



## Meaning and design of nature for the urban built environment

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### **Plant communities and biodiversity in the city**

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Our research focuses on identifying different types of existing urban vegetation (urban biotopes). The task is to define, classify and sample urban biotopes as a foundation for understanding the composition of urban vegetation, its structure and successional processes. This research involves botanists, ecologists and landscape architects. The results of the biotope research will be used as a special management tool for manipulating urban vegetation towards greater indigenous species composition.

One of the important components of the project is the assessment of biodiversity across gradients from remnant indigenous forest and wetlands to the residential matrix covering both conventional and low-impact development. Biotope typology in New Zealand cities has resulted from a direct translation of the European vision of urban landscape development to fragile native island ecosystems. New Zealand biotopes clearly reflect not only the development of European urban and landscape design styles but also cultural traditions, especially horticultural fashions. The result is a trend towards homogeneity of composition and structure of urban biotopes in New Zealand and other “colonial” cities (in USA, Australia, South Africa and many others).

Currently we recognise seven main culturally-induced biotopes in Christchurch: lawns, wastelands, herbaceous borders, hedges and shrubberies, parklands and street trees, walls, and pavements cracks. Lawn is the most common biotope type in Christchurch. As a major design element of open space it appears in private gardens (front and back yards) in public

gardens and parks, in cemeteries and playing fields, and along streets and roads. For these reasons, we chose lawn as the first biotope type to be investigated.

More than 300 lawns were randomly sampled in 90 neighbourhoods of the city. Lawn sampling was carried out in residential gardens (front and back yard), streets, and in public places such as parks and school grounds.

Christchurch lawns are dominated by exotic herbaceous plants. The most common plants are the grasses, *Festuca rubra*, *Agrostis capillaris* and *Lolium perenne*, which were probably the essential core of Christchurch lawn seed mixtures. *Trifolium repens* featured in nearly all lawns, with significant cover in many cases. Among other grasses, *Poa annua* and *Bromus willdenowii* appeared often. Most lawns support common English meadow species – *Ranunculus*, *Taraxacum*, *Hypochoeris*, *Bellis* and *Plantago* spp. However, 8 native plant species were encountered, the most frequent were *Hydrocotyle heteromeria* and *Hydrocotyle moschata*. The other native species encountered were *Dichondra brevifolia* (?), *Dichondra repens*, *Epilobium nummulariifolia*, *Pseudognaphalium luteoalbum*, *Pratia* spp., and *Oxalis exilis*. Small seedlings of a few native shrubs such as *Pseudopanax arboreus*, *Pittosporum eugenioides*, *Coprosma repens* and *Phormium tenax* were also found in some lawns (likely to be offspring from plants growing in the adjacent garden). Most of the exotic lawn species have a Eurasian origin, although some are of North American origin. Native species were more likely to be found in backyards, rather than street or front yard lawns and this was related mostly to greater moisture and shade, rather than to disturbance such as mowing frequency.

Ordination analysis indicates the primary gradient in species composition is from coarse grasses, patchy ground cover and drought-tolerant weeds (*Malva* and *Erodium* spp.) of infrequently mown parks through to finer grasses and flatweeds typical of pampered suburban lawns.