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# Promoting sustainability behaviours through forestry

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Recent UK government policy design has drawn heavily on insights from behavioural sciences, however, engagement with these ideas in the forestry sector has been limited. This article critically reflects on the interface between forest policy and 'behaviour'. After considering what the term 'behaviour' may mean in the forestry context, we draw on a literature review to develop four key principles that can be used to guide forestry interventions seeking behavioural change. These recommend that interventions: (1) are grounded on an understanding of individual's and groups' values and motivations, (2) seek to affect the wider social and physical context of its target groups, (3) adopt a multifaceted approach at various scales and (4) facilitate active involvement by participants in project design and implementation. These principles are then applied to the analysis of four UK forestry case studies. We conclude that forestry interventions have affected behaviours but without explicitly linking them to 'behavioural' discourses. Furthermore, robust monitoring and evaluation to track behaviour change is currently lacking. We argue that the principles we have developed can be used in forest programme design to ensure that participatory processes, monitoring and evaluation criteria and adequate periods for reflection are built into interventions.

## Introduction

There has been increasing interest in focusing policy interventions explicitly on behaviour and behaviour change in order to tackle a wide range of societal and environmental issues. In the UK, for example, challenges such as obesity, smoking, energy use and transport have been targeted by 'behavioural' policies. Direct engagement with these ideas within the forestry sector has, however, so far been limited. Traditionally, government interventions have made use of regulation, legislation and financial incentives or disincentives such as tax. Behaviourally focused approaches are generally seen as providing a broader mix of policy options and the forestry sector potentially has much to gain from these additional options.

Although not explicitly labelled as such, there has long been a focus within the environment and land use sectors on what may be thought of as behaviour connected to sustainable development (hereafter 'sustainability behaviours'). For example, the long-standing 'think global, act local' concept has a strong behavioural dimension (United Nations, 2009). It is similarly not a new activity for forestry. Well-established mechanisms such as regulation, establishing best practice and grants all seek to encourage particular 'behaviours' such as the use of woodlands as part of healthy lifestyles, sustainable harvesting practices and tree planting. Having said this, taking greater advantage of the research and evidence on 'behaviour' could benefit forestry further by underpinning improved intervention design. Problems at the core of forest policy, such as improving surveillance for tree health and encouraging appropriate species selection in response to climate change, could be met with novel intervention designs that go beyond the well-established mechanisms.

Current governmental interest in behavioural theory in North America, Europe and beyond has particularly been stimulated by the concept of 'nudge' (Thaler and Sunstein, 2008). This asserts that people can be made to make significant positive changes to their behaviour using only small-scale interventions. One example of this interest was the establishment of the 'Behavioural Insights Team (BIT)' in 2010 within the UK government. This now partially private company co-published a landmark report (Dolan *et al.*, 2010), has a strong record of impact on public policy and offices internationally. Subsequent to the BIT's establishment, a number of further government departments, in the UK, Australia and elsewhere, created internal behavioural teams or worked with organizations such as the BIT to translate these insights into their own policy arenas. Behavioural theory is broad, as we highlight later in this article, and alongside 'nudge' another approach labelled 'think' is also becoming prominent. This is founded on deliberative democracy ideals whereby listening to and taking part in debate can lead to changes in attitudes and behaviours (John *et al.*, 2009). 'Ecoteams' is an example of this approach (Hargreaves *et al.*, 2008). To date, the Forestry Commissions in the UK (the devolved government bodies responsible for forestry in England and Scotland) have not explicitly adopted the concepts, theories and

models that have emerged from behaviour and behaviour change science. There is, however, considerable interest within forestry in developing new approaches and interventions that can enable key challenges to be tackled (see Moseley *et al.,* 2014).

The behaviourally focused policies of government have not gone unquestioned. Whitehead *et al.* (2011), for example, provide a critique of the current focus arguing that the framing of behaviour decouples the rational from the emotional in decision-making; with emotions being seen as negatively influencing the decisions that people make and potentially being deleterious to people's well-being. Cocker (2013: p. 27) argued against an exclusive focus on the individual's role in behaviour: 'individualism is not just a generalised mis-reading of the causes of "excess" consumption, but a way of diverting attention from the socio-technological systems underpinning unsustainable behaviours'. He suggested that it is often easier to deflect attention by turning a systemic problem into the 'ideologically more palatable problem of individual choice' (Cocker, 2013: p. 27). The analysis of behaviour is clearly deeply political (Whitehead *et al.,* 2011; Goodwin, 2012) and certain formulations of behaviour are easier to integrate within dominant paradigms of policy-making than others and so these can become strongly intertwined (Shove, 2010; Whitehead *et al.,* 2011).

In this article, we critically reflect on the interface between forest policy and behavioural science, asking how forestry interventions can best facilitate the adoption of sustainability behaviours. In referring to 'forestry', we follow the definition of *sustainable forest management* outlined by the 1993 Ministerial Conference on the Protection of Forests in Europe (and enshrined in the UK Forestry Standard). This inclusive definition encompasses a broad range of activities relating to the 'stewardship and use of forests and forest lands' to fulfil 'ecological, economic and social functions' (Forestry Commission, 2011: 7). In this article, we focus on woodland creation and the use of woodlands as part of lifestyles focused on health and sustainability as examples of 'sustainability behaviours'. In recognition of the broad multifunctionality of trees, woodlands and forests, captured by this definition of sustainable forest management, forestry (and hence forest policy) in the UK encompasses a wide range of activities including timber production, forest-based recreation, woodland creation, wildlife conservation, health promotion and community engagement across the urban and rural continuum (Forestry Commission, 2011; Defra, 2013). After considering the conceptualisation of behaviour in the context of forestry, we analyse two key forestry 'behaviours' through the application of principles provided by a review of behavioural research to four case studies of UK forest policy intervention. A case study approach enables us to critically appraise contemporary forestry interventions in the UK in relation to 'behaviour'. It allows us to make concrete links between 'behaviour' in theory and practice: providing examples of how to translate the main principles into action. Comparisons between cases also provide opportunities for learning by identifying gaps in delivery and alternative ways to implement similar policies. This should benefit those forestry professionals involved in designing future interventions.

