16

Environmental Ethics of Forest Health: Alternative Stories of Asian Longhorn Beetle Management in the UK

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1 Introduction

Humans respond to invasive pathogens and invertebrates by taking actions that have significant consequences for humans, non-humans, and the wider environment. Although the public generally expresses strong support for managing forest health problems by whatever means are deemed necessary (Fuller et al. 2016), these same people are also significantly concerned about the impacts on non-humans as a result of the management methods being used. Such questions are at the

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J. Urquhart et al. (eds.), *The Human Dimensions of Forest and Tree Health*,
https://doi.org/10.1007/978-3-319-76956-1_16

core of environmental ethics, which explores the relationships between humans and nature, the intrinsic value of nature, and the consequences of anthropocentrism. Key topics in this area of study include climate change, biodiversity loss, the treatment of non-human species, and environmental aesthetics. In this chapter, we explore the implicitly anthropocentric ethical positions which form the foundation of forest health management decisions. We seek to generate insights into the ethical framings of forest health and 'invasive' species management, which remains a much-neglected debate in both forestry and environmental ethics. Our aim is to demonstrate that extant framings and practices of forest management are not the only options, but also rather one approach amongst a number of alternatives. Many of these frameworks go beyond the anthropocentrism that lies at the core of much environmental degradation.

We have generated three novel narrative accounts, or stories, of the 2012 'outbreak' of Asian longhorn beetle (*Anoplophora glabripennis*, ALB) in Kent, UK, by using three distinct perspectives rooted in environmental and non-human ethics. The 'emergency modality' management response (Collier and Lakoff 2008) to ALB, as with forest health management and biosecurity more generally, was founded on broad utilitarian claims. These claims relate primarily to environmental protection, the conservation of 'native' species, and the prevention of economic damage to commercial forestry. We provide a description of how the management of this outbreak unfolded in practice, followed by three possible alternative accounts of the outbreak. Each account critically reflects on the event through different ethical frameworks focused on the moral status of, empathy for, and the flourishing of non-humans.

The three ethical frameworks that we have chosen represent something of a cross section of perspectives within environmental ethics. 'Biocentrism', developed by Paul Taylor, is a relatively mainstream approach that argues for well-established ethical concepts, including the expansion of rights and associated moral consideration beyond humans and other sentient beings. Lori Gruen's arguments for 'entangled empathy' are, although applied to non-humans, a well-known source of moral obligation. Finally, 'flourishing', and in particular the work of Angela Kallhoff, has a long legacy within ethics, but has only rarely

been utilised in relation to non-humans. These three frameworks offer distinct opportunities to reflect on forest health, and whether or how they would be accepted into contemporary approaches to environmental management. Consequently, we position each framework in relation to forest health in the sections below.

The stories we construct through our interactions with these frameworks pay particular attention to decision-making and outbreak management processes. Asking who is included in those processes, and how, has significant implications for both humans and non-humans. Our juxtaposition of these three different approaches to the ALB outbreak will demonstrate how competing ethical claims are framed through and by particular interests. Through this analysis, we will demonstrate how different environmental ethical frameworks may or may not demand varied approaches to managing forest health and result in different outcomes.

Narrative construction has an established place in critical environmental ethics (Clayton 1998; King 1999) and ecofeminism (i.e. Vance 1995). At its root, a narrative is a story or an account of events. Paying attention to the frameworks in which stories are constructed allows us to be open to other voices. In the context of this chapter, this means being attentive to the organisms who are central characters in the story, but whose interests were not given consideration in the environmental management approach that was employed in the ALB 'outbreak'. In this way, narrative offers us a means of imagining possibilities for the non-human beings who were originally ignored or silenced, and we are able to explore how things might have been different had those voices in some way been heard. Our goal with this chapter is to add forest health to the narrative analytic tradition. Such stories have often proved an effective way of revealing the detrimental impact of dominant anthropocentric approaches to environmental management. In her discussion on narrative, animals, and ethics, Vance (1995, 165) argues that most human narrative is written with the intention of explaining or giving meaning to human experience; this means that narratives about nature are inherently anthropocentric. By declaring that storytelling is 'an act done in community' (176), Vance identifies that stories are ethical discourse which model the storyteller's beliefs about human–non-human

animal relationships, as well as shape the beliefs of others about these relationships. The alternative narratives in this chapter were generated through the recursive process of connecting the practice of ALB outbreak management and associated policy responses, as they were observed and experienced by the authors through research and documentary sources, with each of the three ethical frameworks. Insights were also generated by comparing the narratives to each other as they were developed.

Following a conventional narrative about how the ALB outbreak and its management unfolded (Section 2), each subsequent section outlines an ethical perspective and is followed immediately by the accompanying alternative narrative. The discussion (Section 6) looks across these three alternative narratives to consider the demands that might be placed on outbreak management if forest managers were to adopt an approach that was more attentive to non-human species.

2 Contemporary Management of the Asian Longhorn Beetle in the UK

In 2009, a lone adult ALB was found in the garden of a homeowner on the outskirts of Paddock Wood, Kent, UK. ALB is a wood boring insect that can cause widespread tree mortality and is able to live on many hardwood tree species (Macleod et al. 2002; CABI 2017). The resident reported the beetle to the Food and Environment Research Agency (Fera) and a local officer then carried out a site survey. The survey revealed no evidence of an infestation, but annual monitoring visits by entomologists from Forest Research (FR) were scheduled for the next four years. This decision was made in line with European level guidance to monitor high-risk sites for at least 3 or 4 years following a beetle discovery. During one of these routine site surveys in early March 2012, evidence was found indicating a possible wild population of ALB. Although *Anoplophora* species had occasionally been intercepted whilst entering the UK since the 1990s, this was the first time a breeding population had been found established in British woodland. Following further investigation, the presence of ALB was confirmed by scientists at FR on 15 March 2012.

