

Box S1. Selected examples of recent publications in ecology, biogeography, conservation biology, nature management, and sociology and politics with “extinction” in the title.

Ecology

Smith et al. (1993)	Wake and Vredenburg (2008)	Thomas (2017)
Gaston (2008b)	Wiens (2016)	Rejmánek (2018)
Avise et al. (2008)	Roberts et al. (2017)	

Biogeography

Thomas et al. (2004)	Crisp and Cook (2011)	Kouviri and van der Geer
Gaston (2006, 2008a)	Eiserhardt et al. (2015)	(2018)
de Boeck et al. (2008)	Plotnick et al. (2016)	Humphreys et al. (2019)
Turvey (2009b)	Ceballos and Ehrlich (2018)	Ledford (2019)

Conservation biology

MacPhee (1999)	Cronk (2016)	Brook and Alroy (2017)
Barnosky (2008)	Kosnik and Kowalewski (2016)	

Nature management

Gaston (2005)

Sociology and politics

Barnosky (2014)	Dawson (2016)
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- Avise JC, Hubbell SP, Ayala FJ. 2008. In the light of evolution II: Biodiversity and extinction. *Proceedings of the National Academy of Sciences USA*. 105(supl 1):11453-11457.
- Barnosky AD. 2008. Megafauna biomass tradeoff as a driver of Quaternary and future extinctions. *Proceedings of the National Academy of Sciences USA*. 105(supl 1):11543-11548.
- Barnosky AD. 2014. *Dodging Extinction: Power, Food, Money, and the Future of Life on Earth*. Oakland, CA: University of California Press.
- Brook BW, Alroy J. 2017. Patterns, process, inference and prediction in extinction biology. *Biology Letters*. 13:20160828.
- Ceballos G, Ehrlich PR. 2018. The misunderstood sixth mass extinction. *Science*. 360(6393):1080-1081.
- Crisp MD, Cook LG. 2011. Cenozoic extinctions account for the low diversity of extant gymnosperms compared with angiosperms. *New Phytologist*. 192(4):997-1009.
- Cronk QCB. 2016. Plant extinctions take time. *Science*. 353(6298):446-447.
- Dawson A. 2016. *Extinction. A Radical History*. New York: OR Books.
- de Boeck HJ, Visscher A, Milbau A, Nijs I. 2008. Quantifying the randomness of extinctions. *Ecography*. 31:327-334.
- Eiserhardt WL, Borchsenius F, Plum CM, Ordonez A, Svenning J-C. 2015. Climate-driven extinctions shape the phylogenetic structure of temperate tree floras. *Ecology Letters*. 18(3):263-272.
- Gaston KJ. 2005. Biodiversity and extinction: species and people. *Progress in Physical Geography*. 29(2):239-247.
- Gaston KJ. 2006. Biodiversity and extinction: macroecological patterns and people. *Progress in Physical Geography*. 30(2):258-269.
- Gaston KJ. 2008a. Biodiversity and extinction: the dynamics of geographic range size. *Progress in Physical Geography*. 32(6):678-683.
- Gaston KJ. 2008b. Biodiversity and extinction: the importance of being common. *Progress in Physical Geography*. 32(1):73-79.
- Humphreys AM, Govaerts R, Ficinski SZ, Lughadha EN, Vorontsova MS. 2019. Global dataset shows geography and life form predict modern plant extinction and rediscovery. *Nature Ecology & Evolution*. 10.1038/s41559-41019-40906-41552.

- Kosnik MA, Kowalewski M. 2016. Understanding modern extinctions in marine ecosystems: the role of palaeoecological data. *Biology Letters*. 12:20150951.
- Kouvari M, van der Geer AAE. 2018. Biogeography of extinction: The demise of insular mammals from the Late Pleistocene till today. *Palaeogeography, Palaeoclimatology, Palaeoecology*. 10.1016/j.palaeo.2018.1006.1008.
- Ledford H. 2019. World's largest plant survey reveals alarming extinction rate. *Nature*. 570(7760):148-149.
- MacPhee RDE, editor 1999. *Extinctions in Near Time - Causes, Contexts, and Consequences*. New York: Kluwer/Plenum.
- Plotnick RE, Smith FA, Lyons SK. 2016. The fossil record of the sixth extinction. *Ecology Letters*. 19(5):546-553.
- Rejmánek M. 2018. Vascular plant extinctions in California: A critical assessment. *Diversity and Distributions*. 24(1):129-136.
- Roberts DL, Jarić I, Solow AR. 2017. On the functional extinction of the Passenger Pigeon. *Conservation Biology*. 31(5):1192-1195.
- Smith FDM, May RM, Pellow R, Johnson TH, Walter KR. 1993. How much do we know about the current extinction rate? *Trends in Ecology & Evolution*. 8(10):375-378.
- Thomas CD. 2017. *Inheritors of the Earth - How Nature is Thriving in an Age of Extinction*. London: Allen Lane.
- Thomas CD, Cameron A, Green RE, Bakkenes M, Beaumont LJ, Collingham YC, Erasmus BFN, de Siqueira MF, Grainger A, Hannah L et al. 2004. Extinction risk from climate change. *Nature*. 427(6970):145-148.
- Turvey ST, editor 2009b. *Holocene Extinctions*. Oxford: Oxford University Press.
- Wake DB, Vredenburg VT. 2008. Are we in the midst of the sixth mass extinction? A view from the world of amphibians. *Proceedings of the National Academy of Sciences USA*. 105(suppl 1):11466-11473.
- Wiens JJ. 2016. Climate-related local extinctions are already widespread among plant and animal species. *PLoS Biology*. 14(12):e20001104.

Box S2. Selected European Pliocene or Early Pleistocene tree genera that are absent (exterminated), relictual and rare, or widespread in Europe today.

