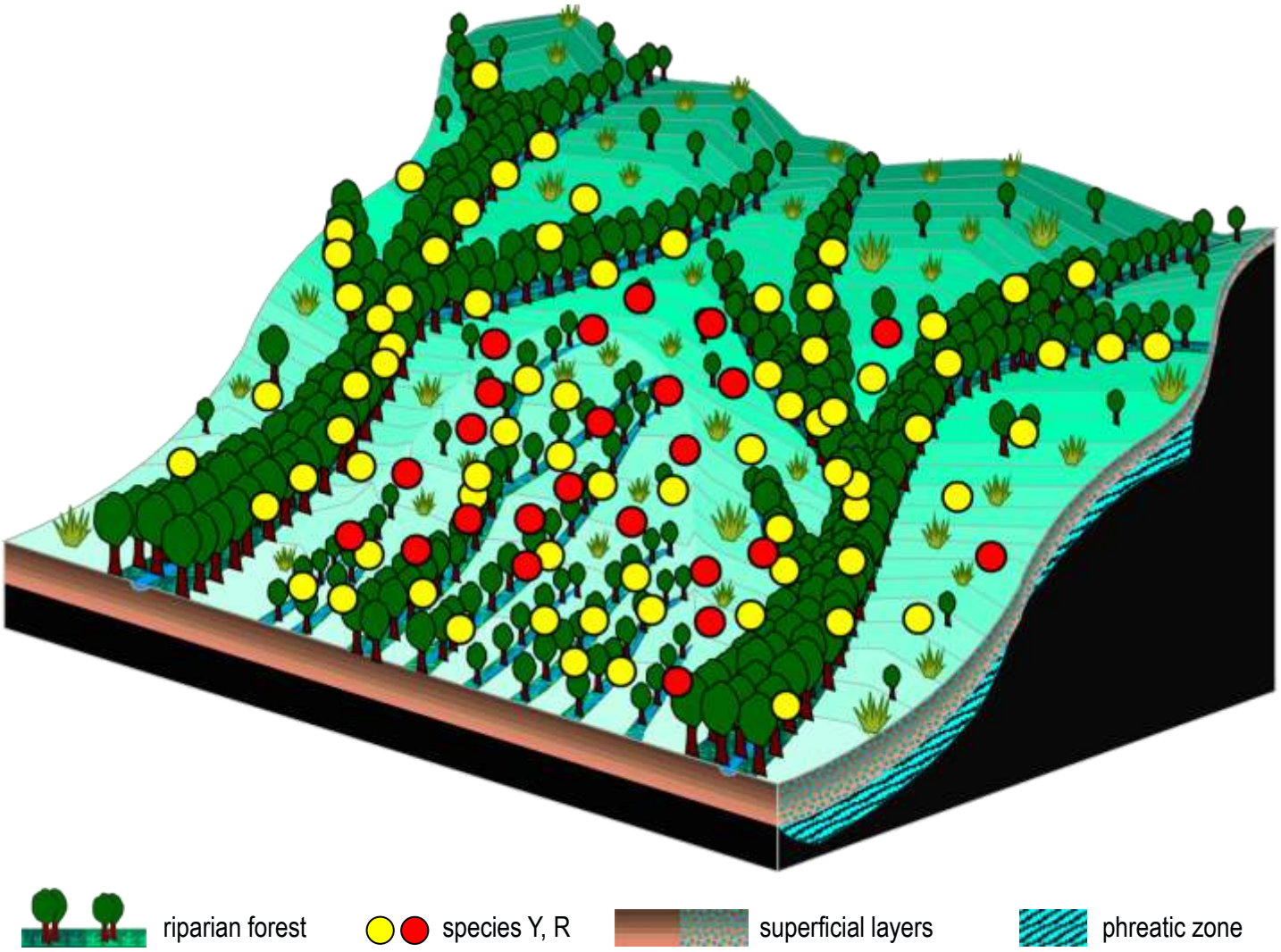

Evolution, during paleoclimatic oscillations, of abiotic factors, including surface layers, slope, phreatic zone, and rivers, and of biotic features, including riparian forest and two hypothetical forest species. (altitude not to scale)

