academicJournals

Vol. 6(7), pp. 232-237, July 2014
DOI: 10.5897/JENE2014.0461
Article Number: 965D32646854
ISSN 2006-9847

http://www.academicjournals.org/JENE

Journal of Ecology and the Natural Environment

Full Length Research Paper

Comparison of the trees regeneration at different distances from Alang Dareh forest roads considering tourist pressure

Aidin Parsakhoo*, Mohammad Hadi Moayeri and Majid Poursadeghi

Department of Forestry, Faculty of Forest Sciences, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran.

Received 14 July, 2014; Accepted 23 July, 2014

Natural regeneration is the most important factor in survival and sustaining forest parks. This study was conducted to compare the regeneration frequency of trees species at distances of 15, 40 and 80 mfrom roads considering tourist pressure in Alang Dareh forest park. Results show that number of high seedling in low tourist pressure area was more than that of area with severe tourist pressure. Moreover, total number of seedlings in low tourist pressure area was more than that of area with severe tourist pressure. Lowest number of seedlings was recorded at distance of 80 m from road edge because of the tourist density and consequently soil compaction.

Key words: Tourist pressure, regeneration, forest road, Alang Dareh park.

INTRODUCTION

Changes to regeneration conditions are considered by forest park managers to be an important impact of tourism use and consequences of soil compaction (Good, 1995). Reduction of regeneration is a well-documented negative effects of tourism use (Good and Grenier, 1994). Decompaction using subsurface tilling, grazing and blocking compacted area after regeneration or plantation are preferred site-preparation treatments by many public and private park managers (Shestak and Busse, 2005). Beside, ground cover by slash and plant residuals is said to decrease soil compaction by providing a pressure absorbing layer, lowering the net ground pressure of passing equipment.

Siikamäki (2009) in a study in Paanajärvi National Park, Republic of Karelia, Russia indicated that high compaction of the soil mineral horizons lead to critical status for normal growth and development of the root system. Beside it was concluded that the most important factors in soil resistance to trampling are moisture and type of the plant community. Natural regeneration is the most important factor in survival and sustaining forest parks. Therefore, study of the regeneration condition in a forest park can be useful to predict ecosystem future and apply forestry programs for improving forest stands. Despite Alang Dareh Forest Park's size and status, it has not been closely studied, and thus little information is available about floristic condition of forest to develop ecology-based management tools. The objective of this study was to compare the regeneration frequency of trees species at different distances from roads considering population

*Corresponding author. E-mail: parsakhoo@gau.ac.ir. Tel: +98 171 4427050. Fax:+98 171 4427176.

