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From satellite data to operational conservation tools

Satellite Remote Sensing for Conservation Action: Case Studies from Aquatic and Terrestrial Ecosystems, by Allison K. Leidner & Graeme M. Buchanan, 2018, Cambridge University Press, 323 pp., ISBN: 9781108631129, www.cambridge.org

Within the last decade, conservation scientists, managers, and decision-makers have gained unprecedented access to satellite remote sensing data. It has become a standard tool for many conservation scientists who use it to monitor and understand changes in biodiversity and habitats as well as the environmental, ecological and socio-economic processes that drive these changes. Yet, despite being the only type of data providing repeated, wall-to-wall observations of large sea- and landscapes, we are still far from routinely using satellite remote sensing data in conservation decision-making tools. It is this application gap that Allison Leidner and Graeme Buchanan aim to address with their book, through which they hope to “stimulate collaborations that result in the development and implementation of operational systems through which satellite remote sensing informs conservation” (p. xiii). To my knowledge, this is the first book which explicitly extends its scope beyond proof-of-concept (the focus of much conservation science employing satellite remote sensing) to the issue of operationalising satellite remote sensing data use in conservation – i.e., issues that arise when making a user-friendly, reliable and effective tool for everyday use by non-remote sensing specialists.

The book consists of seven case studies framed by two introductory chapters and a synopsis. The first introductory chapter is written for remote sensing specialists with a limited knowledge of conservation, and it starts with a (very) brief overview of our current knowledge about the magnitude of the biodiversity crisis, its main drivers, and the key approaches to solving it. It also provides a brief history of satellite remote sensing for conservation. Remote sensing specialists wanting more introduction to the conservation context of remote sensing applications will probably get more out of reading the individual chapter introductions, where each conservation problem is presented in detail, than from this tour de force of a varied and dynamic field. The second introductory chapter is aimed at conservation experts with a limited knowledge of remote sensing, offering a very accessible, non-technical explanation of key concepts and terms. It also introduces some of the technical issues unique to satellite remote sensing data (e.g., in data pre-processing and trade-offs between different kinds of resolutions), in a more heavy, technical style. Non-remote sensing specialist readers might be left wanting more guidance to resources to delve deeper into these topics than a list of useful websites that

the author provide after the references. However, this would - in fairness to the editors – be quite far from the stated scope of the book.

Seven case studies of using satellite remote sensing data in conservation decision making constitute the core of the book. Five of these are operational tools that have – to varying degrees - automated the process of downloading, analysing, and visualising remotely sensed information about the environment in a way directly relevant to conservation decision makers and natural resource managers. These include projects on: 1) assessing chimpanzee habitat loss and quality; monitoring 2) indicators of fire activity; or 3) ecosystem functioning in protected areas; and predicting 4) population sizes of mule deer; or 5) presence of whales in near real time. Another case study describes the use of satellite remote sensing data to demonstrate the loss of coastal wetland habitats, and recounts how this information directly fed into conservation policy decisions; however, this has not (yet) been converted into an operational tool. The last case study is an account of how satellite remote sensing has transformed conservation action in one particular conservation organisation, Conservation International, and outlines recommendations for how satellite remote sensing can be made into a standard tool in conservation action. The book finishes with a synthesis of the lessons learned from the case studies, focusing on the obstacles to operationalisation.

Each case study includes a description of the conservation problem and detail the methodology used to convert satellite remote sensing data into information relevant to decision making. Remote sensing experts will find details about the sensor used and the way indices were derived; conservation experts will find information about the type of actionable information that can be extracted from satellite imagery. They also, to varying degrees, speak about the logistical obstacles, barriers of communication or understanding between the conservation and remote sensing experts in a project. This is where the authors diverge from previous treatments of the subject and give frequently candid insights into the obstacles that are unique to converting a proof-of-concept remote sensing approach into a user-friendly, effective tool for conservation. This will be of interest to conservation scientists, practitioners, and remote sensing experts alike since this information is hard to find in the other white and grey literature on the subject. Conservation managers, decision makers, and scientists are provided

an accessible overview for how satellite remote sensing can support ongoing conservation action; remote sensing specialists who are already interested or involved in conservation science are likely to be interested in the wide-ranging discussion of the technical and logistical barriers that may arise.

It is refreshing to see a discussion not only of the analytical challenges of extracting actionable information from satellite remote sensing data, but also of the logistical and practical issues that need to be considered. As the global biodiversity crisis is progressing with increasing intensity, and conservation managers and decision makers require up-to-date information about the state of and pressures on biodiversity, this contribution is a much-needed synthesis of how we can best leverage the benefits of satellite imagery for day-to-day conservation action. If there is any aspect that detracts from the aim of this book it would be the implicit expectation that the most important barriers to operationalisation are the analytical, technical, and logistical issues to conservation managers and conservation scientists. As a conservation scientist myself, I had expected to read about some experiences of recruiting the necessary remote sensing experts to a project – the editors themselves highlight in the introduction that collaboration with such experts is an

important pathway to mainstreaming satellite remote sensing data in conservation action (p. 19). However, it is not a given that such a project will be attractive or accessible to a remote sensing expert given that they are likely to have very different professional networks, language, and priorities. Despite this, the book succeeds in highlighting both the challenges of operationalising satellite remote sensing for conservation action, as well as the transformational power this technology can have in our work to protect biodiversity.

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