

Research Article



Association between Poor Forest Governance and Illegal Timber Trade Activities in Malakand Khyber Pakhtunkhwa Pakistan

Taimoor Khalid*, Asad Ullah and Mussawar Shah

Department of Rural Sociology, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan.

Abstract | The purpose of this research study is to find association or links between poor forest governance and illegality. The research area comprised three union councils i.e. Pir Khail, Agra and Totai of Tehsil Batkhela, District Malakand, Khyber Pakhtunkhwa, Pakistan. A sample size of 357 respondents was proportionally allocated to the mentioned three union councils of the study area and selected by simple random sampling technique. Perception of the respondents regarding illegality in forest management (independent variable) and forest governance (dependent variable) were measured on three level likert scale. Chi-square test was applied to test the association between the study variables. The results show that poor forest governance had highly significant association with people cut trees by legal permits ($P=0.000$), due to illegal forest use the environmental services are greatly reduced ($P=0.000$), people are illegally occupying forest land ($P=0.000$), implementation of forest law is not same for all ($P=0.000$), timber permits are issued illegally to rich and powerful ($P=0.000$), due to illegality in forest management the forest management is not sustainable ($P=0.000$) and forest are cut without permission ($P=0.000$). Bringing forest department out of political influence and fair implementation of rule of law were the main study recommendations.

Received | November 26, 2018; **Accepted** | September 03, 2019; **Published** | November 04, 2019

***Correspondence** | Taimoor Khalid, Department of Rural Sociology, The University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; Email: taimoor.khaliduom@gmail.com

Citation | Khalid, T., A. Ullah and M. Shah. 2019. Association between poor forest governance and illegal timber trade activities in Malakand Khyber Pakhtunkhwa Pakistan. *Sarhad Journal of Agriculture*, 35(4): 1063-1070.

DOI | <http://dx.doi.org/10.17582/journal.sja/2019/35.4.1063.1070>

Keywords | Illegality, Timber permits; Forest governance

Introduction

The term Illegality used in this study refers to the actions which fail to conform to state laws and standards regulating forest resource allocation, forest management and extraction, processing, transport and trades. (Wells et al., 2007; Irland, 2008). In environmental context the illegalities are supposedly involved with violation of formal laws and rules and disturbing the defined environmental values with subsequent effect on human beings as well (Gibbs et al., 2010).

Illegal cutting of trees is the major source of wealth for the avaricious section of society. Cutting of trees

is illegal as it is accomplished after breaking rules of law and it weakens the local communities socio-economically. The business of illegal timber survives and thrives on corruption, violence and bullying. The groups of illegal timber businessmen connive with government officials to loot the forest resources, cheat the government in forest revenue and deprive the local people of the use of their resources. The weakening writ of the government agencies in controlling forest damage and deep root of corruption further accelerate the illegal cutting of forest. In this situation illegality and corruption has emerged as a major challenge for forest protection and management (The Guardian, 2014; Smith et al., 2015; Halkos et al., 2015).

The term illegality in forest governance refers to cutting of forest trees by adopting procedures and activities that are inconsistent with the national laws (Smith, 2002). Illegality in forest cutting activities, under the cover of legal contract, affects forest governance in three major ways. Initially the contractor may cut over and above the prescribed volume of timber cutting. Second, the contractor may cut the high value trees species for higher economic returns, leaving behind low valued trees species. Thirdly, the harvester may violate the instruction of sustainable use and adopt cutting techniques that are not consistent with the requirement of scientific forest management. All these three dimensions of illegalities are made possible by the weak forest governance and low public participation in forest management (Amachar et al., 2012).

Governance is large institution if it is compared with the government; governance has standard elements that include the constitution, legislature, executive and judiciary. Governance component in society exercises power and authority. Besides this, Governance contains contacts between these official institutions and those of public society. Governance is measured under the principles of degree of legitimacy, representativeness, transparency, accountability, efficiency, and fairness (The Governance Working Group of the International Institute of Administrative Sciences (GWGIAS, 1996; IMF, 1997)).

