

Fig 1 | a) Vegetation in arid ecosystems grows in patches. The associated growth provides enhanced local growth conditions as well as protection against grazing. With decreasing environmental quality, vegetation declines and the landscape becomes more fragmented (mid column), leading to desertification (right column). b) Schematic representation of plants growing in patches. The direct neighborhood of plants provides shelter, retention of organic matter and water below and atop the soil surface. Spots remote from vegetation suffer erosion and evaporation. c) The cellular automata model used in this study distinguishes three states: occupied by vegetation (black), empty but fertile (grey) and degraded (white). d) Cumulative patch size distributions described by power law models: with decreasing environmental quality, the number of large patches declines, turning the power law distribution from up-bent (left) to down-bent (mid). Degraded landscapes have lost all the larger patches and are not to be described by a power law (right).

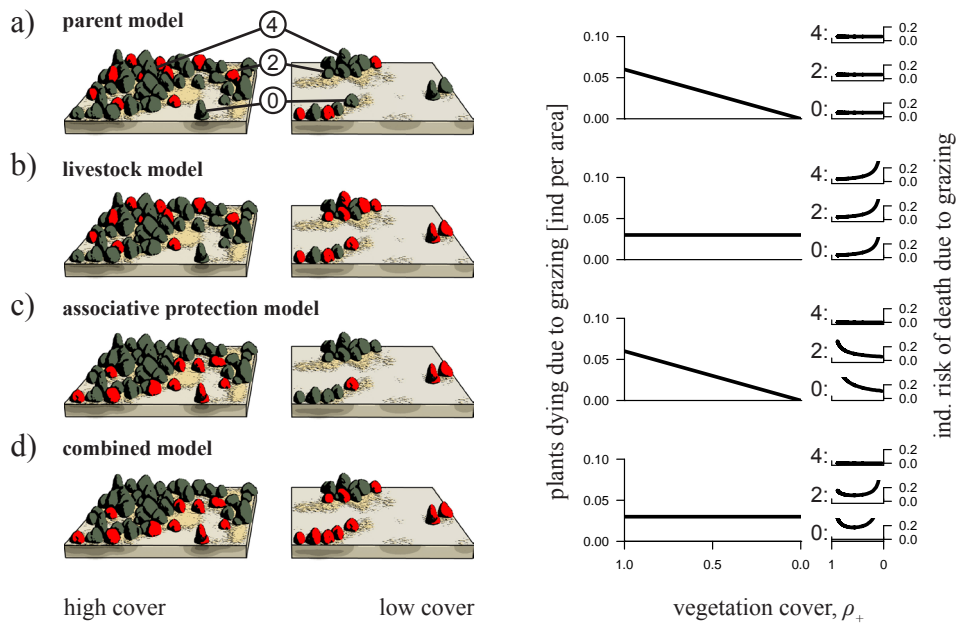


Fig 2 | Grazing affects the mortality of individual plants and the patch structure emerging in the landscape. The four models compared in this study use different assumptions on the quantity and spatial differentiation of a particular grazing pressure. Visualized in the left column are the plants dying due to grazing (red). In each model, plants suffer different individual risk, sometimes depending on the number of direct local neighbors (estimates for plants with 4, 2, or 0 neighbors). a) The **parent model** as formulated in Kéfi et al 2008 assumes that grazing affects a proportion of living plants, i.e. individual risk is independent of global vegetation cover and shared evenly among all plants. b) The **livestock model** assumes a constant number of plants dying, regardless of the number of plants available. The individual risk is increasing when vegetation cover is low. c) Assuming **associative protection** leaves plants in the patch center unaffected by grazing (4), whereas plants at the patch border (2) or growing isolated (0) are suffering more from grazing. Particularly at high vegetation cover, the proportional grazing concentrates on those plants. d) The **combined model** is integrating both assumptions leading to highest individual risk at low and high vegetation cover for isolated plants.

