# MINIMIZING THE HAZE

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## **WHAT CAUSES HAZE**

- PEAT CONSIST OF THE ACCUMULATION OF ORGANIC SOIL MATERIALS
- DURING THE DRY SEASON WATER TABLE IN THESE WATERLOGGED SOILS CAN BE BELOW ONE METER OF THE SOIL SURFACE
- PEAT SOILS HAVE ALSO BEEN DRAINED FOR
   AGRICULTURAL DEVELOPMENT
- HAZE IS THE RESULT OF BURNING OF THE PEAT OR ORGANIC SOILS ON THE LAND SURFACE
- HAZE IN 2015 IS EXPECTED TO BE WORST IN HISTORY
- EL-NINO EFFECT WILL MEAN, IT MAY CONTINUE TO EARLY 2016

EXAMPLES OF PEAT SOIL



Note the Surface Layer differences cause of Past Fires

### PEAT FIRE

Drainage and lowering the watertable can make surface layers become dry

- Fire can be started intentionally during land clearing to reduce cost
- Accidently-Cigarette butts etc. thrown on the dry peat surface
- Peat fires continue to burn / smoulder below the surface making it more difficult to put it out
- Peat fires take place both on PLANTED AREAS AND NATURAL UNDRAINED PEAT SWAMPS

## SLASH AND BURN WOOD ON THE PEAT SOIL SURFACE



Surning is used to clear litter to plant crops

## HAZE PROBLEM

- Annual Problem in dry season
- Peat burning in Indonesia
  - Smallholders need to slash / burn / Plant Crops
- NO BURN NO FOOD
- Some Estates do not follow Best Agricultural Practices (BAPs)
- **NO BURN POLICY**



## **EFFECTS OF THE HAZE**

- Health problems
- Increase in respiratory problems
  - Eye and Throat irritation
- Dramatic increase in GHG emissions
- Crop losses
  - Lower sunlight reduces photosynthesis
  - Lower yields of Oil Palm, Vegetables, Fruits
- Affect on livestock
  - Poultry are dying
- Migrating birds
  - Cannot find directions
  - Cannot find food source
- Poor visibility
- Flight Disruptions

### DISTRIBUTION OF PEAT SOIL



	Rieley of	e <i>t al.</i> 1995 (x	million)	Tie, 1990
Country	Minimum (Ha)	Maximum (Ha)	Per cent	(x million ha)
Brunei Indonesia Malaysia Papua New Guinea Philippines Thailand	0.01 17.00 2.25 0.50 0.10 0.07	0.01 27.00 2.73 2.89 0.24 0.07	0.03 82.00 8.28 8.76 0.72 0.21	0.01 26.20 2.56 0.5 na 0.8
Total	19.93	32.94	100.00	30.07

Largest Extent in Indonesia

### CAUSES OF THE PEAT FIRE

### Dry season water table drop > 100 cm (Forest)

Artificially drained

Oil Palm cultivation
Water control

#### Kuala Selangor Peat Swamp Forest

#### Pekan Peat Swamp Forest



Depth of water table below one meter in dry season

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WET PEAT LAYER		WET PEAT LAYER	WET PEAT LAYER
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CLAY	CLAY	CLAY	CLAY
UNCONFINED AQUIFER	UNCONFINED AQUIFER	UNCONFINED AQUIFER	UNCONFINED AQUIFEI
CLAY	CLAY	CLAY	CLAY
CONFINED A CHUEFED		CONFINED A OLUSED	CONFINED A OUTFER
CONFINED AQUIFER	CONFINED AQUIFER	CONFINED AQUIFER	CONFINED AQUIFER
CLAY	CLAY	CLAY	CLAY
CLAY	CLAY WET SEA	CLAY	CLAY
		CLAY	CLAY
		CLAY SON	CLAY
CLAY	CLAY WET SEA	CLAY SON	CLAY
	CLAY WET SEA	CLAY SON	CLAY
CLAY	CLAY WET SEA	CLAY SON	CLAY
CLAY	CLAY WET SEA	CLAY SON	CLAY
CLAY	CLAY WET SEA	CLAY SON Drain DRY PEAT LAYER	CLAY
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WHO IS TO BE BLAMED FOR PEAT FIRES PLANTATIONS OR SMALLHOLDERS ?

## PLANTATIONS:

- No burn policy
- Water controlled to 50 cm depth
- Warning signboards
- Canals used for drainage are barriers to spread of fires
- Canals do not work, if prolonged dry season
- Road access to put out fires

WHO IS TO BE BLAMED FOR PEAT FIRES PLANTATIONS OR SMALLHOLDERS ?

## **SMALLHOLDERS / SUBSISTENCE FARMING:**

- Slash and burn to clear vegetation to plant crops
- Burning spreads to nearby estates
- Lack of enforcement
- Smallholders / Farmers NO BURN NO FOOD

## OMINIMIZING THE HAZE CURRENT METHODS

- Cloud seeding
- Hose down fire
  - Not effective, due to lack of water
  - Some have suggested compacting the peat will minimize the burning
    - Compacting only slows down the spreading of the fire – DOES NOT ELIMINATE FIRE
    - How to compact in peat swamp forests without accessibility (Roads / Canals)
    - Standard BMPs for Oil Palm cultivation requires compactions



# APPLICATION OF PROPOSED METHODOLOGY

- Two Plantation Companies have successfully tapped underground water in Kalimantan on 1<sup>st</sup> October 2015
  - Have installed Tube-wells
- Located unconfined aquifer at 9-10 meter below surface
- Requires pumping
- Check recharge
- Cost / Tube-well ≈ USD 350.00

# TUBE-WELL IN KALIMANTAN PREPARATION



1<sup>51</sup> OCTOBER 2015

# TUBE-WELL IN KALIMANTAN INSTALLING TUBE-WELL



1<sup>57</sup> OCTOBER 2015

# TUBE-WELL IN KALIMANTAN EUREKA! SUCCESS !



#### 1<sup>51</sup> OCTOBER 2015



RECOMMENDATIONS

- Need to be PROACTIVE
  - Prepare tube-well BEFORE the dry season
  - Water can be used for drinking (Check water quality)
  - Open the well and wet the peat layer at the beginning of the dry season
- > Need for control over number of Tube-wells
  - Government approval required ?

## CONCLUSIONS

- **Governments need to be PROACTIVE**
- Estates need preplanning and action
- Estates help Smallholders / Farmers to clear forest
- Government to install Tube-wells in Peat Swamp Forests
- ASEAN Neighbours stop the BLAME GAME and HELP ONE & ANOTHER
- LET US COOPERATE AND USE SCIENCE TO SOLVE THE PROBLEM— NOT BE EMOTIONAL

