Ecological Monitoring for Successful Restoration

Presenter: Mark Vergara, Acacia Environmental management
Contact details: mark.vergara@acacia.cc; 0472 720 063
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Time: 6:30 – 7:30pm

Q&A

Q: If you have to choose between monitoring fauna or flora, what would be better to prioritise?
A: *It depends on what question you need to answer. If you are trying to find out the impact of you management intervention on the population of a specific fauna then it has to focus on that taxa but if your question is "will my management intervention improve the density of a specific group of plants" then flora. But I'm assuming by "choose" you mean you just want to have some measure of success to your restoration project then maybe if you have limited resources and have to choose only one then flora might be the more obvious choice if you can also use that taxa as a surrogate or proxy for other parameters, like the potential presence of a certain fauna as that flora provides habitat or food for that species (i.e. indicator species).*

Q: Are there any learnings we can apply to Yarra river? Perhaps near and/or in urban areas?
A: *I certainly hope so. After going through the requirements for an effective monitoring program I guess one can also look into the potential impact of edge effects and ecological succession on your restoration project. Like, maybe you are trying to establish a community that is in a more advanced stage which doesn't have the "building blocks" from the previous stage that's why it's not as successful? Or your project is exposed to a lot of edge effects that maybe you should also shift some focus into providing a buffer to your peripheral area to give your core area a fighting chance.*

Q: Adaptive approach fundamental to monitoring:- does this happen in reality?
A: *I acknowledge the fact that adaptive monitoring is not typically practiced in small, not so well-funded restoration projects. Adaptive monitoring is usually practiced in large-scale restoration/ research projects. But that is also the point of this presentation, to make people aware that it should become a standard practice. Our monitoring program is based on our conceptual model, which is based on a lot of assumptions on how the ecosystem will respond to our management intervention. Our measure of success is based on meeting those assumptions; therefore, our basis of success is only as good as our data. So, if our current data doesn't show that then we definitely need to make some adjustments to at least address that before we can say our project is a failure or success.*

Q: How do you suggest we could get more project designers aware to the importance of this?
A: *One of the easier pathways is through making these types of webinar open to the public or at least at reasonable cost. This way we can reach out and educate our colleagues from other industries. Especially, with the lockdown restrictions, more people have the ability to attend these types of events. The more difficult and long-term pathway is to be patient and understanding in educating our colleagues as not everyone has the same training and experience.*

Q: You gave some examples of poor and non-existent monitoring, are there publicly available examples from Victoria of good monitoring programs
A: *David Lindenmayer's group has been doing long-term monitoring in southeastern Australia since 1983. You can refer to slide no. 5 or go to their blog spot at longtermecology.com to find out about the amazing work they do.*

Q: I imagine most citizen scientists would mainly report novelty species (most won't report noisey minors but will report king parrots in their yard for instance), how would this impact the data?
A: *Yes, I agree with your statement and that's why one has to acknowledge the limitation of citizen science data. In some instances, you can easily use citizen science data for geographic range or expansion of a certain species but sometimes you need to take the data with a grain of salt when looking into presence/absence data. Presence data of easily recognisable species might be reliable, but the absence data might not be so accurate (false absence) just because that species is not easy to identify. So, sightings might have been reported to genus level or even misidentified. That's why it's important that the citizen science program is guided by scientists.*

Q: If I am not mistaken you mention the $50m project in Singapore 'did not work'. How well did the client take that news? Is bad news a barrier to not undertaking restoration monitoring?
A: *I would like to clarify that I didn't think the restoration project did not work, in fact I think it achieved a lot of its goals but just like every project there is always room for improvement. Maybe the fact that the project had so many goals to meet is also the reason why it fell short in some aspects. It did not totally fail but at least the client had the initiative to rectify issues at an early stage. The issue may not have been necessarily due to the design but in some cases in the implementation stage or even due to compromises made to accommodate some aspects of the project. I think the outcome of a project should be shared regardless of its success or failure; the lessons learnt will make future restoration efforts more successful.*

Q: One assumption of managers is that monitoring is not required is because it is implied that a restoration treatment should work, especially if engineers are involved. Have you ever found this?
A: *Yes, I have encountered that in the past especially when I used to do a lot of urban planning work. Some of our colleagues have a different way of thinking because of differences in our training and industry standards. For example, engineers can have very precise/accurate answers to a problem as they deal with physical science – like calculating tensile strength. But for us in the natural sciences, we use a lot of "maybes" as we can only make an intelligent guess of how the ecosystem will react to the management intervention based on the limited data we have before us. But based on my experience lately, especially here in Australia, that's changing. Our colleagues in the physical sciences have a better appreciation of the unknowns in the natural sciences and more receptive to the monitoring requirements of our work.*

Q: What are your thoughts on how monitoring work has been affected by technological improvements?
A: *Technological advancement will and has already changed the way monitoring is done, from the use of satellite images and drone technology to augment or even replace human tasks. For example, the image of me taking underwater photos to monitor coral reef health can now be replaced by using unmanned machines to go to a specific location and take photos at specific intervals. Another project I've worked on in the past was training a software designed to automatically count blood cells to identify benthic organisms from underwater photos instead. The goal was to automate the assessment of coral reef health. Once the method is refined then just imagine the amount of data that can be processed by a machine without the need for too much human intervention.*

Literature Cited:

10 Australian keystone endangered species. (2014, September 10). Australian Geographic. https://www.australiangeographic.com.au/topics/wildlife/2014/09/australias-keystone-endangered-species/

Biogeographic Factors | BioNinja. (2020). Retrieved 30 September 2020, from https://ib.bioninja.com.au/options/option-c-ecology-and-conser/c4-conservation-of-biodiver/biogeographic-factors.html

Bishan-Ang Mo Kio Park | 2016 ASLA Professional Awards. (n.d.). Retrieved 2 October 2020, from https://www.asla.org/2016awards/169669.html

Burns E, Lindenmayer D, Tennant P, Dickman C, Green P, Hanigan I, Hoffmann A, Keith D, Metcalfe D, Nolan K, Russell-Smith J, Wardle G, Welsh A, Williams R, Yates C (2014). *Making ecological monitoring successful: Insights and lessons from the Long Term Ecological Research Network*, LTERN, Australia.

