Seven Steps Towards Sustainability: Tourism in the Context of New Knowledge

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This paper is about tourism and change. It examines changes that have taken place in politics, policy, development, conservation, human–environmental relations, and the convergence of these areas over the past 30 years, especially during the past decade. As the result of international cooperative scholarship, some old concepts of how the world works are shown to be giving way to a new focus. It discusses how, instead of managing tourism through attempting to maintain stability, new thought guided by close observations of reality, depicts a world full of uncertainty that is constantly changing and evolving, and where enhancing resilience to disturbance replaces the former focus on achieving stability. This is not a universal paradigm shift, but it is a shift nevertheless. It shows how a new world-view is gradually supplanting the old, and it suggests that this view and its leaders, cannot be ignored. The paper presents readers with seven introductory steps on the road to greater understanding of sustainable tourism in the context of complex system dynamics, in the hope of enabling a more effective transition to sustainability.

Keywords: adaptive management, complex adaptive systems, integration, non-linear science, revised ecosystem ecology, sustainability transition

Introduction

New knowledge of the way in which systems function suggests that nature and human activity should be viewed and studied, not separately but as integrated, *complex adaptive systems,* also termed social-ecological systems (SESs). All living things, human and non-human, and their surroundings exist as communities and networks governed by their own particular behaviour and to a considerable extent they are structured by forces and interactions of complex systems themselves. It is the forces generated within systems that produce continual uncertainty and unpredictability and confound those attempting management through rigid control. Although tourism practitioners may know something about social and ecological systems when looked at separately, in reality they know little if anything about complex systems or of merged SESs whose terrestrial landscapes are observed and experienced every day and that are largely the raison d'être of tourism (Holling & Sanderson, 1996).

While at school and university, students at various levels and after graduation in their daily lives, learn the well-established world-view that the Earth (nature,

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the economy, the stock market, personal health, political climate and tourism) is normally in balance and although there are disturbances, if treated properly things will ultimately return to expectable normality, a state of apparent equilibrium. This falsely optimistic principle has long governed the scientific study of nature as well as most of the social sciences, including economics and tourism. But it is now known that people's lives are enmeshed in the interactions of mainly complex systems in every sphere of activity. These systems are periodically stable, but never permanently so. Events usually triggered by multiple causes have uncertain consequences, and because complex systems operate over a variety of *temporal* and *spatial scales*, little is likely to result simultaneously at the time expected or on the scale imagined. This is pivotal to any thoughts of achieving sustainability. Policy decisions may take from weeks to years for all goals to reach fruition. Those concerning human control of resources (like social policy) may cause cascades of surprising outcomes, some of which when they finally arrive may be quite out of proportion to the magnitude of the original inputs. Others, which take a long time to reveal themselves, may be recognised too late for us to do anything about them.

The nature of sustainability is vitally affected by these changes and this leads to the unhappy realisation that present approaches to tourism serve students and researchers poorly, providing no more than a partial explanation with which to work. To manage human activity within ecosystems it must be acknowledged that as a complex system of people, land and ideas, sustainability concepts are themselves forever evolving, adapting to site and regionally specific conditions, and they can never be cast as universal. Because a set of interacting variables behave in a particularly successful way in one place does not mean they will behave similarly elsewhere. Each place or destination is unique in its combination of characteristics and its expressions of *self-organisation*: the size, arrangement and character of lakes, coastal areas, transport net, habitations, schools and hospitals, shopping facilities, mountains, hotels, recreation facilities and areas, water supplies, agricultural resources, tourists and local population are all intricately connected in a network in which the alteration or disturbance of one component from within or without, may affect a hundred others. Sustainable development then, must be viewed as an evolving complex system that co-adapts to the specifics of the particular place, and especially to the aspirations and values of local people. To assist readers to comprehend this new approach to sustainability and the common search for a *sustainability transition*, the discussion below takes the form of a series of steps: 'seven steps towards sustainability'. Before discussing these steps in detail, the contextual foundation for this new philosophy is introduced.

