Serial Powerpoint Presentasi

ATMOSPHERIC CARBONDIOXIDE SEQUESTRATION TROUGH KARST DENUDATION PROCESS

(Preliminary Estimation from Gunung Sewu Karst Area)

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- A. Introduction**
- B. The Study Area**
- c. Karst Denudation and Carbon
Sequestration**
- D. Concluding Remarks**
- E. Field Research Illustration**

Presentation Outline

A. Introduction

- CO₂ is one of the important green house gases that contribute global warming.
- Karst ecosystem is one of the carbon sink potentials
- Karst denudation up-takes CO₂ from atmosphere

B. The Study Area

Research area topography from space

Gunungsewu karst landscape - surface

Outcrop of limestone rock

Gunungsewu karst landscape -underground

- Area : 1300 km²
- Rocks : Limestone (Wonosari-Punung F.)
- Rainfall : 1500 - 2986 mm/year
- Landuse: Dry field agriculture

Question: what is the significant role of this karst area in climate change issue?

C. Karst Denudation and Carbon Sequestration

General Concept

- Karst is the term used to describe a special style of landscape containing caves and extensive underground water systems that is developed on especially soluble rocks
- The major denudation process in the area is dissolution
- Around **20%** of Indonesia area composed by karst topography

Dissolution Process

120 kg carbon is up-takes from atmosphere during the removal of 1000 kg (to dissolve limestone)

Karst Denudation

$$V = \frac{4 ET}{100} \dots\dots\dots (1)$$

Where:

V : Denudation rate by dissolution ($\text{m}^3/\text{year}/\text{km}^2$)

E : *Run off* (Precipitation – Evaporation) in decimeter (dm)

T : CaCO_3 concentration in water discharged by karst springs (mg/l)

- Average precipitation in Gunung Sewu Karst is **2,051 mm/year**
- Annual potential evapotranspiration (PET) of Gunung Sewu Karst is **1,362.91 mm**

- Annual runoff discharging from Gunung Sewu Karst is **688 mm**

- Average CaCO_3 removed from Gunung Sewu Karst is **185 mg/l**

- Denudation rate of Gunung Sewu Karst is estimated to be **50.91 m³/km²/year**
- Equivalent to **165,464 ton CaCO_3 /year**
- Thus, the estimate annual carbon dioxide sequestration in Gunung Sewu Karst through denudation processes is **72,804.16 ton**

D. Concluding Remarks

- Greater attention should be devoted to understand karst ecosystem in climate change mitigation
- Karst ecosystem in regulating atmospheric carbon through denudation processes
- Removal of 1 ton limestone through denudation process up-takes 120 kg carbon from the atmosphere
- Attempts should be made to ascertain comprehensive carbon cycle mechanism in karst ecosystem including carbon cycle from biomass production in general or specifically from agricultural practices
- Attempts to preserve karst formation from mining

Still continue to research the mechanism of carbondioxide consumption in dissolution process

Spatial and temporal variation of CO₂ rest in the karst water after dissolving limestone

Gilap Cave -- log PCO₂

Ngreneng Cave - log PCO₂

Bribin Cave - log PCO₂