The site at the centre of the outbreak had previously been a stonemasonry business. As a regular importer of stone from China, it is likely the beetle was introduced from their 'native' range in East Asia to Paddock Wood through the wood pallets in which the stone was shipped (referred to in phytosanitary terms as the 'wood packaging pathway'). Although ALB had historically been regarded as a benign native species in China, they are now widely regarded as a 'pest'; this has primarily been attributed to a significant increase in monoculture tree plantations in China from the 1960s, which has allowed them to reproduce beyond their usual numbers and led to regular outbreaks beginning in the 1980s and continuing into the present (Haack et al. 2010, 527). In the light of this, it could be said that both the proliferation of this species of beetle in China and its increased accidental transport to new environments all over the world is a direct result of human practice. The outbreak site was semi-rural and relatively densely wooded, although it had traditionally been a hop-growing area. As ALB can be hosted on multiple tree species, the variety of trees in the area provided an ideal environment for the insect to spread once adult beetles had emerged from the wood pallets.

An Outbreak Management Board (OMB) was established on 24 March 2012, comprised of experts from the Forestry Commission and Fera, with the goal of developing an eradication programme. The environmental management options presented were based on the biology of ALB, particularly in relation to its large size and relatively sedentary nature, both of which facilitate its containment. Unlike many pest insect species, it is possible to eradicate ALB once it has become established in an area, as has been demonstrated in cases in Europe and North America (Haack et al. 2010). Based on this evidence, the Board decided upon a programme of 'sanitation felling' (removing and incinerating possible host trees) aimed at the eradication of this 'pest'.

Ground surveys were used to identify host trees. This was difficult from a practical perspective because ALB lives in the tree crown and can be difficult to detect from the ground. Once identified, these trees were felled and inspected for the presence of ALB at all life stages; if found to be infested, other tree species within 100 metres known to be hosts for ALB were felled. Infested branch and stem material was cut and packaged before being sent to FR at their Alice Holt Research Station for

processing; unaffected woody material was burned to ash on site. The sanitation felling work was carried out by forestry contractors and finished in mid-August 2012. The analysis of infested material at FR was complete by September that year.

A number of established and novel survey techniques were employed during this outbreak. For example, dog handlers with sniffer dogs trained to detect invasive insect species were brought from Austria and worked in the area in late August. The dogs did not, however, detect any ALB or infested trees. The ground and weather conditions caused difficulty for the dogs, as well as for the handlers who were not always able to conclusively identify which tree the dogs had indicated, due to the dense woodland they encountered. As a whole, evidence of infestation (i.e. exit holes and larvae) was very unevenly distributed with, for example, one large sycamore tree accounting for 88% of the exit holes and 40% of the live larvae and pupae discovered (Straw and Tilbury 2012).

When the live beetle was found in 2009, neither Fera nor the Forestry Commission communicated with local residents about its discovery. However, when the wild population was discovered in 2012, staff from the Forestry Commission, along with the local Fera officer, liaised with forestry contractors and local residents, as well as managed the operational aspects of the eradication programme. Immediately after the outbreak had been identified in 2012, the Fera officer distributed information leaflets to Paddock Wood residents about Citrus longhorn beetle (*Anoplophora chinensis*), which looks very similar to ALB, but lives in the roots of trees, rather than in the crown. The CLB leaflet was distributed because, following from the 'emergency modality' management mindset, there was a strong sense of urgency to notify local people about the outbreak. It was ready to distribute when the ALB were discovered, whereas there was no prepared information regarding ALB. This did cause some confusion for residents. Two consultative meetings were held with landowners and residents within the first ten days of identifying the outbreak. The first meeting, held on site, attracted around 90 people, as well as arboriculturalists from other parts of England. The second meeting focused on a discussion of the pre-selected management response (sanitation felling) with residents and local councillors, which brought together about 30 people. The media response was greatest at the beginning of the outbreak management in March and April, with

some follow-up at later stages. Social scientists from FR carried out a postal survey with a selection of residents in Paddock Wood nearly a year after the eradication programme concluded, as well as follow-up qualitative interviews with the residents who were most directly affected by the management. These interviews indicated mixed feelings about the programme, and some concern about the impact of the chosen eradication method on native tree and wildlife species.

In total, 2166 trees were removed from the 14-hectare management site and, of these, 66 trees (3%) were found to be infested. Additional to this, 354 live larvae, 34 live pupae, and 2 live eclosed adult beetles were found during the management effort (the live adult beetles emerged from wood material in the laboratory, not in the field). 46 dead adult beetles were discovered in their tunnels within the wood (Straw and Tilbury 2012). The ALB population in Paddock Wood was considered eradicated in early September 2012. However, the site will continue to be monitored until 2018, more than 2 life-cycle periods of the beetle, until eradication can be officially declared.

For local residents affected by the management effort, there were mixed feelings about its conduct and outcome. A number of communication problems emerged, with issues relating to who was responsible for specific elements of the management. Residents expressed frustrations with the actions of some of those involved in management, and in relation to the seeming disparity between the severity of management and the limited evidence of beetle infestation. Perhaps the overriding sense, however, was sadness at the loss of trees and concern regarding the impact of this on the landscape and its resident wildlife (Porth et al. 2015).

