

Wellbeing Conference 2013

Public Forests and Public Health: the emerging evidence base for the role of woodlands in promoting physical and psychological wellbeing

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Not quite the Royal Easel!

Photo: E.R. Wilson 2012

The link between Nature, Woods and Wellbeing



John Muir
1938-1914

*"Climb the mountains and get
their good tidings. Nature's
peace will flow into you as
sunshine flows into trees.
The winds will blow their
own freshness into you, and
the storms their
energy, while cares will drop
away from you like the
leaves of Autumn."*

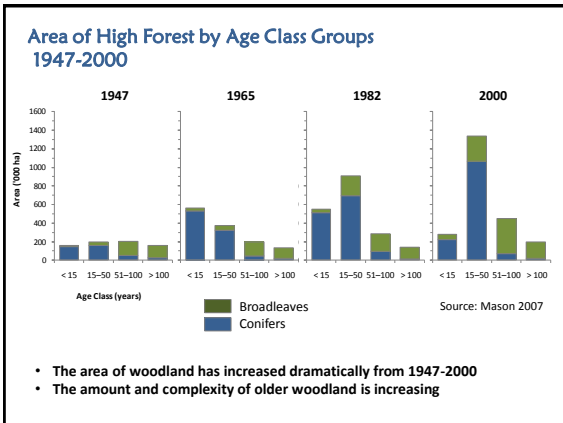
John Muir, *Our National Parks*

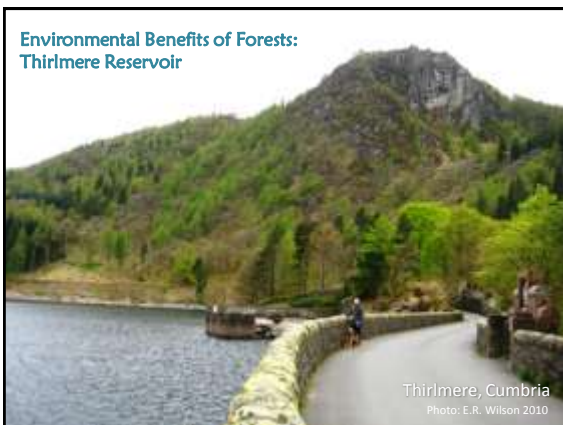






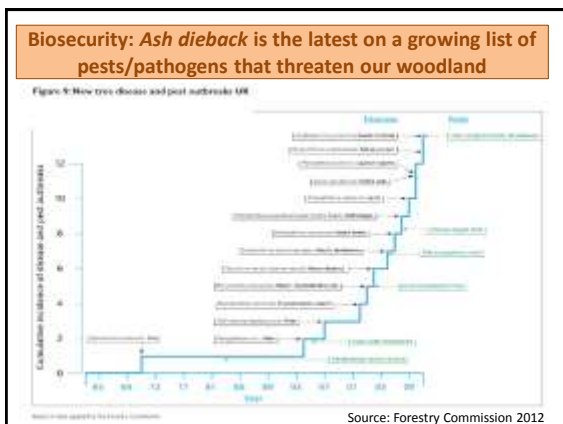


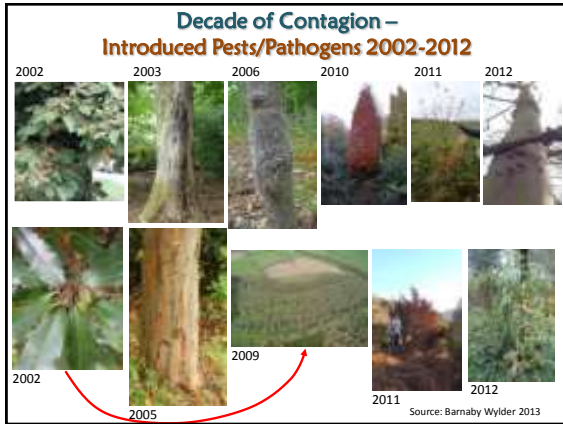
















Forest Policy and Ecosystem Change

- Throughout the 20th century there has been a **concerted effort to restore and enlarge the forest estate**.
- **Forests have become larger and more complex as they age, but are at risk from a variety of threats.**
- Now we are moving to a **more ecological form of forest management** to promote **biodiversity and recreational values**
- The 2012 Independent Panel on Forestry identified the need for a **NEW Woodland Culture** in Britain, where we connect with woodlands for the widest range of values and ecological services, **key being health and well-being**

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Policy Drivers in Health: Physical activity and health



Be Active, Be Healthy. Department of Health 2009.
The Scottish Health Survey. Scottish Government 2009.

