SUBMISSION ON THE NATURE REPAIR MARKET

(NATURE REPAIR MARKET BILL 2023 AND NATURE REPAIR MARKET (CONSEQUENTIAL AMENDMENTS) BILL 2023

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I am an ecologist and conservation scientist with 40 years of experience in working on the management, conservation and restoration of natural environments in Australia including in forests, woodlands, farmlands and other ecosystems. I applaud the initiatives in the Bills, for seeking to generate innovative new kinds of financing to help promote the conservation of the nation's natural environments, by establishing a framework for a voluntary nation market with the intention of delivering improved biodiversity outcomes.

My submission relates to three key areas that are outlined below.

1. The Nature Repair Market and monitoring

For the Nature Repair Market to be effective, we will need excellent monitoring programs (Lindenmayer et al. 2023b). Indeed, initiatives like Nature Repair Markets, and allied approaches like certification schemes, stewardship programs, and sustainability frameworks simply cannot operate in the absence of high-quality empirical data gathered from robust monitoring programs. This includes: **(1) Compliance monitoring** to determine if a landholder actually did what they said they would do; **(2) Inputs monitoring** (for example: How much of money that was sought was actually invested in actions like fencing or planting trees?); and, **(3) Outcomes monitoring** (that is: Was there a demonstrable biodiversity dividend from management interventions?) (Lindenmayer et al. 2023b)

Robust outcomes monitoring will require documenting biodiversity responses not only to management interventions (like establishing a planting), but also biodiversity levels before an intervention (e.g., baseline monitoring), and biodiversity levels where there has been no intervention (i.e., control sites). These considerations demand that monitoring programs be guided by a robust experimental design to provide confidence that the impacts of interventions are real and not an artefact resulting from low statistical power or some other effect. Passive surveillance monitoring (sensu Lindenmayer et al. 2022b) that lacks a robust design including those that ignore contrasts between management interventions (like intensive continuous livestock grazing versus rotational grazing) will very rarely produce the kinds of data needed for outcomes monitoring.

Some of the monitoring data to support biodiversity initiatives can be extracted from satellite imagery, such as spatio-temporal changes in vegetation cover, although our experience shows considerable ground-truthing is essential to reconcile classification errors (e.g. Chen et al. 2023). However, much of the key biodiversity monitoring data will need to be gathered by people working on the ground (as satellites will not tell us which reptile or bird species occur in a particular area) (Lindenmayer et al. 2023b). These people must have considerable expertise in biodiversity surveys and associated species recognition – otherwise data gathered will be compromised, and the initiatives will lack accountability and credibility. There is also considerably opportunity for First Nations to work on country and, for example, seek ways to integrate Indigenous Knowledge and western science, including in improved land management and biodiversity monitoring (see below) and natural capital accounting (Normyle et al. 2022).

2. The Nature Repair Market and novel financing arrangements

The costs of halting biodiversity loss and land degradation are non-trivial. Almost 3 billion ha of agricultural land globally is in poor condition (an area the size of Russia) (Gibbs and Salmon 2015). The estimated costs of reversing land degradation are astronomical – more than $US14 trillion (Crouzeilles et al. 2020). The sheer scale of the problem – including in Australia – is beyond the capacity of conventional financial approaches (Chapman and Lindenmayer 2019).

A key question is therefore: *How can farmers best finance eligible projects to restore and improve the natural assets like patches of remnant vegetation, shelterbelts, farm dams and*

waterways on their land? Restoration projects cost money and that money has to come from somewhere? Chapman and Lindenmayer (2023) (see https://theconversation.com/hecs-for-farmers-nature-repair-loans-could-help-biodiversity-recover-and-boost-farm-productivity-204040) have argued that part of the answer has its origins in the nature of higher education loans - Higher Education Contribution Scheme (HECS). HECS is a loan to students which is required to be repaid if (and only when) their future annual personal incomes exceed a certain amount. Chapman and Lindenmayer (2023) have advocated a financial instrument similar to HECS for application in the agricultural sector. That is a "revenue-contingent loan" (RCL) system. An RCL to finance Nature Repair would operate as an income-smoothing device for farmers. The money for restoration projects would be supplied in the form of a debt to be repaid when future revenues allow this. If a future annual farm revenue is low or zero, the RCL repayment would be low or zero. And when the farm revenue is healthy, the amount of the debt returned to the government is correspondingly higher.

As part of RCL approach within a Nature Repair Market, it would be critical to ensure there are environmental standards to guide appropriate land management actions. We can use the past 25 years of insights from the Sustainable Farms monitoring program at The Australian National University across 230 farms in endangered temperate woodlands of eastern Australia (e.g. see https://www.sustainablefarms.org.au/) to provide standards to guide how best to establish plantings and shelterbelts or renovate farm dams. These standards are critical because some actions – if done the wrong way – can have perverse effects – such as establishing narrow replantings creating habitat for junk birds (Lindenmayer et al. 2022a). In the case of farm dams, the vast majority of the 650 000 dams in the Murray-Darling Basin are in poor condition. Renovating an individual dam with an appropriate restoration standard would cost approximately $5000 (Dobes et al. 2021). However, a farmer will make their money back from accelerated weight gain from livestock consuming improved quality water (Dobes et al. 2021). There is also a Greenhouse Gas benefit as dams change rapidly from being carbon sources to carbon sinks when they are renovated (Malerba et al. 2022). Plus there is a biodiversity dividend with greater abundance of birds, amphibians and macro-invertebrates when farm dams are repaired (Westgate et al. 2022). Of course, (and as outlined in the first point in this submission), robust monitoring will be critical to ensure that restoration efforts and programs to recovery biodiversity within a

RCL or any other framework within a Nature Repair Market are effective (Lindenmayer et al. 2023a).