Figure S1. Situation during a humid phase: rainfall is abundant and river flow is high and continuous; the surface layers are moist and the phreatic zone is well fed; forest cover is expanding. Species Y (yellow) is abundant in riparian and other forest formations; species R (red) is more common in other (non-riparian) forests as a consequence of competition with Y in riparian forests.

Mercier, J.-L. and Wilmé, L. 2013. The Eco-Geo-Clim model: explaining Madagascar's endemism. Madagascar Conservation & Development 8, 2: 63–68. http://dx.doi.org.104314/mcd.v8i2.3 Supplementary Material.

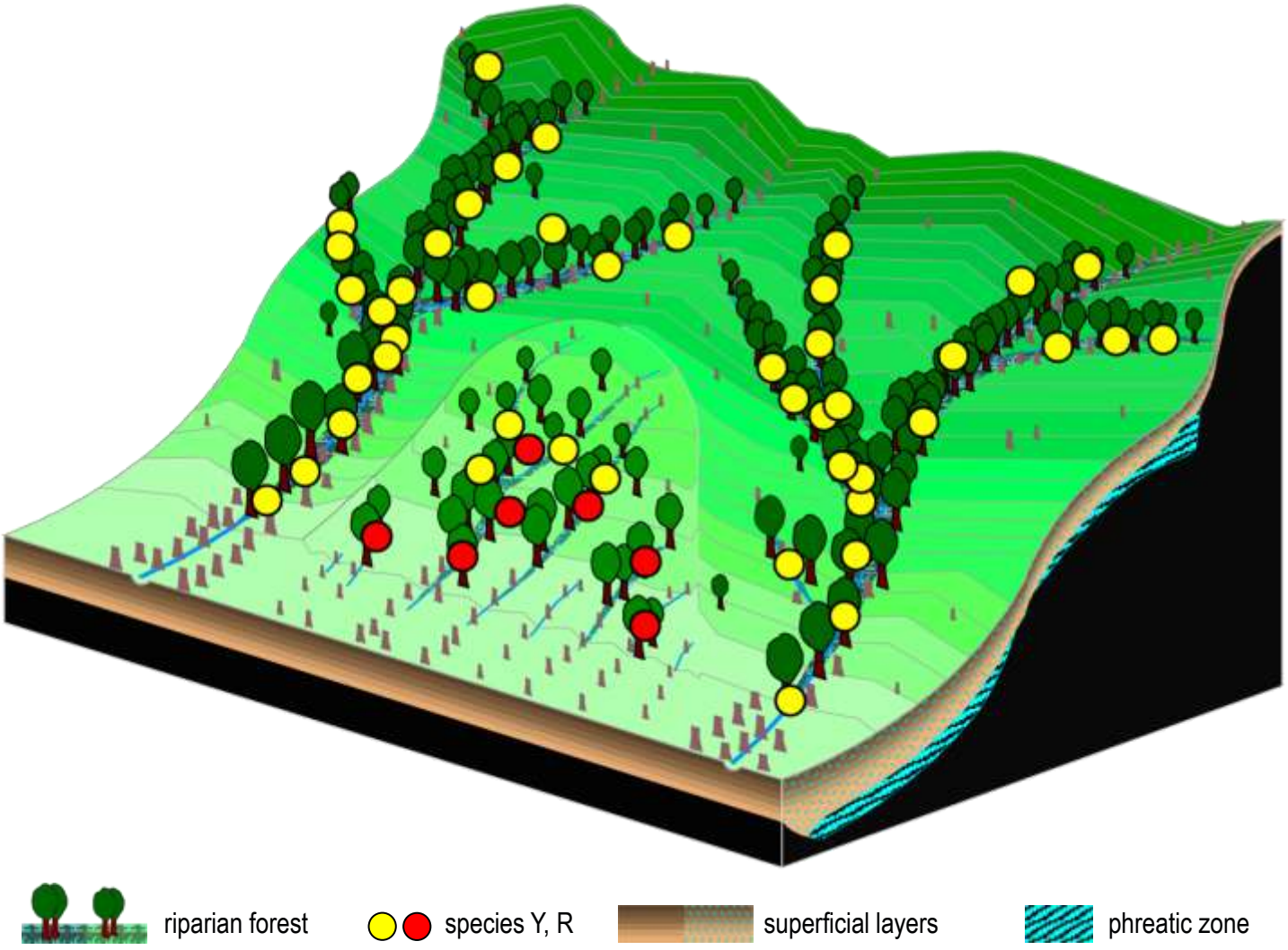

Figure S2. Situation as the climate becomes drier: rainfall decreases, evaporation is higher, rivers with headwaters at lower altitudes dry up, and rivers with headwaters at higher altitudes are fed intermittently, at least along their mid-portions. The site-specific hydrologic balance decreases, surface layers dry up, and the water table drops. Slope instability