



AWARENESS OF FOREST BENEFITS IN ELEYELE FOREST RESERVE, IBADAN, OYO STATE

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ABSTRACTS

Forests sustain human life through numerous benefits, functions and services of forest ecosystems. An analysis of people's perceptions is fundamental to participatory forest planning and management because individuals' knowledge has the potential to effectively support decision-makers in the management and preservation of forest resources. This study examined the awareness of forest benefits in fringe communities of Eleyele forest reserve, Ibadan Oyo State. Primary data used in this study were obtained in a multi-stage random sampling procedure within the forest reserve. Kruskal-Wallis tests were used to establish significant differences in perception of forest benefits across different livelihood groups. These were then followed by pair wise comparisons of groups' perception using the Mann-Whitney U test. The results of the Kruskal Wallis tests showed that there was a statistically significant difference in rank of perception score across various livelihood options ($\chi^2 (8) = 26.882$, $p = 0.001$) while the Mann Whitney U test revealed that there was no significant difference between the perception of arable crop farmers and tree crop farmers' ($U = 10.000$; $p = 0.680$) and arable crop farmers and salary earners ($U = 9.000$; $p = 0.309$). However, the test established a significantly higher difference between perception of arable crop farmers and those of livestock farmers ($U = 0.000$; $p = 0.043$), lumber person ($U = 0.000$; $p = 0.043$), NTFP collectors ($U = 0.000$; $p = 0.046$), artisanship/craft ($U = 9.000$; $p = 0.034$), traders ($U = 13.000$; $p = 0.045$) and students/others ($U = 0.000$; $p = 0.01$). Therefore, this study recommends that awareness and enlightenment campaigns on forest benefits should be intensified so as to encourage their conservation by the surrounding fringe communities.

Keywords: Awareness, Forest reserve, Forest Benefits and Fringe communities



INTRODUCTION

Forests sustain human life through numerous benefits, functions and services of forest ecosystems (Zahvoyska and Bas, 2013). More than four hundred million people throughout the world live in or around forests (Patosaary, 2006). They enjoy and benefit from forest goods and ecosystem services. Forest trees provide several beneficial environmental functions; it plays indispensable roles in creating and preserving a quality environment (Innes, 2007). They contribute to the fundamental ecological process which keeps the planet in a state of quasi-equilibrium. Also, they are fundamental to the maintenance of biosphere, conserve biological diversity, shield the earth's landscape from abrupt climatic or scenic changes, bring order to the flow and quality of water and help to stabilize climate change (IPCC, 2007). Despite these physical and ecological benefits offered by forest, its destruction is very alarming in Nigeria.

The forests occupy about 10 million hectares representing almost 10 percent of the total land area of 92,376,700 hectares (FRA, 2015). The forests provide a wide range of non-wood products and environmental functions, though not adequately quantified and are under-estimated in national accounting. These products include bush meat, medicine, watershed protection, stabilisation of the hydrological regimes and carbon sequestration (FRA, 2010). The forest estates from which wood and other products are obtained have been subjected to severe encroachments, degradation and de-reservation for agriculture, industrial development, urbanisation and many more (FRA, 2010).

There are many practices that contribute to the destruction of vegetative cover in Nigeria such as bush burning, agricultural practices, industrialization, over-exploitation, forest fire and so on (Chakravarty *et al.*, 2012). The result of deforestation, intensive grazing, bush burning, over ploughing and over cultivation is severe land degradation. In general, deforestation brings about serious ecological and socio-economic problems some of which include wood shortage, food shortage, flooding, erosion, siltation of riversstreams, destruction of wildlife habitats and increase poverty, especially in rural communities, ozone layer depletion, and global warming and many more. All these bring the need for sustainable forest management practices for which local willingness is essential. The sustainable forest management (SFM) paradigm aims to balance the



social, economic, ecological and cultural needs of present and future generations (Wyder 2001; Tabbush 2004) and to maintain resources based on the multiple use of forests (García-Fernández *et al.*, 2008). Direct integration of people's values in the decision-making process is an important aspect of SFM, because it can increase the social acceptance of the decisions and reduce conflict among users (O'Brien, 2004; Cantiani, 2012).

Forest values can be defined as enduring concepts of what is good and desirable, or conversely, bad and undesirable, about forests (Paletto *et al.*, 2013). These values vary from culture to culture and over time (Paletto *et al.*, 2013); consequently, knowledge of forest values is important in determining people's attitudes (Duinker 2008), and the criteria used to evaluate management practices from a social point of view should be based on the values assigned by people to forests (Gamborg and Rune, 2004).

