

Matkailututkimus 4: 2, 69–79 (2008)

©Suomen matkailututkimuksen seura



Katsauksia

Current methodology and future challenges of protected area planning and management frameworks

Pirkko Siikamäki
Oulanka Research Station

As tourism is one of the world's largest and expanding industries (Tisdell, 1987, Lindberg, 1998; Mowforth & Munt, 1998, Hall & Page 1999, Eagles, 2002), various impacts of tourism are under lively debate not only in the scientific community but also among the managers of tourism. Environmental impacts have been focused especially because nature-based tourism is recognized as the most rapidly growing tourism sector (Fennell 1999, Buckley 2004) and protected areas are the most attractive destinations for nature tourism. Accordingly, visitor numbers of national parks and other protected areas have been multiplied during the last decades. For example, in northern Finland the annual visitor numbers of national parks has been tripled in the 1990's (A. Leivo / Metsähallitus, pers. comm., Siikamäki & Kangas 2006).

Tourist activities impact directly and indirectly on ecosystems. Globally tourism contributes to changes in land cover and land use, energy use, introductions and extinction of species, dispersion of diseases and changes in perceptions of environment (e.g., Gössling 2002). Ever increasing amounts of visitors and new types of use in protected areas cause environmental wear and deterioration, which can threaten the biological and recreational values of areas if the change is not under control. At the worst areas can lose many ecological functions and values, such as rare organisms and their habitats, which make them destinations in the first place. It has been argued that the single most critical component for long-term strategy for sustainability is to maintain protected areas in a reasonably intact and functional state (Buckley 2004).

Nowadays, it is widely acknowledged that unplanned tourism may lead to severe ecological and social problems in tourist destinations (Inskeep 1994). Contrary, when tourism is environmentally sensitive and well-planned, it can both benefit the local communities and also promote nature conservation, i.e. tourism and nature conservation can be mutually supportive (Hall 1998, Butler 1999). At present, the relative importance of tourism as a year-round source of income is constantly increasing in northern Scandinavian, and the income from tourism exceeds the one from agriculture

and forestry in many rural municipalities in Finland (Saastamoinen et al. 2000). This trend emphasized the importance of sustainable development of tourism industry.

Indeed, growing interest in sustainable development and sustainable tourism has been paralleled with the concerns about the ability of protected areas to absorb tourists. Budowski (1976) started scientific debate on the relationship between nature protection and tourism discussing about conflict, coexistence and symbiosis between tourism and nature. Lately the key trends that described the evolution of relationship between tourism and protected areas revealed a shift from protection *against* people towards managed *with and for* people, and from national to international concern (Nelson 1994). Due to these shifts and the integration between nature protection and tourism development, the objective of planning and management of protected areas is to compromise between these two activities and to have a symbiotic relationship between them. Nature-based tourism using national parks as tourist destinations is today in fact a vehicle for nature protection in many places. For instance, the initiative to establish the Syöte national park (municipalities of Pudasjärvi, Taivalkoski and Posio) came from the local community to enhance and promote the tourism development in the region. This bottom-up process was reflected also as positive perceptions of local residents towards nature protection and tourism development (Törn et al. 2007).

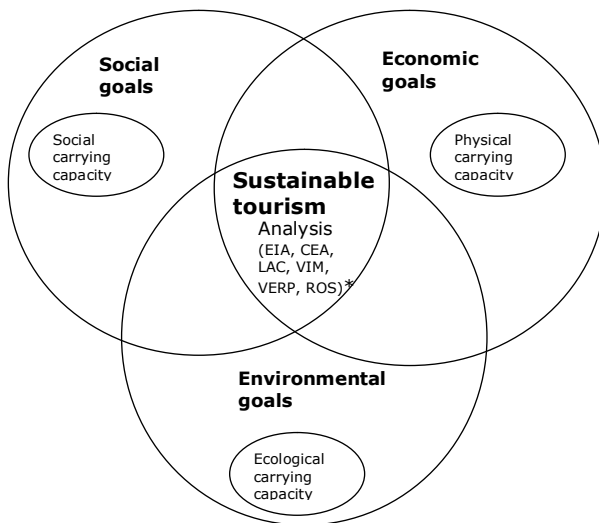
In this paper I focused how environmental impacts of tourism are measured, analyzed and taken into account in the management of tourism. I will have an emphasis on the tools and methods that have been used for the management and planning of tourism and recreation use of protected areas. The development of methodology and tools for the management of protected areas has been in the front line because of the apparent need for compromises between tourism use and nature protection to ensure the primary purpose of nature protection areas. Firstly, I review the currently used definitions, frameworks and indicators used in wilderness recreation management. Additionally, I focus on the challenges of taking into account the scales of ecological entities as well as the incorporation of ecological sustainability to the other dimensions of sustainability.

