



# INTERNATIONAL LIVING LANDSCAPES FACT BOOK

## PURPOSEFUL BACKYARDING FOR HEALTH & HAPPINESS

*Spending time outdoors in the family yard and community green space is good for physical and mental health, year-round.*

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**TurfMutt.com**

# Backyarding Supports Health & Happiness

Backyarding is the trend to move activities that typically happen inside, outside (think working, exercising, entertaining, vacationing and more). The movement started during the pandemic, and it's here to stay because people have discovered it's often a better way to live. As this scientific research compiled by the [TurfMutt Foundation](#) illustrates, spending time outdoors in your own backyard and community green space year-round is good for your health, happiness and the environment.



## Right Plant, Right: The Key to Successful Backyarding

Creating a yard that supports every aspect of your family's outdoor lifestyle means identifying your backyard personality type and then taking stock of what you might need to create and care for your outdoor space. To set the stage for backyarding, you must add trees, bushes, grass and flowering plants to your living landscape. When selecting plants for your family yard be purposeful by putting the right plant in the right place. Location, maintenance, sunlight and watering requirements must all be considered, in addition to your climate zone and lifestyle needs. (To learn more refer to the [USDA's Plant Hardiness Zone Map](#).)

## Green Space: Good for You & the Environment

Our yards, parks, and other public green spaces are environmental superheroes. They capture and filter rainwater, produce oxygen, and absorb carbon. Your yard is also an important part of the connected ecosystem that provides food and shelter for pollinators, such as birds, bees, butterflies, bats, and other creatures.

**For more information visit [TurfMutt.com](#)**

# CONTACTS

## THE TURFMUTT FOUNDATION

1605 King Street  
Alexandria, VA 22314  
(703) 549-7600

## MEDIA CONTACTS

Ami Neiberger-Miller  
Four Leaf Public Relations, LLC  
(703) 887-4877  
[ami@fourleafpr.com](mailto:ami@fourleafpr.com)

Debbi Mayster  
Four Leaf Public Relations, LLC  
(240) 988-6243  
[debbi@fourleafpr.com](mailto:debbi@fourleafpr.com)



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*Note: “\*” below indicates new information that has been added since the last update to this document.*



## Invest in Your Yard for Health & Happiness

Having the right plants, shrubs, trees, and grass in your yard offers numerous benefits.

- **Remember, nature starts at your backdoor.** The majority of Americans have a yard comprised of grass (86%), trees/bushes/shrubs (80%), pavers, cement, bricks, patio (51%), and landscaping rocks/gravel (47%).<sup>1</sup> Your yard, our parks, schoolyards and other community green space is a safe place to de-stress and is also vital to the world's ecosystem.
- **Choose the appropriate living landscapes.** Nine in 10 Americans say it's important to have a landscape at their home, and women are slightly more likely than men to value having a landscape (90% vs. 85%).<sup>2</sup> Use the [USDA Plant Hardiness Zone Map](#) to determine the best types of turf, trees, shrubs, and plants for your location.
- **Select the right grass.** Nearly all Americans have a yard, and 89% of those who do correctly believe having grass in their yard is good for the environment.<sup>3</sup> But selecting the right grass is important. There are hundreds of varieties of turfgrass, and some of them – like Buffalo and Bermuda – even do well in drought-prone areas and also will survive foot traffic, children's play, and pets.
- **Mix native plants with adaptive plants and grasses.** In man-made cities and suburbs, we must incorporate plants in areas with a lot of concrete, asphalt, people, and traffic. You need both native plants and drought-resistant adaptive species that can thrive in these conditions.
- **Incorporate pollinator plants.** Remember to keep bees, butterflies, bats, and birds in mind when planting. Your yard and our community green spaces are part of the connected ecosystem that they rely on for food and shelter.
- **Plant to slow and capture water.** Water sheets off hard surfaces, asphalt, and other hardscapes in cities and suburbs. Grass and plants slow down and capture this water, recharging underground aquifers.
- **Water wisely.** Only water your yard when it is necessary. Install watering solutions – like smart controllers on irrigation systems – to help you use less water while maintaining a living landscape.
- **Don't forget, too much water is bad for grass.** Over-watered grass gets lazy, growing roots in a horizontal pattern. With less water, grass sends its roots deeper – vertically – seeking water. By working harder, grass does a better job of sequestering carbon and releasing oxygen.



