International Journal of Sustainable Development & World Ecology

ISSN: 1350-4509 (Print) 1745-2627 (Online) Journal homepage: <http://www.tandfonline.com/loi/tsdw20>

The effectiveness of incentives in protected area management: An empirical analysis

Yihe Lu , Bojie Fu , Liding Chen , Jianying Xu & Xin Qi

To cite this article: Yihe Lu , Bojie Fu , Liding Chen , Jianying Xu & Xin Qi (2006) The effectiveness of incentives in protected area management: An empirical analysis, *International Journal of Sustainable Development & World Ecology*, 13:5, 409-417, DOI: [10.1080/13504500609469690](https://doi.org/10.1080/13504500609469690)

To link to this article: <http://dx.doi.org/10.1080/13504500609469690>

Published online: 20 Sep 2010.

Submit your article to this journal [↗](#)

Article views: 70

View related articles [↗](#)

Citing articles: 6 View citing articles [↗](#)

The effectiveness of incentives in protected area management: An empirical analysis

Yihe Lu, Bojie Fu, Liding Chen, Jianying Xu and Xin Qi

State Key Laboratory of Urban and Regional Ecology, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China

Key words: Biodiversity, community-based conservation, employment, industrial development, Wolong Biosphere Reserve, China

SUMMARY

Incentive approaches are believed to be indispensable for effective conservation and successful management in protected areas. However, the actual effectiveness of these approaches is still debatable. We carried out a case study in Wolong Biosphere Reserve (WBR), the largest reserve for the giant panda (*Ailuropoda melanoleuca*), to evaluate the effectiveness of incentives. We obtained data from government documents and statistics, interviews and surveys on the employment status of public sector and industries. Results indicated that government-paid community-based conservation projects provided the most widespread and direct economic incentives. The conservation sector and several industries including hotels, hydropower and tourism have directly raised the employment level of local communities. The hotel industry, driven by the development of tourism, has been the most effective means of increasing local employment. However, the problem of immigrants attracted by the improved economic situation in WBR should be considered in the management plans. Suggestions for WBR management include development of quality ecotourism, vocational education for local young adults and new policies encouraging employment of local labour, both in the reserve and outside. Lessons learned from this research are constructive for the management of other protected areas.

INTRODUCTION

At a global scale, the cornerstone of conservation efforts has been the creation of protected areas as refuges from human threats (Fuentes-Quezada *et al.* 2000). However, the effectiveness of protected areas in biodiversity conservation is limited by increasing human pressures (Liu *et al.* 1999a). Human pressures often lead to conflicts or incompatibilities between people and protected areas. Small-scale incompatibilities driven by economic

necessity and lack of alternatives for local populations within and adjacent to protected areas have occurred more frequently than large-scale incompatibilities driven by larger economic interests (Rao *et al.* 2002). Permanent settlements, hunting, grazing, medicinal plant extraction, fuelwood and timber and non-timber forest product extraction have been recognized as the main local incompatibilities (Maikhuri and Nautiyal 2000; Salafsky and

Correspondence: Yihe Lu, State Key Laboratory of Urban and Regional Ecology, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, P.O. Box 2871, Beijing 100085, China. Email: lyh@rcees.ac.cn

Wollenberg 2000; Samant *et al.* 2000; Larsen 2002). The establishment of protected areas can incur tangible economic costs at the household level because of restrictions on some traditional resource uses (Shyamsundar and Kramer 1997). This may result in negative attitudes of local people towards the management of protected areas, which will harm cooperation between local communities and the management authorities in the long run. Therefore, the success or failure of protected area management depends on the patterns of human activities and perceptions. Protected areas cannot be sustained without support from local people living in or adjacent to such areas (Nepal 2002).