Definitions and tools of sustainable tourism

Although the concept, theory and practical indicators of sustainable tourism development (STD) are currently widely studied, currently there is no universally accepted definition of sustainable tourism (e.g., Honey 1999, Blamey 2001, Saarinen 2006). Definitions of sustainable tourism typically emphasize the ecological, social and economic elements of tourism in order to achieve a 'balanced' or 'wise' use of natural resource. On one hand, social sustainability and the integration of the local community into the sustainable development of tourism have been emphasized more and more in the planning process of tourism (e.g. Milne 1998). On the other hand, deterioration of environment and erosion are mentioned frequently as the most negative impacts of tourism by local residents emphasizing the role of environmental element of sustainability (e.g. Rämetsä et al. 2005; Hynönen & Kuttilanen 2004). Recently, a fourth dimension, the institutional one is seen essential to achieve a balance among

the three classic dimensions of sustainable tourism (Eden et al., 2000; Spangenberg & Valentin 1999).

Figure 1 shows some examples of the wide array of the tools used for sustainability analysis. The development of management frameworks for protected areas initiated with a search of certain carrying capacities just as generally for the whole tourism industry. However, as the limitations of the concept of carrying were becoming increasingly apparent, the question was directed from the use numbers to appropriate or acceptable conditions of tourism destinations (e.g. McCool & Lime 2001). Even though several authors have identified numerical carrying capacities for specific tourist destinations (e.g. Saveriades 2000), the relationship between use level and biophysical and/or social impacts seems not to be a linear function between them. In general, even very little use leads to disproportionately large increases in impacts (e.g. Hammit & Cole 1987, Leung & Marrion 2000, Tolvanen et al. 2001, 2004). Instead, impacts are largely a function of tourist behavior, developers practices, sensitivity of environments and other variables. Because of the failures to find carrying capacities, a variety of new planning frameworks have been developed to address the issues of visitor impacts. These new planning frameworks include Recreation Opportunity Spectrum (ROS; Clark & Stankey 1979, Brown et al. 1978)), a Process for Visitor Impact Management (VIM, Graefe et al 1990), Visitor Experience and Resource Protection (VERP, National Park Service 1997, Manning 2001) and Limits of Acceptable Change (LAC, Stankey et al. 1985). These all are based on protecting certain conditions rather than finding numerical carrying capacities. Several reviews and evaluations of these frameworks are described in the recent literature (e.g. McCool & Cole 1997, Nilsen & Tayler 2000; Manning & Lime 2000, Leung & Marion 2000, McCool et al. 2007).



CEA = Cumulative Effects Assessment
 EIA = Environmental Impact Assessment
 LAC = Limits of Acceptable Change
 ROS = Recreation Opportunity Spectrum
 VIM = Visitor Impact Management
 VERP = Visitor Experience & Resource Protection

Figure 1. Tools for sustainability analysis (modified from Wight 1998)

These frameworks have several common themes and issues even though they all do have their unique origins (Nilsen & Tayler 1998). The basic steps of the management and planning process are quite similar in each of the frameworks (Fig. 2) even though the language and the terminology they use vary considerably. Basically, the wilderness mandates are transformed into objectives that can be implemented and evaluated with standards. Limits of acceptable conditions are defined by the standards that are monitored with the selected social and environmental indicators. If standards are exceeded, appropriate and effective management interventions are evaluated by a problem analysis.