Three Threads of Understanding

Ideas written here have come from three development threads, and from these threads a number of major ideas have been selected to illustrate a more unified and appropriate approach to tourism. The first and probably most relevant is the *revised ecosystem ecology* thread. This thread developed energy in the early 1960s and it progressively gained strength during the next 40 years while new biology was emerging (Botkin, 1990). Revised ecosystem ecology combines insights

discussed later about the structure, function and behaviour of complex adaptive ecosystems, the integration of human and natural systems (social-ecological systems), resilience versus equilibrium and sustainable development (Folke *et al.*, 2002; Gunderson & Holling, 2002; Gunderson *et al.*, 1995; Holling, 1995).

The second and much later thread, that of the *sustainability transition*, borrows some ideas from the first and has several contributors in common. It incorporates the views of a group of distinguished US and later similarly qualified international, interdisciplinary scholars. Its inception dates from the 1990s and the focus is primarily on the scientific underpinning of sustainable development in a world-wide context. This thread incorporates a 'place-based' understanding of the interactions between environment and society, and it adopts a systems approach using adaptive management and social learning. Together with the development of an interdisciplinary *sustainability science* to accommodate new ideas, the focus of the thread is the need to continuously strive for a transition towards sustainability because continual change and evolution prevents the attainment of simultaneous sustainability. Many new insights for this group come from the research of global change scientists (Steffen *et al.*, 2004).

The third thread, unrecognised to most tourism researchers, is the little developed and quite discontinuous *non-linear tourism thread*. Non-linear tourism starts not with the work of social scientists in the tourism community, but with ecosystems ecologists. In the early 1970s several ecologists and interdisciplinary colleagues from a number of departments at the University of British Columbia, working with local government departments, mounted an ambitious exercise to survey the Gulf Islands of British Columbia in terms of their possible futures for tourism and recreation, for the populations of Vancouver, Victoria and Seattle. This involved a futures simulation model for the islands and a series of stakeholder workshops lasting a number of months and using adaptive systems thinking and scenarios . This effort was commended for its pioneering contribution to sustainable development by the National Research Council (NRC) report on sustainability transition, entitled *Our Common Journey* (NRC, 1999: 156).

Almost at the same time, UNESCO launched its Man in the Biosphere Project, targeting threatened places in the European Alpine areas. Obergurgl, a ski village in the Austrian Alps, was selected as the pilot study and, over a 12-year period, 80 scientists and a local stakeholder committee conducted probably the first and perhaps the most complete sustainability survey ever envisaged, using probably the widest array of natural and social parameters ever to have been attempted. Several systems ecologists from the Gulf Islands study, now in Austria with the International Institute for Applied Systems Analysis (IIASA), helped create the Obergurgl Simulator Model (1974). The methods used provided a template for a number of subsequent surveys in the European Alps and elsewhere (Moser & Petersen, 1981; Moser & Moser, 1986).

The purpose of mentioning these early episodes is to illustrate the shortcomings of contemporary orthodox tourism study that is structured on purely disciplinary lines, is largely social science or business oriented, and frequently ignores the natural sciences and interdisciplinarity, both of which are important components of sustainable development. If tourism's research focus had not

been so narrow it could perhaps have been in the vanguard of sustainability study today. Had the research community investigated where the thread had started some members would not now still be presenting insights that could have been appropriate more than a quarter of a century ago. It is no wonder that each of the three threads is critical of conventional, science-defined disciplines that draw barriers around themselves.

