



Towards a Fire Early Warning System for Indonesia (ToFEWSI)

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The severe El Niño episode of 2015 led to a major and damaging increase in Indonesian peatland fire, highlighting an urgent need to develop operational systems to forecast potentially severe fire events to mitigate the impacts of fire and haze. A total of 10 ASEAN states have formally agreed to control peatland and forest fires and urgently need a fire 'early warning' system. An operational early warning system for forecasting dangerous burning conditions is within reach using state-of-the-art modelling tools, such as the ECMWF's System 5 seasonal forecast model, but is currently hampered by insufficient knowledge about the influence of fluctuations in peat moisture on fire, particularly during periods of extreme drought (e.g. 1997-98 and 2015 El Niño episodes - the strongest and second strongest on record). Most present-day fires in Indonesia result from deliberate burning for land clearance, and this human factor means that burning can be influenced by policy and altered land management practice.

In this paper, we present an overview of the ToFEWSI project, which started in late 2017 and is funded by the UK's National Environment Research Council (NERC) and the Indonesia Endowment for Education (LPDP). We plan to both develop a new scientific forecasting tool for fire danger and to influence policy and fire regulations – a novel combination of urgent science and policy research. ToFEWSI will develop a suite of climate-, hydrological- and agent-based modelling tools at landscape to regional-scales to predict the incidence of peat fires for the period 1997 to 2015. It builds on previously published seasonal fire forecasting and global fire weather database work. Agent-based modelling will be employed to help simulate the complex array of bio-physical, socio-economic and cultural factors that drive observed fire activity. While focusing on the tropical peatlands of Riau province, Sumatra, we will also undertake broader analysis covering Sumatra, Kalimantan and West Papua – the three main regions experiencing unsustainable burning and deforestation in Indonesia.

Emissions from peatland fires is a recurrent problem often causing severe environmental and health impacts at local to global scales. These problems are projected to worsen under business-as-usual policies/governance due to: i) a likely increase in the frequency of extreme El Niño events under future climate change; ii) a growing regional population, and iii) increased demand for rainforest timber, pulp and paper, palm oil and rice. Therefore, ToFEWSI will deliver a new early warning system for fires in Indonesian peatlands and a scientifically-based policy framework for the control of such fires and their atmospheric emissions. ToFEWSI will analyse and develop evidence-based policies to address non-climate factors driving fire under extreme events, as these present the most tractable means to develop sustainable mitigation actions at village and community levels. Furthermore, ToFEWSI will help Indonesia to meet its commitments under the Paris Climate Agreement on carbon emissions reduction.