To reduce human pressures on protected areas, changes in traditional human activities and perceptions leading to incompatibilities are necessary. But these transitions to sustainable human-protected area relationships will never happen automatically. Therefore, innovative and efficient incentive approaches need to be formulated and tested to facilitate changes. Several approaches have been proposed including community-based conservation (CBC), community-based natural resource management (CBNRM), and integrated conservation and development projects (ICDP) (Wainwright and Wehrmeyer 1998; Nepal 2002). Although these approaches have been praised extensively, their actual effects have not always been significant. They can only be identified as successful if they improve both the wellbeing among local people and sustain biodiversity. Effective incentive mechanisms are indispensable to these approaches if they are to be successful. Economic incentives are important in influencing people's behaviour by making it more desirable for them to conserve, rather than to degrade or deplete biodiversity in the course of their economic activities (Emerton 2000).

According to the Convention on Biological Diversity, an incentive is a specific inducement designed and implemented to influence government bodies, business, non-governmental organizations, or local people to conserve biological diversity or to use its components in a sustainable manner. Incentive measures usually take the form of new policy, law or economic or social programmes (Emerton 2000). Incentives or motivating mechanisms are important in the policy-making process of protected area management.

Protected areas in China have experienced rapid growth in recent years. The number of protected

areas increased annually at a rate of 17.7% during the period from 1978 to 2003, resulting in about 14.37% of the national territory under protection. The rapid increase in the number of protected areas has raised an important question on how to manage them in an effective and sustainable manner (Han 2000). The participation of local people in the management and conservation of protected areas is indispensable to improve their functions (Lü *et al.* 2003). Research on mechanisms for motivating local people towards sustainable livelihoods and an awareness of the importance of biodiversity conservation are therefore crucial.

In this study, we chose the Wolong Biosphere Reserve (WBR), a national nature reserve with global importance, as a case study site to analyze the incentives present in the reserve and their effectiveness in harmonizing local socioeconomic development and biodiversity conservation. The objectives of this research were to: (a) identify the main incentive mechanisms implemented from reviewing the evolution of WBR development and management, and (b) assess the effectiveness of these incentive mechanisms, mainly from the local employment perspective. The research on these issues is relevant to regional development decision-makers and for biodiversity conservation in WBR. It can offer useful information for designing effective policies to improve the management of other protected areas in China and elsewhere.

METHODS

The study area

Wolong Nature Reserve was established in 1963, with an area of 200 km², and in 1975 was enlarged to 2000 km² upon approval of the State Council. It was designated as a biosphere reserve in the UNESCO Man and Biosphere Programme of 1980, to protect alpine and sub-alpine ecosystems, and endangered species such as the giant panda (*Ailuropoda melanoleuca*), golden monkey (*Rhinopithecus* spp) and dove trees (*Davidia involucrata*). WBR is located in Wenchuan County, Sichuan Province, southwestern China (102°52' to 103°24'E, 30°45' to 31°25'N) in the transition zone from the Chengdu Plain to the Qinghai-Tibet Plateau. The reserve has an elevation between 1200 m and 6250 m, with high mountains and deep valleys characterizing the area. It maintains a variety

of ecosystem types and a rich biodiversity (Fu *et al.* 2004).

The reserve is managed by the Wolong Administration Bureau, which reports to both China's Ministry of Forestry and Sichuan Province. There are two township governments under the Administration Bureau, Wolong Township and Gengda Township (Liu *et al.* 1999a). In 2001, there were 1456 households living in the reserve, with a total population of 5145. The local farming community increased by 0.94% annually from 1983 and, by 2001, accounted for about 88.9% of the total population. Over the same period, the labour force component of the farming population increased by 1.95% annually.