It is argued in this opinion piece that there are probably no more that two-dozen tourism researchers who have drawn inspiration from the other two threads and applied these to tourism. Murphy (1985) saw the necessity for expanding tourism study, as others have since, from its 'industrial core' (defined by Farrell & Twining-Ward (2004: 279) as 'the assemblage of structures, goods, services and resources directly contributing to the sector') to the affected community. In addition, he introduced dynamics and believed there was an analogy between a destination life cycle and that of an ecosystem passing through a succession of predictable stages. This was a leap from the status quo, but unfortunately ecosystem cycling was already being radically revised by workers from new ecology. The new cycle devised by Holling (1986) and reproduced in Farrell and Twining-Ward (2004), was a much closer fit with reality and far more comprehensive in terms of system dynamics than the widely accepted orthodox view that all systems eventually seek a steady, climax state. A portion of Holling's cycle shows similarity to Butler's (1980) tourist area cycle, the implications of which are discussed further in Farrell and Twining-Ward (2004). Murphy, two years before Holling published his work, was likely unaware of changes taking place in ecosystem ecology and, as might be expected, stayed with the established system. Following this, Pearce (1989) and Mill and Morrison (1985, 1992) placed tourism in a systems setting, while Leiper (1989) and Simmons and Leiper (1993, 1998) took this a step further, indicating that each system had numerous environments, both natural and social with which connections were pervasive. Most writers after Murphy were, however, plainly oriented toward seeing the tourist industry mainly in its commercial role, and apart from a realisation that systems had spatial dimensions there was little to no cognisance of the multidimensionality of systems or of their thermodynamic flows and configurations.

The 1990s saw further advances and greater sophistication in the work of Faulkner and Russell (1997), Hein (1997); Laws *et al.* (1998); Russell and Faulkner (1999, 2004), and McKercher (1999), which particularly focuses on uncertainty, an aspect of system dynamics, and the shortcoming of cause and effect science for dealing with such situations. Russell and Faulkner's later work (2004) was largely a continuation of past themes.

The turn of the century saw numerous advances on what had come before and the link between the centuries was filled appropriately by Walker *et al.* (1999), a group from Sustainable Ecosystems, CSIRO in Australia, which transferred methods of systems analysis and thinking from ecological field work to nature-based tourism in tropical north-eastern Queensland. Here they developed and introduced the 'Tourism Futures Simulator', a collaborative exercise with stakeholders to examine the intersection of tourism, the economy and the environment with an interactive tool (see the earlier Gulf Islands Project). Over the next few years the team mounted somewhat similar projects involving

community partnerships in the tourism areas of the Snowy Mountains and the Tapestry Region of Western Australia.

Between 2003 and 2005 work from all three threads and a variety of sources has been brought together. Abel (2000, 2003), an anthropologist and computer scientist, working at the same time as the present researchers, published a thorough study on the ramifications of the introduction of ecotourism on the society and economy of the island of Bonaire. He took a non-linear ecosystem's approach and, more than any other study, he modelled the system on the basis of energy flows, feedbacks, and energy dissipation. Together with his colleague Stepp (Abel & Stepp, 2003), he showed how a complex adaptive systems/ecosystem approach was now an appropriate and valid way to approach cultural ecology, crossing an anti-systems barrier that had plagued anthropology for decades. Farrell and Twining-Ward (2004) and Twining-Ward and Farrell (2005) go further and they applied the new non-linear knowledge specifically to tourism in a more unifying manner, and did so in a context of sustainable development.

Some of this recent research runs counter to previous thinking and is not quickly assimilated. The aim here is to assist readers to grasp the basics of this new thinking and to understand how it affects sustainable development research, no matter from where it originates. The 'steps' in the title are not all sequential, but are believed to be important signposts on the road travelled. These are by no means the only signposts, just the most salient points by way of an introduction to these new directions. The presentation is intended to be as simple as possible, and should readers develop an interest in what they read, the cited sources listed as references are a recommended supplementary, and easily available set of readings.

