Australian acacias: useful and (sometimes) weedy

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Abstract
Tim Low's article "Australian acacias, weeds or useful trees" criticizes aid and development agencies for planting and promoting agroforestry and forestry trees, like Australian acacias, across the world, highlighting evidence that several species have become problematic biological invaders. We propose an alternative to Low's blanket condemnation, emphasizing the importance of the regional socio-ecological context, taxon specificity, and participatory political process. We address flaws in Low's case that all wattles should always be judged dangerous, and ask who should make judgements – and on what basis – on whether people can diffuse plants across ecological barriers. Context-specific, socially debated and environmentally responsible diffusion of alien plants can amply satisfy the sustainable development goal of meeting the needs of the present while safeguarding those of the future.

Keywords
Acacia, agroforestry, conflict of interest, culture, ideology, invasive alien species, perception, plant introduction, scale

Introduction

Should certain wattle species – or by extension, all Australian acacias, all agroforestry trees, or even all plants used in the name of development – be banned from cultivation outside their

native areas as a precautionary measure against the danger of biological invasion? This is the argument put forward by Tim Low, author of the well-known books *Feral Future* (2002) and *New Nature* (2003), in an essay in this journal (Low 2012). In this response to Low's essay, we dispute the details and logic of his argument. First, however, we propose an alternative and in our view more appropriate stance.

A position that treats a wide variety of species as dangerous invaders, with little sense of geographical or social context, goes against a fundamental theme of human history, and against an understanding of the utility of these plants. Certainly, the success of certain species in particular environments is sometimes unanticipated or unwanted. But the uncritical promotion of an alarmist view of introduced plants misses a chance to see introduced plants as important elements of dynamic human-shaped landscapes, important elements that may achieve various utilitarian aims and also may provoke ecological change, and whose place in those landscapes may be viewed differently from different social and temporal vantage points (Kull and Rangan 2008; Robbins 2001; Starfinger et al. 2003).

Instead of using an *a priori* judgement to call for a blanket ban of a wide array of plant species, the focus should be on the processes that societies (communities, governments, agencies) use to anticipate and debate the changes to landscapes and human lives that are possible outcomes of specific plant introductions and diffusion in specific places. Who are the winners and losers, now and in the foreseeable future? What tradeoffs can be expected? Who has the right to decide, and the might to enforce? What is the evidence that can inform these decisions? Human societies are usually well equipped to deal with such decisions, even in polarized debates in which compromise appears intractable. That is what the political arena is for – legislators, agencies, and private actors propose and undertake different stances and activities, interest groups complain and lobby, debate takes place, and a resolution is reached.

A case for the responsible diffusion of plants

Humans move plants – it is what we do. Our species has become a key dispersal agent for a wide variety of plants; one might even claim that plants have adapted to take advantage of our services (Pollan 2001). As humanity mastered techniques of horticulture and ocean travel, our scope to move plants vastly increased (Beinart and Middleton 2004; Crosby 1972). Identifying and moving plants has long been a central component of social interactions across geographic space, from prehistoric ocean trade, to European colonialism, to modern agricultural development (Brockway 1979; Rangan et al. 2012).

We move plants because they are useful, interesting, helpful, and fascinating. We move plants because they produce food, wood, oils, and other supplies, because they diversify our economic options, because they have interesting smells or attractive flowers. Over time, introduced plants become parts of different regional landscapes. Most are minor details, a curiosity in a few gardens or a failed forestry trial; many are useful, appreciated, and diffused by people further across the landscape, while some succeed wildly and come to be considered – by different sectors of society at different times – as problems.

Since problems do occur with some introduced plants in certain environments, there is a strong case to be made for the *responsible diffusion* of plants. As opposed to Low's all-out ban, we suggest an evidence-based, context-specific, socially-negotiated approach. Instead of advocating a ban on planting all Australian acacias, for example, we would suggest that

people be forbidden to plant particular acacia species or cultivars in particular environments (like in *fynbos* riparian areas) *if* the political consensus across interest groups in that area is that the value of those acacias (as a resource, or as an ecological restoration tool) is less than the potential damage now and in the future to aesthetics, flora, fauna, and other resources like water. Such an approach is sensitive to the fact that one person's weed may be another's income (Aitken *et al.* 2009; de Neergaard *et al.* 2005; Pfeiffer and Voeks 2008; Robbins 2004; Shackleton *et al.* 2007), and the political deliberation opens room for discussions over future expectations, clashing values, and potential compromises. It recognizes that introduced plant species are part of landscapes which are at least as dependent on the land uses and activities pursued by humans as they are on the character of the species in question (Brown and Sax 2004; Castro-Díez et al. 2011; Davis 2009; Larson 2005).

A paper co-authored by a transdisciplinary team present at the Stellenbosch acacia workshop to which Low refers, argues that acacias "have had different human and environmental impacts in different places, so their invasive status requires more than just a scientific and management response. The fundamentals of invasion biology as a scientific enterprise demand that actions be sensitive to ecological and social context" (Carruthers et al. 2011: 815).

A case against Tim Low's argument

Low's essay places a certain kind of Science – his reading of invasion biology – as the expert, unquestionable, rational, and neutral authority. This authority should, he implies, take precedence over the views of the development community (characterized as misguided, error-prone, and by a "failure to understand plants") and over the views of local communities (who "cannot be expected to make sound judgements about unfamiliar plants"). Aside from the social and political problems of enforcement and resistance that come from such top-down approaches (Scott 1998), Low's stance falls apart when his authoritative Science is subjected to reflexive analysis. Numerous scholars both inside and outside the field of invasion biology have shown that it – like any scientific endeavour – is affected by social and ideological contexts, as manifested in research agendas and in the terminology used (Colautti and MacIsaac 2004; Davis 2009; Larson 2007; Latour 1986; Warren 2007). As Low himself states, "biological invasions are mediated by cultural values". Exactly our point: differences over the value of introduced plants are political – based on different interests, ideologies, cultures and local contexts.