## THE FAMILY YARD & PHYSICAL HEALTH

**Living landscapes are a key part of the outdoor lifestyle.**

- When you go outside, bacteria from soil, plants, and the air transfer to your body, which has the potential to benefit overall health.<sup>4</sup>
- An investigation into the spread of COVID in the U.S. indicates that population density was the most likely factor directly impacting the transmission of the disease and that urban vegetation weakened the association.<sup>5</sup>
- Adults in the U.S. with higher “nature connectedness” responded to the pandemic differently than adults without high nature connectedness, including greater compliance with pandemic precautions and an appreciation of how movement restrictions benefited the environment.<sup>6</sup>
- With indoor closures and restrictions due to the pandemic, green spaces have become one of the only sources of resilience. Park visitation has increased worldwide during the pandemic, highlighting the important role and benefits provided by parks, especially urban and community parks.<sup>7</sup>
- Research focusing on two Eastern-European cities indicates that removing restrictions to accessing informal greenspace could help reduce inequity in access to nature.<sup>8</sup>
- Exposure to nature and outdoor exercise during childhood is a strong predictor of nature exposure and connectedness later in life.<sup>9</sup>
- Spending at least 120 minutes a week in nature is associated with good health and well-being according to UK researchers.<sup>10</sup>
- Living near green space makes it easier for people to quit smoking, according to researchers.<sup>11</sup>
- Using data from more than 24,000 English adults, researchers found that exposure to nature, even strolling through a city park, makes people engage in more eco-friendly behaviors like recycling, buying local and seasonal produce, and engaging in environmental volunteering.<sup>12</sup>
- The first single study to investigate the contribution of both nature contact and connection to human health, well-being, and pro-environmental behaviors found that physically and psychologically reconnecting with nature can be beneficial for human health and well-being, while at the same time encouraging individuals to act in ways that protect the health of the planet.<sup>13</sup>
- In Philadelphia, scientists estimate that 403 premature deaths could be prevented annually if the city meets its goal of increasing tree canopy cover to 30%.<sup>14</sup>
- A review of research published between 1976 and 2017 found consistent associations between greater urban green space exposure and decreased mortality, heart rate, and violence, as well as between greater urban green space exposure and increased attention, mood, and physical activity.<sup>15</sup>
- More trees reduce premature deaths in cities, according to research that pulled data from nine studies involving more than 8 million people in seven countries.<sup>16</sup> Specifically, for every 10% increase in vegetation that’s within 1,600 feet of your home, your probability of death drops by 4%.
- Medicare costs tend to be lower in counties with more trees and shrubs, a recent study finds.<sup>17</sup>

- U.K. researchers are encouraging policymakers to make more funds available to improve and maintain green spaces so residents can reap the health and well-being rewards they provide.<sup>18</sup>
- People who have access to green spaces live longer, according to Harvard University researchers.<sup>19</sup>
- Natural vegetation (“greenness”) may benefit maternal health and fetal growth by providing opportunities for physical activity and psychological restoration.<sup>20</sup>
- Short-term memory is improved 20% by walking in nature or just looking at a natural scene.<sup>21</sup>
- Physicians are now prescribing time outdoors for some patients, according to recent reports.<sup>22</sup> Park Rx America is a non-profit with a mission to encourage physicians to prescribe doses of nature.<sup>23</sup>
- According to Canadian researchers, living in a greener neighborhood could lower the risk of early death.<sup>24</sup>
- People who live within a half mile of green space were found to have a lower incidence of 15 diseases by Dutch researchers — including heart disease, diabetes, asthma, migraines, depression and anxiety.
- A 2015 study found that people living on streets with more trees had better heart and metabolic health.<sup>25</sup>
- Australian men and women in their 60s who gardened regularly had a 36% lower risk of dementia than those who didn’t garden.<sup>26</sup>
- People who gardened for at least 30 minutes a week had lower body mass indexes (BMIs) – a measure of body fat – as well as higher levels of self-esteem and better moods overall. They also reported lower levels of tension and stress.<sup>27</sup>
- Studies show that tasks conducted under the calming influence of nature are performed better and with greater accuracy, yielding a higher quality result. Spending time in gardens, for instance, can improve memory performance and attention span by 20%.<sup>28</sup>



## LIVING LANDSCAPES & MENTAL WELL-BEING

**Spending time in green space makes us happier, healthier people.**

- \*Green space and park use was associated with less emotional distress among U.S. college students during the pandemic.<sup>29</sup>
- Responses from nearly 800 adults from 42 different countries showed that frequency of contact with nature in childhood predicts certain aspects of adult personality, including higher levels of creative imagination and intellectual curiosity and lower levels of anxiety and depression.<sup>30</sup>
- An international study found greater odds of depression and anxiety among adults who faced more severe COVID lockdowns but concluded that contact with nature reduced the negative effects.<sup>31</sup>
- Bulgarian university students who spent an average of 20 hours per day at home during COVID reported better mental health if they had access to a garden, a few of greenery from their window, or houseplants.<sup>32</sup>