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The evidence base for the link between Nature, Woods and Wellbeing

- **Ulrich 1984**
 - **View from a window may influence recovery from surgery.** Science, 224(4647):420–421
- **Mitchell and Popham 2008**
 - **Effect of exposure to natural environment on health inequalities: an observational population study.** Lancet 372(9650):1655–1660
 - *Green space can dilute the effects of poverty and risk of morbidity and mortality*
- **Donovan et al. 2013**
 - **The Relationship Between Trees and Human Health: Evidence from the Spread of the Emerald Ash Borer.** Am J Prev Med 44(2):139–145
 - *Loss of trees to the emerald ash borer increased mortality related to cardiovascular and lower-respiratory-tract illness. This adds to the growing evidence that the natural environment provides major public health benefits.*





What the research demonstrates with certainty (Townsend and Weerasuriya 2010)

A = Anecdotal T = Theoretical E = Empirical

Assertion	Evidence			Key references
	A	T	E	
There are acute adverse health and physiological effects that occur when humans are exposed to artificial lighting, especially when combined with artificial sounds, smells, and tastes.	✓	✓	✓	Plumley (2007), Black and Hughes (1998), White and Kende (1988), Ueki et al. (2001), Parsons (2001), Fiedler et al. (2004), Fiedler et al. (2005)
Natural environments, such as parks, forests, and gardens, have a positive effect on human health and well-being.	✓	✓	✓	Hansen (2000), Hartig et al. (2001), Hansen and Kaplan (2000), Kaplan and Kaplan (1989), Farnsworth (1979)
There are established methods of natural light therapy for treating depression, anxiety, and other mental health conditions, and that these methods are effective in treating patients who previously had not responded to medication.	✓	✓	✓	Fennell and Roberts (2001), Glick and O'Donnell (2008), Lewis (1996), Russell et al. (1998), Black et al. (2000), Kasper and Glick (2002), Leshem (1998)
Green spaces and natural environments, particularly those with water features, are good places for children to play, and that these environments are important for children's health and well-being.	✓	✓	✓	Hartig et al. (2006), Norwell (2007), Parsons (1981)

What the research demonstrates with certainty (Townsend and Weerasuriya 2010)

A = Anecdotal T = Theoretical E = Empirical

Assertion	Evidence			Key reference/s
	A	T	E	
The majority of people that people accessible. Research on narrative and endogenous and being in these places is recuperative.	✓	✓	✓	Heeling et al. 2003, Heeling et al. 2007, Newman 2007, Hoggart and Hoggart 2008, Poulton and Rennie 2008, Hoggart and Hoggart 2009.
People have a more positive outlook on life and higher life satisfaction when in proximity to nature. Greenness is linked to well-being.	✓	✓	✓	Han 2007, Kuo and Sullivan 2001, Hoggart 2008a, Lechner et al. 2008, Lohani 2008, Hoggart and Hoggart 2009.
The majority of health problems currently and future related to the future are likely to be chronic degenerative, mental health problems and non-communicable health problems.	✓	✓	✓	Commonwealth Dept of Health and Aged Care and Australian Institute of Health and Welfare 2008, Australian Institute of Health and Welfare 2009.

What the research demonstrates with certainty (Townsend and Weerasuriya 2010)

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Assertion	Evidence			Key reference/s
	A	T	E	
Social capital is decreasing and is likely to continue to decline.	✓	✓	✓	Patten 1995.
Exposure to natural environments, such as parks, increases the ability to cope with and recover from stress, cope with subsequent stress and recover from stress and injury.	✓	✓	✓	Persson 1997, Litch et al. 2003, Litch 2004.
Opening natural environments, such as parks, increases the ability to cope with and recover from stress, cope with subsequent stress and recover from stress and injury.	✓	✓	✓	Taylor et al. 2007, Lechner et al. 2008, Townsend and Grogan 2009.
Having natural resources (e.g. urban or natural parks), or just knowing it exists, is important to the well-being of whether they are regular "users" of it.	✓	✓	✓	Goed et al. 2000, Hoggart and Hoggart 2009.

Prevailing Theories Linking Contact with Nature and Wellbeing

- Biophilia Hypothesis
- Attention Restoration Theory
- Stress Reduction Theory
- Environmental Self-regulation Hypothesis
- Bio-ecological Model
- Relaxation Response
- Each theoretical framework is a function (to varying degrees) of evolutionary, genetics, psychology theory and research

Health benefits and restorative effect of contrasting woodlands in urban greenspace (Jorgensen et al – currently in review)

- **Public health priorities:** promote healthy activity/exercise, for both prevention of illness and rehabilitation; physical and mental well-being.
- **Restorative value of greenspace** for well-being is recognised.
- Generic features of restorative environments (Kaplan, 1995): **Being away, Extent, Compatibility, Fascination.**
- **Few studies** have examined whether/how variations between urban green spaces affect the restorative experience.
- **Limited evidence** indicates that the presence of characteristics consistent with the impression of tendedness, species richness and the feeling of being away are likely to enhance restoration.

