

**UNDERLYING CAUSE OF CONSERVATION AREA ENCROACHMENT
BY PLANTATION IN SUMATRA
Study case : Balairaja Wildlife Reserve**

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I. INTRODUCTION

In 1997 Indonesia have faced economic crisis which is followed by social and political turmoil, which is followed by the replacement of president and promulgation of MPR's Decree No. XV/MPR/1998 on the Fair Management of Regional Autonomy, Regulation, Division and Use of National Resources. As the follow up of that decree, in May 1999, Law No.22/1999 on Regional Government and Law 25/1999 on revenue sharing between central and provincial was legalized. The law should be enacted since 2001, and the period of 1999 – 2001, which is call a transition period whereas the Government should prepare some detail regulations to implement the Law. In 2004, after 3 years implementation the Law were revised by the Government, by promulgation Law No. 32/2004 and Law No. 33/2004.

The implementation of Law No. 32/2004 and Law No. 33/2004 has caused also the authority of department is now in the hand of regional government include the organization structure of forestry department. It was directed to achieve better management of forest, however, in the beginning of the implementation of regional autonomy forest conflict highly increased have been reported. There are 359 cases of conflict between 1997-2003 and 153 cases occurred in 2000 (Wulan *et al.* 2004). The conflicts are due to forest log exploitation, wood collection, environmental damage, and forest borders conflict. For conservation areas the conflict occurred is mostly forest encroachment (conservation of forest land becoming cultivate land and plantation areas) and illegal logging/logs stealing. There are many explanation behind the conflict, namely unresolved forest area border conflicts, economical crisis which leads to poverty, law uncertainty during the transition period of regional decentralization, and limited capability of the forest area administration institution, however, there is insufficient spatial and time series data to support the analysis. The objective of the study is to collect facts on the encroachment of conservation (Wildlife reserve) after Regional autonomy by utilizing time series Landsat imagery data. Hopefully, the data provided and coupled with historical as well as socio-economical data can improve our

understanding on the problem of natural forest conversion, especially wildlife/nature reserve area.

II. METHOD

2.1 Location

The study is conducted in Balairaja Wildlife reserve (Riau Province) covering of about 18000 ha. Balairaja Wildlife reserve is designated for Elephant and Sumatra Tiger habitat conservation (Fig. 1).



Fig. 1. Location of the reserves

2.2. Landsat data and its interpretation

Five year time series data of Balairaja Wildlife reserve were classified into land cover by applying supervised classification using maximum likelihood method. Analysis of Land cover change was made by overlay analysis. Landsat data needed is presented in Table 1.

2.3. Field observation

Field observation is aimed at :

- (a) data collection for social and culture especially data and information related to historical record of their stay within the reserve.
- (b) Ground truth for land cover development

(c) Information about the Management of Nature Reserve, related to the capacity of the institution

Table 1. Landsat data description

No	Year	Sencore	Acquisition Date
Balairaja Wildlife reserve			
1	1985	Multi Spectral Scanner (MSS)	2 August 1985
2	1989	Landsat TM (Geo Cover)	Composite
3	1992	Landsat Thematic Mapper (TM) Path 127/Row 59	7 Jan. 1992
4	2000	Landsat Enhanced Thematic Mapper (ETM) Path 127/Row 59	26 April 2000
5	2004	Landsat Enhanced Thematic Mapper (ETM) Path 127/Row 59	4 Mach 2004

III. RESULT & DISCUSSION

3.1. Management of Balairaja Wildlife Reserve

a. Number responsible person

Balairaja Wildlife Reserve is among of 17 unit conservation areas which are managed by BKSDA Riau Province. Total area of the conservation area is 446 647.67 Ha which is handled by 166 person. It means that one person should observe 2690.81 Ha. In case of Balairaja (18000 ha) there is only one responsible person. This number is not sufficient enough base on the World Conservation Monitoring Centre criteria. Ideally, for every 1 sq.km of conservation area should be managed by 16 person, or 6.37 Ha per person (McNeely, 1999).

b. Availability of Management Plan

Managemen unit of Conservation area should have Management Plan, as a guide to manage biodiversity sustainability of the area and it should be revised for every 5 years. Unfortunately Balairaja Wildlife Reserve hava no any document.

c. Budget availability

Based on the report of BKSDA Riau, the total annual budget for conservation area management is 280 million or Rp. 62.665 per sq.km (Accountability Report of Agency of Nature Resources Conservation Riau Province, 2000). The budget is very small compare to ideal budget. Based on study of World Conservation Monitoring Centre, ideal budget for conservation area management is about US \$ 447 per km² or Rp. 4.072.170,- per km² (McNeely, 1999). The indication of insufficiency of budget also can be seen in the field, in which there was no any management activities.