- Scientists evaluating the mental health of a cross-section of the U.S. found that increased time outdoors was significantly associated with decreased odds of meeting criteria for depression.<sup>33</sup>
- A recent poll conducted for the Nature Conservancy of Canada indicates that 94% of people credit time spent in nature with helping them cope with stress and anxiety caused by the pandemic's second wave.<sup>34</sup>
- Canadians who reported better mental health during the pandemic were more likely to report having exercised outdoors.<sup>35</sup>
- Childhood exposure to green space is associated with lower risk for schizophrenia in adulthood, according to Danish researchers.<sup>36</sup>
- A UK study found that young city residents gain mental health benefits – including a stronger sense of self and feelings of escape, connection, and care – through every day experiences with urban nature.<sup>37</sup>
- College-age people experience mental health benefits after spending as little as 10-20 minutes in nature.<sup>38</sup>
- Meta-analysis of 143 studies showed that greenspace exposure reduces the risk of a number of health-related concerns and that the health benefits of greenspace exposure may be greater for people living in deprived communities.<sup>39</sup>
- People living in neighborhoods with more birds, shrubs, and trees are less likely to suffer from depression, anxiety, and stress.<sup>40</sup>
- Family leisure time in a community park provides space and time for strengthening family bonds and for enhancing self-satisfaction and happiness.<sup>41</sup>
- Wooded areas expose people to phytoncides, or essential oils, that trees emit to protect themselves from germs and insects. Research finds inhaling phytoncides improves immune system function.<sup>42</sup>
- A systematic research review concluded that “the balance of evidence indicates conclusively that knowing and experiencing nature makes us generally happier, healthier people.”<sup>43</sup>
- People who had close contact with the environment during childhood have better mental health and vitality as adults.<sup>44</sup>
- An increase in the “greenness” of an environment corresponds to lower levels of psychological distress in teenagers, according to UCLA researchers.<sup>45</sup>
- Urban nature experiences – like spending just 20 minutes in a park – has been shown to reduce stress.<sup>46</sup>
- Spending just five minutes in a natural setting can help improve your mood.<sup>47</sup>
- Homes in the U.S. are getting bigger, while yards are getting smaller, a detriment to our overall mental health.<sup>48</sup>
- Greening of vacant urban areas in Philadelphia reduced feelings of depression by 41.5% and reduced poor mental health by 62.8% for those living near the vacant lots.<sup>49</sup>
- Walking in nature is beneficial for people with major depressive disorder.<sup>50</sup>
- German scientists found urban dwellers living near the forest may be better able to cope with stress.<sup>51</sup>
- Researchers in England found that people moving to greener areas experienced an immediate improvement in mental health that was sustained for at least three years after they moved. The study also showed that people relocating to a more built-up area suffered a drop in mental health.<sup>52</sup>
- *Mycobacterium vaccae* in soil mirrors the effect on neurons that drugs like Prozac provide. The bacterium stimulates serotonin production, which makes you relaxed and happier.<sup>53</sup>
- Walking or running in green spaces, rather than synthetic environments, led to decreased anger, fatigue and feelings of depression, while increasing attention levels.<sup>54</sup>





## GREEN SPACE & LEARNING

**Research shows exposure to nature can improve children's ability to learn.**

- \*A review of research paints a convincing picture of a cause-and-effect relationship between nature and children's learning and development, including children with ADHD.<sup>55</sup>
- Children in green urban spaces are likely to perform better academically.<sup>56</sup>
- A recent review of the literature examined the impact of schoolyard greening on children's physical activity and socioemotional health. With few exceptions, most studies demonstrated beneficial changes on both outcomes due to greening.<sup>57</sup>
- Trees on or near school grounds are positively linked to academic achievement in sixth-grade students.<sup>58</sup>
- Learning outside can help children develop important skills for future success in the workplace, including social and problem-solving skills.<sup>59</sup>
- Children who participated in an urban farming youth internship program experienced a number of long-term benefits, including higher college enrollment, connectedness to the environment and the community, healthy eating habits, and higher levels of self-confidence.<sup>60</sup>
- Horticulture-related activities have been shown to reduce stress levels of elementary school children with emotional and behavioral concerns, according to researchers in Korea.<sup>61</sup>
- Children in Bangladesh earned significantly higher science scores after being taught outdoors versus their indoor classrooms.<sup>62</sup>
- Children in China who attended schools with greater greenness levels were significantly less likely to have ADHD symptoms than children with less greenness.<sup>63</sup>
- A review of research published between 1990 and 2010 indicates garden-based learning positively academic outcomes, including improvements in science, math and language arts.<sup>64</sup>
- Children who attend schools in greener areas are at lower risk of having attention-deficit/hyperactivity disorder symptoms.<sup>65</sup>
- "Greening" under-privileged urban neighborhoods in Chicago with tree canopy and grass/shrub cover has the potential to mitigate academic underachievement.<sup>66</sup> Chicago girls living in public housing performed better on tests measuring self-discipline if they had greener views from their apartments.<sup>67</sup>
- The National Institutes of Health is tracking the changes in children's brains due to screen time. Early results show kids who have more than seven hours of screen time per day score lower on language and cognitive tests.<sup>68</sup>
- Excessive screen time has been linked to learning delays in Canadian preschoolers.<sup>69</sup>

- Primary schoolchildren who have been raised in homes surrounded by more green space tend to have larger volumes of white and grey matter in areas of the brain associated with improved cognitive function.<sup>70</sup>
- Teaching outside can help students be more attentive to learning.<sup>71</sup>
- Children gain attention and working memory benefits when they are exposed to greenery.<sup>72</sup>
- Researchers found that Barcelona school children who had more exposure to the outdoors performed better on cognitive testing.<sup>73</sup>
- A systematic review of research found that both active nature engagement initiatives (e.g., horticultural and wilderness therapy) and passive nature exposure (e.g., greenness around schools and in urban parks) may offer emotional, behavioral, and cognitive benefits for children.<sup>74</sup>