Restoration- the theoretical context

- Extensive literature on the **psychological benefits** of exposure to urban green spaces
- Different explanatory models of restoration or stress-relief:
 - **Restoration of attention deficit** (Kaplan and Kaplan, 1989; Kaplan, 1995)
 - **Improvement in mood states** accompanied by **physiological changes** (Ulrich *et al.*, 1991)
 - **“Restoration”** often used generically to refer to either/both
- Natural environments generally more restorative than urban ones (e.g., Bodin & Hartig, 2003; Hartig *et al.*, 2003; Hug, 2008; Hug *et al.*, 2009)

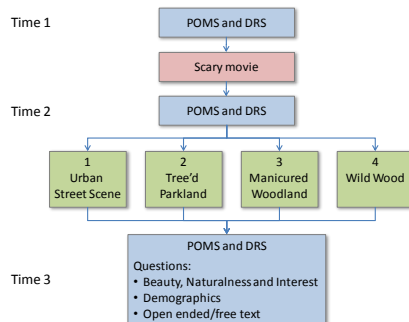
Research questions

1. What is the impact of vegetation on restoration in urban public open space?
2. Are more enclosed or densely vegetated natural environments more restorative than open parkland?
3. Does biodiversity (as manifested in the presence of additional vegetation ‘layers’) promote restoration?
4. Are more manicured enclosed and biodiverse settings more restorative than less tended ones?
5. Does exposure to more densely vegetated natural environments have “deep restoration” effects that are not achievable in more open settings?

Methods

- Methodology previously used by Van den Berg *et al.* (2003).
- Used an affective model of restoration (improvement in mood states) & an **affective stressor** ("scary movie").
- Key components:
 1. **Profile of Mood States (POMS)** (Curran *et al.*, 1995)
 - Short form of POMS used to measure affective changes
 - 37 items loading onto 6 dimensions- "Tension", "Anger", "Fatigue", "Vigour", "Depression" and "Confusion"
 - e.g. The items loading onto "Tension" were "Tense", "On edge", "Uneasy", "Restless", "Nervous" and "Anxious"
 2. **Deep Restoration Scale (DRS)**
 - 12 dimensions
- **7-point bipolar scales** used for POMS and DRS
 - e.g. "Anxious": 1= "Do not feel at all"- 7 "Feel very strongly"

Experimental design



Environmental treatments

- **Locations:** variation in naturalness, biodiversity and structural complexity
- **Transect:** 250 m
- **Filming:** 50 images (each 5 m, 2 secs. each); 5 video clips with sound (60 secs. each).
- **Total time:** 6 mins, 40 secs

Urban streetscene	Tree'd parkland	Manicured woods	Wildwood

Sheffield City Centre	Graves Park	Botanic Garden	Greno Woods

Sheffield City Centre

- Offices
- Georgian/Victorian architecture
- Mix open and narrow streets, lanes, square

Graves Park

- Simple vegetation structure
- Mown grass, avenue trees, limited shrubs
- Paved paths, benches

Botanic Garden

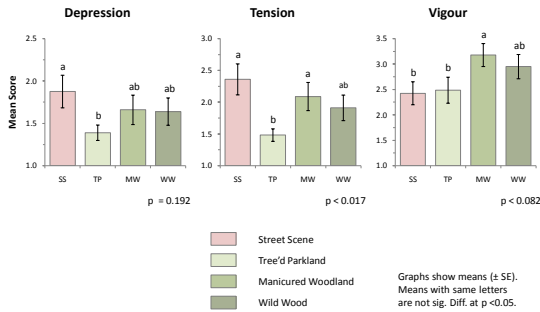
- Carefully tended arboretum
- Complex structure
- Structural and species diversity
- Paved/gravel paths

Greno Woods

- Semi-natural woods
- Complex structure
- Open areas, dense thickets, seedlings to mature trees
- Gravel paths

POMS

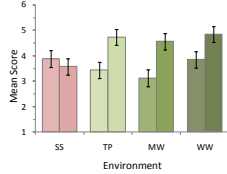
- Significant differences between groups after environmental exposure, T3.