## Conceptualising behavioural interventions within the forestry sector

### Behaviour

What is meant when the term 'behaviour' is used in the forestry context? And what constitutes forestry behaviour *change*? A review of the literature illustrates that there are several ways in which behaviour can be conceptualized and defined. The majority of approaches, primarily from within psychology and economics, place the individual at the centre of behaviour. Although some of these various models and theories acknowledge the influence of external factors, each holds behaviour to be an outcome of competing influences balanced and decided upon by the cognitive processes of individuals. Prominent within this academic tradition are theories such as the theory of planned behaviour (Ajzen 1985, 1991), the Health Belief Model (Rosenstock 1966, 1974) and the transtheoretical (or Stages of Change) model (Prochaska, 1979; Prochaska and Diclemente, 1983). These have been applied to numerous types of behaviour and in varied contexts such as health and in environmental issues (e.g. Nisbet and Gick, 2008). Stern (2000) builds a theory of 'environmentally significant behaviour' from within this theoretical paradigm. Drawing particularly on value–belief–norm theory in relation to environmentalism, he outlines eight principles for interventions to change 'environmentally destructive behaviour'.

Other theoretical traditions move away from the individual to focus either on behaviour itself, or the social and physical environments in which 'behaviours' happen or are carried out (i.e. the relationships between behaviour, individuals and their contexts). Innovation theories, such as diffusion of innovation theory (Rogers, 2003), focus on behaviours (often as innovations) themselves as agents of change. Other geographical, sociological and anthropological research, such as social practice theory (Reckwitz, 2002; Shove *et al.,* 2012) and sociotechnical systems (Geels, 2004; Smith *et al.,* 2005) focus on practice (which must be carefully distinguished from other conceptualisations of behaviour) as an outcome of the interrelationships and shared social experiences that constitute everyday life. Individuals thus reproduce or perform practices that are a product of relationships between people, their environment and the technology that surrounds them. Objects and environments consequently become active in the production of 'behaviour'.

Bringing this broad theoretical landscape together with the wide-ranging forest policy in the UK means that *forestry* behaviours and practices are numerous and diverse. They can range from those activities comprising timber harvesting (a traditional definition of 'forestry') to social, recreational and cultural activities conducted in a woodland or forest setting. In order to clarify this conceptual landscape, we can identify three broad types of forestry behaviour. Firstly, 'input' behaviours are those, such as tree planting and woodland management, that contribute to sustainable forest management. Interventions aimed at affecting such behaviours could include grant schemes, the provision of advice and the placement of 'champions' within local forestry networks. Secondly, 'outcome' behaviours are those that can flow from people's interaction with forests, including exercise and learning. Forest policy interventions aimed at these behaviours could include the organization of accompanied woodland walks or educational initiatives. Finally, 'input-outcome' behaviours are those that deliberately combine the two forms of behaviour. This type can include environmental volunteering where participants both gain well-being benefits, through their interaction with woodlands and other people in the forest setting, and contribute to sustainability through the practice of sustainable forest management.

Within an individualistic frame of reference, behaviours in a forestry context could encompass buying particular trees from a

nursery, using a chain saw or citizen science mobile phone application, or going for a walk in the woods. In some senses, however, broader forestry activities such as woodland creation and woodland management may be considered forms of behaviour. Whilst perhaps having been more traditionally referred to as 'land use', woodland creation and management can at least to a certain extent be conceptualized as discrete actions. The difficulty with this is the internal complexity of such 'behaviours'. Both woodland creation and woodland management (usually) involve not only multiple individuals, but can also have a number of component actions. It is therefore important to consider whether it is more meaningful to analyse woodland creation *per se*, as a single behaviour, or to analyse the subcomponent actions such as identifying land for planting, grant choice and application, seeking and taking advice, learning the relevant regulations and employment of planting contractors – each of which an individual land manager may have to perform. Staged models (such as the Stages of Change model) acknowledge this internal heterogeneity of behaviour and, in particular, behaviour *change*, and can be applied to understanding forestry behaviours (Moseley *et al.*, 2014). Differentiating 'behaviour' or 'practice' from 'land use' allows researchers to investigate, for example, whether woodland creation with grant support is a different form of behaviour from self-financed woodland creation. This might clarify some critical differences such as likely types of trees planted and the quality of subsequent woodland management. The land use (i.e. forestry) is essentially the same (although grant-aided creation may result in a different mix of tree species, different ecology and a different management regime).

At the individual level, behaviour *change* in the forestry context, may comprise land managers applying to forestry grant schemes where they had not done so previously, contractors following new or changed 'best practice' or using certain hard technologies, individuals shifting their exercise routes into (or taking part in new recreational activities in) forested areas, and not participating in anti-social behaviours such as fire-setting. At the next level up, it may consist of land managers creating woodland (thus changing from whatever land use pre-existed on the site) or managing woodland more 'actively' or to a different set of objectives or standards.