Data collection and analysis

This study adopted quantitative and qualitative data from primary and secondary sources. The fieldwork was carried out from July to September 2002, and archival records related to development, management and regulations in WBR were studied to identify the incentives involved. These records included the Master Plan, Regulation series, the Brief History of Agricultural and Rural Economic Development, the Master Plan of Natural Forest Protection and Reforestation, and the Master Plan of Ecotourism. The human resource records of, particularly, the permanent staff in Wolong Administration Bureau were also reviewed, together with employment statistics for staff from the resource protection and tourism management sectors. The small-scale hydropower and hotel industries were also surveyed on the employment attributes (i.e. age, sex, education level, salary and the geographical origin of the workers, employers or employees). These data were used to calculate the sex ratios, proportion of locally employed people, their age and education level, together with the monthly wage of the employees in the various WBR employment categories, and thus characterize the incentive effects of development and employment.

RESULTS

The projects and developments with incentives

The project of reforestation is a national effort for environmental restoration and protection, which involves the reforestation of slope cropland. The

first round of the reforestation project in WBR started in 1983 and the second round started in 1999. The project has so far resulted in 515.04 ha of slope cropland being reforested. The compensation, provided by the government for the reforested cropland, was 2250 kg in food crops (mainly rice and wheat) and 300 Yuan (US\$36.6) per ha, with each household in WBR receiving compensation proportional to the individual area of cropland reforested.

The project of natural forest protection is a key strategic decision of the central government of China. The aim of the project is to improve ecological and environmental quality and at the same time to promote the socio-economic development at the national level. The project involved 734 counties from the upper reaches of Yangtze River, the middle and upper reaches of the Yellow River, northeastern China and Inner Mongolia, with 286.9 billion Yuan (US\$35.0 billion) being invested in the project (<http://www.tianbao.net>). The project was implemented in 2001 in WBR, when 44,279 ha of natural forest, about 37.2% of the total protected forest area, were allocated to local communities for protection. Each household in the local community was rewarded for protecting the forest, depending on the area and geographical location of forest allocated, as well as the difficulty involved and quality of protection. The maximum amount of the annual reward was 1400 Yuan (US\$170.7) per household.

The development of the small-scale hydropower and tourism industries was important in WBR for provision of incentives. WBR has abundant resources for producing hydropower but only about 36% of the usable hydropower resources had been used for generating electricity. It was generally believed that the development of small-scale hydropower plants could not only raise employment but also provide a sustainable energy source, thereby reducing fuelwood consumption in the reserve. The development of this industry would therefore be beneficial to both nature conservation and socio-economic development. The development of the tourism industry would provide employment and increase environmental awareness.

The status of permanent and temporary employees

The permanent staff in WBR were employed in several sectors, including the administration bureau,

township governments, school system, tourism management agency, the hydropower industry and clinics (Table 1). The recruitment of permanent staff from local communities was rare. The number of permanent staff, the sex ratio of staff employed, their age and education level varied from one sector to another. The monthly wage of staff was generally dependent on their age, number of years in employment and the education level.

Few members of the temporary staff employed in the tourism management agency were recruited from the local community, while 72% of the temporary staff in the hydropower industry were local (Table 1). Generally, there were more female than male temporary staff in both the tourism and hydropower industries, but the temporary employees from local communities were mainly male. The average age of the temporary staff in the tourism industry was lower than that of the hydropower industry, but there was greater variance. Local temporary employees' education levels were lower

in the hydropower industry than in the tourism industry. Monthly wages and average age of temporary staff were both lower in the tourism industry than in the hydropower industry.

The category of conservation temporary staff was from the conservation stations and research centre for giant pandas of Wolong administration bureau for protection in the wild and captive rearing of the animals. The number of temporary staff in each was nearly the same, with males dominant (Table 1). Young males were more likely to be hired in the above conservation sectors with a low monthly wage.

