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Nativeness, invasiveness and nation in Australian plants

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Abstract

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Keywords

Australia, backyards, Cinnamomum camphorum, Lantana camara, Pittosporum undulatum, weeds.

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NATIVENESS, INVASIVENESS, AND NATION IN AUSTRALIAN PLANTS*

LESLEY HEAD and PAT MUIR

ABSTRACT. The conceptualization of alien invasive species conflates two axes of variability that have become unhelpfully blurred. The nativeness/alienness axis refers to the presumed belonging of a species in ecological or social space. Invasiveness refers to the behavior of the species in question, particularly in relation to other species. The overlay of nation introduces further variability. Teasing these axes apart is important for more effective environmental management. We examine these concepts using two influential forms of ecological knowledge: the biogeographical and ecological literature and the vernacular experiences of suburban backyarders. Three case studies, the invasive native *Pittosporum undulatum* and two invasive exotics, *Lantana camara* and *Cinnamomum camphora,* illustrate the complex and contingent nature of human interactions with such species and the potential for human interactions to increase and/or reduce the propagation of plant species. *Keywords: Australia, backyards,* Cinnamomum camphora, Lantana camara, Pittosporum undulatum, *weeds.*

Species have been moving around the globe throughout the ecological history of the Earth. These movements have accelerated in the last few hundred years as a consequence of European colonialism, intensified human impacts on the environment, and economic and social globalization. The Global Invasive Species Program of the International Union for the Conservation of Nature now argues that "Invasive alien species are recognised as one of the leading threats to biodiversity and also impose enormous costs on agriculture, forestry, fisheries, and other human enterprises, as well as on human health" (Wittenberg and Cock 2001, 1).

But the concept of invasive alien—or exotic, or introduced—species conflates two axes of variability that need to be differentiated if management solutions are to be most effective. Invasiveness refers to the behavior of an organism, particularly in relation to other species and ecosystems. Alienness—or its converse, nativeness—refers to its presumed belonging in a certain place. Invasives take over, but they may take over places in which they belong. Aliens are in the wrong place, but they are not necessarily taking over. The idea of nation in concepts of ecological belonging adds a third layer of variability. Nation, as a sociopolitical construct, may or may not make ecological sense, and it operates at a variety of scales. In the European context, nation may be too small; in the Australian context, it may be too large.

In this study we analyze the interpenetration of nativeness, invasiveness, and nation in relation to Australian plants. We illustrate the variable social processes implicated in such conceptualizations by drawing on two distinct bodies of environmental understanding. The first is the biogeographical and ecological literature,

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in which complex combinations of biophysical factors and processes are understood as contributing to invasiveness and invasibility. These scientific understandings are influential in the formulation of government policy toward and environmental management of invasive species. Second, we examine the vernacular experiences of suburban backyarders, who interact with species in the context of domestic gardens. Urban dwellers are significant ecological actors, through both their political influence on environmental policy and the species they permit in the domestic spaces over which they have control. These latter ecological influences may magnify over time, given the dominance of yesterday's garden plants among contemporary lists of invaders. As a recent overview emphasizes, "The worst weeds were deliberately introduced and then escaped. . . . Nearly all introductions of woody plants that have become invasive were introduced by horticulturalists, botanists, foresters, agroforesters or gardeners. . . . One paradox that needs to be explicitly addressed is that many of the attributes of invasive species are precisely those characteristics favored by the horticulture industry" (Myers and Bazely 2003, 240–241).

It is relevant, therefore, to understand and compare the thoughts and practices of people who engage with plants at the domestic level as well as those of professional scientists and land managers. As Paul Robbins (2004) points out, suburban gardens are important nodes in a number of sociobiological networks. The relationship between perception and practice is increasingly recognized as important by ecologists: "The particular problem posed by invading Australian plants relates to perceptions of weediness. Many people are reluctant to believe that the invasions are of management concern; how can a 'native' plant be a weed?" (Carr 2001, 124).

Analyzing attitudes toward broad categories such as nativeness can tend to be rather abstract and mask the details of people's engagements. Thus we look at interactions with three woody weed species in more detail: *Pittosporum undulatum* Vent. (sweet pittosporum, native daphne, mock orange; Pittosporaceae), *Lantana camara* L. (lantana; Verbenaceae), and *Cinnamomum camphora* (camphor laurel; Lauraceae). We chose these species because they appear frequently in both bodies of knowledge on which we draw. In a literature survey of environmental weeds in Sydney sandstone bushland, Stefan Rose (1997) found that *P. undulatum* was the highest-ranked locally native environmental weed and that the top four exotic environmental weeds in order of ranking were *Lantana camara, Ligustrum sinense* (Chinese privet), *Ligustrum lucidum* (glossy privet), and *Cinnamomum camphora.* Of the woody weeds, the backyarders we interviewed mentioned lantana most frequently, followed by privet and camphor laurel. Pittosporum received slightly less mention than did camphor laurel, and not necessarily as an environmental weed.

None of the above species is listed among Australia's top eighteen environmental weeds, most of which are more common in remote tropical or arid parts of the nation (Commonwealth of Australia 1991). The species we study, however, are more significant in the highly urbanized southeastern states. *Pittosporum undulatum* is listed as a significant environmental weed in the states of Victoria (Commonwealth

of Australia 1991, App. 5) and New South Wales (Rose 1997; Mullett 2001); *Lantana camara* and *Cinnamomum camphora,* in the states of New South Wales and southeastern Queensland (Commonwealth of Australia 1991, Apps. 9 and 10).

