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GROUND WATER LEVEL, RAINFALL AND SUBSIDENCE: KEY FACTORS ANALYSIS AFFECTING PEATLAND MANAGEMENT SYSTEM FOR OIL PALM PLANTATIONS IN INDONESIA

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Peatland has been cultivated for various agricultural crops for many years in Indonesia. However, in recent times, land fires are frequently associated with peatland over-drained due to inappropriate management systems. Here, we present the results of four years' research on key factors analysis affecting the peatland management system i.e. groundwater level (GWL), rainfall, and subsidence. Ecological samplings were conducted in Jambi in oil palm plantations in an area of mature peat of about 5,077 hectares. Peat depth at the study sites varies from 1 m to 7 m. Zonation systems were set up based on topographical information. In total, there were four zones with every single zone covering an elevation from 1.5 m to 2 m and consisting of a canal system, water gate, and overflow. GWL were observed by monitoring 540 piezometers installed in 108 blocks (one block is about 30 ha). Groundwater table was recorded once a week. Rainfall information recorded every day was pooled as one month's observation. Subsidence poles were set up in 20 blocks and peat surface levels were recorded once a month. The results indicate that GWL was strongly affected by rainfall. In the rainy season, GWL reached 14 cm under the soil surface level which flooded the plantation, in contrast during the dry season GWL reached up to 117 cm. By operating water gates and overflows, GWL can be well maintained at around 45 cm and 60 cm to keep the soil wet and not flooded or over-drained. The peat surface level fluctuated following rainfall and subsidence was recorded as very low. The lowest rainfall ($30.3 \text{ mm month}^{-1}$) was followed by lowering of the peat surface (-0.5 cm), in contrast at the highest rainfall ($474 \text{ mm month}^{-1}$) the peat surface returned to zero. Oil palm yield at the study site was recorded as 24.2 ton year $^{-1}$ on average. In conclusion, the peat management system applied in the study area can ensure high yields and at the same time maintain water expected levels.

Keywords: peatland, management, groundwater level, subsidence, zonation