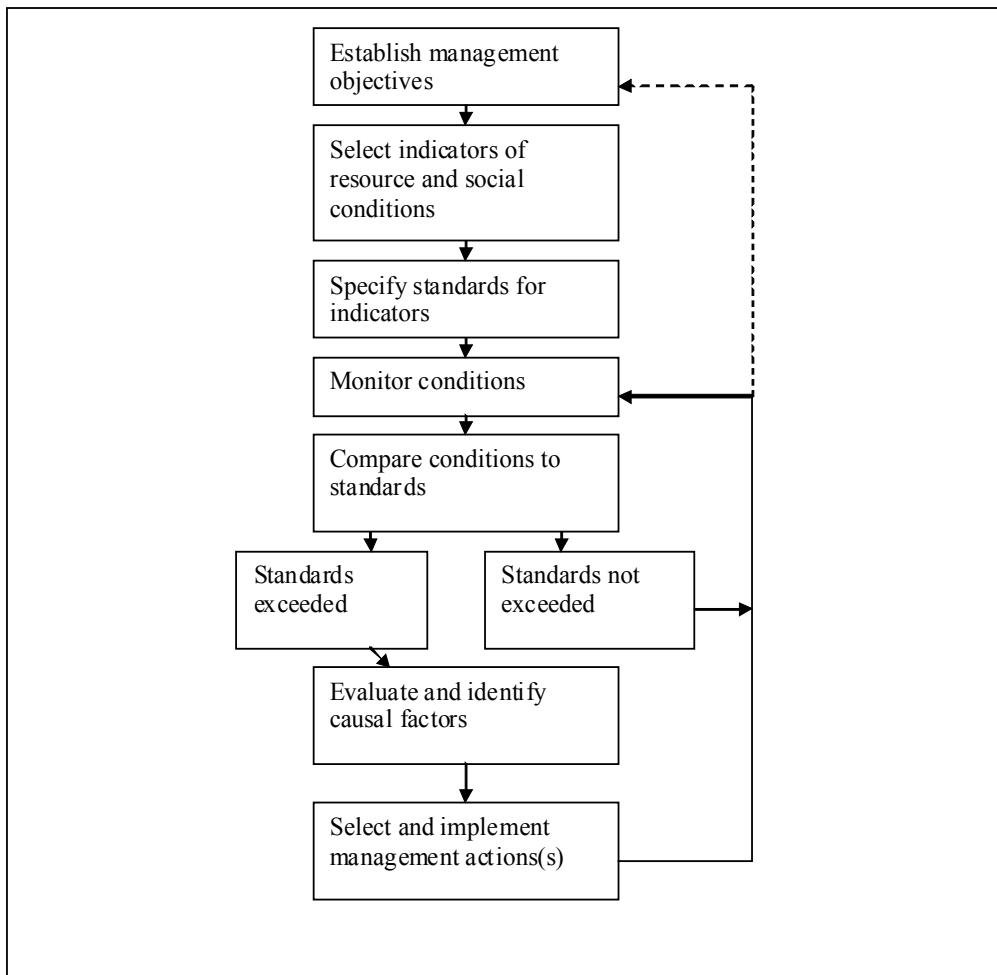


Figure 2. Diagram illustrating the basic stages of management planning frameworks (modified from Leung and Marion 2000)

Impact indicators

Because a common approach to achieve management goals is to use of indicators in the monitoring, the criteria and selection of effective indicators has received increasing attention in the wilderness recreation literature (e.g. Merigliano 1990, Manning & Lime 2000). Indeed, critical components of almost all management frameworks

are judicious selections and periodic monitoring of indicators. Good indicators reflect desired conditions and include for instance the following characteristics:

1. Relevant.
2. Specific. Indicators should define specific rather than general conditions.
3. Objective. Indicators should be measured in absolute, unequivocal terms.
4. Reliable and repeatable.
5. Related to visitor use. Indicators are related to level of use, type of use, location of use or behaviour of visitors.
6. Sensitive. Indicators should be sensitive to visitor use over a relatively short period.
7. Amenable to management. Indicators should be responsive to and help to determine the effectiveness of management actions.
8. Directly observable and easy to measure. As indicators should be monitored on a regular basis, they should be relatively easy and cost-effective to measure.
9. Reflect appropriate scales.