In the following we examine the interaction of invasiveness, nativeness, and nation in the broader literature. We then go on to ask more specific questions about how they vary. How are plant nativeness and invasiveness understood in the Australian ecological literature, and how has this changed over time? How are they understood by suburban backyard gardeners, and how does that understanding affect their practice in controlling and promulgating species? The variability is then illustrated by the three case studies, the invasive native *Pittosporum undulatum* and two invasive exotics, *Lantana camara* and *Cinnamomum camphora.*

Invasiveness, Nativeness, and Nation

The characteristics that make successful invaders, or that make ecosystems vulnerable to invasion, are recognized in the international ecological literature as being extraordinarily complex (Groves and Burdon 1986; Mosquin 1997; Myers and Bazely 2003; Robbins 2004). Notions that something does not "belong" are ecologically imprecise and not helpful for management. Plant nativeness or belonging has become entwined in many areas with national belongings, partly because the late nineteenth and early twentieth centuries were an important period for establishing both the idea of nation and the research areas of plant geography, plant ecology, and plant sociology. Gert Gröning and Joachim Wolschke-Bulmahn look at the history of the distinction between native and non-native plants, arguing that "the idea of classifying plants as 'native' or 'foreign' may be as old as concepts of nations and of native and foreign people" (2003, 75).

Kenneth Olwig argues that "discourses concerning the threat of alien species to national landscapes have a curious tendency to bleed into discourses concerning the threat of alien races and cultures to the native people and culture of these same nations" (2003, 61; see also Comaroff and Comaroff 2000). Olwig traces the history of these parallels in what he terms "the cartographic-pictographic episteme." This episteme is understood as a concept of landscape, space, and nature that developed in the Renaissance, combining "the logic of the map, with its hard-edged and timeless geometric principles for drawing boundaries, with the pictorial image of a nature that has given birth to the 'natives' of these areas" (2003, 72). He examines these issues in relation to contests over the border between Denmark and Germany as both real and rhetorical space.

The relationship between ecological belonging and national belonging has a particular expression in the European context, where many nations, or parts of nations, may lie in a single ecological zone. This creates a particular suite of management issues (Genovesi 2005). The problem is converse in Australia, where the nation encompasses a variety of ecosystems, including arid, temperate, tropical, and alpine. To say that a plant is native to Australia says very little about its ecological requirements. Nevertheless, the boundary of the Australian nation is more or less

coterminous with that of a relatively isolated, ecologically distinct continent. The vegetation that has survived here has something of a shared evolutionary history.

In these and other contexts, questions of biogeographical nativeness or alienness must be considered within a set of nested spatial scales that operate both within and across broader bioclimatic regions. That individual species have a unique geographical range is a central tenet of biogeography (Brown and Lomolino 1998, 61). Species also occupy particular habitats within that range. In the case of weeds those habitats have often been disturbed or created by human activity, gardens of diverse types being prime examples.

Nativeness must be considered with reference to time as well as space. Theodore Mosquin (1997) considered the matter of history in his analysis of the situation in Canada. He discussed the problem of identifying the natural historical range of a species when its presence is temporally discontinuous. For example, the finding of 500-year-old fossil bison remains in Alaska is considered to substantiate its (now reintroduced) native status. For Mosquin, the most relevant categories included a combination of continental and regional ones. Thus he distinguished between alien species introduced from other continents: native North American species that have been introduced to regions of Canada in which they are alien because of human activities and/or actions; and native Canadian species deliberately introduced to islands off Canada's Atlantic and Pacific coasts.

In Australia, the relationship between the continent and the nation has facilitated a simplistic distinction between native species and exotic invasives in public environmental debates and the national imaginary. The importance of 1788 (the date of British colonization) as a marker of profound social and ecological change fixes the temporal threshold of nativeness for many writers, but significant environmental change had been occurring for many thousands of years before that, including under the influence of Aboriginal peoples. Some examples of the equation of the idea of nation with particular plants can be seen in the period leading up to and immediately after Australia's federation in 1901. Indigenous flora, as portrayed particularly in the decorative arts, became some of the contested symbols of the nation (Crone 2001). The rivalry between the two largest states, New South Wales and Victoria, for example, is seen in their respective promotion of the waratah (*Telopea speciosissima*) and wattle (*Acacia decurrens*) as the national flower. Other frequently depicted motifs included Sturt's desert pea (*Clianthus formosus*), gum leaves and gum nuts, and flannel flowers (*Actinotus helianthi*) (Crone 2001). Gum leaves and gum nuts provide perhaps the strongest link between nation and continent, for they symbolize the genus *Eucalyptus,* whose many hundreds of species are found across all ecological zones. *Eucalyptus* is one of the Australian plants that damages ecosystems overseas, so it constitutes an environmental weed in many parts of the world (Doughty 2000).

The conflation of nativeness and nation continues in much popular gardening literature (for example, Snape 2002). In writing the prologue to Diana Snape's book, George Seddon tempers his enthusiasms with a caution to the reader that "Austra-

lian plants" is "a convenient fiction, sometimes useful, sometimes not," because "plants know nothing of nationality" (Seddon 2002, 8). He goes on to provide many details of both useful and not-so-useful examples.