Regionally exterminated from Europe in Pliocene or Early Pleistocene

Ailanthus
Amenotaxus (Follieri 2010)
Carya (Orain et al. 2013; Magri et al. 2017)
Cedrus (Boyd 2009; Magri 2012; Magri et al. 2017)
Cephalotaxus (Follieri 2010)
Cryptomeria
Diospyros
Engelhardia (Magri et al. 2017)
Eucommia (Magri et al. 2017)
Gleditsia
Halesia
Liquidambar (Boyd 2009)
Liriodendron
Parrotia (Magri et al. 2017)
Platycarya
Pterocarya (Magri et al. 2017)
Robinia
Sassafras
Sciadopitys (Magri et al. 2017)

Sequoia
Swertia
Taxodium (Follieri 2010),
Taxodium-type (Magri et al. 2017), or *Glyptostrobus* (Boyd 2009)
Torreya (Follieri 2010)
Tsuga (Follieri 2010; Magri et al. 2017)

Relictual and rare in southern Europe today

Aesculus
Celtis
Cercis
Cupressus (Follieri 2010)
Ostrya
Rhododendron
Zelkova (Follieri et al. 1986; Kvavadze and Connor 2005; Boyd 2009; Magri et al. 2017)

Widespread in Europe today

Abies
Acer
Alnus
Betula
Buxus (di Domenico et al. 2012)
Carpinus
Corylus (Magri 2010)
Fagus (Magri et al. 2006)
Fraxinus
Juniperus
Larix
Picea (Magri 2010)
Pinus
Quercus
Taxus
Tilia
Ulmus

Boyd A. 2009. Relict conifers from the mid-Pleistocene of Rhodes, Greece. *Historical Biology*. 21(1-2):1-15.

di Domenico F, Lucchese F, Magri D. 2012. *Buxus* in Europe: Late Quaternary dynamics and modern vulnerability. *Perspectives in Plant Ecology, Evolution, and Systematics*. 14:354-362.

Follieri M. 2010. Conifer extinction in Quaternary Italian records. *Quaternary International*. 225:37-43.

Follieri M, Magri D, Sadori L. 1986. Late Pleistocene *Zelkova* extinctions in central Italy. *New Phytologist*. 103:369-273.

Kvavadze EV, Connor SE. 2005. *Zelkova carpinifolia* (Pallas) K. Koch in Holocene sediments of Georgia—an indicator of climatic optima. *Review of Palaeobotany and Palynology*. 133(1):69-89.

Magri D. 2010. Persistence of tree taxa in Europe and Quaternary climate changes. *Quaternary International*. 219:145-151.

Magri D. 2012. Quaternary history of *Cedrus* in southern Europe. *Annali di Botanica*. 2:57-66.

Magri D, Di Rita F, Aranbarri J, Fletcher W, González-Sampériz P. 2017. Quaternary disappearance of tree taxa from Southern Europe: Timing and trends. *Quaternary Science Reviews*. 163:23-55.

Magri D, Vendramin GG, Comps B, Dupanloup I, Geburek T, Gömöry D, Latałowa M, Litt T, Paule L, Roure JM et al. 2006. A new scenario for the Quaternary history of European beech populations: palaeobotanical evidence and genetic consequences. *New Phytologist*. 171:199-221.

Orain R, Lebreton V, Ermolli ER, Combourieu-Nebout N, Sémah AM. 2013. *Carya* as marker for tree refuges in southern Italy (Boiano basin) at the Middle Pleistocene. *Palaeogeography, Palaeoclimatology, Palaeoecology*. 369:295-302.

Box S3. References to selected studies that attempt to provide an evidence-based framework for ecological restoration, rewilding, wilding, translocation, and de-extinction.

Restoration

Sutherland (2002)	Burney (2010)	Henne et al. (2015)
Bradshaw (2004)	Gell (2010)	Perring et al. (2015)
Burney and Burney (2007)	Davies (2011)	Corlett (2016)
Lindbladh et al. (2007)	Jiang et al. (2013)	Hilt et al. (2018)
Jackson and Hobbs (2009)	Rotherham (2013)	
Marris (2009)	Tinner et al. (2013)	

Rewilding

Donlan et al. (2005, 2006)	Rubenstein and Rubenstein (2016)	Jepson et al. (2018)
Taylor P (2005, 2011, 2016)		Johnson et al. (2018)
Caro (2007)	Svenning et al. (2016a, 2016b)	Olofsson and Post (2018)
Oliveira-Santos and Fernandez (2010)	Palazón (2017)	Pennisi (2018)
Bekoff (2014)	Thompson et al. (2017)	Pettorelli et al. (2018, 2019)
Monbiot (2014)	Bakker and Svenning (2018)	Torres et al. (2018)
Carey (2016)	Cromsigt et al. (2018)	Willby et al. (2018)
Malhi et al. (2016)	Derham et al. (2018)	Perino et al. (2019)
	Fuhlendorf et al. (2018)	Schweiger et al. (2019)
	Jarvie and Svenning (2018)	

Wilding

Vera (2000)	Oliveira-Santos and Fernandez (2010)	Tree (2018)
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Translocation

Hodder and Bullock (1997)	Schwartz et al. (2012)	Taylor G et al. (2017)
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De-extinction

Anthony (1979)	Seddon (2017)
Shapiro (2015, 2017)	Wood et al. (2017)

Anthony P. 1979. *The Source of Magic*. New York: Ballantine Books.

Bakker ES, Svenning J-C. 2018. Trophic rewilding: impact on ecosystems under global change. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170432.

Bekoff M. 2014. *Rewilding our Hearts: Building pathways of compassion and coexistence*. Novato, California: New World Library.

Bradshaw RHW. 2004. Past anthropogenic influence on European forests and some possible genetic consequences. *Forest Ecology and Management*. 197(1):203-212.

Burney DA. 2010. *Back to the Future in the Caves of Kaua'i: a scientist's adventures in the dark*. New Haven: Yale University Press.

Burney DA, Burney LP. 2007. Paleoeecology and "inter-situ" restoration on Kaua'i, Hawaii. *Frontiers in Ecology and the Environment*. 5(9):483-490.

Carey J. 2016. Rewilding. *Proceedings of the National Academy of Sciences USA*. 113(4):806-808.

Caro T. 2007. The Pleistocene re-wilding gambit. *Trends in Ecology & Evolution*. 22(6):281-283.

Corlett RT. 2016. Restoration, reintroduction, and rewilding in a changing world. *Trends in Ecology & Evolution*. 31(6):453-462.

Cromsigt JPGM, te Beest M, Kerley GIH, Landman M, le Roux E, Smith FA. 2018. Trophic rewilding as a climate change mitigation strategy? *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170440.

