Technical Report :
Revisited of the Batang Toru Heritage Forest [1]

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1. Background

The Batang Toru Forest Ecosystem (BTFE) consisted West and East Batang Toru Forest Range. The BTFE is located in North Sumatra Province south of the second world largest lake of Lake Toba. Roads separate West Batang from the East Sarulla area, in which orangutans also are found. Geographically, the BTFE is located at 98^0 50' - $99^0$18' East Longitude and 1^0 26' - 1^0 56' North Latitude. The site is accessible from Medan, 1 hour by plane, and 10 – 12 hours by car. The Batang Toru is a water catchment area that encompasses four regencies : North Tapanuli, Central Tapanuli, Sibolga and South Tapanuli. Primary rain forest dominates the vegetation cover, which grows on steep hillsides with more than a 60-degree slope. Batang Toru holds at least six principal habitat types including moss forest (above 600 meter), hill side moist forest (dominant between 200 m -600 m), lowland, cliffs and talus slopes, secondary forest, and riparian forest. Total existing forest covers approximately 148,000 hectares.

Increasing pressures on forest resources and habitats, including loss and degradation of habitat through land clearing, threaten the remaining Batang Toru forest. In addition, this area includes Batang Gadis, Batang Toru and Western Lake Toba, the convergence point of southern and northern biogeographical assemblages, i.e., where distributions of species such as orangutan, mitered leaf-monkeys (Presbytis melalophos), Malayan tapir (Tapirus indicus), Sumatran serow (Capricornis sumatraensis sumatraensis) and Raflessia gadutensis overlap. In addition to the Sumatran orangutan, a second Critically Endangered species occurs in this area, the Sumatran tiger (Panthera tigris sumatraensis), Sumatran orangutans and tigers are the focus of intensive international conservation efforts, with both species facing extinction within the next decades if immediate conservation interventions are not successful.

2. Bio-socio-physical Conditions

2.1 Biodiversity and Conservation Values

The forest areas within BTFE have a high scientific value and are important to be protected, because it is though to be a biogeographic transitition area between the convergence point of southern and northern Toba Lake biogeographically assemblages, *i.e.*, where distributions of species such as orangutan, mitered leaf-monkeys (*Presbytis melalophos*), Malayan tapir (*Tapirus indicus*), Sumatran serow (*Capricornis sumatraensis sumatraensis)* and *Raflessia gadutensis* overlap. This situation is of course thought to have big consequences for the value and uniqueness of its biodiversity.

The eco-physiographical scheme presented in Laumonier (1997a, b) employs a total of 47 mapping units and 9 bioclimatic regimes in Sumatra to categorize the plant cover (both spontaneous and anthropogenic) over the entire island. Within the BTFE, the Laumonier system recognizes the following principal vegetation types: 1) Western plain and foothill formations <300 m: secondary and derived types mosaic,

[1] Technical report prepared and submitted for JBIC funded project "A Feasibility Assessment for Calculating Carbon Stock in The Batang Toru Forest Ecosystem for REDD Opportunity", 11 August 2008.

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mainly shrubby; 2a) Medium elevation western hill formations (300 m–1000 m): secondary and derived types mosaic, mainly shrubby; 2b) ditto, forest from Airbangis to Bakongan regions (i.e.,one of the 16 main physiographic regions recognized for Sumatra); 3) Formations of the Barisan range above 1,000 m: submontane forest (1000 m–1800 m); 4) Cultivated types and plantations: mosaic of dryland rice, food crops and secondary growth.

Picture 1. Sumatran Orangutan, globally endangered species (©Tantyo Bangun)

Recent survey by Conservation International in 2006 and other institution revealed that the BTFE and adjacent areas are home to a rich variety of the Sumatran species, particularly mammals, birds and plants, which are globally threatened. Sixty-seven species of mammals, two hundred eighty-seven of birds and one hundred ten of herpetofauna have been recorded in the area. Of this total number of mammals species, twenty species are protected under Indonesian law and twelve are globally threatened. Among these are Sumatran Orangutan *(Pongo abelli),* Sumatran tiger (*Panthera tigris sumatrae*), serow (*Capricornis sumatrensis*), Malayan tapir (*Tapirus indicus*), Malayan sun bear (*Helarctos malayanus*), slow loris *(Nycticebus coucang),* Golden Cat *(Pardofelis marmomata*). The survey also discovered rich avifauna diversity in the region, including rare as well as threatened species. Of this total number of bird species fifty-one species are protected under Indonesian law and sixty-one are globally threatened, such as Sunda Blue Flycatcher *(Cyornis caerulatus),* Wallace's Hawk-eagle (*Spizaetus nanus),* Blackcrowned (*Pitta venusta).* Initial data from the BTFE suggest that it holds some of the highest levels of vascular plant biodiversity, with 688 different species. Of this total number of plant species, 138 species of orangutan food resources, 8 species globally threatened, including *Nepenthes sumatrana (Miq.),* the largest flower in the world *Rafflesia gadutensis Meijer*,*Becc* and the tallest flower in world *Amorphophalus baccari* and *Amorphophalus gigas* (Perbatakusuma, et al, 2006).

