

# THE IMPACT OF DEFORESTATION RATE FOR EXTINCTION BIODIVERSITY IN INDONESIA

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# THE IMPACT OF DEFORESTATION RATE FOR EXTINCTION BIODIVERSITY IN INDONESIA

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## Abstract

The purpose of this study was to examine the impact of deforestation on biodiversity loss in Indonesia. Firstly author presented information about deforestation trends that spread across Indonesia. And presented information about forest fires that triggered off the continuous deforestation and occurred one after another throughout the year. The collected data showed deforestation and forest fires have occurred since 1960 to 2015, and deforestation and forest fires implicated in the extinction of species diversity, genetics, and ecosystems that spreads from Sunda region to Sahul region.

Author used descriptive regulation and legislation methods, used literature approach, as well as arranged with descriptive and interpretational form in papers.

From the results of this study author concluded that deforestation rate implicates in forest fires that occur continuously throughout the year and can not be inevitable possibility of extinction of biodiversity spread across Indonesia.

Keywords: impact, deforestation, forest fires, biodiversity loss

## I. Introduction

Indonesia is one of the rich diversity for biological resources with are concentrated in tropical areas, namely in the area of tropical rain forest. From these in the world three regions, in South America the Amazon basin Brazil is concentrated with 400 million hectares, otherwise Indo-Malaya zone, including Indonesia, India, Thailand and Malaysia has 250 million hectares, and forest areas of West Africa which is concentrated in the valley of the river Congo to the Gulf Guyana has about 180 million (Myers, 1980, Whitmore, 1990). Besides of these divisions Indonesia has rich of biological resources, and it included one of the seven countries megadiversity in the world and ranks the second country after Brazil, and has third largest tropical forest areas after Brazil and Zaire, although the extent of comprehensive areas cover only 1.3% earth's land (Muhtaman, D.R et al, 1999).

The rich biodiversity is comprised with 10% of flowering plants, 12% of mammals, 10% reptilia amphibia, 17% of birds and 25% of the fish. Under these conditions and abundant natural resources, Indonesia is also located at the intersection of two continent and two oceans that are geographically divided into two regions, namely Indomalaya and Australia, these region are divided by the Wallace line. This line is also the boundary line between central and western and central Indonesia and boundary line between eastern Indonesia puts on the middle part Weber, so flora and fauna in western Indonesia are called flora and fauna of Sunda region, while the flora and fauna found in eastern Indonesia are also called flora and fauna Sahul region (Ministry of Environment, 2009). Initially the international community is very interested in the conditions of abundant natural wealth and researchers attract to examine these conditions, but deforestation of these reaches 1.5 million per year and the international community is very worried these conditions.

The extent of forest area in Indonesia were once about 144 million hectares, now becomes only 130.68 million hectares, but forest cover area disappears with deforestation and forest fires that occurred throughout the year over and over again like the vicious circle, and will not only result in destruction biological resources spread from Sunda region also will exposure to Sahul region. Flora and fauna habitat destruction will obviously affect biodiversity and will inevitably become extinct.

The deforestation and forest fires occur every year, indicated that failure of forest management by government. This condition occurs because of the national development policy which overlaps on the concept of forest conservation with not accordance of use. Until now Government has not set single agency to response for the preservation of natural resources in Indonesia, consequently becomes sectoral conflicts of interest and overlapping conditions. The deforestation has been occurred since last 1960s, in this time Indonesia experienced severe economic crisis. To avoid the economic crisis Foreign Investment Law, namely Law No. 1 of 1967, supported by Law No. 5 of 1967 on Basic Provisions of Forestry. These were enacted laws became the basis for all rules relating to the management of biodiversity resources in Indonesia to encourage foreign or domestic private companies.

The impact of deforestation due to convert from state forest into forest concessions promotes deforestation. These facts show that the implementation of the concession like rule of the new order has led to the forest destruction for 32 years. In 46 million hectares of production forest, 14.2 million hectares put on severely damaged condition while 13.5 million hectares put on vulnerable condition, the rest forest are categorized as moderate and good, but these forest need intensive care so as not destroyed. In Indonesia only 18 million hectares or 41% of the total forest area still yet touched by human hands (Erwidodo, et al, 2000). To reduce forest damage from the concessionaire, Director General of Forestry issued Decree No. 35 / Kpts / DD / I / 1972 concerning the procedures of logging which Selective Cutting Guidelines for Indonesia (TPI).