- Davies AL. 2011. Long-term approaches to native woodland restoration: Palaeoecological and stakeholder perspectives on Atlantic forests of Northern Europe. *Forest Ecology and Management*. 261:751-763.
- Derham TT, Duncan RP, Johnson CN, Jones ME. 2018. Hope and caution: rewilding to mitigate the impacts of biological invasions. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20180127.
- Donlan CJ, Berger J, Bock CE, Burney DA, Estes JA, Foreman D, Martin PS, Roemer GW, Smith FA, Soulé ME et al. 2006. Pleistocene rewilding: an optimistic agenda for twenty-first century conservation. *The American Naturalist*. 168(5):660-681.
- Donlan CJ, Greene HW, Berger J, Bock CE, Bock JH, Burney DA, Estes JA, Foreman D, Martin PS, Roemer GW et al. 2005. Re-wilding North America. *Nature*. 436:913-914.
- Fuhlendorf SD, Davis CA, Elmore RD, Goodman LE, Hamilton RG. 2018. Perspectives on grassland conservation efforts: should we rewild to the past or conserve for the future? *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170438.
- Gell P. 2010. With the benefit of hindsight: the utility of palaeoecology in wetland condition assessment and identification of restoration targets. In: Batty LC, Hallberg KB, editors. *Ecology of Industrial Pollution*. Cambridge: Cambridge University Press; p. 162-188.
- Henne PD, Elkin C, Franke J, Colombaroli D, Calò C, La Mantia T, Pasta S, Conedera M, Dermody O, Tinner W. 2015. Reviving extinct Mediterranean forest communities may improve ecosystem potential in a warmer future. *Frontiers in Ecology and the Environment*. 13(7):356-362.
- Hilt S, Alirangues Nuñez MM, Bakker ES, Blindow I, Davidson TA, Gillefalk M, Hansson L-A, Janse JH, Janssen ABG, Jeppesen E et al. 2018. Response of submerged macrophyte communities to external and internal restoration measures in north temperate shallow lakes. *Frontiers in Plant Science*. 9:art194.
- Hodder KH, Bullock JM. 1997. Translocations of native species in the UK: implications for biodiversity. *Journal of Applied Ecology*. 34:547-565.
- Jackson ST, Hobbs RJ. 2009. Ecological restoration in the light of ecological history. *Science*. 325:567-569.
- Jarvie S, Svenning J-C. 2018. Using species distribution modelling to determine opportunities for trophic rewilding under future scenarios of climate change. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170446.
- Jepson P, Schepers F, Helmer W. 2018. Governing with nature: a European perspective on putting rewilding principles into practice. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170434.
- Jiang W, Cheng Y, Yang X, Yang S. 2013. Chinese Loess Plateau vegetation since the Last Glacial Maximum and its implications for vegetation restoration. *Journal of Applied Ecology*. 50(2):440-448.
- Johnson CN, Prior LD, Archibald S, Poulos HM, Barton AM, Williamson GJ, Bowman DMJS. 2018. Can trophic rewilding reduce the impact of fire in a more flammable world? *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170443.
- Lindbladh M, Brunet J, Hannon G, Niklasson M, Eliasson P, Eriksson GR, Ekstrand A. 2007. Forest history as a basis for ecosystem restoration - a multidisciplinary case study in a south Swedish temperate landscape. *Restoration Ecology*. 15:284-295.
- Malhi Y, Doughty CE, Galetti M, Smith FA, Svenning J-C, Terborgh JW. 2016. Megafauna and ecosystem function from the Pleistocene to the Anthropocene. *Proceedings of the National Academy of Sciences USA*. 113(4):838-846.
- Marris E. 2009. Reflecting the past. *Nature*. 462:30-32.
- Monbiot G. 2014. *Feral: Rewilding the Land, Sea and Human Life*. Penguin Books.
- Oliveira-Santos LGR, Fernandez FAS. 2010. Pleistocene rewilding, Frankenstein ecosystems, and an alternative conservation agenda. *Conservation Biology*. 24(1):4-5.
- Olofsson J, Post E. 2018. Effects of large herbivores on tundra vegetation in a changing climate, and implications for rewilding. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170437.
- Palazón S. 2017. The importance of reintroducing large carnivores: the brown bear in the Pyrenees. In: Catalan J, Ninot JM, Aniz MM, editors. *High Mountain Conservation in a Changing World*. Cham: Springer Nature; p. 231-249.
- Pennisi E. 2018. Restoring lost grazers could help blunt climate change. *Science*. 362(6413):388.
- Perino A, Pereira HM, Navarro LM, Fernández N, Bullock JM, Ceaușu S, Cortés-Avizanda A, van Klink R, Kuemmerle T, Lomba A et al. 2019. Rewilding complex ecosystems. *Science*. 364(6438):eaav5570.
- Perring MP, Standish RJ, Price JN, Craig MD, Erickson TE, Ruthrof KX, Whiteley AS, Valentine LE, Hobbs RJ. 2015. Advances in restoration ecology: rising to the challenges of the coming decades. *Ecosphere*. 6(8):1-25.