Although there is a great deal of literature on forest owner 'decision-making', literature bringing together forestry and behavioural theories is limited. Karpinnen (2005) applied the theory of planned behaviour to Finnish private forest owners' decision-making to explore choices between natural regeneration and planting. Results showed that forest owners' choice of natural regeneration could be explained by the theory, with former experience being the most important explanatory factor. More recently, this theory has been used to explore forest owner 'stand improvement' decisions (Karppinen and Berghäll, 2015) intentions to produce biomass for energy (Becker *et al.*, 2013; Brough *et al.*, 2013) and establish carbon sinks (Bull and Thompson, 2011). Moving beyond studies of land managers, Marzano and Dandy (2012) reviewed 40 studies of the impacts of recreationists' behaviour in forests. Only a minority of these explore the social causes of these impacts. Within this, very few draw directly on established behaviour theory, and these authors found no studies that used a social practice approach to analyse recreational behaviour. Morris *et al.* (2012) reviewed lessons learnt from forest-based interventions aiming to change behaviours. The majority of these interventions

focused on encouraging healthy lifestyles, however none of them used the lens of behavioural theory to evaluate the interventions. A systematic review of the use of the Theory of Planned Behaviour concluded that the theory was used to understand behaviour, but rarely used for intervention design (Hardeman *et al.*, 2002). Michie *et al.* (2008) also note that theory is often used to explain behaviour, but rarely to change it, and they observe a lack of guidance on the application of theory to intervention design.

### Interventions

Grounding the design and delivery of interventions in a strong understanding of the values, motivations and perceptions of target individuals and groups emerges from the evidence as a potential predictor of effectiveness (Barr, 2003; Morris and O'Brien, 2011). For example, Barr (2003) found that in order to achieve reductions in waste and increases in recycling, different approaches were required depending on whether or not participants believed in the intrinsic importance of nature and accepted notions of human priority for action in relation to the environment. We argue this should be a key principle informing the design of interventions that aim to change behaviour and we refer to this as 'Principle 1' in this article.

As a result of dominant understandings of 'behaviour' amongst policy-makers, many interventions focus on the individual (Moloney *et al.*, 2010; Aitken *et al.*, 2011). However, a review of the evidence suggests that social actors such as families, community structures and social networks can play critical roles in behavioural change, and thus affecting these can have significant benefits in terms of achieving the desired behavioural change outcomes (Greaves *et al.*, 2011; Jepson *et al.*, 2010). In support of this argument, there is evidence that certain behaviours, such as those involving outdoor activity for physical health benefits, are not only especially enjoyed, but are also more likely to be sustained because they are intrinsically *social* experiences (Morris and O'Brien, 2011). This evidence suggests that combining measures focused on target individuals with those that also target individuals' wider social environments are likely to be more effective (Golley *et al.*, 2011; Pomerleau *et al.*, 2005). We argue this should be a key principle ('Principle 2') informing the design of interventions that aim to change behaviour.

Interventions which adopt a multifaceted approach, for example those that combine technical approaches with education, training and community-based interventions, have generally been found to be more effective than singular interventions (see, e.g. Lombard *et al.*, 2009; Fjeldsoe *et al.*, 2011). As such, adopting a multifaceted approach should also be a key principle informing the design and delivery of interventions ('Principle 3').

Some of the evidence reviewed points to the notion that interventions which adopt a participatory approach, actively involving participants in the process of design and implementation, are most effective ('Principle 4') (Ogilvie *et al.*, 2004; Hargreaves *et al.*, 2008). For example, interventions to encourage sustainable travel behaviours, where participants are actively involved in the process of intervention design and are, therefore, able to make it relevant to their personal circumstances, emerge as more effective than more passive methods of participant involvement, such as the provision of information and advice (Ogilvie *et al.*, 2004; Fujii and Taniguchi, 2006).

Overall, the broad sociological and individually focused theoretical and empirical evidence relating to behaviour and behaviour-change focused policy interventions indicates that the most effective are those that: (1) are grounded on an understanding of individuals' and groups' values, motivations and understandings – that is, is in line with its 'target' group's goals, (2) seek to affect the wider social and physical context of its targets, (3) adopt a multifaceted approach at various scales and (4) facilitate active involvement by participants in project design and implementation.

## Methods and data analysis

Our research began with an extensive evidence review encompassing analysis of the policy context and theories of behaviour, along with an appraisal of evaluations of policy interventions aimed at behaviour change. This review identified key policy arenas (e.g. health, transport and consumption) engaging with behaviour and behaviour change, as well as the key cross-cutting dimensions of behaviour-related theories and frameworks. In our searches relating to forestry, we sought to use the most relevant common and generic terms fitting the sustainable forest management definition (see Table 1 for indicative search terms used). Our approach may have failed to identify work where specific terminology particular to its national or cultural context was used. The authors searched Google Scholar, Web of Science and major publisher databases (e.g. Science Direct, Taylor and Francis online) for peer-reviewed publications. Grey literature was identified using web searches and by searching UK government department websites such as the Department of Health, Department for Environment, Food and Rural Affairs (Defra), Department for Transport, and Department for Energy and Climate Change and the Cabinet Office. We initially limited our searches to material published since 2000 to ensure that the findings were likely to still be contemporary and relevant. However, seminal research prior to 2000 was also included where necessary. Our four 'key principles' of successful behaviour change interventions, outlined above, emerged clearly from this evidence review process and are thus based on theoretical and empirical insights. Although the review was conducted with a view to advising public forest managers in the UK, we drew on substantial relevant international evidence. The search for evaluations of interventions identified 103 journal articles and reports, 43 of which provided information of direct relevance to this study.