The complexities of discussing indigenousness and belonging in relation to plants are exacerbated in former colonies where settler human populations are still coming to terms with their own belonging, particularly in relation to the indigenous prior inhabitants (see, for example, Dominy 2001 on New Zealand). This has been explored most fully in the Australian context by David Trigger (2002).

The specific dualisms that are distinguished here need to be considered in the broader context of the human/nature binary in Western thought. Humans conceptualize themselves as being included in or excluded from nature in variable and to some extent arbitrary ways. The biggest unacknowledged social overlay on debates about plant nativeness and alienness is what Mosquin referred to as the paradox of human exemption: "These definitions [of invasive aliens] exclude humans from recognition as alien species regardless of biological, geographical or historical facts" (1997, 3). The paradox is strongest in former European colonies such as Australia, the United States, and Canada, where most of the now-problematic alien plants were introduced following European settlement. The human components of that settlement, whether ecologists or gardeners, are unlikely to conceptualize themselves as problematic aliens. In urban contexts where people have constructed themselves as belonging, they are likely to think of native plants and wildlife as not belonging. Research in urban Australia and rural towns indicates the dominance of a strongly partitioned view of the world, conceiving of urban areas as being "right for humans" and distant areas as being "right for wildlife" and other conservation outcomes (NSWNPWS 2002).

Ecological Understandings of Plant Nativeness and Invasiveness in Australia

Giving a resounding yes to his question, "Can some Australian plants be invasive?" the leading plant ecologist Richard notes that this is different from his own findings twenty years previously, when relatively few Australian weeds were native. Both a shift in consciousness and an exacerbation of the native invasive problem are indicated during this time span. In 1991 a federal overview defined invading species as the converse of native species (Commonwealth of Australia 1991, 20). But the same document recognized that native species can constitute environmental threats; that is, "native species naturalized outside their natural geographic distribution can be as ecologically serious as any alien introduction . . . and the likelihood of hybridization is probably higher" (p. 30). Naturalized species make up about 15 percent of the total indigenous flora. "Of these about half invade native vegetation and probably a quarter are serious or very serious environmental weeds or have the potential to be so" (p. 3). Of Australia's eighteen most serious environmental weeds, none is native (Table 6.1). Of the sixty-five most serious environmental weed species in Victoria, ten are native; twenty-eight natives are identified as "invasive" (App. 5). The definition

of environmental weeds as "those species that invade native communities or ecosystems" (p. 3) implicitly acknowledges that native species can be invaders.

Groves (2001) distinguishes several different spatial scales relevant to questions of nativeness and invasion. Australian plants can be weeds outside Australia. Examples include the notorious *Melaleuca quinquenervia* (broad-leaved paperbark) in Florida (see also Turner and others 1998) and *Pittosporum undulatum* in the Azores, Hawaii, South Africa, and Jamaica. Plants that become weeds in different biogeographical regions within Australia most typically include those native to the southeastern or southwestern corners that have crossed the biogeographical barrier of the Nullarbor Plain with the assistance of human activity. Examples include *Sollya heterophylla* (bluebell creeper) sensu lato in horticulture in eastern Australia and *Acacia longifolia* (Sydney golden wattle, sallow wattle) and *Leptospermum laevigatum* (coast tea tree) in western Australia. Plants can also behave like weeds within particular biogeographical regions when they experience cyclical expansion within or adjacent to their normal range. Thus *Sclerolaena birchii* (galvanised burr) expands dramatically in central New South Wales and southern Queensland after rain, and flooding east of the Darling River triggers increases in native shrubs such as *Eremophila* spp. and *Senna* spp. They are regarded as weeds because they reduce the fodder available to livestock. These definitional changes and acknowledged contradictions have led to a shift, particularly in the last ten years or so, from dealing exclusively with the indigenous/non-native distinction to a more broadly conceived analysis of invasiveness and ecosystem health (Mosquin 1997; Groves 2001). In the following we consider how this compares with the domestic context.

Backyarders and Nativeness

In this section we draw on work from a broader project in which we are analyzing 259 backyards in Sydney, Wollongong (a coastal city of about 300,000 people 85 kilometers south of Sydney), and Alice Springs (a central Australian desert town of 26,000 people). We are examining people's perceptions of environment and nature and their daily practices, using a multimethod approach that comprises semi-structured interviews, biogeographical mapping and checklists of backyard contents, and sociodemographic characteristics of the household. Although we were not attempting to select a statistically representative sample we did try to encompass socioeconomic, ethnic, age, gender, and tenure variability in our participants. The interviews were transcribed and imported into the qualitative data analysis program N6. Each interview was read through and coded as ideas, attitudes, and practices were analyzed. Descriptive coding, for example, recorded how people's backyards had changed over time; emotive and attitudinal codes explored how participants felt; and conceptual codes examined emerging discourses, for example, participants' perceptions of agency within broader environmental issues.

Wollongong and Sydney share elements of a broader Sydney sandstone flora comprising both dry and wet sclerophyll elements. But Wollongong lies on a narrow coastal plain beneath the Illawarra escarpment and has proportionally more

wet sclerophyll and rain-forest vegetation communities. Due to the linear layout of the city, many backyards are in relatively close proximity to these environments, with interchange of species facilitated by birds and humans. In contrast, questions of nativeness for Alice Springs residents relate to the surrounding arid-zone flora.

