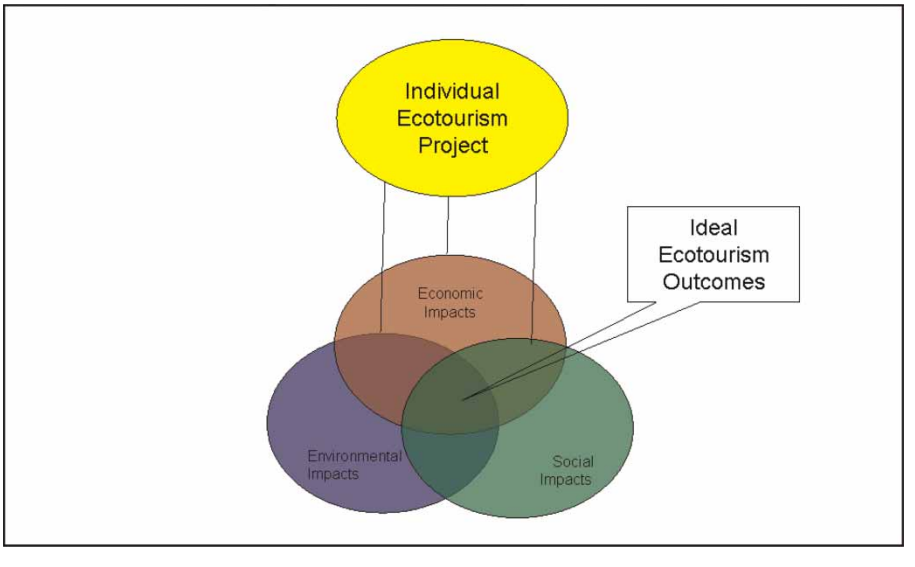

Figure 3. Components of sustainability in ecotourism.

Hierarchy theory dictates that a minimum of three nested levels must be considered in any given analysis – the level of interest and the levels directly above and below. Through this organisation of hierarchically determined lower level enabling factors and upper level constraints, it is apparent that certain processes or phenomena may serve in both capacities as the level of interest changes. This chicken-or-the-egg situation will no doubt be clarified through the opening of this dialogue on hierarchical approach to ecotourism research and, of course, by expanding both the grain and extent of our research foci. What serves as a constraint or is of secondary importance at one point in time may be seen a crucial enabling factor when considered across a longer time span, or vice versa. However, in order to initiate the dialogue, we will start with a tentative separation of the processes and phenomena that appear to enable ecotourism success from those that appear to constrain or limit its success.

With respect to the ecotourism research to date, the process or phenomenon of interest is typically an individual ecotourism project, often embodied by an eco-lodge which serves as its focus (Kwan, Eagles, & Gebhardt, 2008; Osland & Mackoy, 2004) (Figure 4). With the level of interest in this instance being an individual ecotourism operation, the challenge is to identify appropriate and useful lower and upper levels with which to contextualise this focal level. Hierarchy theory dictates that the lower level be conceptualised as the state variables and the upper level as the background. However, the choice of which variable to utilise will depend on which aspect of ecotourism is being addressed. We now proceed with some specific examples of how upper and lower levels might be conceptualised in relation to existing scholarly ideas about ecotourism.

According to hierarchy theory, the lower levels of the hierarchy are typically populated by 'spatially small, high frequency' entities, processes, or phenomena that provide the explanation for behaviour. Ecotourism research has identified many such factors, which are believed to contribute to ecotourism outcomes. Social capital, referring to relations of trust, reciprocity, common rules, sanctions, and norms within communities, is directly related to the ability of community to act collectively towards common goals including those of ecotourism (Pretty & Ward, 2001; Putnam, 1995). Likewise, the strength of local institutions, or sets of formal and informal rules that shape interactions of humans with nature, has an influence on ecotourism outcomes