We suggest that ecological questions about species redistributions (as well as the history of the human role in facilitating these distributions) should be separated from judgements and debates over whether the plants are good or bad. Low may consider that the future is a "landscape degraded by weeds", but others may see the same future as a landscape enhanced by a successful, vigorous, useful plant, or a landscape with a historical legacy, a palimpsest of human and natural activities. Successful policy approaches in democratic societies are based on recognition of divergent interests, and on cases being made using logical arguments and convincing evidence. Here too Low's poorly structured essay poses problems, as we outline below.

A frequent recourse to hyperbole harms the credibility of the argument – the paper appears at times to lean towards a blanket statement that the use of (all) plants by (all) aid and development agencies is (always) a dangerous failure. Different viewpoints are polemically painted into irreconcilable corners: on the one hand the developers indiscriminately seeding

miracle plants to save the poor, and on the other hand the conservationists staunchly defending the biological purity of nature.

The paper privileges without justification a certain kind of environmental concern over others. Its concern over invasive behaviour by agroforestry trees appears to trump concerns over desertification and land degradation. Low simply discards any discussion of potential benefits of agroforestry trees in reducing pressure on indigenous species. His suggestion to plant eucalyptus instead of acacia privileges concerns over invasion over concerns over water.

Unnecessary one-sided comments distract from constructive debate. For example, Low states that the "Sahel is only region where acacias are not invasive", which fails to note the equally relevant fact that there are *no* regions where acacias are not also considered useful. They include his assertion that the trees are "failed wonder plants", which disregards the successful uses of the trees for industrial and subsistence uses. The assertion that the aid and development community have a history of creating problems – while regrettably true at times – ignores the important impacts they have had on improving peoples' lives. His assertion that the sustainable development agenda has been "hijacked" away from strictly environmental concerns ignores the fact that the Brundtland Commission sought to not just protect the environment, but to attend to the needs and aspirations of people for development (WCED 1987).

Further, the argument Low builds using the Brundtland definition of sustainable development is unconvincing. He suggests that "sustainability should be the principle guiding plant introductions", i.e., that the planting of Australian acacias would be sustainable if it met the needs of the present while not compromising the ability of future generations to meet their needs. That certain Australian acacias can meet the needs of the present – as woodfuel, timber, pulpwood, fertilizer, fodder, human food, soil stabilizer – can be amply documented (Griffin et al. 2011; Kull et al. 2011). That they compromise future need fulfilment (because of growing and expanding in the landscape too vigorously) is more difficult to prove. Being listed on an invasive species list, or the fact of displacing other flora and fauna, may demonstrate that an introduced Australian acacia causes significant ecological changes, but these statements do not in themselves show that the species compromises future need fulfilment. Nor, in themselves, do the cases of mesquite or jatropha that are so prominently highlighted.

Errors of fact include the assertion that relative costs and benefits depend on the position of a species on the invasion trajectory – the further along the invasion is, the higher the costs outweigh the benefits. This is certainly not a universal rule – in Madagascar's Vakinankaratra highlands, much of the local economy revolves around the omnipresent Australian acacia (e.g., *Acacia dealbata*) trees, to the point that they are called "precious things" and their prodigious natural regeneration is occasionally even supplemented with seeding (Kull et al. 2007). Likewise, in many cases, Australian acacias are not "displacing the original vegetation"; they are growing in anthropogenic landscapes shaped by cultivation, altered fire regimes, logging, and planting. That agroforestry species are "used by necessity, not choice" is only partially true and highly contextual to particular places and species.

The judgement of "weed versus useful" should not be made at a global level, it should remain contextual to local and regional scales, to particular ecosystems and landscapes, particular economies and socio-political situations. The outcome in water-stressed, relatively wealthy, tree-less biomes (like South Africa's *fynbos*, from which much concern over Australian

acacias arises) will likely be different than in humid, development-driven economies (like south east Asia's vast acacia plantations). The latter may be criticized for rainforest conversion, but not for compromising future needs. Instead of slamming the door shut, our recommended approach follows Wilson et al.'s review of acacia risks, which recognizes that "perceived benefits might override ecological concerns in some cases" (2011, p. 1041).

Conclusion

The above problems with Low's essay occlude some useful observations for further research and policy discussion. Low rightly points to contradictions in the World Agroforestry Centre (ICRAF)'s approach to the sometimes unforeseen rapid spread or side-effects of the plants it promotes (see also Jose 2011; Richardson et al. 2004; Tassin et al. 2012). ICRAF should, in our view, make a stronger case for context-specific evaluations of the merits of introducing particular agroforestry trees into particular landscapes, and open those decisions to participatory debate and negotiations in those regional contexts. Otherwise, it may find its useful contributions to rural livelihoods and land management stifled by polemic concerns over invaders.

Low's observation that "throughout the world, wherever plants benefit one sector while imposing a greater cost on others, those who benefit typically get their way" warrants further research and substantiation. A blanket prohibition on introductions of Australian acacias (or agroforestry trees in general) would inverse this logic, with those presumed to (perhaps) bear a cost having their way over those who benefit. Again, these are not disputes for scientists to settle at a global level, but for interested parties to resolve in the context of regional economies, land uses, ecologies, and the particular plant species concerned.

Acknowledgments

We thank Dave Richardson for leading the Stellenbosch acacia workshop and inviting an ecumenical set of participants. We thank Charlie Shackleton, Rod Griffin, Libby Robin, Tony Rinaudo, Jane Carruthers, and Haripriya Rangan for their insights on this paper; however, the final contents remain our own responsibility.

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