

DESIGN OF PLANTATION AREA OF PT PERTAMINA UBEP BLOCK LIMAU, SOUTH SUMATERA

ABSTRACT

PT Pertamina UBEP Block Limau is an exploration state company located in Prabumulih city, South Sumatera Province. According to legal regulation, it is stated that PT Pertamina UBEP Limau has responsibility conserving biodiversity in exploration territory. The responsibility of its oil company showed by planting trees in open spaces inside the explorations areas. The trees planted are indigenous trees of Sumatera such as Meranti (*Shorea sumatrana*), Jelutung (*Dyera lowii*), Tembesu (*Fragraea fragrans*), Perupuk (*Lopothepalum javanicum*), Gaharu (*Aquilaria malaccensis*) and Pulai (*Alstonia scholaris*). Those trees are used to be common plantation trees in South Sumatera but recently their number is become decreased as an impact of monoculture plantation. The only ex-situ trees planted are Jati Solomon (*Tectona grandis* Linn) as one of requirement from PT Pertamina UBEP Limau. The method for obtaining and processing data is descriptive method by site surveying. The base map was obtained from PT Pertamina UBEP Limau and it was updated with actual hidden underground utilities. According to the limitation of open spaces, the planting distance selected was 3x3 m square and the trees were arranged on non-utility open spaces inside exploration territory. According to the final planting plan, there were 10.850 trees planned to be planted on PT Pertamina UBEP Limau. The start of planting plan's implementation was held on August 2012 in Niru Field by planting 1.000 trees. In implementation activity, there are on field planting adjustments as a consequence of unrecorded underground utilities.

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BACKGROUND

Indonesia is a country with huge resources of biodiversity. Biodiversity is the diversity of life forms on earth between various life forms and between those life forms with the environment. The life form are from simple organisms such as fungi and bacteria standing of trees in complex life of a forest (Bappenas, 2003). The biodiversity is an important aspect to be concerned in Indonesian development. Creating plantation area in exploration zone is one of strategy to preserve biodiversity by involving stakeholders to resolve conflicts over natural resources (Bappenas, 2003).

South Sumatera used to have various commodities of plantation supported biodiversity. Recently, the plantation of South Sumatera is dominated by oil palm, Acacia mangium and rubber trees. The large-scale introducing of exotic plants in plantation overcomes long-term ecological impacts (Muhtarman et al, 2000). The local trees such as Meranti (*Shorea sumatrana*), Jelutung (*Dyera lowii*), Tembesu (*Fragraea fragrans*), Perupuk (*Lopothepalum javanicum*), Gaharu (*Aquilaria malaccensis*) and Pulai (*Alstonia scholaris*) are become decreased as an impact of large-scale exotic trees used in plantation. Those trees

are used to be plantation commodity in South Sumatera. For example, Jelutung wood is a high value of timber for stencil printing, drafting table, pencil, plywood and carving, and it is one of endangered tree in Sumatera (Martawijaya et al. 1981 in Utami, Anggareni and Sahwilata, 2008). It is important to conserve those local trees by planting them on plantation area of PT Pertamina UBEP Limau.

PT Pertamina UBEP Limau is an Export Processing Zone (EPZ) oil exploration located in Prabumulih, South Sumatera province. This company has a vision to be an ecological friendly oil company by doing environmental activities such as developing plantation area surround oil exploration blocks. Planting forest is a potential to conserve biodiversity by improvement in design and management (Hartley, 2002).

The main concept of Plantation area of PT Pertamina UBEP Limau is conserving biodiversity by planting indigenous trees. The trees will be planted in different blocks according to their species. The advantage of planting mixture trees in plantation is complementary resource use between species that arises from development of a stratified canopy and possibly root stratification, and pos-

sibility in nutrition improvement if the nitrogen fixing species is combined with non nitrogen-fixing species (Kelty, 2006). The Planting design is needed in order to distribute various trees planting in order to support biodiversity. The design and management are needed in plantation forest development in order to optimize biodiversity conservation (Hartley, 2002).

Objectives

The objective of this research is designing the plantation forest of PT Pertamina UBEP Limau for greenery and conserves biodiversity. The main output of the plan is planting design that consist of plants arrangement pattern, 3D simulations, planting points and quantity of trees planted. The planting design is used as guideline for developing plantation of PT Pertamina UBEP Limau.

MATERIALS & METHODOLOGY

The project was held in June to August 2012. The first two months are used for site surveying and planting design. The first step of implementation was held in August 2012 by planting 1.000 trees for starting the program.