Moreover, there was no any infrastructure and facilities such a communication radio, workshop or vehycles.

3.2. Land use History of Balairaja Wildlife Reserve

Access of forest in Riau was started in 1924, where Oil company have been exploring and exploiting oil resouces. When access to forest areas was became possible, the Sakai tribe in 1964 have started to go into forest areas which is now becoming Farmer Village Pinggir sub-district. They employed swidden cultivation, primarily for food crops. This forest was then claimed by Sakai Tribe as their traditional forest. In 1970, Social Department employed a program called Isolated Tribe Resettlement (*Program Pemukiman Kembali Masyarakat Terasing* – PKMT) in Pematang Pudu Village, Mandau Sub-district. This program provided permanent houses for the Sakai community.

After the implementation of the investment policy both national and foreign, in 1977, 1978 and 1980, in this area the government issued Forest Concession Rights to 3 concession companies (Fig. 2). This effort has given access to the people to step into forest and the economic activities grow and at some points its brought more and more people to enter into the Balairaja Forest area. A community leader revealed that in 1982 the Javanese and Bataks started enter the Balairaja area. They started to do permanent agriculture and grow rubber plants. Due to the success of this rubber plantation, this technique is then imitated by Sakai Community which has previously no knowledge of rubber plantation.

In 1986, Balairaja Forest Area became wildlife reserves based on the Ministry of Forestry Decree No. 173/Kpts-II/1986. Based on this decision part of Pematang Pudu Village, and Pinggir Village, became part of Balairaja Areas. Even though it is permits to PT AD and PT DJL to open plantation of oil palm which is part of the area belongs to Balairaja Forest Area. This has triggered the return of the Javanese in 1990. Approximately 90 households of Java ethnic went into Petani Village of Mandau Sub-district and cutting down the forest of Balairaja Wildlife reserves and grow oil palm in the area. This oil palm plantation became larger and larger because of the law was not working optimally. The peak of the looting of Balairaja Wildlife reserves areas was in 1997 when economic crisis hit Indonesia and the succession of Suharto regime was going on in 1998. Table 2 describes the chronology of some important events.