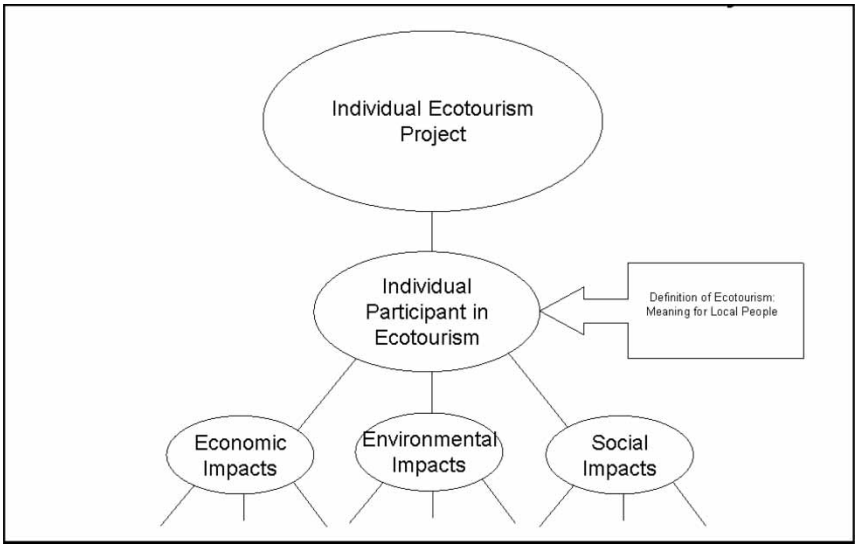

Figure 4. Ecotourism at an individual level of analysis: meaning of ecotourism defined uniquely by each individual.

(Agrawal & Gibson, 1999; Ostrom, 1990). The experience and expertise levels of local participants in ecotourism projects vary widely, as do existing environmental ethics at the time of ecotourism project development. Compatibility of local subsistence activities and other typical means of employment will play a role, as do market prices for inputs such as produce, dairy, meat, and key services such as local transportation. Vision, foresight, and entrepreneurial spirit also play a key role in ecotourism outcomes. Proximity to other protected areas is an important factor. These are state variables and represent lower level phenomenon or processes that enable ecotourism project success, and which we must consult in order to explain how an ecotourism project succeeded or failed. Our definition of ecotourism must be adjusted to accommodate this context (Figure 4).

Upper levels, on the other hand, are comprised of entities which are much larger and work at a much lower frequencies so as to be considered constants, binding the lower levels. A variety of market-related factors including but not limited to local eco-lodge competition and market saturation, non-locally determined transportation rates such as airfare, and overall tourism demand, are higher level, constraining factors. Natural disasters such as tsunamis and hurricanes can devastate any form of tourism development including ecotourism. Political turmoil and conflict likewise serve as limiting factors in certain situations. Costa Rica thrived on ecotourism in the 1980s and 1990s, while its next-door-neighbour Nicaragua, equally blessed with charismatic landscapes and wildlife, was mired in counter-revolutionary conflict. Geography and local biodiversity in and of itself play major roles in the appeal of ecotourism projects.

Governmental policies, efficacy of national agencies, tax incentives, and the availability of external support through training, development grants, and/or NGOs also affect the expression of ecotourism. Analysing the ecological impacts of ecotourism at the global level, despite demonstrated positive outcomes at the local level, often reveals a net negative environmental impact (Hunter & Shaw, 2006). This is primarily due to emissions from air travel which comprise 90% of a trips' contribution to climate change (Gossling, 2002). Advances in energy technology will hopefully reduce the impacts of travel, but for the time being this also represents an upper level constraint to the positive environmental impact of ecotourism. No strategy taken at the local, project level can adequately address it. Strategies therefore need to be implemented at a much higher level, perhaps through voluntary environmental behaviour of travel industry CEOs (Rivera & De Leon, 2005), or operators who offer to offset substantial air travel impacts through the purchase of carbon credits (Gossling et al., 2007). Hierarchy theory will help identify the levels where constraints occur, and therefore the appropriate levels for taking action to affect certain outcomes.