increases as erosion becomes more widespread. Forests recede, disappearing from drier areas but persisting along rivers where the water table remains close to the surface. Species Y disappears from the driest areas but is able to survive in riparian forest where conditions remain suitable; species R survives in drier forests, but suffers from increased competition with species Y in riparian forest.

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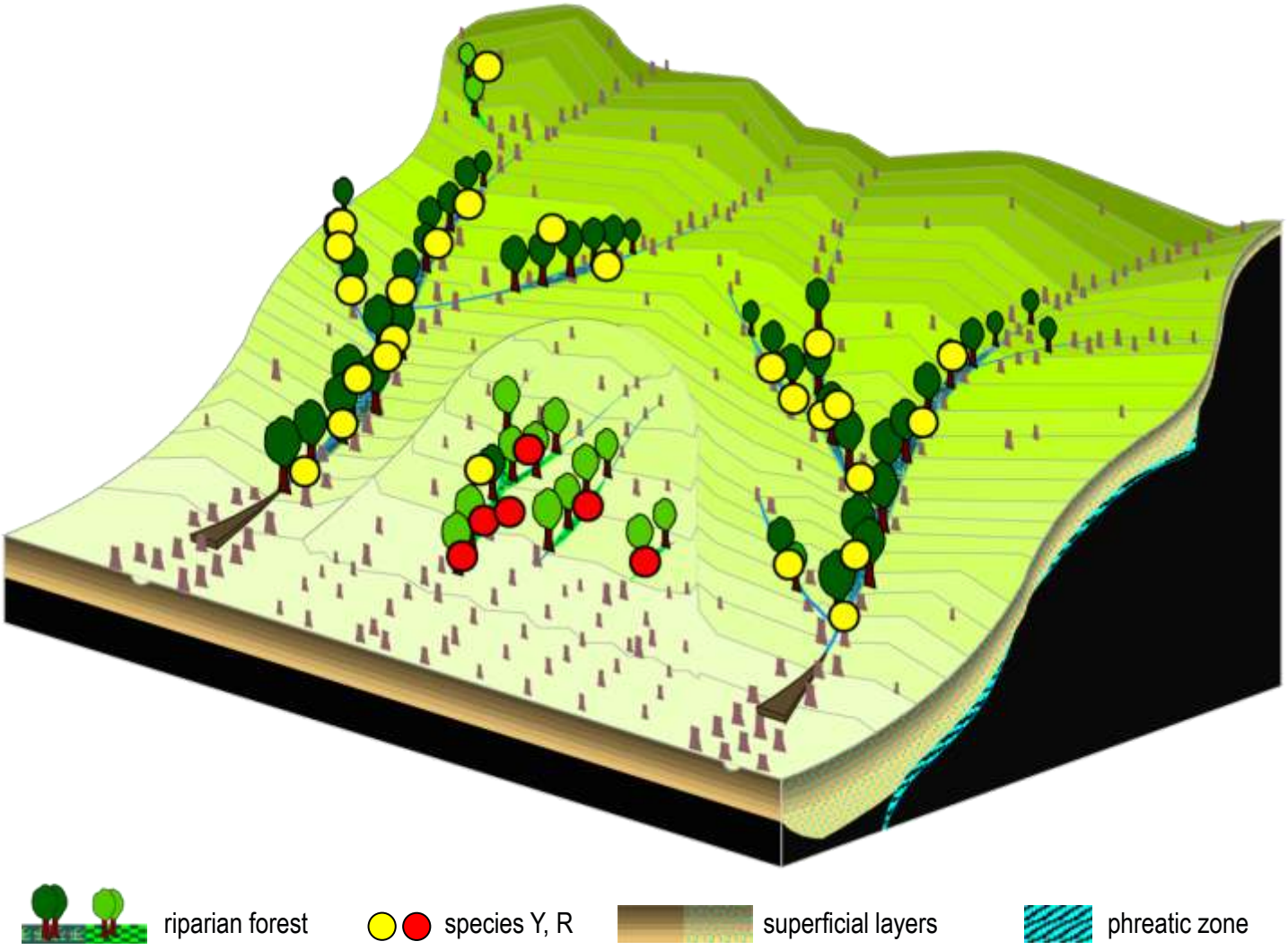