Step One: Understanding Complex Adaptive Systems

The first step begins with the recognition, understanding and acceptance of *complex adaptive systems* (SFE, 2004). Field observations and recent global change science indicate that they exist and are not humanly devised frameworks (ESA, 1995; GECP, 2001). Natural ecosystems and tourism systems are examples. They are dynamic, operational realities, being changeable, largely unpredictable, and only minimally explainable by linear cause and effect science. Their stability states can range from stable to turbulent, and if their resilience is insufficient, then they can cross a threshold, brought about, for example, by the onset of hostilities, the over-stressing of the local environment or the aggressive and successful competition of a more attractive destination. Once the threshold is crossed they flip from an existing condition to one that is less productive or rewarding, perhaps with unpredictable and possibly irreversible, cascading results (Holling, 1986; Marten, 2001). The September 11 disaster in the United States is a frightening but spectacular example of a complex systemic event with multiple causes and outcomes that resulted in change in every part of the Earth, including fear generation, terrorism, warfare, restructuring and breakdown of transportation, the building of new hostilities, the imposition of political systems, regime change, world power changes, changing control of vital resources, curtailment of civil liberties, distortion of international law and nation

rebuilding and the destruction or suspension of tourism in a number of areas, to mention a few. Cascades of change are still likely to emerge with unpredictable results and severity even to the end of the century, with a likely effect on tourism in all its sectors.

Each complex system has its own identity and it is never interchangeable as are the simple systems of, for example, particle physics. The evolution of complex systems is the outward expression of a process of self-organisation driven by circular flows of energy, materials and information that originate largely from the sun and are organised as *feedback loops*. Some feedback loops are reinforcing, such as the constant addition of hotels and facilities owing to increased tourism demand (positive feedback), while some are reverse flows, acting as regulators (negative feedback) in the case of policies intended to limit or better control further development. These processes affect interlinked components, both human and non-human, and result in patterns and structures that reflect sites, ideology and human cultures and give distinction to ecosystems and destinations alike. The components are themselves mini-systems, each with their own unique properties which as they interact create higher level systems with new *emergent properties*, quite different from those of their constituents. In the case of tourism, these emergent properties are vital contributors to the tourism experience, that may be enhanced or degraded.

For example, the volume of tourism in south coastal Spain is so demanding of water resources that inland upland water tables have been reduced to the extent that in a number of areas traditional, especially non-irrigated, farming is no longer possible or is highly problematic. While such farming areas, which may be long distances from acknowledged destinations, their pedological, hydrological and social problems and solutions are nevertheless part of the local tourism system and the affected farmers are critical stakeholders. This example is merely part of the cascade of unexpected outcomes that one must always learn to expect, and guard against, in tourism management.

Because the components of complex systems are linked in a network of connections of varying intensities, a change or disturbance in one part of the system is likely to have repercussions throughout the system (Jervis, 1997), or across boundaries and scales to other systems well beyond (for example, the Southeast Asian economic crisis and tourism). Everything is not linked to everything else, so that the 'flap of a butterfly's wings' in Brazil does not create a tornado in Texas. But that picturesque metaphor from meteorology does graphically indicate cascading system effects.

Ways are now being learned to maintain resilience to disturbance so that this will not cause drastic outcomes, and also to sustain desirable dynamic states, but much is still to be learned. An elementary working knowledge of complex systems and associated systems thinking are the key to understanding and implementing the next six steps.

Step Two: Learning From Natural Ecosystems

This step concerns *natural ecosystems.* These are complex adaptive systems, about which, as the result of many decades of research by ecosystem ecologists, more is known than appears to be the case with the social sciences. Ecosystems

have been found to be driven, not by regular and expectable climatic controlled, vegetational succession, but by local variables. This, together with research in other areas, has served to show that ecosystems are largely governed by the non-linear forces of characteristic uncertainty. From these findings emerged revised ecosystem ecology, focused today on sustainability, and the management of resilience rather than equilibrium. Now it is understood that continuing stability rather than being desirable, may indicate *ecosystem senescence* (in tourism an overly mature destination or part thereof), sharply reduced resilience and vulnerability to surprises, where an unexpected event may trigger collapse and a flip to a different dynamic state (tourist hostage taking, a severe hurricane, a SARS outbreak or a collapse in the economy of a major market area). As a consequence, it has become essential to manage ecosystems for uncertainty through *adaptive management,* whereby stakeholders co-manage on the basis of long understanding and reciprocal social learning (the passing of expertise on a particular ecosystem's behaviour from one generation to another). This type of management is necessary to allow for rapid operational adjustment to change, the seizing of arising opportunities and the enhancement of resilience (Holling, 1978; Lee, 1993; Nyberg, 1999; Walters, 1986).