Forest governance comprises of a) all official and non-official controlling structures i.e. institutions containing rules, norms, principles, decision procedure concerning forests, their use and their preservation, b) the connections between public and private actors therein and c) the special effects of either on forests. (Giessen and Buttoud, 2014)

Forests are considered as earth lungs and believed to be environmental pre request for the life on earth. Their environmental benefit ranges from purification of air, erosion control, regulation of water cycle and bio diversity conservation. In addition, forests provide livelihood supports to local communities in term of meeting their timber, firewood, grazing and other non-timber products related needs. Sale and export at commercial level has put some social groups, out of their greed, manipulate laws and exercise illegalities to get maximum benefits out of these finite natural resources. The obvious effects of these illegal activities are the forest degradation and deforestation on one

side and unmet legal needs of the local communities on other side.

This research study is an effort to find out the perception of local communities regarding illegalities related to forest governance in the area, and how is it associated with forest governance system.

Materials and Methods

As per office record of Election Commission of Pakistan at Batkhela, the study area i.e. Union Councils Pir khail, Agra and Totai comprises of 5776 household. A sample of 357 respondents suffices for 5776 households Sekaran (2003). For the collection of data random sampling technique was used. Sample was proportionally allocated to each union council by using proportional allocation formula Cochran (1977).

$$n_i = \frac{n}{N_i} \times N_i$$

n= required total sample size for researcher; N= is the number of total household in study area; N_i = represent household in each Union council; n_i = Selected village's size from each union council.

Data was collected on a pretested, structured interview schedule covering both the variables i.e. illegality in forest management (independent variable) and forest governance (dependent variable). The variables were measured on a three level Likert scale .

Collected data was analyzed by using uni variate and bi-variate data analysis techniques. At uni-variate level, frequencies and percentages were worked out for both the variables. Chonbatch's Alpha test was used to test the reliability of the scale with the test value of above 0.7 as standard. Furthermore, the dependent variable (forest governance) was indexed and cross tabulated with independent variable (illegality) to measure the association between two variables. Chi-square test was used as a tool for testing the association among variables. Following procedure devised by Tai (1978) was used to calculate Chi-square values.

Chi square test formula is:

$$x_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Three assumptions of chi square test are; 1). Independently and randomly subjects selected for each group; 2). For one and only one category each

observation must qualify; 3). Sample size must fairly be large such that no expected frequency is less than 5, for r and $c > 2$ or < 10 if $r = c = 2$.

Instead of simple Chi-square test, if in case third assumption violated in data, the Fisher Exact Test was used as a tool.

Results and Discussion

Table 1 depicts monthly income of the respondents. Majority (36.1%) of the respondents belonged to the monthly income group of 10001-20000 PKR, followed by 24.6% of the respondents that had income in 20001-30000 PKR range. Similarly, 24.6% of the respondents were in the category of 20001-30000 PKR range, likewise, 21.6% of the respondents were from the income group of below 10000 PKR, 12.3% of the respondents were in the orbit of 30001-40000 PKR. Likewise, 2.8% of the respondents were from within the range of 50000 and above monthly income and 2.5% of the respondents were having range of 40001-50000 PKR. The results show that majority of people belong to low or middle level income groups. The people living near forest area and belonged to low income are more likely to depend on natural resources for their livelihood. That is a major cause of forest resource depletion. The forest officials allow forest use only on production of illegal permits or by receiving illegal gratuities in form of bribes. This statement was supported by Gupta (1998) who stated that there is direct relationship between corruption and poverty. Corruption does not produce poverty by itself; rather it has direct consequences on economic and governance factors, corruption plays a mediator role in turn to produce poverty. It showed that it appears to be corruption that increases poverty.

