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# Applying Scenario Planning to Park and Tourism Management in Sagarmatha National Park, Khumbu, Nepal

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We used participatory scenario planning to support strategic-level analysis by stakeholders in tourism and park management issues in Sagarmatha National Park, Nepal. Authority and responsibility for protected area

management in Nepal are gradually being devolved to local communities. Tourism growth and globalization are strengthening the links between social-ecological change in mountain protected areas and drivers of change at national, regional, and global scales. Park management needs to become forward looking, and local communities need to increase their grasp of potential long-term changes and associated uncertainty. Scenario planning is a tool for dealing

with long-term uncertainty and complexity and for guiding adaptive management. We developed scenarios together with representatives of the tourism industry, park comanagement institutions, and communities. Stakeholders described their understanding of the social-ecological system of the park. They formulated and tested 4 scenarios of system change, based on plausible changes in governance systems and the role of outside tourism industry actors. Stakeholders can use scenarios to reflect on the inherent uncertainty of long-term change, to address potentially conflictual issues by exploring multiple perspectives, and to assess the need to negotiate strategic goals and long-term visions for the park.

**Keywords:** Scenario planning; landscape; mountain protected area; participatory systems analysis; Sagarmatha National Park; Sherpa; strategic planning; tourism; Nepal.

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## Managing Sagarmatha National Park in the 21st century: What does the future hold?

Sagarmatha (Mt Everest) National Park (SNP) in Nepal is one of the highest mountain protected areas in the world. The region, also known as Khumbu, extends over 1148 km<sup>2</sup> and is home to some 6000 people, mostly of the Sherpa ethnic group. Its highly diverse landscape has been shaped by human use for centuries (Furer-Haimendorf 1964; Oppitz 1973; Macdonald 1980; Ortner 1989; Brower 1991; Stevens 1996; Zangbu 2000; Sherpa 2003; Spoon and Sherpa 2008). Mountaineering and tourism have been growing steadily since the 1950s. Though these activities have had a major positive impact on local economic conditions, they have also wrought cultural and landscape changes through a complex interplay of effects on lifestyle and livelihood practices, resource governance systems, development interventions, and technological innovations (Stevens 1996; Rogers et al 1998; Stevens 2003; Byers 2005; Ives 2005).

The park was gazetted in 1976 in response to conservation concerns. The first Park Management Plan (Garratt 1981) allowed local people to continue to live in the park but strengthened state control over local

resources at the expense of traditional resource management and largely centralized tourism revenues. The Buffer Zone Policy, introduced in 2002, encouraged closer involvement by local people in management and allocated 30–50% of park revenues for investment in local development. The new Park Management Plan (DNPWC 2005, 2006) has further devolved authority to local representatives. It also emphasizes support for local economic development through the growth of a self-regulated tourism industry, local natural resource production systems, local stewardship of natural resources (ie forests) as a key conservation strategy, and establishment of local grassroots capacities and a multistakeholder governance system.

The tourism industry in SNP is largely in the hands of Sherpa from the park area. However, outside business interests are increasingly purchasing land and establishing chain resorts. The number of migrant workers and settlers is also on the rise. Despite the park protection system, tourism continues to cause environmental impacts (eg water pollution; solid waste; greater demand for forest products; increased mining of soil, sand, and rock; wildlife poaching; cultural change). Beyond these direct impacts, the pattern of social-

ecological change in SNP is also shaped by a web of indirect and cross-scale effects of tourism and other driving forces, which are as yet not fully understood.

The growth of international tourism and globalization has increasingly integrated mountain protected areas into the global economy. This has typically led to intensified resource use, loss of resource management options, and weakened traditional institutional and social controls and feedback loops. The result is that these fragile landscapes become more vulnerable, as mountain people lose their livelihood adaptation and risk-mitigation options (Jodha 2005). To address the vulnerability of high-mountain livelihoods, we must therefore not only better understand the internal factors that underpin local resilience but also adopt a forward-looking perspective.

Gaining insight into the future of the tourism industry and its impacts on the landscape calls for a sophisticated systems integration approach that considers both local (internal) systems (eg agriculture, cash economy, local tourism industry, lifestyle changes, technological and infrastructure development, governance systems) and external drivers (eg national politics, tourism markets and regional trade, climate change). Such an approach must grapple with the uncertainty and unpredictability inherent in all social dynamics. As park management is increasingly devolved, its effectiveness and ability to adapt and address long-term challenges will become more dependent on the local community's perception of the long-term future.

### Scenario planning: A tool for looking at the future of landscapes

Scenario planning (SP) is a tool for dealing with uncertainty and complexity in devising long-term strategies (Schwartz 1998). It is based on formulating narrative descriptions of alternative hypothetical futures as a way to overcome biased views of the world and help managers prepare for developments that cannot be anticipated by extrapolating from past trends. A wide array of SP approaches and methodologies, which rely on qualitative techniques sometimes combined with quantitative analysis (Bradfield et al 2005), is available.

The overall management purpose of SP is to assess the long-term implications of current decisions and options and to explore pathways of change and unexpected outcomes. SP has been used for decades to study global change in business and security applications and more recently has been introduced into the analysis of social-ecological systems as an approach for tackling complexity. SP has been proposed as particularly suited to contexts characterized by high uncertainty and uncontrollable external drivers (Peterson et al 2003b; Swart et al 2004; Carpenter et al 2005).