Table 1 summarizes the main results related to the definitions and the role of indicators from Nilsen and Taylor's (1998) comparative analysis on several planning and management frameworks. The role, the importance of indicator system and the degree of emphasis is placed on factors, indicators and standards vary a lot between different management frameworks. These differences reflect variations on the objectives of frameworks, questions being asked, the type of research and analysis that follows and the decisions that are being made. VAMP and VERP have their emphasis on strategic level planning and management having a broad range of factors. These strategic decisions then form a basis for developing the indicators and standards. In contrary, VAMP emphasizes social indicators and standards from a visitor's viewpoint and is then complemented by an environmental impact assessment and natural resource management.

Additionally, the starting point of the managing frameworks seem to differ – ROS, VERP and VAMP put stress on the recreational opportunities and are more comprehensive and holistic whereas LAC and VIM are primarily issue-driven and narrower in focus. In LAC and VIM the first steps in the process are the definitions of issue and management objectives which guide the selection of indicators and standards.

All these above mentioned frameworks are developed for the management needs of wilderness areas and national parks in the USA and Canada by the managers and researchers as a response to constantly growing recreation use. They are principally concentrated on impacts and/or setting limits for use and based on a range of indicators and indicator system. Public participation and engagement of the communities have quite a minor role in the development of frameworks. Consequently, in the assessments of experiences on these frameworks, the need for collaborative planning is regularly emerged (McCool et al. 2007). There are several other frameworks developed worldwide like The Tourism Optimization and Management Model (TOMM) that has emphasized more holistic approaches with optimal and sustainable outcomes for tourism and community. TOMM was developed in Australia in the 1990s to monitor and manage tourism in Kangaroo Island (Manidis Roberts Consultants 1997).

Table 1. Indicators and standards used in different planning and management frameworks

Recreation Opportunity Spectrum ROS	Process for Visitor Impact Management VIM	Limits of Acceptable Change LAC	Visitor Experience Resource Protection VERP	Management Process for Visitor Activities VAMP
<p>Setting indicators</p> <ul style="list-style-type: none"> - Access - Remoteness - Visual characteristics - Site management - Visitor management - Social encounters - Visitor impacts 	<p>Physical impacts</p> <ul style="list-style-type: none"> - Soil density, pH, compaction, productivity - Amount and depth of litter and dust - Area of bare ground - Area of campsites - Number and size of fire rings - Number of social trails - Visible erosion <p>Biological impacts</p> <ul style="list-style-type: none"> - Soil fauna and microfauna - Ground-cover density - Diversity and composition of plant species - Proportion of exotic plant species - Plant species height, vigours and diseases - Trees – mutilation, seeding regeneration, exposed roots - Wildlife species – diversity, abundance - Indicator species 	<p>Indicators depend on the goals and desired conditions defined in the first step of LAC process.</p> <p>Examples: Resource:</p> <ul style="list-style-type: none"> - Trail conditions - Campsite conditions - Water quality - Air quality - Wildlife populations - Threatened / endangered species <p>Social:</p> <ul style="list-style-type: none"> - Solitude while traveling - Campsite solitude - Conflicts between visitors - Conflicting traveling methods - noise 	<p>The following factors are considered:</p> <ul style="list-style-type: none"> - park purpose statement - statements of park significance - primary interpretation themes - resource values, constraints and sensitivities - visitor experience opportunities - resource attributes for visitor use - management zones 	<p>Factors for developing indicators and standards include:</p> <ul style="list-style-type: none"> - visitor activity profiles (kind, quantity, diversity, location, experiences sought, support services etc.) - stakeholder profiles - resource values, constraints and sensitivities - existing legislation, policy, management directions, plans - services and facilities - satisfaction with service offer

In Finland, Metsähallitus is currently developing and testing a management framework for Finnish national parks and protected areas. This Finnish version is based on LAC framework and is guided by the nine principles for sustainable nature-based tourism (Metsähallitus 2007). The indicators, standards and management actions of the pilot version are mainly defined by the manager not through a process with the involvement of different stakeholders and local residents.

