The forest protection service: a risk management decision support tool

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In recent years in mountain areas, natural hazards such as rockfalls, avalanches and mudflows, triggered by ongoing climate change have increased in both frequency and magnitude. Hazards that, accompanied by increasing demographic pressure, socio-economic and land-use changes, especially in the Alpine region, have called for a greater need for human protection. This demand can be met with artificial structures, such as rockfall nets and avalanche fences, or with natural solutions, such as forests if properly managed. However, the protection service provided by forests, against natural hazards is difficult to value because it has no target market. Therefore, providing a value for this service would allow it to be integrated into risk management plans and programs. In this work, we analyzed from a qualitative and quantitative point of view the most widely used economic methods for estimating the protection service provided by forests against natural hazards, providing a decision support tool for stakeholders involved in risk management. The main results indicate that, depending on the resources and time available, as well as the spatial and temporal scale required, some methods are preferable to others. The Replacement Cost method is well suited to most operational contexts in which stakeholders may find themselves, as it is replicable, cost-effective and results are reliable and easily communicated. Although the Avoided Damages method refers to market data and is also capable of estimating indirect costs, it has the limitation of being site-specific. While the stated preference methods are suited for long-term evaluations on a large spatial scale, they require a high level of expertise and are costly in terms of both time and resources. From our analysis, we can conclude that the provided decision support tool should not replace the human ability to analyze complex situations, but rather be an aid to this process. The combination of this tool with others, such as frameworks and guidelines, provides a flexible support system aimed at improving the design and implementation of future ecosystem service assessments and management, as well as related decision-making.