To date, most SP applications in the environmental domain have been assessment oriented and expert driven,

with public participation limited mainly to scenario validation. Despite growing interest, empirical evidence of the benefits of SP application is still limited (EEA 2009). The technique has not yet been extensively used in area management or regional planning processes. Increased attention is being given to SP applications initiated through stakeholder processes and/or conceived to influence decisions on regional development (Amelung and Lamers 2005; Yeoman and McMahon-Beattie 2005; Patel et al 2007; Evans et al 2008; Lebel and Bennett 2008).

This article presents the methods, initial outcomes, and lessons learned from the introduction of participatory scenario planning in SNP and recommends options for its further application in the local context of conservation and development practice.

### Introduction of scenario planning in Sagarmatha National Park

The local people of Sagarmatha National Park and the Buffer Zone were invited to take part in scenario planning exercises aimed at exploring plausible future alternative evolutions of Khumbu. The initiative was conducted as part of a project to develop a set of decision-support tools for protected area management (Hindu Kush–Karakoram–Himalaya Partnership Project, hereafter HKKH Project; Amatya et al 2010). SP was applied as a soft-systems decision-support tool to prompt strategic reflection among the local people of SNP on the long-term challenges for park management (Daconto 2007a) and initiate a participatory systems analysis process (Walker et al 2002). In a second case study, SP was also introduced in a protected area in Pakistan (not covered in this article; see Daconto 2007b).

SP was introduced in SNP through 2 workshops (Daconto and Sherpa 2007; Daconto et al 2007). The first was held as a retreat near Kathmandu and involved participants who were originally from Khumbu but were currently working in Kathmandu in tourism businesses, nongovernmental organizations (NGOs), trade associations, and religious institutions. Technical staff from our project partners were also involved, serving in the role of nonparticipating observers of the proceedings. This first workshop advised involving a wider range of stakeholders in future initiatives, including in particular local-level representatives of the SNP governance system. The second workshop was held in Namche, the main village inside SNP, and involved park staff (non-Sherpa) and representatives from all the Buffer Zone Committees and other local institutions (all Sherpa) (Table 1).

The workshops were organized by our project, with the approval of the Department of National Parks and Wildlife Conservation (DNPWC) and the chair of the Buffer Zone Committee of SNP. The facilitators were a foreign adviser, who was a member of the HKKH technical team, and a Sherpa park management expert,

**TABLE 1** Participants in the scenario planning workshops.

Workshop participants	Kathmandu	Namche
Tourism businesses and associations	5	0
Local NGOs	6	1
Local religious institutions	2	0
Local students (at senior secondary or tertiary institutions)	1	2
Department of National Parks and Wildlife Conservation	3	3
Local comanagement institutions (Community Forest User Groups, Buffer Zone Management Committee) <sup>a)</sup>	0	18
Local energy company	0	2
International NGOs/research institutions (IUCN, ICIMOD, Italian CNR)—observers	6	0
Facilitators (including actors in Namche)	2	5
<b>Total number of participants</b>	<b>25</b>	<b>31</b>
Women	2	2
From the Khumbu region/Sherpa	15	24
Non-Nepali	4	2

<sup>a)</sup> Some also run local tourism businesses.

who is from Khumbu and has a long-standing association with SNP management and local institutions.

Our methodology was formulated by adapting the guidelines and experiences described in the literature. Evans et al (2006) was particularly helpful for structuring the participatory proceedings, and we also drew lessons and approaches from other environmental applications (Peterson et al 2003a, b; Millennium Ecosystem Assessment 2005; Lebel 2006; Resilience Alliance 2006). A review of business applications (Schwartz 1998; Ogilvy and Schwartz 2004) and especially of applications to small enterprises (Burt and van der Heijden 2003) underscored the importance of focusing the strategic analysis on problem solving to create and maintain momentum in stakeholder participation.

From our initial review and consultations (Daconto and Sherpa 2007), we identified a range of broad topics for engaging SNP stakeholders in long-term strategic analysis: tourism management, changes in the agropastoral economy, and linking research and learning to adaptive park management. Preparatory to introducing the SP exercises, we held further informal consultations with senior DNPWC staff and SNP Buffer Zone Committee members. They confirmed their long-term concerns about the environmental, social, and cultural impacts of tourism development—particularly the need to support self-regulation capacity, the risks of the long-term financial viability of hotel investments by local entrepreneurs, and the growing influence of outside investors.

We accordingly proposed the following specific objectives for our exercise: (1) to test SP as a participatory tool for assessing strategies and exploring the future of the park, (2) to raise awareness about perceptions of change and the factors likely to influence the park and its tourism industry in the long term, (3) to initiate the development of alternative future scenarios for SNP and tourism, and (4) to provide advice to the HKKH project on framing further systems analysis.

A detailed but flexible workshop road map was prepared to guide the facilitation, providing alternative tools to fit a range of plausible participants' reactions at each stage. The facilitators had different backgrounds and degrees of association with the area (professional actors were also part of the facilitator team in the second workshop). The preparation and prior rehearsal of the road map allowed them to explore and discuss their own cognitive notions of scenario thinking and agree on explicit lines of facilitation, concept cues, and questions for each workshop step.