Future challenges for management frameworks

The scale of management – use of ecosystem approach?

The scale of management and planning in all management frameworks are mainly defined by the needs of the managers and planners. This may lead to scale-mismatches between ecological entities and management regimes. Although in fragmented urban landscapes scale mismatches can be even more pronounced than in most other social–ecological systems (Borgström et al. 2007), these mismatches are most likely problematic in other systems as well. Ecological scales can be described using a three-part classification: spatial, temporal, and functional scales (Lee 1993). Spatial mismatches occur when the boundaries of management and planning do not coincide with the boundaries of the ecological entity (Christensen et al. 1996, Hobbs 1998). When important ecological functions and processes, and their connections (Lugo et al. 1999), as well as disturbance regimes (Engstrom et al. 1999, White et al. 1999) are recognized, the functional scales of ecosystems are matched with management. Instead, a functional scale mismatch includes the neglect of interactions of ecosystems, and largely ignores the basic characteristic of an ecosystem as a complex adaptive system (Christensen et al. 1996).

In the context of planning and managing the recreational use of protected areas, ecological entities and processes that needed larger scale management approaches are for example following:

- ecosystem services like pollination, nutrient cycling, pest control
- animals with large home ranges such as large carnivores, birds of prey, moose
- ecological processes: migration, colonization, succession
- disturbance regimes

It seems that current management and planning frameworks for recreation in wilderness and protected areas do not recognize temporal, spatial and functional scales of ecological entities (i.e., ecosystems, habitats, landscapes). Within these frameworks ecological entities are often seen as resources for recreation. This viewpoint has led to situation where management and monitoring are emphasized on the direct impacts of recreation and nature-based on resources. Consequently, the monitoring and indicators is stressed on visible impacts on soils, vegetation, trails and campsites which all are relatively easy to measure. Furthermore, they seem to neglect the complexity, interconnectedness and dynamic characteristics of ecological systems which may lead to a gradual reduction in the capacity of the ecosystems to provide ecosystem services.

Participatory planning and comanagement

As already mentioned above, the lack of public involvement and participation is quite common weakness of several planning frameworks that are currently implemented at protected areas. A proper solution for nature resource planning may not be achievable by an authoritarian regime (top-down) nor an exclusively community-based approach (bottom-up). It is also notable that participation of stakeholders does not automatically guarantee the sustainable use of natural resources (e.g., Butler 1999). The development of cooperative relationships with local stakeholders and sharing the burden of management responsibilities have emerged as a potential way of comanagement of protected areas (Lane 2001). Protected area managers have proved that decentralized, participatory approaches are the most effective management strategies (e.g. Western et al. 1994). Although in conflict situations stakeholders by definition hold divergent views, the fundamental assumption behind comanagement is that resource management will be enhanced by the sharing of authority and decision-making. The central objective of comanagement is to develop strategies to ensure the collaboration of park managers and different stakeholders. Local inhabitants may have traditional knowledge and holistic views about the area concerned, while managers and decision-makers may rely more on rational and specialized facts. The sharing of ideas among different stakeholders in a long time period can thus result in a deeper understanding of the issues, and should result in more legitimate and sustainable policies (Salmi 2000, Castro and Nielsen 2001).

The need for adaptive management

Due to uncertainties both in the development of recreation and nature-based tourism and in our knowledge of ecosystems and ecological processes, the management and planning involves the need to emphasize monitoring, feedback, learning and adaptability. Whatever management framework is implemented and used, it should be also developed and processed according to feedback and enhanced knowledge. Furthermore, by adaptive management process also the scales of management can be better fitted to ecological entities.

