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Changes in runoff response to rainfall after ecosystem disturbance by super-typhoon Haiyan: contrasts between Imperata grassland and reforestation (Leyte Island, the Philippines)

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As tropical oceans continue to warm globally, the strength and intensity of tropical storms and cyclones are predicted to increase over the coming decades with as yet unknown hydrological consequences. Being situated in one of the world's prime cyclone-generating areas and having deforested a major part of its land mass in the past, the Philippines suffer regular flooding and widespread mass wasting and sedimentation. In response to these problems the country has embarked on a massive reforestation programme in recent years. As part of a study comparing the hydrological response of degraded Imperata grassland (baseline) and semi-mature multi-species reforestation, streamflow from two watertight headwater catchments underlain by mafic rocks and located 3.5 km apart on Leyte Island was monitored for a year (June 2013–May 2014). On 8 November 2013 the catchments were hit by super-typhoon Haiyan – one of the largest events on record –providing an opportunity to study the storm's hydrological impacts for the two contrasting covers. In the grassland, old landslide areas expanded and new ones formed, increasing the landslide-affected area from 3.4 to 7.7%. No landsliding occurred in the reforest. Defoliation of the reforest temporarily reduced interception losses but forest leaf area largely recovered to pre-disturbance values by March 2014. Pre-Haiyan quickflow runoff coefficients Qq/P were 8.7% and 0.3% for the grassland and reforest, respectively, versus 23% and 2.7% after the typhoon. We are currently using a hydrological model to better separate the effects of vegetation destruction and landsliding during the typhoon from that of the higher rainfall during the post-Haiyan period and will present these results as well. Whilst it would seem that the hydrological behaviour of the study catchments may return to 'normal' within a comparatively short period it remains to be seen how the ecosystems will cope with more frequent disturbances of similar magnitude.