An analysis of people's perceptions is fundamental to participatory forest planning and management because individuals' knowledge has the potential to effectively support decision-makers in the management and preservation of forest resources (Jensen, 2000; Lewis and Sheppard, 2005; Hickey *et al.*, 2007). Moreover, being aware of people's perceptions and preferences regarding the forest and its landscapes is important for designing and implementing management policies (Lee, 2001; Cantiani *et al.*, 2002; Heer *et al.*, 2003; Edwards *et al.*, 2012).

Therefore, this study assessed the socio-economic characteristics of respondents; evaluate the perception of forest benefits among respondents; and analyze the relationship between the perceptions across the various livelihood options with the view to bringing out right or wrong perception and eventually working on such for sustainable use of forest and its resources.

MATERIALS AND METHODS

The study was carried out in the fringe communities around Eleyele forest estate (Fig 1) located in Ibadan the capital of Oyo State, Nigeria. Ibadan is located between latitude $7^{\circ}20'N - 7^{\circ}25'N$ and longitude $3^{\circ}51'E - 3^{\circ}56'E$. The city has a population of 1,338,659 in 2006 and more than 96 percent of the inhabitants are Yoruba (Otunaiya *et al.*, 2015). Ibadan has a tropical wet and dry climate, with a lengthy wet season and relatively constant temperatures throughout the course of the year (Olowogbon *et al.*, 2013).



Multi stage sampling technique was used in this study. Stage one involved the purposive selection of communities around Eleyele forest reserve. The second stage involved the purposive selection of three (3) communities namely Apete, Ijokodo and Eleyele while respondents were randomly selected (third stage). A total of ninety-seven respondents were randomly selected for the study (Eleyele - 37, Apete - 30 and Ijokodo – 30 respondents). Primary data were used for this study. The data were collected through the use of structured questionnaires. Data collected included age, household size, gender, income; perception of forest benefits and so on. Both descriptive and quantitative techniques were used for the analysis.