The development of the hotel industry was driven by development of tourism in WBR. There were three company-owned high-priced hotels and 33 privately-owned low-priced hotels in WBR, with only nine of the private low-priced hotels in Gengda Township. The development of the hotel industry created 142 job opportunities in WBR (Figure 1), 85.9% of which were in Wolong Township. In

Table 1 The characteristics of different kinds of employees in Wolong Biosphere Reserve

Employment category	Sex ratio (male : female)	Age	Education years	Monthly wages
Permanent staff	1.78	37.3 ^a ± 9.1 ^b	11.6 ^a ± 2.7 ^b	1034.4 ^a ± 191.2 ^b
Tourism, temporary	0.80	26.1 ^a ± 10.2 ^b	11.7 ^a ± 1.2 ^b	350.0 ^a ± 50.0 ^b
Hydropower, temporary	0.92	29.9 ^a ± 6.1 ^b	10.2 ^a ± 1.5 ^b	498.0 ^a ± 145.6 ^b
Conservation, temporary	3.58	74.5% ≤ 30	20% ≥ 12	387.1 ^a ± 116.0

^aAverage; ^bStandard deviation

Figure 1 The characteristics of different employment categories. PS = Permanent staff; HT = Hydropower temporary; TT = Tourism temporary; CT = Conservation temporary; HI = Hotel industry. Total employees and mean salaries can be presented using the same numerical scale. The unit of mean salary is Chinese Yuan (CNY)

Table 2 The characteristics of employment in the hotel industry

Township	Employer				Employee				
	Sex ratio	Age	Education years	Local (%)	Sex ratio	Age	Education years	Local (%)	Monthly wages (Yuan)
Wolong	1.31	33.7 ^a ± 6.8 ^b	8.6 ^a ± 2.9 ^b	36.7	0.67	24.8 ^a ± 7.6 ^b	8.0 ^a ± 2.0 ^b	38.3	401.4 ^a ± 248.9 ^b
Gengda	1.67	39.6 ^a ± 10.4 ^b	9.0 ^a ± 1.6 ^b	87.5	0.18	22.8 ^a ± 5.9 ^b	9.3 ^a ± 1.5 ^b	75.0	250.0 ^a ± 57.7 ^b

^aAverage; ^bStandard deviation.

company-owned high-priced hotels, the majority of employees were not recruited from local communities. Privately-owned hotels as a whole recruited less than half of their employers and employees from the local population, with employees being generally younger than their employers, while education levels were nearly the same (Table 2). There were differences between the employment statistics of the privately-owned low-priced hotels in Wolong Township and Gengda Township. The sex ratio (male : female), age, education level and percentage of local staff were generally higher in Gengda Township than in Wolong Township. This indicated that younger investors were moving to Wolong Township to establish and manage their own hotels. Male employers outnumbered females in both townships, whereas females were dominant among the employees. The ratio of employees hired from the local communities in Wolong Township was lower than that in Gengda Township, whereas the monthly wages of the employees in Wolong Township were higher than those in Gengda Township.

DISCUSSION

The incentive effects of the projects on local communities for conservation participation

The national reforestation and natural forest protection projects provided economic incentives directly to local communities. Every household in WBR was compensated and supported economically through these projects, resulting in a total of 1197 local farmer households directly benefiting. Local communities began to realize the close relationship between their livelihood and conservation, and this resulted in greater cooperation in the management of WBR (Xu *et al.* 2005).

Before 2001, felling wood for fuel was allowed to supply the energy needs of the local WBR

communities. Fuelwood consumption was taken as a key factor affecting giant panda habitats and the forest ecosystem as a whole (An *et al.* 2001; Liu *et al.* 2001). After the implementation of the natural forest protection project, fuelwood felling and timber extraction were prohibited in the reserve. Local people were only entitled to collect the dead wood in the forest area allocated to them for protection and this resulted in a gap between energy demand and supply. The development of the small-scale hydropower industry in WBR provided a means of supplying this demand through a clean source of renewable energy. Before the prohibition of fuelwood felling, local people had a free source of energy. As they change to use electricity, they will have to pay for their consumption and therefore it is essential that the electricity price is kept as low as possible. If the price is greater than the amount that local communities can afford, the transition from fuelwood to electricity will not be smooth. Some survey results indicated that local farmer households were likely to switch from fuelwood to electricity if the electricity price was not more than 0.05 Yuan per kwh (An *et al.* 2002).