Concurrent after the occurrence of forest damages, serious forest fires occurred during 1997-1998 mainly on Borneo and Sumatra islands, these conditions were supported by Grahame, A. et al, 2003. He stated that the land and forest fires accompanied smoke causes at once: (1 ) serious damage to the forest; and (2) damage to biodiversity habitats. The total burning area were added up by Asian Development Bank (ADB) in 1999, and the area affected by fire in the fire from 1997 to 1998 is 1.6 million hectares in Sumatra island, 6.5 million hectares Kalimantan, in 0.2 million hectares Java island 1 million ha. If these conditions are not immediately controlled throughout the year, it will no doubt to be extinct biodiversity both in level of species, genetic and ecosystem.

From the background which was described above, author wants to assess the impact of deforestation on biodiversity loss in Indonesia.

## **II Objectives**

This study aims to assess the impact of deforestation for biodiversity loss in Indonesia. Firstly author presented information on deforestation trends that spread across Indonesia. Secondly presented information on forest fires triggered by the continuous deforestation occurred over and over again throughout the year. Data has been collected about deforestation and forest fires which have been occurred since 1960s to 2015 which have implicated for the extinction of species diversity, genetic and ecosystem that spreads from Sunda region to Sahul region.

## **III Methods**

The used method is descriptive method for regulations and legislation, and approach to literatures, after that interpreted these materials and arranged in the form of papers.

## **IV Results and Discussion**

### **4.1 Results**

#### **1. Rate of Deforestation**

Since a few years ago especially outside of Java Island, forest destruction generally had no legal basis for which appointed the permanent forest, forest protection, and levy of change for timber harvesting and collection of forest products. However, in certain areas legislations been in have been enacted such as (a) agrarian regulations, (b) forest protect ordinations, (c) fields ordinations and (d) regulate logging ordination, but these ordinations make confuse and still contain many weaknesses, so they can not be used as legal basis for the healthy run forest Management (Forestry History Compiler team I, 1986: 71-84).

Impact of forest degradation will trigger off forest fires, and will be inevitable for endless vicious cycle every year. Such conditions were supported by Otto Soemarwoto (2003), and he said that increase of deforestation rate with forest fires caused serious forest damage.

Apparently forest fires have occurred since 1960s and then increased since the enactment No. 1 of 1967 on Foreign Investment Law and this enactment was supported by Law No. 5 of 1967 on Basic Provisions of Forestry (BPF). The rate of forest conversion to forest industry was running very fast. The enactment of Foreign Investment Act of 1967 and BPF 1967 led to higher forest conversion which were allocated to forest concessions (HPH). The collected data showed that in 1978 the number of concession holders were 383, but after nine years (1987) increased 564 concessionaires have 55468.35 million hectares forest areas (Department of Forestry, 1986). Failure of TPI (Selective Cutting Indonesia) concept stimulated Indonesia's deforestation rate as shown in Table 1.

Table 1. The rate of deforestation in Indonesia Period 1985-2009

Span	Year Interval	Deforestation	Total (Million hectares)
1985-1997*	12	1.80	21.60
1997-2000**	3	2.84	8.52
2000-2009*	10	1.51	15.15
<b>Total</b>		<b><math>\bar{X} = 2.05</math></b>	<b>45.27</b>

Source: \* FWI / GFW, 2001 "Portrait of the Forest Indonesia"

\*\* Department of Forestry, 2005

In table 1 the rate of deforestation in Indonesia from 1985 to 2009 period which were collected from the data FWI / GFI, 2001, reached 1.8 million hectares per year, from the Ministry of Forestry in 2005 reached 2.84 million hectares per year, and from the analysis of FWI reached 1.51 million per year.

