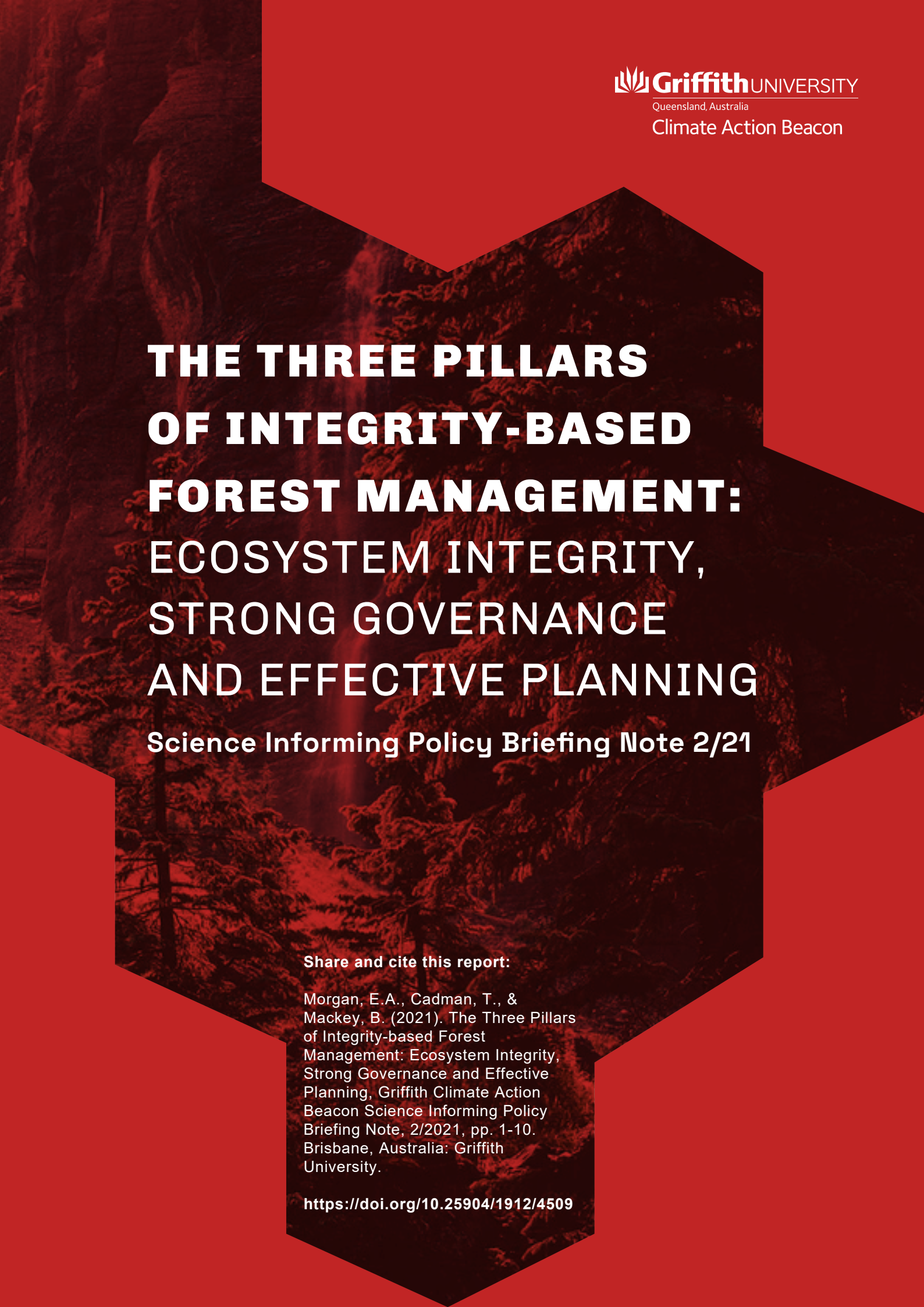

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# THE THREE PILLARS OF INTEGRITY-BASED FOREST MANAGEMENT: ECOSYSTEM INTEGRITY, STRONG GOVERNANCE AND EFFECTIVE PLANNING

## Science Informing Policy Briefing Note 2/21

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## OVERVIEW

Effective management of forests is an essential component of global efforts to address the climate emergency and the biodiversity crisis. Yet, despite increasing recognition of the importance and significant value of the carbon and multiple other benefits provided by forests, and especially primary forests,[1,2] forest loss and degradation continue to increase, especially in the tropics.[3-5]