Natural ecosystems are a category of ecosystems dominated by natural processes and self-organisation (Holling *et al.*, 1995). They develop their own changing character as complex systems and have enough in common with tourism systems to warrant close study. However, for the most part sustainable tourism researchers appear to operate from a quite inadequate resource base, knowing much about the basic aspects of tourism, yet very little about tourism as a system or about the encompassing ecosystems both natural and human. Evidence makes it increasingly clear that *a tourism system is an ecosystem,* like an urban ecosystem or an agro-ecosystem, in which tourism is merged with life support systems and related social systems which are likely to extend well beyond the recognised destination (Abel, 2003; ESA, 1995). To remove just tourism components from this network for study purposes and analysis demolishes reality, yet this reductionist practice continues with the expectation of realistic results.

The tourism reality is much greater than its industrial core on which most people normally focus. Because of their disciplinary orientations, tourism researchers are usually little prepared to discuss ecosystems. Much is known in detail about the components of tourism, but correspondingly little is known about those of natural ecosystems, yet the two are intimately connected. As a consequence, the somewhat ambiguous word *environment,* is spoken of frequently with regards to impacts which tend to be assessed in terms of visual damage due to some degree of past exploitation. Following on from this comes the notion of carrying capacity, a measure largely based on visual indicators, such as the state of plant cover, soil quality or the incidence of soil erosion thought to be caused by some particular population of tourists at which stage stress is believed to take place. This point is likely to change with the seasons, the behaviour of non-tourism components as well as that of the tourist group used as a measure. Carrying capacity largely disregards the fact that tourism may cause indirect changes such as lowering the water table, altering water quality, or aggravating drought conditions, exacerbating what otherwise might have had little effect. It

disregards disturbances outside tourism and the *uncertainty* of ecosystem behaviour while it relies on the idea that ecosystems seek equilibrium, a notion long-since invalidated in ecosystem ecology, and thus it leaves tourism with an insubstantially based concept.

Natural resource researchers have found that natural variability may obscure the effects of exploitation-induced stress and by the time those stress impacts are detectable they may very well be irreversible. Additionally, it is frequently assumed that the impact will simply increase gradually with the intensity of usage, but evidence suggests that this may not be the case. Ecosystems may not show signs of stress until suddenly a threshold is crossed when they collapse and flip to another state (Gunderson & Holling, 2002). Reducing tourist numbers to below the point where impacts were seen has little to recommend it unless populations are reduced to the switchpoint, the point where stress set in perhaps years before impact became obvious. Such a remedy suggests linear thinking applied to non-linear behaviour, a strategy that is bound to produce less than satisfactory results.

Step Three: Co-evolution of Human and Natural Systems

Social system or human behavioural research and theory provides valuable information about people and their constructions but, unfortunately, usually with little or no reference to natural ecosystems, despite knowledge that humans and their structures have co-evolved with them. This is illustrated in the following example.

Lake Arrowhead, California, has a population of 15–20,000, and it lies at over 5000 feet above sea level and the Los Angeles Basin, within the densely tree covered San Bernadino National Forest, well-known for its recreation and wildlife. A rigorously controlled leisure settlement surrounds the lake, which supports a thriving tourism industry. A pine dominated forest, a signature of the destination, exists within a sub-humid mountain climate. Drought is chronic and water conservation mandatory, yet building continues apace. The fact that on private residential land there is irrigation for landscaping and fire protection, and that tree cutting has not been permitted for decades has resulted in an exceptional landscape but also one with an intensity of forest growth which is in no way sustainable. Stress and drought have resulted in pine bark beetle killing millions of trees: logging and tree removal to partially reduce a huge fire danger is now a major activity. The situation, worsened by overloaded biomass in the National Forest owing to its being protected from fire for generations, climaxed in 2003 when fires resulted in thousands of acres being devastated and hundreds of houses being lost.