The rate of deforestation has been increased due to allocate forest areas for non-forestry purposes such as agri-food, agriculture, fisheries, livestock, mining and transmigration area about 13,025,053 hectares (Department of Forestry, 1986). Based on the analysis of forest cover since 2000 to 2009 which were released from FWI (2001), Indonesia has experienced deforestation around 15,158,826.59 hectares, so 1,515,892.66 hectares of deforestation get on per year as shown in Table 1 and 2.

Table 2. Forest Cover, Deforestation and Rate of Deforestation Year 2000-2009

Island	Land area (hectare)	Forest cover 2000 (hectare)	Forest cover 2009 (hectare)	Deforestation 2000-2009 (hectare)	Deforestation rate 2000-2009 (hectare)
Sumatera	46,449,970.82	15,516,958.84	11,805,161.39	3,711,797.45	371,179.75
Kalimantan	53,262,378.46	32,856,107.16	27,350,243.23	5,505,863.93	550,586.39
Sulawesi	19,375,054.75	10,707,185.76	9,039,345.18	1,667,840.59	166,784.06
Maluku	7,972,596.62	5,015,206.85	3,757,115.13	1,258,091.72	125,809.17
Papua	42,877,146.20	34,767,891.15	34,138,992.70	628,898.44	62,889.84
Java	13,008,124.79	2,281,183.78	897,978.82	1,383,204.96	138,320.50
Bali Nusa Tenggara	7,365,736.32	2,184,833.28	1,181,603.75	1,003,229.49	100,322.95
<b>Total</b>	<b>190,311,007.96</b>	<b>103,329,366.78</b>	<b>88,170,440.19</b>	<b>15,158,926.59</b>	<b>1,515,892.66</b>

Source: Forest Watch Indonesia (2001) data is modified

In 2009 the forest cover of forest concessions obviously affected the rate of deforestation. Although approximately total 88,170,440.19 hectare were included in the logging concessions which did not clearly felled with forest cover, because they have implemented TPI (Indonesian Selective Cutting) system, but at HTI (Forest Plants industry) and HGU (Cultivation Rights) chances they would clear cut to simplify its business as shown in Table 3 below.

Table 3. Area of Forest Cover in Concessions in 2009 (Ha)

Island	HPH	HTI	HGU	Total	Overlap between HPH, HTI, HGU	Other HPH, HTI and HGU	All Total
Sumatera	1,070,678.80	682,732.65	19,437.92	1,772,849.37	56,561.76	9,975,752.27	11,805,161.39
Java	-	-	-	-	-	897,978.82	897,978.82
Bali Nusra	-	2,108	-	2,108	-	1,179,495.53	1,181,603.75
Kalimantan	8,854,978.79	426,007.68	759,781.11	10,040,767.58	299,854.01	17,009,621.63	27,350,243.23
Sulawesi	1,077,089.06	35,792.89	-	1,112,881.95	-	7,929,463.23	9,039,345.18
Maluku	852,380.67	19,949.03	-	872,329.7	5,283.95	2,879,501.48	3,757,115.13
Papua	8,566,145.35	411,804.56	-	8,977,949.91	-	25,161,042.79	34,138,992.70
<b>Total</b>	<b>20,421,270.66</b>	<b>1,578,395.03</b>	<b>779,219.03</b>	<b>22,778,886.51</b>	<b>361,699.72</b>	<b>65,029,855.76</b>	<b>88,170,440.19</b>

Source: Forest Watch Indonesia, 2001 data is modified

Comprehensive land which was covered with forest or non-forest remained due to the degradation rate, in 2012 these land spread in forest areas and outside forest areas such as KSA-KPA (Nature Reserve Areas - Nature Preservation Areas) is also called HK (Conservation Forest), HL (Protected Forests), HPT (Limited Production Forest), HP (Permanent Production Forest), HPK (Convertible Production Forest) and APL (other land use). This data indicates that the rate of deforestation is occurring throughout the forest areas both inside and outside these areas. These conditions are very worried for habitat of flora and fauna, and greatly affect the existence of biodiversity. These conditions will be exacerbated by the forest fires that occur endlessly throughout the year and sooner or later these will affect the extinction of species diversity, genetic and ecosystem.

