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Climate Change – What Does It Mean for Oil Palm?*

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The climate has changed continuously for millions of years, and will certainly change in future, but the direction of change is far from clear. Greenhouse gases (GHGs) warm the atmosphere, and computer climate models predict droughts, floods and hurricanes as a result of rising temperatures. However, the models are unable to simulate past temperature and rainfall patterns, so little reliance can be placed on the projections. Based on solar activity, some authors have even indicated the possibility of lower temperatures in future.

Global temperature has risen over the last century, and effects of this warming on climate may indicate what to expect if temperatures rise in future. For the tropics as a whole wet regions have become wetter, and dry regions drier. In West and Central Africa, droughts have become longer and more frequent over the last 50 years. There has been a trend towards reduced drought in Colombia, but probably an increase in Central America and Amazonia. In South-east Asia there have been no clear trends in past rainfall; El Niño will continue to have major effects in this region, but is not yet predictable. Otherwise, there is no evidence from observations that warming has been or will be harmful, while the benefits of rising CO_2 for crop photosynthesis and yield are well established. Crop water use efficiency is also improved under high CO_2 levels.

Oil palm development has both positive and negative effects. Deforestation affects climate, causing changes in rainfall distribution, and also releasing CO_2. More importantly, biodiversity is irreversibly lost when primary forest is destroyed. Oil palm is often quoted as a 'major driver' of deforestation and thus biodiversity loss, but global oil palm expansion, including non-forest sites, was equal to less than 10 per cent of forest loss in oil palm-growing countries from 2000 to 2010. Most studies do not allow for delays, often of several years, between deforestation and oil palm planting. However, even degraded forest contains much more carbon than an oil palm plantation, and the only way to eliminate GHG emissions from land use change, and to minimise biodiversity loss, is to avoid clearing any forest. Where peat is drained to plant oil palm, oxidation and CO_2 emission will increase, but if peat swamp forest has already been degraded and drained, planting oil palms may make the best and least damaging use of the land.

While oil palm may contribute to the deforestation problem, it also has a positive role in tackling poverty and as the main source of vegetable oil. Demand for edible oil is expected to reach at least 240 Mt by 2050, and palm oil will be able to meet this from a much smaller area than alternative oil crops. The palm can also be a source of biomass, and palm oil can be converted to biodiesel. Apart from minimising deforestation, mitigation of the damaging effects of the crop will require capturing methane from effluent digestion, and more efficient recycling of nutrients.

The future climate in some regions may be drier, and expansion into areas with a dry season will continue. Where irrigation is not feasible, increased drought tolerance will be essential. High temperatures are probably rarely limiting except under drought conditions, where large vapour pressure deficit can cause stomatal closure; thus increased drought tolerance may also lead to improved high temperature tolerance. Low temperatures are a limitation; the palm does not tolerate low temperatures, and improvement could extend the altitude limits for the crop. If sea levels continue to rise, flooding and salinity may become more important in low-lying areas, and good water table management will be essential. Better tolerance of a high water table could also be beneficial for peat plantings, as the higher the water table the lower the rate of peat loss.

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