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Factors Influencing the Occurrence of Forest Offenses in a Peninsular Malaysia State

RUSLI MOHD
Department of Forest Management
Faculty of Forestry
Universiti Putra Malaysia, 43400 UPM Serdang,
Selangor, Malaysia

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ABSTRAK

Satu kajian telah dibuat disalah sebuah negeri di Semenajung Malaysia untuk melihat tren dan mengenalpasti faktor yang mempengaruhi kesalahan hutan yang berlaku untuk jangkamasa dari tahun 1981 hingga 1992. Data serta maklumat tentang kesalahan hutan, harga balak, keluasan kawasan hutan, dan bilangan pegawai penguatkuasa telah dikumpul dari pelbagai sumber termasuklah rekod serta laporan tahunan Jabatan Hutan Negeri berkenaan, dan buletin MASKAYU yang dikeluarkan oleh Lembaga Industri Perkayuan Malaysia. Analisis korelasi dan regressi telah dilakukan untuk melihat kaitan diantara kesalahan hutan dengan harga balak, bilangan pegawai penguatkuasa dan keluasan kawasan hutan. Jumlah kesalahan hutan di negeri kajian menunjukkan tren yang menurun. Pembalakan haram yang merupakan satu dari kesalahan hutan membentuk peratusan yang tinggi pada setiap tahun dalam jangkamasa kajian. Dari tiga faktor yang dikaji, cuma harga balak sahaja mempunyai korelasi yang bermakna terhadap kesalahan hutan. Harga balak berkadar songsang dengan bilangan kesalahan hutan. Model regresi yang terbentuk yang mengkaitkan kesalahan hutan dengan harga balak adalah:

Bil. kesalahan hutan = 393.94 - 0.53 harga balak ($p = 0.02$)
Bilangan pembalakan haram = 264.69 - 0.37 harga balak ($p = 0.03$)

Kajian yang lebih terperinci perlu dijalankan dimasa akan datang untuk memahami dengan lebih lanjut faktor lain, seperti denda, yang mempengaruhi kesalahan hutan.

ABSTRACT

A study was conducted in one of the states of Peninsular Malaysia to observe the trends and identify factors associated with the occurrence of forest offenses during the period from 1981 to 1992. Data and information on forest offenses, price of logs, size of forest areas, and number of enforcement officers were collected from various sources including the records and annual reports of the State Forestry Department, and MASKAYU bulletin published by the Malaysian Timber Industry Board. Correlation and regression analyses were carried out to determine the relationships between forest offenses and price of logs, size of forest area and number of enforcement officers. The number of forest offenses in the state shows a decreasing trend. Illegal logging which is a form of forest offense constitutes the highest percentage in all the years during the study period. Of the three factors investigated, only the price of logs correlated significantly with forest offenses. The price of logs is inversely correlated with forest offenses. The regression models developed show the relationships between the number of offenses and the price of logs as follows:

For number of forest offenses $p = 0.02$ and
For number of illegal logging cases $p = 0.03$

Further studies should be conducted to better understand other factors like penalties that influence forest offenses.

INTRODUCTION

The government of Malaysia, like many other producers of tropical wood products, has pledged its commitment to manage the forests in a sustainable manner, in line with the International Tropical Timber Organization (ITTO) year 2000 objective which states that all wood products traded in international market must be produced from sustainably managed forests. A number of strategies and programmes have been implemented by the government, including the establishment of National Timber Certification Council as well as the formulation and testing of Malaysia's criteria and indicators (MC&I) for sustainable forest management. Recently, funds collected through timber export cess amounting to more than RM 350 million have been allocated by the government to finance forest development and research projects in an effort to speed up the attainment of the sustainable forest management objective.

