azing). The model developed here exploits this methodology, basing rules for change on the behaviour of broad land-cover classes (defined in Table 4.1) and their interaction with key environmental resource constraints (water and light availability) and disturbance (fire and agriculture). A schematic overview of the model procedure is presented in Figure 4.1.

Table 4.1 Land-cover classes represented in the model. Potential transitions between land-cover classes are shown with the duration over which they occur. Transitions and durations are derived from previous literature and 'expert' knowledge as described in detail in section 4.4.4, and specified in Appendix I.

State	*Land-cover*	*Description*	*State Change*
1	Pine	Primarily *Pinus pinea* and *P. pinaster*	→ 2; 15 – 40 years*
			→ 3; 20 years
2	Transition Forest	Mixed *Pinus, Quercus* and *Juniperus* species	→ 1; 20 – 30 years
			→ 3; 20 – 25 years
			→ 4; 20 – 50 years*
3	Deciduous	Primarily chestnut (*Castanea sativa*) and alder (*Alnus glutinosa*) but also *Populus* species	→ 1; 20 – 30 years
			→ 2; 30 – 40 years
4	Holm Oak	*Quercus ilex*	→ 2; 30 years
5	Pasture	Land exclusively reserved for livestock grazing	→ 8; 3 years
6	Holm Oak with Pasture	Representative of traditional *dehesa* woodland	→ 8; 3 years
7	Cropland	Cereals, vines, olives, almonds and figs	→ 8; 3 years
8	Scrubland	*Cistus, Lavandula* and *Genista* species with *Pinus* and *Quercus* species	→ 1; 10 – 15 years
			→ 2; 15 years
			→ 3; 15 – 20 years
			→ 4; 30 – 50 years
9	Water/Quarry	River, reservoir or open stone quarry	
10	Urban	Built-up area	
11	Burnt	Post-fire condition of states 1 – 8	→ 8; 3 years

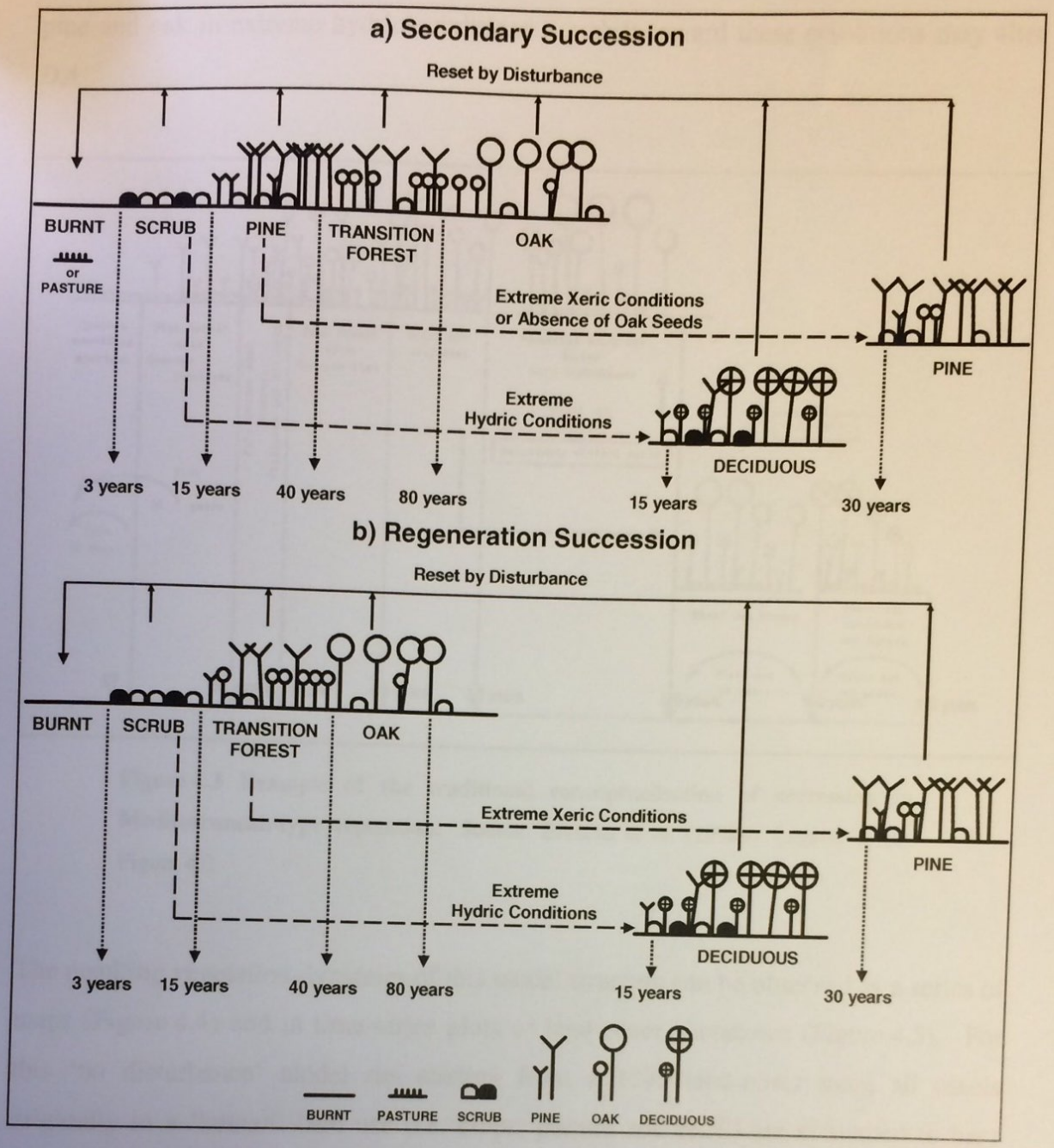

Figure 4.2 Succession pathways used the LFSM. a) secondary succession and b) regeneration succession. Directions and rates of transition are shown for various environmental conditions.

The routes and durations specified in the look-up table are expected directions and times to transition for pixels under conditions in which pixel physical attributes do not change. Values for $D\Delta$ and $T\Delta$ will vary if pixel attributes change in time. Specifically, these values will vary depending upon seed, light and water availability. For example, if a seed source becomes available that was not present previously, the transition may change toward the vegetation represented by the seed source (e.g. transition from Scrub → Pine may change to Scrub → Deciduous if seeds are available for the later and conditions are hydric). A second example is that deciduous species will out-compete