Figure S3. Situation as the climate dries further: river flow decreases and becomes sporadic; river courses become longer as sea level drops; slopes are more unstable with increased erosion and river sedimentation; an alluvial fan appears at the knick point. The site-specific hydrologic balance decreases further, surface layers become drier, and water table drops further. Forests recede even more. Species Y disappears from dry forests, reduced populations survive in riparian forest only along larger rivers with higher altitude headwaters; species R survives in the remaining pockets of dry forest.

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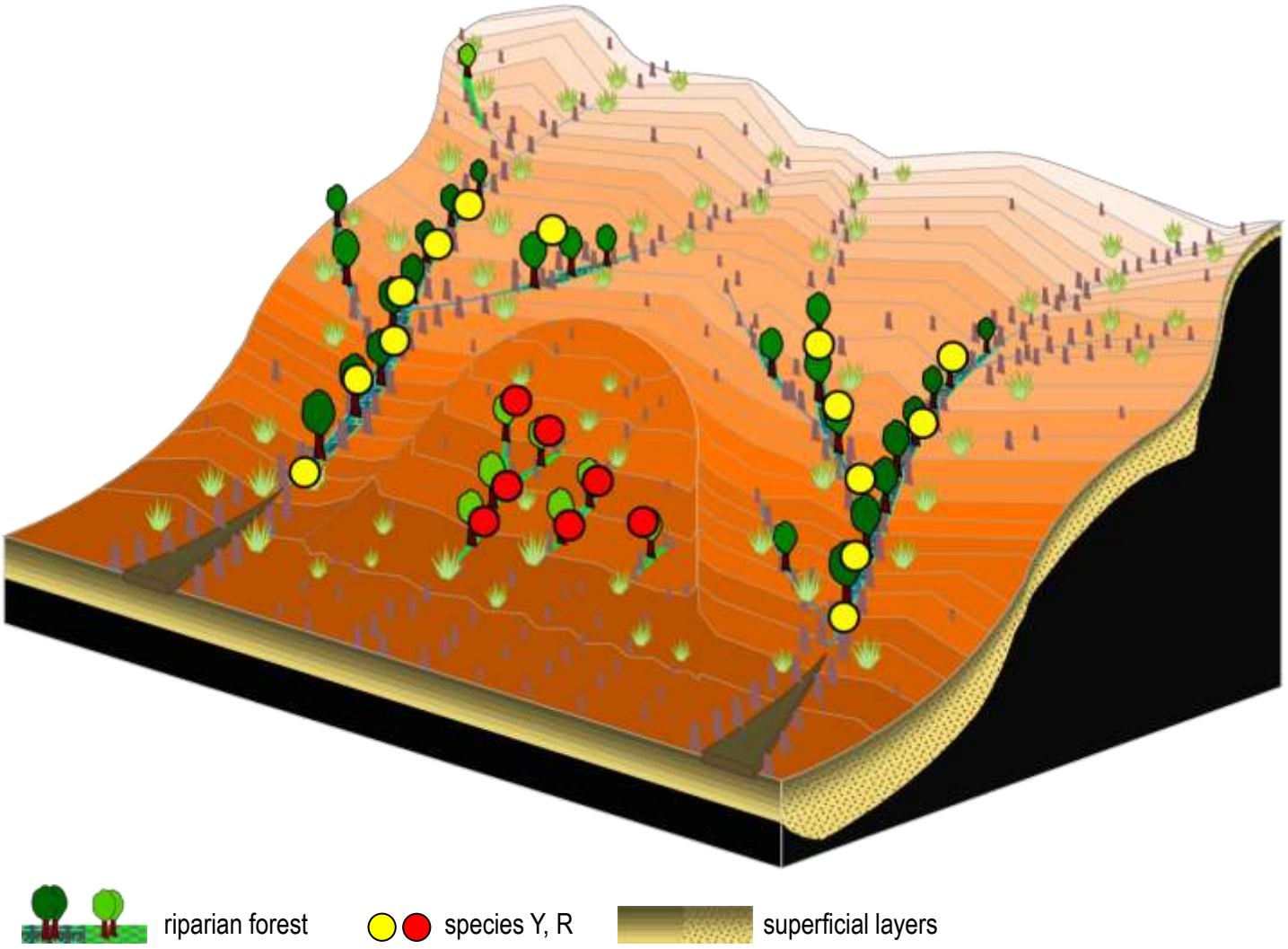

Figure S4. Situation during the most arid phases: soil horizons are dry, the phreatic zone is discontinuous except below the mid-portion of rivers with high altitude watersheds and in isolated pockets within residual reliefs (e.g., karsts). Forests recede further, becoming limited to the riparian zone, which is drier along the small rivers. Species Y is restricted to riparian forest along rivers with high altitude headwaters, while species R is limited to watersheds with headwaters at low altitude, within the last remaining pockets with adequate moisture to maintain a forest cover.

