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Messages, limitations and future needs of research into environmental impacts and mitigating and remediation measures of oil palm and forest land-use and land management in SE Asia

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Oil palm and forest logging land-uses have expanded immensely in recent decades in SE Asia and other parts of the humid tropics – and increasingly into steeplands where adverse biophysical in situ and downstream impacts are particularly severe. With a focus on recent and current projects in Sabah (Malaysian Borneo) and Peninsular Malaysia, this paper examines the changing nature of research foci and approaches of research projects to assess impacts and develop and test mitigation strategies. Early projects focussed on comparing slope- and catchment-scale hydrology and erosion of selectively logged forest and primary forest and on ways of reducing logging impacts. The second phase of research focussed increasingly on (1) longer-term recovery from logging and (2) the likely impacts of climate change. With repeat logging and conversion of areas of forest to oil palm (and conservation of remaining primary forest was secured), the focus of attention has moved to (1) assessing impacts of oil palm conversion and land management practices, (2) testing existing (and potentially more effective) Roundtable for Sustainable Palm Oil (RSPO) guidelines and Government Regulations aimed at reducing impacts and (3) developing and testing ways of restoring and rehabilitating forest within both badly degraded logged forest areas and largely oil palm landscapes – with attention focussed on the landscape scale, the long-term, downstream as well as in situ impacts and the more vulnerable steepland areas. Two multidisciplinary umbrella projects – the SAFE (Stability of Altered Forest Ecosystems) Project and the SEnSOR Programme – have formed the backbone of this latest phase. The SAFE Project is a ten-year programme assessing the effectiveness of retention of differing widths of riparian forest buffers and different- sized forest 'islands' within converted oil palm landscapes in reducing their adverse ecological, emissions, hydrological, erosional and water pollution impacts. The SEnSOR Programme is specifically testing the effectiveness of RSPO guidelines and possible improved land management measures. After a brief overview of some of the approaches and key findings of these studies, the paper focuses on some of the advantages, limitations and future needs of these studies. Important features of the projects are (1) the involvement of industry, Government and local people from the start in the projects, (2) the focus on the landscape scale and long-term (for example with use of current monitoring as well as a historical approach involving sediment dating and fingerprinting), (3) simultaneous consideration of impacts on a wide variety of environmental impacts, as impacts of land management practices can be beneficial to some but adverse to others. Key limitations and needs are then identified and discussed. The most important of these include how to reconcile the sometimes conflicting impacts of land management practices (and remedial measures) on different environmental parameters and concerns – what is good for Peter is sometimes very bad for Paul. A key need identified, therefore, is for methodologies to evaluate comparative environmental and socioeconomic benefits and costs of sometimes conflicting or alternative land management practices and options that emerge from usually separate scientific investigations of how to reduce impacts of, for example, soil erosion, landslide risk, streamwater pollution, atmospheric emissions, river ecology and landscape biodiversity (and its components). There is also a key need for involvement of social scientists in projects.