3 Biocentrism

3.1 Biocentrism as an Ethical Perspective

In constructing a biocentric account of forest beetle management, our starting point is Paul Taylor's seminal biocentric environmental ethic centred on 'respect for nature' (Taylor 1981, 2011). Situated firmly within the rationalist tradition of ethics, Taylor's biocentrism focuses

on individual organisms as 'teleological centers of life' and is highly structured by a number of stated rules and beliefs. Taylor posits duties towards all non-human (plant and animal) life based on the fact their well-being can be promoted or hindered. An attitude of 'respect for nature' is underpinned by a set of beliefs and basic rules of conduct. The beliefs are that (i) humans and non-humans alike are all members of Earth's 'community of life', (ii) the natural world is interdependent to the extent that the survival of individual organisms is interlinked, (iii) each organism has an individual existence and pursues its own way of life in response to its environment, and (iv) humans are not inherently superior to non-humans.

The four rules of conduct are to (i) avoid harm (*nonmaleficence*), which is the most fundamental duty towards nature, (ii) avoid restricting the freedom of individual organisms to act and develop in their own way (*noninterference*), (iii) avoid deception of any organism capable of being deceived (*fidelity*), and (iv) restore the balance of justice between agent and subject in the case of wrongdoing (*restitutive justice*). A critical implication of the rule of non-interference in the context of an ALB outbreak is the implication of species-impartiality. Taylor highlights this as particularly key to redressing the tendency for people to favour and sympathise with certain species over others, for example prey over predator.

> People get disturbed by a great tree being "strangled" by a vine. And when it comes to instances of bacteria-caused diseases, almost everyone has a tendency to be on the side of the organism which has the disease rather than viewing the situation from the standpoint of the living bacteria inside the organism. If we accept the biocentric outlook and have genuine respect for nature, however, we remain strictly neutral between predator and prey, parasite and host, the disease-causing and the diseased. (Taylor 2013, 156–157)

Detailed consideration of what a 'respect for nature' attitude would entail for invasive species management is entirely lacking from academic literature. However, the stated beliefs and rules do have some profound consequences for beetle management in forests. For example, it places

individual trees and individual beetles on an equal footing in their interaction with humans as 'centers of life' (Taylor 1981, 210) and, perhaps much more significantly, it requires us not to harm individual trees, beetles, or other organisms in our response.

However, one other key feature of Taylor's biocentrism is enormously relevant to beetle management: for an organism to fall within the remit and moral purview of 'respect for nature', it must be encountered in its 'wild' state within its 'natural' ecosystem. Concepts of natural or ecosystemic 'balance', 'integrity', and/or 'equilibrium' feature clearly in the construction of this ethic as being the appropriate context in which individual organisms can best pursue their own good. This duty extends only to human (non)interference in natural systems. Taylor explicitly precludes human interference to redress *naturally* occurring changes in ecological relationships and structures.

Taylor's specific biocentric perspective relies on some strong conceptual boundaries between the human and non-human worlds, which many call into question as valid bases for scientific or ethical judgements. They are, however, concepts that are regularly mobilised to justify outbreak management. Furthermore, a 'respect for nature' entails moral duties which generate questions about how humans respond to beetle outbreaks. One of these focuses on the means by which a beetle came to be found outside its 'natural' habitat.

3.2 Outbreak Story 1: A Biocentric Account

In 2009, an adult ALB was found in the garden of a homeowner in Kent, UK. Considering the beetle to be unfamiliar and out of place, the resident reported it to Fera. Local officers subsequently carried out a detailed site survey, which revealed no evidence of an infestation. At this stage of the risk assessment, there was considered to be limited threat to the local environment, but annual monitoring visits by entomologists from FR were scheduled. Three years later, during one of these routine surveys, evidence was found of a wild population of ALB. Although *Anoplophora* species had occasionally been intercepted whilst being transported to the UK, this was the first time a breeding population

had been found established in British woodland. Had the stonemasonry business at the centre of the outbreak still been operating, government would have sought financial compensation due to the breach of existing environmental non-interference regulations through the import and introduction of ALB from its native environment.

At this stage, an OMB was established, comprised of experts from relevant governmental agencies. It had the goal of developing a management programme to address the occurrence of ALB within the framework of the overarching Respect for Nature Code of Practice for government bodies. Key principles of this code were the prevention of harm to organisms and protection of the integrity of the natural environment. The management options presented were thus based on the biology and ecology of ALB and the ethical commitments to avoid harm to members of native populations, which was perceived to be intrinsic to an attitude of respect for nature. ALB was swiftly designated as non-native, and given its large size and relatively sedentary nature, both of which facilitate its containment, the OMB recommended a measured and targeted response focused on removal of the beetle population. Fera undertook a rapid environmental assessment pertaining to the nativeness and vulnerability of local tree species. The potentially affected outbreak zone was heavily wooded and featured a number of native (e.g. field maple, willow, and black poplar) and non-native tree (e.g. sycamore and horse chestnut) species. Based on this information, the board decided upon a programme of intensive surveying, safe removal of live non-native beetles, and targeted sanitation felling (removing and incinerating clearly identified infested trees along with non-native possible host trees). This was aimed at the containment and gradual removal of ALB.

Detailed ground and aerial surveys were used to positively identify infested trees. ALB survey is difficult from a practical perspective because the beetle lives in the tree crown and can be difficult to detect from the ground. Therefore, substantial resources had to be allocated to the survey effort. Pheromone trapping was used to monitor and capture any beetles potentially in the local landscape. Once identified, infested trees were felled and inspected in detail for the presence of ALB at all life stages. Other potential host tree species within 100 metres were subject to close survey, and the same process was followed if infested.