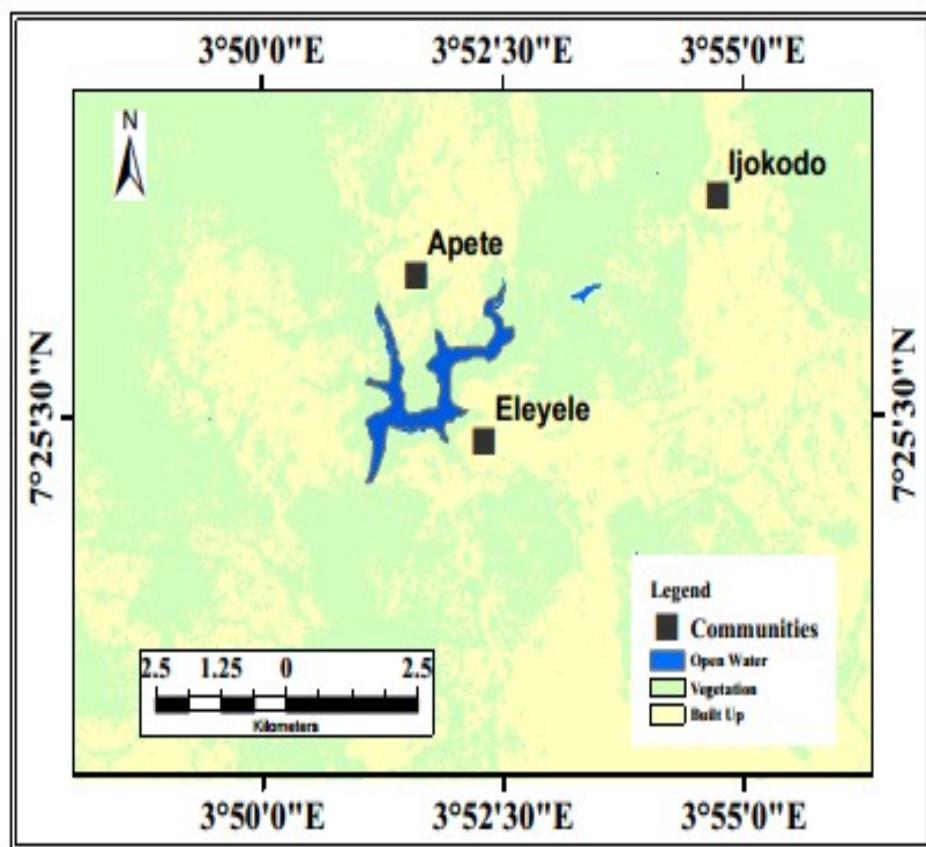


Figure 1: Map showing Eleyele Forest Reserve

Descriptive statistics such as frequency count and percentage were used in presenting perception of forest benefits. Kruskal-Wallis test was used to assess differences between the nine (9) main livelihood options available in the study area. This was followed by Mann-Whitney U-tests for pair wise comparison and differences across livelihood options.



The test statistics is given below:

$$H = \frac{12}{N(N+1)} \sum_{i=1}^k \frac{R_i^2}{n_i} - 3(N+1)$$

Where:

H is the Kruskal-Wallis H test

N is the total number of participants (all groups combined).

R_i is the rank total for each group.

n_i is the number of participants in each group.

Mann-Whitney U-tests compares the distributions of scores on a quantitative variable obtained from two (2) independent groups.

The test statistics is given below:

$$U_i = R_i - \frac{n_i(n_i+1)}{2}$$

Where:

U_i is the Mann Whitney U Test Statistic

R_i is the sum of ranks in the sample, and n_i is the number of items in the sample.

In this scenario, Kruskal-Wallis tests were used to establish significant differences in perception of forest benefits across different livelihood groups. These were then followed by pair wise comparisons of groups' perception using the Mann-Whitney test.

RESULTS AND DISCUSSION

Table 1 shows the socio-economic distribution of the respondents. It was revealed that about one third (32.2%) of the respondents were 30years or less thus one in every individual around the reserve is an economically active youth. Also, male constituted majority (66.0%) of the respondents. The respondents had formal education as about half (46.4%) had secondary education while 18.6% of the respondents had tertiary qualification within the study area. The youthfulness, educational status of this population can be harnessed in preserving and protecting the forest reserve. Furthermore, most (66.0%) of the respondents were married with most (71.1%) household sizes ranging from 1 to 4. Household size here is still within the acceptable limit and if maintained through advocacy, unnecessary pressure resulting from large household



size can be taken off the forest reserve. However, the largest percentages (34.4%, 30.9%) of the respondent earn about ₦20, 000 per month and were traders respectively. Inadequate income relative to existing economic situation in the country can be a predisposing factor to forest exploitation (Bwalya, 2013; Belcher *et al.*, 2015).

Table 1: Socio-economic characteristics of the respondents

Socio-economic characteristics	Percent
Age Group (years)	
= 30	32.6
31 – 40	27.4
41 – 50	14.7
=60	9.5
Gender	
Male	66.0
Female	34.0
Level of Education	
No – formal	7.2
Primary	27.8
Secondary	46.4
Tertiary	18.6
Marital Status	
Single	25.8
Married	66.0
Widow	8.2
House hold size	
1 – 4	71.1
5 – 8	25.8
9 – 12	3.1
Income Group (₦)	
= 20000	34.4
21000 – 40000	6.3
61000 – 80000	17.7
81000 – 100000	3.1
>100000	9.4
Livelihood Activities	
Arable Crop Farming	3.1
Tree Crop Farming	8.2
Livestock	3.1
Lumbering	3.1
Non – Timber Forest Products (NTFPs)	3.1
Artisanship/Craft	26.8



Perception of forest benefits was measured on four scales: not at all, low, moderate and high. The first two classes were interpreted as poor and the last two as good appreciation of forest benefits. Consequently perception in the first two classes was interpreted as non-beneficial and the last two as beneficial. On this note, more than half of the respondents (56.7% and 54.6%) perceived forest as beneficial in soil and water management and shielding crops from unfavourable weather respectively.

