World Agroforestry Centre

Forest Conversions and Degradation in Kutai Barat District, Indonesia

photos: Subekti Rahayu/World Agroforestry Centre

Under the efforts of reducing CO_2 emissions for Reducing Emissions from Deforestation and Degradation plus conservation (REDD+) and Indonesia's Sub-national Action Plan in Reducing Greenhouse Gas Emissions (*Rencana Aksi Daerah penurunan Gas Rumah Kaca* (RAD-GRK)), it is important to obtain estimates of land use-cover changes, including deforestation and degradation information. In 1990-2005, conversion of Indonesia's forest into other land uses covered 23%, i.e. from 128.72 million hectares in 1990 to 99.6 million hectares in 2005. By 2005 40% (38.5 million hectares) of forest cover was logged-over forest, demonstrating the extent of forest affected by logging and other timber extraction activities (Ekadinata et al 2011).

East Kalimantan is one of the provinces that have committed to reduce emissions from land-based sector. According to Governors Climate and Forest (GCF) Task force of Indonesia (2013), in 2006-2011, deforestation in East Kalimantan reached 0.88 million ha with main deforestation drivers being, among others, illegal logging and mining. Within the provincial level commitment for emission reduction, each district (*kabupaten*) in a province, including that in East Kalimantan, also has to initiate efforts to reduce emissions.

Kutai Barat District as being referred to in this Brief is the former name of the currently two districts in East Kalimantan: Mahakam Ulu and Kutai Barat[1] (Figure 1). The district is located at 113° 45′ 05″ – 116° 31′ 19″ East and between 1° 31′ 35″ North and 1° 10′ 16″ South. The total area is 31,629 km^2, with altitudes of 0-1500 m asl (above sea level). The topography is dominated by sloping lands with more than 50% of it mountainous, mostly in the northern part of the District.

[1] The former district name 'Kutai Barat' is kept referring to the name when the study was conducted (2011-2012); currently it covers two districts: Mahakam Ulu and Kutai Barat

Highlights

- Undisturbed forest in Kutai Barat for 1990-2010 persistently decreased up to 42%, either deforested and converted to other uses or degraded into disturbed forest.
- Land use conversions and forest degradation took place in state forest land areas designated for productions and in non-forest land status, while forest degradation also occurred in forest areas designated for protection functions where timber extraction is actually prohibited.
- Major trajectories of changes from forest were conversions to agroforest and plantations as well as degradation into shrublands, which were for economic reasons and with the supports from government policies and programs.

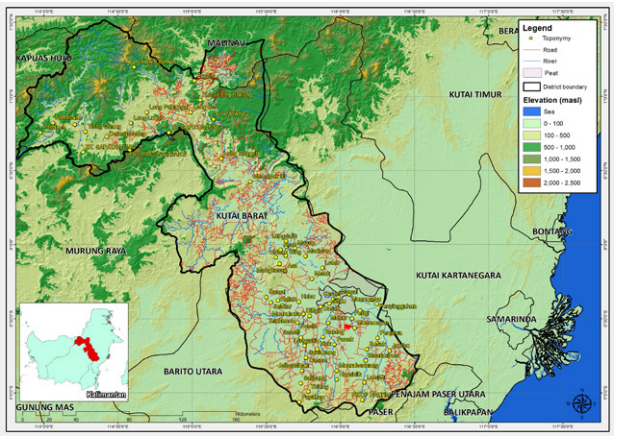

Figure 1. Location of Kutai Barat District in East Kalimantan Province, Indonesia