While commendable efforts are ongoing in some aspects, the government should also examine other important aspects of forest policy to make sure that they complement one another. One of these aspects is related to forest law enforcement. Forest law enforcement is a critical aspect of forest management because it regulates the relationship between many parties, particularly timber companies, with the forest resource. Illegal and uncontrolled harvesting activities, for example, may cause irreparable damage to the forest which subsequently influences its long-term productivity and sustainability. Generally, forest authority should try to keep forest offenses to a minimum level, particularly those that cause great harm to the forest and the environment.

In spite of the fact that forest offenses pose obstacles to sustainable forest management, little has been studied about them. Little, if any, has been published on the extent of the problem as well as factors influencing their occurrence. This paper highlights the trends in the occurrence of forest offenses in one state of Peninsular Malaysia and identifies factors associated with their occurrence. These offenses are only those provided for in the National Forestry Act, 1984. No attempt is made to look at the nature of these offenses under the general law of crime, namely the Penal Code.

Factors Influencing Forest Offences

Forest offenses can be defined as the conduct of any activity, or its omission, which is illegal under the existing forest law of the country. The main piece of legislation governing the conduct of such activities in Peninsular Malaysia is the National Forestry Act, 1984 and its amendments of 1993. Forest offenses are criminal acts because they violate the law of the state and the person committing them are liable to legal punishment. According to Curzon (1979), crime is "an unlawful act or default which is an offense against the public and renders the person guilty of the act liable to legal punishment." Forest offenses have impact on the State which, in turn, has the responsibility to bring the guilty person to justice. Theories on the economics of crime, therefore should shed light on factors which influence the occurrence of forest offenses.

The body of literature on the economics of crime focuses on two main issues. The first issue is on individualís decision about criminal activity while the second is on criminal justice policy (Hirsch 1979). The concern of the first issue is on the factors that influence an individualís decision whether or not he or she commits a crime. Studies done on this first issue try to develop the supply function for crimes or also known as the deterrence function. The object of studies on the second issue, on the other hand, is to determine the optimal probability of punishment and the optimal type and severity of punishment. Such studies entail, among other things, the determination of the loss to society as a result of crimes.

Economists argue that criminals are rational individuals who respond in a natural way to the incentives provided by the environment in which they operate. Rational individuals balance the costs and benefits of their possible actions and allocate their time to legal and illegal activities accordingly. These individuals will take an action if the benefits obtained outweigh the costs. Following such argument, rational individuals would commit crimes if the expected benefits gained outweigh the expected costs incurred.

What are the benefits and costs associated with committing a crime? The benefit that the individual stands to gain as a result of crime can be measured by establishing the amount that

the offender, in a market-like setting, would have to be offered in order to pursuade him against committing the crime. Inferences about these benefits can be made by measuring the extent of change in the volume of crimes that result from a given change in costs.

The expected costs (or expected punishment) to the individual comprise of several parts. These are the size of punishment, probability of arrest and probability of conviction. Expected punishment is given by the following formula (Reynolds 1996):

Expected punishment (E.P.) = Punishment X Probability of Arrest X Probability of Conviction

where:

punishment = jail sentence

probability of arrest = number of arrests/ total number of offenses

probability of conviction = number of convictions/number of arrests

The discussions on benefits and costs of committing crimes presented above can suggest factors that influence forest offenses. The benefits that an offender stands to gain from committing forest offenses should be related to the revenue that he expects to obtain from the sale or processing of stolen logs. Therefore, the sale price of logs should influence the occurrence of forest offenses. It is expected that the higher the price of logs the higher will be the occurrence of forest offenses, if other factors remain constant.

Costs associated with forest offenses are related to the chances that an offender will be apprehended and later convicted and the penalty that he pays if he is convicted. The number of enforcement officers and the size of forest areas should influence the chances of arrest and, hence, the occurrence of forest offenses. The more the enforcement officers, the greater the likelihood for inspection activities to be carried out, and therefore, the higher probability of arrest. Consequently, the more the enforcement officers, the lesser the chances of forest offenses occurring. Therefore, it is expected that the number of enforcement officers is inversely related with forest offenses.