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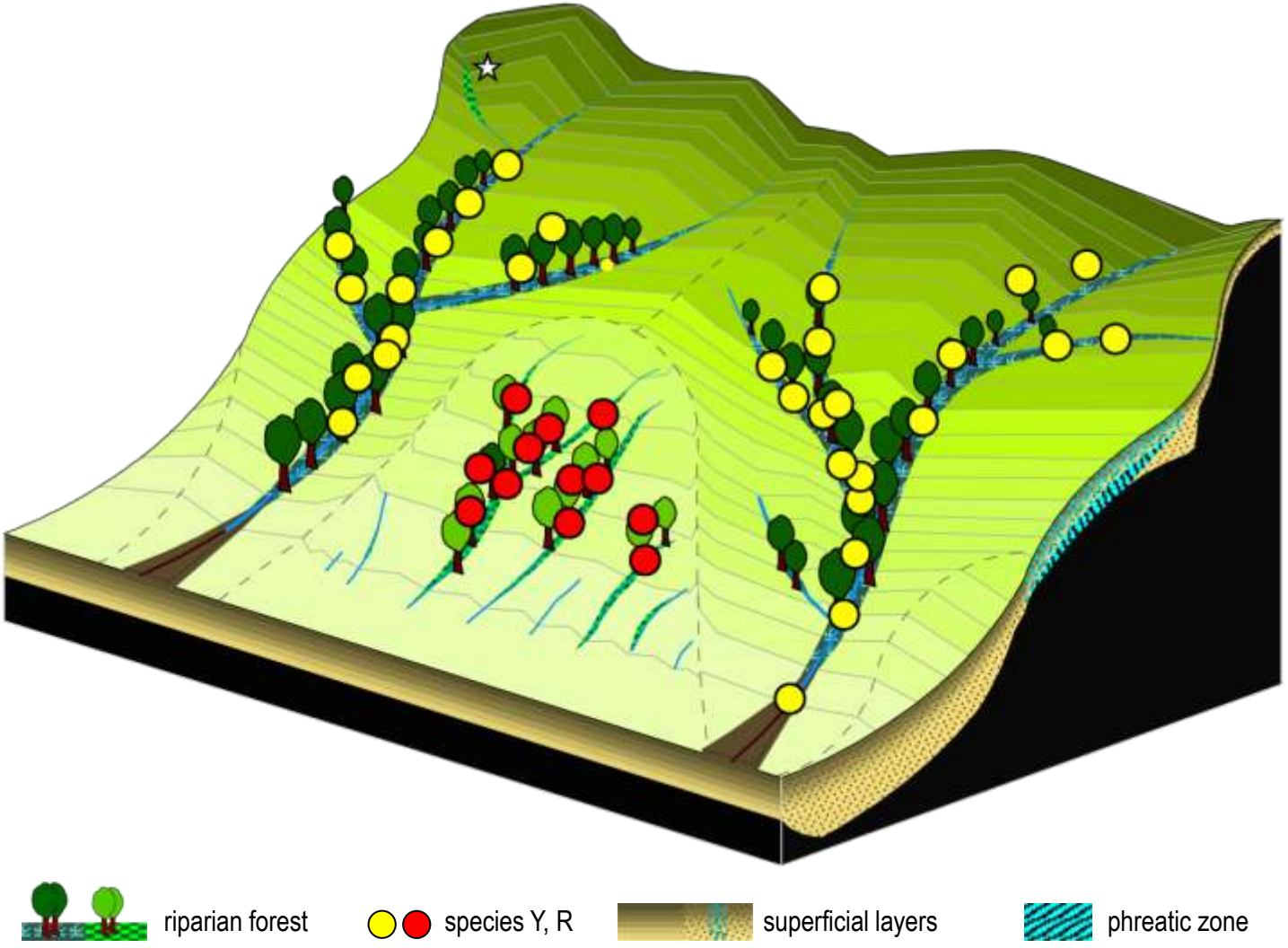

Figure S5. Situation after a dry phase, when the climate becomes wet again: rainfall and river flow increase, surface layers become wet, the phreatic zone is once again fed. Some tributaries reconnect to the main rivers. Forests expand along these tributaries. Species Y disperses along the expanding riparian forest as tributaries aggregate to the re-establishing river system; species R is a narrow-ranged taxum endemic to the Central Menabe.