Table 2: Perception of forest benefits

Forest Benefits	Not at all	Low	Moderate	High
	(%)	(%)	(%)	(%)
Added current and potential economic value to land	19.6	23.7	39.2	17.5
Confer some privacy to farmland	21.6	19.6	41.2	17.5
Conserve aesthetic value of land for future generations	7.2	10.3	45.4	37.1
Create conducive environment for relaxation	7.2	10.3	45.4	37.1
Create a more natural environment for farm animals	12.4	19.6	42.3	25.8
Help improved microclimate	11.3	14.4	48.5	25.8
Help in soil nutrient recycling	13.4	18.6	45.4	22.7
Help in Soil water management	8.2	14.4	56.7	20.6
Help protect soil from erosion	3.1	15.5	54.6	26.8
Help to diversify income sources	21.6	14.4	44.3	19.6
Improved soil fertility	8.2	19.6	51.5	20.6
Providing building materials for construction	10.3	16.5	45.4	27.8
Provide fruits and other food substances	22.7	18.6	37.1	21.6
Provide wood fuel for household use and sale	13.4	24.7	40.2	21.6
Serve as additional source of income	18.6	18.6	42.3	20.6
Serve as windbreak for crops and home	7.2	13.4	36.1	43.3
Shielded crops from unfavourable weather/sun	2.1	19.6	54.6	23.7
Shield home and farm from noise barrier	13.4	15.5	43.3	27.8
Supply herbs and medicinal plant for family health	14.4	14.4	41.2	29.9
Support activities of beneficial micro/macro-organism	11.3	23.7	39.2	25.8



Support hunting activities	29.9	18.6	32.0	19.6
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Furthermore, about half (48.9%, 45.4% and 45.4%) of the respondents perceived forest as helpful in improving microclimate (cooler and serene environment), soil nutrient recycling and providing building materials for home/farm shed construction respectively. In general, the fringe communities of Eleyele forest reserve perceived the forest as beneficial to the environment. This result is consistent with the findings of FAO (2013) that forests are fundamental to the survival of forest dwellers and important provider of ecosystem services including maintaining, restoring and improving soil fertility, protecting watershed and biodiversity.

In terms of challenges associated with forest management, a larger percentage agreed that forest management involves additional cost (53.6%) and time (52.6%) of management. They also indicated that forest can pose a threat to forest operations (51.5%). On the contrary, majority do not believe that forest management damage the environment (59.8%), limit crop rotation options (50.5%), cause soil damage from extraction (50.5%) and spoils landscape aesthetics (53.6%) respectively.

Table 3: Challenges of forest management

To what extent does the forest in your communities pose the following challenges?	Not at all (%)	Low (%)	Moderate (%)	High (%)
Additional cost of management	20.6	25.8	38.1	15.5
Additional management time	22.7	24.7	37.1	15.5
Constraints field operations	15.5	33.0	38.1	13.4
Environmental damage from establishment	24.7	35.1	27.8	12.4
Limits crop rotation options	20.6	29.9	37.1	12.4
Soil damage from extraction	23.7	26.8	35.1	14.4
Spoils the landscape aesthetics	25.8	27.8	33.0	13.4

Table 4 shows the relationship between perceptions of forest benefits across different categories of livelihood activities. The test establishes statistical significant differences in perception based on various livelihood options. The table shows mean rank, chi-square and the asymptotic significance. Evidence from the Table reveals that there was a statistically significant difference in rank of perception score across various livelihood options, $\chi^2 (8) = 26.882$, $p=0.001$. Mean perception rank of 82.33 for arable crop farmers was the highest indicating arable crop farmers



perceived forest benefits better than others. The category was followed by tree crop farmers (77.38) while those that collect NTFPs had the worst perception of forest benefits (5.83). Although the result also indicated significant differences in the mean perception scores, the sources of differences were however not revealed. This therefore necessitated pair wise comparison of mean rank score using another non-parametric test.

Table 4: Kruskal Wallis Test of Significant Difference in Perception Scores

Livelihood activities	Mean rank
Arable crop farming	82.33
Tree crops farming	77.38
Livestock farming	28.00
Lumbering	28.83
Non-timber forest products (NTFP's)	5.83
Artisanship/craft	46.73
Trading	49.22
Salary job	60.90
Others/student	36.23
Chi-square	26.88
Asymptotic Significance	0.001

The significance of differences between perception and livelihood options was assessed by the non-parametric Mann–Whitney test. The result of this test on Table 5 shows the mean rank, sum of ranks for the different groups, Mann-Whitney U statistics, Z-statistics, asymptotic significance and the exact significance. Arable crop farmers group was the reference category while all other groups were compared with it. Comparing the perception of forest benefits, the Table revealed no significant difference between the perception of arable crop farmers and tree crop farmers' ($U = 10.000$; $p = 0.680$), arable crop farmers and salary earners ($U = 9.000$; $p = 0.309$). In essence, arable crop farmers, tree crop farmers and salary earners perceived forest benefits



equally. However, the test established a significantly higher difference between perception of arable crop farmers and those of livestock farmers ($U = 0.000; p = 0.043$), lumber person ($U = 0.000; p = 0.043$), NTFP collectors ($U = 0.000; p = 0.046$), artisanship/craft ($U = 9.000; p = 0.034$), traders ($U = 13.000; p = 0.045$) and students/others ($U = 0.000; p = 0.01$). This implies that arable crop farmers had the best perception of forests benefits when compared to these categories.