The BTFE will provide effective management for an area of a global biodiversity significance, and was defined one of the remaining a Key Biodiversity Area in Sumatra Island based on the CI's Conservation Outcomes Definition Process.

The Sumatran orangutan's primary habitat is located in the lowlands of the Leuser Ecosystem Area in the provinces of Nangroe Aceh Darussalam and North Sumatra, Indonesia. The Sumatran orangutans' population is now estimated at 7,000 individuals. Recent survey conducted by Conservation International (2006), through three extensive and broad surveys in 16 locations with total 40.6 km transect length (varies between 750-1,500 meter above sea level), also regular monthly monitoring in existing transects in five model sites (Lobu Pining, Sibulan-bulan, Sipetang, Sitandiang and Uluala) throughout three regencies, it was estimated that the orangutan population population density between 0.2-0.82 individual/km^2 distributed in a West Batang Toru landscape unit of 74.886 ha, which is known as a potential orangutan habitat over the total area of 90,000 ha. Overall estimation on population density, which was about 380 individuals, was calculated in four forest type by counting the orangutan nests along the transects line and extrapolating with the habitat type based on LANDSAT ETM+ 2001 Map. Results

indicated that orangutan densities were found higher in the old moist secondary forest (0.82 individual/km^2) but on the contrary it was lower in the mixed forest (0.26 individual/km^2). Habitat disturbance caused by land conversion seemed to affect the orangutan density within mixed and lowland forests Orangutan density in West Batang Toru forest is lower in comparison with the other forest area in North Sumatera, for instance in Aceh with density >6 individuals/km^2 (van Schaik *et al*., 1995). The orangutan distribution pattern is highly affected by food resources availability, altitude, river shed and human activities in the habitat of orangutan.

Picture 2. Globally plant endangered species and world tallest flower - *Amorphophalus gigas*

Tall

This fact awakens Conservation International concern to work in this area to saving the last orangutan habitat in North Sumatera Province. Because of this precipitous decline, without effective and immediate intervention, the species could become functionally extinct within the next ten years. And, because orangutans are “keystone” species for conservation as they play an important part in forest regeneration processes.

2.2 Socio Economic and Total Economic Value

The three districts (South Tapanuli, Central Tapanuli and North Tapanuli) have similar history, demographic, livelihood and economic characteristics. All three have large rural-based populations with population densities varying from 126/km^2 in Central Tapanuli, to 69/km^2 in North Tapanuli, to 54/km^2 in South Tapanuli. The population is dominated by the indigenous Batak Toba, Batak Pesisir, Batak Angkola-Mandailang ethnic groups with some communities of Javanese or Nias.

Natural forest and agroforests are the primary land cover. Elevations range from 200 m to 1500 m, with slopes of 30° to 60°. The local communities have a long history of sustainable forest resource management through a gradient of landuse intensities ranging from mixed tree gardens where species composition is largely controlled by farmers and management is intermediate, to natural forests where impact from human intervention is light with small quantities of products harvested. In between are various types to agroforests (forest farming systems) where human management favors plant species that provide useful/valuable products but management remains extension rather than intensive. Mixed tree garden and agroforest systems are collectively referred to as upland agroforestry systems.