Similarly, frequency and percent distribution of the respondents on the basis of gender show that most of the 94.7% of the respondents were male while 5.3% of the respondents were female. Gender is the major determinant in division of labour especially in rural areas. Male gender is allocated with masculine outdoor jobs whereas females perform indoor tasks. Representations of both genders ensure diversity in views on variables in hand. Correspondingly, the respondent's education status show that majority of 43.1% of the respondents were having bachelor degrees. Besides, 20.2% of the respondents were intermediate pass, 13.1% of the respondents had postgraduate qualification, and 9.8% of the

respondents were illiterate, while, 9.5% of the respondents were matriculate. Furthermore, 3.6% and 0.6% of the respondents studied up-to middle and primary education level. These finding are against national census where major chunk of population is either illiterate or lowly literate. This high level of education is probability due to localized awareness of the people about importance of education.

Table 1: Demographic profile of the respondents.

	Particulars	Frequency	Percentage
Monthly income	Below 10000	77	21.6
	10001-20000	129	36.1
	20001-30000	88	24.6
	30001-40000	44	12.3
	40001-50000	9	2.5
	50000 and Above	10	2.8
Age (Year)	Below 30	176	49.3
	31-40	112	31.4
	41-50	39	10.9
	51 and Above	30	8.4
Education status	Illiterate	35	9.8
	Primary	2	0.6
	Middle	13	3.6
	SSC	34	9.5
	Intermediate	72	20.2
	Bachelor	154	43.1
	Postgraduate	47	13.1

Frequency and percentage distributions regarding illegality in forest management

Results indicate that 58.8% respondents agreed that people cut trees by obtaining legal permit, 21% of the respondents disagreed with the statement, and 20.2% of the respondents were not sure that whether people cut trees by legal or illegal permits (Table 2). Timber permit is the major house hold need of forest dependent communities. Legal permits are issued to right holders by the forest department; however, legal permits are insufficient to meet the needs of community. Moreover, the non-right holders have no way out to meet their needs except by theft or by paying bribe. These results are in line with the report published by The Guardian (2014) stating that according to the report of Greenpeace, people converted timber obtained from illegal logging to legal paper through flourishing illegality through bribery in government officials. Almost 80% of the woods obtained from world tropical forests are obtained illegally.

Table 2: *Frequency and percentage distributions regarding illegality in forest management.*

Statements	Yes	NO	Uncertain	Total
People cut trees by legal permit.	210(58.8)	75(21)	72(20.2)	357(100.0)
Due to illegal cutting of forests, the livelihood of poor segment of community is at stake.	205(57.4)	146(40.9)	6(1.7)	357(100.0)
Due to illegal timber harvesting the forest have been vanished	236(66.1)	100(28.0)	21(5.9)	357(100.0)
People are illegally occupying forest lands	139(38.9)	166(46.5)	52(14.6)	357(100.0)
Implementation of forest law is not same for all.	167(46.8)	109(30.5)	81(22.7)	357(100.0)
Timber permits are issued illegally to rich and powerful.	179(49.9)	91(25.5)	88(24.6)	357(100.0)
Due to illegality in forest management the forest management is non-sustainable.	187(52.4)	108(30.3)	62(17.4)	357(100.0)
Forests are cut without permission.	150(42.0)	101(28.3)	106(29.7)	357(100.0)

Furthermore, majority of the respondents (57.4%) agreed that due to illegal cutting of forests, the livelihood of poor segment of community is at stake, 40.9% of the respondents denied about it while 1.7% of the respondents were uncertain about it. There is strong link between poverty and forests. Poor people live near forests and are highly dependent on forest resources. Therefore, depletion of forest negatively affects livelihood of poor people. This result is supported by [Solomon and Colleagues \(2015\)](#) who stated that the lives of indigenous communities and villagers living in proximity to the forests are usually destroyed in countless ways because of illegal logging. Illegal logging takes away their traditional way of life and livelihoods. Particularly, their tribal cultural are lost if the forest goes away and it also makes it difficult for them to forage which threatens their survival.