The majority of study participants preferred a combination of natives and exotics in their gardens. This concurs with previous studies showing that the most common garden types combine native (construed most broadly in the first instance as native to Australia) and exotic plant species (NSWNPWS 2002; Zagorski, Kirkpatrick, and Stratford 2004). Because we were interested in interrogating issues of nativeness in greater depth, we divided our total sample into the following categories, based on attitudes expressed in the interviews: committed native gardeners ($n = 34$; 13 percent), general native gardeners who chose to plant both natives and exotics ($n = 61$; 24 percent), and non-native gardeners who chose not to plant natives but who might have inherited some when they moved to their current address ($n = 135$; 52 percent). Another group defined as nongardeners were either self-described or not involved in the backyard ($n = 29$; 11 percent). The construction of the groups also has biogeographical validity (Figure 1). Fifty-three percent of committed native gardeners had between 80 percent and 100 percent of the shrub and tree layer in their backyard planted with native plants (percentages based on numbers of individual plants). Such yards were likely to include a higher proportion of not just species native to Australia but also species indigenous to the local area. Most general native gardeners had between 20 percent and 80 percent native plants, and most non-native gardeners had less than 20 percent native plants. A further 36 percent of non-native gardeners had no native shrub or tree layer. Fifty-five percent of nongardeners had no shrub or tree layer at all. In the general and non-native gardener categories "native" plants usually comprised *Eucalyptus* trees and/or hybrid cultivars such as *Grevillea* spp. Nonlocal natives were more prevalent than local natives in the study backyards (Figure 2). Nearly half of the backyards in the study had no local natives (more than half, if those with no shrub or tree layer at all are included). Only a small proportion of backyards had more than 60 percent of the shrub and tree layer under natives, whether local or not.

Only rarely was nativeness explicitly conflated with the nation in these interviews, as for example with Kent of Austinmer, a respondent who, when asked why he liked natives, said, "I must be Australian true blue sort of thing because I just love Australian things." A number of other people referred to the nation more implicitly; for example, in frequent references to their love of the "Australian bush" and its influence on their planting decisions. But a number of people did not know whether their plants were native: We documented instances of people thinking plants were native when they were not, and vice versa. The former tended to occur in situations where plants behave like natives—for example, where they are not water hungry.

Three discourses emerge from those who expressed clear views about nativeness: indigenous purism, pragmatism, and dislike. A subset of committed native

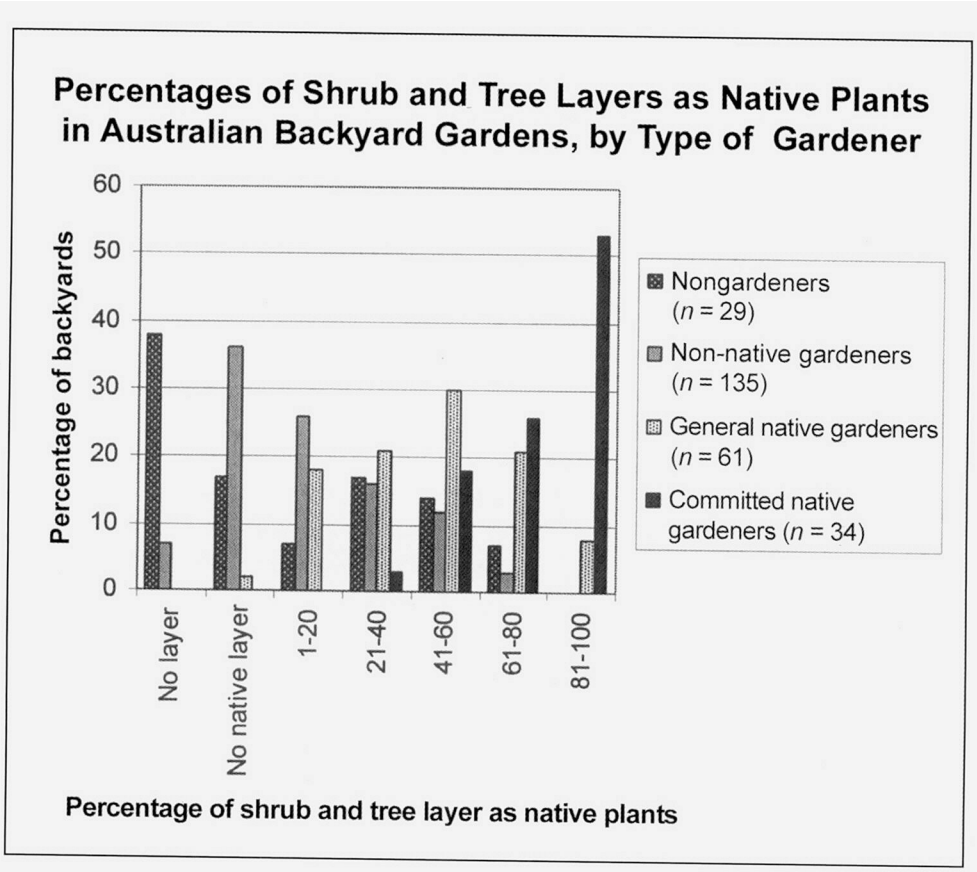

FIG. 1—Percentages of shrub and tree layers as native plants in Australian backyard gardens, by type of gardener (n = 259). In this analysis, "native" means Australian.

gardeners expressed indigenous purism, although not all committed native gardeners were purists. The latter were strongly ecologically informed and were most likely to discuss natives in terms of localness; that is, they emphasized the importance of being "native to this area" rather than conceptualizing it more broadly. These people were more likely to propagate their own plants from local seed, seek out specialist suppliers, and/or facilitate the process of self-seeding of local plants. Conversely, they tended to have aggressive attitudes toward exotic or foreign plants—and toward neighbors who harbored them.