Host species that were not directly observed as infested were kept under close observation. Infested branch and stem material was sent to FR for further analysis and to support the development of ALB management methods that were not lethal to host trees. The sanitation felling work was carried out by specialist forestry contractors.

As part of the detailed survey work, sniffer dogs trained to detect specific insect species were brought to the area. The dogs did not detect any ALB or infested trees, although the ground and weather conditions caused difficulty for the dogs and their handlers, making the inspection process challenging. No live ALB were encountered in the field during the management programme, although two emerged in laboratory conditions at FR.

Staff from Fera liaised with forestry contractors and local residents and managed the operational aspects of the removal programme. Shortly after the outbreak had been identified, the Fera officer distributed detailed information leaflets to residents about ALB. Local community members proved to be well-informed about the issue of non-native species. Consultative meetings were held with landowners and residents within the first days of the outbreak. In parallel with this, there was in-depth consultation with non-governmental organisations dedicated to nature protection and to the protection of living beings as part of efforts to take account of non-human stakeholder perspectives. Other meetings focused on the selected management with around 30 residents and local councillors contributing actively to the debate. FR conducted social scientific research with a selection of local residents approximately a year after the removal programme concluded, as well as follow-up work considering the impact on those non-human stakeholders most directly affected by the management. These analyses indicated mixed feelings about the programme, although there was a level of satisfaction amongst residents regarding the limited impact of the management on native species.

In total, 66 trees were found to be infested and were felled. A small number of other trees were felled after initial detection of infestation proved false. Nearly 400 live larvae and pupae were removed from the site. The ALB population took several months to be removed, and the location will continue to be monitored for a number of years before the local environment can be officially declared ‘safe’.

4 Entangled Empathy

4.1 Entangled Empathy as an Ethical Perspective

'Entangled empathy' is an ethical framework developed by Lori Gruen (2015) as an alternative ethic for human–animal relationships. This framework is part of an 'ethics of care', which focuses on 'the particularity of caring relationships' (Gruen 2015, 32); it falls within the Feminist Care Tradition in Animal Ethics, as characterised by Carol Adams and Josephine Donovan (Gruen 2015, 35). In contrast to traditional ethical approaches, the care tradition is attentive to context rather than abstraction; relationality instead of individualism; connection over impartiality; and responsiveness to move towards solutions, rather than focusing on conflict (2015, 33–34).

Gruen describes empathy as a 'particular type of attention' which can be considered to be a kind of moral perception (2015, 39).

> Entangled Empathy is a type of caring perception focused on attending to another's experience of well-being. An experiential process involving a blend of emotion and cognition in which we recognize we are in relationships with others and are called upon to be responsive and responsible in these relationships by attending to another's needs, interests, desires, vulnerabilities, hopes, and sensitivities. (Gruen 2015, 3)

By using the word 'entangled', Gruen highlights the multiple ways that we exist in active relationships with human and non-human beings, which 'co-constitute who we are and how we configure our identities and agency'. Entanglement asserts that we cannot disentangle ourselves from these relationships because our lives would no longer make sense (2015, 63). The challenge is to recognise how deeply entangled we are in these relationships and to find ways to be more perceptive and responsive to them.

At its core, to enact entangled empathy requires reflection and correction through a blend of cognition (knowledge) and affect (emotional reaction) about these relationships. 'The empathizer is always attentive to both similarities and differences between herself and her situation and that of the fellow creature with whom she is empathizing' (Gruen 2015, 66).

Entangled empathy encourages one to pay attention to well-being, and to meaningfully consider how one's actions interact within privilege and intersectional oppression (2015, 94). Ultimately, it is hoped that deeper understanding will motivate the empathiser to take action in ways that improve communal well-being.

Gruen insists that entangled empathy is limited in its application to beings who are 'sentient' and 'have experiences' (2015, 67). She does not, however, explicitly define what either of these concepts means to her within the context of this work. Gruen conflates ecosystems (including rivers, meadows, glaciers, etc.) with microbes, insects, and trees in her list of non-human beings who lack sentience and the ability to have experiences with which we, as humans, can either empathise or understand (2015, 70–71). Although this part of her ethical framework could pose problems in its application to the field of forest health, there are good reasons to question her assumptions. First, she makes arbitrary distinctions between, for instance, insects 'inhabiting' a tree and the birds 'who make their homes' there (2015, 70–71). These are superficial, semantic descriptors that create unnecessary emotional distance between species. Second, her suggestion that we can know 'what it is like to be like' (2015, 71) sentient beings, such as a cow or a dolphin, to a greater extent than we can with presumably non-sentient beings, such as an ALB or a tree, can be rejected: any of these experiences would feel particularly alien to a human.

There are many different ways to acquire knowledge about species-typical behaviour and the individual personality of a being. Multispecies ethnography, for instance, is an emerging research method which experiments with different ways of knowing and understanding the experiences of a wide variety of non-human beings, including insects, microbes, and trees. Pioneering research is being done with trees to understand how individuals support one another via, for example, nutrient and water transfer (Simard and Durall 2004) and perhaps 'communicate' with each other (Simard 2016; Wohlleben 2016), and research has long been carried out on the sociality of some insect species. Wagler and Wagler (2011) found that teachers exposed to hissing cockroaches in the classroom only developed more positive attitudes towards those insects over time (although not to other arthropods),

and insect zoos have also evidenced attitude change in humans towards insects (Pitt and Shockley 2014). These studies demonstrate it is possible for anyone with curiosity and openness to cultivate experiences that will help them to understand the behaviour and individual personalities of other beings over time, even when those species might initially seem very alien to us.