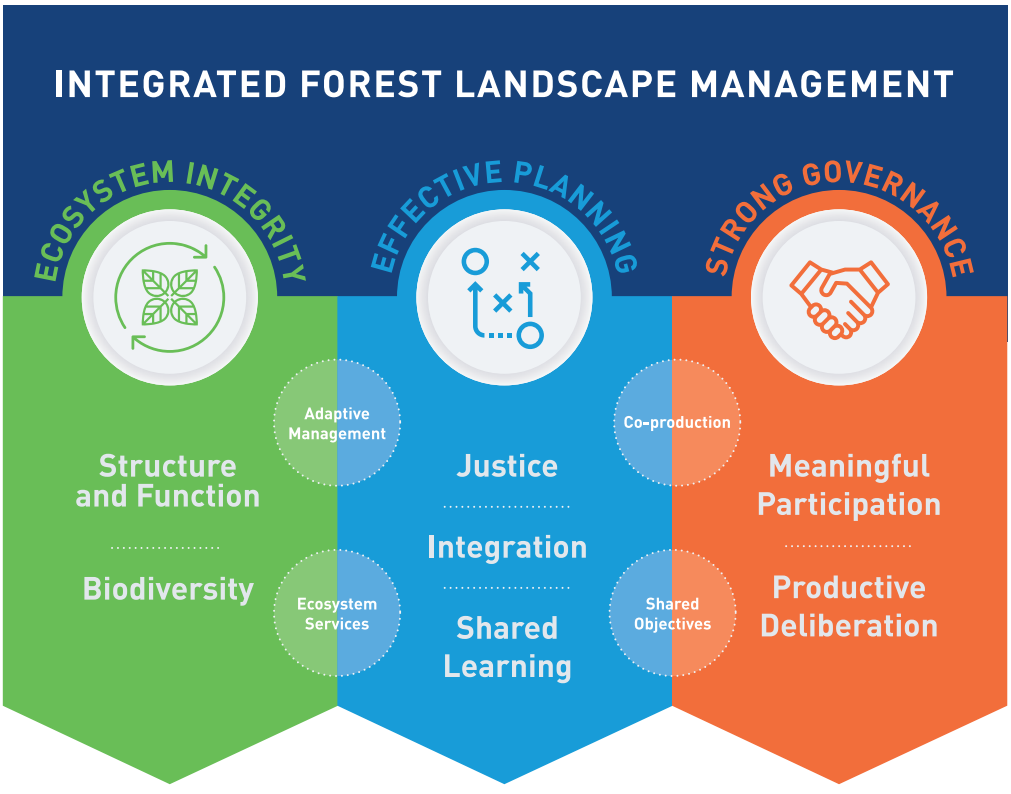
A large contributor to the decline of forests is unsustainable industrial demand for timber, beef, soy and palm oil products.[6-8] However, poor forest management is also a significant cause of forest loss and degradation.[9-11] Conversely, effective management can play a key role in maintaining, enhancing and restoring forests – actions that demonstrate and uphold their ecological attributes and societal values. This policy brief sets out the basis for a new framework for forest landscape management built on the three pillars of *ecosystem integrity, strong governance and effective planning*.

This new approach is needed because the current suite of forest and land management approaches is far from ideal. The existing models are sector-specific, focusing on industrial forestry (sustainable forest management SFM), agriculture (sustainable land management SLM) or management for conservation. Each of these management systems have their merits, but all struggle to address landscape management in a holistic and integrated way, and often fail to recognise the multiple benefits and address key drive rs to forest loss and unsustainable land use change. While there is widespread agreement within policy and practice on the need for landscape approaches to address these issues,[12-14] it remains unclear what a landscape approach requires and how it should be different to existing efforts. The purpose of this policy brief is to highlight tools we can use to help implement and evaluate better landscape approaches.

The Three Pillars Framework (Figure 1) – outlined in Morgan et al. (2020) '**Integrating forest management across the landscape: a three pillar framework**'[15] – addresses this complexity and ambiguity by synthesising three key sets of principles. The framework is designed to be straightforward enough to provide guidance for the development and assessment of landscape-level management, but also flexible enough to be applicable to multiple forest, and potentially other, landscape contexts.

The three pillars – *ecosystem integrity, effective planning and strong governance* – are essential components to ensure both healthy forest ecosystems and sustainable, just and legitimate management of the landscape. Supporting landscape approaches requires activities, policies and strategies that address all three pillars.

**FIGURE 1.**




The Three Pillars Framework for Integrated Landscape Management

## BACKGROUND

Forests, and especially primary forests, provide vital ecosystem services on a global, regional and local scale (see Box 1).[2,16] They hold major carbon stocks that are an essential part of the response to the climate emergency.[1,9,17] Forests are also major reservoirs of biodiversity (providing habitats for 80% of amphibian species, 75% of bird species and 68% of mammal species, and 60% of all vascular plants are found in tropical forests).[5,18,19] Forests maintain regional level climate and water processes,[16,20,21] which in turn are fundamental to preserving carbon and biodiversity, for maintaining productivity and providing clean water for downstream use. Importantly, forests are also the traditional territories of Indigenous Peoples and home to local communities that use forests for food, fibre and fuel[22,23] and for whom they are important cultural and spiritual places.[24,25] The recent pandemic has also brought back into focus the how forest loss significantly increases the risk of animal-to-human transfer of novel diseases and future pandemics.[26]

Despite this, forest loss and degradation with accompanying land use change is continuing globally. Loss of primary forest in the tropics and elsewhere particularly acute,[3,4,6,27] commonly driven by industrial exploitation by logging, mining and clearing for agriculture.[7,8] In response, there is a need for forest and land management that better recognises and reflects the complexity and multiple benefits of forest landscapes.