The Lake Arrowhead Tourism Ecosystem is dysfunctional in the extreme but that is understood by very few. Virtually every part of the system is intricately interrelated and the potential for a magnificent destination for all concerned remains. But forest management, water provision, economic development, fire protection and human behaviour (to mention only a few of the many elements), must be drastically revised in the interests of human and forest/wildlife/lake well-being. There are half a dozen organisations, both governmental and non-governmental, earnestly at work on their own narrow interests. Few if any see the situation as an ecosystem problem in which human population pressure

intimately linked to tourism has overstressed all local life support systems including water supply, lake levels, and forest resources. And in so doing, every component with its intensity of connections has played a part in the co-evolution of the whole.

Natural systems are, therefore, only one part of the equation. It is essential to understand social systems better in preparation for a more complete understanding of tourism systems. Humanly created networks and connections contribute to resilience by protecting against disturbance from outside causes. These connections also, however, insulate humans from what is taking place elsewhere, especially in the biophysical world of which they are an essential part. All aspects of these connections effectively distance tourism from its other support connections and networks rather than contributing to the creation of a sustainable transition.

Step Four: Extending Tourism Systems

Tourism researchers frequently refer to systems in casual reference, sometimes as a framework for focused understanding, and very occasionally as a real entity. However, these are usually simple systems (referred to earlier), that are usually confined to tourism's industrial core, including relationships largely within the core with components that are mostly of economic origin. They have seldom been discussed as complex systems, despite significant evidence to show the value of this approach. If one fails to see tourism's operational entity as an ecosystem extending as far as tourism's influence, and that radiates from the core to innumerable supporting parts of the ecosystem, then perhaps a significant proportion of the data necessary for sustainable tourism development is ignored. In contrast to the bare-bones core system, this is a *comprehensive tourism system*, and it includes significant social, economic, geological and ecological components, along with the processes and functions that are essential for sustainability (Farrell & Twining-Ward, 2004). The comprehensive system is considered a basic unit for the study and management of tourism.

To see the system as such is believed to be a serious, radical suggestion, calling for another layer of management and stakeholder participation that, to the writers' knowledge, does not yet operate anywhere. Only as the result of joint management (tourism, local government, ecosystem ecologists NGOs, local residents, etc.) at this level can detailed knowledge of system behaviour become second nature and known to all levels. Only then can weaknesses and strengths be determined, and only then can shifts be made in the operation of components in an attempt to allow the system to remain in, or to move into, a state more beneficial to all interrelated components.

Step Five: Integration

Integration is essential and it takes several forms. First, there is the integration of the previous steps to effect sustainable development, including a now absent orientation towards complex systems, a greater understanding of natural ecosystems interconnecting with tourism components, a deep appreciation of the role of social systems and an integration of tourism theory with that of social science and ecosystem ecology. Secondly, because the highly connected system

on the ground within a destination does not differentiate between the human and the biophysical or disciplinary divisions, scholarship should reflect this reality or risk disastrous misinterpretations (Berkes & Folke, 1998; Farrell & Twining-Ward, 2004; Twining-Ward & Farrell, 2005). Thirdly, to aid understanding of an essentially new scientific milieu, *sustainability science*, a synthesis of social, technological and biophysical science, has been devised for those prepared to venture into interdisciplinary and trans-disciplinary research (Kates *et al.*, 2001; NRC, 1999; Twining-Ward & Farrell, 2005). Fourth, following from the above, information to illuminate tourism system understanding should represent an integration of information from any appropriate source and not just from those disciplines believed appropriate to the social and economic activity of tourism. The socio-economic activity still exists but tourism in its widest sense embraces much more. Integration, as essential as complex systems, opens a new and revealing window on sustainability.

