URBAN FORESTS AS A NATURE-BASED SOLUTION FOR IMPROVED HUMAN HEALTH

Matilda van den Bosch, MD, PhD

DEPARTMENT OF FOREST AND CONSERVATION SCIENCES
SCHOOL OF POPULATION AND PUBLIC HEALTH
THE UNIVERSITY OF BRITISH COLUMBIA, VANCOUVER, CANADA
URBAN FORESTS AND HEALTH ARE INTEGRATED IN THE SDGss
## THE GLOBAL DISEASE SCENARIO

### Ten leading causes of burden of disease, world, 2004 and 2030

<table>
<thead>
<tr>
<th>Disease or injury</th>
<th>As % of total DALYs</th>
<th>Rank</th>
<th>As % of total DALYs</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower respiratory infections</td>
<td>6.2</td>
<td>1</td>
<td>1</td>
<td>Unipolar depressive disorders</td>
</tr>
<tr>
<td>Diarrhoeal diseases</td>
<td>4.8</td>
<td>2</td>
<td>2</td>
<td>Ischaemic heart disease</td>
</tr>
<tr>
<td>Unipolar depressive disorders</td>
<td>4.3</td>
<td>3</td>
<td>3</td>
<td>Road traffic accidents</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>4.1</td>
<td>4</td>
<td>4</td>
<td>Cerebrovascular disease</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>3.8</td>
<td>5</td>
<td>5</td>
<td>COPD</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>3.1</td>
<td>6</td>
<td>6</td>
<td>Lower respiratory infections</td>
</tr>
<tr>
<td>Prematurity and low birth weight</td>
<td>2.9</td>
<td>7</td>
<td>7</td>
<td>Hearing loss, adult onset</td>
</tr>
<tr>
<td>Birth asphyxia and birth trauma</td>
<td>2.7</td>
<td>8</td>
<td>8</td>
<td>Refractive errors</td>
</tr>
<tr>
<td>Road traffic accidents</td>
<td>2.7</td>
<td>9</td>
<td>9</td>
<td>HIV/AIDS</td>
</tr>
<tr>
<td>Neonatal infections and other&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.7</td>
<td>10</td>
<td>10</td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td>COPD</td>
<td>2.0</td>
<td>13</td>
<td>11</td>
<td>Neonatal infections and other&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Refractive errors</td>
<td>1.8</td>
<td>14</td>
<td>12</td>
<td>Prematurity and low birth weight</td>
</tr>
<tr>
<td>Hearing loss, adult onset</td>
<td>1.8</td>
<td>15</td>
<td>15</td>
<td>Birth asphyxia and birth trauma</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>1.3</td>
<td>19</td>
<td>18</td>
<td>Diarrhoeal diseases</td>
</tr>
</tbody>
</table>
NON-COMMUNICABLE DISEASES (NCDs) ARE A CHALLENGE FOR THE SDGs

Sustainable Development Goal (SDG) 3 includes target 3.4 to reduce premature NCD mortality by a third by 2030.
CLIMATE CHANGE AND IMPACT ON HUMAN HEALTH:
“THE MAJOR THREAT OF THE 21ST CENTURY”

The Lancet Countdown on health and climate change: from 25 years of inaction to a global transformation for public health

Nick Watts, MBBS  •  Markus Amann, PhD  •  Sonja Ayeb-Karlsson, MA  •  Kristine Belesova, MA  •  Timothy Bouley, MD  •  Maxwell Boykoff, PhD  •  et al.  •  Show all authors  •  Show footnotes

Published: October 30, 2017  •  DOI: https://doi.org/10.1016/S0140-6736(17)32464-9  •  Check for updates
AIR POLLUTION CAUSES 7 MILLION PREMATURE DEATHS ANNUALLY (COHEN ET AL. 2017)
URBAN HEAT ISLAND CAUSES MORE DEATHS THAN ALL OTHER WEATHER EVENTS COMBINED

(CDC, 2018)
“TACKLING CLIMATE CHANGE COULD BE THE GREATEST GLOBAL HEALTH OPPORTUNITY OF THE 21ST CENTURY.”
Urban forests and climate change related disorders can be mitigated by urban forestry.

**Accessibility, exposure**

**Physical activity**

**Social contacts**

**Stress reduction**

**Regulating Ecosystem Services**
- Cooling of cities
- Storm-water runoff
- Reduced air pollution
- Providing microbiota

**Health outcomes**
- Cardiovascular diseases
- Diabetes
- Mental health
- Pregnancy outcomes
- Mortality
- Asthma
- Heat related morbidity

**Effect modifiers 1. Examples:**
- Distance, weather, societal context

**Effect modifiers 2. Examples:**
- Gender, age, SES, context

Adapted from Hartig et al. 2014

Donovan et al. 2015
Astell-Burt et al. 2014
Annerstedt [van den Bosch] et al. 2012
Glazer et al. 2018
Crouse et al. 2017
Sbihi et al. 2016
Graham et al. 2016
Urban forests provide Ecosystem services
Investing $100 million annually in tree planting could provide 77 million people with cooler cities and 68 million people with cleaner air.
TREE PLANTING – SMALL BUT COST-EFFICIENT EFFECT ON AIR POLLUTION

Modest but significant reductions in mortality

URBAN TREE PLANTING IS AMONG THE MOST COST-EFFICIENT WAYS OF REDUCING THE URBAN HEAT ISLAND EFFECT

“The maximum possible tree planting in cities would reduce heat related mortality by 2.4 percent to 5.6 percent”

URBAN TREES ARE PART OF THE SOLUTION

• Targeted actions – specific places where people can benefit the most

• Cost-efficient – investments vs trade-offs

• Co-benefits

AMPLE EVIDENCE THAT EXPOSURE TO GREEN SPACES PREVENTS DISEASE AND PROMOTES HEALTH

Reduces

- **mortality**
  (Crouse et al. 2017)
- **asthma** prevalence
  (Sbihi et al. 2016)
- **cardiovascular** disease
  (Donovan et al. 2015)
- **heat** related morbidity
  (Graham et al. 2016)
- **diabetes** prevalence
  (Astell-Burt et al. 2014)

Improves

- **pregnancy** outcomes
  (Glazer et al. 2018)
- **mental** health
  (Annerstedt [van den Bosch] et al. 2012)
- **cognitive** function
  (Dadvand et al. 2015. PNAS)
The Parma Commitments (WHO, 2010)

“We aim to provide each child by 2020 with access to healthy and safe environments ..., and to green spaces in which to play and undertake physical activity.”

The Sustainable Development Goals, 2015 (11:7)
“...provide universal access to ... **green and public spaces**, in particular for women and children, older persons and persons with disabilities.”
THANK YOU FOR LISTENING

Contact: Matilda.vandenbosch@ubc.ca
THE COOLING EFFECTS DIMINISHES WITH DISTANCE FROM THE TREES