- Pettorelli N, Barlow J, Stephens PA, Durant SM, Connor B, Schulte to Bühne H, Sandom CJ, Wentworth J, du Toit JT. 2018. Making rewilding fit for policy. *Journal of Applied Ecology*. 55(3):1114-1125.
- Pettorelli N, Durant SM, du Toit JT, editors. 2019. *Rewilding*. Cambridge: Cambridge University Press.
- Rotherham ID, editor 2013. *Trees, Forested Landscapes and Grazing Animals*. London: Routledge.
- Rubenstein DR, Rubenstein DI. 2016. From Pleistocene to trophic rewilding: A wolf in sheep's clothing. *Proceedings of the National Academy of Sciences USA*. 113(1):E1.
- Schwartz MW, Hellmann JJ, McLachlan JM, Sax DF, Borevitz JO, Brennan J, Camacho AE, Ceballos G, Clark JR, Doremus H et al. 2012. Managed relocation: integrating the scientific, regulatory, and ethical challenges. *BioScience*. 62(8):732-743.
- Schweiger AH, Boulangeat I, Conradi T, Davis M, Svenning J-C. 2019. The importance of ecological memory for trophic rewilding as an ecosystem restoration approach. *Biological Reviews*. 94(1):1-15.
- Seddon PJ. 2017. The ecology of de-extinction. *Functional Ecology*. 31(5):992-995.
- Shapiro B. 2015. How to Clone a Mammoth. *The science of de-extinction*. Princeton: Princeton University Press.
- Shapiro B. 2017. Pathways to de-extinction: how close can we get to resurrection of an extinct species? *Functional Ecology*. 31(5):996-1002.
- Sutherland WJ. 2002. Openness in management. *Nature*. 418:834-835.
- Svenning J-C, Pedersen PBM, Donlan CJ, Ejrnæs R, Faurby S, Galetti M, Hansen DM, Sandel B, Sandom CJ, Terborgh JW et al. 2016b. Reply to Rubenstein and Rubenstein: Time to move on from ideological debates on rewilding. *Proceedings of the National Academy of Sciences USA*. 113(1):E2-E3.
- Svenning J-C, Pedersen PBM, Donlan CJ, Ejrnæs R, Faurby S, Galetti M, Hansen DM, Sandel B, Sandom CJ, Terborgh JW et al. 2016a. Science for a wilder Anthropocene: Synthesis and future directions for trophic rewilding research. *Proceedings of the National Academy of Sciences USA*. 113(4):898-906.
- Taylor G, Canessa S, Clarke RH, Ingwersen D, Armstrong DP, Seddon PJ, Ewen JG. 2017. Is reintroduction biology an effective applied science? *Trends in Ecology & Evolution*. 32(11):873-880.
- Taylor P. 2005. *Beyond Conservation: A Wildland Strategy*. London: Routledge.
- Taylor P, editor 2011. *Rewilding*. Walton Hall: Ethos Publications.
- Taylor P. 2016. *The Spirit of Rewilding. Steps Towards a Shamanic Ecology*. Walton Hall: Ethos Publications.
- Thompson MSA, Brooks SJ, Sayer CD, Woodward G, Axmacher JC, Perkins DM, Gray C. 2017. Large woody debris "rewilding" rapidly restores biodiversity in riverine food webs. *Journal of Applied Ecology*.
- Tinner W, Colombaroli D, Heiri O, Henne PD, Steinacher M, Untenecker J, Vescovi E, Allen JRM, Carraro G, Conedera M et al. 2013. The past ecology of *Abies alba* provides new perspectives on future responses of silver fir forests to global warming. *Ecological Monographs*. 83(4):419-439.
- Torres A, Fernández N, zu Ermgassen S, Helmer W, Revilla E, Saavedra D, Perino A, Mimet A, Rey-Benayas JM, Selva N et al. 2018. Measuring rewilding progress. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170433.
- Tree I. 2018. *Wilding - The Return of Nature to a British Farm*. London: Picador.
- Vera F. 2000. *Grazing Ecology and Forest History*. Wallingford: CABI.
- Willby NJ, Law A, Levanoni O, Foster G, Ecke F. 2018. Rewilding wetlands: beaver as agents of within-habitat heterogeneity and the responses of contrasting biota. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 373(1761):20170444.
- Wood JR, Perry GLW, Wilmshurst JM. 2017. Using palaeoecology to determine baseline ecological requirements and interaction networks for de-extinction candidate species. *Functional Ecology*. 31(5):1012-1020.

Box S4. References to selected studies of past events (“historical legacies”) that appear to influence present-day ecology or biogeography.

Short-term (<100 years)

Magnuson (1990)	Dalsgaard et al. (2013)	Faurby and Araújo (2018)
Padisák (1992)	Ogle et al. (2015)	Janssen et al. (2018)
Vellend et al. (2000)	Becker and Pollard (2016)	Ryo et al. (2018)
Bossuyt and Hermy (2001)	Hoffman et al. (2017)	Clark et al. (2019)
Bengtsson et al. (2003)	Neumann et al. (2017)	Hughes et al. (2019)
Golinski et al. (2008)	Schweiger and Beierkuhnlein (2017)	
Schaefer (2009)		
Fukami and Nakajima (2011)	Egelkraut et al. (2018)	

Medium-term (100–1000 years)

Foster (1992, 2002)	Foster et al. (2003)	Vellend et al. (2007)
Motzkin et al. (1996, 1999)	Heckenberger et al. (2003, 2007)	Plue et al. (2008)
Delcourt and Delcourt (1997)		Rhemtulla et al. (2009)
Koerner et al. (1997)	Rackham (2003, 2006)	Junqueira et al. (2010)
Wulf (1997)	Lindborg and Eriksson (2004)	Purschke et al. (2014)
Foster and Motzkin (1998)	Turetsky (2004)	Fraterrigo (2016)
Foster et al. (1998)	Vellend (2004)	Johnstone et al. (2016)
Moorhead et al. (1999)	Willis et al. (2004)	Jonason et al. (2016)
Camill and Clark (2000)	Flinn and Vellend (2005)	Levis et al. (2017)
McLachlan et al. (2000)	Graham et al. (2006)	Whitney and Cárdenas (2017)
Bellemare et al. (2002)	Dambrine et al. (2007)	Feckler et al. (2018)
Dupouey et al. (2002)	Glaser (2007)	Perring et al. (2018)
Peterson (2002)	Rowe (2007)	Schweiger et al. (2019)

Long-term (>1000 years)

Davis (1976, 1981a)	Pärtel et al. (2007)	Herzschuh et al. (2016)
Nilsson et al. (1991)	Svenning and Skov (2007a)	Ordonez and Svenning (2016)
Latham and Ricklefs (1993)	Jackson et al. (2009b)	Blonder et al. (2018)
Tzedakis and Bennett (1995)	Booth et al. (2012)	Correll et al. (2018)
Lindbladh (1999)	Kissling et al. (2012)	Douda et al. (2018)
Ricklefs (1999)	Pederson et al. (2014)	Pinto-Ledezma et al. (2018)
Willis and Birks (2006)	Svenning et al. (2015)	Sandel (2019)

Becker MS, Pollard WH. 2016. Sixty-year legacy of human impacts on a high Arctic ecosystem. *Journal of Applied Ecology*. 53(3):876-884.

Bellemare J, Motzkin G, Foster DR. 2002. Legacies of the agricultural past in the forested present: an assessment of land-use effects on rich mesic forests. *Journal of Biogeography*. 29:1401-1420.

Bengtsson J, Angelstam P, Elmqvist T, Emanuelsson U, Folke C, Ihse M, Moberg F, Nyström M. 2003. Reserves, resilience, and dynamic landscapes. *Ambio*. 32(6):389-396.

Blonder B, Enquist BJ, Graae BJ, Kattge J, Maitner BS, Morueta-Holme N, Ordonez A, Šimová I, Singarayer J, Svenning J-C et al. 2018. Late Quaternary climate legacies in contemporary plant functional composition. *Global Change Biology*. 24(10):4827-4840.

Booth RK, Jackson ST, Sousa VA, Sullivan ME, Minckley TA, Clifford MJ. 2012. Multi-decadal drought and amplified moisture variability drove rapid forest community change in a humid region. *Ecology*. 93(2):219-226.