Land ownership various from 1 to 2 hectares/family. Agriculture is dominated by irrigated rice production and upland agroforestry systems, which include: (1) rubber agroforestry (jungle rubber) systems; (2) durian agroforestry systems; (3) rubber monoculture systems; (4) homegarden systems; (5) fruit-cacao systems; (6) pinang-cacao agroforestry systems; (7) cinnamon monoculture systems; (8) upland rice-banana-cassava-cacao systems, and (9) coffee monoculture systems. Key products of these systems include rice (*Oryza sativa*), rubber (*Hevea brasiliensis*), cacao (*Theobroma cacao*), coffee (*Coffee arbica* and *C. robusta*), kemenyan (*Styrax benzoin*), aren (*Arenga pinnata*), durian (*Durio zibethinus*), petai (*Parkia speciosa*), candlenut (*Aleurites moluccana*), salak (*Salacca zalacca*), and banana (*Musa* sp). Other fruits, medicinal crops and timber are also produced in these systems. Rice, medicinal crops and timbers are primarily produced for home use. Rubber, cacao and kemenyan are exclusively market crops. Other crops are both consumed in the home and marketed. None of the agroforestry systems are intensely because farmers lack access to high quality germplasm, technical support, infrastructure, and market information.

Average annual farm-based income per household in the BTFE is approximately US$650, with total annual income about US$1000/household. Common off-farm income sources include operating small shops, government service, trade of agricultural crops, and remittance. Livestock production and non-timber forest products (NTFPs), which maybe be collected from natural forests or cultivated in tree gardens or agroforests, provide secondary but important sources of income – particularly during holidays and to fill seasonal income needs or other cash flow gaps.

Initial surveys identified rubber, durian, cacao, sugar palm, and kemenyan as important sources of income in the five focal villages. At the Batang Toru level these five crop contribute greater to household farm incomes: rubber 40%; durian 18%, cacao 9%, and sugar palm 5%. In Aek Nabara and Sitandiang sugar palm is the main agricultural crop. (Across Batang Toru coffee, bettlenut (pinang), coconut, kemenyan and cinnamon are also economically importance to smallholder crops, but are only minor crops in the five focal villages. Oil palm is also an important agricultural crop in the area but not for smallholder farmers.) Subsequent activities and surveys also identified the following smallholder products as currently or potentially important: gaharu (*Aquillaria* sp), petai (*Parkia speciosa*), nilam (*Pogostemon cablin*), flowers (*Nepenthes* spp, *Amorphophallus* spp, and orchids), high-quality rubber seedlings, medicinal plants, mushrooms, vegetables, and goats.

However incomes from these crops are limited by a number of technical and marketing issues. Farmers practice traditional non-intensive management, lack access to technical assistance, and are not familiar with grafting techniques. Farmers lack market information and have limited market options because of poor infrastructure and their remote location. Farmers also require advance payment, which reduces their income. Agents complain that smallholder products are of uncertain quality, quantity, and reliability (yields fluctuate), that the location is remote and there is no farmer's association to facilitate transactions.

The BTFE is part of a larger critical watershed area in North Sumatra Province. The watershed covers 148,457 hectares. Ecological functions of the BTFE (e.g., water supply, recycling nutrients, protecting soil quality, and climate regulation control), directly and indirectly significantly contribute to the macro-economic development at the three districts, especially in agriculture, which contributes to 46 – 55 percent of the Gross Domestic Products of this district in 2005. Within the BTFE itself, there are 5 important sub-watersheds, which supply water to the entire three districts, named Batang Toru Sub-Watershed, Batang Gadis Sub-Watershed, Aek Kolang Sub-Watershed, Barumun Sub-Watershed and Bila Sub-Watershed. Based on data in 2005, this watershed is extremelyvaluable, serving more than 344,520 peoples or 81,800 households in three districts upon depend on land-based agriculture sector, especially the 16 sub-districts situated in adjacent areas of the BTFE and also providing regular water supply for more than 20,566 ha of irrigation rice fields and more than 431,600 ha of the fishery area production.

Socio-economic surveys, however, revealed that the local people are generally poor relying on inadequate subsistent farming, where forest clearing has been the most visible opportunity to improve their livelihood. Assessment concluded that the forest areas in this region is indeed in need for appropriate conservation measures, but converting the areas into any form of conservation status gained serious opposition from both local villagers and local governments as they are worrying that such status will deny their access to the resources. That need to make them understand about the conservation area management is indeed necessary. The only perceptible way to get around of such opposition is to change the top-down approach and strategy of project implementation.