General native gardeners, the largest grouping numerically, expressed pragmatism. They tended to plant natives because they attract birds and/or do not need much water. The bird-attracting natives were mostly commercially developed hybrid cultivars such as grevilleas and only rarely species indigenous to the local area. The engagement with native birds was often built up over time, as people began to observe them coming in to drink the nectar. For many participants this was a valued part of their daily lives and a source of engagement with nature. This group was most likely to respond to the implicitly national scale of nativeness represented in

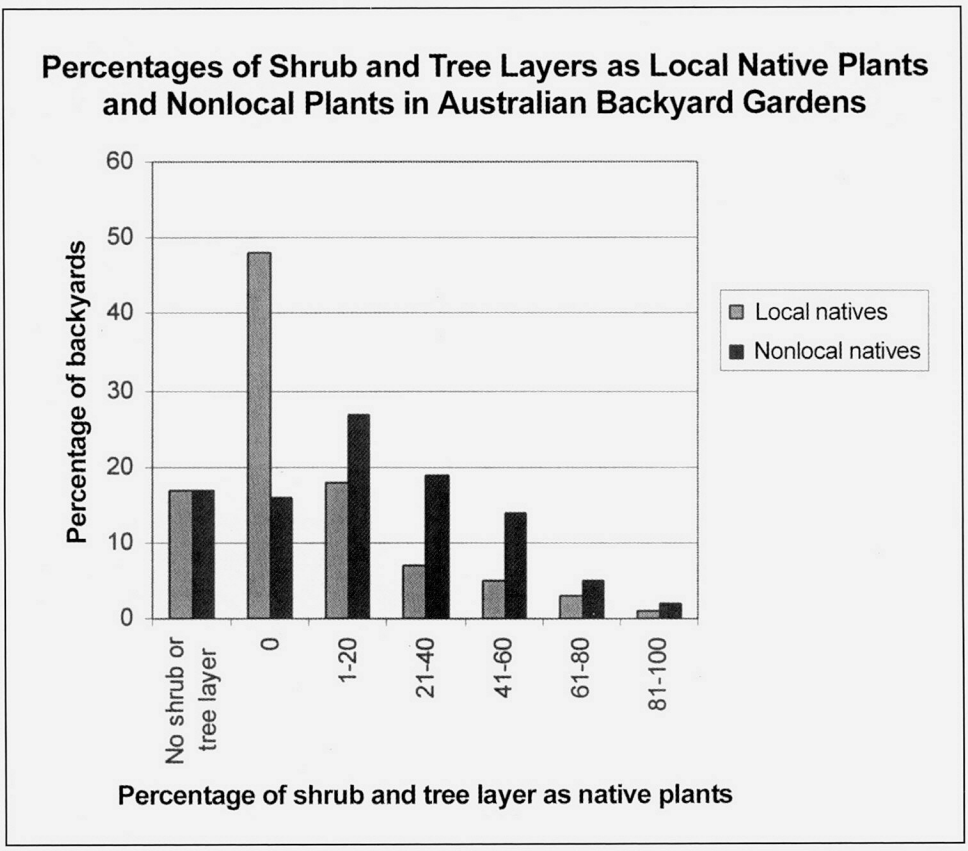

FIG. 2—Percentages of shrub and tree layers as local native plants and nonlocal native plants in Australian backyard gardens (n = 250). In this analysis, "local native" means indigenous to the relevant community type and habitat; for example, wet sclerophyll forest on Hawkesbury sandstone. "Nonlocal native" means native to Australia but not to the area in which the particular garden is situated; the category includes hybrid cultivars such as *Grevillea, Banksia,* and *Callistemon.*

the prolific popular culture of gardening and backyard magazine and television programs. *Burke's Backyard,* a spin-off magazine from the national television show of the same name, encourages readers to do "the wildlife of Australia a big favour" by adding native plants to the overall design of their garden. It lauds the achievements of "Aussie plant breeders" who have produced "the latest generation of natives." A range of positive qualities relating to both hardiness and design are attributed to these species (Burke 2002). This expression of nativeness is also quite eclectic in the way it is combined with other plants: "Hey, it's a post-modern world, and you don't have to stick to the 'purist' line. Mix natives and exotics and enjoy the effect!" (p. 88). Those who "don't like natives" refer to their "scragginess," their unsuitability for small gardens, and not liking the look of them. Guilt associated with not liking natives is often expressed, as though it requires some sort of excuse or explanation, and is seen as somehow unpatriotic.