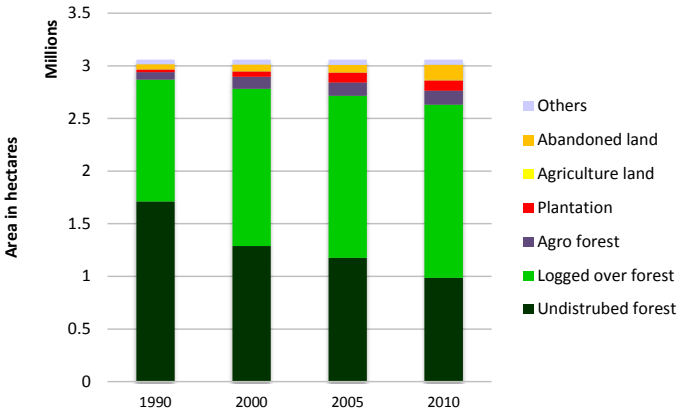

Figure 3. Land cover changes of Kutai Barat for 1990-2010

This northern area is the upstream of Mahakam River and also part of Heart of Borneo (HoB), a zone established as a high conservation area in Borneo Island. Since 2012-2013 the district was divided into two: the northern half became Mahakam Ulu District and the southern-lowland part became Kutai Barat District.

As part of district's efforts to participate in RAD-GRK program and potentially for REDD+ scheme, land use-cover change information becomes an important data source for land-based CO_2 emission estimates and other pertinent calculations. This Brief presents a summary of the dynamics of Kutai Barat forest and land uses for 1990-2010.

Undisturbed forest in Kutai Barat for 1990-2010 persistently decreased up to 42%, either deforested and converted to other uses or degraded into disturbed forest

Time series land cover maps of 1990, 2000, 2005 and 2010 were obtained from Landsat imagery analyses. The result shows that the majority of land cover changes took place in the southern part of Kutai Barat, while only small areas in the northern parts experienced changes during the two decades (Figure 2).

In the beginning of the observation period (1990), undisturbed forest type was the largest land cover, occupying a total area of 1.6 M ha, which was about 50% of the district area. However, it persistently decreased during 1990-2010, with an area of 1.24 M ha in 2000, 1.1 M ha in 2005 and 952 000 ha in 2010. In other words, in 20 years, by 2010, 42% of the undisturbed forest was lost, either deforested or degraded (Figure 3).

Overall, by 2010, 8% of the forest was lost as compared to the initial total forest area in 1990. In average, forest area loss in the three change periods were 8 710 ha per year in 1990-2000, 13 245 ha per year in 2000-2005, and 16 854 ha per year for 2005-2010. Annual rates of deforestation in Kutai Barat for the three periods were 0.31% (1990-2000), 0.48% (2000-2005) and 0.63% (2005-2010).

Logged-over forest increased constantly from the total area of 1.1 M ha in 1990 to 1.5 M ha in 2010. Substantial increase in the district also occurred to shrub-dominated lands with approximately 500% increase (Figure 4). Increases of logged-over forest and shrub areas were associated with logging and other timber extraction activities which left the lands into secondary regrowth. By considering the change of undisturbed forest category into logged-over forest category, forest degradation reached approximately 41 000 ha per year during 1990-2000, decreased into 22 000 ha per year in 2000-2005 and increased again into 36 000 ha per year for 2005-2010. Annual rates of forest degradation for the three periods were estimated into 2.74% (1990-2000), 1.78% (2000-2005), and 3.28% (2005-2010).

