Potential and constraints tidal lowland in Indonesia and its sustainability

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Potentials and constraints

• Potentials and constraints: Land and Water resources and Environment
• Human Resources (HR)
Lowland development in Indonesia to support the food crops production

- Soils: peat and/or clay (alluvial, potential acid sulphate soils);
- Each soil type has their own characteristics related to food crop development.

Soil and Water management are the most important factors
Knowledge and knowhow: theoretical and practical

- Theory on lowland development;
- Topography;
- Hydrology and hydrodynamics;
- Soil, social and environmental science;
- Tides, salinity intrusion, hydro-topography, dikes;
- Polder.
Present conditions of lowland development schemes in Indonesia

After more than 40 years of the development, natural leaching of most of the schemes in Sumatra dan Kalimantan have been occurred. Time for the improvement of water management systems:

- Drought in dry season;
- Flood in rainy season;
- Continue leaching and flushing
Land suitability and water management zoning

- Hydrotopography;
- Peat layer and thickness;
- Pyrite layer;
- Leaching and flushing processes related to food crop development;
- Liming (acid sulphate soils) very costly;
- Water management system (irrigation, drainage, flood and drought control)
Rice crop cultivated under acid sulfate soils

Iron toxicity

Under proper soil and water management
Land and water management in tidal lowlands

• Peat soil: high porosity and susceptible to fire in dry seasons and flood in rainy seasons. The keyword is how to apply and manage land and water resources by using an appropriate way. Water retention, leaching and flushing have to be considered in an integrated way;

• Pyrite soil: avoid the oxidation of pyrite by keeping the groundwater level as high as possible above the pyrite layer. Soil and water management strategy has to accommodate leaching, drainage and flushing of toxic materials from the scheme.

• All the measures has to be supported by an appropriate field data which cover topography, geometry, soil types and its distribution, rain fall.
Macro-Zoning Lowlands – Transect

Source: WACLIMAD, 2011
Water management on peatland in Giethorn, the Netherlands

Water level as high as possible
Water control on peat area

• Which elevation and how large the covering area:
• Follow by installing canal blocking structures?

Distance between two blocking structures: longitudinal slope, porosity of the peat soil
Water retention and conservation measure on peat dome

Precipitation

Canal blocking

Downstream water level

Peat dome

Mineral layer
Land suitability and water management zoning, Telang 2, South Sumatra
Summary

- Potentials and constraints have to be checked;
- Hydro-topographical conditions have to be defined carefully. The hydro-topographical and soil conditions will influence the water management systems;
- Soil and water management system should consider the local circumstances related to leaching, drainage and flushing capacity;
- Peat layer thicker than 2 m has to be conserved;
- Lowlands with pyrite or potential acid sulphate soil: avoid oxidation or maximizing oxidation then followed by leaching and flushing.