The workshops each lasted 2 and half days and were conducted in English with interpretation in Sherpa and Nepali. The facilitators used short visual presentations at each step. The steps of the first workshop were:

- Introduction of cognitive concepts of scenario thinking with visual scenario examples;
- Mapping of participants' and stakeholders' expectations and concerns for the future and charting of the area's history;

- A system description session using pin cards and group discussions to agree on a focal question;
- Selection of 2 drivers for framing alternative scenarios;
- Group formulation of scenario narratives, with feedback from plenary discussion and iterations;
- Scenario presentation and validation and scenario evaluation in terms of the focal question; and
- Screening of policy options.

The second workshop followed the same introductory steps as the first and produced a system description *ex novo*; it then introduced the focal question and scenario storylines obtained in the first workshop for validation and discussion (narratives had been translated into Nepali prior to the workshop and were distributed to the participants). Role-playing and dramatization in Nepali, facilitated by professional artists, were also used. Our aim was to test whether the dramatization of storylines produced jointly with the participants could help capture their knowledge of the local dynamics in tangible terms, rather than through abstract conceptualization. We sought creative reactions to the storylines, which had the main purpose of eliciting out-of-the-box thinking about the future. The artists also facilitated energizing and creative breaks between sessions of the workshop.

The workshops were evaluated with a questionnaire, in which participants were asked to score the workshop achievements against stated objectives and to comment on the methodology and proceedings.

## Outcomes and lessons learned

The initial workshop steps led the participants to gradually explore cognitive concepts of scenario thinking, long-term uncertainty, and diversity of perceptions. At each step, the facilitators introduced concepts and questions and stimulated discussions. These were carefully recorded and documented in the proceedings and, along with the workshop evaluation data, form the basis of our arguments presented later.

Through group discussions, the participants reached a consensus on the focal question of inquiry into the future: *How to develop quality and sustainable ecotourism in the park and Buffer Zone*. This had long been a matter of local debate and was an important issue for the Sherpa, given their desire to preserve cultural identity and their concerns about the sustainability of the booming tourism economy. Climate change adaptation and natural disaster prevention were also identified as secondary themes of inquiry. However, these were set aside for the purposes of this exercise, as the participants agreed to concentrate on the main focal question.

Based on their perceptions across the environmental, socioeconomic, political, and technological domains, the stakeholders identified qualitative drivers of long-term landscape change. For each suggested driver, the

facilitators stimulated reflection about the uncertainty surrounding future changes and the stakeholders' ability to control them. The 2 workshops produced remarkably similar outputs that converged upon the system description shown in Figure 1. These were later used for framing problem analysis and system descriptions undertaken in other phases of the participatory modeling process developed by the HKKH Partnership Project (Salerno et al 2010).

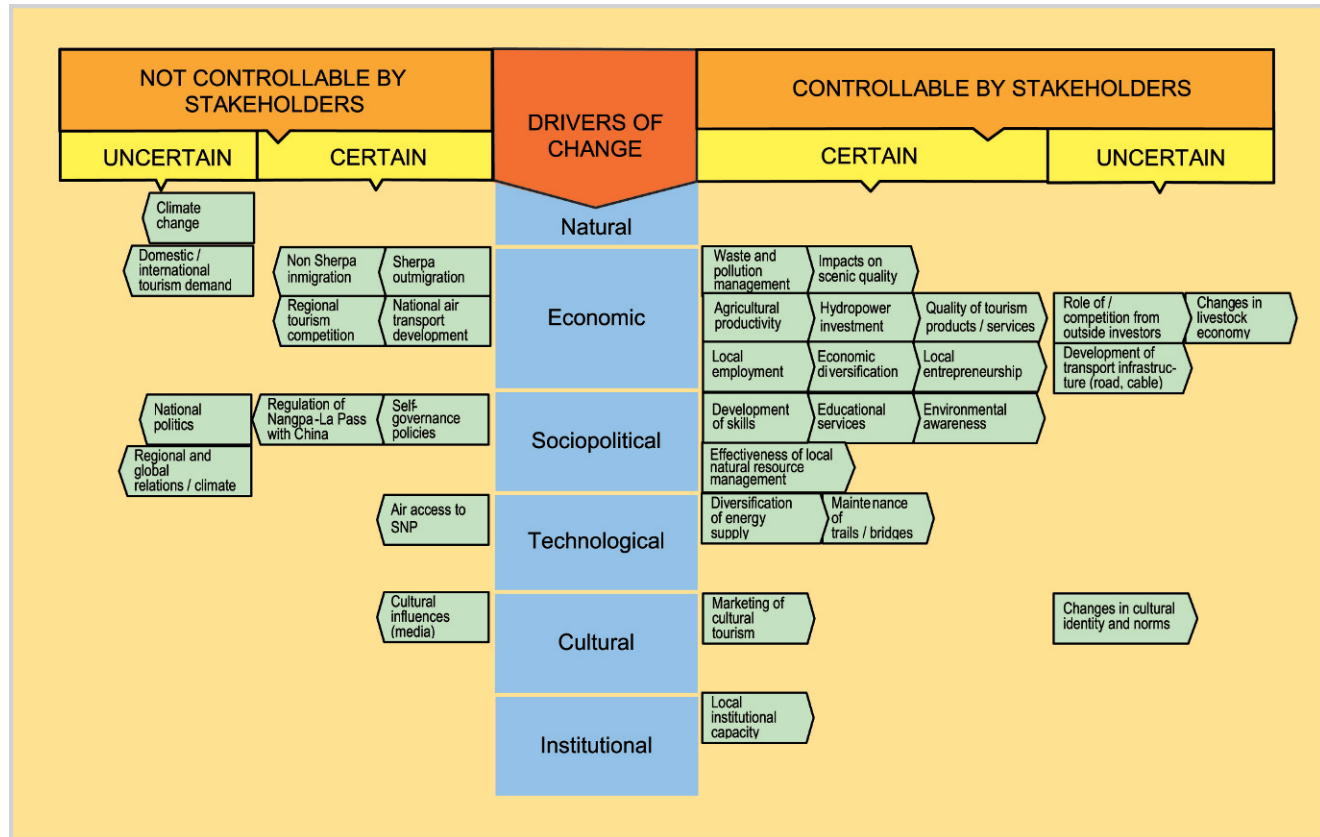
Through discussions and a ranking exercise, the participants jointly selected 2 drivers whose long-term evolution they considered to be most uncertain and difficult to control but which nevertheless fundamentally influence the focal question. The first was the centralization of governance and management imposed by the central government: The discussions revealed that the governance situation was considered potentially subject to wide-ranging and unpredictable changes in the long term. The second driver was the balance of economic influence between Sherpa and outside investors: This stemmed from the participants' concern about the growing influence of non-Sherpa in SNP (through tourism investments and migrant labor).