Finally, the degree of empathy responsible for Gruen (or anyone else) refusing to harm insects and choosing to move them to safety (2015, 70) is irrelevant. This is particularly true in a management-centred narrative where we are focusing on situation outcomes. It may also be that in a situation where there are so many human and non-human beings with whom one can enact entangled empathy, the chosen outcome will still result in the harm of some of these beings, whether they are 'sentient' or not. For all of these reasons, we apply the entangled empathy ethical framework to construct a novel account of the ALB outbreak.

4.2 Outbreak Story 2: An Account of Entangled Empathy

An established population of ALB was discovered in Kent during a regular annual inspection by entomologists from FR in 2012. The semi-rural outbreak area was a mix of widely spaced residential and business properties within relatively dense woodland. Given the ability of ALB to inhabit many hardwood tree species, the variety of trees in the area provided an ideal environment for ALB to spread once one or more adult beetles had emerged unseen from the wood pallets. However, these woods are also home to many other animal species, including colonies of woodpeckers who are a source of pride and a symbol of ecosystem health to some residents.

Once the wild population of beetles had been identified through the annual survey undertaken by FR, they contacted Fera and organised a joint OMB. This board was comprised of experts in entomology and environmental management; social scientists from FR who were able to provide advice about how to manage the social impacts of the outbreak and carry out research to understand local responses to the beetles; and

public engagement experts who were able to develop and enact a strategy to communicate with and involve affected residents in the management process. In close consultation with the local community, the OMB was responsible for deciding on a course of action in response to the discovery of the beetle population.

The public engagement experts began by printing ALB fliers and visiting people whose properties could be directly affected by the beetle population and/or a type of eradication programme. These people were invited to participate in a series of consultation meetings, each held only a week apart, which were also attended by a representative from each of the local town council, county council, and parish council, in addition to representatives from relevant environmental third sector organisations.

At the first of these meetings with the OMB, local people and the various representatives were provided with background information about the biology of ALB, and what was currently known about the population of beetles in their community. During this meeting, local people and representatives were invited to speak about their concerns. Although some were preoccupied with potential damage to their properties through any sort of eradication effort, others spoke about their apprehension around how the local landscape might change if many trees were felled. There was also concern about the well-being of the trees themselves and the animals who depended on them for their homes and for food. Although some third sector organisations were primarily preoccupied with the long-term damage that ALB could cause to Britain's landscape and were in agreement with OMB environmental managers that the beetle needed to be fully eradicated, other charities and individuals were concerned about the welfare of ALB. Hearing about how the beetle had—purely through human activity—become invasive in its native habitat in China and then introduced to radically different environments where it was hunted down as an alien, some people felt moved to protect ALB, even though they simultaneously wanted to protect the landscapes that they loved and called home. This instigated some emotional discussions amongst those present about whose lives should be prioritised in this situation.

The first meeting provided the OMB with a wide range of material with which to contemplate possible management options. They also received letters from local children who had been learning about empathy and 'compassion for all species' at school. The children advocated the protection of ALB, whom they likened to refugees who were persecuted in their homeland and then smuggled overseas by traffickers. All members of the OMB worked together over the course of a week to synthesise these various perspectives and, in combination with their expert knowledge, narrow down acceptable management options.

At the second meeting, OMB experts gave a presentation about what had happed in other countries where ALB had been discovered, and how it had been managed. Attendees were then presented with several management options in both presentations and dissemination materials, which they were encouraged to take home and contemplate. The first option included sanitation felling and incineration of all trees which were possible hosts of the beetle in order to eradicate it and protect Britain's trees from the potential future spread of ALB. It would, in time, be possible to replant the area with hybrid trees resistant to the beetle. The second option, seeking to minimise collateral harm to wildlife, involved the use of insecticides and pheromone traps to kill and trap as many beetles as possible in the outbreak area, an attempt to protect as many trees and other animals in the local ecosystem who were dependent on them. Third was the option of using a biological control to eliminate the beetle as had been used elsewhere (Liu et al. 1992; cited in CABI 2017), although there was little sense of whether there could be further environmental impacts from releasing nematodes into the local environment. Finally, given the concerns about the beetles themselves, which the OMB had not expected, and using Bavaria's response to spruce bark beetles in Bavarian Forest National Park as a precedent (Müller and Job 2009), the OMB presented the option of allowing the beetle to continue to exist in its adopted environment. At a third meeting one week later, everyone met again to discuss their thoughts and feelings about these management options and how they would impact the local community.

Based on the discussion and final vote on the four presented options, the OMB made the somewhat surprising recommendation that the

beetle be left to its own devices. Given the emerging evidence that the majority of beetles were not surviving in their new environment, managers concluded it would be difficult for ALB to spread outside the local area. However, they also recommended a long-term woodland management plan to ensure the area did not lose species diversity. This would include prioritising the planting of hybrid tree species with resistance to ALB infestation; planting a range of oak and beech species which have not been found susceptible to ALB (CABI 2017); and interspersing conifers throughout the landscape, which are resistant to ALB. The OMB decision also referenced the aforementioned research in which visitors to Bavarian Forest National Park revealed a preference for granting the spruce bark beetle (*Ips typographus*) a right to exist in the park and were disinclined to support outbreak management there (Müller and Job 2009). It was made clear that this management option was an informed decision made by local people about what type of changing landscape they were willing to accept. This decision was then communicated in an official press release by the OMB to media outlets for dissemination.