Table 4. Comparison of Land Cover with Deforestation rate per province Years 2011-2012 (ha) Forest Area

No.	Provinsi	Forest Area							APL	TOTAL
		Permanent Forest								
		KSA-KPA	HL	HPT	HP	Total	HPK	Total		
1	2	3	4	5	6	7	8	9	10	11
1	The rate of land cover	22,057,900	30,388,400	27,907,800	30,168,200	110,522,400	17,863,400	128,385,800	59,455,100	187,840,900
2	Deforestation	36,396.1	44,997.6	66,060.4	155,402.6	302,856.6	49,675.6	352,532.2	260,948.4	613,480.7
3	Cover the remaining land area	22,021,503.9	30,343,402.4	27,841,739.6	30,012,797.4	110,219,543.4	17,813,724.4	128,033,267.8	59,194,151.6	187,227,419.3
4	Persentase (%)	0.165	0.148	0.236	0.515	0.274	0.278	0.274	0.438	0.326

Source: Statistics of Forest Area in 2013 the Ministry of Forestry in 2014

## 2. Forest Fires

Estimated spatial due to fires in 1997-1998 occurred in number of the larger islands of Indonesia, such as Kalimantan, Sumatra, Java, Sulawesi and Papua, which spread in the mountain forests, lowland forest, peat and swamp forest, dry brush and grass, industrial forest, agriculture and plantations these areas reached approximately total 9.745 million hectares as shown in Table 5.



Table 5. Estimated Spatial due to fires from 1997 to 1998 (in hectares)

Island	Mountain Forest <sup>a</sup>	Lowland Forest	Peat and Swamp forest	Dry bush And grass <sup>b</sup>	Industrial forest <sup>d</sup>	Agriculture <sup>b</sup>	Plantation <sup>e</sup>	Total
Kalimantan	-	2,375,000	750,000	375,000	116,000	2,830,000	55,000	6,501,000 <sup>f</sup>
Sumatera	-	380,000	300,000	260,000	70,000	670,000	60,000	1,740,000 <sup>f</sup>
Java	-	25,000	-	25,000	-	50,000	-	100,000
Sulawesi	-	200,000	-	-	-	200,000	1000	401,000
Papua	100,000	300,000	400,000	100,000	-	100,000	3000	1,003,000
<b>Total</b>	<b>100,000</b>	<b>3,280,000</b>	<b>1,450,000</b>	<b>760,000</b>	<b>186,000</b>	<b>3,850,000</b>	<b>119,000</b>	<b>9,745,000</b>

Source: Grahame, A. et al 2003

Note:

- Estimates of aerial surveys help members, the United Nations Disaster Assistance Disaster Assessment Commission Report, Field visit, Papua, 3 to 8 October 1997 (NSWRFS 1997).
- Estimates of the total area of which is exploited in land cover categories such as lowland forest, shrubs and grasses, and agriculture, based on estimates Liew et al. (1998) and Burnt Scar Maps or Map burnt from the Center for Remote Sensing and Processing 1999; puau zoning on other islands based on land cover data from the National Forest Inventory (NFI) or the National Forest Inventory of Indonesia (1996), National Development Planning Agency (1993, 62-9), and ADB (1999).
- Papua and other islands based on estimate of 20% peat and peat distribution in the Biodiversity Action Plan (Liew et al, 1998).
- Estimates based Soedarmo (1998), and the estimated loss of plantation given by the Department of Agriculture of East Kalimantan Province (1998), 13,769 hectares in 1997 and 101,922 hectares in 1998.
- Soedarmo (1998) estimates that 112,000 hectares burned in 1997 and the Government of Indonesia, the Ministry of Environment and the United Nations Development Program (1998) estimates that 119,070.32 ha burnt.
- Liew et al. (1998) estimates that 3.06 million hectares in Kalimantan (similar estimate for 1998 to 1.5 million ha in Sumatra (E. Nabet, SPOT ASIA Pte Ltd). Makarim et al. (1998) reported that the EU forecasts for may Sumatra 2,798,000 ha, including 700,000 ha of forest.

Recapitulation of forest fires in 2014-2015 conducted by the compass in 2015 are presented in Table 6.