By plotting these 2 drivers on orthogonal axes, 4 scenarios were generated corresponding to extreme values for each driver, representing 4 envisaged future states (Figure 2). Participants were then asked to imagine arriving at SNP 25 years in the future and to write credible descriptions of the park's situation, and how this situation had come about, for each of the 4 scenarios. The aim of these storylines was to trace plausible change trajectories from the present situation to each future scenario using the drivers identified in the system description and picturing realistic behavior by park stakeholders.

The scenarios were validated through discussions and, in the second workshop (Figure 3), through reactions to 2 enacted scenarios. Participants were encouraged to point out inconsistencies in the stories and elaborate upon them further. The final aim was to discuss the scenarios in light of the focal question, seeking to draw lessons by using the storylines as plausible "future experiences." The participants were asked to examine strategic questions, for example, "What will be the long-term implications of present management systems and choices given the long-term outlook of the focal problem under each scenario?"

The criteria for selecting workshop participants were pragmatic. Several participants had been involved in the recently concluded participatory park planning process, upon which our strategic analysis was being built. Existing discourses on tourism in the park were also leveraged by including a core group of closely concerned stakeholders. One drawback of this concurrence with the park planning process was that the relation between the proposed strategic analysis and the ongoing park management initiatives had to be clarified. The distinction was in fact

**FIGURE 1** System description produced by SNP stakeholders: Drivers affecting the long-term future of tourism growth and quality.



not always obvious to participants, who at times expected the scenario workshop outcomes to feed directly into park planning tools. However, the discussions clarified that the focus of the SP workshops was on long-term strategies. According to the evaluation data (Table 2), most participants judged that the workshops had made good progress towards the 4 stated objectives and that scenario planning should be applied more widely to SNP stakeholders.

The choice of participants unavoidably affected the technical outputs of the exercise (qualitative systems analysis and scenarios). However, we maintain that in this case the process was at least as important as the outputs insofar as it prompted participants to reframe their perceptions, expanding their grasp of landscape change factors and their ability to identify adaptive options. Some examples of the process outcomes are summarized later.

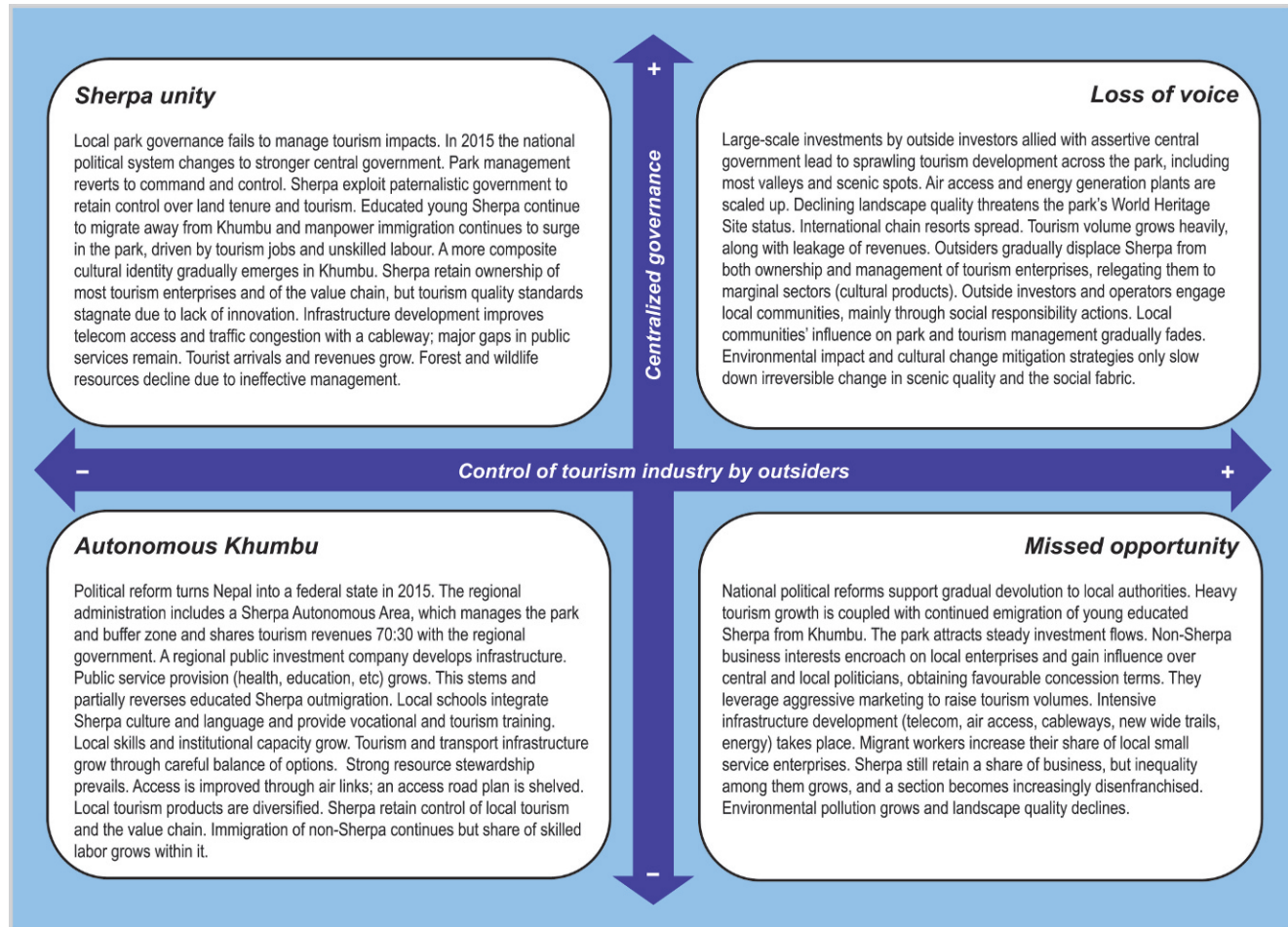
The rationale of the exercise assumed that the long-term vision of the participants—who represent a cross-section of stakeholders with influence on the governance of the park and its tourism industry today—could have a significant impact on the region's future development. The novel concept of scenario thinking was embraced by