Bossuyt B, Hermy M. 2001. Influence of land use history on seed banks in European temperate forest ecosystems: a review. *Ecography*. 24:225-238.

- Camill P, Clark JS. 2000. Long-term perspectives on lagged ecosystem responses to climate change: permafrost in boreal peatlands and the grassland/woodland boundary. *Ecosystems*. 3(6):534-544.
- Clark AT, Knops JMH, Tilman D. 2019. Contingent factors explain average divergence in functional composition over 88 years of old field succession. *Journal of Ecology*. 107(2):545-558.
- Correll MD, Wiest WA, Hodgman TP, Kelley JT, McGill BJ, Elphick CS, Shriver WG, Conway M, Field CR, Olsen BJ. 2018. A Pleistocene disturbance event describes modern diversity patterns in tidal marsh birds. *Ecography*. 41(4):684-694.
- Dalsgaard B, Trøjelsgaard K, Martín González AM, Nogués-Bravo D, Ollerton J, Petanidou T, Sandel B, Schleuning M, Wang Z, Rahbek C et al. 2013. Historical climate-change influences modularity and nestedness of pollination networks. *Ecography*. 36(12):1331-1340.
- Dambrine E, Dupouey JL, Laüt L, Humbert L. 2007. Present biodiversity patterns in France related to former Roman agriculture. *Ecology*. 88:1430-1438.
- Davis MB. 1976. Pleistocene biogeography of temperate deciduous forests. *Geoscience and Man*. 13:13-26.
- Davis MB. 1981a. Quaternary history and the stability of forest communities. In: Shugart HH, West DC, Botkin DB, editors. *Forest Succession*. New York: Springer; p. 132-177.
- Delcourt HR, Delcourt PA. 1997. Pre-Columbian Native American use of fire on southern Apalachian landscapes. *Conservation Biology*. 11(4):1010-1014.
- Douda J, Havrdová A, Doudová J, Mandák B. 2018. Legacy of post-glacial colonization affects β -diversity: Insights into local community assembly processes. *Journal of Biogeography*. 45(7):1604-1615.
- Dupouey JL, Dambrine E, Lafite JD, Moares C. 2002. Irreversible impact of past land use on forest soils and biodiversity. *Ecology*. 83(11):2978-2984.
- Egelkraut D, Aronsson K-Å, Allard A, Åkerholm M, Stark S, Olofsson J. 2018. Multiple feedbacks contribute to a centennial legacy of reindeer on tundra vegetation. *Ecosystems*. 21(8):1545-1563.
- Faurby S, Araújo MB. 2018. Anthropogenic range contractions bias species climate change forecasts. *Nature Climate Change*. 8:252-256.
- Feckler A, Goedkoop W, Konschak M, Bundschuh R, Kenngott KGJ, Schulz R, Zubrod JP, Bundschuh M. 2018. History matters: Heterotrophic microbial community structure and function adapt to multiple stressors. *Global Change Biology*. 24(2):e402-e415.
- Flinn KM, Vellend M. 2005. Recovery of forest plant communities in post-agricultural landscapes. *Frontiers in Ecology and the Environment*. 3(5):243-250.
- Foster DR. 1992. Land-use history (1730-1990) and vegetation dynamics in central New England, USA. *Journal of Ecology*. 80:753-772.
- Foster DR. 2002. Insights from historical geography to ecology and conservation: lessons from the New England landscape. *Journal of Biogeography*. 29:1269-1279.
- Foster DR, Knight DH, Franklin JF. 1998. Landscape patterns and legacies resulting from large, infrequent forest disturbances. *Ecosystems*. 1:497-510.
- Foster DR, Motzkin G. 1998. Ecology and conservation in the cultural landscape of New England: lessons from nature's history. *Northeastern Naturalist*. 5(2):111-126.
- Foster DR, Swanson F, Aber J, Burke I, Brokaw N, Tilman D, Knaap A. 2003. The importance of land-use and its legacies to ecology and environmental management. *BioScience*. 53:77-88.
- Fraterrigo JM. 2016. Land-use legacies and the role of persistence traits in species recovery. *Applied Vegetation Science*. 19(4):555-556.
- Fukami T, Nakajima M. 2011. Community assembly: alternative stable states or alternative transient states? *Ecology Letters*. 14(10):973-984.
- Glaser B. 2007. Prehistorically modified soils of central Amazonia: a model for sustainable agriculture in the twenty-first century. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 362(1478):187.
- Golinski M, Bauch C, Anand M. 2008. The effects of endogenous ecological memory on population stability and resilience in a variable environment. *Ecological Modelling*. 212(3):334-341.
- Graham CH, Moritz C, Williams SE. 2006. Habitat history improves prediction of biodiversity in rainforest fauna. *Proceedings of the National Academy of Sciences USA*. 103(3):632-636.
- Heckenberger MJ, Kuikuro A, Kuikuro UT, Russell JC, Schmidt M, Fausto C, Franchetto B. 2003. Amazonia 1492: Pristine forest or cultural parkland? *Science*. 301(5640):1710.
- Heckenberger MJ, Russell JC, Toney JR, Schmidt MJ. 2007. The legacy of cultural landscapes in the Brazilian Amazon: implications for biodiversity. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 362(1478):197-208.