Burns, E. L., Tennant, P., Dickman, C. R., Gillespie, G., Green, P. T., Hoffmann, A., Keith, D. A., Lindenmayer, D. B., Metcalfe, D. J., Morgan, J. W., Russell-Smith, J., & Wardle, G. M. (2018). Making monitoring work: Insights and lessons from Australia's Long Term Ecological Research Network. *Australian Zoologist*, *39*(4), 755–768. https://doi.org/10.7882/AZ.2018.030

Costermans, L. F (2009). *Native trees and shrubs of south-eastern Australia* (Revised edition, reprint with addendum). Reed New Holland, Sydney

Dixon, S. J., Sear, D. A., & Nislow, K. H. (2019). A conceptual model of riparian forest restoration for natural flood management: Riparian Forest Restoration for NFM. *Water and Environment Journal*, *33*(3), 329–341. https://doi.org/10.1111/wej.12425

Edge Effects of Corridors. (2020). Retrieved 2 October 2020, from https://www.fs.usda.gov/nac/buffers/guidelines/2_biodiversity/10.html

Goldsmith, B. (Ed.). (1991). *Monitoring for Conservation and Ecology*. Springer Netherlands. https://doi.org/10.1007/978-94-011-3086-8

Hutto, R. L., & Belote, R. T. (2013). Distinguishing four types of monitoring based on the questions they address. *Forest Ecology and Management*, *289*, 183–189. https://doi.org/10.1016/j.foreco.2012.10.005

Kirkpatrick (2018). *Designing with ecological succession*. (n.d.). Landscape Australia. Retrieved 23 September 2020, from https://landscapeaustralia.com/articles/designing-with-ecological-succession/

Lamb, D. (2017). Long-term ecological monitoring and institutional memories. *Ecological Management & Restoration*, *18*(3), 200–204. https://doi.org/10.1111/emr.12271

Lindenmayer, D. B., & Likens, G. E. (2010). The science and application of ecological monitoring. *Biological Conservation*, *143*(6), 1317–1328. https://doi.org/10.1016/j.biocon.2010.02.013

Lindenmayer, D. B., & Likens, G. E. (2018). *Effective Ecological Monitoring*. CSIRO Publishing. https://doi.org/10.1071/9780643100190

Lindenmayer, D., Michael, D., Crane, M., & Florance, D. (2018). Ten lessons in 20 years: Insights from monitoring fauna and temperate woodland revegetation. *Ecological Management & Restoration*, *19*, 36–43. https://doi.org/10.1111/emr.12303

McDonald, T., Gann, G. D., Jonson, J., & Dixon, K. W. (2016). *International Standards for the Practice of Ecological Restoration – Including Principles and Key Concepts*. 48. Society for Ecological Restoration.

McDonald, T., Jonson, J., & Dixon, K. W. (2016). National standards for the practice of ecological restoration in Australia: National restoration standards, Australia. *Restoration Ecology*, *24*, S4–S32. https://doi.org/10.1111/rec.12359

Putz, F.E. (2020). Restoration Mistakes. Errors Made While Re-Creating Longleaf Pine Savanna.. Falling forward and lessons learned Webinar. 28 August 2020. Society for Ecological Restoration.

Restoration Resource Center Project Database. (2020). Retrieved 2 October 2020, from https://www.ser-rrc.org/project-database/?posted=1&biome=&geographic_region=&country_or_territory=Australia&ecosystem=&primary_causes_of_degradation=&keyword=

Rice, A.N., J.H. Waddle, Valerie M. Johnson K.G. Rice, and F.J. Mazzotti. (2006). Amphibian Communities as Indicators of Restoration Success in the Greater Everglades Ecosystem. Poster presented at the Greater Everglades Ecosystem Restoration Conference, Orlando, Florida. https://crocdoc.ifas.ufl.edu/publications/posters/amphibiansasindicatorsgreater/

Roedenbeck et al. 2007. The Rauischholzhausen agenda for road ecology. *Ecology and Society* 12(1): 11. http://www.ecologyandsociety.org/vol12/iss1/art11/

Szmant, A. (2002). Nutrient Enrichment on Coral Reefs: Is It a Major Cause of Coral Reef Decline? *Estuaries*, 25(4), 743-766.

Victorian Resources Online, A. V. (n.d.). *Buck's Horn Plantain* (Victoria) [Text]. Retrieved 2 October 2020, from http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/water_sss_buck_horn_plantain

Vivian, L. (2018). The heathland sanctuaries of Bayside. *Remember The Wild*. https://www.rememberthewild.org.au/the-heathland-sanctuaries-of-bayside/

Webb, A. A., & Erskine, W. D. (2003). A practical scientific approach to riparian vegetation rehabilitation in Australia. *Journal of Environmental Management*, *68*(4), 329–341. https://doi.org/10.1016/S0301-4797(03)00071-9

Wedge-tail-eagle-fox-5.jpg (203×248). (n.d.). Retrieved 2 October 2020, from https://donaldelley.files.wordpress.com/2016/07/wedge-tail-eagle-fox-5.jpg