The potential of local employment as a conservation incentive

The majority of all the employees in WBR were permanent staff, and their rewards were the highest (Figure 1, Table 1). The geographical origin of permanent staff was largely external due to the lower education levels achieved in local communities (Table 1). Therefore, public sector employers (e.g. the reserve administration bureau, township government) could provide little, if any, direct employment opportunities for the local farmer communities. The tourism industry also provided only a minor contribution to increasing the local employment level, which was similar to the findings from a national park in Nepal (Bookbinder *et al.*

1998). This suggests that local communities were not effectively participating in tourism and that local communities should be encouraged to promote activities that supplement tourism (Ogutu 2002).

Nature conservation and the development of the small-scale hydropower and hotel industries could raise the employment level of the local communities significantly (Figure 1). Although the ratio of the local labour force absorbed by the hotel industry was the smallest, the total number was the biggest. This indicated that the hotel industry played the most important role, and also had the greater potential to absorb the local labour force. The small-scale hydropower industry employed more local labour than the nature conservation sector of the reserve administration bureau.

From the sex ratio of temporary staff in hydropower industry and conservation sector, and the employers and employees of the hotel industry (Figure 2), it is clear that the temporary staff in the conservation sector were male dominated, whereas employees of hotel industry were mostly female. This indicates that the nature conservation sector preferred a male labour force and the hotel industry preferred female employees.

The spatial differentiation of economic incentives created by tourism and hotel industries

There were more investment and job opportunities in the hotel industry of Wolong Township than in Gengda Township due to the different degrees of tourism development. Tourism was much higher in Wolong Township and therefore more economic

incentives were created there. The revenue from the hotel industry was higher in Wolong Township, which was why the wages of employees were higher there. The large variance in the monthly wages of the employees in Wolong Township resulted from the fact that chefs earned more money than employees doing simple table waiting. Besides the hotel industry, there were 37 shops and 31 stalls, mainly for tourists, in Wolong Township, each providing one or two temporary jobs for the local community.

CONCLUSION

Many environmental management problems are caused by a mismatch between environmental decision-makers and locally affected communities (Faust and Smardon 2001). The majority of the local population in WBR was composed of farming communities. Farming households depended mainly on traditional agriculture for subsistence. The labour force of these communities increased more rapidly than the total population. The small cropland holdings and a lack of employment opportunities led to an excess in the labour force and this sharp increase is exceptionally significant with regard to natural ecosystem protection and biodiversity conservation (Liu et al. 1999b). The local labour force generally had a low educational level and could only provide manual labour for construction of roads, buildings, and small hydropower plants or other simple service work. Most of the local excess labour force exploited the natural environment to collect resources for either household use, or to sell and supplement the household income. Therefore, the problems of insufficient livelihood alternatives and

Figure 2 Sex ratio (male:female) of different employment categories. HT = Hydropower temporary; CT = Conservation temporary; H1 = Hotel industry (employer); H2 = Hotel industry (employee)

overstocked labour force need to be considered for effective biodiversity conservation and successful protected area management (Fu *et al.* 2004).

It has been claimed that development and employment opportunities can be important incentives for local people's participation and cooperation in protected area management (Holmes 2003), however, we have not seen any detailed research on this topic. Our study demonstrated that the local labour force and its employment status were important human factors in the management of protected areas, which differs from the traditional analysis focusing mainly on human population size effects (Ehrlich 1988; Dompka 1996).