## GREEN SPACE & CHILDREN'S HEALTH

**Children benefit from exposure to living landscapes in several ways.**

- \*Community tree canopy coverage significantly decreased the odds of conduct problems in children with autism.<sup>75</sup>
- \*Children feel better physically and mentally after spending some time outside in nature.<sup>76</sup>
- \*Green space exposure helps children hit developmental milestones, according to Canadian researchers.<sup>77</sup>
- A systematic review and meta-analysis of studies from nine countries found that greater access to green space predicted higher levels of physical activity, healthier weight, and lower levels of screen time in children and youth.<sup>78</sup>
- A review of research discovered that children who have indirect or direct access to nature while visiting pediatric healthcare centers experience reduced pain and stress, enhanced social functioning, and an increased sense of control.<sup>79</sup>
- Finnish children attending a childcare center with natural forest floor in their play yard had more diverse skin and gut bacteria and signs of better immune system functioning than those in centers without the biodiverse elements.<sup>80</sup>
- A literature review indicates greater access to green space predicts activity level and weight-related health outcomes, providing some support for a positive association between greenness and higher levels of physical activity, healthier weight, and less screen time for children and youth.<sup>81</sup>
- A literature review on the potential impact of childhood exposure to green space identified four areas of positive impact: perinatal health, physical exercise, respiratory health, and neurodevelopmental health.<sup>82</sup>

- More greenness at school is associated with healthier weight in children and adolescents, according to Chinese researchers.<sup>83</sup>
- Iranian children hospitalized in rooms with a dish garden showed significantly greater gains in physical and neuropsychological health than children without the gardens in their rooms.<sup>84</sup>
- Street greenery around schools in China was significantly associated with children's active transport to school and healthier body weight for the children.<sup>85</sup>
- A review of research on pediatric healthcare building design found that healing gardens and other nature-related elements like natural lighting are associated with reduced stress and pain and an overall improved sense of well-being in children.<sup>86</sup>
- Nearby urban green space is positively linked to the development of pro-social behaviors in children and adolescents, according to a systematic search of 15 studies.<sup>87</sup>
- Due to the coronavirus pandemic, kids spent more time playing outside and breathing in clean air, and a UK research study indicates children will miss the outdoors when things return to normal.<sup>88</sup>
- Children eat more fruits and vegetables if they are homegrown, according to new Saint Louis University research.<sup>89</sup>
- A review of literature concluded that greenness may help protect children from asthma by moderating factors that contribute to the respiratory disease.<sup>90</sup>
- In China, greater greenness near schools had a beneficial effect on blood pressure, especially in overweight or obese children.<sup>91</sup>
- EEG readings showed that viewing living plants prompted improvements in attention, concentration, and feelings of comfort in children.<sup>92</sup>
- Access to neighborhood parks and green space is linked to higher activity levels in children in Norway.<sup>93</sup>
- Children living in the countryside spend more time outside and have better motor skills than children living in metropolitan areas.<sup>94</sup>
- Children with greater exposure to nature demonstrate higher levels of self-regulation.<sup>95</sup>
- Scientists have discovered a link between teen's frequent use of digital media and symptoms of ADHD.<sup>96</sup> Time in nature is one effective antidote.
- Natural environments have been shown to improve parent-child communication, resulting in more responsive and connected communication compared to an indoor setting.<sup>97</sup>
- Children who are raised on farms in a "dirtier" environment than an urban setting not only have a stronger immune system but are also better able to manage social stress.<sup>98</sup>
- Exposure to natural settings may be widely effective in reducing ADHD symptoms.<sup>99</sup>
- A study of over 1,000 mother-child pairs indicates that residential exposure to green space is positively associated with the neurodevelopment of young children.<sup>100</sup>



## CHILDREN'S HAPPINESS & GREEN SPACE

**Being outside sparks joy in kids and improves their mental health.**

- \*Window views to green landscapes help high schoolers recover from attention fatigue and stress.<sup>101</sup>
- Children's stress levels fall within minutes of seeing green spaces.<sup>102</sup>
- The first study to link connectedness to nature to happiness and pro-ecological behaviors found that children who grow up feeling connected to nature are happier and more likely to become eco-friendly compared to those who suffer from a nature deficit disorder.<sup>103</sup>
- Empirical research over the last 40 years identifies positive associations between nature activities and well-being in children and youth, including self-esteem, confidence, positive and negative affect, stress reduction and resilience.<sup>104</sup>
- A systematic, scoping review of research indicates that high levels of screen time in children are associated with depression, anxiety and stress while green time tends to be associated with positive mental health, better cognitive functioning, and improved academic achievement.<sup>105</sup>
- Primary students in Germany with more natural window views in their classrooms reported less perceived stress and more attention in class than students with fewer natural window views.<sup>106</sup>
- A school-based nature education program had a significant and positive effect on the health-related quality of life markers of low-income youth.<sup>107</sup>
- Children experience psychological, social, and pro-environmental benefits from spending time in nature as opposed to those who spent time in a museum.<sup>108</sup>
- Increased exposure to nature reduces elementary students' anxiety.<sup>109</sup>
- An Australian study revealed that students spent more time on-task in outdoor classrooms versus indoor ones.<sup>110</sup>
- COVID-related restrictions have negatively impacted the mental health of children and youth, but according to scientists, being outdoors can help mitigate these adverse impacts.<sup>111</sup>
- A study from North Carolina State University found outdoor play and nature-based activities helped buffer some of the negative mental health impacts of the COVID-19 pandemic for adolescents.<sup>112</sup>
- Scientists in Mexico discovered children's connectedness to nature resulted in feeling emotionally connected with all elements of a natural environment and feeling happier as a result.<sup>113</sup>
- Urban minority youth who participated in an environmental education and nature contact program reported an overall improvement in health-related quality of life.<sup>114</sup>
- Urban park soundscapes can help children recover from stress, according to Chinese researchers.<sup>115</sup>