There was some initial opposition to this policy by stakeholders who continued to be concerned about the long-term implications of this decision for the UK as a whole. However, in general the local community expressed pride about the decision they had made in conjunction with a group of wide-ranging expert stakeholders. Through this process, there was a greater awareness of habitat and local species (including ALB) conservation across the immediate area. A small group of local people also formed an advocacy organisation dedicated to campaigning for the flourishing and well-being of non-humans in environmental decision-making.

At this point, the ALB population remains unobservable to the human community, and trees in the area are still visibly unaffected. A monitoring schedule has been instigated by FR as part of the management plan to ensure the ALB do not begin to unduly disturb the local ecosystem, or unexpectedly spread far beyond local boundaries. The OMB was clear that any subsequently identified ALB outbreaks in other areas of the UK would be subject to the same decision-making process and this case does not necessarily set a precedent for their management.

5 Flourishing

5.1 Flourishing as an Ethical Perspective

Our final account of forest beetle management makes use of the concept of 'flourishing', presented here as an ethical framework which sees plants (including trees) as holding moral status due to their ability to flourish. This narrative is based on the work of Angela Kallhoff (2014). However, the concept of flourishing has also been discussed by Martha Nussbaum as a means of extending her 'capabilities approach' to non-human animals. Human capabilities are 'what people are actually able to do and to be' and are necessary in terms of respect for human dignity (2006, 70). In extending her capabilities approach to non-human animals, Nussbaum argues that it 'offers a model that does justice to the complexity of animal lives and their strivings for flourishing' (2006, 407). As Kallhoff notes, 'flourishing is explored as a basic concept of the good life and one in line with concepts such as "happiness", "well-being" and the like' (2014, 689); a flourishing life is one in which we realise our capabilities.

As a framework for considering the moral status of plants, flourishing contains two key features. The first is that any deliberate act which limits the possibility of flourishing is harmful to a plant: 'if the flourishing of a plant suffers negative effects from human actions, this should be part of the process of an ethical assessment of that action … harm to plants should be part of a moral calculation' (2014, 693). Flourishing, as Kallhoff presents it, requires potential harm to plants to be taken into consideration, but 'there is no moral imperative which says that persons should protect the flourishing of each single plant' (2014, 693). However, she draws on further arguments in favour of protecting plants that derive from the particular value that humans gain from them, such as 'aesthetic experiences and feelings of being "at home" in a specific area' (Kallhoff 2014, 693). The second argument is that flourishing is a means of giving plants an ethical status without anthropomorphising (resorting to human moral theory). This begins from the premise of the plant, rather than adding plants to existing human reasons for granting moral consideration (2014, 694). Unlike ethical frameworks which

rely on species-based features such as sentience or suffering, flourishing can be applied across species boundaries and gives humans a means 'to interpret non-human nature' (2014, 694).

Kallhoff presents three conditions sufficient for flourishing. First, that a plant remains viable (can react to external stress and maintain its performance, thus sustaining life). Second, a plant is able to accomplish a typical life cycle. Third, its characteristics remain those 'both of a plant which has a specific life-form and of a more specific organism, generally fitting its species description' (2014, 687). Therefore, any discussion of felling trees as part of an eradication programme would be required to give full moral consideration to the trees felled. That the trees in question may also be of worth because of the aesthetic or recreational value they offer to humans would also be considered, but such a discussion should be mindful that any threat to a tree's capacity to flourish is in and of itself a significant moral harm.

5.2 Outbreak Story 3: An Account of Flourishing Plant Life

The presence of ALB was confirmed by scientists at FR on 15 March 2012, after carrying out regular non-invasive monitoring in the area. Given the regularity of stone imports by the business previously sited at the centre of the outbreak area, the UK government would have been justified in pursuing the company as they had breached biosecurity and thus endangered the flourishing of trees in this area. However, the business was no longer operational.

An OMB was established on 24 March 2012, comprised of experts from Fera and the Forestry Commission, which included a Plant Ethics officer. Their goal was to develop an ethically sensitive eradication programme. The discussion centred around the need to contain and then eradicate the outbreak in order to facilitate the ongoing flourishing of as many trees in the area as possible. Consideration was given to the avoidance of harm to trees which were not infested and also to those trees which contained only grubs that may or may not develop into ALB. The grubs could be harmless and, even if they did prove to be ALB, it is

unlikely they would survive to develop into adult beetles. Trees already hosting ALB were no longer viable and not capable of achieving a full life cycle and so could not be considered to be flourishing; these trees would be felled. The ethical motivation for felling in this instance was to ensure the flourishing of as many other trees as possible by removing infested trees (all remaining trees were viable and could maintain a full life cycle and develop characteristics of their specific type of tree). An additional and significant consideration was to protect as many trees as possible, given the value that local residents derived from them.

The initial management programme focussed on the area of the existing infestation. Arboriculturalists climbed trees within a 100 metre radius of the discovered ALB population to inspect the crowns for more beetles. Branches of trees were removed and taken to the Alice Holt Research Station to be examined for any grubs and to test their DNA. Branches were given a numerical code corresponding to the tree they came from (the tree had a temporary label placed on it to make identification possible), so if any grubs were found it would be possible to establish which tree they came from. If adult ALB or grubs with ALB DNA were detected, then that particular tree was felled and other possible host trees within 100 metres were closely monitored. Out of respect for the flourishing of the tree, sanitation felling was only carried out on trees that were confirmed to contain ALB.