- Herzschuh U, Birks HJB, Laepple T, Andreev AA, Melles M, Brigham-Grette J. 2016. Glacial legacies on interglacial vegetation at the Pliocene-Pleistocene transition in Asia. *Nature Communications*. 7:11967.
- Hoffman KM, Lertzman KP, Starzomski BM. 2017. Ecological legacies of anthropogenic burning in a British Columbia coastal temperate rain forest. *Journal of Biogeography*. 44(12):2903-2915.
- Hughes TP, Kerry JT, Connolly SR, Baird AH, Eakin CM, Heron SF, Hoey AS, Hoogenboom MO, Jacobson M, Liu G et al. 2019. Ecological memory modifies the cumulative impact of recurrent climate extremes. *Nature Climate Change*. 9(1):40-43.
- Jackson ST, Betancourt JL, Booth RK, Gray ST. 2009b. Ecology and the ratchet of events: Climate variability, niche dimensions, and species distributions. *Proceedings of the National Academy of Sciences USA*. 106:19685-19692.
- Janssen P, Bec S, Fuhr M, Taberlet P, Brun J-J, Bouget C. 2018. Present conditions may mediate the legacy effect of past land-use changes on species richness and composition of above- and below-ground assemblages. *Journal of Ecology*. 106(1):306-318.
- Johnstone JF, Allen CD, Franklin JF, Frelich LE, Harvey BJ, Higuera PE, Mack MC, Meentemeyer RK, Metz MR, Perry GLW et al. 2016. Changing disturbance regimes, ecological memory, and forest resilience. *Frontiers in Ecology and the Environment*. 14(7):369-378.
- Jonason D, Bergman K-O, Westerberg L, Milberg P. 2016. Land-use history exerts long-term effects on the clear-cut flora in boreonemoral Sweden. *Applied Vegetation Science*. 19(4):634-643.
- Junqueira AB, Shepard GH, Clement CR. 2010. Secondary forests on anthropogenic soils in Brazilian Amazonia conserve agrobiodiversity. *Biodiversity and Conservation*. 19(7):1933-1961.
- Kissling WD, Baker WJ, Balslev H, Barfod AS, Borchsenius F, Dransfield J, Govaerts R, Svenning J-C. 2012. Quaternary and pre-Quaternary historical legacies in the global distribution of a major tropical plant lineage. *Global Ecology and Biogeography*. 21(9):909-921.
- Koerner W, Dupouey JL, Dambrine E, Benoit M. 1997. Influence of past land use on the vegetation and soils of present day forest in the Vosges Mountains, France. *Journal of Ecology*. 85:351-358.
- Latham RE, Ricklefs RE. 1993. Global patterns of tree species richness in moist forests: energy-diversity theory does not account for variation in species richness. *Oikos*. 67:325-333.
- Levis C, Costa FRC, Bongers F, Peña-Claros M, Clement CR, Junqueira AB, Neves EG, Tamanaha EK, Figueiredo FOG, Salomão RP et al. 2017. Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science*. 355(6324):925-931.
- Lindbladh M. 1999. The influence of former land-use on vegetation and biodiversity in the boreo-nemoral zone of Sweden. *Ecography*. 22:485-498.
- Lindborg R, Eriksson O. 2004. Historical landscape connectivity affects present plant species diversity. *Ecology*. 85(7):1840-1845.
- Magnuson JJ. 1990. Long-term ecological research and the invisible present. *BioScience*. 40(7):495-501.
- McLachlan JS, Foster DR, Menalled F. 2000. Anthropogenic ties to late-successional structure and composition in four New England hemlock stands. *Ecology*. 81(3):717-733.
- Moorhead DL, Doran PT, Fountain AG, Lyons WB, McKnight DM, Priscu JC, Virginia RA, Wall DH. 1999. Ecological legacies: impacts on ecosystems of the McMurdo Dry Valleys. *BioScience*. 49(12):1009-1019.
- Motzkin G, Foster DR, Allen A, Harrod J, Boone R. 1996. Controlling site to evaluate history: vegetation patterns of a New England sand plain. *Ecological Monographs*. 66(3):345-365.
- Motzkin G, Wilson P, Foster DR, Allen A. 1999. Vegetation patterns in heterogeneous landscapes: the importance of history and environment. *Journal of Vegetation Science*. 10:903-920.
- Neumann JL, Holloway GJ, Hoodless A, Griffiths GH. 2017. The legacy of 20th Century landscape change on today's woodland carabid communities. *Diversity and Distributions*. 23(12):1447-1458.
- Nilsson C, Grelsson G, Dynesius M, Johansson ME, Sperens U. 1991. Small rivers behave like large rivers: effects of postglacial history on plant species richness along riverbanks. *Journal of Biogeography*. 18:533-541.
- Ogle K, Barber JJ, Barron-Gafford GA, Patrick Bentley L, Young JM, Huxman TE, Loik ME, Tissue DT. 2015. Quantifying ecological memory in plant and ecosystem processes. *Ecology Letters*. 18(3):221-235.
- Ordonez A, Svenning J-C. 2016. Strong paleoclimatic legacies in current plant functional diversity patterns across Europe. *Ecology and Evolution*. 6(10):3405-3416.
- Padisák J. 1992. Seasonal succession of phytoplankton in a large shallow lake (Balaton, Hungary) - a dynamics approach to ecological memory, its possible role and mechanisms. *Journal of Ecology*. 80:217-230.
- Pärtel M, Helm A, Reitalu T, Liira J, Zobel M. 2007. Grassland diversity related to Late Iron Age human population density. *Journal of Ecology*. 95:574-582.
- Pederson N, Dyer JM, McEwan RW, Hessel AE, Mock CJ, Orwig DA, Rieder HE, Cook BI. 2014. The legacy of episodic climatic events in shaping temperate, broadleaf forests. *Ecological Monographs*. 84(4):599-620.