An initial spreadsheet listed details of the interventions including their objectives, 'target' groups and behaviours, location, success indicators and the availability of evaluative evidence. Each was briefly assessed against the four principles identified via the literature review. The four case studies included in this article were selected primarily because they offered the best available evidence and the opportunity for comparison. Data for the case studies were gathered through reviews of existing literature, which included evaluations of the interventions based on a mix of interview, focus group and survey research with those involved. For this article, 17 further interviews were carried out with key individuals involved in delivering the case study interventions. The aim of these interviews was to identify the extent to which the interventions had successfully maintained or changed participants' behaviour, including over the long term (2 or more years after the interventions had finished). Interview questions were focused on understanding the motivations of participants and opinions about whether involvement has led to any behavioural outcomes. The interviews also sought to reflect critically on the key principles for effectiveness identified above.

## Forestry case studies

Four UK case studies are presented here with the aim of making clear links between the identified principles of 'behaviour' theory and the practice of forestry interventions. Along with being tools for critical reflection in this way, these descriptions are intended to provide accessible materials for forest policy-makers involved in designing future interventions. The first two case studies are related to woodland creation (The Big Tree Plant, BTP; National Forest), while the second two case studies are focused on woodland use (Active England; Neroche). Each case study intervention description provides background details to the case, target behaviour that is desired and types of intervention. This is followed by an exploration of the extent to which each studied intervention has embodied the four key principles for effective engagement to facilitate sustainability behaviours.

### The Big Tree Plant

In 2011, the UK Coalition Government launched the 'BTP', a £4.2 million programme that, through supporting community action, aimed to fulfil a commitment to plant 1 million trees in towns and cities across England by 2015. At its core was a Forestry Commission grant scheme available to any 'community-led, not for profit organisation' (FCE 2010: p. 1), administered by Groundwork (a UK environmental non-governmental organization that works with communities to improve well-being and increase connections with nature). Funds could be used for community engagement, planting site surveys, paying for 'expert' advice, along with purchasing trees and other planting materials. The urban emphasis, small scale of planting (small groups of trees and street trees) and funding of community involvement distinguished the BTP from standard forestry grant schemes in the UK. As such, the outcome activities of this programme can be best understood as community tree-planting projects. Tree planting by more than 160 groups at 3363 sites was funded and the programme succeeded in meeting its planting target (Groundwork Trust, 2014). Furthermore, the scheme managed to deliver 58 per cent of its planting sites in economically 'deprived' areas and those with existing low canopy-cover (Groundwork Trust, 2014).

Local community members were the primary target of the BTP. Although the application process stopped short of demanding a full stakeholder analysis, it did require applicants to demonstrate an understanding of local community values and motivations through providing evidence of their support for the proposed tree planting. The scheme explicitly demanded that each planting project be led by a community group that 'represented the

Table 1 Indicative terms and keywords used for database searches

| Behaviour | Change | Policy | Plans, actions, strategies |
| --- | --- | --- | --- |
| | Maintain | Theory | Principle(s), model(s), value(s), attitude(s) |
| | Understand | Natural settings, landscape, forest, tree, wood, countryside, greenspace | Grants, interventions, regulation, campaign, events |

interests of the local community' (FCE, 2010: p. 1). The application materials suggested conducting a survey, which some projects did undertake (Groundwork Trust, 2012: p. 15). Other consultation methods included door-to-door enquiries, stalls at local events and petitions (Silvanus, 2013: p. 40).

The strong community focus of the BTP meant that the programme sought to affect the wider context surrounding tree-planting behaviour in various ways. In particular, projects drew extensively on established social groups and institutions – both locally and beyond the project area. This included, for example, making links to Forest School (FS) programmes (FS is a process that allows hands on learning in a woodland environment – see O'Brien and Murray, 2007) and to pre-existing environmental volunteer groups organized by The Conservation Volunteers (http://www.tcv.org.uk/), the Royal Society for the Protection of Birds and similar non-governmental organizations. Some projects provided tree-planting training with the aim of improving community members' skills and confidence (Silvanus, 2013: p. 43).

There were several aspects to the delivery of the BTP – particularly at the local project level. These included various community engagement and tree-planting activities, advice giving and promotion (FCE, 2011). The relatively novel and open structure of the grant allowed community engagement in a number of forms including direct recruitment of volunteers, establishment of sponsorship schemes, securing commitments to maintain trees (local stewardship), creating ties to existing local groups and the active use of local media.

Local community groups had to be the named applicants for BTP projects and, thus, were necessarily involved in development. They had to 'involve' and 'provide benefits' to 'people living and working in the neighbourhood'. Encouraging volunteering and building long-term pro-environmental capacity were explicit goals. The application form guidance stated 'The more the planting is done by local volunteers the better. This will develop capacity in the community to look after the trees into the future' (BTP Application Form, note 11). In many cases, communities were already well engaged in environmental volunteering prior to the BTP projects (Groundwork Trust, 2012: p. 16; Silvanus, 2013: p. 42). This provided a firm basis for moving forward; however, it also indicates the need for caution in making claims regarding the generation of new or additional pro-environmental behaviours.

Evaluative research on BTP community groups indicates that capacity has been built through the programme. It suggests that strong enabling relationships and partnerships have been established, such as active ongoing co-working between local community groups, tree wardens and local authority staff. Groups feel capable of, and have plans to do, further tree planting (Silvanus, 2013: p. 68) and are able to share their knowledge and experience with other potential tree planters (in some instances donating trees to other new projects). Evidence also indicates that local communities themselves recognize the importance and value of community project leadership (Silvanus, 2013: p. 69).