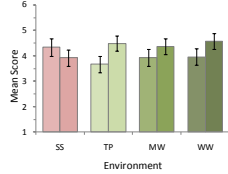
Significant DRS Dimensions, T2-T3

"I feel connected to the natural world" *"I can take time out from a busy life"*

Time: $p < 0.01$; Time x Enviro.: $p < 0.01$



Time: $p = 0.02$; Time x Enviro.: $p = 0.03$



T2 T3

Street Scene
Tree'd Parkland
Manicured Woodland
Wild Wood

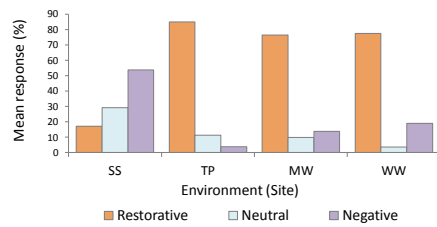
Graphs show means (\pm SE).

Keyword analysis

Environment 1 Street Scene	Environment 2 Tree'd Parkland	Environment 3 Manicured Woodland	Environment 4 Wild Wood
Words A-Z	Words A-Z	Words A-Z	Words A-Z
angry	boring (5)	boring (2)	amused
amused	calming (12)	calming (9)	anxious
boring (6)	cleaning	free	awake-active
calming (2)	creative	fresh	boring (2)
claustrophobic	green (3)	happy (4)	calming (7)
claustrophobic	happy (4)	happiness	damaged
constrained	natural (2)	homestead	detached
confusing	peaceful (7)	isolated	disorienting
confusing	pleasant (6)	lonely	exciting
depressing	relaxing (6)	motivational/bright	free
diminishing	serene (3)	natural (4)	fresh air
dirty	sleepy	nervous	freshness
disappointed	stunned	optimistic	green (4)
dull	vulnerable	peaceful (4)	happy (2)
dull		pleasant	invaded
fear		positive	invigorating
grey		refreshed	lonely
hopeless		relaxing (10)	natural (5)
inspiring		sad	nervous
lively		scary	peaceful (8)
lonely		sleepy (3)	pleasant (5)
natural		still scared due to first film	refreshing
pleasant			refreshing
powerless			relaxing (9)
relaxing			restless
restrictive			sadness
scruffy			tense
uncertain			uplifted
uncomfortable			
unhappy			
unimaginative			
uninteresting (3)			
unpleasant			

Key:
Shaded – words mentioned 3 or more times in any one environment
Blue – associated with positive feelings, vigour
Red – associated with negative feelings

Keyword analysis of environments



- Pronounced restorative experience in all three green spaces.
- Highest proportion of negative impressions/feelings in Street Scene.
- Moderate distinction among green spaces with distinct structural attributes in terms of negative impressions, most obvious in the Wild Wood setting.

Health benefits and restorative effect of contrasting woodlands in urban greenspace

(Jorgensen et al)

Conclusions

- Urban green spaces varying in structural complexity had differing restorative impacts: simple vs. complex structures.
- Tended-ness (manicured woodland versus wild wood) seemed to help mitigate the negative aspects of more structurally complex environments.
- “Deep restoration”, in our study, was not enhanced in environments with greater structural complexity.
- Both ethnicity and gender impacted on some aspects of the restorative experience.
- Applications of this research approach to urban green space design
- Potential link to design of health promotion programmes.

Health risks associated with nature: The case of *Ixodid* ticks



Nymph

- 1 to 1.5 mm in size
- difficult to detect



Adult (female)

- 3 to 3.5 mm in size
- males are smaller
- can remain attached to host for several days

Photos: E.R. Wilson 2013

Tick habitat



Image: BADA-UK

Open forest *Calluna* dominated



Area of natural regeneration



Bracken dominated understorey



Photos: E.R. Wilson 2013

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Erythema migrans (EM) – the target rash



Image: LDA

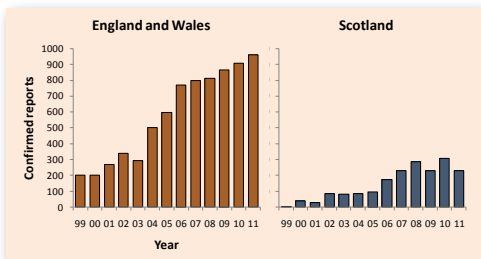


Image: 2007 J Gathany PHIL/CDC

- The rash is an early and common symptom of infection
- The rash present in 74 % of cases (LBU, HPA Study) (Marcu et al 2013)
- The rash can be a wide variety of shapes depending on the location of the bite
- Left untreated, Lyme disease can develop into a serious medical condition