The operational aspect of the eradication programme was coordinated by the local Fera officer who liaised with the Forestry Commission, contractors (including arboriculturalists), and representatives from woodland advocates such as The Woodland Trust. The local Fera officer had more knowledge of the trees in the area and of the community, so was best placed to coordinate on the ground. The Fera officer also contacted scientists at FR who were able to provide detailed descriptions and pictures of ALB. These images and descriptions were carefully displayed on flyers which were distributed to residents. This information was also given to the media for dissemination and the Forestry Commission launched a social media campaign to raise awareness of this particular beetle. Residents and anyone else who derived value from the trees, as well as landowners, were invited to an initial meeting where the local Fera officer explained the planned initiative to tackle ALB. Residents

were assured that no trees would be felled unless it was clear they contained ALB. A scientist from FR also attended the meeting to offer clear guidance on how to detect the beetle, to provide information on the life cycle of the beetle, and to explain the types of trees which were at risk. The flourishing of as many trees as possible would be given priority at all times, and this was particularly in line with the views of residents who had no desire to see their trees felled unless absolutely necessary.

Sixty-six infested trees were removed. Monitoring will continue until 2018 (beyond 2 life cycles of the beetle), with special attention paid to the 'eradication zone', but all trees will be regularly inspected for the presence of ALB.

6 Discussion

This chapter has reflected on the ethical framing of forest health management with an emphasis on non-human and environmental ethical perspectives: biocentrism, entangled empathy, and flourishing. The three alternative stories of 'outbreak' management have shed light on the relationships between some specific management actions, their impacts on non-humans, and their often implicit ethical underpinnings. We do not claim to have provided exhaustive, comprehensive, or unchallengeable applications of these chosen ethical frameworks. Instead, our goal has been to open up and critically reflect on the dominant anthropocentric framings of forest health management.

One of the most striking outcomes of this analysis is that stronger commitments to non-humans would not necessarily result in radically different outbreak management approaches to those currently followed. None of the ethical positions we have presented—respect for nature, a commitment to empathetic engagement with non-humans, and attributing a higher moral standing to plants on account of their ability to flourish—would result in an outright rejection of management methods, such as felling, that are lethal to non-humans. The use of these methods in relation to particular non-humans could be justified within each framework. However, looking across our narratives and at their founding ethical frameworks, two interrelated recommendations for outbreak management emerge.

First, these perspectives suggest the need to vastly increase the surveying and analysis efforts that precede the implementation of management on the ground. This is required to minimise harm to non-humans. All three of our alternative stories told of substantial inspection and investigation work at early stages that subsequently underpinned a more precise and targeted set of management actions. This included both technical and biological assessments of individual trees, along with ecological and epidemiological analyses of the wider environment to assess its vulnerability and the extent of the outbreak. Our narratives also suggest the need for a much greater understanding of the management context, as each story described the in-depth consideration of alternative stakeholder perspectives, whether through strong consultative processes with local human residents and community members or through 'noticing' non-humans such as by proxy representation or empathetic engagement. Indeed, this echoes Anna Tsing's advocacy of 'arts of noticing' as methods for building our appreciation of multispecies assemblages (Tsing 2015, 22–25). However, as has been noted before (MacKenzie and Larson 2010; Porth et al. 2015), the dominant 'emergency modality' of outbreak management often crowds-out the participation of many relevant human stakeholders and the expression of their perspectives. This same modality more or less bulldozes (perhaps literally in some cases!) opportunities for 'noticing' (Tsing 2015) non-humans.

The second, very much interrelated, recommendation made by our alternative stories would be for a substantive shift and increase in the allocation of resources to outbreak management. The above-mentioned processes of investigation and taking notice would require significant investment of personnel, skills, and technology, particularly in their initial development. A primary driver of current approaches to outbreak management is the minimisation of economic costs (both of the management scheme itself, and any consequent environmental or resource damage). Therefore, careful consideration of the costs of these activities relative to one another is important. Having said this, evidence suggests that public support for forest health management is strong, forests are very highly valued as places for wildlife, and there is clear support for particular management methods which minimise potential impacts on 'non-pest' wildlife (Fuller et al. 2016). This may indicate a widespread,

yet unacknowledged, acceptance amongst stakeholders of higher costs associated with outbreak management. The government agencies responsible for managing environmental outbreaks could leverage this support to access additional funds to better 'notice' or otherwise account for non-humans. Furthermore, there have been significant recent steps forward to account for non-humans in public policy. For instance, in 2017 legal frameworks in New Zealand and India were extended to include non-human elements of natural systems—most specifically, rivers—as having clear moral rights worthy of consideration (Safi 2017). These precedent-setting decisions could underpin policy to develop more effective processes to 'notice' non-humans in environmental management.

The ethical frameworks we employ here require different levels of stakeholder engagement and afford distinct reflections on forest health. For example, whilst biocentrism and flourishing are examples of environmental ethics which are relatively easy to translate to the case of forest health, entangled empathy demands greater interpretation and justification. This does not detract from the value of entangled empathy as a perspective for understanding, in this instance, forest health management. It is common for environmental ethics to be adapted from earlier frameworks in order to fit environmental debates. Virtue ethics, for example, is now used in environmental debates to better understand human relationships to nature, but was previously concerned with broader political questions about how we should live.

Notably, flourishing is the only perspective that gives exclusive attention to plants (trees in this instance). Both entangled empathy and biocentrism involve consideration of living beings more broadly—the beetles as well as the trees. This illustrates important questions about what and who counts when it comes to moral consideration, and which non-human living organisms should be afforded a moral status. Finally, biocentrism and flourishing specifically enjoin us to avoid harm. With these two perspectives, it is considered both logically and morally inappropriate to cause harm and this should consequently be part of our consideration as human beings. Whilst entangled empathy would also not advocate harm, it provides a more positive approach to our relation with the more-than-human world. Rather than emphasising our capacity to harm, Gruen's framework stresses our capacity to engage:

to actually entangle ourselves with these 'others'. Consequently, of the three frameworks discussed, it could be said that entangled empathy encourages us the most to be open to the lives of all others.