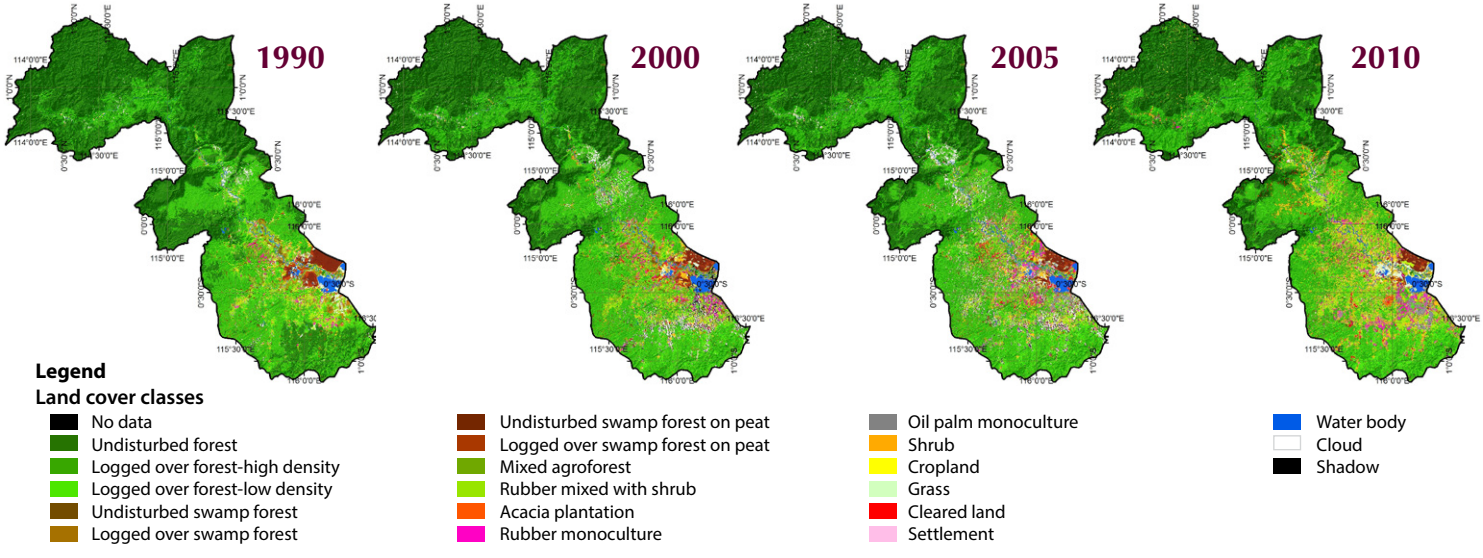

Figure 2. Land cover maps of 1990, 2000, 2005 and 2010 of Kutai Barat District

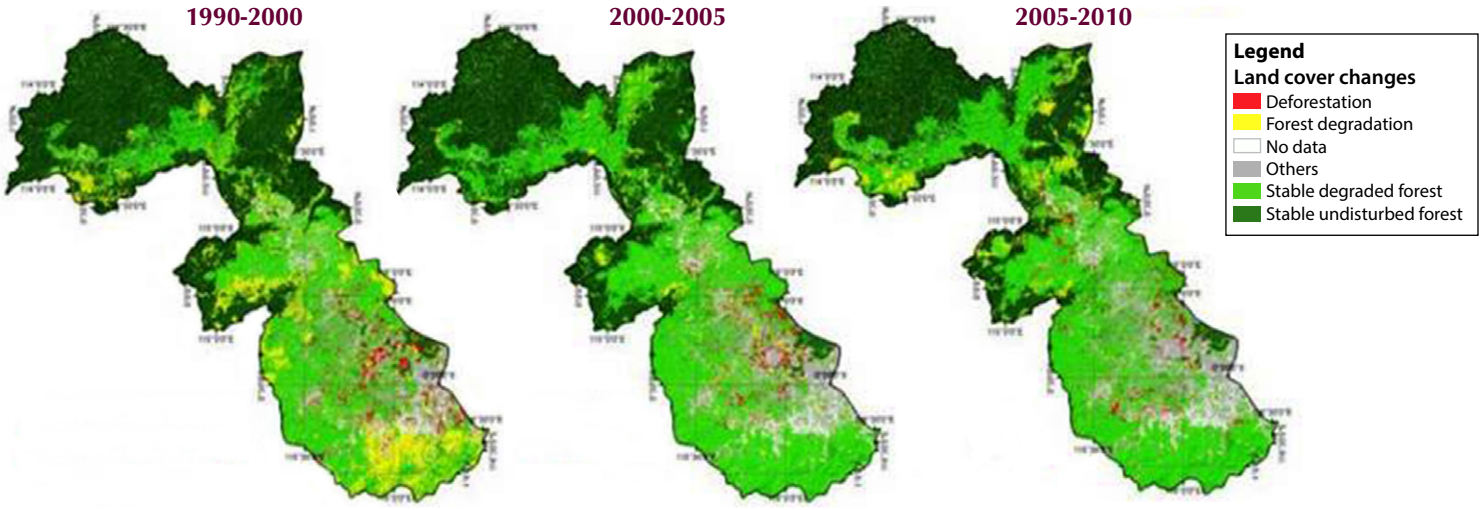

Figure 4. Deforestation and forest degradation maps of Kutai Barat

Land use conversions and forest degradation took place in state forest land areas designated for productions and in non-forest land status, while forest degradation also occurred in forest areas designated for protection functions where timber extraction is actually prohibited