References

- Blamey, P.K. (2001). Principles of ecotourism. In: The encyclopedia of ecotourism. Weaver, D. (ed). Oxon, UK. CABI Publishing. pp 5-22.
- Borgström, S. T., Elmqvist, T., Angelstam, P. & Alfsen-Norodom, C. (2006). Scale mismatches in management of urban landscapes. *Ecology & Society* 11, 16
- Brown, P., Driver, B. & McConnell, C. (1978). The opportunity spectrum concept in outdoor recreation supply inventories: Background and application. Proceedings of the integrated renewable resource inventories workshop. USDA Forest Service General Technical Report RM-55.
- Buckley, R. (2004). Impacts positive and negative: Links between ecotourism and environment. In Buckley, R. (ed.): Environmental impacts of ecotourism.. CABI Publishing. 5-14
- Budowski, G. (1976). Tourism and environmental conservation: conflict, coexistence, or symbiosis? *Environmental Conservation* 3, 27–31.
- Butler, R. (1999). Sustainable tourism: a state-of-the-art review. *Tourism Geographies* 1,

7–25.

- Castro, A.P. & Nielsen, E. (2001). Indigenous people and co-management: implications for conflict management. *Environmental Science & Policy* 4, 229–239.
- Christensen, N. L., A. M. Bartuska, J. H. Brown, S. Carpenter, C. D'Antonio, R. Francis, J. F. Franklin, J. A. MacMahon, R. F. Noss, D. J. Parsons, C. H. Peterson, M. G. Turner, and R. G. Woodmansee. (1996). The report of the Ecological Society of America Committee on the scientific basis for ecosystem management. *Ecological Applications* 6, 665–691
- Clark, R. & Stankey, G. (1979). The recreation opportunity spectrum: A framework for planning, management, and research. USDA Forest Service Research Papers PNW-98.
- Cole, D.N. and Stankey, G.H. (1997). Historical development of limits of acceptable change: Conceptual clarifications and possible extensions. In *Proceedings – Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions*. Missoula, MT: USDA Forest Service.
- Eagles, P. F. J. (2002). Trends in Park Tourism: Economics Finance and Management. *Journal of Sustainable Tourism* 10, 132-153.
- Eden, M., L. Falkheden, L., & Malbert, B. (2000). The built environment and sustainable development: research meets practice in a Scandinavian context. *Planning Theory and Practice*, 1, 260-272.
- Engstrom, R. T., S. Gilbert, M. L. Hunter, D. Merriwether, G. J. Nowacki, & P. Spencer. (1999). Practical applications of disturbance ecology to natural resource management. In Szaro, R. C., Johnson, N. C., Sexton, W. T., and A. J., Malk, (eds):. *Ecological stewardship. A common reference for ecosystem management*. Vol. 2. Elsevier Science, Oxford, UK. 313–329
- Fennell, D. (1999). *Ecotourism: an introduction*. Routledge, London & New York,
- Graefe, A., Kuss, F. R. & Vaske, J. J. (1990). *Visitor impact management: the planning framework*. Washington, DC. National Parks and conservation association. 105.
- Gössling, S. (2002). Global environmental consequences of tourism. *Global environmental change* 12, 282-302.
- Hall, C.M. & Page, S. J. (1999). *The geography of tourism: environment, place and space*. Routledge, London & New York.
- Hall, C.M. (1998). Historical antecedents of sustainable development and ecotourism: new labels on old bottles. In: Hall, C.M. & Lew, A.A. (eds.). *Sustainable tourism: a geographical perspective*. Longman, New York. 13–24.
- Hammit, W.E., & Cole, D.N. (1987). *Wildland recreation: ecology and management*. New York, NY: Wiley.
- Hobbs, R. J. (1998). Managing ecological systems and processes. In Peterson D. L. & Parker, V. T. (eds.): *Ecological scale. Theory and applications*. Columbia University Press, New York, New York, USA. 459–484
- Honey, M. (1999). *Ecotourism and sustainable development: Who owns paradise*. Island Press, Washington DC.
- Hynönen, A. & Kutilainen, S. (2004). ”Elämää cityyn ja särkille”. *Kalajoen matkailun kehittäminen. Nordia Tiedonantoja 2/2004*. [In Finnish].
- Inskeep, E. (1994). *National and Regional Tourism Planning: Methodologies and Case Studies*. Routledge, London-New York. 249 p.
- Lane, M. B. (2001). Affirming new directions in planning theory: comanagement of protected areas. *Society and Natural Resources* 14, 657-671.
- Lee, K. N. (1993). Greed, scale mismatch and learning. *Ecological Applications* 3, 560–564.
- Lindberg, K. (1998). Economic Aspects of ecotourism. In Lindberg, K., Wood, M. E. & Engeldrum, D. (eds.): *Ecotourism: A guide for planners and managers*. North Bennington,