The economic valuation study by Conservation International in 2006, the BTFE revealed that a high sustainable economic values. A total economic value of natural recourses in the BTFE is about USD 403 millions per year or the net present value is about USD 4,066 millions over 25 years (at discount rate as 10%). Of this total of economic values, indirect use economic value (for erosion control, disaster prevention, climate regulation, hydrology regulation, etc) is USD 7 millions per-year and direct economic values (for timber, gold mining, hydro-electricity power plant, geothermal power plant, tourism, water supply for drinking water, irrigation and fishery) is USD 395 millions per-year.

This value is beneficial in order to support economic development within the four regencies which are dependent on the agricultural sector. Based on economic benefit and cost analysis concluded the BTFE need urgently to conserve for long term sustainable economic benefits compare with a short-term economic-based and extractive-based natural resources exploitation such as logging or open pit gold mining. It has a positive sustainable an economic value is about USD 378 millions per-years.

3. Threats and challenges

The BTFE consists of around 150.000 hectares The Batang Toru catchment areas `currently are belong to four districts, i.e. the Districts of South Tapanuli, Central Tapanuli and North Tapanuli and Sibolga that located surround the BTFE. Total forest loss across the mapped for Sumatra region was 25%, representing over 5 million hectares, from nearly 20.6 million ha in 1990 to approximately 15.5 ha in 2000 (WCS, CI, MoF, 2007). Based-on CI-I assessment result (2006), a total of 6.34 km2 of forest was cleared between Year 1990-2000 in BTFE, equivalent to an average deforestation rate of .05% per year. Although the current condition is not yet available, visual observation in the field indicates that the deforestation is continually taking place.

During the period of 1990-2000, the probability of an area being cleared of forest was found to be significantly and negatively related to elevation, slope, distance to plantation areas, distance to transmigration ($P>z = 0.000$) and distance to logging concession .The result of this process is a map of continuous values representing a composite index of suitability (or likelihood) for deforestation. The analysis indicated that most of all forests in the West Batang Toru area were facing high deforestation threat, so that the BTFE area has been as well under high pressure. In addition, this prediction can occur in the future since the area is surrounded by provincial and regency level roads, new settlements are continued to appear upward penetrating the forest. Disturbance to orangutan habitat made by human in the area through forest conversion to agriculture and plantation areas, either legal or illegal and logging and mining activities have occurred as well as. Therefore, monitoring forest conversion to agricultural land and modeling future threats for the network of protected areas are very important to the maintenance of the BTFE areas.

Protecting the remaining orangutan population and its habitat thus has been the top priority at the global and national levels. The responsibility of local governments has been explicitly addressed in the Act No. 33/2004 stating that the local government is obligated to conserve the natural resources, including the

biodiversity and its ecosystem, while business actors should incorporate the same obligation in the good corporate governance scheme that demands business sectors to be involved in conserving nature through their
corporate social responsibility mechanism.