The method for obtaining data is descriptive method by site surveying. During the site surveying, the primary data were collected, such as soil sample, possible open spaces to be planted, built spaces and forbidden planting areas. Beside primary data, secondary data such as authorized base map was gathered from PT Pertamina UBEP Limau. The method for defining plantation spaces ground checked survey by comparing the base map obtained from PT Pertamina EP UBEP Limau with actual condition. In ground checked survey, the suitable spaces for plantation are marked on base map. The suitable spaces are non-built spaces and non-utilities spaces. The steps of producing planting design and its implementation can be seen in Figure 1.

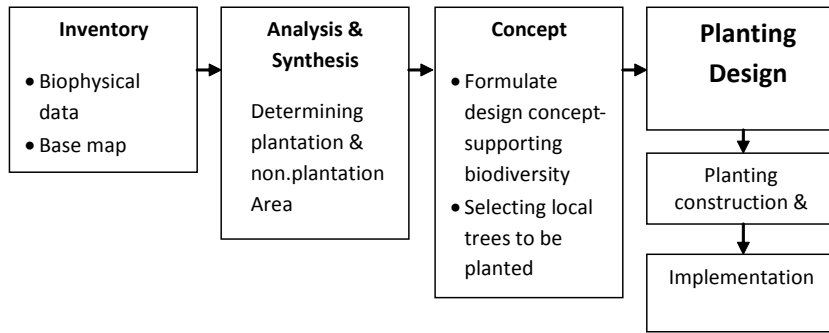


Fig 1. Step of Planting Design

RESULT AND DISCUSSION

Result

The PT Pertamina EP UBEP Limau has several stations distribute in several locations in Prabumulih and Muara Enim, South Sumatera Province. In this study, there are 6 areas to be planned, those are Niru Rig Exploration Clusters (Niru 1 until Niru 4), Stasiun Pengumpul/SP (collecting station), and Stasiun Kompresor Gas/SKG (Gas Compressor Station). The landscape of PT Pertamina EP UBEP Limau is dominated with bare land. Only several trees and grass (ground cover) are existed in SKG cluster. According to the base map and site survey, the possible area for plantation is 97.654,53 m², distribute in Niru-1 Cluster (41.956,69 m²), Niru-2 Cluster (12.500,28 m²), Niru-3 Cluster (10.882,56 m²), Niru-4 Cluster (7.472,52 m²), SP cluster (12.000,97 m²) and SKG cluster (12.841,52 m²). The plantaion areas in Niru Cluster can be seen in Figure 2.

In order to obtain the fast result of green open space, trees spacing was set 3x3 m² meters. It is a dense trees spacing but may obtain a fast greenery visual result. For Jelutung (Dyera

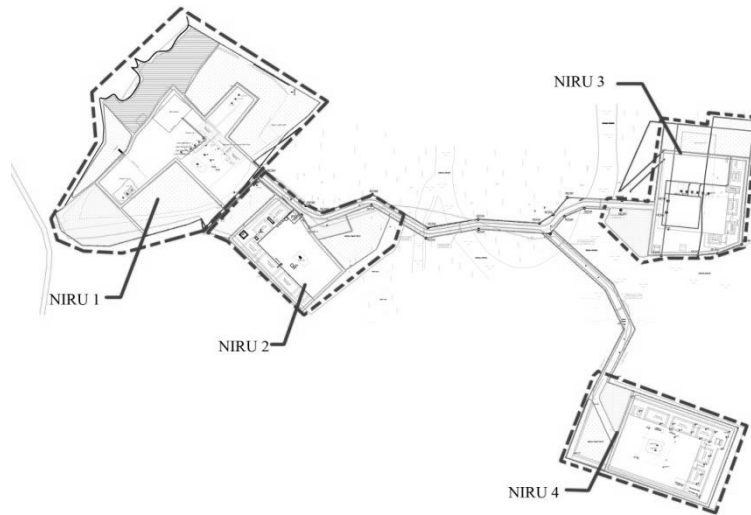


Fig 2. The Possible Area for Plantation (Green) in Niru Cluster

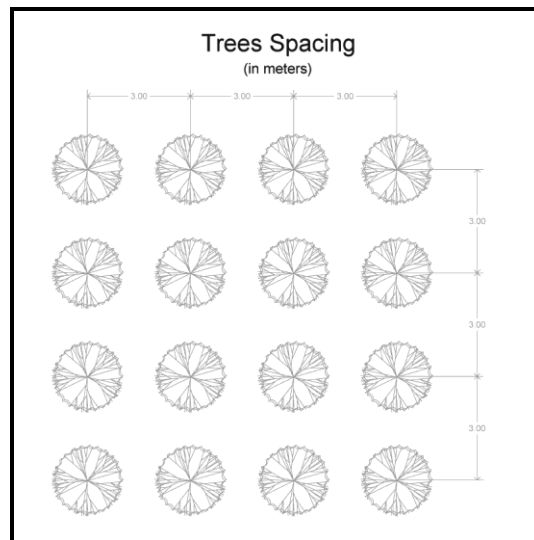


Fig 3. Trees Spacing with distance 3 meters

lowii), the ideal distance between trees are 5x4 m² (Bastoni, et al. 2010). But by consulting to the expert of Jelutung, Ir. Bastoni, the tree spacing may be set 3 x 3 m² with consideration of tree thinning in the next 5 years (Fig 3). By trees spacing 3 x 3 m², the number of possible trees predicted is 10.850 trees.