most participants, who at times explained their thinking by noting how, in Sherpa Buddhism, future outcomes are clearly linked to present deeds through the concept of karma.

The system descriptions and scenario discussions produced by the participants in the 2 workshops reflected largely consistent worldviews. The Kathmandu-based Sherpa participants appeared to more readily grasp the approach (Table 2), thanks to their broader exposure and better education level, while others found the methodology conceptually demanding and overly oriented towards literate participants. Producing narratives requires skills, and outcomes can be improved by slowing the pace and by repeated iterations. Dramatization proved effective in eliciting informal and emotional engagement but required careful blending of script preparation and improvisation to ensure that the key features of the storylines were captured while still allowing creative participation.

The systems analysis (Figure 1), the storylines, and the discussions they engendered prodded participants to grapple with long-term horizons, uncertainty, and multiple perspectives and roles. Discussions (eg on

**FIGURE 2** Summary of 25-year scenarios for tourism and governance in Sagarmatha National Park.



expectations regarding future change, the uncertainty and controllability of each identified driver) revealed a range of opinions among participants, and sometimes inconsistencies (eg conflict between desire to improve tourism access and cultural and environmental conservation). The system description and scenario approach tended to foster convergence and consensus, rather than differential analysis of opinions.

We argue that one of the strengths of this approach is its ability to cause hidden or difficult themes to emerge. The tension between Sherpa and outsiders (captured in the choice of the second axis and articulated in the storylines) is a case in point. The participants agreed that investments by outsiders and migration flows (outmigration of local Sherpa and influx of outsiders into Khumbu) are powerful forces of change driven by economic, political, and social realities. They felt they had little control over these factors, and scenario discussions revealed some anxiety and insecurity in this regard. For

example, the “loss of voice” storyline (Figure 2) showed a tension between the positive impact of outside investors on local tourism standards and the attendant disempowerment of local people.

Our view, based upon close observation of the local tourism industry and the SNP management processes, is that this tension had been a growing undercurrent in local discussions but had not been addressed as openly as it was during these exercises. The issue was ultimately raised in a constructive fashion, with both workshops recommending the involvement of non-Sherpa stakeholders in future scenario conversations and more inclusive strategic processes for the park and its tourism industry.

The tension surrounding governance devolution reflects both the historical trend of park management in Nepal and a broader transition in national politics, with growing demand for devolution of authority. In the scenario storylines and discussions, the participants

**FIGURE 3** Clockwise from top left: (1) Scenario group work with tourism industry and NGO experts during the first workshop; (2) we presented the growing uncertainty of future park states and trajectories as sequential points along a braided river channel; (3) during our second scenario workshop, an actor plays a rogue community member as a metaphor for loss of local social norms; (4) in another dramatized scenario, an outside businessman tries to influence local park officials. (Photos by Laxmi Krishna Amatya and Jeremy Spoon)



strongly supported park management devolution and local self-governance. However, discussion of the “autonomous Khumbu” scenario surprisingly revealed that participants did not have full confidence in local

people’s ability to build on self-governance due to their lack of experience.

The participants had unwavering trust in the long-term potential of tourism in Khumbu because “there is

TABLE 2 Participants' workshop evaluation results.

