

Appendix 1 Structured literature review methods

A structured literature review was conducted to examine how landscape approaches are discussed in the literature, specifically focusing on conceptual frameworks and explicitly defined landscape approaches. Three main search terms were used in the Web of Science and Google Scholar search sites to identify articles selecting only articles providing some form of landscape-scale approach for resource management, which included both human and natural systems (Figure 2). The fourth set of search terms was only queried in Web of Science, as Google Scholar didn't provide very relevant results.

A range of different complications of search terms were preliminarily tested before coming up with the final set of three which were found to provide the most relevant results. Some sets of terms initially tested included: whole AND landscape* AND approach; integrated AND landscape* AND management; "landscape mosaic" AND livelihood*; "landscape mosaics" AND livelihood*; "landscape approach" AND livelihood* AND "case study"; ecosystem* service* approach*.

Google Scholar and Web of Science were chosen as the two search sites after reviewing a range of relevant search databases including: AGRICOLA, CAB Direct, FAO, Academic Search Complete, BIOSIS preview, AgEcon Search, Environmental Sciences and Pollution Management, Social Sciences in Forestry. Web of Science returned more specific results drawing from high impact, cross-disciplinary, international research complemented by Google Scholar providing a much broader inventory of research to ensure any important relevant articles were not missed. The first one hundred hits, sorted by relevance, for each set of search terms were reviewed. Articles were initially screened based upon their title and abstract (first selection), and then further screened based upon content in the text (second selection) (Figure A1.1).

Originally three categories of articles were screened for. This included: 1) landscape approaches or analyses which provided some level of insight into taking a landscape-scaled approach including lessons learned from management activities or a set of suggested key principles; 2) conceptual frameworks for landscape-scale approaches addressing some aspect of resource management; and 3) case studies of resource management activities implemented at a landscape scale. The last category was dropped from the study design before analysis of the articles as it was originally included for a separate analysis that was determined beyond the scope of the study after obtaining search results. Additionally a limited number of papers that identified areas for further research or research priorities related to landscape-scale resource management were included as deemed highly relevant. A total of 23 articles were selected from the literature review to be included in the analysis. After all 23 articles were read in detail other relevant citations were noted and these articles were also reviewed. 20 additional papers were added to the analysis using this snowballing method resulting in a total of 43 articles (Figure A1.1).

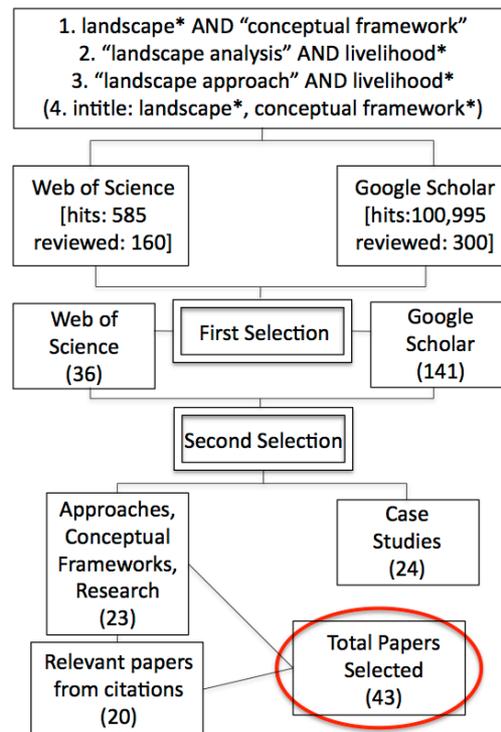


Figure A1.1 Diagram of the article selection process with the four sets of search terms, the number of hits returned from the two search sites and the number of articles selected at each stage of the process. The second and third sets of search terms contain the word 'livelihood', chosen to help find articles that included human systems as stipulated in the inclusion criteria.

The papers included in the review each provided a set of guidelines, principles or recommendations. These were developed for four different overarching objectives: to inform and further develop landscape research (e.g., Wu and Hobbs 2002, Chazdon et al. 2009, Pfund 2010, Pijanowski et al. 2010), to improve landscape-scale planning processes (e.g., Klug 2012, Gomez-Sal et al. 2003, Pressy and Bottrill 2009, Pearson and Gorman 2010), to guide landscape management (e.g., Wyborn 2009, Duff et al. 2009, Frost et al. 2006, Fischer et al. 2006) and to provide an alternative conceptual design of a landscape (e.g., Field et al. 2003, Terkenli 2001, Musacchio 2009a, Naveh 2001). Different categories of information extracted from the papers, such as the definition/interpretation of landscape, were examined individually and then compared across papers to identify convergences and divergences between them. The top six cross-cutting concepts identified are as follows: 1) complexity, 2) interdisciplinarity or transdisciplinarity, 3) sustainability, 4) participation, 5) tradeoffs and 6) holism. As the selection and analysis work was completed solely by the first author there may have been both selection and observation bias present in this process. Furthermore the total of 43 articles is a limited sample size compared to the number of articles that exist relating to landscapes and landscape approaches. This set of 43 articles therefore represents a select set of articles with an emphasis on conceptual frameworks and guidelines for taking a landscape approach in complex social-ecological systems.

