A global review of risk–cost–benefit assessments for introductions of biological control agents against weeds: a crisis in the making?

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Risks of non-target effects resulting from introductions of exotic organisms for the biological control of exotic pests are a growing major concern because: a) a small number of previous introductions are having significant negative impacts on rare native species, b) exotic organisms are an increasing global threat to sustainable agriculture and biodiversity, c) risk assessment, as applied to environmental threats of species invasions and harmful effects of releases of genetically modified organisms, is a burgeoning new field, and d) biological control is increasingly being used in complex natural ecosystems where indirect impacts are harder to predict. As a result, governments are adopting a more risk-averse attitude to biological control as they assess such releases from an environmental as well as agricultural stand point. In this paper we review the risk assessment processes used by regulatory bodies around the world to pre-judge biological control introductions against weeds in light of risk–benefit–cost (RBC) assessment theory. The aim is to publicize both strengths and weaknesses and to help encourage existing risk-assessment processes to be fair to all without blunting the value of biological control as a recognized effective tool against increasingly damaging exotic weeds. The six key components of formal RBC assessment are: 1) a comparative assessment of the RBC of biological introductions relative to other types of introductions, 2) a full identification of hazards, benefits and costs, 3) exposure analysis of identified hazards and benefits, 4) clearly defined procedure, responsibility and democracy in the decision process, 5) procedures to manage risks where appropriate, and 6) procedures to evaluate outcome in relation to the risk assessment, 7) adequate communication/consultation on RBC at all levels. Currently, only New Zealand addresses the concepts of a formal ecological RBC assessment of biological-control introductions with a precautionary approach, open consultation, broad definition of risk taken in the release application, and a judicial basis to the decision. What is also clear is that the benefits of biological control remain poorly understood by the public, such that the risks are given disproportionate attention. We make recommendations to address this and discuss the outcomes of the review with respect to the inherent social risks of making assessment of biological control releases an overly protracted process.