APPENDIX S1: Data details

This appendix includes the following sections:

- *Species data and study areas*
- *Explanatory variables*
- *Data for life forms, long-distance dispersal vectors and climate zone associations*

Species data and study areas

Data on the geographic distribution of 2,728 native European plant species were obtained from Atlas Florae Europaeae (AFE; volumes 1–13; Jalas & Suominen, 1972-1994; Jalas *et al.,* 1996, 1999; Kurtto et al. 2004), which covers c. 20% of the European flora and maps species distributions on an equal-area grid with cells of c. 50 × 50 km (Fig. S1.1a). Only species level information was used, i.e. the distribution of subspecies and varieties were combined, and in the case of aggregates, the distribution of the aggregate was used.

We used different study areas for computing the LGM range, accessibility and range shifts for each species and for the logistic regression of each species current distributions (see the main text for the reasons): (i) The species distribution models were calibrated using both native and naturalized occurrences of each species across all of Europe, including the former Soviet Union (n = 4878 AFE cells; 31.3 °W to 68.7 °E; 27.6 to 82.9 °N)(Fig. S1.1a). (ii) The obtained species distribution models were hind-casted to the area covered by the LGM climate simulations (10.9 °W to 50.0 °E; 33.9 to 74.7 °N)(Fig. S1.1b). (iii) The logistic regression modelling was performed within Europe, excluding the former Soviet Union (34.9 °N–71.0 °N and 9.5 °W–29.6 °E)(Fig. S1.1c). In addition, coastal cells with less than 10% land and cells without estimates for the LGM climate were excluded, leaving n = 2,276 AFE cells.

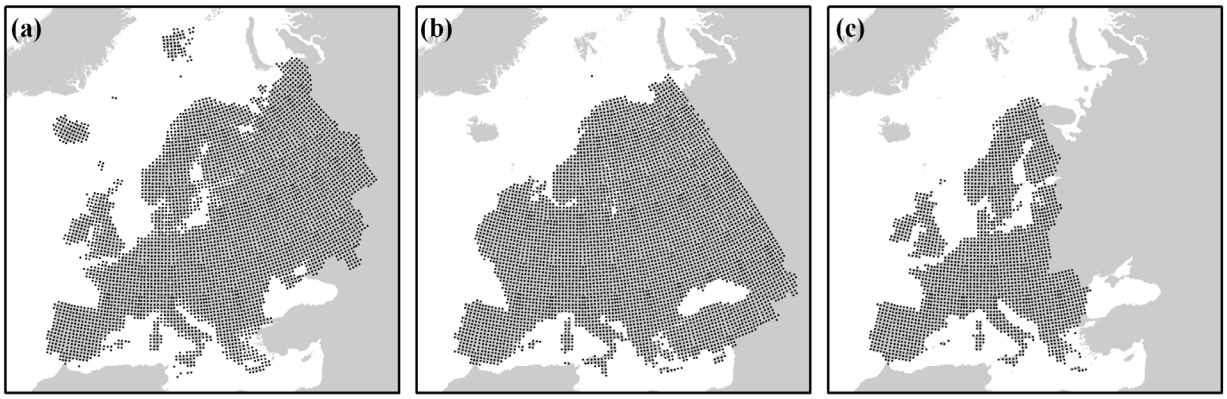

Figure S1.1 Different study area extents. Each dot represents the centroid of the AFE-cells included in each study area.

Explanatory variables

We derived three key bioclimatic variables from monthly values of mean temperature and precipitation in the current as well as the two LGM climate datasets: absolute minimum temperature of the coldest month (TMIN), growing-degree-days (GDD), and water balance (WBAL). TMIN was calculated following Prentice *et al.,* (1992). GDD was computed as the sum of daily mean temperatures on days with temperatures >5°C (Prentice et al., 1992; Zimmermann & Kienast, 1999). WBAL was computed as the yearly sum of the monthly differences between precipitation and potential evapotranspiration (Lugo *et al.,* 1999; Skov & Svenning 2004).

The explanatory variables showed the following correlations (Spearman's rho; for accessibility (ACC) the median and, in parentheses, the minimum and maximum across all species are given): TMIN–WBAL −0.40; TMIN–GDD 0.79; WBAL–GDD −0.72; TMIN–ACC 0.65 (−0.42, 0.87); GDD–ACC 0.75 (0.01, 0.89); and WBAL–ACC −0.38 (−0.58, 0.03).

Data for life forms, long-distance dispersal vectors and climate zone associations

Data on life forms were kindly provided by Christopher D. Preston and is the same as used by Finnie *et al.* (2007). The species were categorized as fern (including fern allies), annual herb, perennial herb, shrub (including woody climber), or tree. Data on long-distance dispersal (LDD) vectors (i.e., anemochory, hydrochory, epizoochory, endozoochory, dysochory, and hemerochory) were compiled from three databases: LEDA (Kleyer *et al.* 2008), DIASPORUS (Bonn *et al.* 2000), and BIOPOP (Poschlod *et al.* 2003). The number of LDD vectors recorded for each species was used as a surrogate for its LDD potential; the rationale being that the more LDD vectors a species has, the higher is its probability of achieving LDD. Each species was assigned to one of seven climate zones (Northern-Alpine, ALN; Southern-Alpine, ALS; Atlantic, ALT; Boreal, BOR; Continental, CON; Mediterranean, MED; and Pannonian, PAN) based on the prevalence of the zones within their current native ranges (Fig. S1.2). The assignment were performed by computing the area of each climate zone (measured as the number of pixels of ca. 1 × 1 km) within the 50 × 50 km AFE cells where a given species occurs and assigning the species to the climate zone with the largest area in its range. Information about the geographic distribution of the climate zones in Europe was obtained from Metzger *et al.* 2005.

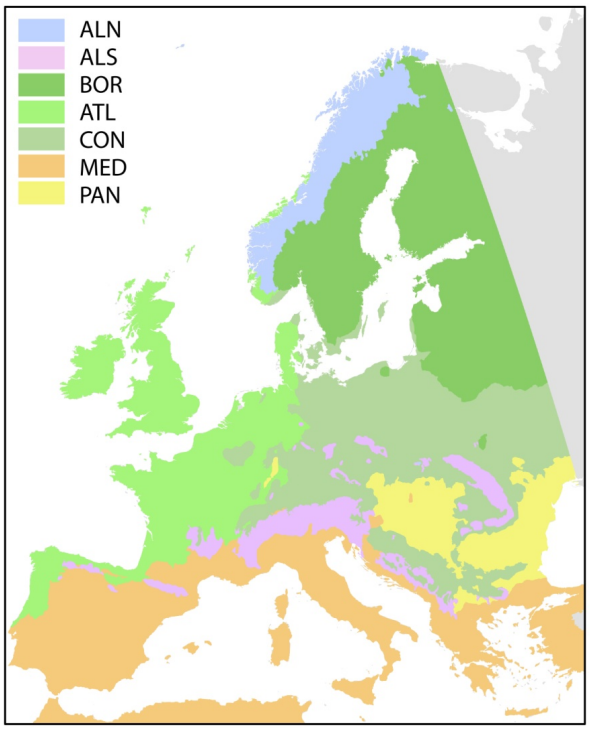

Figure S1.2 Distribution of the seven climate zones to which species were assigned. Modified from Metzger *et al.* (2005).

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