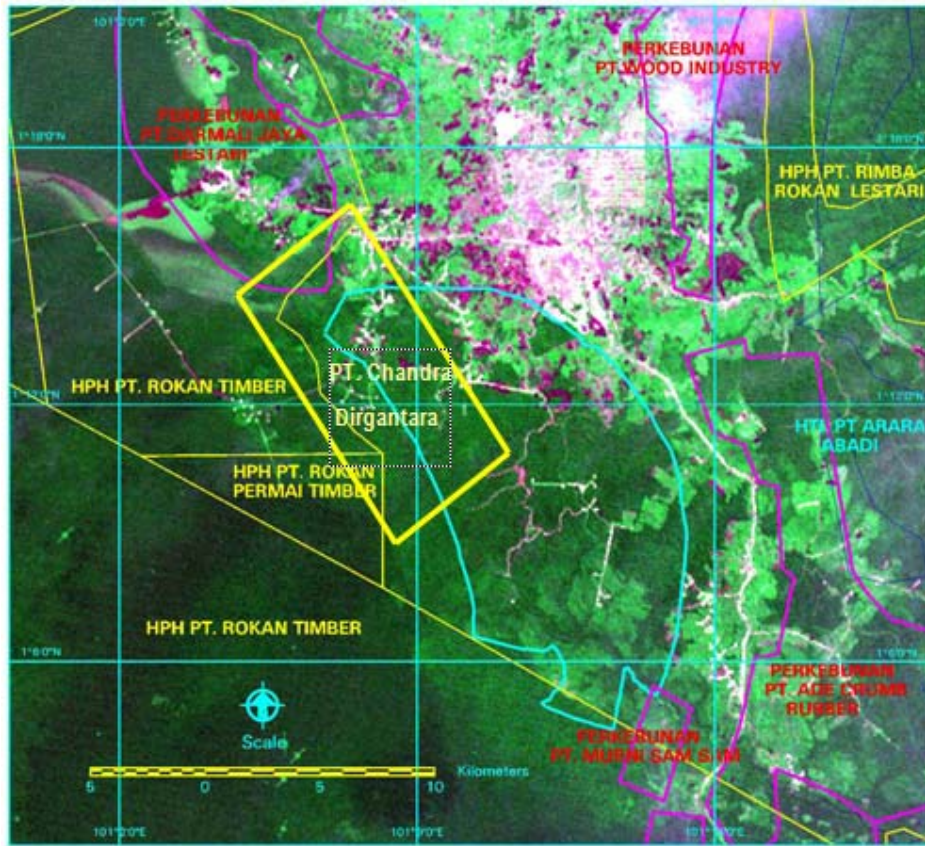


Fig 2. Landuse of Balairaja wildlife and its surroundings (yellow : Forest concession, Red : Plantation, Pink : forest plantation, Light blue : Balairaja wildlife reserve)

Table 2. Summary of the History of Policy and Its Implication to Balairaja Wildlife reserves

No	Year	Description
1.	1924	Oil Exploration was started
2.	1941	Oil Drilling in Duri
3.	1944	Oil Field Drilling of Minas
4.	1952	First oil Production
5.	1964	Sakai Tribe entered the area currently known as Petani Village, Pinggir Sub-district
6.	1970	Isolated Community Resettlement Program (PKMT) by Social Departemen which provided houses for the Sakai Ethnic group in Pematang Pudu Village, Mandau Sub-district
7.	1974	In Petani Village schools started with voluntary fee. This school was initiated by the village leaders
8.	1977/78	Forest Concession Right was granted to PT. Rokinan Timber and Mandau Abadi
9.	1980	Agriculture Minister Decree No 228/Kpts/Um/4/1980 on Forest Concession Rights Operation of PT Chandra Dirgantara Balairaja Wildlife reserves

10.	1982	Ethnic group of Java (majority) and some Bataks and Sakais with totally 68 households KK started going into Pematang Pudu village, but it was still forest at the side of concrete road. Currently this location is under the Women Empowerment Program of Bengkalis Regency
11.	1986	Ministry of Forestry Decree 173/Kpts-II/1986 on the settlement of Balairaja Wildlife reserve Part of Tengganau Village Mandau Sub-district belongs to Balairaja areas on which at that time 300 people live. The community has started grow oil palm at small scale, approximately one hectare.
12.	1986	PT AD join in with rubber and oil palm business, of which is part of the reserves area.
13.	1989	PT DARMALI JAYA LESTARI (PT DJL) went into the areas dan grow rubber using land which they rent from the locals, which is part of it belongs to Balairaja reserves. When manager of PT DJL is substituted, gradually they change the rubber plants to oil palm in Tengganau village
14.	1989	Joint Letter of Mining and Forestry Ministers No. 969.K/05/M.PE/1989 and No. 429/Kpts-II/1989 on the legalization of mining activities on conservation land, specifically Natural and Wildlife reserves
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16.	1998	Letter of Director General of PHPA No. 547/DJ-VI/Binprog/1998 : 10 oil fields of PT CPI were stated under the authority of Balairaja Wildlife reserves & PT CPI got permission on the seismic activities and oil well in Balairaja Reserves
17.	1990	About 90 households of Java ethnic group went into Petani Village Mandau Sub-district and enter to Balairaja Reserves by growing oil palm in the area.
18.	1993	In Tengganau village there was a farmer group train by the Agriculture Ministry for food crops
19.	1997	The peak of economical crisis, whereas people facing difficulties and uncertainty to earn money for their lives.
20.	2004	PERPPU No. 1 on mining within protection forest

3.2 Trend of Land Use Changes

During period between 1985-1989, forest conversion is merely aimed at log production, which is indicated by huge area of degraded land in the form of bush, grassland and bare land without any effort to plant palm oil/rubber (Table 3).