- Spending time in public open spaces increases children’s chances of experiencing “happy moments” compared to spending time in commercial areas like shopping malls, according to a study of over 10,000 children.<sup>116</sup>
- Children with more access to natural areas as well as more perceived nature in the home and school environment had lower stress levels, suggesting that nearby nature bolsters children’s resilience in dealing with stress.<sup>117</sup>
- A longitudinal study of a park prescription program for low-income families found that increased visits to neighborhood parks significantly increased children’s resilience while decreasing their stress levels.<sup>118</sup>
- Results of a study of rural children in grades 3-5 showed the impact of life stress was lower among children with high levels of nearby nature than among those with little nearby nature.<sup>119</sup>
- A systematic review of current literature concluded that benefits associated with children’s access to green environments include improved confidence, social interactions, cognitive development, academic achievement, and emotional well-being.<sup>120</sup>
- Children in the UK who spent just one hour per week learning outdoors showed significant, immediate improvements in mood and longer-term improvements in well-being.<sup>121</sup>
- Any activity that gets children thinking and acting spontaneously outdoors without needing adult control can help them develop complex thinking abilities, social skills, and creativity.<sup>122</sup>
- Improving the quantity and quality of public open space in disadvantaged neighborhoods may help reduce mental health inequities, according to a systematic review of literature.<sup>123</sup>
- The “greenness” of residential neighborhoods in South Korea is associated with children demonstrating lower levels of aggressive behaviors and fewer attention problems.<sup>124</sup>



## THE OUTDOOR LIVING ROOM & PLAY SPACE

**Green space is a safe place for children and pets to play and learn.**

- Outdoor play in shorter, more frequent increments can boost physical activity in early learning settings, according to Canadian researchers.<sup>125</sup>
- A review of 16 studies suggests that “nature play” with plants, sand, rocks, etc., may positively impact children’s physical health and cognitive development.<sup>126</sup>
- A Canadian research study discovered that exposures to electronic screen technology may be related to declines in the importance of nature in the lives of young people.<sup>127</sup>
- A study involving 80 children from eight different early childhood centers found a significant positive correlation between children’s play, well-being and involvement. Scientists discovered that

children engaged in more functional play outdoors, and more symbolic play indoors, while non-play activities were slightly higher in the outdoor environment.<sup>128</sup>

- Kindergarteners – especially girls – who spent more time in green schoolyards and in the outdoors in general showed higher gains in self-regulation than those who didn't have as much exposure.<sup>129</sup>
- Greening of daycare outdoor spaces by adding sod, peat blocks, and planters for vegetables and flowers, provide rich opportunities for creative play and learning, according to new research.<sup>130</sup>
- An analysis of 16 quantitative studies focusing on play in natural environments found that unstructured nature play fostered increased physical activity and was consistently linked to positive impacts in imagination, creativity and dramatic play.<sup>131</sup>
- Canadian researchers discovered that adolescents consider being outdoors less important than access to nature, indicating that screen time is a barrier to connecting to nature.<sup>132</sup>
- Urban youth in San Francisco revealed three themes relating to what they want in outdoor recreation: connecting with family and friends, escape and unplug, and discover the adventure.<sup>133</sup>
- Trees, lawns, and exercise trails in urban green space can promote adolescents' physical activity and health by increasing frequency and duration of exercising outdoors.<sup>134</sup>
- Children prefer school grounds with biodiverse vegetation over paved ones.<sup>135</sup>
- A comprehensive assessment in Canada indicates that physical activity can improve kids' brain health by boosting both cognitive ability and mental wellness.<sup>136</sup> Time in nature – even your own backyard – can be a gateway to this much-needed physical activity.
- Scientists have concluded that the majority of U.S. kids are not getting the recommended amount of physical activity they need and that only 5% are meeting the 60-minutes-per-day goal.<sup>137</sup>
- Scientists have concluded that children may reduce the risk of short-sightedness by spending more time playing outdoors.<sup>138</sup>
- Outdoor play increases fitness levels and builds active, healthy bodies, an important strategy in helping the 1 in 3 American kids who are obese get fit.<sup>139</sup>
- Research shows children reap numerous health, social and personal benefits from spending time outside playing.<sup>140</sup>
- Combined, trees and grass foster activities such as recreation, which is important for child development.<sup>141</sup>
- Nine out of 10 Americans have a yard, and 78% of Americans have grass in their outdoor family room.<sup>142</sup>