Production Forest (*Hutan Produksi* - HP) and Limited Production Forest (*Hutan Produksi Terbatas* - HPT) are allocated for production activities in forestry sector, such as logging concessions and forest-timber plantations, while the Non-forest Land (*Area Penggunaan Lain* - APL) is intended for non-forestry activities and refers to privately owned lands by individuals or companies. Protection Forest (*Hutan Lindung* - HL) status is established mainly for protecting hydrological and watershed functions. In Kutai Barat District, the largest land status fell into Limited Production Forest status with the area of 984 130 ha (30% of the district area) (See Table 1).

Table 1. Composition of land designation in Kutai Barat District

Land designation status	Area in Ha
Protection Forest	755 528
Nature Reserve	16 775
Limited Production Forest	984 130
Production forest	658 297
Non-forest land	885 374
Total	3 300 104

From the total forest loss in 1990-2010, Non-forest Land (APL) contributed 73% and Production Forest (HP) contributed 22%. Forest conversions are legal in APL, where forest products can be extracted and the lands can be developed for economic development and other production and livelihood needs. In the Production Forest areas, forest timber extraction is legal, although conversions for agricultural commodities are not, unless the forest land status is transformed into land status where conversions are allowed.

Although very small, forest loss and conversions also occurred inside the Protection Forest with increasing areas of 1.89 ha per year for 1990-2000, 27.8 ha per year for 2000-2005 and 863.4 ha per year for 2005-2010 (Figure 5 (a)).

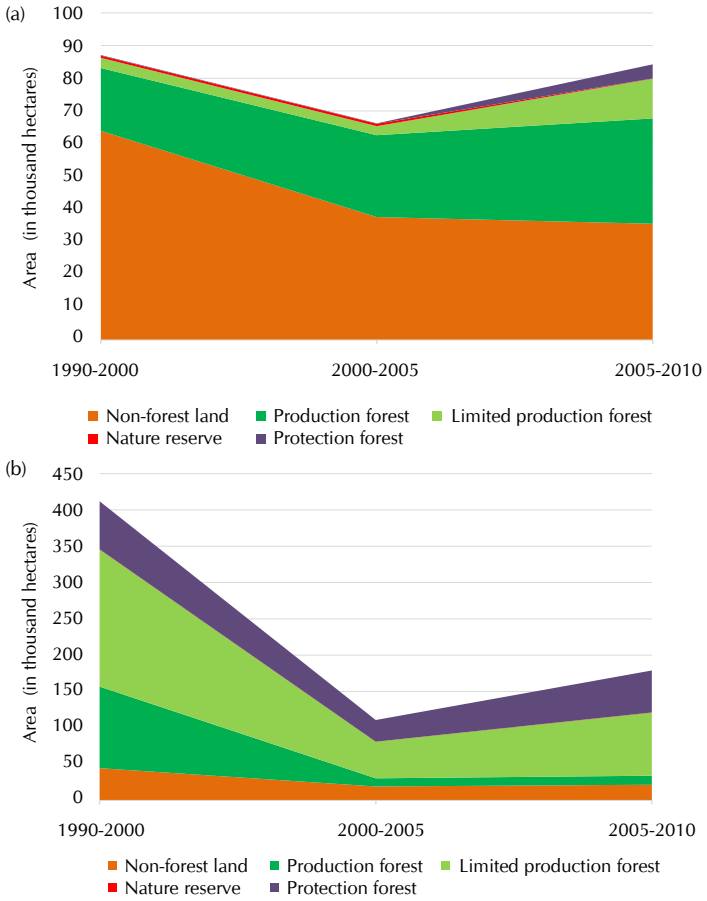

Figure 5. Deforestation (a) and forest degradation (b) occurrence based on land designation in Kutai Barat during 1990-2010