Local community-based conservation projects and industrial development offer great potential for absorbing the excess labour force in WBR and are more effective than the alternative of population relocation. Past relocation projects have proved to be impractical because of the complex social-economic-cultural constraints relating to these projects (Liu *et al.* 1999b). Tourism development brought the establishment and development of several related industries, including sightseeing services and the hotel and retail industries. These, together with sustainable energy source demand, necessitated the development of the small-scale hydropower industry, which provided employment opportunities for both the local community and employees from outside of WBR. To improve the employment environment for the local population it is crucial to absorb the local excess labour force and thereby reduce the pressure they exert on natural ecosystems and biodiversity. Providing vocational education to local young adults can increase their skills and competitiveness over the outsiders in securing employment in WBR. Providing a quality education in school systems is a key factor in stimulating local young people to move outside WBR to make a living (Liu *et al.* 1999b). The effect of this particular mechanism for alleviating population pressure can only be demonstrated in the long term.

In conclusion, community-based conservation projects, such as the reforestation and the natural forest ecosystems protection project, have provided the most widespread direct economic incentives for local communities to conserve biodiversity. They can be categorized as what was called the direct payment approach for conservation (Kiss 2004) and are proved to be the most effective in WBR, at least in the short term. Local industrial developments

such as tourism and the development of the hydropower and hotel industries, provide incentives for biodiversity conservation through the direct improvement of local employment levels. However, the improvement of the economic situation in the reserve attracts immigration, which was predicted as a potential time bomb under the integration of conservation and development (Scholte 2003). Consequently, government involvement and policy initiatives are needed to improve local employment and reduce population pressures in WBR, accompanied by educational approaches. Community-based conservation projects are fundamental in the management of WBR, but the capacity of farmers for harmonizing livelihoods, development and conservation needs have to be fostered at the local level in the long term. Local communities need to be encouraged to change their behaviour and participate in biodiversity conservation activities, with the government providing financial support for these projects. New policies need to be formulated to encourage the employment of the labour force from local communities in the process of industrial development, but a mechanism should be established to facilitate the local excess labour force in finding employment positions outside the reserve.

What we can learn from the present research is multi-faceted. First, the management of most protected areas all over the world is full of complexity and uncertainty. Therefore, the design and implementation of the incentive approaches for effective conservation and management, both direct and indirect, should incorporate the complexity and uncertainty involved (e.g. the spatial differentiation of economic incentives, the gender imbalance of employment opportunities, the relative utility of different incentive approaches, and the development-induced immigration reported in this study). Second, because of the existence of complexity and uncertainty, good intentions in protected area management and, specifically, the design and implementation of incentive approaches, do not necessarily lead to success. Consequently, socio-economic and ecologic monitoring mechanisms should be established to direct the management of protected areas on the right path. Finally, it is rational to integrate the indirect and direct payment approaches for biodiversity conservation and protected area management to embrace comparison, fine tuning and improvement.

ACKNOWLEDGEMENTS

This research was supported by the National Natural Science Foundation of China (No. 30300052 and 40321101). The authors would like to thank

Wolong Nature Reserve Administration Bureau and the industry sectors surveyed for their cooperation. We are also grateful to Prof. Pehr H. Enckell and Dr Alison Bentley for their suggestions to improve early versions of the manuscript.