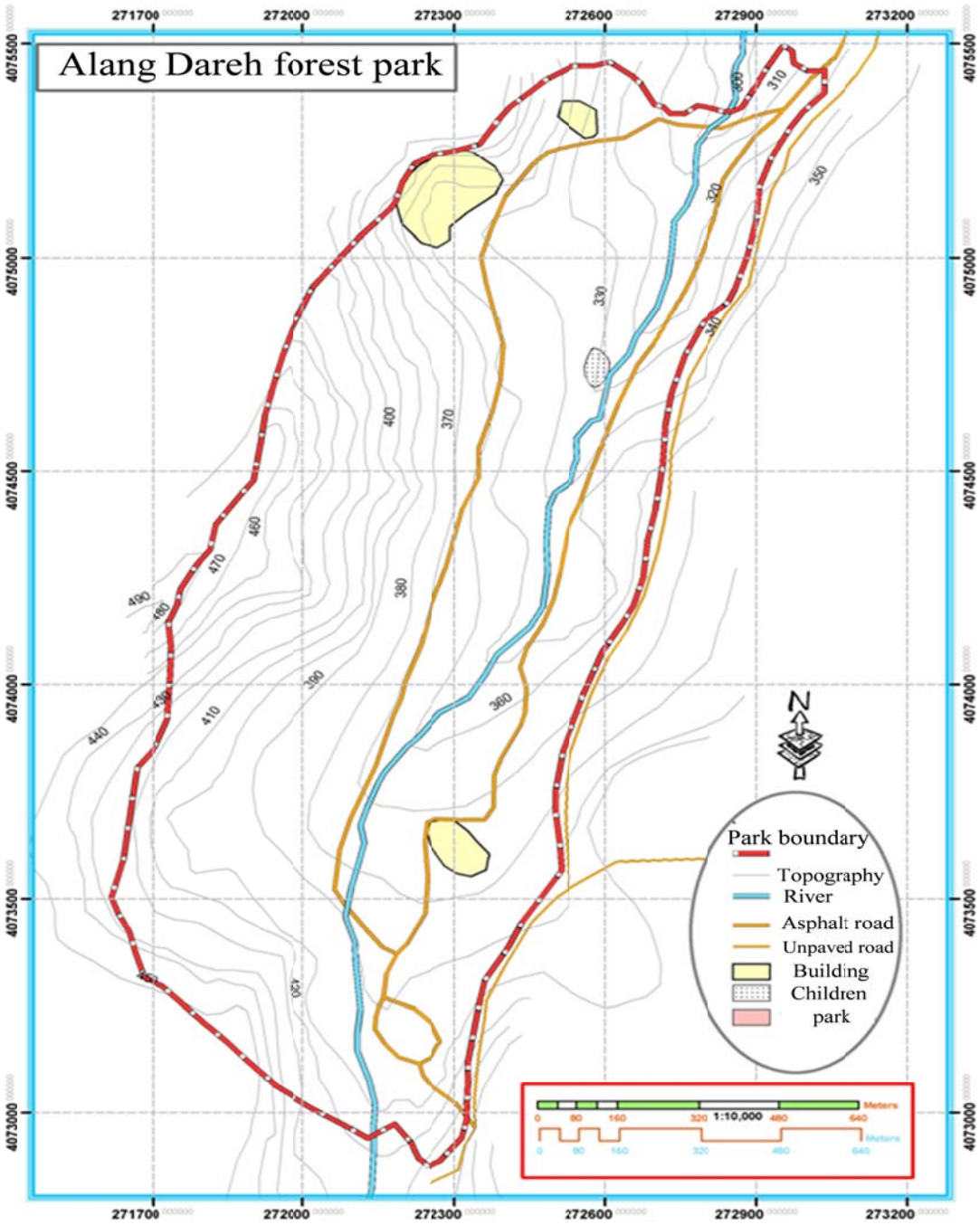

Figure 1. The geographical position of the study area.

density in Alang Dareh forest park.

MATERIALS AND METHODS

Study site

Alang Dareh forest with an area of 185 hectares Alang Dareh is a forest 5 km away from Gorgan city in the south west on the way to Naharkhoran (36°47´43˝ N and 54°26´44˝ E). The climate of the region is moderate, moist and mid-moist. The bedrock of this forest is green schist and sedimentary loess stone with altitude ranging from 300 to more than 400 m above sea level. The forest is mixed deciduous which has been established on brown forest soil. The mean annual precipitation is 837 mm which the highest is occurred in autumn (Figure 1). The Ambrotermic curve of the study area can be shown as Figure 2. Floristic composition of the park are *Oplismenus undulatifolia*, *Oplismenus* sp., *Carex silvatica*, *Viola spp.*, *Juncus* sp., *Euphorbia* spp., *Agropyrum* sp., *Convolvulus* sp., *Parrotia persica*, *Carpinus betulus* and *Quercus castaneifolia*.