Achievement of workshop objectives (based on 0–10 scoring by participants)	Kathmandu stakeholders (n = 13)			Kathmandu observers <sup>a)</sup> (n = 6)			Namche (n = 16)		
Objectives	Score range								
	0–3	4–6	7–10	0–3	4–6	7–10	0–3	4–6	7–10
Understand and try scenario planning as a tool for assessing strategies and exploring the future	1	4	8	0	0	6	2	4	10
Improve awareness about change and factors likely to influence SNP and the tourism industry in the long term	0	5	8	0	3	3	3	7	6
Start developing possible alternative future scenarios for SNP and tourism	0	6	7	0	2	4	2	6	8
Provide advice to the HKKH project on future analysis	0	5	7	0	2	3	1	8	7
Typical comments on workshop methods and results:									
<ul style="list-style-type: none"><li>• Very participatory.</li><li>• Builds the capacity to think a long time ahead.</li><li>• Makes you realize the long-term concerns related to Khumbu region; clears up many conflicting issues and helps focus on the main issues.</li><li>• Slightly too fast for the level of some participants.</li><li>• Try to use as much Nepali as possible so that uneducated persons like us can make more out of it.</li><li>• New and useful method, because conclusions come from different people and group decisions.</li><li>• This methodology brought all the important parties into the discussion (culture, business, environment).</li><li>• Involve outside business people, local people, more women and youth.</li><li>• The drama was very good.</li></ul>									

<sup>a)</sup> We asked participants to identify themselves as stakeholders or observers in the evaluation forms to allow disaggregation.

only one Everest.” They showed far less concern about the long-term impact of changes in national politics or international events on the tourism supply side than about the development of the tourism market and competition and revenue-sharing issues. Yet they felt they had a fairly high degree of control over these latter factors (Figure 1). In the initial systems analysis, participants also considered tourism environmental impacts to be largely controllable. But the storylines (Figure 2) led them to reconsider this view and explore a range of environmental outcomes driven by different governance systems and tourism development pathways.

## Conclusions

Most participants in the exercise had had prior involvement in park planning processes. Their initial

reaction to the scenario approach revealed the typical contrast between management thinking (more linear, focused on deliverables, tangible outcomes, efficiency, and effectiveness) and strategic thinking (grasping inherent uncertainty, adaptive management, multiple perspectives, and vision building and sharing). The outcomes of our introduction of scenario planning in Khumbu suggest that this approach can help bridge management and strategy in other similar contexts.

Scenario planning, adapted to cultural perceptions and focusing on long-term management problems as entry points, holds strong potential for effectively complementing planning processes with inclusive strategic conversations between stakeholders in mountain protected areas with a resident population. The approach can suit a range of public consultation levels and targets by carefully adapting the tools and communication methodologies

(narratives in local languages, visual presentations of storylines and system description, storyline dramatization).

We propose its further application in SNP along 2 lines. In one, scenario reviews and discussions could provide a focus for public consultations on park and tourism strategies, with conversations extended to a wider range of park and tourism stakeholders. The focus on long-term implications, rather than on present trade-offs, could help raise potentially conflictual issues in a nonconfrontational and inclusive manner. The process would need to emanate from a suitable institution that embraces as many stakeholders as possible. There is at present no self-evident solution (the park's collaborative management institutions represent chiefly Sherpa interests), though the recently established Sagarmatha Tourism Forum might be suitable. Another line of technical analysis (supported by scientific and management bodies) could articulate and elaborate on the initial scenarios to improve their internal consistency and, where possible, feed them with quantitative analysis. Assessment and modeling of the direct environmental and economic impacts of tourism are the most immediate candidate themes for this level. Building on the scenarios developed by stakeholders, the results of these technical analyses could be communicated to stakeholders to deepen their understanding of the uncertainty and

controllability of these drivers of change. This could support further scenario refinement and thinking by stakeholders.

The overall process could facilitate stakeholders' strategic-level learning, guiding continued adaptive park management and area development and availing of the large body of research that SNP continues to attract. The process could build on intuitive analysis based on scenario tools. This would not preclude nontechnical participation; alternative options could be discussed and observed from a range of perspectives outside the straight-jacket often imposed by legal, institutional, and management frameworks.

However, the long time horizons and fuzzy analytical boundaries of scenario planning can be obstacles to the participation of stakeholders, who often need to see tangible benefits from a process to sustain momentum. We suggest that this challenge can be mitigated through conscious use of creative scenario communication and participation tools. Moreover, the scenario process can foster momentum by engaging stakeholders in the development of a long-term, inclusive, strategic vision of the park and its tourism industry. Scenario analysis can support this process by catalyzing consensus and providing a framework for factoring in uncertainty.