Table 3. Landuse and Land cover change 1985 – 1989 (Ha)

1989 \ 1985	Forest	Bush	Grassland	Builtup area	Bareland	Upland	Water
Forest	12.808,48	0,00	0,00	0,00	0,00	0,00	0,00
Bush	333,23	641,47	51,11	0,00	18,29	0,00	0,45
Grassland	437,49	429,04	669,80	5,53	56,31	0,04	0,63
Bareland	72,87	5,54	30,27	236,84	735,07	0,05	2,16
Upland agriculture	3,43	1,54	4,17	8,88	4,35	0,43	0,00

Period 1989 – 1992, land use conversion of forest, bush and bareland are directed to the development of agricultural land and plantation (Table 4).

Table 4. Landuse and Land cover change 1989 – 1992

1989 \ 1992	Forest	Bush	Grassland	Builtup area	Bareland	Upland	Water
Forest	10.526,06	0,00	0,00	0,00	0,00	0,00	0,00
Bush	418,56	361,69	351,31	39,58	202,09	6,31	5,12
Grassland	484,06	290,04	545,90	48,93	312,80	20,29	5,30
Bareland	546,78	92,29	161,04	12,32	47,85	2,80	1,44
Oilpalm	60,55	39,75	42,64	8,37	11,24	1,44	3,78
Rubber	255,26	127,44	177,14	23,66	91,83	4,51	3,06
Upland agriculture	263,99	92,65	229,41	46,68	126,63	14,70	1,98

During period 1992-2000, forest conversion into oil and rubber plantation is huge, and in the meantime conversion of bush, grassland and bareland into oilpalm and rubber are also significant high. This is a clear indication that during that period demand of land for oil and rubber plantation is also high (Table 5).

Table 5. Landuse and Land cover change 1992 – 2000

1992 \ 2000	Forest	Bush	Grassland	Builtup area	Bareland	Oil Palm	Rubber	Upland	Water
Forest	1.868,35	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Bush	1.192,91	228,04	154,11	29,25	78,21	14,86	70,20	46,31	20,90
Grassland	1.732,90	243,66	281,73	52,91	150,29	19,27	143,39	97,94	22,07
Bareland	1.976,86	281,56	629,30	105,11	232,01	15,13	181,93	303,29	32,16
Oilpalm	1.488,41	203,77	153,39	50,03	165,79	92,55	83,68	116,24	18,65
Rubber	446,36	82,03	60,62	11,61	45,32	4,14	32,39	23,34	6,31
Upland agriculture	1.644,86	295,19	342,26	69,02	171,10	18,10	148,01	130,56	33,33

Period 2000 – 2004, land conversion into oilpalm and rubber plantation is continuing, in fact its rate is slowing down. During this period the conversion of bush and grassland into oilpalm and rubber plantation is higher than conversion of forest. This phenomenon can be explained by the fact that the forest area is already scarce (Table 6).

Based on the above table one thing should be paid attention is the conversion of oilpalm into bush, grassland, and bareland. This is due to the fact that (a) converted land

is not suitable for oil and rubber plantation. The other reason is that the developed plantation were disturbed by the wildlife such as elephant.

Table 6. Landuse and Land cover change 2000 – 2004 (Ha)

2004 \ 2000	Hutan	Belukar	Alang-alang	Bullup	Bareland	Kebun sawit	Kebun karet	Ladang (berpindah)	Air
Hutan	706,04	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Belukar	262,77	202,55	74,56	4,83	13,98	67,33	17,96	46,23	2,25
Alang-alang	179,23	369,38	614,71	14,22	82,08	229,63	53,69	170,05	1,53
Bareland	249,09	305,44	700,90	134,37	2622,49	228,64	85,72	604,41	16,83
Kebun sawit	187,61	489,14	576,30	27,80	255,07	1245,75	201,75	404,08	2,97
Kebun karet	105,69	151,32	205,11	9,48	148,82	236,32	192,82	212,31	2,07
Ladang (berpindah)	68,60	197,68	350,90	46,40	452,51	294,61	140,85	1275,87	4,32

Spatial distribution of land-use and land cover in 1985, 1989, 1992, 2000 and 2004 are presented in Fig. 4, Fig. 5, Fig. 6, Fig.7 and Fig. 8.

