**Supplementary Fig. 1** Conceptual workflow of this study. Step 1, eight vegetated landcover types with no change over 18 years were extracted to conduct multiple regression analyses; Step 2, regressions of vegetation structural (LAI deficit) and functional (GPP deficit) responses over climate drivers (including temperature (°C, T), precipitation (mm, P), TP index, Dryness index, SPEI (Standardized Precipitation Evapotranspiration Index)) were conducted over all vegetated pixels and within each vegetation type; Step 3, 10 regression analyses and probability density function (PDF) curves of 7 variables shedding new light on future landcover changes. Step 4, direction and intensity of landcover change were quantified using time series and transition matrices.

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