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

“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

John Muir 1938-1914
The Great Public Forest Sell-Off Debate
Protest at Grizedale Forest, January 2011

Area of High Forest by Age Class Groups 1947-2000

- The area of woodland has increased dramatically from 1947-2000
- The amount and complexity of older woodland is increasing

Environmental Benefits of Forests: Thirlmere Reservoir
Biosecurity: *Ash dieback* is the latest on a growing list of pests/pathogens that threaten our woodland.
Decade of Contagion – Introduced Pests/Pathogens 2002-2012


Source: Barnaby Wylder 2013

Ash Dieback (in Denmark)
Source: Barnaby Wylder, Forestry Commission 2012.

Ash pollard
St John's in the Vale, Cumbria
Photo: E.R. Wilson 2012
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.

Policy Drivers in Health: Physical activity and health

- Be Active, Be Healthy. Department of Health 2009.

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
  - Green space can dilute the effects of poverty and risk of morbidity and mortality
- Donovan et al. 2013
  - 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)

<table>
<thead>
<tr>
<th>Assertion</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>There are some known beneficial pharmacological effects that occur when</td>
<td></td>
</tr>
<tr>
<td>herbal, aromatherapic, or other therapeutic interventions, such as</td>
<td>A</td>
</tr>
<tr>
<td>plants, techniques, or otherwise</td>
<td></td>
</tr>
<tr>
<td>Natural environments, such as eco-</td>
<td>T</td>
</tr>
<tr>
<td>What the research demonstrates with certainty (Townsend and Weerasuriya 2010) (T = Theoretical)</td>
<td>E = Empirical</td>
</tr>
</tbody>
</table>
What the research demonstrates with certainty (Townsend and Weerasuriya 2010)

<table>
<thead>
<tr>
<th>Assertion</th>
<th>Evidence</th>
<th>Key references</th>
</tr>
</thead>
<tbody>
<tr>
<td>The majority of people believe contact with nature promotes a sense of well-being</td>
<td>✓</td>
<td>Townsend and Weerasuriya 2010</td>
</tr>
<tr>
<td>People have a strong positive reaction to nature that is linked to improved health outcomes</td>
<td>✓</td>
<td>Townsend and Weerasuriya 2010</td>
</tr>
<tr>
<td>The need for contact with nature is essential for maintaining physical, psychological, and social well-being</td>
<td>✓</td>
<td>Townsend and Weerasuriya 2010</td>
</tr>
</tbody>
</table>

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.
- 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 tenderness, 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

<table>
<thead>
<tr>
<th>Time 1</th>
<th>POMS and DRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 2</td>
<td>Scary movie</td>
</tr>
<tr>
<td>Urban Street Scene</td>
<td>POMS and DRS</td>
</tr>
<tr>
<td>Tree’d Parkland</td>
<td>POMS and DRS</td>
</tr>
<tr>
<td>Manicured Woodland</td>
<td>POMS and DRS</td>
</tr>
<tr>
<td>Wild Wood</td>
<td>POMS and DRS</td>
</tr>
<tr>
<td>Time 3</td>
<td>Questions:</td>
</tr>
<tr>
<td>Beauty, Naturalness and Interest</td>
<td></td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
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<tr>
<td>Open ended/free text</td>
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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
POMS

- Significant differences between groups after environmental exposure, T3.

**Depression**

<table>
<thead>
<tr>
<th>Environment</th>
<th>T3</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Scene</td>
<td>a</td>
<td>1.2</td>
</tr>
<tr>
<td>Tree'd Parkland</td>
<td>b</td>
<td>1.4</td>
</tr>
<tr>
<td>Manicured Woodland</td>
<td>ab</td>
<td>1.5</td>
</tr>
<tr>
<td>Wild Wood</td>
<td>ab</td>
<td>1.6</td>
</tr>
</tbody>
</table>

**Vigour**

<table>
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<tr>
<th>Environment</th>
<th>T3</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Scene</td>
<td>a</td>
<td>2.0</td>
</tr>
<tr>
<td>Tree'd Parkland</td>
<td>b</td>
<td>2.2</td>
</tr>
<tr>
<td>Manicured Woodland</td>
<td>ab</td>
<td>2.4</td>
</tr>
<tr>
<td>Wild Wood</td>
<td>ab</td>
<td>2.5</td>
</tr>
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Graphs show means (±SE). Means with same letters are not sig. Diff. at p <0.05.

Significant DRS Dimensions, T2-T3

**“I feel connected to the natural world”**

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

**“I can take time out from a busy life”**

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

Keyword analysis

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Street Scene</th>
<th>Tree'd Parkland</th>
<th>Manicured Woodland</th>
<th>Wild Wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>(4)</td>
<td>(3)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td>(3)</td>
<td>(4)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>Relaxing</td>
<td></td>
<td>(10)</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td>Peaceful</td>
<td></td>
<td>(7)</td>
<td>(8)</td>
<td></td>
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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
**Erythema migrans (EM) – the target rash**

- 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.

**Epidemiology of Lyme disease in the UK 1999-2011**

- Approximately 10,000 confirmed cases in past 10 years.
- Confirmed reports thought to significantly underestimate true incidence (3:17).
- Up to 20% of cases in any year are thought to be acquired abroad.
Accessible public health information is key

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

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
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

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: J R Wilson 2011
Lower risk habitat with paths carefully prepared and vegetation cut back

Photo: E.R. Wilson 2012

Center Parc Forest Village, Whinfell Forest

What research is required
(Townsend and Weerasuriya 2010)

A = Anecdotal  T = Theoretical  E = Empirical

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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

“Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and give strength to body and soul.”

John Muir

“When one tugs at a single thing in nature, one finds it attached to the rest of the world.”

John Muir