Articles included in the review:

- Ahern, J. 2005. Theories, methods and strategies for sustainable landscape planning. In Tress et al. (eds) *From landscape research to landscape planning: aspects of integration, education and application*. Springer, Dordrecht, Netherlands, 119-131.
- Antrop, M. 2000. Background concepts for integrated landscape analysis. *Agriculture, Ecosystems & Environment* 77(1):17–28.
- Antrop, M. 2006. Sustainable landscapes: contradiction, fiction or utopia? *Landscape and Urban Planning* 75(3-4):187–197.
- Bastian, O., D. Haase, and K. Grunewald. 2012. Ecosystem properties, potentials and services – The EPPS conceptual framework and an urban application example. *Ecological Indicators* 21:7–16.
- Bohnet, I., and D. M. Smith. 2007. Planning future landscapes in the Wet Tropics of Australia: A social–ecological framework. *Landscape and Urban Planning* 80(1-2):137–152.
- Bowd, R. et al. 2012. The Identification of Potential Resilient Estuary-based Enterprises to Encourage Economic Empowerment in South Africa: a Toolkit Approach. *Ecology and Society* 17(3):15.
- Chazdon, R. L. et al. 2009. Beyond Reserves: A Research Agenda for Conserving Biodiversity in Human-modified Tropical Landscapes. *Biotropica* 41(2):142–153.
- Duff, G. et al. 2009. A collaborative design to adaptively manage for landscape sustainability in north Australia: lessons from a decade of cooperative research. *Landscape Ecology* 24(8):1135–1143.
- Field, D. R. et al. 2003. Reaffirming Social Landscape Analysis in Landscape Ecology: A Conceptual Framework. *Society & Natural Resources* 16(4):349–361.
- Fischer, J., D. B. Lindenmayer, and A. D. Manning. 2006. Biodiversity, ecosystem function, and resilience: ten guiding principles for commodity production landscapes. *Frontiers in Ecology and the Environment* 4(2):80–86.
- Frost, P. et al. 2006. Landscape-scale approaches for integrated natural resource management in tropical forest landscapes. *Ecology and Society* 11(2): 30.
- Ghazoul, J., C. Garcia, and C. G. Kushalappa. 2009. Landscape labelling: A concept for next-generation payment for ecosystem service schemes. *Forest Ecology and Management* 258(9): 1889–1895.
- Gómez-Sal, A., J.-A. Belmontes, and J.-M. Nicolau. 2003. Assessing landscape values: a proposal for a multidimensional conceptual model. *Ecological Modelling* 168(3):319–341.
- Klug, H. 2012. An integrated holistic transdisciplinary landscape planning concept after the Leitbild approach. *Ecological Indicators* 23:616–626.