3. Honesty in compliance and reporting

Regulation, transparency and compliance is essential to the successful operation of any market, including a Nature Repair market. Indeed, legislation and Codes of Practice exist to ensure natural resources are managed sustainably. Regulation and compliance has a poor record in some key areas of natural resource management in Australia (e.g. see (VAGO 2022)). These problems must be rectified if the Nature Repair market is to be successful.

The best way to illustrate the need for strong regulation and compliance comes from an example from forestry in the State of Victoria and it relates to submissions to the Senate Environment and Communications Legislation Committee. In particular, there were discussions about widespread breaches of logging codes of practice in which forest on steep slopes were logged illegally (see (Taylor and Lindenmayer 2021) (Taylor and Lindenmayer 2022)).

On Monday, 19th April 2021 Ms Monique Dawson, Chief Executive Officer, VicForests appeared before the Committee, then inquiring into the Environment Protection and Biodiversity Conservation Amendment (Regional Forest Agreements) Bill 2020. In response to questions on notice, Ms Dawson made the following statements:

3. **Is it correct that 15.4 per cent of logging coupes in the Upper Goulburn Catchment have more than 10 per cent of their cut area exceeding 30 degrees?**

No this is not correct. The LiDAR model used by VicForests which uses 1m by 1m pixels to determine slope shows that only 2% of the area harvested in the Upper Goulburn catchment since 2004 was over 30 degrees. As this includes very small patches as small as 1 square metre this does not mean that regulatory requirements have necessarily been breached as these areas are too small to exclude in practice and have no meaningful impact on the management of run-off over an operational area of around 40 hectares (i.e. 1 square metre is 0.00025% of an average harvest operation area).

The determination of slopes is highly dependent on the modelling and/or measurement techniques used. It is our understanding that the model used by Professor Lindenmayer used a pixel size of 30m by 30m, and that he has also considered DELWP's terrain model using a 10m by 10m pixel size. The VicForests LiDAR based model is based on a 1m by 1m pixel and is significantly more detailed. These different models will potentially generate different results.

That said, VicForests notes that it has reviewed Professor Lindenmayer's paper and has re-created the analysis using the model and data claimed to have been used by him. We achieved very different results to the results reported by Professor Lindenmayer, in fact, our results using the model and data claimed to be used by Professor Lindenmayer are quite similar to the results produced through VicForests' model. We therefore do not understand the basis of Professor Lindenmayer's claims.

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5. **Would LiDAR data find there are more slopes with gradients above 30 degrees as inferred by Professor Lindenmayer?**

No. VicForests already uses LiDAR and is able to detect a greater granularity in landscape features that are smoothed out at coarser resolutions. So our model is already more sensitive. VicForests is able to use fine-resolution data so we can plan accordingly, unlike many others who undertake analyses on larger cell resolutions with coarser vertical accuracy.

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In both responses, Ms Dawson explicitly questioned / asserted an inability to understand the basis of scientific claims and research showing unequivocally that there was in fact widespread breaches of logging codes of practice as demonstrated in the peer-reviewed scientific literature (Taylor and Lindenmayer 2021) (Taylor and Lindenmayer 2022)).

In order to understand the basis of this clear refutation by Ms Dawson of that research and reflection on my standing as a leading researcher in the area, I made repeated requests, under FOI, for the 're-created analysis' and 'very different results' that had been specifically referred to. Those requests yielded no result, with no documents identified as existent at the relevant time produced by VicForests. To so question a reputation under parliamentary privilege ought to be supported by evidence, that exists at the time. Hence, it would be reasonable to expect that Ms Dawson would have had briefing notes, spreadsheets and physical evidence of spatial analysis. However, it is now clear that Ms Dawson's statements were not so supported by any such material.

Following investigation by the Office of the Victorian Information Commissioner (OVIC), it is apparent that Ms Dawson had no documents before her to support her response to the Committee and her questioning of my scientific claims and research, but what she relied upon is said to have existed alternatively in the mind of one of VicForest's junior officers or earlier on her computer screen. This reflects bad science and its implausibility is more manifest following the fact that the data that was provided by VicForests, that was created after Ms Dawson's response to the Committee, was analyzed with precisely the same results as my initial analysis. Indeed, we have now published results in a peer-reviewed international journal indicating precisely this outcome (Taylor, C., Lindenmayer, D.B. 2022. The use of spatial data and satellite information in legal compliance and planning in forest management. PLOS One, 17(7), e0267959. https://doi.org/10.1371/journal.pone.0267959).

This example of widespread illegal logging on steep slopes serves to highlight that agencies charged with responsibility to comply with regulations and codes of practices sometimes fail to do so (see also (VAGO 2022)). This highlights that regulation, transparency and compliance is essential to successful natural resource management and in terms of this submission, the successful operation of any market, including a Nature Repair market.

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