Table 6. Forest Fire and Disaster Smoke Ever Since

2014 – 2015
<ul style="list-style-type: none"> <li>Fires 1,827 hectares of forest and peat land in Riau</li> <li>About 30 percent of the forest and conservation areas covering 10.5 million hectares or damaged due to various factors, like encroachment, illegal logging and forest fires</li> <li>Each year an average of 100,000 hectares conducted restoration</li> <li>BNPB perform artificial rain at a cost of 200 billion Rupiah to cope with drought. To cope with forest fires, the cost of prepared 385 billion Rupiah. Burning by plantation companies and residents to open up new land for plantations and agriculture</li> <li>Climate phenomenon El Nino until November feared to increase the incidence of forest fires in Indonesia</li> </ul>

Source: Kompas, 2015

Table 6 shows that the fires in the period from 2014 to 2015 reached 1,827 hectares in peat land of Riau, and about 30% of conservation forests were damaged due to encroachment, illegal logging, forest fires and El Nino climate phenomenon until November feared increasing cases of fire forests in Indonesia.

The vast number of forest fires in every province of Indonesia in 2010-2015 varies for each province as shown in Table 7.

Table 7. Summary of Forest Fire Size (Hectares) per Province in Indonesia Year 2010-2015

No.	PROVINCENCE	2010	2011	2012	2013	2014	2015	TOTAL
1	Aceh	5.00	-	13.00	-	155.66	-	173.66
2	Bali	10.10	-	250.00	60.50	30.00	-	350.6
3	Bangka Belitung	-	-	-	-	-	-	-
4	Banten	-	-	-	-	2.00	-	2.00
5	Bengkulu	-	0.50	-	-	5.25	-	5.75
6	DKI Jakarta	-	-	-	-	-	-	-
7	Gorontalo	-	-	-	-	-	-	-
8	Jambi	2.50	89.00	11.25	199.10	3,470.61	2,217.00	5,989.46
9	West Java	-	1,278.55	1,945.50	252.80	552.69	1,029.70	5,059.24
10	Central Java	-	712.24	454.00	31.20	159.76	424.73	1,781.93
11	East Java	204.90	48.35	2,960.05	1,352.14	4,975.32	553.30	10,094.06
12	West Kalimantan	-	-	577.40	22.70	3,556.10	995.32	5,151.52
13	South Kalimantan	-	-	60.50	417.50	341.00	185.70	1,004.7
14	Central Kalimantan	-	22.00	55.15	3.10	4,022.85	1,220.40	5,323.5
15	East Kalimantan	-	148.80	51.50	-	325.19	109.00	634.49
16	North Kalimantan	-	-	-	-	-	-	-
17	Kepulauan Riau	-	-	-	-	-	-	-
18	Lampung	106.00	31.00	-	-	22.80	10.00	169.8
19	Maluku	-	-	-	-	179.83	-	179.83
20	North Maluku	10.00	-	-	-	6.50	-	16.5
21	West Nusa Tenggara	2.00	-	-	12.00	3,977.55	-	3,991.55
22	East Nusa Tenggara	95.00	-	553.20	649.90	980.87	3.05	2,282.02
23	Papua	39.00	-	-	-	300.00	177.40	516.4
24	West Papua	1.12	-	-	-	-	-	1.12
25	Riau	26.00	74.50	1,060.00	1,077.50	6,301.10	2,643.00	11,182.1
26	West Sulawesi	-	-	-	-	-	-	-
27	South Sulawesi	28.00	31.75	45.30	40.50	483.10	751.05	1,379.7
28	Central Sulawesi	-	-	30.83	1.00	70.73	-	102.56
29	South East Sulawesi	16.00	85.90	346.10	13.00	2,410.86	284.31	3,156.17
30	North Sulawesi	-	-	1.80	0.25	236.06	-	238.11
31	West Sumatera	56.00	-	3.50	-	120.50	0.25	180.25
32	South Sumatera	-	84.50	-	484.15	8,504.86	476.57	9,550.08
33	North Sumatera	80.00	5.00	1,181.00	295.40	3,219.90	146.00	4,927.3
34	Yogyakarta	2,818.50	-	6.45	6.00	0.27	-	2,831.22
	<b>TOTAL</b>	<b>3,500.12</b>	<b>2,611.64</b>	<b>9,606.53</b>	<b>4,918.74</b>	<b>44,411.36</b>	<b>11,226.78</b>	<b>76,275.62</b>