To summarize, trend of land use changes took place in Balairaja wildlife reserve has closed relation to the dynamics of the community for the time period of 1985 – 2004 (Fig.2). In 1985 – 1992 period, forest land gradually decreases but after that period (1992 – 2000) the loss of forest cover is very significance. On the contrary in the same period rubber and oil palm plantation grow rapidly. This phenomenon is probably related to the multidimensional crisis happening in 1997-1998, in which the value of

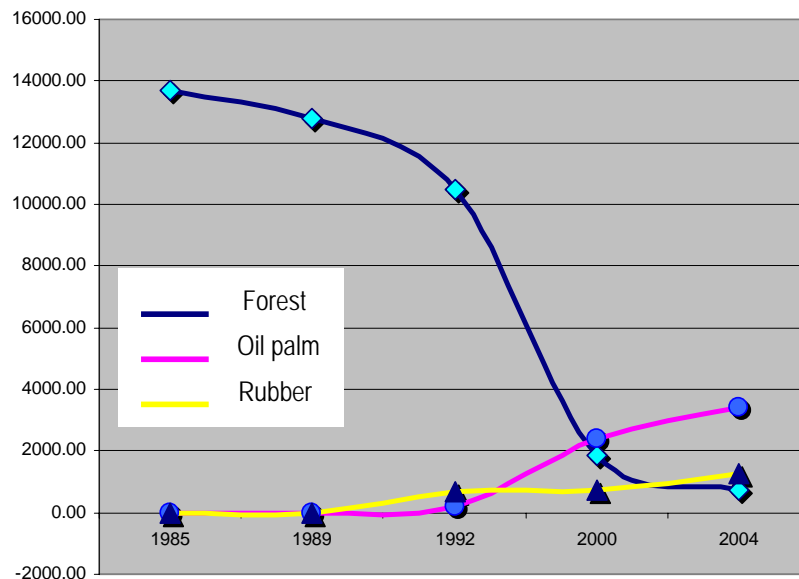


Fig. 3. Graphic of Changes on Forest, Oil Palm and Rubber Plantation

Indonesia Rupiah became very low and in the meantime the price of exported agricultural product (such as oil palm and rubber plantation) were experiencing very high price. At that time in many parts both in Java and outside Java, natural of plant forest areas were looted by the people both individually or in groups.

IV. CONCLUSION

Land use and land cover changes in the conservation area is depended on several factors, which are categorized into internal and external factor. Both factors may lead to forest area encroachment either directly or indirectly. Internal factor refer to factors that can be manage by the management such as availability of infrastructure, human resources, and fund for conservation area management. Meanwhile, the external factors are refer to factors that can not be controlled by the management, namely demand on wood, or high price of oil palm which may lead to forest conversion. Socio-political and policy changes may also be categorized into external factor.

In term of internal factor, management Balairaja wildlife reserve is very weak, there is insufficient person, budget and program. In the other hand the pressure of external factors such as agricultural expansion, demand of logs & settlement is high. Moreover, most of the village within the reserve is exist before the establishment of reserve.

Another external factor that lead to encroachment is economical crisis in 1997/1998. Sunderlin (1999) found that two-thirds of the people in forested areas have become worsen off during the crisis compared with their situation in the year before the crisis. The other finding is that small farmers are increasingly interested in clearing forests for perennial tree crops rather than raising food crops in shifting cultivation systems.

External factors that lead to reserve encroachment in Balairaja wildlife reserve was high price of oilpalm and the high demand of logs. Casson (1999) also found similar condition in the other area.

Unsynchronized vision among the institution of the government is also identified. In case of Balairaja, the Government have gave the concession to the companies, even though the area concession/plantation is situated within the reserve. There are also school, oil palm processing factory and other facilities have been built within the reserve.