Participation and collaboration was also evident at the BTP's national-level partnership. The scheme was managed and delivered by Forestry Commission England in partnership with a number of other organizations including the Groundwork Trust (which administered the grant), Defra, Royal Botanical Gardens Kew, Trees for Cities (a non-governmental organization that works with communities to plant trees in urban areas) and the Tree Council (a non-governmental organization for groups involved in

tree planting and conservation). These partners provided expertise and advice, networks and resources for communication, promotion and information dissemination, and administrative support (e.g. participating in the project assessment panel).

## National Forest

The creation of a new multi-purpose forest in England was announced in 1990. Called 'The National Forest', the aim was to demonstrate that a large-scale forest could be created in lowland England encompassing commercial forestry, alongside public and ecological benefits. Located in the English midlands and spanning $520\,km^2$ in a landscape with initially very low tree cover (6 per cent), the last 20 years has seen forest cover rise to 19.9 per cent with the planting of 9941 ha (National Forest Company, 2014). The National Forest Company (NFC) created in 1995 and sponsored by Defra is responsible for delivery. One of the principal mechanisms of The National Forest has been the 'Tender Scheme' (running from 1995/1996 to 2006/2007), now adapted as the 'Changing Landscape Scheme' (2008/2009-present). These are woodland creation grants encouraging landowners to plant trees and diversify their business interests. The grants have been aimed at landowners in a primarily agricultural area, and encourages them to provide public access and enhance biodiversity.

A key aspect of the Tender Scheme setting it apart from most other forestry grants is that it paid 100 per cent of the costs of woodland creation. It paid for the establishment and maintenance of the woodland for 10 years. According to interviewees, working for the NFC, this has been a key element of success. The longevity of the grants is attractive for farmers for whom woodland creation involves moving from producing yearly crops to long-term woodland management. The NFC spends time seeking to understand different types of landowners: from those with large or small land-holdings, and from those they term 'lifestyle' landowners to traditional landowners. In working with larger landowners, the NFC is taking an approach that highlights opportunities for woodland creation across a part of their landholding that might be less productive. With smaller owners, the NFC at first tried to identify specific pieces of land where trees could be planted but this was met with some resistance. Following improved understanding of these owners' perspectives, they have now moved away from this approach towards being more flexible. One NFC interviewee suggested that active listening and putting themselves into the landowner's position was key to success, as well as building long-term relationships. As the work of the NFC has developed, it has been able to learn in an iterative way and apply this to how the scheme is delivered.

Interviewees at the NFC spoke of not underestimating the power of landowner's positive experiences, as they take a lot of notice of their peers and what they are doing. This can be important particularly with farmers who may not be familiar with forest management. The NFC set up the Tender Scheme Winners Club whose members had been successful in their application and they met to discuss any issues or problems and to provide advice to other famers. This has proved especially beneficial in spreading the news of success as respected landowners who have participated in the scheme have talked about it to their peers. One farmer's family member outlined how core

values had changed: 'now the trees are here he loves them' (Morris and Urry, 2006: p. 27). The grant has also enabled some landowners to diversify their businesses (e.g. through creation of fishing lakes, caravan and camping sites, and horse livery) (Morris and Urry, 2006). This diversification has generated greater connections between landowners and local communities through the provision of public access, community visits and the visual impact of the forest in the landscape. The role of land agents is also very important. Once a landowner has expressed interest in the National Forest, the NFC guides them to an agent who works closely with them to design a scheme and make an application.

Coupled with the grants, the NFC has also used a range of publicity approaches (e.g. personalized letters, private emails) to encourage participation in the scheme. Face-to-face meetings and building relationships with landowners are also of key importance. Alternative funding options are provided by schemes such as the 'Parkland and wood pasture' scheme for those who wish to plant tree less densely (see National Forest Company, no date). This scheme, and others, offer opportunities for those who feel the mainstream Changing Landscape Scheme is not for them.

Landowners were consulted before the creation of the original Tender Scheme and this provided a crucial opportunity for the NFC to understand and address specific barriers to woodland creation. Some landowners were particularly concerned about allowing for public access and this was subsequently not made a mandatory requirement; although it was actively encouraged. The NFC created a scheme that was flexible and provided a wide range of options for landowners. The discussions established trust between the NFC and landowners. While landowners were not directly involved in the creation of the more recent Changing Landscape Scheme, they are very closely involved with a land agent in designing any project they are interested in undertaking. This has enabled a number of famers and other landowners to not only change behaviour (i.e. plant trees) but has also led in some cases to diversification of their businesses, thus creating long-term behavioural change. For example, one traditional farmer, whose parent was very much against tree planting, planted trees and is now providing chain saw skills courses. Other landowners have got involved in education and have had school and community visits to their farms.

## Active England

The Active England programme ran from 2005 to 2009 with the aim of increasing community participation in physical activity, and was funded by the Lottery and Sport England. Of the 250 projects funded as part of the overall programme, 5 were located in woodlands with total funding of ~£5.5 million. The target behaviour for these projects was increased levels of physical activity through the use of woodlands. Key target groups were women and girls, those over 45 years of age, under 16s, disabled, black and minority ethnic groups, and people on low incomes. Mechanisms involved were targeted project initiatives (organized activities and events), partnership working and changes to the woodland infrastructure (e.g. creation of new paths, cycle-ways and play areas).

The five projects incorporated outreach activity with nearby communities to gain understanding of the target groups and recognize what barriers they may face in accessing woodlands. A group of Asian women were supported in visiting a forest as they faced barriers including a lack of confidence and a lack of cultural affinity with visiting woodlands. They were able to provide suggestions for overcoming these barriers. A women's mountain bike group was set up at one forest following communication of concerns about the dominance of men and competitiveness in mountain biking. Outreach activity became increasingly difficult as some of the projects developed and attracted large increases in visitor numbers. This needed managing at the expense of outreach (Morris and O'Brien, 2011).