Some comparisons are possible with the 2002 New South Wales National Parks and Wildlife Service (NSWNPWS) study, which includes both qualitative elements and a questionnaire survey of 1,006 people throughout New South Wales. The researchers found that "on balance a garden with manicured lawns, or paved areas, and garden beds were preferred over a 'bush garden' " (p. 48). The structure of that

TABLE I—NUMBERS OF INTERVIEWS IN WHICH THE THREE STUDIED AUSTRALIAN INVASIVE SPECIES WERE MENTIONED, BY CONTEXT OF DISCUSSION

	CONTEXT OF DISCUSSION	
GENUS AND SPECIES	In the Backyard	Beyond the Backyard[a]
Lantana camara (lantana)	27	25
Pittosporum undulatum (sweet pittosporum, native daphne, mock orange)	24	4
Cinnamomum camphora (camphor laurel)	14	7

[a] "Beyond the backyard" could mean a neighbor's backyard or the bush.

question may have exacerbated the differences between the two. Our pragmatists, for example, would typically have the former type of garden, but native plants would be included in the garden beds. When the NSWNPWS survey participants were asked to choose adjectives to describe a "garden with garden beds containing mainly Australian native plants," the most frequent selections were "right for Australia" (88 percent), "natural" (87 percent), and "relaxing" (86 percent). This is congruent with our findings, as is their ranking of the plants most desired in the garden: the natives bottle brush (*Callistemon* spp.) and banksia (*Banksia* spp.) ranked highest, followed by the exotic camellia (*Camellia* spp.).

Because of their ongoing engagement with many plants as active colonizers of backyard space, our participants were much more likely to talk about weeds in terms of their invasive qualities than their nativeness per se. This is a commonsense understanding born of the labor of maintaining a garden—or perhaps out of frustration at not having the time or inclination to do so. Thus Hamish of Turramurra talked to us of weeds as plants that "run over everything else." For Jane of Austinmer, an active participant in bush-regeneration projects, the distinction between good and bad exotic plants was strong, and separate from their nativeness. The bad ones, including *Anredera cordifolia* (Madeira vine) and *Lantana camara,* were invasive in the bush, whereas those that sat quietly in the domestic space of her garden (specimen conifers, *Michelia figo* [port wine magnolia], daffodils) were welcome even though they were exotic. In general the backyarders were less likely to think of natives as invaders, but some respondents did: "If native species like Currawongs turn out to be invasive, then we treat those in the same way as we would treat cotoneast-

ers or camphor laurels" (Donald of Austinmer). For a more detailed analysis we now examine three species and their networks. Within the backyard study, these are in the consciousness of a significant minority of participants (Table I), with lantana most entrenched in people's consciousness as an issue beyond the backyard.

Pittosporum undulatum

As an invasive native, *Pittosporum undulatum* is a useful example because it challenges the conflation of nativeness and invasiveness. It usually grows as a slender, branched shrub or tree, 5–13 meters tall (Figure 3), and has a broad geographical range throughout southeastern Australia. Prior to European settlement it was mainly confined to wet forest and rain-forest environments, but now it encroaches from sheltered gully environments into adjacent vegetation communities on drier slopes (Mullett 2001).

Trudy Mullett (2001) summarizes a number of factors that contribute to the spread of *Pittosporum undulatum* and thus highlight our emphasis on the ecological complexity of invasiveness. Anthropogenic influence played a prominent role in the dispersion of *Pittosporum undulatum*. Ornamental planting of *P. undulatum* was widely employed in nineteenth-century gardens as a local equivalent to the English use of Portuguese laurel (*Prunus lusitanica*) (Forster 1991). This local equivalence is reflected in two of the common names for *Pittosporum undulatum*—native daphne and mock orange—and reminds us that early European settlers in Australia interpreted their new environment through the lens of their European sensibilities. Its ornamental status is also the source of its invasiveness in places outside Australia, where it was widely planted within the network of British colonial botanical gardens (in Jamaica and South Africa, for example) (Cronk and Fuller 2001, 109).

Several other factors of a less directly anthropogenic nature are also involved. Increased dispersal opportunities occur particularly through bird activity; for example, due to expanded populations of introduced blackbird and native pied currawong in urban and suburban areas (Low 2002). Changes in fire regimes also affect *Pittosporum undulatum*, which is fire sensitive and may have been kept in check by frequent, low-intensity burning by Aboriginal peoples. Attempts at fire suppression in and around urban and suburban areas over recent decades have allowed *Pittosporum* to expand out of topographically protected gullies. The inherent plasticity and adaptability of the plant may also have been a contributing factor. As with most invasives, *P. undulatum*'s resilience and opportunism favor it over more specialist species. In this process of population expansion, clumps around mature trees offer perching sites for birds. These vegetation clusters create their own microclimates. The deep shade and litter fall within each clump create feedbacks that prevent the seed germination and expansion of competing species while enhancing the conditions conducive to the growth of *P. undulatum*.

The fundamental importance of ecological and social context in debates about invasives is nowhere better illustrated than through *Pittosporum undulatum*'s dual status as invasive and endangered species in the state of Victoria, where "*P. undulatum*

invasion is listed as a 'potentially threatening process' under Schedule 3 of the *Flora and Fauna Guarantee Act* 1988. . . . Under the same legislation, *P. undulatum* is identified as a component of a rare plant community (Dry Rainforest (Limestone) Community) listed under Schedule 2 of the Act" (Mullett 2001, 120). This creates significant problems for environmental managers, who often respond by directing resources toward introduced species because they "have a clearer invasive status" (p. 120).

Given the confusion among environmental professionals, it is not surprising that *Pittosporum undulatum* is not strongly established in the consciousness of our backyard study participants, despite its frequent occurrence in the region. Even when present, it was often not mentioned by respondents, either in taped interviews or on informal walks around the garden, and was recorded only by interviewers in field notes (numbers not included in Table I). This was found to be a typical pattern where plants are self-seeded; they may not be an important part of the backyard as perceived by the owner. In several cases people did not recognize *P. undulatum* and had to ask the interviewer what it was.