The size of forest area should also influence the probability of arrest. The bigger the forest area, the more time needed for inspection and patrol, and the lower will be the chances for detection of forest offenses. Therefore, the size of forest area should be inversely related with the occurrence of forest offenses. In this study, the number of forest offenses will be correlated with the sale price of logs, the size of forest area and number of enforcement officers in the state forestry department.

METHOD

This study was conducted in one of the states in Peninsular Malaysia and it was chosen for reason of convenience. The total forest area of the state is about 260,000 ha. and this represents about 23 percent of the total land area of the state. Income from forestry activities, particularly logging, contributes significantly to the state's economy. For the purpose of administration, the state is divided into three forest districts.

Two categories of data were collected for the study. The first category is related to the occurrence of forest offenses in the state while the second is on factors that are predicted to influence these offenses. For the first category, data on the number and types of forest offenses for each year during the 1981 to 1992 period were gathered from the records kept by the State Forestry Department. Data on log prices delivered at mill gate, number of enforcement officers in the state and size of productive forests belong to the second category and these were collected from various sources including the records kept by the Malaysian Timber Industry Board and the State Forestry Department itself.

For purposes of analysis, forest offenses were divided into six categories based on the provisions of the National Forestry Act, 1984. These categories were: a) illegal cutting and removing of forest produce from a permanent reserve forest or state land, b) illegal searching, collecting, removing, or manufacturing of any non-wood forest produce, c) illegal clearing for purpose of cultivation, d) trespassing, e) illegal possession of forest produce for conversion, and f) violating license conditions. Graphical analysis will be done in order to observe the trends in the occurrence of the various offenses over the study period.

Models will be developed to relate the occurrence of forest offenses with log prices, number of enforcement officers and size of forest area by means of linear regression which can be mathematically expressed as:

$$\text{Offenses} = \alpha + \beta_1 P_L + \beta_2 F + \beta_3 A$$

Where:

P_L = price of logs
F = number of officers
A = size of forest area

RESULTS

Occurrence of Forest Offenses

Table 1.0 provides information on the occurrence of forest offenses in the State during the study period. It gives the actual number of offenses, the number of offenses per 1000 cu.m of wood production and the percentage of category A offenses.

TABLE 1
Occurance of forest offenses, 1981-1992

Year	Total number of offences	No. of offenses/1000 cu.m of log production	% of category a offences (i.e. illegal logging)
1981	150	0.44	75
1982	129	0.39	71
1983	91	0.15	88
1984	84	0.28	73
1985	80	0.28	83
1986	68	0.23	70
1987	47	0.18	48
1988	47	0.10	89
1989	70	0.16	67
1990	31	0.06	90
1991	31	0.09	80
1992	45	0.17	73
	median = 69	median = 0.17	median = 74

Data in the table show that forest offenses in the State are on a declining trend. The number of offenses was highest in 1981, gradually decreases from then on until 1988, increases slightly in 1989 before leveling off in early 1990's. The median number of offenses per year is 69 which means that one offense in every four to five days. Information contained in column three of the table indicate that, on the average, almost two offenses occurred for every 10,000 cu.m of logs harvested or one offense per 5000 cu.m of log produced.

It is also shown that in almost every year, offenses that can be classified as "illegal logging" constitute the biggest proportion of all the categories of offenses. On the average, nearly 74 percent of all the offenses that occurred every year are illegal logging cases. This confirms claims often made that illegal logging occurs widely in the states, including in the State being studied.

Factors Correlated with Occurrence of Forest Offense

Results of correlation analysis between the number of offenses and type A offenses with the independent variables are shown in Table 2.0.