- USA: The Ecotourism society: 87-117
- Leung, Y.-F. & Marion, J. L. (2000). Recreation impacts and management in wilderness: A state-of-knowledge review. USDA Forest Service Proceedings RMRS-P-15-VOL-5.
- Lugo, A. E., J. S. Baron, T. P. Frost, T. W. Cundy, & P. Dittberner. (1999). Ecosystem processes and functioning. In Szaro, R. C., Johnson, N. C., Sexton, W. T. & Malk, A. J. (eds.): Ecological stewardship. A common reference for ecosystem management. Vol. 2. Elsevier Science, Oxford, UK. 219–250
- Manidis Roberts Consultants (1997). Developing a Tourism Optimisation Management Model (TOMM): a model to monitor and manage tourism on Kangaroo Island, South Australia. Final Report, South Australian Tourism Commission, Adelaide.
- Manning, R. E. (2001). Visitor experience and resource protection: a framework for managing the carrying capacity of national parks. *Journal of Park and recreation administration* 19, 93-108.
- Manning, R. E. & Lime, D. W. (2000). Defining and managing the quality of wilderness recreation experiences. USDA Forest Service Proceedings RMRS-P-15-VOL-4.
- McCool, S. & Cole, D.N. (1997). Annotated bibliography of publications for LAC applications. Proceedings - Limits of acceptable change and related planning processes: Progress and future directions. USDA Forest Service General Technical Report INT-371, 81-84.
- McCool, S.F. & Lime, D. W. (2001). Tourism carrying capacity: tempting fantasy or useful reality? *Journal of Sustainable tourism* 9, 372-388.
- McCool, S.F., Clark, R.N. & Stankey, G.H. 2007. An assessment of frameworks useful for public land recreation planning. General Technical Report PNW-GTR-705. Portland: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 125 p.
- Merigliano, L. (1990). Indicators to monitor the wilderness recreation experience. *Managing America's enduring wilderness resource*. St. Paul, MN: University of Minnesota: 156-162.
- Metsähallitus (2007). Sustainable Nature Tourism in Protected Areas <http://www.metsa.fi/page.asp?Section=3139>. (29.3.2007)
- Milne, S. S. (1998). Tourism and sustainable development: exploring the global-local nexus. In Hall, C.M. & Lew, A.A. (eds.): *Sustainable tourism.. A geographical perspective*. Prentice Hall. 35-48.
- Mowforth, M., Munt, I. (1998). *Tourism and Sustainability: new tourism in the Third World*. Routledge, Taylor and Francis Group, London and New York.
- National Park Service (1997). VERP: the visitor experience and resource protection (VERP) framework – a handbook for planners and managers. National Park Service technical report, Denver, Colorado.
- Nelson, J. G. (1994). The spread of ecotourism: Some planning implications. *Environmental Conservation* 21, 248-255.
- Nilsen, P. & Tayler, G. (1998). A comparative analysis of protected area planning and management frameworks. In McCool, S. F. & Cole, D. N. Proceedings – limits of acceptable change and related planning processes: progress and future directions. Ogden, UT: USDA Forest Service Rocky mountain Research Station. 49-57.
- Rämet, J., Törn, A., Siikamäki, P. & Tolvanen, A. (2005). Luonnonsuojelu ja luontomatkailu paikallisväestön silmin – Kyselytutkimus Kuusamossa ja Syötteen alueella. - Metsähallituksen Luonnonsuojelujulkaisuja Sarja A 151. [in Finnish]
- Saarinen, J. (2006). Traditions of sustainability in tourism studies. *Annals of Tourism Research* 33, 1121-1140
- Saastamoinen, O., Loven, L. & Sievänen, T. (2000). Nature-based tourism in forested North-Europe – case of Finland. Finnish Forest Research Institute, Research papers 792, 7-17.
- Salmi, P. (2000). Tieto ja valta kalastuksen päätöksenteossa – konfliktista yhteishallintaan?