The soil type is red-yellow Podzolic. The physical characteristic of the soil is sandy loam texture, blocky structure and sticky consistency. During the planting implementation on August 2010, there was a long dry season with low rainfall. It is a very disadvantage situation for planting activities. The water storage polymer was added in planting points in or-

der to keep water supply longer. Water absorbent Polymers are capable of swelling and retain large amounts of water (Yu, et al. 2012). The planting construction of selected trees can be seen in Figure 4.

The selected trees are local trees that its number is become decrease. The trees selected are Meranti (*Shorea sumatrana*), Jelutung (*Dyera lowii*), Tembesu (*Fragraea fragrans*), Perupuk (*Lophothepalum javanicum*), Gaharu (*Aquilaria malaccensis*) and Pulai (*Alstonia scholaris*). The teakwood tree, Jati Solomon (*Tectona grandis* Linn), is the only ex-situ tree selected in order to know whether these trees can grow well on site for prospective plantation trees.

Jelutung, Tembesu, Perupuk, Gaharu and Meranti are useful trees but but its number is become decrease. Jelutung (*Dyera lowii*) is characterized by height can reach 35 meters with wood diameter 95 cm, the stem is characterized with a surface smooth, dark gray and no buttresses, wood is whitish, smooth, soft and gummy (Istomo, 2002). Perupuk (*Laphope-*

talum javanicum) is characterized with bark that contains oil and used as tinder. Perupuk is a timber gained economic due to its suitability for cabinets and decorative veneer (Kessler, 1996). The first site for implementation is

Niru-1 because it is located adjacent with inter-city road. The Niru-1 is the main gate for other Niru clusters. There are several adjustments in implementing design of plantation on site because of unrecorded utilities such as gas pipeline and the barrier