## DOGS & BETTER HEALTH

**No one knows & loves your backyard like the family dog.  
Science proves having a dog is good for your health.**

- A review of studies by the American Heart Association found that dog ownership was associated with a 24% risk reduction for all-cause mortality as compared to non-ownership.<sup>143</sup>
- Having a canine companion in the home can be beneficial for children with autism spectrum disorder and their families, according to recent research.<sup>144</sup>
- According to a recent study, toddlers from dog-owning families were 30% less likely to have conduct and peer problems compared to young children from families without a dog.<sup>145</sup>
- During the coronavirus pandemic especially, pets provide companionship, consistency, and joy.<sup>146</sup>
- Exposure to household dogs and cats in childhood has been linked to a reduced risk of being diagnosed with schizophrenia or bipolar disorder.<sup>147</sup>
- Dog owners are more likely to engage in moderate physical activity than non-dog owners. In fact, dog owners walk an average of 300 minutes per week, while those without a dog walk 168 minutes per week on average.<sup>148</sup>
- Playing with or even just petting a dog lowers blood pressure, slows heart rate, regulates breathing and relaxes muscle tension.<sup>149</sup>
- When dogs and humans interact with one another they get a dose of oxytocin, a.k.a. the "cuddle hormone."<sup>150</sup>
- Dog ownership is linked to a 21% reduction in the risk of death from cardiovascular disease.<sup>151</sup>
- Having a strong attachment to a pet makes people feel more connected to their communities and to their human relationships.<sup>152</sup>





## FINANCIAL BENEFITS OF GREEN SPACE

### Living landscapes are good for property values.

- \*Over 90% of respondents in a recent U.S. survey said landscaping has an impact on their decision to buy or rent a home. In the same survey, three in four millennials said they will still consider buying an outdated or rundown home if the yard is already landscaped.<sup>153</sup>
- According to a comprehensive study from U.S. Forest Service's Northern Research Station, the nation's urban canopies, which are home to an estimated 5.5 billion trees, provide roughly \$18 billion in annual benefits through the removal of pollution from the air (\$5.4 billion), carbon sequestration (\$4.8 billion), reduced emissions (\$2.7 billion), and improved energy efficiency in buildings (\$5.4 billion).<sup>154</sup>
- A beautiful landscape improves curb appeal and can increase home values by as much as 17%.<sup>155</sup>
- Landscaping in vacant lots has been shown to reduce overall crime by more than 13%, reduce burglary by 22%, and decrease nuisance reports by 30%.<sup>156</sup>
- Among Realtors®, 94% have suggested sellers improve curb appeal before listing a home for sale. 99% of Realtors® believe curb appeal is important to a potential buyer.<sup>157</sup>
- Each front yard tree adds 1% to a homeowner's sale price, while large specimen trees can add 10% to property values.<sup>158</sup>
- Planting a tree on the west side of your house has been shown to reduce energy bills by 3% in 5 years and 12% in 15 years.<sup>159</sup>
- According to the Urban Forest Coalition, 100 million mature trees around U.S. residences save approximately \$2 billion annually in reduced energy costs.<sup>160</sup>
- Strategically placed trees save up to 56% on annual air conditioning costs. In the wintertime, evergreens that block winter winds can save 3% on heating.<sup>161</sup>
- In tree-lined commercial districts, people shop more frequently, take longer shopping trips, and are willing to spend 12% more for goods.<sup>162</sup>
- According to a British study of people who exercise in nature, outdoor exercise delivers an estimated £2.2bn of health benefits to adults in England each year.<sup>163</sup>
- Consumers can use the National Tree Benefit Calculator ([TreeBenefits.com/calculator/](https://www.treebenefits.com/calculator/)) to estimate the economic and environmental value trees provide on an annual basis.
- Cost/benefit analyses show that landscaped plants are worth the investment in resources, especially water. Selecting drought resistant plants, coupled with proper management and irrigation, allows lawns and landscapes to flourish while still saving water.<sup>164</sup>