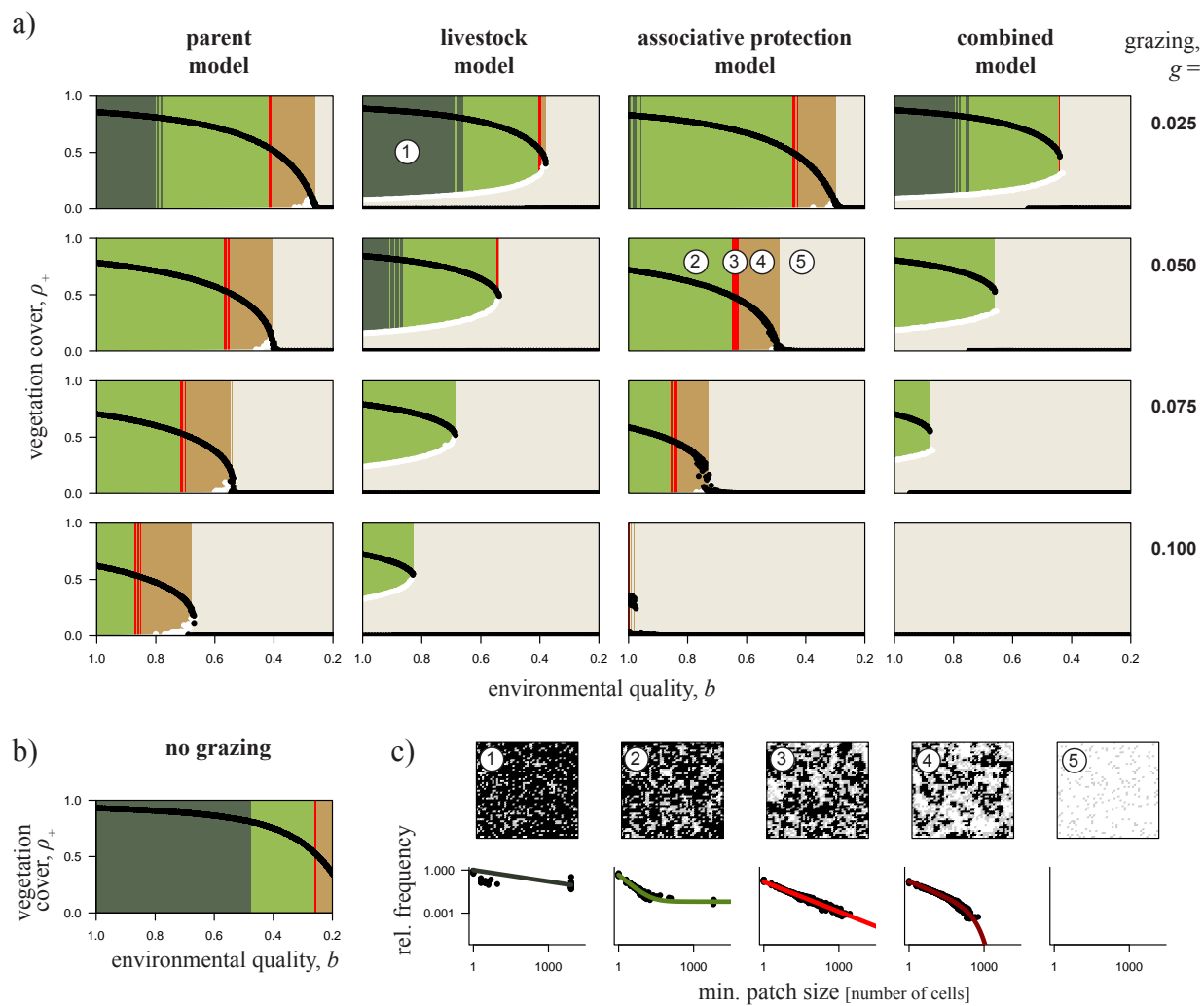


Fig 3 |