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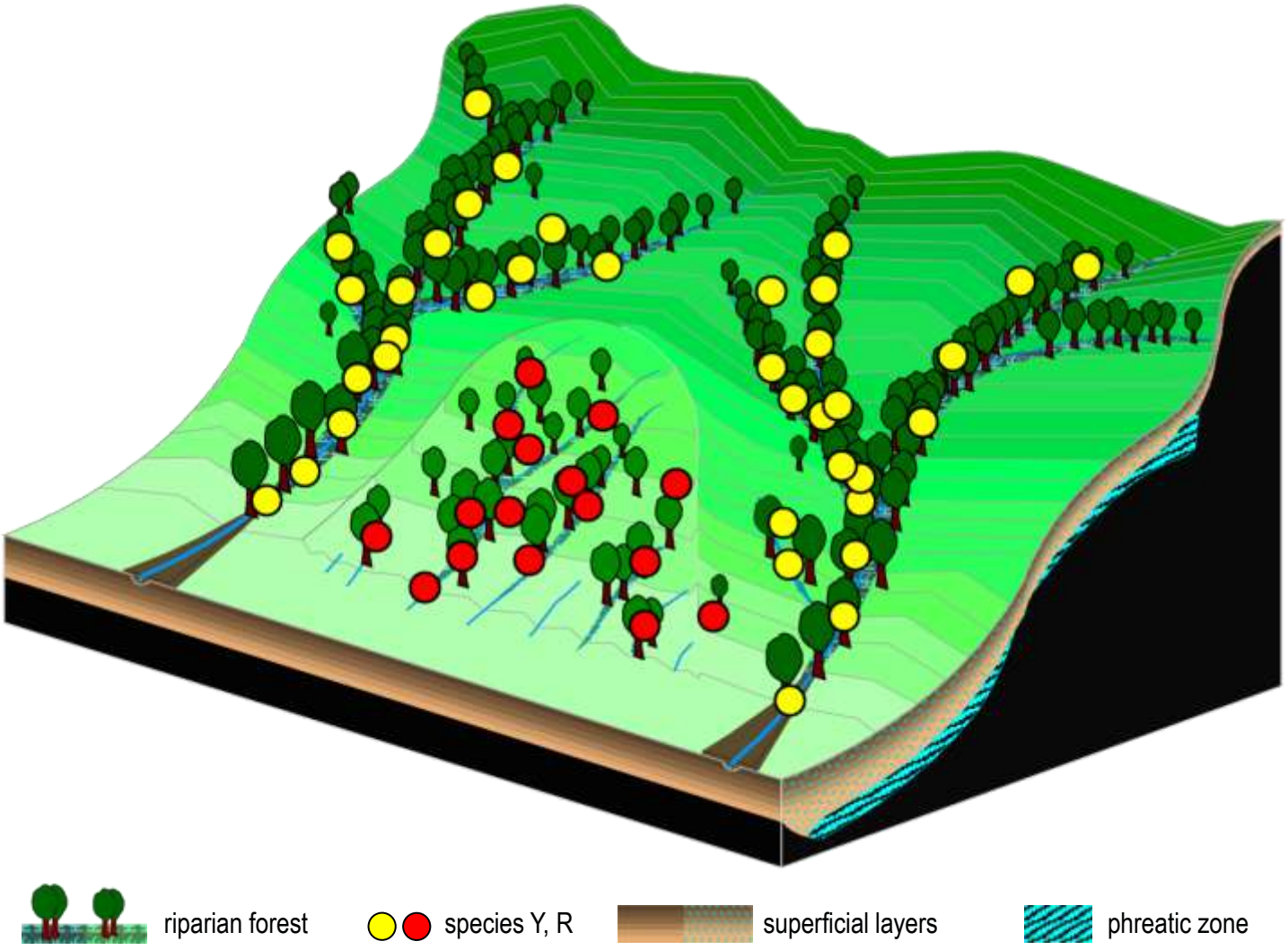

Figure S6. Situation as the climate continues to become wetter: rainfall and river flow increase, surface layers become wet, the phreatic zone is once again well fed. More tributaries reconnect to the main river. Forests expand along these tributaries. Species Y disperses along the expanding riparian forest as tributaries aggregate to the re-establishing river system; species R is a narrow-ranged taxum endemic to the Central Menabe. The watersheds with groundwater fed by precipitations and with headwaters at low altitudes remain isolated vs. connected system within watersheds with rivers and tributaries with headwaters at higher altitudes.

Mercier, J.-L. and Wilmé, L. 2013. The Eco-Geo-Clim model: explaining Madagascar's endemism. Madagascar Conservation & Development 8, 2: 63–68. http://dx.doi.org.104314/mcd.v8i2.3 Supplementary Material.