- Perring MP, Bernhardt-Römermann M, Baeten L, Midolo G, Blondeel H, Depauw L, Landuyt D, Maes SL, De Lombaerde E, Carón MM et al. 2018. Global environmental change effects on plant community composition trajectories depend upon management legacies. *Global Change Biology*. 24(4):1722-1740.
- Peterson GD. 2002. Contagious disturbance, ecological memory, and the emergence of landscape pattern. *Ecosystems*. 5:329-338.
- Pinto-Ledezma JN, Larkin DJ, Cavender-Bares J. 2018. Patterns of beta diversity of vascular plants and their correspondence with biome boundaries across North America. *Frontiers in Ecology and Evolution*. 6:194.
- Plue J, Hermy M, Verheyen K, Thuillier P, Saguez R, Decocq G. 2008. Persistent changes in forest vegetation and seed bank 1,600 years after human occupation. *Landscape Ecology*. 23(6):673-688.
- Purschke O, Sykes MT, Poschlod P, Michalski SG, Römermann C, Durka W, Kühn I, Prentice HC. 2014. Interactive effects of landscape history and current management on dispersal trait diversity in grassland plant communities. *Journal of Ecology*. 102(2):437-446.
- Rackham O. 2003. *Ancient Woodland: its history, vegetation and uses in England*. 2nd ed. Dalbeattie: Castlepoint Press.
- Rackham O. 2006. *Woodlands*. London: Collins.
- Rhemtulla JM, Mladenoff DJ, Clayton MK. 2009. Legacies of historical land use on regional forest composition and structure in Wisconsin, USA (mid-1800s–1930s–2000s). *Ecological Applications*. 19(4):1061-1078.
- Ricklefs RE. 1999. Global patterns of tree species richness in moist forests: distinguishing ecological influences and historical contingency. *Oikos*. 86(2):369-373.
- Rowe RJ. 2007. Legacies of land use and recent climatic change: the small mammal fauna in the mountains of Utah. *The American Naturalist*. 170:242-257.
- Ryo M, Yoshimura C, Iwasaki Y. 2018. Importance of antecedent environmental conditions in modeling species distributions. *Ecography*. 41:825-836.
- Sandel B. 2019. Disequilibrium in trait-climate relationships of trees and birds. *Frontiers in Ecology and Evolution*. 7(138).
- Schaefer V. 2009. Alien invasions, ecological restoration in cities and the loss of ecological memory. *Restoration Ecology*. 17(2):171-176.
- Schweiger AH, Beierkuhnlein C. 2017. The ecological legacy of 20th century acidification carried on by ecosystem engineers. *Applied Vegetation Science*. 20(2):215-224.
- Schweiger AH, Boulangeat I, Conradi T, Davis M, Svenning J-C. 2019. The importance of ecological memory for trophic rewilding as an ecosystem restoration approach. *Biological Reviews*. 94(1):1-15.
- Svenning J-C, Eiserhardt WL, Normand S, Ordonez A, Sandel B. 2015. The influence of paleoclimate on present-day patterns in biodiversity and ecosystems. *Annual Review of Ecology, Evolution, and Systematics*. 46(1):551-572.
- Svenning J-C, Skov F. 2007a. Ice age legacies in the geographical distribution of tree species richness in Europe. *Global Ecology and Biogeography*. 16(2):234-245.
- Turetsky MR. 2004. Decomposition and organic matter quality in continental peatlands: the ghost of permafrost past. *Ecosystems*. 7(7):740-750.
- Tzedakis PC, Bennett KD. 1995. Interglacial vegetation succession: a view from southern Europe. *Quaternary Science Reviews*. 14:967-982.
- Vellend M. 2004. Parallel effects of land-use history on species diversity and genetic diversity of forest herbs. *Ecology*. 85(11):3043-3055.
- Vellend M, Lechowicz MJ, Waterway MJ. 2000. Environmental distribution of four *Carex* species (Cyperaceae) in an old-growth forest. *American Journal of Botany*. 87(10):1507-1516.
- Vellend M, Verheyen K, Flinn KM, Jacquemyn H, Kolb A, van Calster H, Peterken GF, Graae BJ, Bellemare J, Honnay O et al. 2007. Homogenization of forest plant communities and weakening of species–environment relationships via agricultural land use. *Journal of Ecology*. 95(3):565-573.
- Whitney BS, Cárdenas ML. 2017. Legacies of pre-Columbian land use on Latin American ecosystem composition and diversity: a case for paleoecology. *PAGES Magazine*. 25(2):84-85.
- Willis KJ, Birks HJB. 2006. What is natural? The need for a long-term perspective in biodiversity conservation. *Science*. 314(5803):1261-1265.
- Willis KJ, Gillson L, Brncic TM. 2004. How "virgin" is virgin rainforest? *Science*. 304(5669):402-403.
- Wulf M. 1997. Plant species as indicators of ancient woodland in northwestern Germany. *Journal of Vegetation Science*. 8:635-642.

Box S5. Selected examples of approaches to studying the possible impacts of future climate change on biodiversity.

Palaeoecology and “lessons from the past”

Bush (2002)	Willis and Bhagwat (2010)	Barnosky et al. (2017)
Willis and Birks (2006)	Willis and MacDonald (2011)	Cuesta et al. (2019)
Botkin et al. (2007)	Nogués-Bravo et al. (2016)	Lovejoy and Hannah (2019)

Ecological modelling

Botkin et al. (2007)	Tovar et al. (2013)	Graae et al. (2018)
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Conservation studies

Willis and Bhagwat (2009)	McGeoch et al. (2013)	Urban et al. (2016)
Araújo et al. (2011)	Watson and Segan (2013)	Pecl et al. (2017)
Groves et al. (2012)	Garcia et al. (2014)	Lovejoy and Hannah (2019)
Gillson et al. (2013)	Urban (2015)	

Ecological or biogeographical studies

Walther et al. (2002)	Moritz and Agudo (2013)	Nadeau et al. (2017)
Nogués-Bravo and Rahbek (2011)	Scheffers et al. (2016)	Lovejoy and Hannah (2019)

Integrated studies

Botkin et al. (2007)	Dawson et al. (2011)	Lovejoy and Hannah (2019)
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- Araújo MB, Alagador D, Cabeza M, Nogúes-Bravo D, Thuiller W. 2011. Climate change threatens European conservation areas. *Ecology Letters*. 14:484-492.
- Barnosky AD, Hadly EA, Gonzales P, Head J, Polly PD, Lawing AM, Eronen JT, et al. 2017. Merging paleobiology with conservation biology to guide the future of terrestrial ecosystems. *Science*. 355(6325):594.
- Botkin DB, Saxe H, Araujo MB, Betts R, Bradshaw RHW, Cedhagen T, Chesson P, Dawson T, Etterson JR, Faith DP et al. 2007. Forecasting the effects of global warming on biodiversity. *BioScience*. 57:227-236.
- Bush MB. 2002. Distributional change and conservation on the Andean flank: a palaeoecological perspective. *Global Ecology and Biogeography*. 11(6):463-473.
- Cuesta F, Llambí LD, Huggel C, Drenkhan F, Gosling WD, Muriel P, Jaramillo R, Tovar C. 2019. New land in the Neotropics: a review of biotic community, ecosystem, and landscape transformations in the face of climate and glacier change. *Regional Environmental Change*. 10.1007/s10113-10019-01499-10113.
- Dawson TP, Jackson ST, House JJ, Prentice IC, Mace GM. 2011. Beyond predictions: biodiversity conservation in a changing climate. *Science*. 332:53-58.
- Garcia RA, Cabeza M, Rahbek C, Araújo MB. 2014. Multiple dimensions of climate change and their implications for biodiversity. *Science*. 344(6183):1247579.
- Gillson L, Dawson TP, Jack S, McGeoch MA. 2013. Accommodating climate change contingencies in conservation strategy. *Trends in Ecology & Evolution*. 28(3):135-142.
- Graae BJ, Vandvik V, Armbruster WS, Eiserhardt WL, Svenning J-C, Hylander K, Ehrlén J, Speed JDM, Klanderud K, Bråthen KA et al. 2018. Stay or go – how topographic complexity influences alpine plant population and community responses to climate change. *Perspectives in Plant Ecology, Evolution and Systematics*. 30:41-50.
- Groves CR, Game ET, Anderson MG, Cross M, Enquist C, Ferdaña Z, Girvetz E, Gondor A, Hall KR, Higgins J et al. 2012. Incorporating climate change into systematic conservation planning. *Biodiversity and Conservation*. 21(7):1651-1671.
- Lovejoy TE, Hannah L, editors. 2019. *Biodiversity and Climate Change: Transforming the Biosphere*. New Haven: Yale University Press.
- McGeoch MA, Dawson TP, Gillson L. 2013. Accommodating the human response for realistic adaptation planning: response to Watson and Segan. *Trends in Ecology & Evolution*. 28(10):574-575.