Sumber : [http://sipongi.menlhk.go.id/hotspot/luas\\_kebakaran](http://sipongi.menlhk.go.id/hotspot/luas_kebakaran)

## 4.2 Discussion

### 1. Rate of Deforestation

From western regions of Indonesia along Sunda islands to eastern Indonesia of Sahul, forest damages were already spreaded destruction, reduced forest cover and habitat loss threaten the extinction of biological resources, diversity of species, genetic and ecosystem.

Now we must answer the question, how is it possible to occur the extinction of biological resources? Yes, of course if the government does not care about the biological resources these have been severely damaged by deforestation, so we must answer that the solution is of course the government should immediately prevent and mitigate for example by restoring the biological resources by proper regulation to develop policies, and it must not overlap with the concept for conservation for biological resources that are appropriately utilized for natural resources, and they have already depleted and needs to be tackled.

Since Law No. 1 of 1967 concerning Foreign Investment was enacted, forest damages rapidly expanded, then this Law was also supported by Law No. 5 of 1967 concerning Basic Provisions of Forestry and Law No. 6 of 1968 concerning Domestic Investment which stimulated investors both from within and outside the country to invest in the Forestry Industry. And enactment of Law No. 1 In 1967, Law No. 5 of 1967 and Law No. 6 of 1968 triggered off the conversion of forest to concessions. The collecting data showed that in 1978 concession holders reached to 383 and in 1987 the number increased to 564 with an area of 55468.35 million hectares of forest (Department of Forestry, 1986), so forest exploitations was brought out with large scales.

To reduce the rate of deforestation in HPH concessions, Director General of Forestry issued Decree No. 35 / Kpts / DD / I / 1972 concerning Procedures for Selective Cutting Guidelines in Indonesia (TPI). But this decree was in vain. From 1985 to 2009 period, average rate of deforestation reached 2.05 million hectares per year, but from 2000 to 2009 period was to 1.51 million hectares per year (Table 1). This decrease was depended on the development of the pulp and paper industry and the export ban on logs (Hardjono, 1994: 21).

In 2000-2009 Forest cover, quick deforestation and spreaded throughout major islands in Indonesia, including Bali and Nusa Tenggara, with total area of deforestation around 88,170,440.19 hectares, namely 1,515,892.66 hectares per year (Table 1 and 2). Obviously forest cover in the concession of 2009 has affected the rate of deforestation in forest concessions, although not except for HTI and HPH concession system all clear-felled forest cover should apply TPI (Indonesian Selective Cutting) as shown in Table 3. With decrease of total forest area in Indonesia throughout forest cover area have been affected the loss of habitat of flora and fauna, and the extinction of biological resources will be unavoidable. It seems that the extinction of biological resources occurs more obvious with the rate of deforestation throughout the land which was covered with and nonforest-forest in 2011-2012 (Table 4).

Damage and degradation due to forest fires in the forest conservation (KSA-KPA) area reached 36396.1 hectares, in protected forests (HL) area reached 44997.6 hectares, in Limited Production Forest (HPT) area reached 66060.4 hectares, in permanent production forest (HP) area reached 155,402.6 hectares, in convertible production forest (HPK) area reached 49675.6 hectares and other land use (APL) area reached 260,948.4 hectares, so total 613,480.7 hectares were degraded as shown in Table 4. Table 4 shows that in Indonesia land cover area or land area commonly reached 187,227,419.3 hectares, so have been decrease due to deforestation around 613,480.7 hectares ( $0.326\% = 0.33\%$ ) from original area about 187,840,900 hectares in 2012.