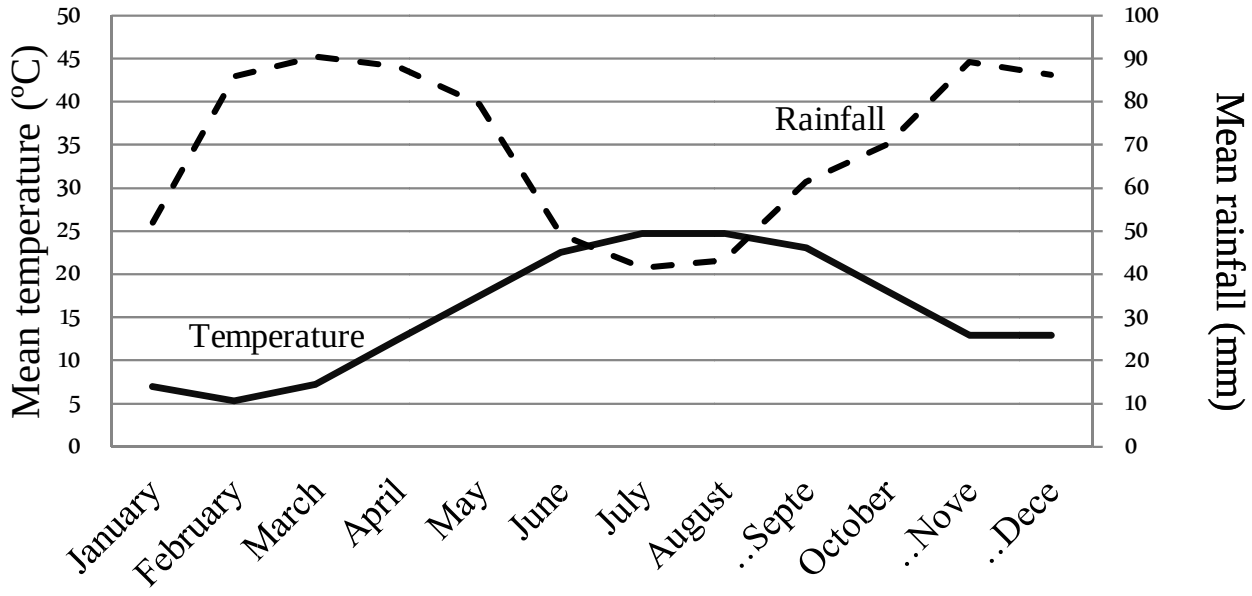

Figure 2. Ambrotermic curve of the Alang Dareh forest park.

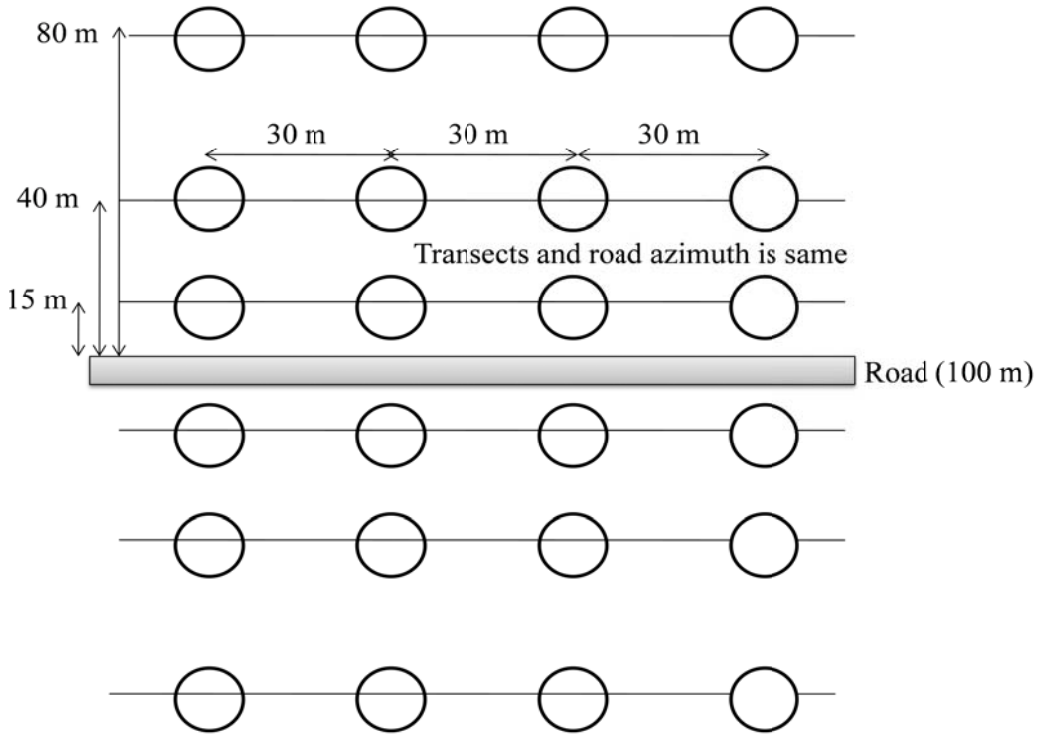

Figure 3. Sampling design in study area.