One project decided to reach families through FS and family-based learning. They organized family events that attracted children, women and girls and over 45s to the forest. Training of FS leaders enabled a legacy to be created that could ensure such activities would continue beyond the end of the project. The Asian women's group (noted above) suggested that Asian men be targeted and encouraged to visit the woodland, so that if they enjoyed the experience they would visit with their families. Quantitative data collected via site surveys found that overall there was a decrease in solitary visits to the sites and a significant increase in the proportion of family visits illustrating the effectiveness of this approach (Morris and O'Brien, 2011). The creation of health walks at many sites provided opportunities for physical activity for those who wanted social contact. Led activities supported those people who lacked confidence or had concerns about visiting woodlands alone. Generating social interaction at forest sites appears to have motivated continued involvement in physical activity: 'I like the aspect of the social stuff... they sometimes meet at the end of the night down at the pub to have a drink after the session they've had...there are organised weeks away...trips around the country that they will go away for say a long weekend' (Silvanus, 2014: p. 4). Two sites in particular were described as hubs of social interaction, supported by the diversity and quality of their infrastructure and the activities provided. The manner in which these sites act as a focus for physical and social action and engagement with the natural world appeared to support behavioural change (Silvanus, 2014: p. 24).

The projects used a number of distinct delivery mechanisms. Some created site infrastructure improvements (e.g. new footpaths, mountain bike routes, play areas for children and visitor centre), organized events (e.g. fun runs, cycle events and tree festivals), led activities (such as health walks, cycle rides) and facilitated access (working with a specific group lacking confidence about visiting forests and transporting them to a site). One site purchased equipment (e.g. a climbing wall and laser quest) which could be used in the woods and taken out into other community spaces to provide taster sessions, allowing access by those who might not normally visit woodlands. Another intervention enabled behaviour change amongst potential mountain bike users by financing courses to engage local people, assisting the set-up of a club and contributing towards infrastructure improvements.

While none of the participants in the five Active England projects was involved in the initial design of the interventions, there was involvement once the interventions had started and target groups were being contacted. An Asian men's senior walking group provides a clear example of active and ongoing involvement of intended participants in activity design and delivery. The establishment of a committee of members for the group

that steers planning and implementation allows development of activities that are well suited to engaging the target participants and maintaining that involvement. The committee now wish to reshape delivery to meet new ambitions, expanding both the activities they provide and the type of participants they engage, even though the project finished in 2009 (Silvanus, 2014).

Evaluations of the projects within the Active England programme offer some evidence of successful long-lasting behaviour change. For example, a woman who joined the health walks after her doctor suggested that she undertake more physical activity stated 'if I hadn't been coming here [to the health walks] I wouldn't have considered... doing the race for life.. we do 5K and you can walk or run, so I walked' (O'Brien and Morris, 2009: p. 32). Furthermore, a woman who participated in a mountain bike training day stated that it led onto her joining the mountain bike club which she has now been a member of for 6 years. She stated 'when I started with the mountain bike club it probably kicked me off to a new phase of activity, because it was something different so it stimulated more activity within me' (Silvanus, 2014: p. 3).

## Neroche

The Neroche Landscape Partnership Scheme (NLPS) ran from 2006 to 2011 and covered a 35-square mile area in the Blackdown Hills Area of Outstanding Natural Beauty in south west England. It was funded by the UK's Heritage Lottery Fund under its Landscape Partnership programme. The scheme was delivered by a partnership of local authorities and agencies, led by Forestry Commission England, and consisted of a wide range of landscape and heritage-based projects and activities, seeking to maximize the area's value in terms of wildlife conservation, cultural heritage, access and recreation, learning and skills development. Schemes funded by the Heritage Lottery Fund must take a holistic approach to landscape heritage and encompass a diverse range of objectives attuned to a similarly wide range of interests, perspectives and values. The NLPS implemented a diverse portfolio of 23 projects targeting a wide range of behaviours (Carter et al., 2011).

A partnership approach was key to the delivery of a scheme that needed to be sensitive and relevant to a diverse, and sometimes conflicting range of local aspirations and values. A Landscape Partnership Board was established to develop the initial proposal and to deliver the scheme once funding was secured. The Board was made up of members of the Local Stakeholders Group and representatives of local authorities, public agencies and third sector organizations, many of whom were already actively engaged in local projects and activities that were effectively extended though the NLPS. Individual projects were led and delivered by each of the partner organizations and steered by the Board which, in practice, meant the devolution of responsibility for project design and delivery, and allowed partners to tailor each project to specific needs and aspirations. The fact that the Board had oversight of each project also meant that a wealth of experiences and contacts were brought to bear, together with a high level of familiarity with parts of the landscape and its communities.

The partnership approach was instrumental to the scheme's successes in terms of changing behaviours at community level, but also within the partnership itself. Several board members and project leaders explained how the partnership had influenced their working practices and boosted their visionary capacity and confidence. For example, one Board member stated 'A broader outlook and I think a braver outlook, definitely. [...] inspiration, the kind of wider, the broader approach, I think that's a very good benefit.'