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## REFERENCES

- Amatya LK, Cuccillato E, Haack B, Shadie P, Sattar N, Bajracharya B, Shrestha B, Caroli P, Panzeri D, Basani M, Schommer B, Flury B, Manfredi EC, Salerno F.** 2010. Improving communication for management of social-ecological systems in high mountain areas: Development of methodologies and tools—The HKKH Partnership Project. *Mountain Research and Development* 30(2):69–79.
- Amelung B, Lamers M.** 2005. Scenario development for Antarctic tourism: Exploring the uncertainties. *Polarforschung* 75(2–3):133–139.
- Bradfield R, Wright G, George B, Cairns G, Van Der Heijden K.** 2005. The origins and evolution of scenario techniques in long range business planning. *Futures* 37:795–812.
- Brower B.** 1990. Range conservation and Sherpa livestock management in Khumbu, Nepal. *Mountain Research and Development* 10(1):34–42.
- Burt G, van der Heijden K.** 2003. First steps: Towards purposeful activities in scenario thinking and future studies. *Futures* 35:1011–1026.
- Byers A.** 2005. Contemporary human impacts on alpine ecosystems in the Sagarmatha (Mt Everest) National Park, Khumbu, Nepal. *Annals of the Association of American Geographers* 95(1):112–140.
- Carpenter S, Pingali PL, Bennett EM, Zurek MB, editors.** 2005. *Ecosystems and Human Well-Being: Scenarios*. Millennium Ecosystem Assessment, vol 2, Findings of the Scenarios Working Group. Washington, DC: Millennium Ecosystem Assessment and Island Press.
- Chermack TJ.** 2004. Improving decision-making with scenario planning. *Futures* 36:295–309.
- Daconto G.** 2007a. *Analysis of Future Scenarios for Sagarmatha National Park: Scenario Planning as Participatory Decision Support Tool*. Institutional Consolidation for the Coordinated and Integrated Monitoring of Natural Resources towards Sustainable Development and Environmental Conservation in the Hindu Kush–Karakoram–Himalaya Mountain Complex. Kathmandu, Nepal: CESVI [Cooperazione e Sviluppo]. www.hkkhpartnership.org/ThmCMS/docs/technical\_documents/A1410\_A154\_scenario\_planning\_concept\_paper.pdf; accessed on 8 October 2009.
- Daconto G.** 2007b. *Exploring the Future: Strategic Analysis of Future Scenarios for Central Karakorum National Park*. Scenario Planning Workshop, Gilgit, Pakistan, 10–14 June 2007. Institutional Consolidation for the Coordinated and Integrated Monitoring of Natural Resources towards Sustainable Development and Environmental Conservation in the Hindu Kush–Karakoram–Himalaya Mountain Complex. Kathmandu, Nepal: CESVI [Cooperazione e Sviluppo]. www.hkkhpartnership.org; accessed on 8 October 2009.
- Daconto G, Sherpa LN.** 2007. *Exploring the Future. Analysis of Future Scenarios for Tourism Development in Sagarmatha National Park and Buffer Zone*. Report on the First Scenario Planning Exercise, Dhulikhel, Nepal, 23–25 March 2007. Institutional Consolidation for the Coordinated and Integrated Monitoring of Natural Resources towards Sustainable Development and Environmental Conservation in the Hindu Kush–Karakoram–Himalaya Mountain Complex. Kathmandu, Nepal: CESVI [Cooperazione e Sviluppo]. www.hkkhpartnership.org; accessed on 8 October 2009.
- Daconto G, Sherpa LN, Spoon J.** 2007. *Exploring the Future. Analysis of Future Scenarios for Tourism Development in Sagarmatha National Park and Buffer Zone*. Report on the Second Scenario Planning Exercise, Namche Bazar, Nepal, 28–30 May 2007. Institutional Consolidation for the Coordinated and Integrated Monitoring of Natural Resources towards Sustainable Development and Environmental Conservation in the Hindu Kush–Karakoram–Himalaya Mountain Complex. Kathmandu, Nepal: CESVI