Conceptual diagrams for organising ecotourism research

We will now extend the application of the hierarchical approach to increasingly higher levels of analysis, roughly following those identified by Hall in Table 2. We have shown how ecotourism is defined uniquely at each level. In this example, the next higher level beyond 'individual' is an ecotourism project (Figure 5). The definition of ecotourism adopted by project administrators and/or owners, as well as the behaviour, phenomenon, and processes at this level, will bind the meaning of ecotourism for the individuals at the lower level. Yet the state variables, or lower level components, are comprised of those individuals, and their collective behaviour is what enables the unique expression of ecotourism at the next higher level – the ecotourism project.

As we continue to move up the hierarchy, we come to the regional level of analysis (Figure 6). Here, numerous individual ecotourism projects populate the lower component levels. Their collective behaviour enables the emergence of economic, environmental, and social impacts at the regional level. Here, the meaning of ecotourism will derive from national institutes of tourism,

Table 2. Scale in tourism analysis.

Socio-economic systems	Biodiversity	Climate
International	Global	Macroclimate
Supranational	Continental	
National	Biome	
Regional	Bioregional	
	Landscape	
Local	Ecosystem	
Family	Stand/field/communities	Mesoclimate
Individual	Individual species	Microclimate

Source: Hall (2007).
Note: Shading indicates extent to which certain scales of analysis have been studied.

influential NGOs, or regional certifying bodies. These socio-political bodies, regional economic trends, and processes of nature including the regional climate (not the weather) represent the background on which individual ecotourism projects operate.

Another step up the hierarchy takes us to the global level (Figure 7). Here, the lower level components are dominated by ecotourism activities in the regions where this form of tourism

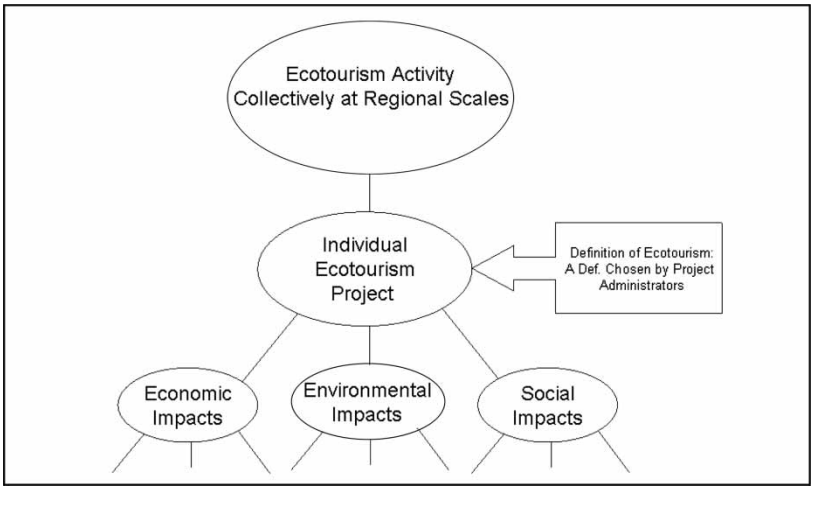

Figure 5. Ecotourism at the local level of analysis: meaning of ecotourism defined by project managers and/or owners for their own operation.