Table 5: Mann Whitney Test of Difference in Perception Scores between Two Groups

Livelihood categories		Ranks		Test Statistics			
		Mean rank	Sum of ranks	Mann Whitney U	Z	Asym sig. (2-tailed)	Exact Sig. (2*(1-tailed Sig))
Arable farming	Livestock farming	5.00	15.00	0.000	-2.023	0.043	0.100
Arable farming	Lumbering	5.00	15.00	0.000	-2.023	0.043	0.100
Arable farming	NTFP's collection	5.00	15.00	0.000	-1.993	0.046	0.100
Arable Farming	Artisanship	24.00	72.00	9.000	-2.121	0.034	0.032
Arable farming	Trading	27.67	83.00	13.000	-2.007	0.045	0.045
Arable farming	Civil service	9.00	27.00	9.000	-1.017	0.309	0.371
Arable farming	Others/Students	13.00	39.00	0.000	-2.583	0.010	0.005
		6.00	66.00				

CONCLUSION AND RECOMMENDATION

This study revealed that forest fringe communities perceive forest as being beneficial while forest management was perceived as highly challenging. This implies that arable crop farmers had the best perception of forests benefits when compared to others within the study area. Therefore, the study recommends that awareness and enlightenment about forest should be vigorously pursued by extension agents of research institutes for sustainable forest management.



REFERENCES

- Belcher, B., Achdiawan, R. and Dewi, S. (2015). Forest-Based Livelihoods Strategies Conditioned by Market Remoteness and Forest Proximity in Jharkhand, India. *World Development*, Volume 66, Pages 269-279
- Bwalya, S.M. (2013). "Household Dependence on Forest Income in Rural Zambia". *Zambia Social Science Journal*: Vol. 2: No. 1, <http://scholarship.law.cornell.edu/zssj/vol2/iss1/6>
- Cantiani, M.G. (2012). Forest planning and public participation: A possible methodological approach. *International Forest* 5:72–82.
- Cantiani, M.G., Bettelini, D. and Mariotta, S. (2002). Participatory forest planning: A chance of communication between forest service and local communities. In: Büchel M, Nipkow F, and Güntensperger M, editors. *Forestry Meets the Public: Seminar and Workshop Proceedings*. Bern, Switzerland: Swiss Agency for the Environment, Forests and Landscape, pp 249–263.
- Chakravarty, S., Ghosh, S.K., Suresh, C.P., Dey, A.N. and Gopal S. (2012). Deforestation: Causes, Effects and Control Strategies, Global Perspectives on Sustainable Forest Management, Dr. Dr. Clement A. Okia (Ed.), ISBN: 978-953-51-0569-5, <http://www.intechopen.com/books/globalperspectives-on-sustainable-forest-management/deforestation-causes-effects-and-control-strategies>. Assessed on 6th June, 2018.
- Duinker, P.N. (2008). Society's Forest Values. Report 11, Drivers of Change in Canada's Forests and Forest Sector Series, prepared for the Forest Futures Project of the SFM (Sustainable Forest Management) Network, University of Alberta, Alberta, Canada. http://www.sfmn.ales.ualberta.ca/en/Research/ForestFutures/~/media/sfmn/Research/ForestFutures/Documents/FF_SocValues_Duinker.ashx; Accessed on 12 March 2013.
- Edwards, D.M., Jay, M., Jensen, F.S., Lucas, B., Marzano, M., Montagné, C., Peace, A. and Weiss, G. (2012). Public preferences across Europe for different forest stand types as sites for recreation. *Ecology and Society* 17(1):27.
- Food and Agriculture Organization (FAO) (2013). Global Forum on Food Security and Nutrition. Accessed online on <http://www.fao.org/forestry/food-security>



Forest Resources Assessment (FRA) (2015). Global Forest Resources Assessment 2015 Country Report Nigeria. Assessed on <http://www.fao.org/3/a-az293e.pdf> Assessed on 6 June, 2018.