Moreover, 38.9% respondents agreed that people are illegally occupying forest lands, similarly, 46.5% refuted about it while 14.6% of the respondents don't know about it. Forest are renewable natural resources, however, the over utilization of forests is reshaping the land use pattern. The blanks created after forest cutting are used for agriculture, habitation and range use which discourages regeneration of forests. This statement is supported by [FAO \(2005\)](#) report that deforestation and forest degradation from illegal activities is hard to measure. Moreover, due to degradation and deforestation some offenders occupy forest lands which destroy forests. ([FAO, 2005](#)).

In addition, majority of the 46.8% respondents were of the view that Implementation of forest law is not same for all, 30.5% of the respondents disagreed about it while 22.7% of the respondents were uncertain about

it. Likewise, majority of the respondents (49.9%) affirmed that timber permits are issued illegally to rich and powerful, 25.5% of the respondents disagreed about it, followed by 24.6% of the respondents that were unsure about it. It is evident from these results that implementation of law is partial and favoring rich segment of society. This statement was supported by [The Guardian \(2014\)](#) indicating corruption as responsible for the current increase in illegal cutting of trees in the Amazonas where harvesters and lumbers bribe for illegal contracts and permits are issued to rich and influential individuals and companies.

Furthermore, majority of the 52.2% of the respondents were of the view that due to illegality in forest supervision the forest management is non-sustainable. However, 30.3% of the respondents deny about it while 17.4% of the respondents don't know about it. This statement was supported by [Forest Governance Integrity Program \(2011\)](#) which concluded that due to illegality forest management has large cost. Moreover, [World Bank \(2002\)](#) informed that lost revenue from poor forest management and illegality ranges up to US\$15 billion annually. Moreover, majority (42%) of the respondent's believed that Forests are cut without permission, 28.3% of the respondent's disagreed with the statement while 29.7% of the respondents were uncertain about it. This statement is supported by [Gore \(2011\)](#) stating that the role of unlawful act based on well-organized (e.g. illegal trees supplying from one area to another) illegal networks and smugglers is promoting deforestation and forest degradation. Similarly, those who have some access to forest officers can easily access and cut trees without permission. Illegal cutting of forest is proficient after breaking of law.