## THE DEFICIENCIES OF CONVENTIONAL FOREST MANAGEMENT APPROACHES

One challenge is that conventional forest and land management tends to be sector-specific, either focusing on industrial productivity in terms of timber (SFM) or food (SLM), which can result in increased forest loss or degradation, or locking up forests in protected areas, which may negatively impact livelihoods and increase threats to forests elsewhere. These approaches fail to recognise that forests are part of landscapes with multiple land uses and forest types (see Box 2) that provide different benefits to different people.[28,29] As a result, they struggle to both address key drivers to forest loss and unsustainable land use change, and recognise the multiple benefits of different forest types, especially primary forests.[1,9,30,31]

## THE BENEFITS OF LANDSCAPE APPROACHES

Landscape approaches take a more holistic view of the multiple ecosystems, land uses and stakeholders across the landscape level.[12–14] They recognise that decision-making for landscape management needs to balance the protection and restoration of ecosystems, and the multiple benefits they provide, while also meeting the well-being needs of stakeholders, especially Indigenous and local communities. However,

**BOX 1.**

### Primary Forests and Ecosystem Services

Primary forests are forests not subject to management for commodity production and other industrial scale commercial uses and whose structure and function are dominated by natural processes.[5] They make up at least 1.11 billion ha of the estimated 4.06 billion hectares of forest globally.

Forests provide multiple 'ecosystem service' benefits to people at multiple scales,[2,16] including acting as a major carbon stock for climate regulation and irreplaceable value for terrestrial biodiversity.[1,9,17,18] The quality and quantity of forest ecosystem services are related to the ecosystem integrity (see Box 4) of a forest. Primary forests provide the highest quantity and quality of ecosystem service benefits, compared to secondary forests, forest managed for commodity production and degraded forests.[9,30,31]

A landscape perspective is important to allow primary forests to be distinguished from planted forests, forests damaged by logging, second-growth forests, and regrowing forest patches within agricultural landscapes.[27]

BOX 2

## Understanding Landscapes: Primary Forest Landscape Contexts and Landscape Level Management

A forest landscape can be entirely composed of primary forest or contain a mix of primary forest, secondary forest, plantation forest and degraded forest, along with other land covers such as cropping, ranching and human settlements, as highlighted by forest mapping in south east Brazilian Amazon (Figure 2). The forests present in the landscape will provide ecosystem service benefits (see Box 1) depending on their extent and ecosystem integrity (see Box 4)

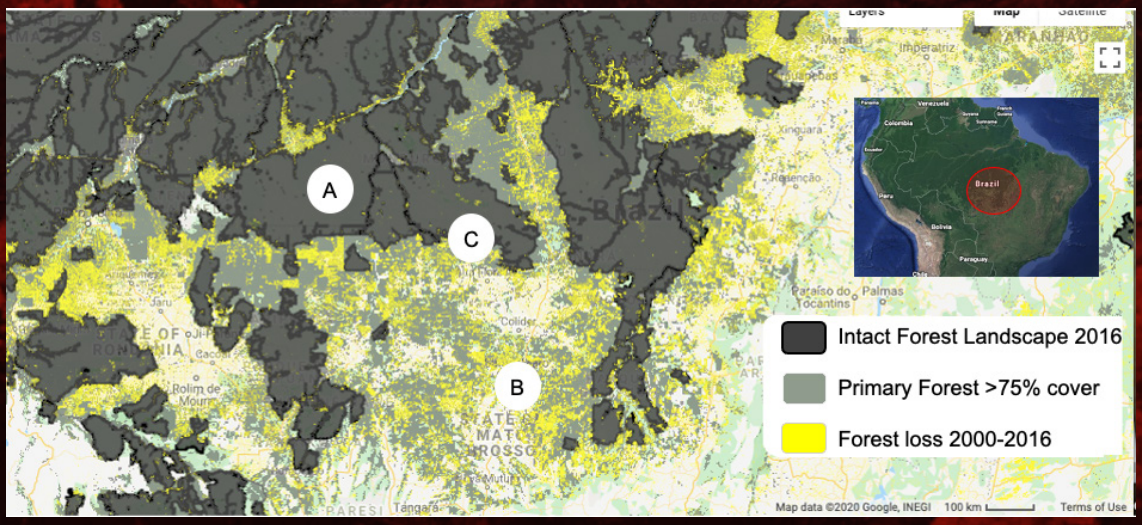



**Figure 2** Three key forest contexts in south east Brazilian Amazon: (A) Intact Forest Landscapes: large (>50,000 ha) areas dominated by primary forest where the challenge is determining land use activities consistent with maintaining the current level of ecosystem integrity; (B) multiple use landscapes, with fragmented primary forest patches (forest blocks of any size with canopy cover >75%), alongside commercial plantations, industrial-scale cropping, and ongoing deforestation, where the challenge is implementing more sustainable forest landscape planning and management; and (C) the boundary zone where intact forests are a dominant landscape element and the challenge is managing conflicting land uses.

there is little agreement on what integrated landscape approaches require, how they might differ from or build on existing efforts, and how they should be evaluated. There are multiple concepts and terms, as well as different sets of principles, all adding to the confusion and limiting guidance for, and assessment of, landscape-level efforts[12–14,32–35] (Box 3). The Three Pillars Framework addresses this complexity and ambiguity to help provide simple but flexible guidance on tools for implementation and evaluation of landscape approaches for sustainable management of forests.