The extent of forest still remains as forest conservation (KSA-KPA) 22,021,503.9 hectares, and protected forest (HL) 30,343,402.4 hectares, limited production forest (HPT) 27,841.739.6 hectares, permanent production forests (HP) 30,012,797.4 hectares, convertible production forest (HPK) 17,813.724.4 hectares, and other uses (APL) 59,194,151.6 hectares.

It can be concluded that in 2012 the forest area already decreased due to deforestation with varied percentages as shown in Table 4. These conditions will be seriously exacerbated by the forest fires endlessly throughout the year and greatly affect the biodiversity extinction species, genetic and ecosystem.

## **2. Forest Fires**

Fire damage for natural resources are already spreaded in 34 provinces of Indonesia (Table 7). Deforestation due to damage forest fires have been started during the colonial times, especially in the teak forests in Java, and spreaded to all provinces of Indonesia. Despite the implementation of ordinations and regulations which aimed to rescue biological resources, buffer soil and water as well as earth's climate



buffer as a buffer development, the existence of such ordinations and regulations could not rescue and preserve forests (Forestry History Compiler Team I, 1980: 71-84).

According to Grahame, A.et.al. 2003, from 1997 to 1998 several major island in Indonesia, total area of forest fire was estimated approximately 9.745 million hectares (Tables 5). This report shows that forest fires also injured various forest ecosystems such as ecosystem mountains forest, lowland forest, peat and swamp forest, dry brush and grass, industrial forest, agriculture, plantations which were very influenced to the destruction of biological resources in each ecosystem spreadly on the large islands in Indonesia, which will be lead to the extinction of species diversity, genetic and ecosystem.

In 2010-2015 Recapitulation of extensive forest fires in every province in Indonesia varies considerably from year to year, but every year continues to forest fires for total of approximately 76275.62 hectares ([http://sipongi.menlhk.go.id/hotspot/luas\\_kebakaran](http://sipongi.menlhk.go.id/hotspot/luas_kebakaran)). This condition will continue from year to year like a vicious circle, and will not cease. This condition is supported by the opinion of Otto Soemarwoto (2003) and he said that forest fires initially triggered off the destruction of forests and after that forest fire will be continue to stimulate the destruction. Then again forest fire occurs every year like a vicious cycle, and will be even worse if drought conditions will be occur not normal during El Nino years.

Since the year 1960-2015 classically forest fires was triggered by off deforestation through Indonesia. Since 1960 the government already should have the program strategy to prevent and combat forest fires in cooperation with investors to handle, but it should not be allowed to continue, the implementation of the program should be carried out every year, monitored, and evaluated so that the losses anticipated economic state can be avoided.

The program is also very important to complement and strengthen the legislation about rights and obligations of the concessionaires. And among others, each concession holder must response for damage and forest fires in this concession area of forest concession and still must maintain their forests respectively. The firmness of the Minister of Environment and Forests should be appreciated for crack concessionaires or anyone who deliberately set fire to the forest but it seems nil. If there is no firmness of government, forest fires will continue every year, especially on the dry season.

It can be concluded that the Indonesian archipelago is categorized as prone to forest fires, especially in seasons of drought during El Nino years that occurred in the equatorial region, this phenomena stimulates extremely fast, especially forest fires which will occur forests damaged. Like recent experience in 2015, we shall prevent to happen again so that biodiversity loss can be avoided.

## **V CLOSE SECTION**

### **Conclusion**

1. Forest cover in Indonesia becomes thinning and widely collapses, so will be able to decrease the rate of extinction of species diversity, genetic and ecosystem.
2. The government should have to care about the condition of natural resources and the concept of conservation for natural resources should be appropriate utilized.
3. Since the beginning of 1960 the government should already anticipate the catastrophic forest fires that biodiversity loss can be avoided.
4. The government should revitalize the legislations which relate on to deforestation and forest fires due to damage to the concession holders.
5. The Government needs to establish a single institution for comprehensive responsibility for the preservation of biological resources in Indonesia to avoid sectoral interests and overlapping conditions.

### **Suggestion**

From the results of this study author expected government to fully aware and concern with help protect, conserve and sustainably utilize natural resources and their ecosystems in accordance with the principles of the law of conservation of biological No. 5 of 1990.

## **ACKNOWLEDGMENTS**

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