REFERENCES

- An L, Liu J, Ouyang Z, Linderman M, Zhou S and Zhang H. Simulating demographic and socioeconomic processes on household level and implications for giant panda habitats. *Ecological Modelling* 2001;140:31–49
- An L, Lupi F, Liu J, Linderman MA and Huang J. Modeling the choice to switch from fuelwood to electricity implications for giant panda habitat conservation. *Ecological Economics* 2002;42:445–57
- Bookbinder MP, Dinerstein E, Rijal A, Cauley H and Rajouria A. Ecotourism's support of biodiversity conservation. *Conservation Biology* 1998; 12:1399–404
- Dompka V (ed.). *Human population, biodiversity and protected areas: science and policy issues*. Washington, DC: American Association for the Advancement of Science; 1996
- Ehrlich PR. The loss of diversity: causes and consequences. In Wilson EO (ed.), *Biodiversity*. Washington, DC, USA: National Academy Press; 1988: 21–7
- Emerton L. *Using economic incentives for biodiversity conservation*. IUCN Economics and Biodiversity Programme. IUCN; 2000
- Faust BB and Smardon RC. Introduction and overview: environmental knowledge, rights, and ethics: co-managing with communities. *Environmental Science and Policy* 2001;4:147–51
- Fu BJ, Wang KL, Lu YH, Liu SL, Chen LD, Ma KM and Liu GH. Entangling the complexity of protected area management: the case of Wolong Biosphere Reserve, southwestern China. *Environmental Management* 2004;33:788–98
- Fuentes-Quezada ER, Sekhran N and Kunte-Pant A. Nesting biodiversity conservation into landscape management. *Natural Resources Forum* 2000;24: 83–95
- Han N. A policy study on sustainable management for China's nature reserves. *Journal of natural resources* 2000;15:201–07
- Holmes CM. Assessing the perceived utility of wood resources in a protected area of Western Tanzania. *Biological Conservation* 2003;111:179–89
- Kiss A. Is community-based ecotourism a good use of biodiversity conservation funds? *Trends in Ecology and Evolution* 2004;19:232–7
- Larsen HO. Commercial medicinal plant extraction in the hills of Nepal: local management system and ecological sustainability. *Environmental Management* 2002;29:88–101
- Liu J, Ouyang Z, Taylor WW, Group R, Tan Y and Zhang H. A framework for evaluating the effects of human factors on wildlife habitat: the case of Giant Pandas. *Conservation Biology* 1999a;13:1360–70
- Liu J, Ouyang Z, Tan Y, Yang J and Zhang H. Changes in human population structure and implications for biodiversity conservation. *Population and Environment* 1999b;21:46–58
- Liu J, Linderman M, Ouyang Z, An L, Yang J and Zhang H. Ecological degradation in protected areas: the case of Wolong nature reserve for giant pandas. *Science* 2001;292:98–101
- Lü Y, Chen L, Fu B and Liu S. A framework for evaluating the effectiveness of protected areas: the case of Wolong Biosphere Reserve. *Landscape and Urban Planning* 2003;63:213–23
- Maikhuri RK and Nautiyal S. Analysis and resolution of protected area-people conflicts in Nanda Devi Biosphere Reserve, India. *Environmental Conservation* 2000;27:43–53
- Nepal SK. Linking parks and people: Nepal's experience in resolving conflicts in parks and protected areas. *International Journal of Sustainable Development and World Ecology* 2002;9:75–90
- Ogutu ZA. The impact of ecotourism on livelihood and natural resource management in Eselenkei, Amboseli ecosystem, Kenya. *Land Degradation and Development* 2002;13:251–6
- Rao M, Rabinowitz A and Khaing ST. Status review of the protected-area system in Myanmar, with recommendations for conservation planning. *Conservation Biology* 2002;16:360–8
- Salafsky N and Wollenberg E. Linking livelihoods and conservation: a conceptual framework and scale for assessing the integration of human needs and biodiversity. *World Development* 2000;28:1421–38
- Samant SS, Dhar U and Rawal RS. Assessment of fuel resource diversity and utilization patterns in Askot Wildlife Sanctuary in Kumaun Himalaya, India, for conservation and management. *Environmental Conservation* 2000;27:5–13

Scholte P. Immigration: a potential time bomb under the integration of conservation and development. *Ambio* 2003;32:58–64

Shyamsundar P and Kramer R. Biodiversity conservation – at what cost? A study of households in the vicinity of Madagascar’s Mantadia National Park. *Ambio* 1997;26:180–4

Wainwright C and Wehrmeyer W. Success in integrating conservation and development? A study from Zambia. *World Development* 1998;26:933–44

Xu JY, Chen LD, Lu YH and Fu BJ. Local people’s perceptions as decision support for protected area management in Wolong Biosphere Reserve of China. *Journal of Environmental Management* 2005; 78:362–72