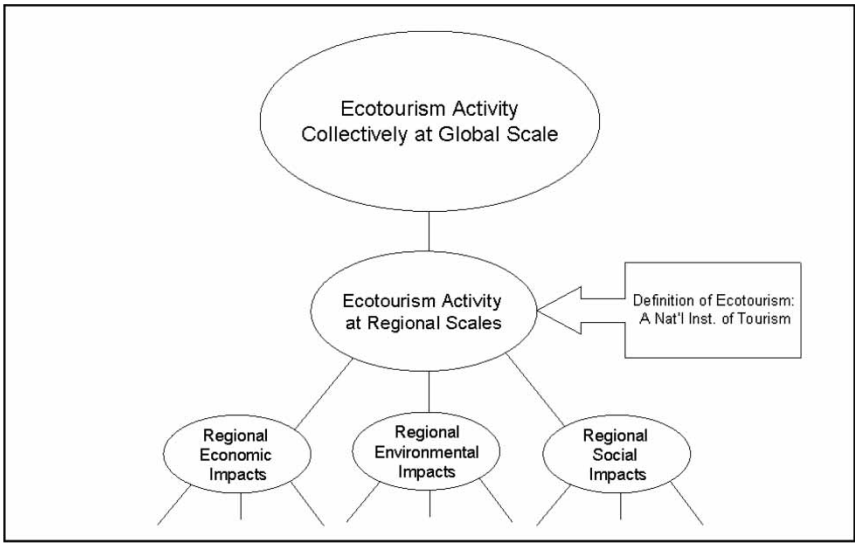

Figure 6. Ecotourism at the regional level of analysis: meaning of ecotourism defined collectively by larger institutions such as national institutes of tourism or NGOs.

predominates. Their emergence into ecotourism's global impacts leads to still a different definition of ecotourism, such as those maintained by influential bodies including large conservation-related NGOs such as The International Ecotourism Society. Following Koestler's (1967) idea of holons, this global level of analysis of ecotourism is a whole composed of the collective economic, environmental, and social impacts of ecotourism activities in the various regions. At the same time, this level is a component of a still larger hierarchy where ecotourism is but a single niche within the broader phenomenon of tourism. Just as each individual or entity

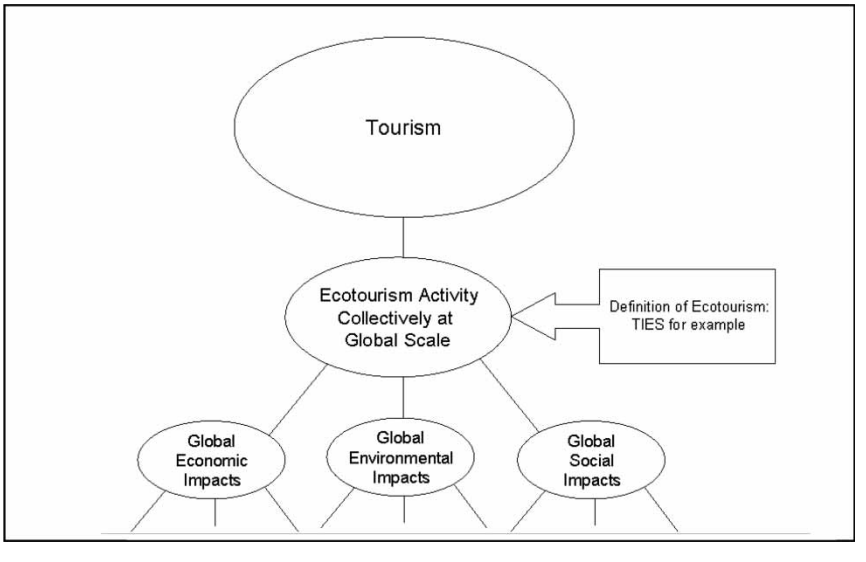

Figure 7. Ecotourism at the global level: ecotourism defined by global bodies such as The International Ecotourism Society.