TABLE 2
Correlation between total number of offences per year and type A offenses per year with independent variables

Offense	Independent variables		
	Log price (RM/cu.um)	Number of officers	Total area of production forest
All offences	r = - 0.6456 p = 0.02*	r = 0.2345 p = 0.46	r = 0.0571 p = 0.86
Type A offences	r = - 0.6209 p = 0.03*	r = 0.1909 p = 0.552	r = 0.1492 p = 0.644

* significant at 5 percent level

As can be seen from the table, only log price correlated significantly with the number of offenses. Both the total number of offenses and type A offenses are inversely correlated with log price which means that there will be fewer of these offenses in times when the price for logs is high than when the price is low.

Subsequent analysis results in the following simple regression models relating forest offenses with log price:

Number of offenses = 393.94 - 0.53 log price
(0.02)

Number of type A offenses = 264.69 - 0.37 log price
(0.03)

The models developed show that for every unit increase in log price, there is a corresponding decrease in about half unit of all types of offenses. Similarly, when the price of logs increases by a unit, the number of type A offenses decreases by about 0.4 unit.

DISCUSSION AND CONCLUSION

Forest offenses, particularly illegal logging, will hinder the attainment of sustainable forest management in this country. Widespread

occurrence of these offenses means that the effective size of productive forest areas is decreased and this can upset the planning for sustainable harvest. In addition, a large sum of money in the form of premium is not collected by the government when the forest areas are illegally logged. Such money could have been invested in development projects that would enhance the productivity and, subsequently, the sustainability of the forest. Due to these reasons, the authority concerned should regularly inspect logging activities to ensure that the loggers abide by the rules and regulations stipulated for them.

The results presented in the earlier part of this paper should be much awaited by the authority. In terms of number of offenses, at least, the trend is declining. However, number of offenses alone do not truly reflect the seriousness of the problem. There can be few incidence of illegal logging activities but the amount of logs removed or the areas cut in each of the incidence can be huge. The state forest authority, therefore, should not be complacent in its enforcement activities once they found out that the number of offenses is declining over the years. It should be a cause for concern in the state being studied as it was shown that illegal logging cases constitute a big proportion of the total number of offenses in the state.

The results of regression analysis do not support the hypotheses made earlier on the relationships between number of offenses and log price, size of forest area and number of enforcement officers. It was expected that forest offenses would increase with increase in log price, and that it would decrease with decrease in forest area and increase in enforcement officers. However, only log price was correlated significantly with number of offenses. It was found that the higher the log price the lower will be the number of offenses. This result shows that loggers will not be motivated to steal more logs when the price of logs increases. It can be argued that an increase in log price already provides enough incentives for the loggers to cut their own forest concession areas. There is no necessity to log other areas in order to obtain a comparable margin of profit.

As far as inspection activities are concerned, the findings indicate that these should be carried more often in times when the prices of logs are low than in times when the prices of logs are high. Inspection activities should be planned taking into consideration the projections made for log prices. The authority should monitor the development in log prices and plan inspection activities accordingly.

The above findings, however, should be treated as very preliminary and more studies should be carried out in other states to confirm them. Future studies may want to use a more disaggregated data for log price, for example, price for different groups of commercial species. Such studies should also try to determine the probability of arrests and probability of conviction for forest offenses and, consequently, analyse their influence on these offenses. More detail data will have to be collected for such studies. The ultimate aim of such studies is to find out whether or not increasing penalties deter the occurrence of forest offenses.

In conclusion, achieving sustainable forest management requires congruent and balanced efforts in many facets of forest policy. The government should not only focus on certain programmes or projects to enhance the productivity and sustainability of the forests but ignore other aspects which may be equally important in achieving sustainable forest management. One important facet of forest policy is its enforcement. Lack of enforcement can lead to widespread occurrence of illegal activities. The occurrence of forest offenses, such as illegal logging and encroachment, can significantly hinder the attainment of sustainable forest management. As little is known on the occurrence of forest offenses in this country, more research should be carried out in the future. Comprehensive research programmes can lead to the formulation of improved strategies to control the occurrence of forest offenses.

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