## THE THREE PILLARS FRAMEWORK

The Three Pillars Framework15 (Figure 1) synthesises three existing sets of principles[13,33,36] for landscape action into a simple but flexible framework. It recognises that landscape management is about the health of ecosystems and the multiple benefits they provide (ecosystem integrity), as well as people and their decision-making (governance), with choices over future land uses and activities (planning) providing the link between the two. These three pillars are essential components to ensure both healthy forest ecosystems and sustainable, just and legitimate management of the landscape. The framework provides key principles for each pillar and key linking concepts to further guide implementation and evaluation to create a framework that is straightforward enough to provide guidance for the development and assessment landscape-level management but also flexible enough to be applicable to multiple forest, and potentially other non-forest, landscape contexts. Policies, strategies and plans for the sustainable management of forest landscapes need to include activities that address all three pillars, which are discussed in more detail below.

## ECOSYSTEM INTEGRITY

This pillar builds on the CBD Ecosystems Approach[33] that puts ecosystems front and centre of management but does not provide a strong and clear conceptual basis for ecosystem integrity to be understood, included and monitored.

Ecosystem integrity (Box 4) refers to the combined characteristics of an ecosystem that

enable the self-regeneration and maintenance of structure and healthy functioning,[37] which in turn results in the many ecosystem services that benefit people. It is the biodiversity – the diversity of genes and species, the ecological communities they form, the complex food webs, and the many forms of mutualistic and supporting interactions – that give an ecosystem its stability, resilience and adaptive capacity.[38] Loss of biodiversity in an ecosystem decreases its functional diversity and complexity, which reduces its ability to resist external stressors (stability), bounce back from impacts (resilience) and respond to change conditions (adaptive capacity).[39]

The level of ecosystem integrity determines the ecosystem services generated and the environmental, economic and social benefits to people. Primary forests, for example, provide the highest quality ecosystem services, while plantations provide far fewer lower quality services. A change in the types and mixes of land uses in a forest landscape will change the level of ecosystem integrity and, consequently, the type, quantity and quality of ecosystem services available. Significant degradation of a forest's ecosystem integrity will result in the ecosystem being unable to self-regenerate and the subsequent loss of vital ecosystem services and related landscape benefits.

Protection and restoration of biodiversity and ecosystem structure and function therefore enables landscapes to continue to provide essential climate-related benefits, especially carbon retention, and other benefits – such as clean water – over the long term. Land use and climate activities, plans and strategies therefore should include monitoring and evaluation of ecosystem integrity and the success of protection and restoration activities.

Mechanisms and tools to protect and restore biodiversity and ecosystems include the use of public formal protected areas, community conserved areas, Indigenous lands, and targeted habitat protection for species of interest in collaboration with land stewards. Ecosystem services evaluation and land management principles can help guide decisions on which land uses are most likely to maintain ecosystem integrity and provide sustainable livelihood benefits. For example, converting primary forest to plantation will result in a loss of a range of high-quality ecosystem services, including threatened wildlife species, resilient carbon stocks, clean water supply and non-wood forest products for local consumptions, in favour of a smaller number of extractive "provisioning services", namely logs and woody fibre for commodity production.

## EFFECTIVE PLANNING

Balancing the needs of people and ecosystems are a key part of landscape approach principles,[13] and planning processes can help stakeholders identify and choose trade-offs. Effective

**BOX 3.**

### Defining a Landscape Approach

Reed et al. identify a large number of terms that have been considered as components of an integrated landscape approach. They criticize authors for "every new tweaking of a given iteration resulting in a plethora of often florid and confusing terms".[12] The term is often used interchangeably with 'ecosystem approach'[34] to describe any effort to address conservation and development at the same time. A variety of principles and concepts for defining a landscape approach have been presented, most notable Sayer et al.'s ten principles[13] and the Ecosystem Approach principles.[33]

The Three Pillars framework addresses Freeman et al.'s call that "more focus needs to be placed on the process of taking the approach",[32] and synthesises several existing principles into a simple but flexible framework that provides three key pillars for a landscape approach: ecosystem integrity, planning and governance.

**BOX 4.**

### Ecosystem Integrity

Including ecosystem integrity as a fundamental pillar is a key novel element of Three Pillars framework. Ecosystem integrity describes an ecosystem's ability to maintain itself, continue its process of self-organization and maintain its optimum operating point.[37]

Ecosystem integrity highlights the importance of biodiversity in ecosystem processes and the emergent properties arising from their interactions, including resilience to the variability inherent in its climate regimes.[38] The biodiversity and complexity of primary forests, for example, gives them their ecological resilience in the face of external stressors.[39]

From a management perspective, ecosystem integrity determines the benefits forest provide. A change in the kinds and mixes of land uses in a forest landscape will result in different levels of ecosystem integrity and changes in the type, quantity and quality of ecosystem services available.

planning is a future focused practice of public action to bring together knowledge with ethical values to choose land uses and activities across a landscape.[40,41] Landscape planning brings stakeholders together to choose land uses, activities and policies with the aim of creating sustainability, just benefit sharing and improved wellbeing. The definition of planning used here does not have to be formal or government-led – it includes any practices that brings people together to help them make choices about their future land use and landscape activities.[42,43]

Importantly, effective planning requires participatory processes to create shared learning, integration and situated justice.

