



The potential influence of the invasive plant, *Impatiens glandulifera* (Himalayan Balsam), on the ecohydromorphic functioning of inland river systems

Philip (Phil) Greenwood, Wolfgang Fister, and Nikolaus Kuhn

Dept. of Environmental Sciences, University of Basel, Switzerland (philip.greenwood@unibas.ch)

The invasive plant, *Impatiens glandulifera* (common English name: Himalayan Balsam), is now found in most temperate European countries, as well as across large parts of North America and on some Australasian islands. As a ruderal species, it favours damp, nutrient-rich soils that experience frequent natural disturbance, such as riparian zones. Its ability to out-compete native vegetation and tendency to suffer rapid dieback during cold weather has led to repeated speculation that it may promote soil erosion, particularly along riverbanks. Despite the strong implication, its ability to promote erosion has only recently been empirically proven during an investigation over one dieback and regrowth cycle along a small watercourse in northwest Switzerland. This presentation now benefits from additional results covering further dieback and regrowth cycles obtained from the same watercourse as above, and from a different river system in southwest UK. These additional results support the original conclusion that *I. glandulifera* promotes soil erosion along riverbanks and the riparian zone. Importantly, the equivalent ground surface retreat from each group of contaminated locations over the three dieback and regrowth cycles are comparable with erosion in regions where high magnitude events are often recorded. Given these very high erosion rates, albeit over three monitoring phases, it is hypothesised that *I. glandulifera* may act as a catalyst for repeat cycles of colonisation, dieback and extreme erosion. Aside from the deleterious effect of large quantities of nutrient-rich sediment entering into watercourses, high magnitude soil loss such as this could result in reach-scale sections of riverbank undergoing profound morphological changes and reduced structural stability. Dynamic modifications such as those could ultimately impede the ability of riverbanks to moderate stream flow and offer flood protection, as well as hamper the capacity of riparian zones to buffer and retain sediment and associated contaminants during their passage from terrestrial to aquatic environments. Given the dearth of effective intervention measures to halt, or even slow, the spread of *I. glandulifera*, the impact of extreme erosion driven by this invasive plant could eventually affect the ecohydromorphic functioning of whole river systems, thus making their management extremely difficult and complex.