Brief review on climate change and tropical peatlands

ABSTRACT

In 2008, the very extensive tropical peats were estimated to be about 182 million ha spanning South America, Asia and Africa. About 20.3% (36.9 million ha) of this area exist in Asia. Peats are classified based on their degree of decomposition, namely Fibrists, Hemists, Saprists and Folists. This makes them different in characteristics. The activities of microorganisms vary in different types of peat due to, for example, the sapric layer of well humified peat can provide water and food to microorganisms during heat stress. In another scenario, deeper peat is older and typically has lower levels of labile carbon to provide substrate for microbes compared to surface peat. A complete understanding of the microbial communities in different layers of peat is essential as microorganisms play major roles in peat decomposition and are important to ecosystem processes. These peats are a very important global carbon (C) store or reserve and could severely impact climate change if not managed well. Peatlands can store as much as 40 to 90 Gt C. Mis-management of peats could severely impact the environment particularly the emission of carbon into the atmosphere. For instance, clearing of peatlands using fire has been reported to release an estimated 88 t C ha−1 to the atmosphere. There are several factors which influence the environmental consequences of tropical peat especially in relation to climate change. The main influences are: (i) changes in temperature, (ii) changes in precipitation or rainfall, (iii) changes in atmospheric composition, and (iv) fire and haze. This paper is a brief review on these four influences in relation to climate change. It is apparent from the brief review that there is a need for continued short and long-term research to better understand tropical peats and how they affect our climate. This will hopefully provide the basis for predicting better what could happen under various scenarios.

Keyword: Tropical peats; Climate change; Carbon; Methane; Decomposition; Microorganisms