Table 3: *Association between forest governance and illegality.*

Statement	Perception	Forest governance			Total	Chi-square(x2) P value
		Yes	No	Uncertain		
People cut trees by legal permit	Yes	30(8.4)	165(46.2)	15(4.2%)	210(58.10%)	X ² =46.244 (P=0.000)
	No	1(0.3)	51(14.3%)	23(6.4%)	75(21.0%)	
	Uncertain	4(1.1)	43(12.0)	25(7.0)	72(20.2)	
Due to illegal cutting of forests, the livelihood of poor segment of community is at stake	Yes	28(7.8)	146(40.9)	31(8.7)	205(57.4)	X ² =11.525 (P=0.022)
	No	7(2.1)	107(30.0)	32(9.0)	146(40.9)	
	Uncertain	0(0.0)	6(1.7)	0(0.0)	6(1.7)	
Due to illegal timber harvesting the forest have been vanished	Yes	28(7.8)	174(48.7)	34(9.5)	236(66.1)	X ² =7.669 (P=0.104)
	No	6(1.7)	71(19.9)	23(6.4)	100(28.0)	
	Uncertain	1(0.3)	14(3.9)	6(1.7)	21(5.9)	
Due to illegal forest use the environmental services of forest are greatly reduced	Yes	25(7.0)	165(46.2)	52(14.6)	242(68.8)	X ² =18.286 (P=0.001)
	No	10(2.8)	83(23.2)	5(1.4)	98(27.5)	
	Uncertain	0(0.0)	11(3.1)	6(1.7)	17(4.8)	
People are illegally occupying forest lands	Yes	24(6.7)	109(30.5)	6(1.7)	139(38.9)	X ² =89.655 (P=0.000)
	No	11(3.1)	126(36.1)	26(7.3)	166(46.4)	
	Uncertain	0(0.0)	21(5.9)	31(8.7)	52(14.6)	
Implementation of forest law is not same for all	Yes	23(6.4)	134(37.5)	10(2.8)	167(46.8)	X ² =65.379 (P=0.000)
	No	12(3.4)	81(22.7)	16(4.5)	109(30.5)	
	Uncertain	0(0.0)	44(12.3)	37(10.4)	81(22.7)	
Timber permits are issued illegally to rich and powerful	Yes	22(6.2)	109(30.5)	47(13.2)	179(49.9)	X ² =34.383 (P=0.000)
	No	13(3.6)	71(19.9)	7(2.0)	91(25.5)	
	Uncertain	0(0.0)	79(22.1)	9(2.5)	88(24.6)	
Due to illegality in forest management the forest management is non-sustainable	Yes	22(6.2)	150(42.0)	15(4.2)	187(52.4)	X ² =48.161 (P=0.000)
	No	13(3.6)	75(21.0)	20(5.6)	108(30.3)	
	Uncertain	0(0.0)	34(9.5)	28(7.8)	62(17.4)	
Forests are cut without permission	Yes	16(4.5)	118(33.1)	16(4.5)	150(42.0)	X ² =51.792 (P=0.000)
	No	16(4.5)	79(22.1)	6(1.7)	101(28.3)	
	Uncertain	3(0.8)	62(17.4)	41(11.5)	106(29.7)	

It is evident from the results that despite of prevalence of laws, policies and regulations, the forests are cut illegally. The growing population needs and high unemployment are exerting pressure for unsustainable forest use by using illegal ways of theft and paying bribes. The result is an overall depletion of the forest resources. In some extreme cases the forests are cleared and lands are occupied by some influential people for their personal agricultural, habitation or rangeland uses through the illegal support of forest department staff.

Association between forest governance and illegality

Forests are managed by forest department under clear forest policies and rules. Under these rules the legal rights and concession of the local communities are evidently mention and the procedure for actualization these rights is clearly written. However, due to growing population needs and economic disparities

the forest dependent people's needs remain unmet. To accomplishing these needs some illegal ways are adopted by local communities which are threatening to the forest resources and overall environment. Association between poor forest governance and illegality are given in [Table 3](#).

The results show that forest governance has a highly significant (P=0.000) association with cutting trees under legal permits. Moreover, forest governance had significant association (P=0.022) with putting the livelihood of poor community is at stake due to illegal cutting. Similarly, forest governance had a significant (P=0.001) association with reduction of environmental services due to illegal use. Under the current forest management system, the local communities are provided with rights and concessions under law. In implementation of these

rights the principles of scientific and sustainable forest management are applied. Wherever the forests are properly governed the local needs are met under the permission of permits. However, lust for money and prevailing poverty compels for illegal cutting of the forest for short term benefits. These short term benefits are negatively influencing the long term livelihood and leads to destruction of environment. These finding are in line with [The Guardian \(2014\)](#) report, stating that in tropical forest the timber is illegally logged and converted into scants with high ratio of timber and environmental losses. The report stated that during illegal logging process bribes are paid to provide protection to the illegitimate acts of loggers that symbolize poor forest governance.

The results further show that forest governance had highly significant ($P=0.000$) association with illegal occupation of forest land by people. Similarly, forest governance had highly significant ($P=0.000$) association with partial implementation of forest law. In addition, forest governance had a highly significant ($P=0.000$) association with illegal issues of permits to rich and powerful. Problems of illegality in forest governance are multifaceted. On one side there is discriminatory implementation of forest law where rich people are differently treated than poor by allowing them illegal cutting of forest under the cover of legal permits. Moreover, the blanks created inside the forest are permanently changed into agriculture land without any legal permission. This state of illegality promotes poor forest governance. [Solomen \(2015\)](#) reported that poor communities living around forest manage to overuse and destroy forest under the cover of illegal logging. They justify their illegal acts by describing it as the traditional way of their livelihood. The author emphasized that if these forest are lost the whole community will have to shift as their survival dependents on these forests. In this way the overall environment services of the forest are destroyed.