Sampling design and field survey

In this study two road segment each of with a length of 100 m was selected in Alang Dareh forest park. It was attempted to select roads with similar condition considering altitude, slope gradient, slope direction, vegetation type and soil. Road segment one is located in a region with high population density in park and another is located in a region with low population density. Three transects were established at each sides of the road and at distances of 15, 40 and 80 m. On each transect, four plots with an area of 100 m^2 and radius of 5.7 m was systematic randomly selected. The distance of plots to each other was 30 m (Figure 3). Trees regeneration with

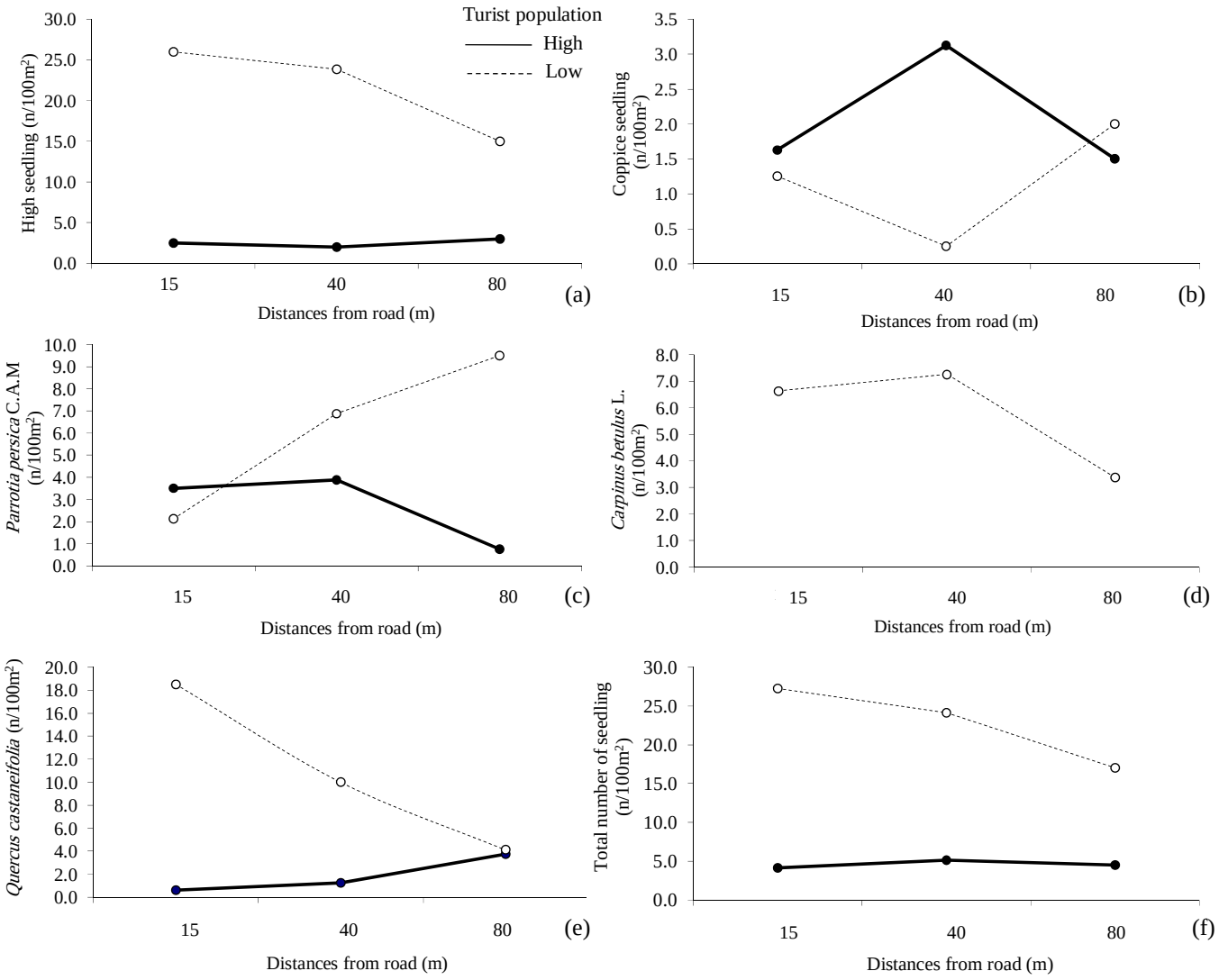

Figure 4. Regeneration trend at different distances from road edge considering population density.

diameter at breast height (DBH) less than 7.5 cm and height of less and more than 1.30 m were counted separately for each species within the plots. Graphs were designed in Excel software.