Some of the NLPS's most successful initiatives were those that targeted family groups, through organized activities, such as bushcraft, health walks and family events. For many participants, these activities generated enjoyment, a deeper sense of confidence and enhanced well-being through experiences shared with family or friends. The evaluation of the scheme pointed to the potential for more fundamental and lasting benefits gained by participating in these shared activities. The Neroche Conservation Volunteers group was created by the scheme (and is still running 4 years later) and set out to recruit volunteers to a diverse range of volunteering opportunities. Two of the research respondents have now been volunteering for the Neroche Conservation Volunteers for 2.5 and 4 years, respectively.

The NLPS used a range of delivery mechanisms. For example, the creation of a 13.5-mile circular path was a key component delivered to improve physical access. Interviewees talked about improved access, the quality of the trail and viewed it as an important legacy of the overall project (Carter et al., 2011). As one interviewee reported 'improved access to the countryside is a huge asset for the area both for the locals and tourists alike whether walking, riding or cycling.' The scheme also had a focus on FS and led to 38 teachers being trained as FS leaders and to the establishment of 11 FS sites. In one primary school, pupils were involved in FS twice a week, with every child in the school taking part at some point in the year. Illustrating another facet of the scheme, one artist was excited by the value placed on art: 'for me that was really the biggest thing [...] was the fact that they [the NLPS] took the art seriously [...] They listened, they took it seriously and they expanded on it' (Artist working on NLPS).

Research has revealed that the NLPS has left a legacy of long-lasting behavioural changes. For example, the access to suitable areas to run FS and the training of FS leaders provides a strong legacy of education and learning that can be maintained beyond the life of the NLPS. The training, learning and experience gained by the Neroche Conservation Volunteers has led to long-term commitment to continue their volunteering activity – as one interviewee stated: 'We are going to see how the whole area is developing from a muddy quagmire to a new open forest. I find it terribly interesting and I'm looking forward to the years ahead to be honest.' Furthermore, five members of the Local Stakeholders Group took a proactive approach to continuing the work of the NLPS by founding the Blackdown Hills Trust to support further conservation work in the area.

One of the key innovations of the NLPS was the way in which governance and power over decision-making was devolved to the Local Stakeholders Group and, by implication to local communities. This group comprised of people who were already engaged in community initiatives. All of the Local Stakeholders Group members consciously thought of their position as 'representing the wider community' and making wise decisions based on their knowledge and experience of local needs, aspirations and values.

One of the most significant devolutions of decision-making power was that the Local Stakeholders Group were given the casting vote on the selection of projects to be delivered, thereby effectively transforming the NLPS into a scheme that was chosen by, and delivered for the community.

## Discussion and implications for policy

In this article, we have shown that forestry interventions in the UK can promote sustainability behaviours: specifically woodland creation and the use of woodlands as part of lifestyles focused on health and sustainability. Indeed, the evidence shows that forestry interventions not only create new or changed behaviour but also contribute to the maintenance of existing sustainability behaviours. Furthermore, interventions also allowed new ways of doing various practices, e.g. improvements in competence and skills. Sometimes behavioural change was continued beyond the boundaries of the intervention.

As with behaviours, which may be made up of a number of related 'component' activities, the interventions that seek to influence or change behaviours also exhibit an internal complexity. Our analysis has revealed that interventions often operate at different levels or scales. They can take their lead from national policy directives and strategic funding streams, and yet reach down to individual actors. This focus could be extended 'upwards' to incorporate policies that operate at the supranational level, for example, European policies to promote the development of green infrastructure (European Commission, 2013). Looking 'downwards', interventions can be made up of subcomponent projects or initiatives, for example, targeted recreational activities that are tailored to the needs of specific social groups. Thus, the application of the principles outlined in this article may change with scale. For example, with the BTP, understanding the values of target groups (Principle 1) was not attempted at the national scale, rather it was delegated to the grant recipients at a local scale.

'Behavioural insights' that are widespread in current government and academic discourses are not as yet prominent within the UK forestry sector – although there are signs that some insights are beginning to be utilized (Moseley *et al.*, 2014). A contribution of this article is, however, to highlight how and where some current forestry interventions have affected behaviours but without explicitly linking them to this discourse. This article importantly takes the next step. By introducing these 'insights' directly to forestry, we have tested a framework and shown that it can be used to evaluate and inform the development of forest policy and programme design focused on sustainability behaviours. The 'behavioural' sciences, which here we construe as including the range of insights referred to in this article emanating from a number of disciplines, offer a rich and varied set of analytic ideas which can reach very fines scales in search of explanations of, and opportunities to influence, human action. Whilst we acknowledge the incommensurability of much of the theoretical and paradigmatic distinctions intrinsic to this field of study (see Shove, 2010), in this article, we have shown that the flexible application of four general principles derived from this body of work can underpin effective policy analysis and reflection. The principles we identify concur closely with some of those identified by Stern (2000) – see in particular his Principles A, B, D and H. However, by drawing on both individually based (psychological and economic) and sociologically informed perspectives, we have refined and focused down his wide-ranging selection. Encompassing social theories also allows the principles to be legitimately applied and interpreted at various scales as required and relevant (rather than only at the individual level). Furthermore, in highlighting the ways in which the forestry sector already enacts these principles, we have perhaps shown that some state actors are not as strongly wedded to individualistic approaches to behaviour and behaviour change as is widely assumed. Certainly, traditional 'carrot and stick' mechanisms such as grants and licences remain important policy tools in the forestry sector. However, it is also clear that forestry actors are aware of some of the wider social, political and environmental determinants of human action.

