THE POTENCY OF TREES IN SUPPORTING HYDROLOGICAL SYSTEM PERFORMANCE

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The Background

Climate Change

Disruption of Hydrology System Performance

Flash flood, land slides, drought

Food security, Prosperity

Human Population

Human Activity

Disaster

To evaluate the character of canopy as a mediator of raindrop movement
To get the modeling of canopy density as the approach of raindrop arranger
The Estimation of Human Population in Indonesia

![Human Population Graph]

The Estimation of Human Population in Indonesia

- **Water absorption area has changed to agricultural land in Darajat, Garut Regency West Java.** Foto by Irfan Budi Pramono

- **Protected area in Darajat mountain, Karyamekar village, Pasirwangi district, Garut regency.** This place is the source of water that flows to Cikamiri (beritagari.id)

- **Land use change on the Biru Malang mountain area.** (Mongobay.co.id)

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Land Use Change

The impact of deforestation in Central Kalimantan. Picture by Greenpeace

Deforestation in Kutai Kartanegara Regency. Forest has been changed to plantation. Picture by compas

Palm plantation on the upstrem of Limboto Lake, Bongomeme Picture by Christopel Paino (Mongabay.co.id)

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Disruption of agricultural production

Drought in Padangpariaman West of Sumatera (antaranews.com).

Flooded in Paddy field (Cisaga district, Ciamis regency, on Sunday, October 9th 2016)
**Important roles of Trees**

Canopy architecture is a branch system that consists of branch, twig and leaves and determines the velocity of raindrop movement. Branching system describes the level of canopy density namely Canopy Density Index.

The stability of soil structure is determined by tree with rooting system which spreads horizontally and vertically (Hairiah et al., 2006).

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**Branching System**

Opening System

Closed System

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The general pattern of branching system and leaves types (Sitompul, 2004)
CORDATE LEAVES AT ERECTOPHIL BRANCHES

CORDATE LEAVES AT PLANOPHIL BRANCHES

NEEDLE LEAVES AT ERECTOPHIL BRANCHES

NEEDLE LEAVES AT PLANOPHIL BRANCHES

Cordate leaves at erectophil branches
Cordate leaves at planophil branches

Needle leaves at erectophil branches
Canopy Density Index (CDI):

\[
CDI = -\left( k \frac{3\xi}{\pi h^2 w^2} \right)
\]

(Budiastuti, 2007)

- \( k \) = constant, based on relation between throughfall (mm) with rainfall (mm)
- \( \xi \) = number of branches (unit/tree)
- \( \pi = 3.14 \)
- \( h \) = height of canopy (m)
- \( w \) = width of canopy (m)
Conclusion

The ideal type of tree is chosen by considering:

1. Specific micro climate
2. The level of canopy stratification
3. Root system condition
4. Market value

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