Kris of Mangerton was one of our indigenous purists, investing considerable effort in restoring locally native understory species to her backyard. For Kris, the regeneration of *Pittosporum undulatum* is part of this process: "There's some pittosporum coming up which is really nice seeing that my neighbour's cut down most of hers." As an environmental professional who moved from Melbourne, Victoria to Wollongong, Kris was quite aware of *P. undulatum*'s problematic status, but for her, its belonging overruled its behavior: "One of the worst species is the *Pittosporum undulatum,* I know that from Victoria because that's just taken over down there, but it's actually native to this area so that's fine. It's allowed to take over because it grows fast and it bushes out."

The agency of nature, as expressed in the appearance of *Pittosporum undulatum* and other species independent of direct human intervention, evoked a variety of responses. A number of participants enjoyed the idea of nature "doing its own thing" and were content to just let things go, at least for a while. Others described pulling the seedlings out or moving them to other parts of the garden.

Lantana camara

Lantana, a perennial, aromatic shrub usually 1–2 meters, but occasionally 6 meters, tall, originated in Central and South America. It has been hybridized extensively since the eighteenth and nineteenth centuries, because its brightly colored flowers made it attractive to gardeners during the period of European colonial expansion into the tropics (Figure 4) (Cronk and Fuller 2001, 82–86). The numerous hybrid forms are now "collectively referred to as the *Lantana camara* complex or *Lantana camara* sensu lato" (pp. 82–83). It is now invasive throughout many parts of the tropics, including Australia.

Although lantana has many ecological characteristics of the successful invasive species—including bird dispersal, toxicity to herbivores, vegetative reproduc-

FIG. 3—Self-seeded *Pittosporum undulatum* (sweet pittosporum, native daphne, mock orange) in a backyard in Wollongong, Australia. (Photograph by Pat Muir, November 2002)

tion, thriving on disturbance, and setting copious seed—it is mainly a weed of highly disturbed habitats rather than an invader of natural ones (Cronk and Fuller 2001, 84–85). These characteristics are seen in the context of Wollongong backyards. Many original suburban subdivisions in Wollongong had been farmland cleared by early European settlers, then invaded by weeds following the cessation of grazing. A number of our study participants recalled a backyard overgrown with lantana and other weeds when they first came to their house or that they knew as children. They described the struggle first to get rid of the weeds, then to keep them at bay.

FIG. 4—The dense clusters of tiny *Lantana camara* flowers make them an attractive garden plant, but, as the arching stems show, the plant can quickly crowd out other vegetation. Erskineville, Sydney, Australia. (Photograph by Pat Muir, September 2003)

> So we actually borrowed a goat . . . and we used to move this goat around say 12 feet a day with a chain about 20 feet long . . . and that goat single handedly chewed through the whole of the reserve, right to the bridge, down to the highway all the way, the same distance up the other way. So he covered about a kilometer and that's where the lantana was and he single handedly demolished all that lantana. (Bob of Corrimal)

> Now where that fern is, all that area was all covered in Madeira vine and lantana, and so I've just gradually got rid of it all and I have to keep vigilant. The Madeira vine still comes back but we've just worked on, I just work at it, you know, its painstaking work but I suppose I seem to have the right kind of mentality. . . . When something gets away you just go back into one area and clean that completely. (Jane of Austinmer)

> It was pretty impenetrable with the lantana and I couldn't cope, not with work and all the rest. . . . One year we had a working party and Ron K came up and . . . he tried to . . . chop down all the lantana but I mean it sort of came back up. . . . It wasn't until I had the extension [done and a bulldozer brought in and] he got in and really rough landscaped it and got rid of the lantana that you could actually really . . . do anything with it. (Joanne of Bulli)

The epic nature of the respondents' struggles reminds us that managing invasiveness is also an intensely social process, requiring considerable mobilization and

investment of human labor. Although backyard lantana was still an issue for a number of people, the greatest struggles were described in the context of first coming to a backyard that had been neglected for various reasons. Although the contemporary forms are horticultural hybrids, lantana is still sold in some nurseries, enhancing some people's perception that it is not too problematic. For example, Brian of Port Kembla told us, "I've got lantana now. Lantana is classified as a weed but it's sold at the garden places. . . . I think that they're controllable weeds."

Removing invaders is not a simple process and does not return an ecosystem to a previous pristine state, because a number of ecological relationships are likely to have changed. A key tension that study participants encountered in relation to lantana was that its dense thickets provide valued habitat for many small, native birds, whose traditional habitat has been decimated by land clearing. This dilemma was particularly felt by indigenous purists such as Donald of Austinmer, who described work over several years to remove a variety of weeds from his backyard in an attempt to revegetate with local native species. Donald recognized that he could not remove all of his exotic plants at once, not only because of the risk of erosion but also because they protected him somewhat from the road below his block: "I feel pretty passionate about not having exotics. But I'm beginning to realize it's a bit more complicated than that now, that lantana isn't necessarily totally bad because it's bird habitat." Other residents agreed: "We're regenerating the coastal Banksia forest on our block and [these bowerbirds] go through from the block next door which has been sort of rented and has just gone to weeds and lantana and morning glory for years now, but they like the thicket I think. . . . The bowerbirds seem to use the whole thing as a sort of corridor" (Ivan and Elizabeth of Austinmer). In spite of this observation, they still considered lantana on their block as a weed and pulled it out when they could. But Nick of Corrimal summed up the contradiction when he observed that "I think we've lost sight now that lantana has been here for so long that it has become the understorey and we have so many small birds, particularly the eastern whipbird which is beautiful to hear and which you'll never see because it's within that."