- [Cooperazione e Sviluppo]. [www.hkkhpartnership.org](http://www.hkkhpartnership.org); accessed on 8 October 2009.
- DNPWC [Department of National Parks and Wildlife Conservation]**. 2005. *Sagarmatha National Park and Buffer Zone Management Plan*. Kathmandu, Nepal: DNPWC.
- DNPWC [Department of National Parks and Wildlife Conservation]**. 2006. *Sagarmatha National Park Management and Tourism Plan 2006–2011*. Kathmandu, Nepal: DNPWC.
- EEA [European Environment Agency]**. 2009. *Looking Back on Looking Forward: A Review of Evaluative Scenario Literature*. Technical Report 3/2009. Copenhagen, Denmark: EEA.
- Evans K, de Jong W, Cronkleton P**. 2008. Future scenarios as a tool for collaboration in forest communities. *Surveys and Perspectives Integrating Environment and Society* 1:97–103.
- Evans K, Velarde SJ, Prieto R, Rao SN, Sertzen S, Dávila K, Cronkleton P, de Jong W**. 2006. *Field Guide to the Future: Four Ways for Communities to Think Ahead*. Nairobi, Kenya: CIFOR [Center for International Forestry Research], Alternatives to Slash-and-Burn, World Agroforestry Centre. [www.asb.cgiar.org/ma/scenarios](http://www.asb.cgiar.org/ma/scenarios); accessed on 30 March 2007.
- Garratt KJ**. 1981. *Sagarmatha National Park Management Plan*. Wellington, New Zealand: Department of Lands and Survey.
- Ives JD**. 2005. Himalayan delusions: Who's kidding who and why—Science at the service of media, politics and the development agencies. *Himalayan Journal of Sciences* 3(5):15–24.
- Jodha NS**. 2005. Adaptation strategies against growing environmental and social vulnerabilities in mountain areas. *Himalayan Journal of Sciences* 3(5):33–42.
- Lebel L**. 2006. Multi-level scenarios for exploring alternative futures for upper tributary watersheds in Mainland Southeast Asia. *Mountain Research and Development* 26(3):263–273.
- Lebel L, Bennett E**. 2008. Participation in building scenarios of regional development. In: Cumming GS, Norberg J, editors. *Complexity Theory for a Sustainable Future*. New York, NY: Columbia University Press.
- Macdonald AW**. 1980. The coming of Buddhism to the Sherpa area of Nepal. *Acta Orientalia Academiae Scientiarum Hung.* XXXIV(1–3):139–146.
- Millennium Ecosystem Assessment**. 2005. *Ecosystems and Human Well-Being*. 5 vols. Washington, DC: Island Press.
- Ogilvy J, Schwartz P**. 2004. *Plotting Your Scenarios*. San Francisco: Global Business Network. [www.gbn.com/articles/pdfs/gbn\\_Plotting%20Scenarios%20new.pdf](http://www.gbn.com/articles/pdfs/gbn_Plotting%20Scenarios%20new.pdf); accessed on 3 September 2009.
- Oppitz M**. 1973. Myths and facts: Reconstructing some data concerning the clan history of the Sherpa. *Kailash* 2(1):121–131. [http://himalaya.socanth.cam.ac.uk/collections/journals/kailash/pdf/kailash\\_02\\_0102\\_04.pdf](http://himalaya.socanth.cam.ac.uk/collections/journals/kailash/pdf/kailash_02_0102_04.pdf); accessed on 15 February 2010.
- Ortner SB**. 1989. *High Religion: A Cultural and Political History of Sherpa Buddhism*. Princeton, NJ: Princeton University Press.
- Patel M, Kok K, Rothman DS**. 2007. Participatory scenario construction in land use analysis: An insight into the experiences created by stakeholder involvement in the Northern Mediterranean. *Land Use Policy* 24:546–561.
- Peterson GD, Beard TD Jr, Beisner BE, Bennett EM, Carpenter SR, Cumming GS, Dent CL, Havlicek TD**. 2003a. Assessing future ecosystem services: A case study of the Northern Highlands Lake District, Wisconsin. *Conservation Ecology* 7(3):1. [www.consecol.org/vol7/iss3/art1](http://www.consecol.org/vol7/iss3/art1); accessed on 27 December 2006.
- Peterson GD, Cumming G, Carpenter S**. 2003b. Scenario planning: A tool for conservation in an uncertain world. *Conservation Biology* 17(2):358–366.
- Resilience Alliance**. 2006. NHD Scenarios. [www.resalliance.org/1614.php](http://www.resalliance.org/1614.php); accessed on 27 December 2006.
- Rogers P, Aitchison J, Lucas B**. 1998. *Sustainable Tourism in the Sagarmatha National Park and the Solu-Khumbu District*. A final report of the seminar convened at the British Council on 12 August 1998. Aberystwyth, Wales, United Kingdom: International Centre for Protected Landscapes, University of Wales.
- Salerno F, Cuccillato E, Caroli P, Bajracharya B, Manfredi EC, Viviano G, Thakuri S, Flury B, Basani M, Panzeri D**. 2010. Experience with a hard and soft participatory modeling framework for social-ecological system management in Mount Everest (Nepal) and K2 (Pakistan) Protected Areas. *Mountain Research and Development* 30(2):80–93.
- Schwartz P**. 1998. *The Art of the Long View: Planning for the Future in an Uncertain World*. New York, NY: Wiley.
- Sherpa LN**. 2003. Sacred beyuls and biological diversity conservation in the Himalayas. In: Lee C, Schaaf T, editors. *Proceeding of the International Workshop on Importance of Sacred Natural Sites for Biodiversity Conservation*, Kunming, 17–20 February 2003. Paris, France: United Nations Scientific and Cultural Organization (UNESCO).
- Spoon J, Sherpa LN**. 2008. Beyul Khumbu: The Sherpa and Sagarmatha (Mount Everest) National Park and Buffer Zone, Nepal. In: Mallarach JM, editor. *Protected Landscapes and Cultural and Spiritual Values*. Values of Protected Landscapes and Seascapes, vol. 2. IUCN [International Union for Conservation of Nature], GTZ [Deutsche Gesellschaft fuer Technische Zusammenarbeit], and Obra Social de Caixa Catalunya. Heidelberg, Germany: Kasperek Verlag.
- Stevens SF**. 1996. *Claiming the High Ground: Sherpas, Subsistence and Environmental Change in the Highest Himalayas*. Delhi, India: Motilal Banarsidass.
- Stevens SF**. 2003. Tourism and deforestation in the Mt Everest region of Nepal. *The Geographical Journal* 169(3):255–277.
- Swart RJ, Raskin P, Robinson J**. 2004. The problem of the future: Sustainability science and scenario analysis. *Global Environmental Change* 14:137–146.
- von Furer-Haimendorf C**. 1964. *The Sherpas of Nepal*. London, United Kingdom: John Murray.
- Walker B, Carpenter S, Anderies A, Abel N, Cumming C, Janssen M, Lebel L, Norberg J, Peterson GD, Pritchard R**. 2002. Resilience management in social-ecological systems: A working hypothesis for a participatory approach. *Conservation Ecology* 6(1):14. [www.consecol.org/vol6/iss1/art14](http://www.consecol.org/vol6/iss1/art14); accessed on 27 December 2006.
- Yeoman I, McMahon-Beattie U**. 2005. Developing a scenario planning process using a blank piece of paper. *Tourism and Hospitality Research* 5(3):273–285.
- Zangbu NT**. 2000. *Stories and Customs of the Sherpas*. Kathmandu, Nepal: Mera.