## BIODIVERSITY & WILDLIFE

### Living landscapes support biodiversity and wildlife.

- Increasing the biodiversity of urban green spaces can help people and the planet adapt to the urban environment in the face of climate change.<sup>165</sup>
- Having more bird species in their vicinity increases life satisfaction for Europeans as much as a higher income does, according to recent research.<sup>166</sup>
- The 2020 National Gardening Survey from the National Wildlife Federation shows more Americans are purposefully planting for wildlife and pollinators than ever before.<sup>167</sup>
- A study published in the journal Science found that nearly 3 billion birds have disappeared in North America since 1970. Adding native trees, bushes and other plants to our backyards and community green spaces offers food and protection.<sup>168</sup>
- Your yard and our parks, schoolyards and other community green spaces are vital to the world's ecosystem. Nature starts in your own backyard.
- Tiny forests, small city forests as big as a tennis court in the Netherlands (600 trees of 40 species), have been shown to increase biodiversity.<sup>169</sup>
- Urban environments are largely responsible for the loss of biodiversity. Increasing natural habits for birds, insects and other animals with living landscapes can help combat this problem.<sup>170</sup>
- Xeriscaping or hardscaping forces birds, squirrels and other animals to forage for food elsewhere. If we eliminate living landscapes from urban and suburban life, birds and wildlife will lose their habitat.
- Drought is negatively impacting many species who rely on green space for food and shelter. Small mammals are more likely to be impacted than large mammals that can simply move elsewhere to find food, water and shelter.<sup>171</sup>
- Grass, trees and shrubs and other plant life provide food and habitat for birds and small mammals.<sup>172</sup> Insects, spiders and worms live among the grass blades and below the surface in the turf.



## HEAT ISLANDS

### Living landscapes combat the heat island effect in urban areas.

- A recent study indicates that school parks can serve as a tool for heat island adaptation and health promotion.<sup>173</sup>
- According to researchers in Australia, domestic yards account for more than 40% of tree cover and 30% of grass cover and that the density of greenery in household yards kept land surface temperatures up to 6° cooler than non-vegetated areas.<sup>174</sup>
- Called the “heat island effect,” air temperatures in cities, even after sunset, can be as much as 22°F warmer than air in neighboring regions.<sup>175</sup>
- On a hot, sunny summer day, roof and pavement surface temperatures can be 50–90°F hotter than the air.<sup>176</sup>
- Turfgrasses dissipate radiant heat through a process called evapotranspiration. Planting vegetation and grass, or installing green roofs, are among the strategies the EPA recommends to mitigate the heat island effect.<sup>177</sup>
- Lawns can be 31° cooler than asphalt and 20° cooler than bare soil.<sup>178</sup>
- Eight average-sized front lawns can provide the cooling equivalent to air-conditioning for 18 homes.<sup>179</sup>
- Urban forests help keep cities cool. In fact, large parks or tracts of urban trees can cool daytime summer temps by about 10°. Shaded ground can be up to 36° cooler than unshaded ground.<sup>180</sup>



## AIR QUALITY

**Green space improves air quality.**

- According to scientists in Brazil, urban forests can help mitigate air pollution, making cities better able to manage climate change and making them more livable.<sup>181</sup>
- More than 160,000 people could die over the next decade from strokes and heart attacks caused by air pollution, the British Heart Foundation (BHF) warns.<sup>182</sup>
- Short-term exposure to ambient air pollution has been associated with mental health issues in children, especially anxiety and risk of suicide.<sup>183</sup>
- Children who live in areas with bad air pollution are more likely to develop asthma, but improving air quality in smog-prone Southern California has resulted in a decrease in the number of kids with asthma.<sup>184</sup>
- In the U.S., more than 26 million people – including more than 6 million children – have asthma, according to the Centers for Disease Control,<sup>185</sup> a condition worsened by air pollution.
- In the U.K., four in 10 children are breathing “toxic air” at school that breaches World Health Organization guidelines.<sup>186</sup>
- Grass plays a vital role in capturing dust, smoke particles<sup>187</sup> and other pollutants that harm people.
- Without the oxygen-producing boost that plants such as grass, trees and shrubs offer, air quality levels will get even worse in drought-stressed areas that have programs promoting the removal of living landscapes.

## OXYGEN PRODUCTION

**Our living landscapes are incredible oxygen-making machines.**

- A 25-square foot area of turf supplies enough oxygen to support one person for a day.<sup>188</sup>
- A turf area 50' x 50' produces enough oxygen to meet the daily needs of a family of four.<sup>189</sup>
- Two mature trees provide enough oxygen for one person to breathe over the course of a year.<sup>190</sup>
- One tree produces nearly 260 pounds of oxygen each year.<sup>191</sup>
- In L.A. alone, trees remove nearly 2,000 tons of air pollution each year.<sup>192</sup>



## CARBON SEQUESTRATION

### **Turfgrass is a carbon sink.**

- Carbon sinks absorb the greenhouse gas carbon dioxide from the atmosphere. Plants absorb carbon dioxide from the atmosphere to use in photosynthesis. Some of this carbon is transferred to soil as plants die and decompose.<sup>193</sup>
- The dense canopy and fibrous root system in a lawn sequesters carbon so well that it outweighs the carbon used for maintaining the grass by as much as seven-fold.<sup>194</sup>
- Scientists have found that recycling grass clippings on lawns (called grasscycling) will sequester even more carbon.<sup>195</sup>
- An average-sized home lawn in the U.S. has the potential to sequester 20.3 to 163.4 kg C/lawn/year.<sup>196</sup>
- Strategies for reducing water use that alter urban land cover can result in significant atmospheric responses that must be considered to ensure efforts to mitigate climate warming are not reversed.<sup>197</sup>

