



Rapid replacement of riparian rainforest habitat and the impacts on the meandering dynamics of the Kinabatangan River, Borneo

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Meandering rivers are defined by their nature to migrate, remobilising floodplain sediment and constructing new surfaces for riparian vegetation to colonise. The presence of riparian vegetation has long been known to limit the ability of rivers to erode riverbanks, but it has remained unclear the principal means by which vegetation provides this function. As a result, most models that predict meandering behaviour do not fully incorporate vegetation, thereby limiting their utility where forest is rapidly replaced. The problem is particularly acute along the Kinabatangan River of Sabah in Malaysian Borneo, where oil palm plantations are replacing one of the oldest riparian rainforests on the planet. The area of Sabah has seen rapid and extensive land use change in the last 40 years, as virgin rainforest has been systematically cleared for logging, and to make way for oil palm plantations. In the 18 years from 1990 to 2008, Sabah lost half of its intact rainforest, which equates to more than 1.85 million hectares. Using Landsat imagery dating back to 1973, we report here the impacts of this rapid land-use change on rates of meander migration on a 280-km reach of the Kinabatangan River. The river planform has been remarkably stable throughout the time period of study, but individual meanders show a rapid response to large discharge events, migrating over an order of magnitude faster than nearby reaches. Rapidly migrating meanders generally occur along portions of floodplain that have been artificially cleared of riparian vegetation, potentially resulting in significant increases in sediment load and within-channel bar development.

A field campaign is planned to investigate the mechanisms by which riparian vegetation effect meander migration in these tropical regions.