The four principles we identify in this article can underpin the design and implementation of successful policies and programmes. As Table 2 shows, each of the case study interventions we studied did enact each principle to a certain extent and in various ways. For example, each of the interventions implicitly enacted Principle 2 by recognizing the importance of influencing social context (e.g. families, peer groups and other social networks, as well as in some projects physical infrastructure improvements). However, there was variation in how different interventions facilitated involvement of participants (Principle 4) at different stages. The BTP, NLPS and some Active England projects involved community level participants at an early stage in design whereas adjustments to the National Forest Tender Scheme were made at a later stage in the delivery cycle, following an evaluation and the incorporation of grant applicants' suggested improvements. We argue that to maximize effectiveness, the four principles should be applied early, but also (re)applied or reviewed at each stage of the adaptive management project cycle. We have noted above that the principles vary with scale and are also often mutually reinforcing. For example, facilitation of active involvement by the participants in project design and delivery (Principle 4) will underpin a good understanding of individual's/group's values, motivations and behaviours (Principle 1). A benefit of interventions that adopt multifaceted approaches (Principle 3) is that they tend by their nature to better recognize and support diversity (differences in people's motivations, ideals and ability), which appeared to be an important aspect of maintaining and amplifying behaviour within a wider context (Principle 2).

Our four principles can moreover form the basis of research and evidence gathering. It is difficult to assess the impact of interventions without robust monitoring and evaluation data. This leads us to advocate a potential fifth principle: to effectively monitor and evaluate interventions. Current monitoring and evaluation is often limited and evidence generated from it can be patchy. It could be improved by greater use of baseline evidence, counterfactuals, indicators and the use of controls where possible. It is important to recognize, however, that monitoring and evaluation carries resource implications. Whilst the interventions we studied each established some basic indicators to show change of the physical environment (e.g. number of trees planted), only one (Active England) gathered baseline evidence. This was related to behaviours on specific sites and not the behaviours of individuals. Through this, the

Table 2 Four principles for designing sustainable behaviour interventions in forestry

| | Principle 1: grounded in an understanding of values. | Principle 2: target the wider social and physical environment. | Principle 3: adopt a multifaceted approach. | Principle 4: facilitate active involvement by participants in design and implementation. |
|---|---|---|---|---|
| BTP | A range of activities to understand local needs and values including surveys, door-to-door consultations, stalls at events. Applicants demonstrated knowledge of local values through providing evidence of community support. | Planting projects led by a community group that 'represented the interests of the local community'. Project made links with existing initiatives and programmes (e.g. FS, Conservation Volunteers). | BTP grant scheme used in combination with other mechanisms, such as community engagement and tree-planting activities, advice giving and promotion. | Projects had to be community led, with the result that local groups were involved in project design and development. |
| National Forest | Time was taken to understand different types of landowners and their needs in order to identify where (on their land) woodland creation could happen. | Programme set up Tender Scheme winners club for farmers to provide advice to grant applicants. | Different schemes were offered to landowners to suit their land and objectives. Grant scheme combined with communications programme. Agents engaged as knowledge brokers. | TS evaluated and respondents' suggestions incorporated into 'lessons learned', leading to significant adaptations (e.g. provision of public access made non-mandatory). |
| Active England | Community outreach to improve understanding of target groups and barriers to access. | Engaging with community groups and families of target participants. Group activities to encourage social group formation to sustain participation. | Projects adopted various measures to encourage access and participation, including improvements to infrastructure, organized events, led activities and publicity. | Communities engaged in the design of interventions with specific target groups to provide 'facilitated access' to woodland sites and organized activities. |
| Neroche | A partnership approach was established early to develop the proposal and deliver the scheme. Programme board comprised a wide set of interests and values. Local Stakeholder Group involved in scheme design and governance to ensure community voice is represented. | Successful engagement with families and community groups. | Wide variety of projects and programmes funded and supported by the partnership. | Governance and decision-making is devolved to Local Stakeholder Group. |

evaluation was able to show changes in the types of behaviours and practices undertaken at specific sites. Moreover, none of the case studies has been evaluated against a control or counterfactual area, which would have better illustrated behavioural impacts.

We advocate that monitoring and evaluation should include the iterative application of the principles as part of an adaptive management approach. A learning cycle that allows, for example, continual reassessment of the values of key participants (Principle 1) enables the adjustment and tailoring of interventions to increase participation and behavioural change. One example of this was the National Forest that had an initial proposal to require public access to woodlands established by the grant scheme which was made optional following opposition from prospective participant landowners. The BTP application materials were adapted following each round of funding so as

to provide guidance that made it easier to apply for, clarified how to write an application and indicated more clearly the relative importance of selection criteria.

## Conclusion

There is an increasing focus on how policy can influence a change in, or maintenance of, environmental and social behaviours which draws directly on behavioural theories. In a forestry context, there is clear legacy of interventions that are successful in facilitating sustainability behaviours such as woodland creation and the utilization of forests but these interventions are not explicitly linked to the insights provided by behaviour theory. We argue that better integrating behaviour theory with forestry practice (sustainable forest management) would allow for a deeper

exploration of the value of these interventions to address key societal challenges. We have developed four key principles that can be used to guide forestry interventions seeking to change attitudes and practices or maintain desired behaviours. Through our case studies, we have shown how forestry interventions have broadened their range of methods and mechanisms beyond the typical grants and licences to reach wider and more diverse audiences. However, we have also drawn attention to the importance of evaluating the effectiveness of interventions and their sub-components to inform the design of further policy and programmes. Monitoring and evaluation of interventions is often currently lacking. More formal mechanisms for assessing and attributing change over longer time frames are needed to create a robust evidence base for positive long-term behavioural outcomes. The principles we have developed can be used to ensure that participatory processes, monitoring and evaluation criteria and adequate periods for reflection are built into interventions at the early proposal or planning stage.

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