RESULTS AND DISCUSSION

Results of the study in high density population area indicates stationary trend at different distances from road concerning high seedling frequency (Figure 4a). Low and high tourist population showed that there was no obvious trend in coppice seedling frequency at the different distances from road edge due to the human interference (Figure 4b). The frequency of different species including *Parrotia persica* (Figure 4c), *Carpinus betulus* (Figure 4d) and *Quercus castaneifolia* (Figure 4e) are shown. Lowest number of seedlings grew at the distance of 80 m from road edge, because tourist density and consequently soil compaction was high in this zone. Indeed number of seedling decreased with increasing distances from road edge in low tourist pressure area. In severe tourist pressure area there was no significant differences among distances in term of seedlings frequency (Figure 3f). Glaeser (2006) conducted a research within a Forest Park, in Queens County, New York, to document the current floristic composition and structure of the woodland community. His findings about the disturbance patterns, the decline in traditional dominant tree species, the abundance of pioneer tree species and the continued colonization by *Phellodendron amurense* may be the signs of structural change throughout the park.

Number of high seedling in low density population area was more than that of high density population area (Figure 5a), while number of coppice seedling in low density population area was less than that of high density population area (Figure 5b). Low density population area has been dominated by *P. persica* (Figure 5c), *C. betulus* (Figure 5d)

