

## Fields of conflict: agriculture, food production and biodiversity

John Morgan

**If ecological science is to contribute meaningfully to the pressing environmental concerns of the globe, it needs to do more than document the decline of biodiversity. The theory and experimentation that underpins ecology should ultimately inform the decisions required to wisely and sustainably manage natural resources, and the rehabilitation and protection of conservation areas.**



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But for policy makers, funding agencies, conservation reserve managers, bush regenerators, farmers, foresters, and everyone who relies on the ecosystem services provided by Nature, accessing clear and sound information is a challenge. If publication rates are any indication, ecosystem science is progressing at an astonishing pace: the challenge lies in distilling the theory that is most relevant to on-ground management from this expanding body of work.

The book *Land Use Intensification: Effects on Agriculture, Biodiversity and Ecological Processes* focuses on agricultural landscapes – where food production and conservation of biodiversity are often at odds with one another – with an eye to future possible conflicts due to land use intensification. This is shaping up to be a big challenge for humanity because it could further compromise our capacity to sustain natural systems and biodiversity.

Clearly the book's editors and authors recognise that offering up more information is not necessarily going to produce better outcomes for ecosystem management. Rather they have attempted to distill knowledge from four decades of study of such landscapes.

The book is pitched at policy-makers but I think its readership should be broader. It highlights the fact that ecology not only offers solutions to existing landscape problems, but can also be used to design better landscapes by documenting

and monitoring the mistakes of the past.

This readily accessible publication – the outcome of a workshop held in Sydney in 2011 – offers diverse insights from across the globe. Each of the 15 chapters comprises five to eight ‘lessons’ discussed by chapter authors – scientists well-known to those working on biodiversity conservation in agricultural landscapes, including Teja Tschardt, Barry W. Brook, Sue McIntyre, Pashupati Chaudhary, Raphael Didham and Marc-André Villard.

Clearly the point of each chapter is to highlight the key concepts (or ‘lessons’) that have been learnt so that these mistakes – or, less often, successes – can be communicated.

Reducing a chapter to a few key concepts might be frustrating for many, but I found it refreshing. Too often the ‘big picture’ moments in textbooks can be lost in the detail. I now have a good understanding, for instance, of the effects that land use intensification has on a range of ecosystems, from temperate to tropical, from south-east Asian forests, to southern Australia’s mallee, forest in Canada, and small landholdings in the eastern Himalayas.

Perhaps because they are so direct, some of the ‘big picture’ statements made me sit up and take notice. For example, even though it might be obvious, Tschardt and his co-authors (chapter 2) reminded me that ‘pesticides are a largely underestimated determinant of biodiversity loss’, highlighting the fact that agricultural impacts are not just about loss of habitat and habitat continuity.

The late Navjot Sodhi (chapter 5) and his co-authors are even blunter, writing: ‘Deforestation likely causes extinctions’ and ‘Forest degradation influences ecosystem processes’. And Australia’s David Lindenmayer (chapter 13) reminds us that we don’t know everything: ‘There are always ecological surprises – the key is to learn how to better anticipate and detect them so they are not surprises’. This is what policy- and decision-makers need to hear.

The book employs informative figures to explain key concepts, such as the timeline of agricultural impacts (Fig 11.1, p.94), highlighting the key events that occurred in mallee landscapes and the implications for native biota. Each chapter is also supported by a short reference list that allows the reader to pursue the ideas further.

Part A (chapters 2-4) covers themes in landscape ecology that are relevant to land use intensification and biodiversity conservation. These could be the ‘location-neutral’ principles that underpin the understanding of the ecology of human-dominated ecosystems.

Part B comprises ten case studies of land-use impacts on natural systems across the globe. While impressive in scope, it was not clear why systems in Central and South America that are relevant, and where land use-intensification is the pressing issue, were not included.

Part C is a general overview of the key themes identified in case studies – definitions, scale, land sparing, research to guide better management, importance of connectivity, predicting species vulnerability to intensification. I was hoping to see more discussion of general principles such as how land use impacts on ecosystem function via effects on trait diversity, and of how climate change will influence the future challenges of providing food, fibre and ecosystem services.

The impacts of humans on natural systems, biodiversity and ecological processes make for sobering reading. This book aims to provide a roadmap, of sorts, to making better decisions by synthesising a large body of knowledge.

I think it has achieved that aim. I’d recommend it to ecologists who interact with policy makers and land managers because it shows us how we need to have a clear, coherent statement of the major lessons learned by scientists, and how this knowledge can be used to deliver better outcomes for humanity. It would also be a useful book for those involved in teaching social-environmental-economic issues to undergraduate students because it interweaves the importance of science into these debates.

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# LAND USE INTENSIFICATION

Effects on Agriculture,  
Biodiversity and  
Ecological Processes



**Editors:** David Lindenmayer,  
Saul Cunningham and Andrew Young

You can order a copy of *Land Use Intensification: Effects on Agriculture, Biodiversity and Ecological Processes* (Eds: David Lindenmayer, Saul Cunningham & Andrew Young) at [CSIRO Publishing](#)

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