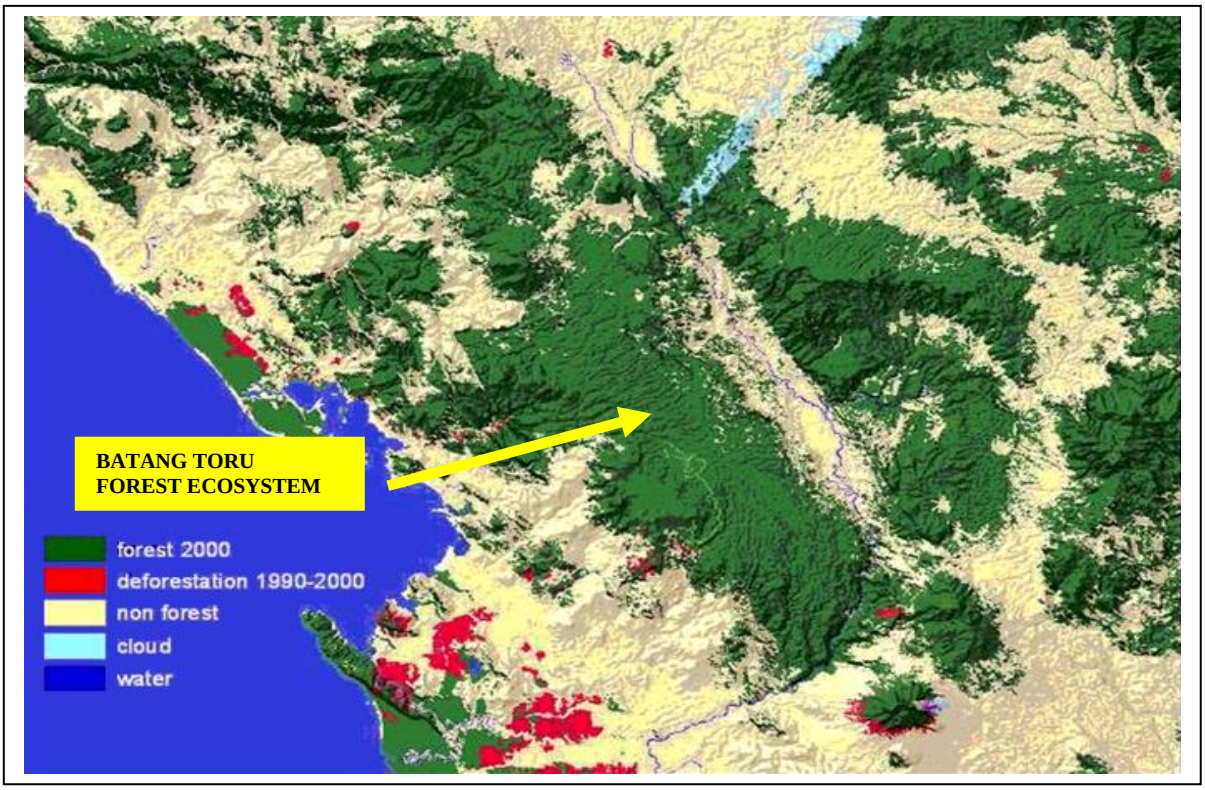

Figure1. Map of deforestation from 1990-2000 for around Batang Toru area (subset from Sumatra deforestation map 1990-2000, WCS-CI-MoF, 2006)

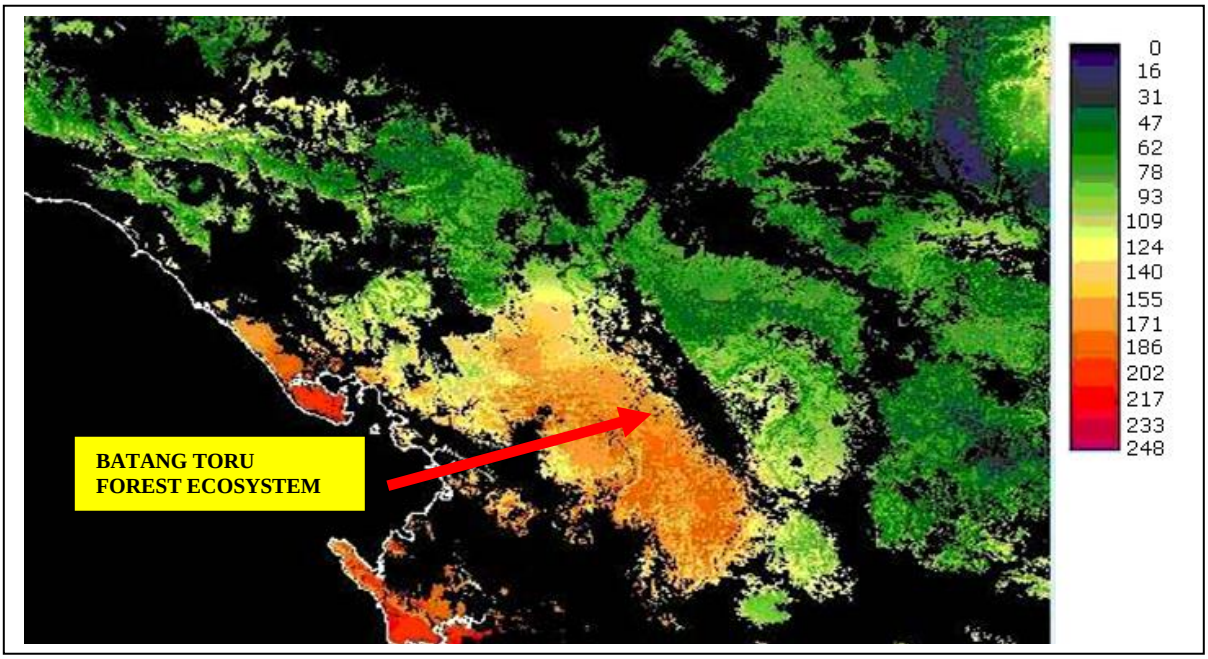

Figure 2. Deforestation likelihood map. Note : Result of MCE produces map of continuous values ranging from 0-255, with 255 (highest values) representing the highest likelihood of deforestation.