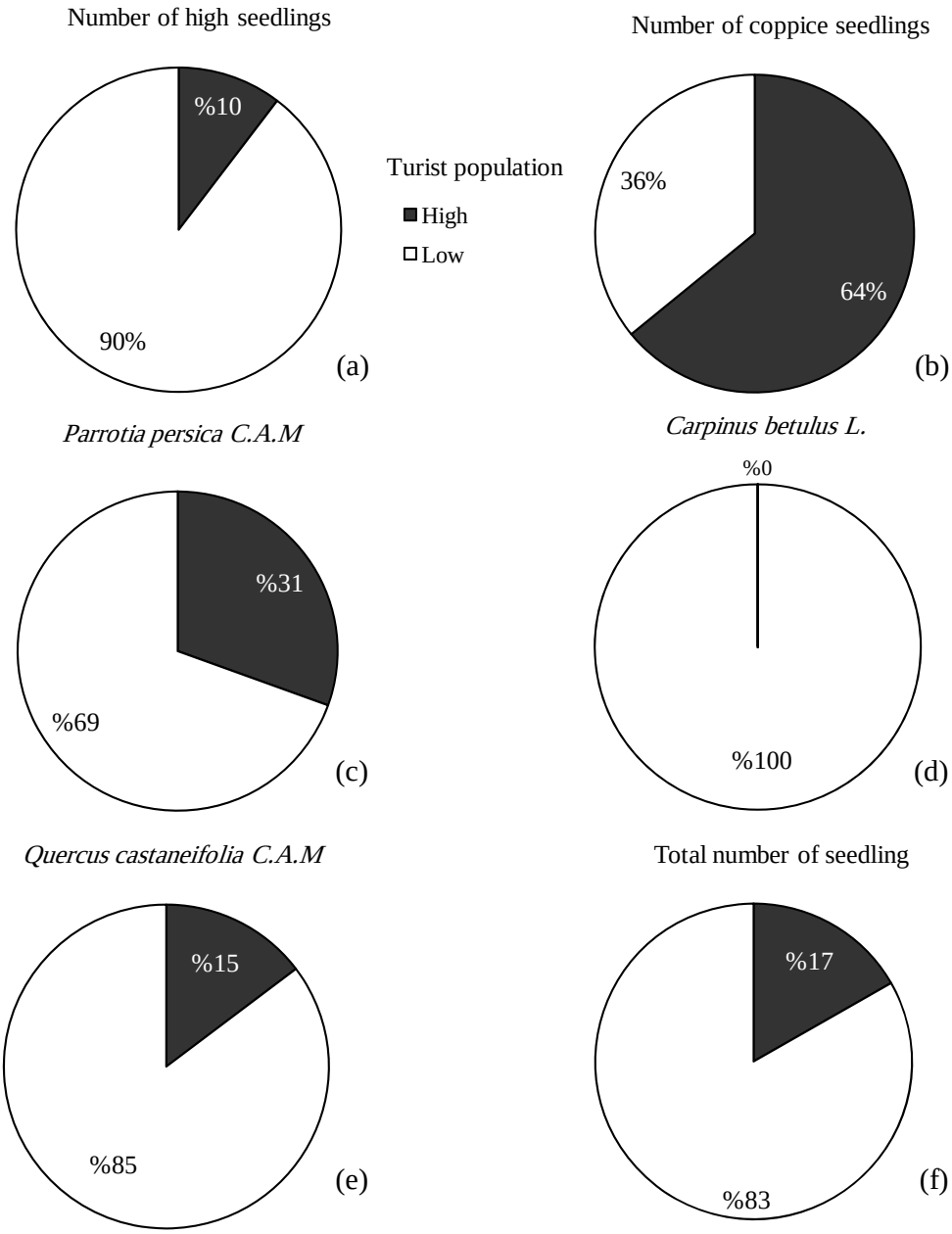

Figure 5. Regeneration in low and high density population area.

and *Q. castaneifolia* (Figure 5e). Total number of seedlings in low density population area was more than that of high density population area (Figure 5f). The loss of regeneration cover and severe compaction and erosion of soil due to human activities resulted in a forest park without restoration (Trn et al., 2006). In forest park, the diversity of ecosystems species and wild gene should be maintained. Native species and populations are highly sensitive to human and domestic animal disturbance (Bhandari, 1999). Increasing the amount of tourism use within an area usually results in increased disturbance to vegetation (Whinam et al., 1994; Cooper et al., 2007).

Conclusions

Study about regeneration, and how it is affected by trampling, etc., considering a conservation area is necessary to develop management recommendations. It was concluded that the number of high seedling in low density population area was more than that of high density population area. Moreover, total number of seedlings in low density population area was more than that of high density population area. Lowest number of seedlings was recorded at distance of 80 m from road edge because of the tourist density and consequently soil compaction. It is necessary

to carry out much more research studies in completion of the study.

Conflict of Interests

The author(s) have not declared any conflict of interests.

REFERENCES

Bhandari M (1999). Tourism Raised Problems in Masai Mara National Park Narok, Kenya APEC, Nepal. 14p.

Cooper C, De Lacy T, Jago L (2007). Impacts of recreation and tourism on plants in protected areas in Australia. Catherine Pickering and Wendy Hill Technical Reports, University of Queensland, ISBN 9781920965099; 30p.

Glaeser CW (2006). The Floristic Composition and Community Structure of the Forest Park Woodland, Queens County, New York. Urban Habitats. Urban Habitats 4:102-126.

Good RB (1995). Ecologically sustainable development in the Australian Alps. Mountain Res. Dev. 15:251-258.

Good RB, Grenier P (1994). Some environmental impacts of recreation in the Australian Alps. Australian Parks & Recreation (Summer). pp. 20-26.

Shestak CJ, Busse MD (2005). Compaction Alters Physical but Not Biological Indices of Soil Health. Soil Sci. Soc. Am. J. 69:236-246.

Siikamaki P (2009). Research and monitoring of sustainability of nature-based tourism and recreational use of nature in Oulanka and Paanajarvi National Parks. Oulanka Research Station University of Oulu, ISBN 978-951-42-9089-3; ISSN 0358-3651, 52p.

Trn A, Rautio J, Norokorpi Y, Tolvanen A (2006). Revegetation after short-term trampling at subalpine heath vegetation. Ann. Bot. Fenn. 43:129-138.

Whinam J, Cannel E, Kirkpatrick J, Comfort JB (1994). Studies on the potential impact of recreational horseriding on some alpine environments of the central plateau, Tasmania. J. Environ. Manage. 40:103-117.