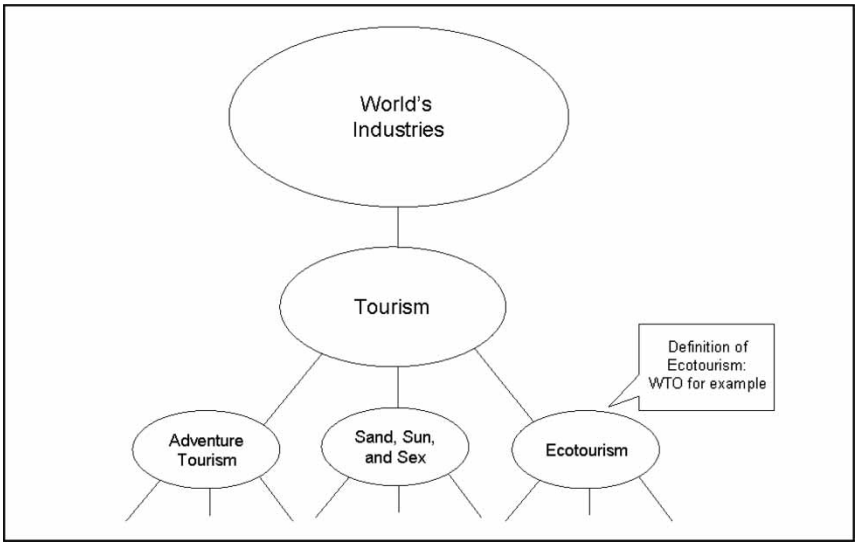

Figure 8. Ecotourism in a hierarchy of the world's industries: ecotourism defined by global tourism bodies such as the World Tourism Organization as one of many subcomponents of interest.

populating the lower levels of analysis conceives ecotourism in a unique way, definitions of ecotourism at these upper levels of analysis likewise come from various agents. Here, definitions coming from global bodies addressing all forms of tourism, such as the World Tourism Organization of the United Nations, may be more appropriate. While such definitions may have commonalities with other bodies at the global level, they would probably share little with the meanings locals from impoverished countries attribute to the ecotourism projects existing in their communities. Trends within tourism, in other larger industries of which tourism is a part (Figure 8), and in natural global processes will bind the activities of interest at this level. In any given analysis, this might include fluctuation of worldwide fuel prices, economic recessions, global climate change, international treaties or laws, and of course wars and armed conflicts.

These hierarchical examples in Figures 4–8 essentially represent different levels of spatial analysis. However, the hierarchical approach applies just as effectively to differing levels of temporal analysis. The case study approach that dominates ecotourism research has a severe temporal handicap, representing merely a snapshot in the history of a project. It is rather oxymoronic to assess a phenomenon designed for sustainability such as ecotourism with only a one-shot case study. Even if sustainability could be determined, this begs the question 'for how long?' Time is not linear and myriad time scales can be shown to operate at the same time (Geores, 2003). The time scales of the local, regional, and global spatial scales discussed earlier are each unique. While a five-year outlook may be acceptable to a globally operating international NGO, local participants in ecotourism may require immediate benefits (Turner et al., 2003). When ecotourism is examined across greater temporal extents, it has been seen in certain situations to devolve into normal, mass tourism through strengthened extra-local interests which seek more tourists and broader promotion, and weak local political systems not capable of controlling such economic activity (Weinburg, Bellows, & Ekster, 2002). In one community involved in ecotourism, once people began earning profits in the short term, everything appeared positive (Gordillo et al., 2008). Yet as they began to pass a certain threshold of increased wealth, their expectations increased as well, generating new levels of discontentment. What they do with profits in the short term has little obvious effect on resources and/or conservation. However, in

the longer term, the detrimental effects become more pronounced as people begin to accumulate capital and invest it in resource exploitation (Stronza, 2007). As the field of ecotourism is young, it is only natural that it suffers from a deficit of longitudinal work. We can be optimistic that these types of temporally expanded analyses will begin to appear in the ecotourism literature in the coming years. Hierarchy theory can help prepare us to analyse ecotourism outcomes along temporal levels of organisation in order to identify and understand some of the important thresholds and constraints as they occur over time.