Cinnamomum camphora

Camphor laurel is a large, spreading tree that grows to a height of 30 meters. It originated in China and Japan, but it has been widely planted in New South Wales since the mid–nineteenth century and is now invasive from Wollongong northward (Figure 5) (Muyt 2001, 233). The features that make it a successful invader include its longevity, heavy shading, and massive root system. Adam Muyt notes that it "can live for over 400 years in [its] natural range and some plants in Australia are now well over 100 years old" (p. 233). Mature trees can produce more than 100,000 seeds annually. Its shading properties and root system prevent the establishment and success of vegetation under the canopy. Although it reproduces by seed, it also suckers vigorously.

The seedlings of camphor laurel can take up to a year to develop strong root systems (Muyt 2001, 234), however, so they are relatively easy to dig out, whereas

controlling well-established plants is difficult. These features were recognized by our backyard study participants, a number of whom had a love-hate relationship with the species. The traits that make camphor laurel a successful weed—longevity, heavy shading of competitors, massive root system—also create a spectacular tree. Although many backyarders recognized it as a problematic weed and pulled out its seedlings, they also valued it as a mature tree. It then also became subject to the complex relationships that people have with trees in the backyard context. They are seen as messy and potentially dangerous, but many people do not like to cut them down. And some people sense that a well-established tree cannot be a weed. Thus Bettina of Mangerton described the clearing she and her husband had to do when they first came to their house as "quite heart breaking, especially for Bob, cutting down trees that were weeds." These feelings do not apply to the seedling form of the plant, which people are much more likely to pull out as they appear. But the use values of a mature shady camphor laurel tree—for climbing, cubby houses, swings, or shade—are often sufficient to override their weed status. Thus Donald of Austinmer remarked, "There's camphor laurel left which is the kids' swing tree. That's why it's there, it's tolerated."

Several respondents used the word "love" to describe their camphor laurels. Kent and Gwen of Austinmer had their house on the market when they were interviewed about their backyard, which is dominated by a large camphor laurel. Kent said, "I love me tree"; and for Gwen, "The tree is a big part of it. . . . We'll be sorry to leave it when [we] sell but then we'll just have to create another one." Moira of Keiraville described how use of the tree had changed with the growth of her family:

> I love that tree. . . . We now have tables and chairs and a paved area underneath it so we tend to sit out there a lot in the summer when the weather is nice. . . . [It] has a ladder going up there, we used to have a tree house in there when the kids were younger. That's gone but the ladder's there so my son has built a crawling insect that's going up the ladder using I think an old shovel head and different pieces of metal. . . . He'll have his mates over too, they like to hang out there as well.

The Contingencies of Nativeness

To summarize answers to our initial questions about the understanding of nativeness and invasiveness, the ecological literature shows an increasingly contingent understanding of invasiveness over the past few decades, born of the struggles of both researchers and environmental managers with increasingly complex social ecologies. Invasiveness is now commonly decoupled from nativeness in much of this literature and in the management literature that discusses environmental weeds. This decoupling is most evident in the more densely populated southeastern part of Australia, where the nation's largest cities are expanding into bushland areas. In northern Australia, by contrast, the most serious invaders are very clearly nonnatives. Such nuanced understandings were expressed by only a few of the backyarders in our study; for example, the indigenous purists, all of whom were ecologically well informed. Others who clearly distinguished between nativeness

FIG. 5—A freestanding deck built around a mature camphor laurel (*Cinnamomum camphora*) in Austinmer, Wollongong, Australia. (Photograph by Pat Muir, September 2002)

and invasiveness were people active in bush-regeneration projects. Thus Jane of Austinmer's close observation of and engagement with the bush adjacent to her quite manicured backyard has given her a detailed understanding of the processes of invasion.

In the three case studies we see that a combination of factors affect attitudes toward and practices related to weediness. The nativeness, or presumed belonging, of the species is one of those factors. Our backyarders generally had a clear idea that lantana and camphor laurel did not belong. However, although they were among the most frequently mentioned weeds, they were tolerated in certain contexts even by the participants who expressed the most purist attitudes. For lantana, the proviso was an ecological one; it provided important habitat for native birds. For camphor laurel, the proviso was an overwhelmingly social one; it was valued for tree houses, swings, and the shady gathering space it provided. Thus Kent of Austinmer could proclaim passions for both the Aussie bush and his backyard tree. Conversely, the native status of *Pittosporum undulatum* was sufficient for Kris to override its weedy behavior in the form of aggressive regeneration. More common was to scarcely be aware of *P. undulatum* in the backyard: Some respondents saw it but did not know what it was; some saw it but did not consider it worthy of mention among the significant aspects of the backyard. This apparent lag time in the public conceptuali-

zation[1] of a species as a problem may have significant implications for the management of *P. undulatum*, particularly in comparison with lantana, which was well entrenched in people's consciousness.

Few factors enhance the likely success of an invader as much as invisibility. The same can be said for the role of social actors and processes in analyses of invasion that focus exclusively on the biophysical sphere. As the conflation of invasiveness and nativeness in some definitions demonstrates, the ecological domain itself carries substantial social baggage. Effective research and management will require engagement with the full range of perceptions, practices, and interactions that influence landscape outcomes.

Note

1. We are grateful to an anonymous reviewer for this suggestion.

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