Managing across a landscape requires an understanding of the multiple ecosystems and the needs and values of the multiple stakeholders across multiple land uses. Shared learning brings scientific, local and Indigenous knowledge together to create a shared understanding of the landscape and its benefits, possibilities and limits.[40,44] This understanding empowers people to choose actions in the landscape that are both in line with their values and grounded in a scientific understanding of threats, risk, opportunities, options and requirements. Adaptive management, monitoring and research will support shared learning if they include participation (see strong governance below) and especially community engagement and involvement to ensure knowledge is co-produced and shared.

Collaboration and coordination help ensure that the choice and implementation of activities on the ground harness the expertise of the stakeholders while recognising the multiple uses, the requirements of ecosystem integrity and promotes fair benefit sharing.[45–47] Activities, policies and strategies should identify stakeholders, use shared visions, aims and goals, and encourage interactions to support collaboration. Identifying issues and responsibilities, and matching capacity for responsibilities will improve coordination.

To have social licence, processes and mechanisms must result in just outcomes that equitably improve the wellbeing and capabilities of those dependent on the landscape, especially Indigenous and other local communities.[48,49] Effective planning must be aware of and seek to address the power imbalances among competing interests and landscape stakeholders[50–52] to support the equitable distribution of benefits, land and resources, as well as the fair sharing of risks and responsibilities; mindful that with power comes increased responsibility to promote the common good. Policies and strategies must also protect and develop institutions that improve access to justice, including recognition of rights; use of free, prior and informed consent; local-level conflict resolution mechanisms with fair and appropriate graduated sanctions; and transparent rules that match local conditions.

**BOX 5.**

### Effective Planning

Land use planning is conventionally associated with urban areas and formal government-led processes, although more strategic and regional planning encompasses rural areas and forests.[40,41]

Landscape planning in the Three Pillars framework combines the social learning aspects of land use planning,[40] the integrated focus of strategic planning[46] and the focus on justice and empowerment of more informal 'radical' planning approaches.[51,52]

Note that this planning doesn't have to be formal and government-led, but can be any process where people come together to make decisions about future land uses and activities.[42,43] Development and conservation activities common in forest landscapes, such as participatory rural appraisal and Theories of Change, are nascent planning processes, as are many existing community activities.

**BOX 6.**

### Strong Governance

Governance is about how people work together to make decisions. Improved governance is commonly cited as essential to landscape approaches.[12,14]

The Three Pillars Framework builds on existing work that highlights the importance of meaningful participation and productive deliberation as the basis good governance.[56] All activities, including planning, and institutions should seek to improve participation and deliberation.

Acknowledging the challenge of improving governance, development of participatory governance standards can help communities evaluate and improve their governance over time.[57]

## STRONG GOVERNANCE

Ostrom's consideration of landscapes as common pool resources highlights the importance of governance in managing forests and natural resources.[36,53] Strong governance ensures that decision-making has integrity so that decisions about the landscape are legitimate.[54,55] Ensuring both meaningful participation and productive deliberation within governance arrangements will result in decision-making that is both effective and fair.[56]

Meaningful participation ensures involvement of all landscape stakeholders in a way that allows them to influence decision-making. Policies and strategies should aim to ensure all interests are represented, include resources to allow and encourage participation, especially of those facing discrimination (e.g., women, youth, minorities), and require that organisations and individuals take responsibility by ensuring accountability and transparency.

Productive deliberation enables agreement and decision-making by including democratic processes and conflict resolution mechanisms, and supports effective implementation by encouraging long-term behavioural change that seeks to address problems. Policies and strategies should include transparent and accessible conflict-resolution methods and processes to encourage democratic involvement of stakeholders. At the same time, they must seek to address identified problems and create positive behavioural change.

The development of a participatory governance standard, based on a standard set of principles criteria, and indicators, with specific verifiers chosen, agreed upon and regularly assessed by stakeholders, can provide an open and transparent institutional framework for strong governance.[56,57] It can also be used to support 'payment for ecosystem service' (PES) schemes that provide funds to land owners and custodians for forest protection and restoration outcomes.

## FUTURE WORK

The Three Pillars Framework provides the basis for new approach to forest landscape management. This approach will help create more consistent implementation and evaluation of landscape approaches across the many different forest landscape contexts. Ongoing work is developing tools and evaluation frameworks to help stakeholders assess current landscape actions and identify the gaps and needs to improve the sustainable management of the landscape.

