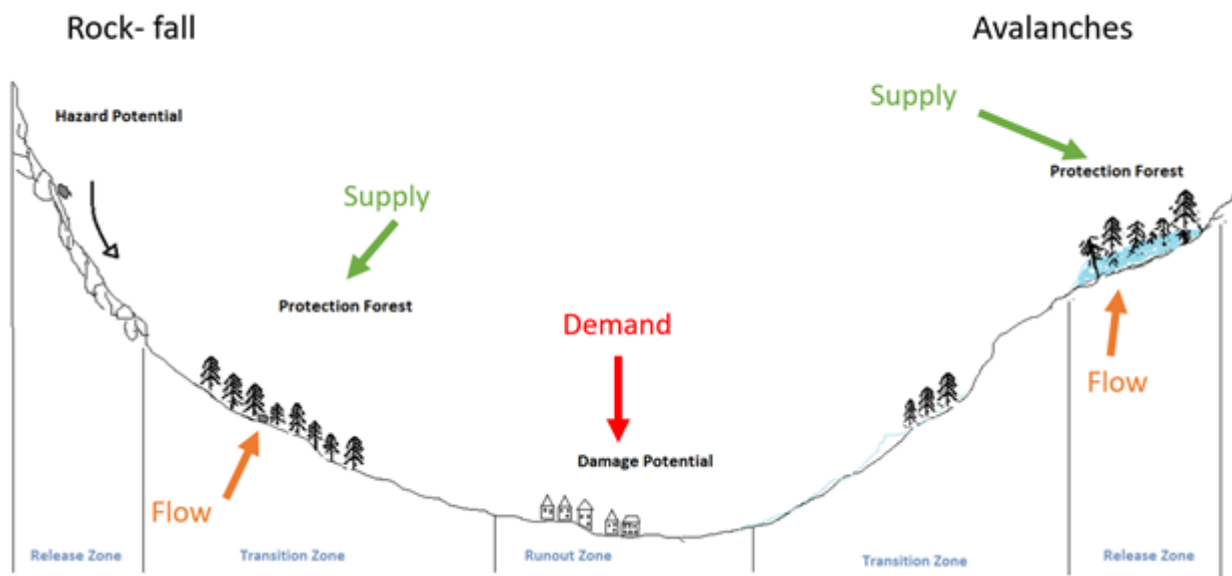# Protection forest

Forests in populated mountainous areas have a very important regulating function: the protection of soils, slopes and people from gravitational mass movements and hazards.

"A protection forest is a forest that has as its primary function the protection of people or assets against the impacts of natural hazards or adverse climate. This definition implies the simultaneous presence of (i) people or assets that may be damaged, (ii) a natural hazard or a potentially adverse climate that may cause damage and (iii) a forest that has the potential to prevent or mitigate this potential damage." [1]

To speak of a protection forest there needs to be a **natural hazard potential**, a **damage potential** and a **forest** that has a **protective effect** against the natural hazard.

- **Natural hazard potential:** The natural hazards whose impact forests can mitigate or even prevent are gravitational, erosion and channel processes. They include avalanches, landslides, rock-falls, mudslides, debris flows and overbank sedimentation. Slower hazardous processes like erosion through wind, water and floods are usually weakened and hindered by forests as well.
- **Damage potential:** Is defined in this context as all human assets, infrastructures and economically used areas that are at risk/ endangered by a natural hazard.
- **Protective effect of forests:** The protective function of forests includes both direct and indirect protection[2] . Indirect Protection being the prevention of soil erosion and regulation of waterflow, direct protection the shielding of human life and activities[3] . This distinction can also be found in the laws on protection forests of the Alpine countries. The Austrian forestry law (ForstG 1975 ver.2002) for example classifies protection forests in **'site protection forest'** (erosion and unpopulated area protection) and **'object protection forest'** (safeguarding human life, infrastructure and cultivated areas).

The protective function of a forest can vary depending on the hazard it is protecting from. In the case of snow avalanches for example the protection of forests lies mostly in the stabilizing effect on the snow cover in the potential avalanche release areas (areas with a steep enough slope, a terrain that enables snow accumulation and enough precipitation in winter). The interception of snow on the tree crowns results in a lower snow cover thickness and the shading from sunlight can impede the occurrence of unstable snow layers, which are one of the main causes of avalanche release. The protective effect of a forest against rockfall hazards on the other hand is strongly dependent on the tree stem density in an area and the diameter of these stems at breast height[4] . In the case of fall processes, the forests are an actual barrier that shortens the transition zone and runout area. Already these two examples show how diverse the influence of the ecosystem is and how difficult it can be to differentiate between services and disservices. Also mapping the whole ES chain is challenging because there are different spatial and topographic factors influencing different events (see Fig. 1)

ES Indicator Development

The ecosystem service is defined in CICES as Erosion / landslide / gravity flow protection; vegetation cover protecting/stabilising terrestrial ecosystems; **vegetation on slopes also preventing avalanches (snow, rock)**. It is part of the mass stabilisation and control of erosion rates (category) which belongs to the mediation of flows (division) more specifically mass flows (group).

To delineate a protection forest it is essential to find out where the above-mentioned criteria are evident and a forest has this additional function and role.

To accomplish this there are different model approaches possible depending on the scale of the assessment and the available geodata. A very good overview of these approaches can be looked up in the reports of various Projects (ProAlp, PARAmount, SilvaProtect)

Within the AlpES project the provision dynamics of the ES protection of areas against avalanches, mudslides and rockfalls in the Alps were assessed by means of the following supply, demand and flow indicators:

- Supply: Site-protecting forest (%)
- Flow: Object-projecting forest (%)
- Demand: Infrastructure at risk (%)

Web links

https://www.bmlfuw.gv.at/forst/schutz-naturgefahren/schutzwald.html

http://www.waldwissen.net/wald/schutzfunktion/wsl_schutzwald_schweiz/index_DE

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ecosystem services, AlpES project

[1]

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[2]

MCPFE 1998 - Ministerial Conference for the Protection of Forests in Europe, 1998. Lisbon

[3]

Notaro, S., Paletto, A., 2012. The economic valuation of natural hazards in mountain forests: An approach based on the replacement cost method. Journal of Forest Economics 18, 318–328. doi:10.1016/j.jfe.2012.06.002

[4]

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