- Alue ja Ympäristö 29, 47–58.
- Saveriades, A. (2000). Establishing the social carrying capacity for tourist resorts on the east coast of the Republic of Cyprus. *Tourism Management* 21, 147.
- Siikamäki, P. & Kangas, K. (2006). Luonnonsuojelualueet luontomatkailun kohdealueina. In Leinonen, R., Siikamäki, P., Kangas, K. & Kauppila, P. *Matkailukehityksestä aluekehitykseen*. Naturpolis Kuusamo Koulutus- ja kehittämispalvelut. Tutkimuksia 1/2006. 43-67. [in Finnish]
- Spangenberg, J. H., & Valentin, A. (1999). Indicators for Sustainable Communities. Wuppertal Institute for Climate, Environment and Energy. <http://www.foeeurope.org/sustainability/sustain/t-content-prism.htm>. (28.3.2007).
- Stankey, G. H., Cole, D. N., Lucas, R. C., Peterson, M., & Frissell, S., S. (1985). The Limits of Acceptable Change (LAC) system for wilderness planning. General technical report INT-176. Ogden, UT: USDA Forest Service, Intermountain Research Station. 37.
- Tisdell, C. A. (1987). Tourism, the environment and profit. *Economic Analysis and Policy* 17, 13-30.
- Tolvanen, A., Forbes, B., Rytkönen, K. & Laine, K. (2001). Regeneration of dominant plants after short-term pedestrian trampling in sub-arctic plant communities. In Wielgolaski, F. E. (ed.) *Man and the biosphere series: Nordic mountain birch ecosystems*. UNESCO, Paris and The Parthenon Publishing Group, pp. 361-370.
- Tolvanen, A., Rämetsä, J., Siikamäki, P., Törn, A. & Orell, M. (2004). Research on ecological and social sustainability of nature tourism in northern Finland. In Sievänen, T., Erkkonen, J., Jokimäki, J., Saarinen, J., Tuulentie, S. & Virtanen, E. (eds.): *Policies, Methods and Tools for Visitor Management*. Proceedings of the Second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas, June 16-20, 2004. Rovaniemi, Finland.
- Törn, A., Siikamäki, P., Tolvanen, A., Kauppila, P. & Rämetsä, J. (2007). Local people, nature conservation, and tourism in northeastern Finland. *Ecology and Society* 13(1): 8. [online] URL: <http://www.ecologyandsociety.org/vol13/iss1/art8/>
- Western, D., Wright, M. R., & Strum, S. C. eds. (1994) *Natural connections: perspectives in community-based conservation*. Washington, DC, Island Press.
- Wight, P. (1998). Tools for sustainability analysis in planning and managing tourism and recreation in the destination. In Hall, C.M. & Lew, A.A. (eds.): *Sustainable tourism.. A geographical perspective*. Prentice Hall. 75-91.
- White, P. S., J. Harrod, W. H. Romme, & J. Betancourt. (1999). Disturbance and temporal dynamics. In Szaro, R. C., Johnson, N. C., Sexton, W. T. & Malk, A. J., (eds.): *Ecosystem management for sustainability. Principles and Practices illustrated by regional biosphere reserve cooperation*. Levis Publishers, Boston, Massachusetts, USA. 281–312.