## SOURCE REFERENCE

Morgan, E. A., Cadman, T., & Mackey, B. (2020). Integrating forest management across the landscape: A three pillar framework. Journal of Environmental Planning and Management, 64(10), 1735–1769. https://doi.org/10.1080/09640568.2020.1837747

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## REFERENCES


1. Mackey, B., DellaSala, D. A., Kormos, C., Lindenmayer, D., Kumpel, N., Zimmerman, B., Hugh, S., Young, V., Foley, S., Arsenis, K., & Watson, J. E. M. (2015). Policy Options for the World's Primary Forests in Multilateral Environmental Agreements. *Conservation Letters*, *8*(2), 139–147. https://doi.org/10.1111/conl.12120
2. Taye, F. A., Folkersen, M. V., Fleming, C. M., Buckwell, A., Mackey, B., Diwakar, K. C., Le, D., Hasan, S., & Ange, C. S. (2021). The economic values of global forest ecosystem services: A meta-analysis. *Ecological Economics*, *189*, 107145. https://doi.org/10.1016/j.ecolecon.2021.107145
3. Turubanova, S., Potapov, P. V., Tyukavina, A., & Hansen, M. C. (2018). Ongoing primary forest loss in Brazil, Democratic Republic of the Congo, and Indonesia. *Environmental Research Letters*, *13*(7), 074028. https://doi.org/10.1088/1748-9326/aacd1c
4. Achard, F., Beuchle, R., Mayaux, P., Stibig, H.-J., Bodart, C., Brink, A., Carboni, S., Desclée, B., Donnay, F., Eva, H. D., Lupi, A., Raši, R., Seliger, R., & Simonetti, D. (2014). Determination of tropical deforestation rates and related carbon losses from 1990 to 2010. *Global Change Biology*, *20*(8), 2540–2554. https://doi.org/10.1111/gcb.12605
5. FAO & UNEP. (2020). *The State of the World's Forests 2020. Forests, biodiversity and people*. FAO and UNEP. https://doi.org/10.4060/ca8642en
6. Leblois, A., Damette, O., & Wolfersberger, J. (2017). What has Driven Deforestation in Developing Countries Since the 2000s? Evidence from New Remote-Sensing Data. *World Development*, *92*, 82–102. https://doi.org/10.1016/j.worlddev.2016.11.012
7. Bebbington, A. J., Bebbington, D. H., Sauls, L. A., Rogan, J., Agrawal, S., Gamboa, C., Imhof, A., Johnson, K., Rosa, H., Royo, A., Toumbourou, T., & Verdum, R. (2018). Resource extraction and infrastructure threaten forest cover and community rights. *Proceedings of the National Academy of Sciences*, *115*(52), 13164–13173. https://doi.org/10.1073/pnas.1812505115
8. Curtis, P. G., Slay, C. M., Harris, N. L., Tyukavina, A., & Hansen, M. C. (2018). Classifying drivers of global forest loss. *Science*, *361*(6407), 1108–1111. https://doi.org/10.1126/science.aau3445
9. Mackey, B., Kormos, C. F., Keith, H., Moomaw, W. R., Houghton, R. A., Mittermeier, R. A., Hole, D., & Hugh, S. (2020). Understanding the importance of primary tropical forest protection as a mitigation strategy. *Mitigation and Adaptation Strategies for Global Change*, *25*, 763–787. https://doi.org/10.1007/s11027-019-09891-4
10. Zimmerman, B., & Kormos, C. (2012). Prospects for Sustainable Logging in Tropical Forests. *BioScience*, *62*(5), 479–487. https://doi.org/10.1525/bio.2012.62.5.9
11. Puettmann, K. J., Wilson, S. M., Baker, S. C., Donoso, P. J., Drössler, L., Amente, G., Harvey, B. D., Knoke, T., Lu, Y., Nocentini, S., Putz, F. E., Yoshida, T., & Bauhus, J. (2015). Silvicultural alternatives to conventional even-aged forest management—What limits global adoption? *Forest Ecosystems*, *2*(1), 8. https://doi.org/10.1186/s40663-015-0031-x
12. Reed, J., Van Vianen, J., Deakin, E. L., Barlow, J., & Sunderland, T. (2016). Integrated landscape approaches to managing social and environmental issues in the tropics: Learning from the past to guide the future. *Global Change Biology*, *22*(7), 2540–2554. https://doi.org/10.1111/gcb.13284
13. Sayer, J. A., Sunderland, T., Ghazoul, J., Pfund, J.-L., Sheil, D., Meijaard, E., Venter, M., Boedhihartono, A. K., Day, M., Garcia, C., Oosten, C. van, & Buck, L. E. (2013). Ten principles for a landscape approach to reconciling agriculture, conservation, and other competing land uses. *Proceedings of the National Academy of Sciences*, *110*(21), 8349–8356. https://doi.org/10.1073/pnas.1210595110
14. Arts, B., Buizer, M., Horlings, L., Ingram, V., van Oosten, C., & Opdam, P. (2017). Landscape Approaches: A State-of-the-Art Review. *Annual Review of Environment and Resources*, *42*(1), 439–463. https://doi.org/10.1146/annurev-environ-102016-060932
15. Morgan, E. A., Cadman, T., & Mackey, B. (2020). Integrating forest management across the landscape: A three pillar framework. *Journal of Environmental Planning and Management*, *64*(10), 1735–1769. https://doi.org/10.1080/09640568.2020.1837747
16. Perera, A. H., Peterson, U., Pastur, G. M., & Iverson, L. R. (2018). *Ecosystem Services from Forest Landscapes: Broadscale Considerations*. Springer.