- Moritz C, Agudo R. 2013. The future of species under climate change: Resilience or decline? *Science*. 341(6145):504-508.
- Nadeau CP, Urban MC, Bridle JR. 2017. Climates past, present, and yet-to-come shape climate change vulnerabilities. *Trends in Ecology & Evolution*. 32(10):786-800.
- Nogués-Bravo D, Rahbek C. 2011. Communities under climate change. *Science*. 334(6059):1070-1071.
- Nogués-Bravo D, Veloz S, Holt BG, Singarayer J, Valdes P, Davis B, Brewer SC, Williams JW, Rahbek C. 2016. Amplified plant turnover in response to climate change forecast by Late Quaternary records. *Nature Climate Change*. 6:1115.
- Pecl GT, Araújo MB, Bell JD, Blanchard J, Bonebrake TC, Chen I-C, Clark TD, Colwell RK, Danielsen F, Evengård B et al. 2017. Biodiversity redistribution under climate change: Impacts on ecosystems and human well-being. *Science*. 355(6332):e9214.
- Scheffers BR, De Meester L, Bridge TCL, Hoffmann AA, Pandolfi JM, Corlett RT, Butchart SHM, Pearce-Kelly P, Kovacs KM, Dudgeon D et al. 2016. The broad footprint of climate change from genes to biomes to people. *Science*. 354(6313):aaf7671.
- Tovar C, Arnillas CA, Cuesta F, Buytaert W. 2013. Diverging responses of tropical Andean biomes under future climate conditions. *PLoS One*. 8(5):e63634.
- Urban MC. 2015. Accelerating extinction risk from climate change. *Science*. 348(6234):571-573.
- Urban MC, Bocedi G, Hendry AP, Mihoub J-B, Pe'er G, Singer A, Bridle JR, Crozier LG, De Meester L, Godsoe W et al. 2016. Improving the forecast for biodiversity under climate change. *Science*. 353(6304).
- Walther G-R, Post E, Convey P, Menzel A, Parmesan C, Beebee TJC, Fromentin J-M, Hoegh-Goldberg O, Bairlein F. 2002. Ecological responses to recent climate change. *Nature*. 416:389-395.
- Watson JEM, Segal DB. 2013. Accommodating the human response for realistic adaptation planning: response to Gillson *et al.* *Trends in Ecology & Evolution*. 28(10):573-574.
- Willis KJ, Bhagwat SA. 2009. Biodiversity and climate change. *Science*. 326:806-807.
- Willis KJ, Bhagwat SA. 2010. Questions of importance to the conservation of global biological diversity: Answers from the past. *Climate of the Past*. 6:759-769.
- Willis KJ, Birks HJB. 2006. What is natural? The need for a long-term perspective in biodiversity conservation. *Science*. 314(5803):1261-1265.
- Willis KJ, MacDonald GM. 2011. Long-term ecological records and their relevance to climate change predictions for a warmer world. *Annual Review of Ecology, Evolution, and Systematics*. 42:267-287.

Box S6. Different types of non-analogous communities (based on Keith et al. 2009).

Type	Features	Examples
Recombinant communities	“Cities provide habitats for a rich and diverse range of plant and animals, which occur sometimes in unlikely recombinant communities”	Angold et al. (2006)
Invasive communities	Community where each new invader facilitates invasion by another species and so on, resulting in “invasion meltdown”	Sutherland et al. (2008)
Highly modified community	Heavily altered community based on the arriver and leaver concepts in modelling	Masters and Ward (2005)
Emerging community	“An ecosystem whose species composition and relative abundance have not previously occurred within a given biome”	Milton (2003)
Novel ecosystem	An alternative name for an emerging community. Now widely used in conservation biology and management. Also used in palaeoecology and called “no-analogue” assemblages	Jackson and Williams (2004); Hobbs et al. (2006, 2013); Williams and Jackson (2007)

- Angold PG, Sadler JP, Hill MO, Pullin AS, Rushton S, Austin K, Small E, Wood B, Wadsworth R, Sanderson R et al. 2006. Biodiversity in urban habitat patches. *Science of the Total Environment*. 360(1-3):196-204.
- Hobbs RJ, Arico S, Aronson J, Baron JS, Bridgewater P, Cramer VA, Epstein PR, Ewel JJ, Klink CA, Lugo AE et al. 2006. Novel ecosystems: theoretical and management aspects of the new ecological world order. *Global Ecology and Biogeography*. 15:1-7.
- Hobbs RJ, Higgs ES, Hall CM, editors. 2013. *Novel Ecosystems: Intervening in the New Ecological World Order*. Chichester: Wiley-Blackwell.
- Jackson ST, Williams JW. 2004. Modern analogs in Quaternary paleoecology: Here today, gone yesterday, gone tomorrow? *Annual Review of Earth and Planetary Science*. 32:495-537.
- Keith SA, Newton AC, Herbert RJH, Morecroft MD, Bealey CE. 2009a. Non-analogous community formation in response to climate change. *Journal for Nature Conservation*. 17:228-235.
- Masters GJ, Ward NL. 2005. Implications for the composition of species communities. In: Berry PM, Harrison PA, Dawson TP et al., editors. *Modelling Natural Resource Responses to Climate Change (MONARCH): A Local Approach*. Oxford: UKCIP Technical Report; p. 68-73.
- Milton SJ. 2003. 'Emerging ecosystems' - a washing-stone for ecologists, economists and sociologists? *South African Journal of Science*. 99:404-406.
- Sutherland WJ, Bailey MJ, Bainbridge IP, Brereton T, Dick JTA, Drewitt J, Dulvy NK, Dusic NR, Freckleton RP, Gaston KJ et al. 2008. Future novel threats and opportunities facing UK biodiversity identified by horizon scanning. *Journal of Applied Ecology*. 45:821-833.
- Williams JW, Jackson ST. 2007. Novel climates, no-analog communities, and ecological surprises. *Frontiers in Ecology and the Environment*. 5:475-482.