- Le, Q. B. et al. 2008. Land-Use Dynamic Simulator (LUDAS): A multi-agent system model for simulating spatio-temporal dynamics of coupled human–landscape system. I. Structure and theoretical specification. *Ecological Informatics* 3(2):135–153.
- Makhzoumi, J. and G. Pungetti. 2008. Landscape Strategies. In I. Vogiatzakis, G. Pungetti, and A. M. Mannion (eds) *Mediterranean Island Landscapes*. Springer Science+Business Media B.V., 325-348.
- Milder, J. C. et al. 2011. Landscape Approaches to Achieving Food Production Natural Resource Conservation, and the Millennium Development Goal. In J. C. Ingram, F. DeClerck, and C. Rumbaitis del Rio (eds). *Integrating Ecology and Poverty Reduction*. Springer, Boston, MA, USA, 77-108.
- Musacchio, L. R. 2009a. The scientific basis for the design of landscape sustainability: A conceptual framework for translational landscape research and practice of designed landscapes and the six Es of landscape sustainability. *Landscape Ecology* 24(8):993–1013.
- Musacchio, L. R. 2009b. The ecology and culture of landscape sustainability: emerging knowledge and innovation in landscape research and practice. *Landscape Ecology* 24(8):989–992.
- Nassauer, J. I., and P. Opdam. 2008. Design in science: extending the landscape ecology paradigm. *Landscape Ecology* 23(6):633–644.
- Naveh, Z. 2001. Ten major premises for a holistic conception of multifunctional landscapes. *Landscape and urban planning* 57(3):269–284.
- O’Farrell, P. J., and P. M. Anderson. 2010. Sustainable multifunctional landscapes: a review to implementation. *Current Opinion in Environmental Sustainability* 2(1-2):59–65.
- Parrott, L., and W. S. Meyer. 2012. Future landscapes: managing within complexity. *Frontiers in Ecology and the Environment* 10(7):382–389.
- Pearson, D. M., and J.T. Gorman. 2010. Exploring the relevance of a landscape ecological paradigm for sustainable landscapes and livelihoods: A case-application from the Northern Territory Australia. *Landscape Ecology* 25(8):1169–1183.
- Pfund, J.-L. 2010. Landscape-scale research for conservation and development in the tropics: fighting persisting challenges. *Current Opinion in Environmental Sustainability* 2(1-2):117–126.
- Pfund, J.-L. et al. 2008. Biodiversity conservation and sustainable livelihoods in tropical forest landscapes. In Laforteza et al. (eds). *Patterns and Processes in Forest Landscapes*. Springer, Netherlands ,297-322 .
- Pijanowski, B.C. et al. 2010. Addressing the interplay of poverty and the ecology of landscapes: a Grand Challenge Topic for landscape ecologists? *Landscape Ecology* 25(1):5–16.
- Potschin, M., and R. Haines-Young. 2006. “Rio+10,” sustainability science and Landscape Ecology. *Landscape and Urban Planning* 75(3-4):162–174.

- Pressey, R. L., and M. C. Bottrill. 2009. Approaches to landscape- and seascape-scale conservation planning: convergence, contrasts and challenges. *Oryx* 43(4):464.
- Romero, C. et al. 2012. Conservation and Development in Latin America and Southern Africa: Setting the Stage. *Ecology and Society* 17(2): 17.
- Saunders, D. A., and S. V. Briggs. 2002. Nature grows in straight lines—or does she? What are the consequences of the mismatch between human-imposed linear boundaries and ecosystem boundaries? An Australian example. *Landscape and Urban Planning* 61(2):71–82.
- Sayer, J. 2005. Ecosystem services of tropical landscapes. Integrated management of environmental services in human-dominated tropical landscapes. CATIE. Turrialba, Costa Rica 49.
- Sayer, J. 2009. Reconciling Conservation and Development: Are Landscapes the Answer? *Biotropica* 41(6):649–652.
- Sayer, J., G. Bull, and C. Elliott. 2008. Mediating Forest Transitions: 'Grand Design' or 'Muddling Through'. *Conservation and Society* 6(4):320-327.
- Schaich, H., C. Bieling, and T. Plieninger. 2010. Linking ecosystem services with cultural landscape research. *GIAA-Ecological Perspectives for Science and Society* 19(4):269–277.
- Scherr, S. J. and J. A. McNeely. 2008. Biodiversity conservation and agricultural sustainability: towards a new paradigm of “ecoagriculture” landscapes. *Philosophical Transactions of the Royal Society B: Biological Sciences* 363(1491):477–494.
- Terkenli, T. S. 2001. Towards a theory of the landscape: the Aegean landscape as a cultural image. *Landscape and Urban Planning* 57(3):197–208.
- Termorshuizen, J. W., and P. Opdam. 2009. Landscape services as a bridge between landscape ecology and sustainable development. *Landscape Ecology* 24(8):1037–1052.
- Tress, B., and G. Tress. 2001. Capitalising on multiplicity: a transdisciplinary systems approach to landscape research. *Landscape and Urban Planning* 57(3):143–157.
- Tress, B. et al. 2001. Bridging human and natural sciences in landscape research. *Landscape and Urban Planning* 57(3):137–141.
- Vaccaro, I., and K. Norman. 2008. Social Sciences and landscape analysis: Opportunities for the improvement of conservation policy design. *Journal of Environmental Management* 88(2):360–371.
- Wu, J., and R. Hobbs. 2002. Key issues and research priorities in landscape ecology: an idiosyncratic synthesis. *Landscape Ecology* 17(4):355–365.
- Wyborn, C. 2011. Landscape scale ecological connectivity: Australian survey and rehearsals. *Pacific Conservation Biology* 17(2):121-131.