Using classification assignment rules to assess land use change impacts on national and regional biodiversity

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• Represent ecosystems across their natural range of variation
• Maintain viable populations of native species
• Sustain ecological and evolutionary processes
• Ensure conservation networks resilient to environmental change

Plant communities: ecosystem surrogates and conservation units

TOWARDS A SYNECOLOGICAL FRAMEWORK FOR SYSTEMATIC CONSERVATION PLANNING

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The interpretation, assessment and conservation of ecological communities

By David A. Keith

Abstract. — Biological data complementarity is essential to both biodiversity informatics and systematic conservation planning. This review provides a perspective on the interpretation, assessment and conservation of ecological communities, highlighting the importance of surrogacy (e.g., single species, plant communities) as ecosystem surrogates and conservation units. Biological data complementarity is a key to understanding ecological communities and their conservation.

Summary. — Ecological communities are assemblages of species that occur together in space and time. Their properties include composition, structure, habitat, distribution, biological interactions and ecosystem functions. The community concept has a central role in conservation planning, and is a key approach for biodiversity conservation above the species level. The relatively recent application of risk assessment and regulatory systems to conservation of ecological communities has highlighted a number of challenges related to intrinsic uncertainties in the definition, diagnosis and assessment of ecological communities. In this review, I aim to elucidate some key conceptual issues essential to the interpretation of communities. Effective description, diagnosis and assessment of communities rests on an understanding of

Ecological Management and Restoration 2009
Representation assessed with GIS-based analysis of mapped ecosystem distributions
Mokihinui dam proposal

https://blog.greens.org.nz/2012/07/18/protecting-the-mokihinui/
NZ has a wealth of vegetation plot data
and a national classification of woody vegetation types
‘Noise clustering’ allows new plots to be assigned to existing types or identified as outliers

Multi-scale assessment of representation

• **Local scale:** are forest alliances and associations in the inundation zone present elsewhere in the Mokihinui catchment?

• **Regional scale:** are forest alliances and associations in the inundation zone present in a similar catchment nearby?

• **National scale:** are any of the forest alliances or associations in the inundation zone confined to the region?

• **National scale:** are there species assemblages in the inundation zone that are not currently defined as alliances or associations in the national classification?

• **National scale:** how does the number of distinct forest alliances and associations (i.e. beta diversity) in the Mokihinui catchment compare to all other catchments nationally?
Are forest alliances & associations present elsewhere in the Mokihinui catchment?
Alliances in lower gorge are different than those in the upper gorge
Associations in lower gorge are different than those in the upper gorge
Regional-scale representation

• Local scale: are forest alliances and associations in the inundation zone present elsewhere in the Mokihinui catchment?

• **Regional scale:** are forest alliances and associations in the inundation zone present in a similar catchment nearby?

• National scale: are any of the forest alliances or associations in the inundation zone confined to the region?

• National scale: are there species assemblages in the inundation zone that are not currently defined as alliances or associations in the national classification?

• National scale: how does the number of distinct forest alliances and associations (i.e. beta diversity) in the Mokihinui catchment compare to all other catchments nationally?
Are alliances & associations present in a similar catchment nearby?

- Mokihinui Lower
- Karamea Lower
Most alliances are present in Karamea
Most associations in inundation zone present in Karamea

% of assigned plots from sample area

- Mokihinui Lower
- Karamea Lower

Association

A74  A41  A63  A22  A61  A44  A38
National-scale representation

• Local scale: are forest alliances and associations in the inundation zone present elsewhere in the Mokihinui catchment?

• Regional scale: are forest alliances and associations in the inundation zone present in a similar catchment nearby?

• **National scale:** are any of the forest alliances or associations in the inundation zone confined to the region?

• National scale: are there species assemblages in the inundation zone that are not currently defined as alliances or associations in the national classification?

• National scale: how does the number of distinct forest alliances and associations (i.e. beta diversity) in the Mokihinui catchment compare to all other catchments nationally?
National representation: Alliances
National representation: Associations
National-scale representation

- Local scale: are forest alliances and associations in the inundation zone present elsewhere in the Mokihinui catchment?
- Regional scale: are forest alliances and associations in the inundation zone present in a similar catchment nearby?
- National scale: are any of the forest alliances or associations in the inundation zone confined to the region?
- National scale: are there species assemblages in the inundation zone that are not currently defined as alliances or associations in the national classification?
- National scale: how does the number of distinct forest alliances and associations (i.e. beta diversity) in the Mokihinui catchment compare to all other catchments nationally?
Lower Mokihinui has high proportion of ‘outlier’ plots

Alliances

% of plots designated as outliers

Associations

% of plots designated as outliers

Lower Mokihinui
Upper Mokihinui
Karamea
National

Lower Mokihinui
Upper Mokihinui
Karamea
National
National-scale representation

• Local scale: are forest alliances and associations in the inundation zone present elsewhere in the Mokihinui catchment?

• Regional scale: are forest alliances and associations in the inundation zone present in a similar catchment nearby?

• National scale: are any of the forest alliances or associations in the inundation zone confined to the region?

• National scale: are there species assemblages in the inundation zone that are not currently defined as alliances or associations in the national classification?

• National scale: how does the number of distinct forest alliances and associations (i.e. beta diversity) in the Mokihinui catchment compare to all other catchments nationally?
National scale: alliances within catchments
National scale: associations within-catchments

Number of catchments

Number of Associations

Mokihinui catchment
Sample effort per catchment: alliances

\[ y = 1.6719 \ln(x) + 0.0055 \]
\[ R^2 = 0.7428 \]

Mokihinui catchment

Number of Alliances

Number of plots per catchment
Catchment size: alliances

\[ y = 8 \times 10^{-6}x + 3.0091 \]

\[ R^2 = 0.1982 \]

Mokihinui catchment
Conclusions

• Flooding would drastically reduce or eliminate certain alliances and associations from the Mokihinui catchment.

• Most alliances & associations would persist in the region and nationally.

• The flooded zone has a high proportion of vegetation that has yet to be described in the national classification.

• The Mokihinui catchment has a higher diversity of woody plant communities than most other catchments in the country.
This provides another way to integrate plant communities into the assessment of biodiversity representation.
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