The result further show that forest governance had highly significant ($P=0.000$) association with non-sustainable forest management due to illegality. Likewise, forest governance had highly significant ($P=0.000$) association with cutting forest without permission. The local communities are in habit of cutting forest to meet their needs and for smuggling purposes. Initially, the smuggler seeks illegal permission from the forest staff for illegal cutting of forest. However, when the forest staffs are trapped in

these activities, the timber smugglers blackmail the forest staff and manage to cut forest without seeking permission from the officer's. [Smith et al. \(2015\)](#) and [Halkos et al. \(2015\)](#) findings are in line with these results. The author reported that forest cutting is the business of the greediest segment of the society. These people, when overcome the forest officers cut the forest without taking permission from them.

The result further show that forest governance had a non-significant ($P=0.104$) association with vanishing of forest due to illegal cutting. Forest is the renewable resource. Protecting forest may enable natural regeneration to establish and reformation of forests.

Forests are managed by government through involvement of local communities while taking care of their rights under the law. However, due to illegal cutting of forest the forest resources are dwindling that is a threat to environment and local livelihood. Due to partial implementation of forest law in favor of rich segment of timber smugglers, the forest resources are vanishing with great speed. This rich segment of smugglers has now over powered the forest staff and is in strong position to illegally cut forest without taking permission from the forest staff.

Conclusions and Recommendations

Forest governance is facing immense threat from illegitimate practices that are underway in the forestry sector. Although, the policies, laws and regulation for forest governance do exist yet the network of illegal lumbers and corrupt forest official manage to sideslip the laws and regulations and cut the forest illegally. In some instances, the illegal lumbers have overpowered the forest staff and forcefully cut the forest without legal permission which is having adverse effects on local livelihood.

Revisiting the policies and laws for forest governance to plug the loopholes in the forest governance issues besides, implementation of the laws in its true spirit so that those officers/officials/offenders that are involved in forest destruction are easily noticed, apprehended and punished under the law without any discrimination were the main recommendations in light of the study findings.

Novelty Statement

The current study highlighted and examined various

dimensions of corruption and links in poor governance in the timber trade activities in Malakand, KPK, Pakistan. In addition, the research is worthy for devising policy to overcome illegality and to improve community perception towards forest governance.

Author's Contribution

Taimoor Khalid: Conceived the idea of research, collected the data and wrote the manuscript.

Asad Ullah: Major supervisor who designed the research, analyzed data and modified the manuscript.

Mussawar Shah: Helped in research design.