## NOISE POLLUTION

### **Living plants help control noise pollution.**

- Data from sensors placed in urban European households with young children showed that homes with more surrounding greenness had less road noise and indoor particulate matter.<sup>198</sup>
- The World Health Organization has concluded that noise pollution is a threat to our well-being.<sup>199</sup>
- The average community noise level is four times higher than it was 20 years ago.
- Grassy areas absorb noise, which cut down on excessive sound, a growing problem in urban areas, where hardscape and pavement reverberates sound.
- Grassy slopes alongside lowered expressways reduce noise 8-10 decibels.<sup>200</sup>
- Scientists found that green roofs have the highest potential to enhance quietness in courtyards and may be able to reduce noise by up to 7.5 decibels.<sup>201</sup>





## RAINWATER HARVESTING & STORM WATER RUNOFF

**Living landscapes reduce runoff and capture and filter rainwater, recharging underground aquifers.**

- Rain water “sheets off” hard surfaces, like hardscapes, artificial turf, parking lots, driveways and roads. Instead of going into the ground, rain water becomes fast-moving storm water runoff, which pollutes water systems.
- Planting trees results in less runoff and erosion, allowing more recharging of the ground water supply and resulting in less sediment and chemicals in streams.<sup>202</sup>
- Grassy areas also mitigate storm water runoff. Acting like a sponge, grass slows down and absorbs runoff, cleanses water of impurities and dust, and recharges groundwater aquifers.
- The biology of turfgrass makes lawns a nearly ideal medium for the biodegradation of all sorts of environmental contamination.<sup>203</sup>
- The grass filtration system is so effective that rain water filtered through a healthy lawn is often as much as 10 times less acidic than water running off a hard surface.<sup>204</sup>
- Turfgrasses can remediate contaminated soil by cleaning it; grasses are more effective at cleansing contaminated soil than trees or shrubs.<sup>205</sup>
- Replacement of turf with other vegetation will not provide the cleansing capabilities grass offers.<sup>206</sup>



## SOIL EROSION

### Plants control soil erosion.

- Grass helps control erosion by slowing down water runoff. Water running off a sodded area will take 28-46 times longer than if the water was on five popular erosion-control materials. Grass slows down the water runoff; thus, less soil erodes.<sup>207</sup>
- Turfgrass controls erosion through its natural, dense and fibrous root system, which holds soil in place.<sup>208</sup>
- Tests show that a dense lawn is six times more effective than a wheat field and four times better than a hayfield at absorbing rainfall.<sup>209</sup>
- Sediment losses from sodded areas are eight to 15 times less than for tested man-made erosion control materials and 10 times less than for a straw covered area.

## FIRE BREAK

### Turfgrass is a natural and effective fire break.

- 1.8 million homes across 13 western states are at “extreme or high risk” of damage from wildfires, and the cost to repair them is estimated at \$500 billion. 27 million additional properties in those states face some risk of damage and would cost about \$6.7 trillion to repair<sup>210</sup>.
- Per the American Society of Landscape Architects, “green infrastructure” can help protect communities from natural disasters, including drought and fire.<sup>211</sup>
- Living grass is a natural fire break. Healthy turfgrass can be a significant deterrent to wildfires and can help protect property.<sup>212</sup>
- Green grass slows the spread of wildfires because of its low fuel value, and it provides a defensible space around structures where firefighters can work effectively.<sup>213</sup>





## PLASTIC GRASS, ARTIFICIAL OR SYNTHETIC TURF

**Plastic grass is an environmental villain and does not provide habitat or support biodiversity.**

- Used artificial turf is expected to produce 1-4 million tons of waste in the next 10 years, and it has nowhere to go.<sup>214</sup>
- Plastic grass – a petroleum product – is *not* more environmentally friendly than real grass.
- Putting plastic propylene sheets in place of a living lawn destroys urban habitat for birds, insects and animals.
- Younger Americans (ages 18-34) are more likely to have an artificial or synthetic lawn than those who are 45+.<sup>215</sup>
- Plastic grass is hot. A 2002 Brigham Young University study revealed that synthetic-turf surface temperatures were 37° higher than asphalt and 86° hotter than natural turf.<sup>216</sup> A 2012 Penn State study found it not uncommon for artificial turf temperatures to surpass 150° and can reach up to 200°.<sup>217</sup>
- Plastic grass may not "use" water to sustain itself, but it must be cooled with water and washed off with water to remove dust, dirt and pet waste. The runoff of the dirty and unsanitary water contributes to water pollution. The L.A. Department of Water & Power attracted negative attention in September 2016 when it was discovered to be using water to clean artificial turf once a week to remove dog waste.<sup>218</sup>
- According to a New Mexico State University turfgrass expert, not only does artificial turf need to be irrigated multiple times a day to keep it cool, reflection of the heat from the turf also impacts surrounding buildings and grass.<sup>219</sup>
- Plastic grass does not last forever and much of it is non-recyclable. Many recycling service providers will not accept artificial turf. According to the Association of Synthetic Grass Installers, surface fibers can be cut away from the backing and recycled, but the backing itself cannot be recycled.<sup>220</sup>

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