17. Dellasala, D. A., Kormos, C. F., Keith, H., Mackey, B., Young, V., Rogers, B., & Mittermeier, R. A. (2020). Primary Forests Are Undervalued in the Climate Emergency. *BioScience*, *70*(6), 445–445. https://doi.org/10.1093/biosci/biaa030

18. Barlow, J., Gardner, T. A., Araujo, I. S., Ávila-Pires, T. C., Bonaldo, A. B., Costa, J. E., Esposito, M. C., Ferreira, L. V., Hawes, J., Hernandez, M. I. M., Hoogmoed, M. S., Leite, R. N., Lo-Man-Hung, N. F., Malcolm, J. R., Martins, M. B., Mestre, L. a. M., Miranda-Santos, R., Nunes-Gutjahr, A. L., Overal, W. L., … Peres, C. A. (2007). Quantifying the biodiversity value of tropical primary, secondary, and plantation forests. *Proceedings of the National Academy of Sciences*, *104*(47), 18555–18560. https://doi.org/10.1073/pnas.0703333104

19. Dirzo, R., & Raven, P. H. (2003). Global State of Biodiversity and Loss. *Annual Review of Environment and Resources*, *28*(1), 137–167. https://doi.org/10.1146/annurev.energy.28.050302.105532

20. Spracklen, D. V., Arnold, S. R., & Taylor, C. M. (2012). Observations of increased tropical rainfall preceded by air passage over forests. *Nature*, *489*(7415), 282–285. https://doi.org/10.1038/nature11390

21. Millennium Ecosystem Assessment Board. (2005). *Ecosystems and Human Wellbeing*. Island Press. http://www.millenniumassessment.org

22. Mackey, B., Nalau, J., Sahin, O., Fleming, C., Smart, J. C. R., Connolly, R., Hallgren, W., & Buckwell, A. J. (2017). *Vanuatu Ecosystem and Socio-economic Resilience Analysis and Mapping (ESRAM)*. Secretariat for the Pacific Regional Environment Program (SPREP). https://pacificdata.org/data/dataset/ecosystem-and-socio-economic-resilience-analysis-and-mapping-vanuatu132ddf1c-21a5-4412-8a60-6dd

23. Zimmerman, B., Schwartzman, S., Jerozolimski, A., Esllei, J., Santini, E., & Hugh, S. (2020). Large Scale Forest Conservation With an Indigenous People in the Highly Threatened Southeastern Amazon of Brazil: The Kayapo. In *Reference Module in Earth Systems and Environmental Sciences* (p. B9780124095489118000). Elsevier. https://doi.org/10.1016/B978-0-12-409548-9.11918-9

24. Buckwell, A., Fleming, C., Muurmans, M., Smart, J. C. R., Ware, D., & Mackey, B. (2020). Revealing the dominant discourses of stakeholders towards natural resource management in Port Resolution, Vanuatu, using Q-method. *Ecological Economics*, *177*, 106781. https://doi.org/10.1016/j.ecolecon.2020.106781

25. Kenter, J. O., Hyde, T., Christie, M., & Fazey, I. (2011). The importance of deliberation in valuing ecosystem services in developing countries—Evidence from the Solomon Islands. *Global Environmental Change*, *21*(2), 505–521. https://doi.org/10.1016/j.gloenvcha.2011.01.001

26. Tollefson, J. (2020). Why deforestation and extinctions make pandemics more likely. *Nature*, *584*(7820), 175–176. https://doi.org/10.1038/d41586-020-02341-1

27. Kim, D.-H., Sexton, J. O., & Townshend, J. R. (2015). Accelerated deforestation in the humid tropics from the 1990s to the 2000s. *Geophysical Research Letters*, *42*(9), 3495–3501. https://doi.org/10.1002/2014GL062777

28. Chazdon, R. L., Brancalion, P. H. S., Laestadius, L., Bennett-Curry, A., Buckingham, K., Kumar, C., Moll-Rocek, J., Vieira, I. C. G., & Wilson, S. J. (2016). When is a forest a forest? Forest concepts and definitions in the era of forest and landscape restoration. *Ambio*, *45*(5), 538–550. https://doi.org/10.1007/s13280-016-0772-y

29. Mace, G. M., Norris, K., & Fitter, A. H. (2012). Biodiversity and ecosystem services: A multilayered relationship. *Trends in Ecology & Evolution*, *27*(1), 19–26. https://doi.org/10.1016/j.tree.2011.08.006

30. Moomaw, W. R., Masino, S. A., & Faison, E. K. (2019). Intact Forests in the United States: Proforestation Mitigates Climate Change and Serves the Greatest Good. *Frontiers in Forests and Global Change*, *2*, 27. https://doi.org/10.3389/ffgc.2019.00027

31. Nadrowski, K., Wirth, C., & Scherer-Lorenzen, M. (2010). Is forest diversity driving ecosystem function and service? *Current Opinion in Environmental Sustainability*, *2*(1–2), 75–79. https://doi.org/10.1016/j.cosust.2010.02.003

32. Freeman, O. E., Duguma, L. A., & Minang, P. A. (2015). Operationalizing the integrated landscape approach in practice. *Ecology and Society*, *20*(1), 24. https://doi.org/10.5751/ES-07175-200124

33. Convention on Biological Diversity. (2007, February 7). *Ecosystem Approach—Principles*. https://www.cbd.int/ecosystem/principles.shtml

34. Sayer, J. A., Maginnis, S., & Laurie, M. (2005). *Forests in landscapes: Ecosystem approaches to sustainability*. Earthscan.