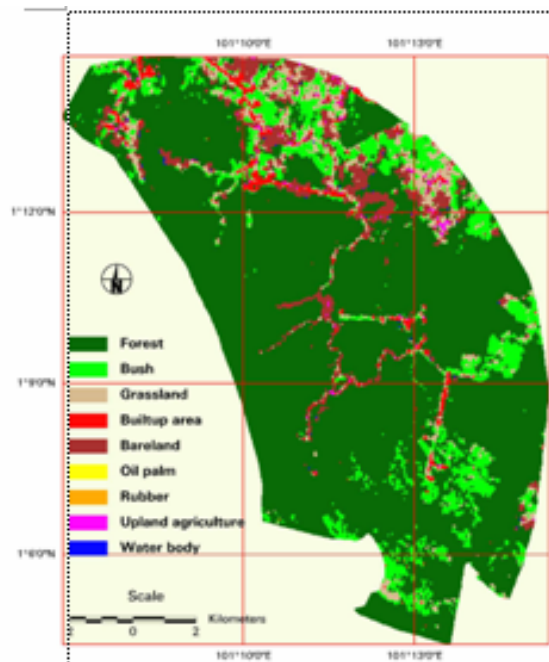


Fig. 4 Land-use/land cover of Balairaja wildlife reserve in 1985

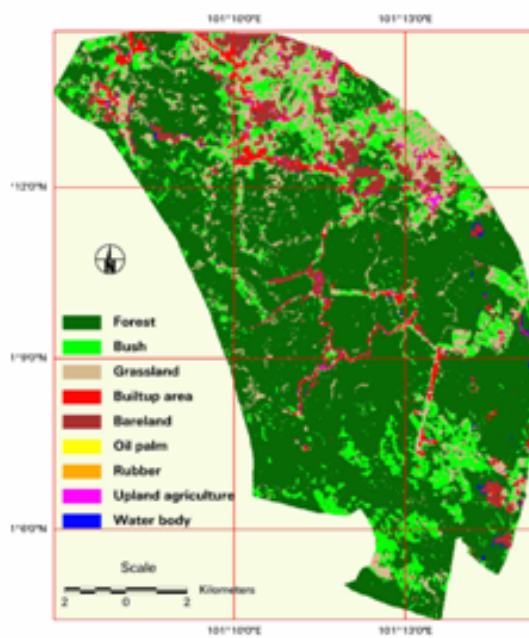


Fig. 5 Land-use/land cover of Balairaja Wildlife reserve in 1989

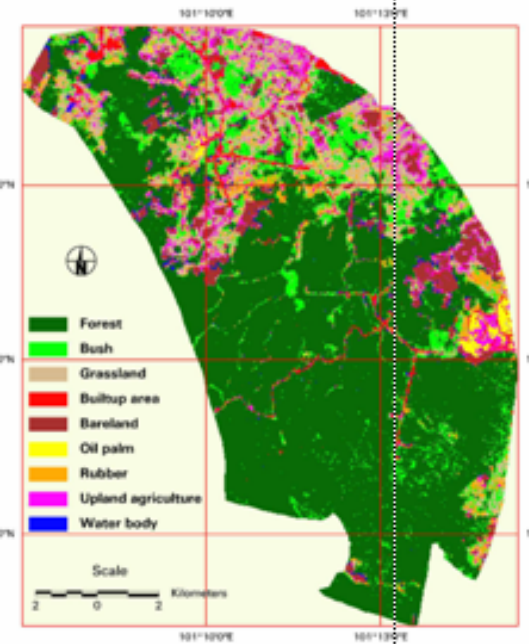


Fig. 6 Land-use/land cover of Balairaja Wildlife reserve in 1992

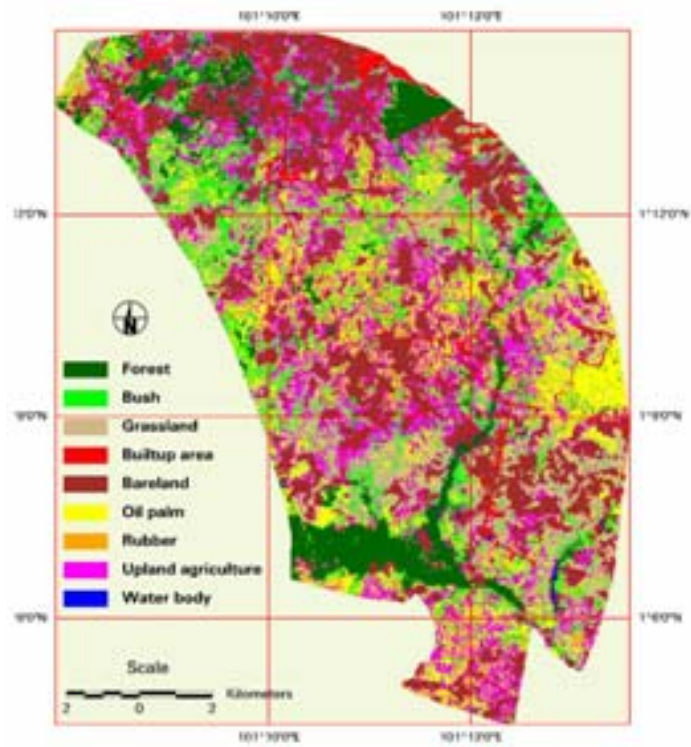


Fig. 7. Land-use/land cover of Balairaja Wildlife reserve in 2000

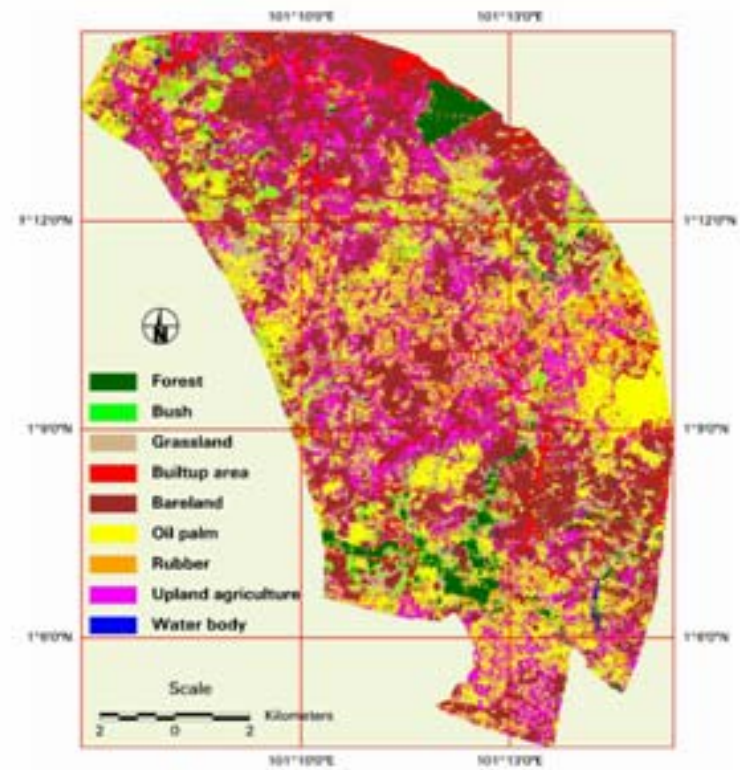


Fig. 8. Land-use/land cover of Balairaja Wildlife reserve in 2004

REFERENCE

- Casson, A. 1999. The Hesitant Boom: Indonesia's Oil Palm Sub-Sector in an Era of Economic Crisis and Political Change. Center for International Forestry Research
- Mokhsen, N. 2003. Decentralization in the post new order era of indonesia . The 8th Commonwealth Advanced Seminar was held in Wellington, New Zealand, 4 February to Friday 7 March 2003.
www.vuw.ac.nz/.../Papers/2003/Nuraida%20Mohksen%20Indonesia%20Decentralisation%20Case%20Study.pdf
- Sunderlin, W.D. 1999. The effect of economic crisis and political change on Indonesia's forest sector, 1997 – 1999.
- Wulan, Y.C., Y. Yasmin, C. Purba, E. Wollenberg. 2004. Analisa Konflik Sektor Kehutanan di Indonesia 1997 – 2003. Center for International Forestry Research (in Indonesian)
- Yamauchi, K. 2005. Conflict resolution mechanism in sustainable forest management: from case studies in Thailand, indonesia and Malaysia.
www.iges.or.jp/en/fc/phase1/3ws-24-yamauchi.pdf