Reviews results on the government's policies, series of workshops, and regular consultations with both local governments and business sectors have identified a discrepancy between the need for Batang Toru Forest conservation and that of economic development. One important proposition was the requirement to replenish the government's policies on the management of natural forests in Batang Toru. Another proposition was the necessity to develop priority strategies for the protection of natural forests in the Batang Toru watershed area that function as the life supporting system as well as orangutan habitat.

Policy replenishment should prioritize reviews on land management in the forested areas of Batang Toru, where a number of aspects should be taken into account. One important aspect has been the status and function of forested areas. Ideally, there should be a cohesive commitment to transform the existing forest functions into 'protected areas' where logging concession areas, limited production forest areas, and nature reserves in the areas are combined into a 'national park' for the fact that those areas are orangutan's habitat. However, a status of national park might not be the only choice, other options need indeed to be explored. Once all stakeholders in the areas could agree on the need to manage forests sustainably, which reserves the importance of wildlife conservation (e.g. orangutan and tiger), a feasible option would be to develop a management body that accommodates all districts' objectives in achieving the regional sustainable development.

An integrated management body that considers the needs to deal with forest functions as carbon storage, the source of energy (via water supply for both hydro-electricity and geothermal powers), the main source of water supply for daily local livelihood (via sustainable agriculture development), the agents for soil fertility maintenance and climatic equilibrium.

4. Concluded Remarks : Additionality for REDD

Surveys revealed that Batang Toru forest areas are under threats from both legal and illegal logging (31,098 ha timber concession overlapping with Batang Toru forests), mining (Agincourt Oxiana, 7,800ha overlapping with Batang Toru forest), migration (Nias communities), estate plantation, geothermal power plants (North Tapanuli), and infrastructure projects such as roads building. All these are on going activities in the region posing a significant conflicting interest. While dealing with legal companies and other infrastructure projects managed by the local governments could be done in a diplomatic way using political advocacy (hence slowing down the exploitation processes), dealing with forest encroachment being undertaken by both the local people and Nias migrants is considered as a very crucial as well as problematical. As for Nias migrants, the local governments of Tapanuli region have also expressed their concerns for they did not have any appropriate way to deal with.

Such conundrum has made it more difficult to protect the high-rich biodiversity region. The only perceptible way to get around of such impracticality is to change the approach and strategy of the REDD project implementation. We suggest the communication among the interest groups will be improved and increased at the first place including their roles and responsibilities, and then facilitate them to decide an appropriate and sustainable forest management.

5. References

Anonim : Survey of Teresterial Ecology, Air Quality and Noise for the Martabe Project Area, North Sumatra Indonesia. PT. Newmont Horas Nauli, LIPI, Hatfield, 2005

Lamounier, Y., Purnajaya and Setiabudi.: International Map of Vegetation and Environmental Conditions: Northern Sumatra, Scale 1:1,000,000. Institut de la Carte Internationale du Tapis Végétal and SEAMEO-BIOTROP, Toulouse and Bogor.

Perbatakusuma, EA, Supriatna, J, Siregar, R,.S.E, Wurjanto, D, Sihombing, L, and Sitaparasti, D : Mainstreaming Biodiversity Conservation and Life Support System Policies in Natural Forest in Batang Toru Water Cachment Area North Sumatra Province. Policy Technical Report. Conservation International Indonesia and Department of Forestry. Pandan. 2006. In Bahasa Indonesia.

Perbatakusuma, EA. Siregar, RS, Siringo Ringo, J.B, Panjaitan, L, Wurjanto, D, Adhikerana, A dan Sitaparasti, Dhani (Eds). Developing Collaborative Strategies for Orangutan Habitat Conservation in Batang Toru Ecosystem. 2007. Multi stakeholder Workshop Technical Report. Sibolga. In Bahasa Indonesia.

Siringoringo, JB, Sihombing L dan Perbatakusuma, EA.: Macro Policy of North Sumaatra Province to Orangutan Habitat Protection Support in Batang Toru Water Catchment Areas. Paper presented on Workshop of Multi stakeholder Collaborative Development on Sumatran Orangutan Habitat and Sustainable Economic Development in Medan, 28 – 30 March 2007. In Bahasa Indonesia.