35. Erbaugh, J., & Agrawal, A. (2017). Clarifying the landscape approach: A Letter to the Editor on "Integrated landscape approaches to managing social and environmental issues in the tropics." *Global Change Biology*, n/a-n/a. https://doi.org/10.1111/gcb.13788

36. Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press. https://doi.org/10.1017/CBO9780511807763

37. Kay, J. J. (1991). A nonequilibrium thermodynamic framework for discussing ecosystem integrity. *Environmental Management*, *15*(4), 483–495. https://doi.org/10.1007/BF02394739

38. De Leo, G. A., & Levin, S. (1997). The Multifaceted Aspects of Ecosystem Integrity. *Conservation Ecology*, *1*(1), 3. https://www.jstor.org/stable/26271649

39. Holling, C. S. (1973). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, *4*(1), 1–23. https://doi.org/10.1146/annurev.es.04.110173.000245

40. Friedmann, J. (1987). *Planning in the Public Domain: From Knowledge to Action*. Princeton University Press.

41. Selman, P. (2005). *Planning and the Landscape Scale*. Taylor and Francis.

42. Thorpe, A. (2017). Rethinking Participation, Rethinking Planning. *Planning Theory & Practice*, *18*(4), 566–582. https://doi.org/10.1080/14649357.2017.1371788

43. Healey, P. (2012). The universal and the contingent: Some reflections on the transnational flow of planning ideas and practices. *Planning Theory*, *11*(2), 188–207. https://doi.org/10.1177/1473095211419333

44. Reed, M., Evely, A., Cundill, G., Fazey, I., Glass, J., Laing, A., Newig, J., Parrish, B., Prell, C., Raymond, C., & Stringer, L. (2010). What is Social Learning? *Ecology and Society*, *15*(4), r1. http://www.ecologyandsociety.org/vol15/iss4/resp1/

45. Albrechts, L., & Balducci, A. (2013). Practicing Strategic Planning: In Search of Critical Features to Explain the Strategic Character of Plans. *DisP - The Planning Review*, *49*(3), 16–27. https://doi.org/10.1080/02513625.2013.859001

46. Healey, P. (2006). Relational complexity and the imaginative power of strategic spatial planning. *European Planning Studies*, *14*(4), 525–546. https://doi.org/10.1080/09654310500421196

47. Forester, J. (1999). *The Deliberative Practitioner: Encouraging Participatory Planning Processes*. MIT Press.

48. Basta, C. (2015). From justice in planning toward planning for justice: A capability approach: *Planning Theory*. https://doi.org/10.1177/1473095215571399

49. Lane, M. B. (2006). The role of planning in achieving indigenous land justice and community goals. *Land Use Policy*, *23*(4), 385–394. https://doi.org/10.1016/j.landusepol.2005.05.001

50. Cameron, J., & Grant-Smith, D. (2014). Putting people in planning: Participatory planning, inclusion and power. In J. Byrne, J. Dodson, & N. Sipe (Eds.), *Australian Environmental Planning: Challenges and Future Prospects* (pp. 197–205). Routledge.

51. Osborne, N. (2015). Intersectionality and kyriarchy: A framework for approaching power and social justice in planning and climate change adaptation. *Planning Theory*, *14*(2), 130–151. https://doi.org/10.1177/1473095213516443

52. Miraftab, F. (2009). Insurgent Planning: Situating Radical Planning in the Global South. *Planning Theory*, *8*(1), 32–50. https://doi.org/10.1177/1473095208099297

53. Nagendra, H., & Ostrom, E. (2012). Polycentric governance of multifunctional forested landscapes. *International Journal of the Commons*, *6*(2), 104. https://doi.org/10.18352/ijc.321

54. Adger, W. N., Brown, K., Fairbrass, J., Jordan, A., Paavola, J., Rosendo, S., & Seyfang, G. (2003). Governance for sustainability: Towards a "thick" analysis of environmental decisionmaking. *Environment and Planning A*, *35*(6), 1095–1110. https://doi.org/10.1068/a35289

55. Sampford, C., Cadman, T., & Maguire, R. (Eds.). (2017). *Governing the Climate Change Regime: Institutional Integrity and Integrity Systems*. Routledge. https://doi.org/10.4324/9781315442365

56. Cadman, T. (2012). Evaluating the Quality and Legitimacy of Global Governance: A Theoretical and Analytical Approach. *The International Journal of Social Quality*, *2*(1), 4–23. https://www.jstor.org/stable/23972428

57. Lopez-Casero, F., Cadman, T., & Maraseni, T. (2016). *Quality-of-governance standards for forest management and emissions reduction. Developing community forestry and REDD+ governance through a multi-stage, multi-level and multi-stakeholder approach. 2016 Update* (No. DP1504). Institute for Global Environmental Strategies (IGES). https://pub.iges.or.jp/system/files/publication_documents/pub/discussionpaper/5257/Discussion_paper_Governance_Standard_20160331_FLC_final_A4.pdf