7 Conclusion

In this chapter, we have used three ethical frameworks to open discussion of the status of non-humans within forest health management. Our aim is to highlight the impact that outbreak management has on non-humans and to challenge deeply entrenched justifications for management intervention. We have considered one specific 'outbreak', which had a particular epidemiology and constituted a particular set of threats to human values, to the environment, and to non-human beings. ALB are by no means the most potentially damaging 'pest' to threaten British forests, and it is important to note that the application of these three ethical frameworks to other outbreaks may well have resulted in different stories.

More work is required in forestry and environmental ethics to unpack the issues that this chapter has begun to explore. However, our analysis leads us to advocate the allocation of greater resources to outbreak management. Most notably, this requires forest managers to undertake improved investigation and stakeholder consultation prior to deciding on a management programme, both of which must be context-specific. These measures have the potential to underpin a substantial reduction in harm to non-human stakeholders.

References

CABI. (2017). *Data sheet: Anoplophora glabripennis (Asian longhorned beetle)*. Accessed March 1, 2017. http://www.cabi.org/isc/datasheet/5557.

Clayton, P. (1998). *Connection on the ice: Environmental ethics in theory and practice*. Philadelphia: Temple University Press.

Collier, S. J., & Lakoff, A. (2008). The problem of securing health. In A. Lakoff & S. J. Collier (Eds.), *Biosecurity interventions: Global health and security in question* (pp. 7–32). New York: Columbia University Press.

Davidson, I. (2017, March 15). Whanganui River given legal status of a person under unique Treaty of Waitangi settlement. *New Zealand Herald*.

Fuller, L., Marzano, M., Peace, A., Quine, C., & Dandy, N. (2016). Public acceptance of tree health management: Results of a national survey in the UK. *Environmental Science & Policy, 59,* 18–25.

Gruen, L. (2015). *Entangled empathy: An alternative ethic for our relationships with animals*. Brooklyn, NY: Lantern Books.

Haack, R. A., Hérard, F., Sun, J., & Turgeon, J. J. (2010). Managing invasive populations of Asian longhorned beetle and citrus longhorned beetle: A worldwide perspective. *Annual Review of Entomology, 55,* 521–546.

Kallhoff, A. (2014). Plants in ethics: Why flourishing deserves moral respect. *Environmental Values, 23,* 685–700.

King, R. J. H. (1999). Narrative, imagination, and the search for intelligibility in environmental ethics. *Ethics and the Environment, 4,* 23–38.

Mackenzie, B. F., & Larson, B. M. H. (2010). Participation under time constraints: Landowner perceptions of rapid response to the Emerald ash borer. *Society and Natural Resources, 23,* 1013–1022.

Macleod, A., Evans, H. F., & Baker, R. H. A. (2002). An analysis of pest risk from an Asian longhorn beetle (*Anoplophora glabripennis*) in the European Community. *Crop Protection, 21,* 635–645.

Müller, M., & Job, H. (2009). Managing natural disturbance in protected areas: Tourists' attitude towards the bark beetle in a German national park. *Biological Conservation, 142,* 375–383.

Nussbaum, M. (2006). *Frontiers of justice: Disability nationality, species membership*. Cambridge, MA and London: Belknap Press of Harvard University Press.

Pitt, D. B., & Shockley, M. (2014). Don't fear the creeper: Do entomology outreach events influence how the public perceives and values insects and arachnids? *American Entomologist, 60*(2), 97–100.

Porth, E., Marzano, M., & Dandy, N. (2015). 'My garden is the one with no trees': Residential lived experiences of the 2012 Asian longhorn beetle eradication programme in Kent, England. *Human Ecology, 43,* 669–679.

Safi, M. (2017, March 21). Ganges and Yamuna rivers granted same legal rights as human beings. *The Guardian*.

Simard, S. (2016). *How trees talk to each other. TED Talk*. Accessed April 1, 2017. https://www.ted.com/talks/suzanne_simard_how_trees_talk_to_each_other?language=en.

Simard, S. W., & Durall, D. M. (2004). Mycorrhizal networks: A review of their extent, function, and importance. *Canadian Journal of Botany, 82,* 1140–1165.

Straw, N., & Tilbury, C. (2012). *Report on the outbreak of Asian longhorn beetle* (*Anoplophora glabripennis*) *at Paddock Wood, Kent in 2012*. Farnham: Forest Research.

Taylor, P. W. (1981). The ethics of respect for nature. *Environmental Ethics, 3*, 197–218.

Taylor, P. W. (2011). *Respect for nature: A theory of environmental ethics* (25th Anniversary Edition). Princeton: Princeton University Press (Originally published 1986).

Taylor, P. W. (2013). Respect for nature: A theory of environmental ethics. In M. Boylan (Ed.), *Environmental ethics* (2nd ed.). Malden, MA: Wiley Blackwell.

Tsing, A. (2015). *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton: Princeton University Press.

Vance, L. (1995). Beyond just-so stories: Narrative, animals, and ethics. In C. J. Adams & J. Donovan (Eds.), *Animals and women* (pp. 163–191). Durham: Duke University Press.

Wagler, R., & Wagler, A. (2011). Arthropods: Attitude and incorporation in preservice elementary teachers. *International Journal of Environmental and Science Education, 6*(3), 229–250.

Wohlleben, P. (2016). *The hidden life of trees: What they feel, how they communicate: Discoveries from a secret world*. Vancouver: Greystone Books.