Forest Resources Assessment (FRA) (2010). Global Forest Resources Assessment 2010 Country Report Nigeria. Assessed on www.fao.org/forestry/fra on 6 June, 2015.

Gamborg, C. and Rune, F. (2004). Economic and ecological approaches to assessing forest value in managed forests: Ethical perspectives. *Society and Natural Resources* 17:799–815.

García-Fernández, C., Ruiz-Pérez, M. and Wunder, S. (2008). Is multiple-use forest management widely implementable in the tropics? *Forest Ecology and Management* 256:1468–1476.

Heer, C., Rusterholz, H.P. and Baur, B. (2003). Forest perception and knowledge of hikers and mountain bikers in two different areas in northwestern Switzerland. *Environmental Management* 31:709–723.

Hickey, G.M., Innes, J. L. and Kozak, R.A. (2007). Monitoring and information reporting for sustainable forest management: A regional comparison of forestry stakeholder perceptions. *Journal of Environmental Management* 84:572–585.

Innes, J. L. (2007). Forests in Environmental Protection. *Forests and Forest Plants* Vol. I, pp. 1-15.

IPCC, (2007). Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)). IPCC, Geneva, Switzerland, 104 pp.

Jensen, F.S. (2000). The effects of information on Danish forest visitors' acceptance of various management actions. *Forestry* 73:165–172.

Lee, T.R. (2001). *Perceptions, Attitudes and Preferences in Forests and Woodlands*. Technical Paper 18. Edinburgh, United Kingdom: Forestry Commission.

Lewis, J. L. and Sheppard, S. R. J. (2005). Ancient values, new challenges: Indigenous spiritual perceptions of landscapes and forest management. *Society & Natural Resources* 18:907–920.



- O'Brien, E. (2004). A Sort of Magical Place: People's Experiences of Woodlands in Northwest and Southeast England. Farnham, United Kingdom: Forest Research.
- Olowogbon, S.T., Fakayode S.B., Jolaiya A.J. and Adenrele A.Y. (2013). Economics of farm safety: The Nigerian scenario. *Journal of Development and Agricultural Economics* Vol. 5(1), pp. 7-11. Available online at <http://www.academicjournals.org/JDAE>. DOI: 10.5897/JDAE12.003.ISSN 2006- 9774 ©2013 Academic Journals
- Otunaiya, A. O., Adeyolu, A. G., Bamiro, O. M (2015). Technical Efficiency of Poultry Egg Production in Ibadan Metropolis, Oyo State, Nigeria. *Economics*. Vol. 4, No. 3, 2015, pp. 50-56. doi: 10.11648/j.eco.20150403.12
- Paletto, A., De Meo, I., Cantiani, M.G. and Maino, F. (2013). Social Perceptions and Forest Management Strategies in an Italian Alpine Community. *Mountain Research and Development*, 33(2):152-160. DOI: <http://dx.doi.org/10.1659/MRD-JOURNAL-D-12-00115.1>, URL: <http://www.bioone.org/doi/full/10.1659/MRD-JOURNAL-D-12-00115.1>. Assessed on 6 June, 2018.
- Patosaary P (2006). Foreword. In: Parotta J, Agnoletti M, Johann E (eds) Cultural heritage and sustainable forest management: the role of traditional knowledge. Proceedings of the conference held on 8–11 June 2006, Florence.
- Tabbush, P. (2004). Public money for public good? Public participation in forest planning. *Forestry* 77:145–156.
- Vining, J. and Tyler, E. (1999). Values, emotions and desired outcomes reflected in public responses to forest management plans. *Human Ecology Review* 6(1):21–34.
- Wyder, J. (2001). Multifunctionality in the Alps: Challenges and the potential for conflict over development. *Mountain Research and Development* 21:327–330.
- Zahvoyska, L. and Bas, T. (2013). *Stakeholders' perceptions of mountain forest ecosystem services: the Ukrainian Carpathians case study*. In J. Kozak *et al.* (eds.), *The Carpathians: Integrating Nature and Society Towards Sustainability*, Environmental Science and Engineering, DOI: 10.1007/978-3-642-127250_25, Springer-Verlag Berlin Heidelberg. Assessed on 6 June, 2018.