Discussion

The attention given to scale issues in the social science literature is growing (Gibson et al., 2000). Yet given the amount of research conducted on ecotourism over the last two decades, scale issues remain noticeably absent. Ecotourism as an emerging field has yet to treat this concept systematically as it is in other fields, and only a small handful of writings specifically address the issue. One early discussion of scale in ecotourism focused on tour operator size and suggested smaller is better (Tomlinson & Getz, 1996). This was later challenged by Lück (2002), who demonstrated that large-scale tour operators are also capable of adhering to principles of minimal impact. More recently, it has been recognised that ecotourism's objectives of biodiversity conservation, economic development, and social well-being operate at different scale levels and that the different levels of analysis used to evaluate them have contributed to the inconsistencies seen in the academic writing on ecotourism (Hunt & Stronza, 2006). Hall (2007) presents this trend in relation to the overall study of tourism, highlighting not only a predominance of analyses at small scales, but also a range of levels of analysis that have been virtually neglected in ecotourism research. These writings represent a recent acknowledgement of the importance of scale to ecotourism research.

Surprisingly, no attention has been given specifically to hierarchical theory with its focus on levels of organisation and issues of scale (Ahl & Allen, 1996). This theory provides directions not only for guiding the development of research that treats scale systematically but also for organising the existing work on ecotourism. The enormous complexity that ecotourism as a phenomenon represents has hindered such organisation; yet, it is precisely because of this complexity that studies need an organising principle in order to determine their place within the larger body of research. Rather than re-invent the wheel, hierarchy theory is a framework for making such decisions and comes with a very productive history of furthering scientific understanding in numerous other disciplines. It also forms the basis for other approaches being taken to examine other forms of tourism.

Political ecology emerged from debates in ecological anthropology, cultural ecology (Steward, 1955), and systems ecology (Rappaport, 1967), which dealt with the effects of political dynamics on the natural environment (Painter & Durham, 1997). According to Stonich (1998, p. 28), 'political ecology attempts to understand how environmental and political forces interact to affect social and environmental changes through actions of various social actors at different scales (levels of analysis)'. This multi-disciplinary approach has seen application in tourism. Stonich (1998) used it to demonstrate how the negative impacts of tourism, despite being attributable to national and international stakeholders, are disproportionately borne by impoverished locals. She later demonstrated the cross-scale linkages inherent in the development of marine-protected areas and tourism (Stonich, 2003). Patterson and Rodriguez (2003) realised their analysis of tourism and politics in Dominica at the domestic, the trans-national, and the international scale levels using a political ecology approach. Young (1999) reveals that the intertwining influences of large-scale commercial claims to common pool resources undermine marine conservation via ecotourism.

Complex systems theory has also been proposed to address multi-level complexity in tourism. This approach is derived from a set of related theories including hierarchy theory (especially Prigogine, 1967; Simon, 1962) as well as chaos theory (Lorenz, 1993), catastrophe theory (Thom, 1975), and theories of self-organisation (Prigogine & Stengers, 1984). Ferrell & Twining Ward (2004; 2005) are critical of existing research on tourism coming from the social sciences, citing 'an anti-systems barrier that has plagued anthropology for decades' (p.113) and other shortcomings of traditional, reductionist approaches in disciplinary science. They propose envisioning tourism systems as an ecosystem in order to address the complex, uncertain behaviour that has been demonstrated in biophysical and socio-economic systems (Holling, 1973).

The hierarchical approach to ecotourism we present here likewise draws parallels with ecology, but rather than focus the comparison on a single level of ecological integration (e.g. an ecosystem), we propose expanding this perspective to include higher and lower levels of analysis. In ecology, levels of ecological integration are organised by organisms, populations, communities, biomes, and biospheres. As we have shown, in ecotourism, research can be organised into levels ranging from individuals, to projects, to regions, and finally to the entire globe (Figures 4–8). Adapting systems thinking to *each* of the multiple levels of the ecotourism hierarchy will be important for analysing the dynamic states, expected behaviour, and stages of their respective adaptive cycles of variables at different levels of interest (Gunderson & Holling, 2002) as seen in the two large-scale, multi-disciplinary tourism research projects that Ferrell and Twining Ward cite as exemplars of the future of 'sustainability science' (2005, p. 111).