Step Six: Adding Post-normal Science

Post-normal, or non-linear science, is an acceptable path that may be followed in addressing tourism study. It is far more appropriate than normal, regular, or orthodox science which is disciplinary, 'cause and effect' science, deterministic, quantitative, linear and the basis of present day scientific thinking and education. It may be, that in time both normal and post-normal science, or parts of each, will merge and evolve as one. Post-normal science, largely governing all living complex adaptive systems, including tourism, is non-linear, uncertain, largely unpredictable, inductive, qualitative and concerned with the integration of parts rather than with high specialisation.

Few of tourism's currently used tools are non-linear, although there are some, such as adaptive management, resilience analysis, system modelling, and the application of scenarios that show potential in this regard. As a consequence, the quest towards tourism's sustainability, dependent on the management of non-linear complex systems, is still largely ineffective, or at least far from complete, if one persists in using only normal science, its tools, and current world-views.

Step Seven: Facilitating a Transition

Sustainability transition is a term commonly used during the last decade by interdisciplinary scientific researchers to indicate not a management endpoint, but continual development towards biophysical and human well-being (Kates *et al.*, 2001). Transition, without an endpoint of achievement, is one literal interpretation of the term sustainable development which can be seen as implying constant evolution and adaptation to site and region. This evolving view of development can never be completed. The use of sustainability on its own, or in conjunction with the term sustainable tourism, is fraught with ambiguity unless a specific explanation of this issue is made. In the past sustainability or often sustainable development suggested the possibility of attainment, at some time in the future. The new conception expressed by sustainability transition suggests that this situation is for most purposes unlikely. Every aspect of development concerning a tourism system moves at a different pace. Imagine, for instance, a

spike in tourist arrivals resulting in possible environmental stress, and the effects on ecosystem restoration, investment and reinvestment, infrastructure, competition for resources, and quality of life support systems, to mention only a few components which are likely to enter the mix. Each is evolving, always subject to change or disturbance, and each moves at its own pace. Except perhaps in limited areas for an uncertain, indefinite period of time, system dynamics disallows the notion of a steady, beneficial state expressed in 'achieved sustainability'. It bears repeating that at all other times, then the varying temporal and spatial scales involved in the interaction of subsystems within tourism systems, and the evolving aspirations and values of local people and their representative stakeholders involved in co-management, together with the probability of surprise from within or outside the system, will always prevent the uniform achievement of permanence. Thus, sustainability transition is a more appropriate notion that indicates an evolving, never-ending process that is not amenable to cut and dried definition or universality.

Conclusion

The information presented here comes largely from the recent understanding of revised ecosystem ecology, global change science and the work of such groups as the Sustainability Science Forum (2004) and the Resilience Alliance (2004). All are outside tourism, all are international, and all are in the context of complex systems behaviour, integration and non-linear science (Steps 1–6). Movement towards a sustainability transition (Step 7) requires the identification of, and the combating of, an array of counter forces, including the ideological values of potent and powerful cultures, conservative elements within tourism, mono- disciplinary science, and linear tools and methods. Above all, it requires an entirely new outlook on the world, building on what has already been learned. Without this, transitions will never be achieved and future tourism will be handicapped and endangered by fragmentation, disunities, vulnerable management and inadequate knowledge of how to meet problems during the rest of this century.

Although the title, 'Seven Steps Towards Sustainability' makes the task seem overly simple, it has been chosen only as an aid to learning and in the knowledge that *operationally* much has still to be learned. Every point raised brings forth questions, most of which have yet to be answered. Nevertheless, those who understand and apply the steps will have the satisfaction of being further along the path than researchers who attempt to persevere with current methods and world-views. Tourism has accumulated substantial resources, and it is argued here that if these resources are valuably complemented with knowledge of complex adaptive systems, natural ecosystems, co-evolution, a more inclusive tourism system, integrated social-ecological systems, and non-linear science, then tourism will be in a considerably better position to move towards a transition to sustainable tourism development than it is today.

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