References

- Amacher, G.S., M. Ollikainen and E. Koskela. 2012. Corruption and forest concessions. *J. Environ. Econ. Sand Manage.* 63: 92–104. <https://doi.org/10.1016/j.jeem.2011.05.007>
- Cochran, W.G. 1977. Sampling techniques, Wiley, New York.
- FAO. 2005. Best practices for improving law compliance in the forest sector. FAO Forestry Paper 145. FAO: Rome.
- Forest Governance Integrity Program. 2011. Analyzing corruption in the forestry sector. Berlin: Germany, Transparency Int.
- Gibbs, C.E., M.L. Gore, E.F. McGarrell and L. Rivers. 2010. Introducing conservation criminology: towards interdisciplinary scholarship on environmental crimes and risks. *Br. J. Criminol.* 50: 124–144. <https://doi.org/10.1093/bjc/azp045>
- Giessen, L. and G. Buttoud. 2014. Defining and assessing forest governance. *For. Policy Econ.* 49: 1–3. <https://doi.org/10.1016/j.forpol.2014.11.009>
- GOP. 2017. Provisional summary results of 6th population and housing census-2017. Pakistan bureau of statistics, 6th population and housing census. www.pbscensus.gov.pk. Archived from the original on 30 October 2017. Retrieved 27 August 2017.
- Gore, M. 2011. The science of conservation crime. *Conserv. Biol.* 25 (4): 659–661. <https://doi.org/10.1111/j.1523-1739.2011.01701.x>
- Gupta, A. and U. Siebert. 2004. Combating forest corruption. *J. Sustainable For.* 19 (1–3): 337–349. https://doi.org/10.1300/J091v19n01_15
- Gupta, A. and U. Siebert. 2004. Combating forest corruption. *J. Sustain. Forest.* 19(1–3): 337–349. https://doi.org/10.1300/J091v19n01_15
- GWGIIAS. 1996. Governance Working Group of the International Institute of Administrative Sciences: Governance: A Working Definition (Brussels: Int. Institute of Administrative Sci). www.britcoun.org/governance/ukpgov.htm
- Halkos, G., A. Sundström and N. Tzeremes. 2015. Regional environmental performance and governance quality: A nonparametric analysis. *Environ. Econ. Policy Stud.* 17 (4): 621–644. <http://www.theguardian.com/environment/2014/may/15/brazil-launders-illegal-timber-on-a-massive-and-growing-scale> <https://doi.org/10.1007/s10018-015-0106-5>
- IMF (International Monetary Fund), 1997. World Economic Outlook. A Survey of the IMF, World Economic and Financial Survey. Washington, D.C.
- Irland, L.C. 2008. State failure, corruption and warfare: Challenges for forest policy. *J. Sustainable For.* 27 (3): 189–223. <https://doi.org/10.1080/10549810802219963>
- Nachmias, D. 1992. Public service liberalism: telecommunications and transitions in public policy. By alan stone. Princeton: Princeton Univ. Press, 1991. pp. 296. \$35.00. *Am. Polit. Sci. Rev.* 86(03): 816–817. <https://doi.org/10.2307/1964178>
- Pellegrini, L. 2007. The rule of jungle in Pakistan. A case study on corruption and forest management in swat. Lorenzo pollegri institute of social studies. <https://doi.org/10.2139/ssrn.1017233>
- Sekaran, U. 2003. Research methods for business. USA, Hermitage publishing services.
- Smith, R.J., D. Biggs, F.A.V. St. John, M. Sas-Rolfes and R. Barrington. 2015. Elephant conservation and corruption beyond the ivory trade. *Biol. Conserv.* 29 (3): 953–956. <https://doi.org/10.1111/cobi.12488>
- Smith, W. 2002. The global problem of illegal logging, ITTO Trop. For. Update 12 (1): 1–S32.
- Solomon, J., M.C. Gavin and M.L. Gore. 2015. Detecting and understanding non-compliance with conservation rules. *Biol. Conserv.* 189: 1–4. <https://doi.org/10.1016/j.biocon.2015.04.028>
- Tai, Simon, W. 1978. Social Science Statistics, it elements and applications. Calif. Goodyear Publ. Co.
- The Guardian, 2014. Brazil laundering illegal timber

on a massive and growing scale. Published May 15, 2014. Available online at <http://www.theguardian.com/environment/2014/may/15/brazil-laundering-illegal-timber-on-a-massive-and-growing-scale>

Wells, A., E. Del Gatto, M. Richards, D. Pommier and A. Contreras. 2007. Rural livelihoods, forest law and the illegal timber trade in Honduras and

Nicaragua. In Tacconi, L. (Ed). *Illegal logging: Law Enforcement, Livelihoods and the timber trade*. Earthscan, London.

World Bank. 2002. A revised forest strategies for the world bank group the world bank. www.tanggol.org/environmental_laws/DMO_04.html