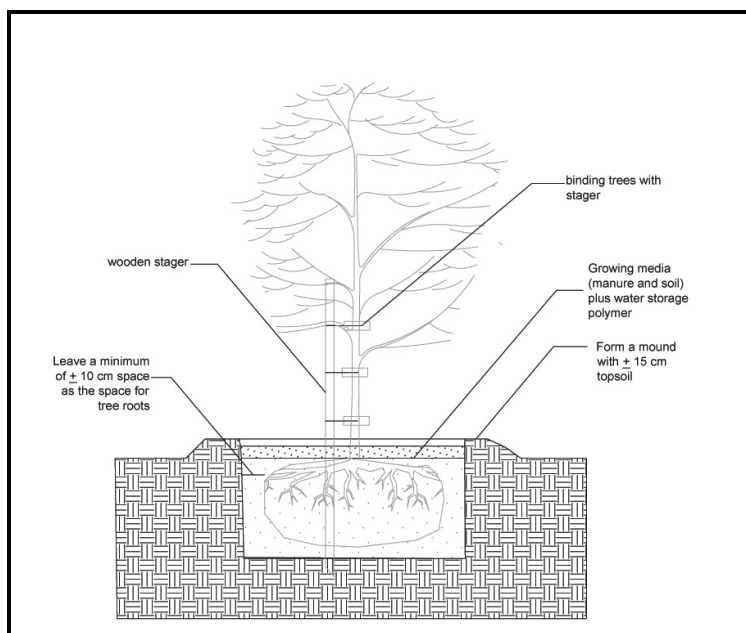


Fig 4. Planting Construction

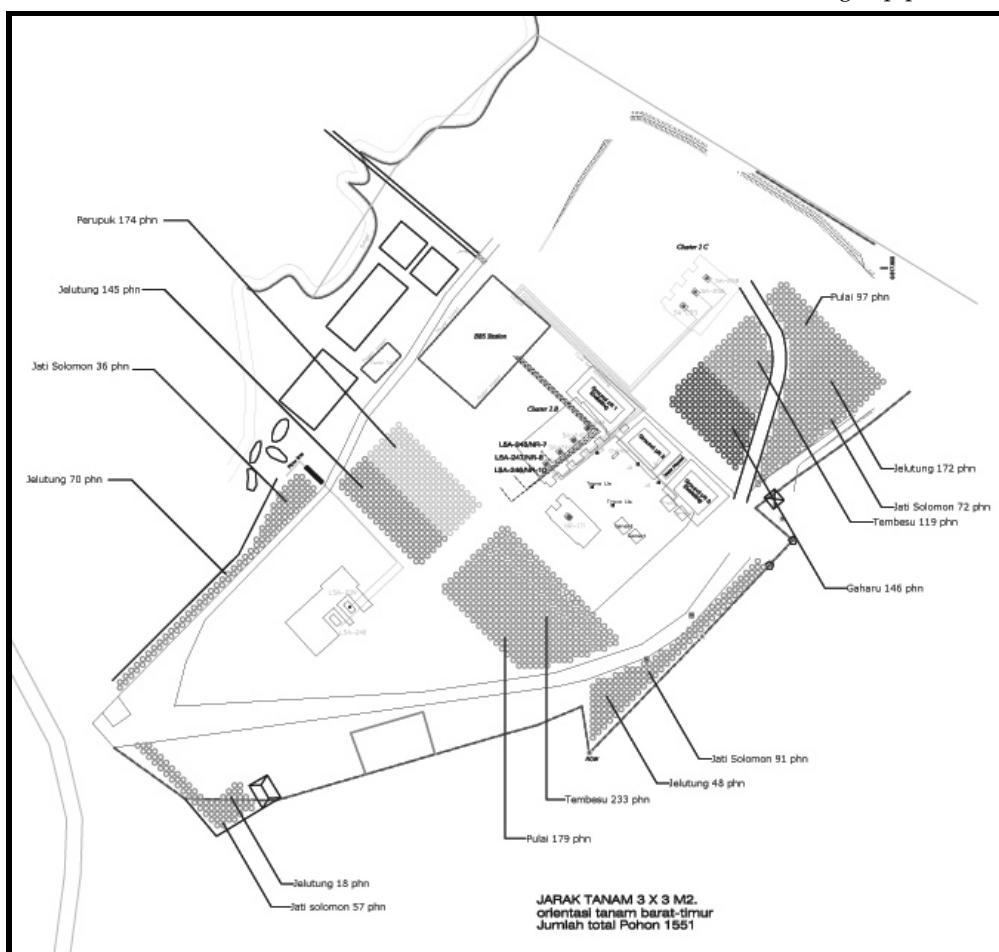


Fig 5. The Planting Design of Niru-1

of safety area. The design correction for Niru-1 cluster can be seen in Figure 5.

The first step is determining plantation points. The stagers from bamboos were used for determining plantation points with the space among the points is 3 meters. The dimension of planting ball is 40 cm x 40 cm x 40 cm. It is a minimum dimension of trees planting hole standard because the soil is compacted and very hard to dig. The planting activity can be seen in Figure 6.



Fig 6. Planting Jelutung tree (*Dyera lowii*)

Discussion

The plantation forest of PT Pertamina UBEP Limau follows recommendation of Hartley (2002) to plant various trees in order to obtain a better biodiversity conservation. There are some aspects influence the biodiversity surround PT Pertamina UBP Limau, such as surrounding landscape type and the effect from oil exploration itself. The next research is needed in order to identify if polyculture and using local trees in plantation forest give a better conservation for biodiversity.

Design and management can better in biodiversity conservation in plantation forest (Hartley, 2002). Planting design is very helpful media, not only to determine the number of trees to be planted, but also to determine distribution of various type of trees that will be planted. The trees composition and pattern should

be planned well before implementation and it is more efficient than replacing planting points after implementation. The visualization of planting design can give a better explanation to stakeholders about the future plantation forest after implementation.

By the explanations above, we can conclude that the planting design is an important step in plantation program. But the next questions are, how to make a good and accurate

planting design? What are the required data needed in planting design process? The answer is the availability of supporting data and base map. The valid base map consist of biological and physical data and also social and culture data is needed in order to be considered for creating a planting design.

CONCLUSION

The planting design is very important for plantation. The planting design brings several benefits, such as knowing the pattern of trees and showing how the future landscape of plantation will be. The other benefit having a planting design is, it could be a planting design construction document, which is not only useful as a reference for implementation, but also useful for maintenance.

One of the issues that are associated with plantation sector is supporting biodiversity. There are few native

trees that are useful for people of Sumatra, but its existence is threatened by a heterogeneous forest land conversion to monoculture plantations tended. By presenting plantations that use local trees like Jelutung, tembesu, Pulai, Perupuk and Meranti will support the preservation of the local plants and preserve biodiversity.

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