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Epidemiology of Lyme disease in the UK 1999-2011



Data: HPA 2013 and HPS 2013

- Approximately **10 000 confirmed cases in past 10 years**.
- Confirmed reports thought to **significantly underestimate** true incidence (3:1?)
- Up to **20 percent** of cases in any year are thought to be acquired abroad

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Case study: Understanding risk during a woodland visit in SE England (O'Brien et al 2012)

• Outcomes

- Woodland visitors recognise many personal benefits from contact with nature
 - Physical exercise, Psychological restoration, Social contact
- Focusing too much on risk can detract from the experience
 - “*distancing from risk*” (Marcu et al 2011)
- Advice at odds with behaviour preference was unlikely to be adopted

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Case study: Understanding risk during a woodland visit in SE England (O'Brien et al 2012)

• Managing woodland visits:

- Providing information that does not seem to impede or reduce recreational use of woodlands
- Short, clear, concise warning messages most appropriate and effective
- Focus on post-visit action (see also Marcu et al 2013)
- “*Naturalness of setting*” is important, sensitive placement of signs is essential
- Responsible management does not equate with a lot of visible warnings

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Health Information about ticks and Lyme disease for Outdoor Users: Key Points

1. Enjoy the outdoors
- it's great for physical and emotional well-being!
2. Before going outdoors
- be aware of ticks and tick ecology
3. While outdoors
- minimise risk of being bitten: dress appropriately; apply acaricide; avoid dense vegetation (questing)
4. After being outdoors
- check for ticks on skin and clothes; check children; check the dog too!
5. If bitten by a tick
- remove promptly using a safe technique
6. Medical treatment
- seek early diagnosis and treatment if symptoms of infection develop after being bitten or after visiting tick habitat
- early diagnosis is easier to treat with ABx
7. If in any doubt, speak with your GP



Images: Forestry Commission
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A high risk area: forest clearing with broadleaf regeneration and a large mat of bracken



Photo: Sharon Rodhouse 2011

Making use of vegetation dynamics – maintain moderate shade in high access areas



Whinlatter Forest
Photo: E.R. Wilson 2011



What research is required

(Townsend and Weerasuriya 2010)

A = Anecdotal T = Theoretical E = Empirical

Assertion	Evidence			Key reference/s
	A	T	E	
Theoretical and/or empirical evidence on whether human health is affected by lack of opportunities to experience nature	✓			Frumkin 2001, Skriver 2001, Hallert 1987, Apple and Black 1987
Theoretical and/or empirical evidence on whether the destruction of the nature environment directly affects human health and well-being and is linked to the persistence of modern diseases in modern society	✓			Popeo et al. 1995
Anecdotal and/or empirical evidence on the importance of parks to the community in terms of health and the social health benefits people derive from parks		✓		Hodkinson 1999
Theoretical and/or empirical evidence on the role that natural environments (natural capital) play in building social and human capital and the outcomes in terms of health	✓			Frumkin 2001, Fluharty 1985

What research is required

(Townsend and Weerasuriya 2010)

Assertion	Evidence			Key reference/s
	A	T	E	
Empirical evidence on the role of nature in enhancing and advancing literacy	✓	✓		Olga and O'Donnell 1998, Siga and Rungt 1999
Evidence on whether the health and life satisfaction of some population groups (e.g. friends of the group, park volunteers, wildlife feeders and users) is different from or greater than others, where those groups have regular contact with nature/visit more often	✓			Townsend and Maller 2003, Townsend 2005, Moore et al. 2007
Evidence on the extent, nature and possible of the impact of nature and parks on maintaining psychological health	✓			Henderson 2008, Brundin et al. 2009
Evidence on the extent, nature and possible of the impact of nature and parks on quality of life and happiness	✓	✓		White et al. 2008, Ho et al. 2005, Looi 2002
Evidence on whether shorter periods of natural settings (green time) generate health benefits that exceed other activities	✓	✓	✓	Potts et al. 2007

Increasing access to woodlands



Photo: E.R. Wilson 2010



Joined up thinking!
Team forestry, health service and railway
Photo: E.R. Wilson 2010

Childhood experience in woods and nature is important
in determining exercise preferences in later life



Photo: Forestry Commission

Conclusions

- We have deep cultural connections with nature and woodlands that need to be nurtured and renewed
- There is now a strong evidence base for the physical and psychological benefits of green space and woodlands
- More work is required to develop specific interventions and therapies, but generally promoting access and use of woodlands is a key function of the public forest estate
- Health benefits must be balanced with health risks – the key is engagement, education and positive communication