For the time being, smaller scale efforts have dominated ecotourism research and it is important to retain their merit. Rather than highlight the shortcomings of lower level or less-complex analyses, we hope to unify these efforts into the emerging line of inquiry that is the field of ecotourism research. This theory not only provides the conceptual structure necessary for pinpointing the analytical levels or parts of a system that other 'less-complex' pieces of research have addressed, but also allows for a framing of the results of given study within the larger body of research. Just as the complex adaptive systems approach has been developed over 'many decades of research by ecosystem ecologists' (Ferrell & Twining Ward, 2005, p. 115), our understanding can be advanced even through modest investigations. It is because of this ability of hierarchical organisation to integrate previous and future research into our evolving understanding of ecotourism that we believe this approach to be both parsimonious and comprehensive. The simple must necessarily come before the complex, and to date, tourism and ecotourism research (Dann, Nash, & Pearce, 1988; Hall, 2000; Hall & Butler, 1995) tend to lack even basic theory.

Fortunately in the field of ecotourism research, mixed methods, multi-level analyses are beginning to appear. Almeyda Zambrano, Broadbent, and Durham (2007) demonstrated positive outcomes of ecotourism in a study of Lapa Ríos en Costa Rica. This study separated ecotourism impacts into separate economic, environmental, and social components and compared each of these at multiple levels of analysis with control groups. Further such elaboration of the hierarchical approach will allow us to differentiate the impacts of individual ecotourism projects from collective impacts of multiple projects at higher levels or to illustrate the competitive advantages of acting collectively via networks (Dredge, 2006a; 2006b). By looking at component lower levels and constraining upper levels in each case, strategies for the optimisation of the positive outcomes of ecotourism at both the project level and at the increasingly higher levels of collective activity can be more effectively designed and implemented.

Conclusions

Scholarly opinion about ecotourism remains divided among proponents and detractors (Higham, 2007). This lack of consensus, further evidenced by the inability to arrive at an agreed-upon

definition, along with a dearth of unifying theory, diminishes the ability of the field of ecotourism research to progress. Without collaboratively analysing the phenomenon, we as researchers cannot provide guidance to practitioners in the development, operation, evaluation, critique, or optimisation of the positive outcomes of ecotourism projects. Meanwhile, oblivious to the debates raging in academia, ecotourism in practice marches on. It is alarming that despite the lack of consensus about how to achieve ecotourism success, NGOs (Christ, O. Hillel, Matus, & Sweeting, 2003), governments (West & Carrier, 2004), and regional initiatives (Basnet, 2004) continue to call for the increased development of ecotourism and even a 'scaling up' of the phenomenon (Epler Wood, 2005). Just as dangerous as scaling up ecotourism without a full understanding of its effects is getting caught in the 'local trap' where efforts at a local scale are considered inherently more likely to have desired social and ecological effects than are activities at other scales (Brown & Purcell, 2005). While the design of specific ecotourism projects may benefit from small-scale thinking, the collective impacts of the phenomenon of ecotourism must now be recognised as large-scale and global (Gossling, 2000; Hunter & Shaw, 2006).

The purpose of this paper has been to present the utility of hierarchy theory to ecotourism research. *Our Common Journey*, the National Research Council's follow-up to the World Commission on Environment and Development's *Our Common Future*, establishes two priorities for research: (1) initiate focused research programmes on a small set of understudied questions that are central to a deeper understanding of interactions between society and the environment, and (2) promote better utilisation of existing tools and processes for linking knowledge to action in pursuit of the transition to sustainability (1999). Hierarchy theory is an existing tool with demonstrated utility in many disciplines, and by applying a hierarchical perspective to ecotourism research, we draw attention to the levels at which the majority of analyses have taken place and in the process highlight understudied questions in the field and corresponding gaps in our understanding. Given such a wide scalar canvas on which to conduct an analysis of ecotourism, this organising principle is necessary for the reconciliation of inconsistencies in the field, appropriate contextualisation of analyses, effective comparison of disparate results, and the development unified ecotourism theory.

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