The highest forest degradation occurred in areas designated as Limited Production Forest (HPT) contributing 46%, 45% and 48% of the total degradation during the three periods (1990-2000, 2000-2005 and 2005-2010) (Figure 5 (b)). However, despite the prohibition for timber extraction, Protection Forest in the district also experienced forest degradation with an average areas of 6 611 ha per year in 1990-2000, 5 961 ha per year (2000-2005) and 11 555 ha per year (2005-2010) (Figure 5 (b)). Degradation occurred mostly around the forest boundaries and is most likely due to the adjacency of the Protection Forest with logging concession areas and/or villages. The reason might be due to unclear boundaries, while in some instances illegal logging might be done deliberately.

Major trajectories of changes from forest were conversions to agroforest and plantations as well as degradation into shrublands, which were for economic reasons and with the supports from government policies and programs

Trajectories of forest loss in 1990-2000 were dominated by changes from forest to agroforest and to shrubs, which contributed 44% and 23% of the total forest loss. In addition, forest was also converted to plantations (21%). For 2000-2005, the major trajectories contributing 40% and 41% are changes from forest to agroforest and to plantations, respectively. In 2005-2010, the largest trajectories were changes from forest to agroforest, to shrubs and to plantation, contributing 36%, 30% and 15% (Figure 6).

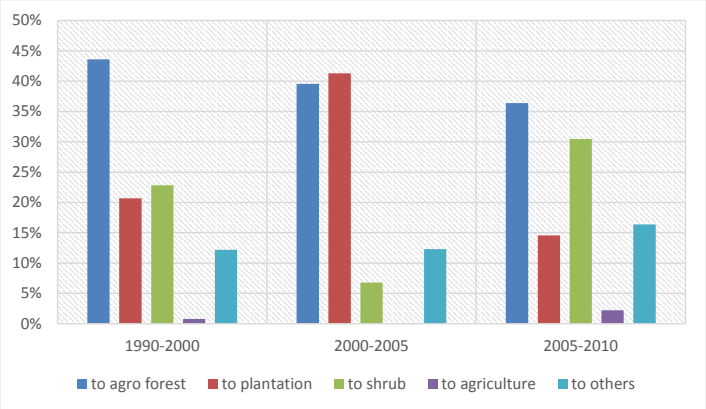

Figure 6. The major trajectories of forest loss in Kutai Barat

The increase of agroforest and plantations especially rubber agroforest and rubber plantations, which were mostly developed by local communities, was very likely driven by, or at least supported by, government programs of providing rubber seeds to communities. This land use development mostly took place in the Non-forest Land (APL) areas, and thus was inevitable for economic development, population growth and people's livelihoods. The conversions into industrial plantations, mainly oil palm and acacia, from what initially is Production Forest status, are normally preceded by license granting or even release from forestland status into a concession land status (HGU or HTI); and hence implying how land use policy has become a driving factor of land use changes in this district.

Conclusion and recommendation

Deforestation and degradation in Kutai Barat mostly took place in the southern parts of the district, where according to land designation, some of them are legal such as logging activity with legal permit in Production Forest and are necessary to improve the economy of the district, while some are illegal such as timber extraction without legal permit and forest encroachments. To reduce illegal activities, forest monitoring and law enforcement are key, and they should be reinforced optimally. In the meantime, alternative livelihood options for communities living around the forest should also be promoted in order to reduce encroachments in the protection areas.
For a district where natural resources still play a major role in the development and economic growth, strategies on land use planning and its implementation, which accommodate environmental protection and community development, should be comprehensively designed in order to ensure good environmental practices as well as to improve community livelihoods. This latter notion should be well captured in the various strategies to mitigate climate change such as REDD+ and land use planning for low (CO_2) emission development.

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Acknowledgements

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