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Understand how to green the world's urban spaces the right way and it can boost human well-being, help redress social inequality and be a ... On evolutionary timescales, urban living is a new invention.

Extracts from article:

The evidence of positive effects from nature includes studies on specific psychological conditions such as depression, anxiety and mood disorder. Access to nature has also been found to improve sleep and reduce stress, increase happiness and reduce negative emotions, promote positive social interactions and even help generate a sense of meaning to life. Being in green environments boosts various aspects of thinking, including attention, memory and creativity, in people both with and without depression. "The evidence is very solid," says psychologist Marc Berman at the University of Chicago.

Complications in comparing studies and saying exactly what's good for whom makes it hard to distil the effects into an individual prescription (see "How much nature do I need?"). In the UK's remote Shetland Islands, however, they are doing just that: since 2018, doctors there have been able to prescribe nature-based activities such as birdwatching and beach walks to treat mental health conditions and stress, as well as physical conditions such as heart disease and diabetes. They aren't alone, either: a review in 2019 identified 28 nature-based interventions used in various countries to improve health and well-being, from organised gardening programmes to forest bathing.

If we are to maximise the benefits of nature for the world's legion of nature-deprived city dwellers, we need to know exactly how they work. Here, too, there appears to be no simple answer.

Urban vegetation can benefit people's physical health by absorbing harmful airborne particulates and other pollutants produced by fossil fuel-powered transport and industry. It may improve mental health in this way as well. Evidence is emerging that exposure to these pollutants can damage the central nervous system and is linked with certain mental health conditions such as depression. Urban vegetation also helps mitigate noise pollution, which causes stress and sleep disturbance.

Paying attention

Another possibility is that the mental health effect is mediated via physical health: urban residents living near green spaces simply take more exercise, which in turn improves their mental health. But most research suggests otherwise. In many cultures, visiting green spaces is less associated with physical exercise than with sedentary social activities, such as picnicking. That could be a source of nature's benefits in its own right: socialising can reduce loneliness, anxiety and depression.

Certainly, being part of a supportive community is good for mental health – and research shows that attractive public spaces are a catalyst for building cohesive neighbourhoods.

Intriguingly, some well-being effects do seem to be entirely psychological. Just this year, researchers in Switzerland found that simply having a view of nature from your home can reduce your perception of noise – and the closer the green space, the bigger the effect. Attention restoration theory is the name given to one hypothesis that attempts to explain such effects. It says that everyday focused thinking is cognitively draining, with negative consequences for mood, and that the wide range of stimuli intrinsic to nature provide a restorative sensory environment that alleviates this attention fatigue.

"Some of the well-being effects of nature seem to be entirely psychological"

But that is as yet educated guesswork. "There's a lot going on. We have to be creative with our studies to try to isolate the different mechanisms," says Berman.

And it is only half the story. Besides mental health benefits, we know that healthy natural spaces provide us with a whole range of essential "ecosystem services" for free, from clean air and water to nutrient recycling, flood defence and pollination. Ideally, in designing or reconfiguring urban environments, we should aim to maximise the benefits for biodiversity too. How do we do that?

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That is always going to be a trade-off because cities occupy land that could be wild, says ecologist Karl Evans at the University of Sheffield, UK. "Urbanisation is a major and increasing cause of global extinction risk," he says. What's more, we have a limited understanding of urban ecology upon which conservation-minded planners can draw. In 2017, Evans and his colleagues highlighted some fundamental questions yet to be resolved. These include how large, connected and diverse urban green spaces must be to promote biodiversity. Many animal species need access to different types of habitat to thrive. "It's not just about the amount, it's about the quality of those spaces," says Evans.

He points out that about half the green space in urban environments in the UK is just closely mown grass, a pattern repeated in many Western cities. "You could convert this to meadows or plant more trees," he says. In a study of urban meadows in the south of England, his team found that people responded more positively to the more-biodiverse meadows than to mown grassland. Similarly, a recent study led by landscape architect Anna Jorgensen, also at the University of Sheffield, concludes that what urbanites, at least in the UK, most value in their encounters with nature is variety.

We still don't know whether increased biodiversity equates to increased mental health benefits for urban dwellers. But incomplete as these findings are, they nevertheless make a strong case for greening cities. "People think of nature as being an amenity, not a necessity," says Berman. "But we all need it and we need to take it very seriously." Environmental engineer Anu Ramaswami at Princeton University agrees. She says green public spaces are one of seven key provisioning systems in cities, along with shelter, water, food, energy, connectivity and sanitation. "I think they are exactly on par," she says. "People need green spaces."

This is something that enlightened urban planning has long taken to heart, from the UK's Garden City movement at the turn of the 20th century to the recently announced plan to turn Paris's Champs-élysées, currently a busy thoroughfare, into a green oasis. Our evolving understanding of nature's broad health benefits, plus our ongoing pandemic experience, is a wake-up call to apply that lesson more widely.

"The pandemic has shown that we don't have enough [access to nature]," says Berman. That is especially true for people in more deprived socio-economic groups. "Access to green infrastructure is very income-based," says Ramaswami. A recent survey by Natural England, for example, found that children from low-income families spent less time outside in green spaces during the pandemic than children from higher-income families.

Meanwhile, a study by Berman and his colleagues in Toronto, Canada, found that adding just 10 trees to a city block has a huge impact on people's perceptions of their health and well-being, equivalent to the effect of earning $10,000 more per household. If urban greening were an investment priority, it needn't take much to have a big impact, with the most disadvantaged benefiting the most.

Even minimal green spaces, such as under this overpass in Osakoko, Japan, boost our mental well-being

Nick Hannes/Panos Pictures

So, what does an ideal green city of tomorrow look like? "I would think of compact, walkable cities," says Ramaswami. "You want four or five-storey buildings in a

liveable fabric. That's the base. Then you include green spaces that are accessible and equitable." Berman says it is important to make green spaces multipurpose so they meet a variety of needs. He also favours incorporating more natural elements into the built environment, such as green roofs, and even designing buildings that mimic patterns found in nature such as curves and fractals. Research using eye-trackers indicates that people are drawn to such shapes, and Berman thinks there is something about the way our brains process the aesthetic of nature that is comforting.

Advocating for nature itself, Evans's utopia is quite similar, emphasising building compactly to minimise the amount of land taken by cities. "A model green city for me would be one that was relatively densely packed," he says. "But the green space within it would be highly connected and extremely high quality and, crucially, highly accessible to all sectors of society."

Realising such visions won't be easy. Evans says it is incredibly hard to retrofit existing cities to match his ideal, and he doubts that new urban areas will be built with such a brief in mind. "I don't think biodiversity conservation needs are given high enough priority to make that a realistic prospect," he says.

But Ramaswami is more optimistic. She notes that the trend for urban greening has already begun, pointing to some inspiring examples in the US, including the Million Trees Los Angeles initiative and an ambitious greening programme in New York.

People use green spaces for physical and social activity, here tai chi in Taiwan

mixetto/Getty Images

This isn't just a richer-world phenomenon, either. Most urban growth in the next decades will occur in lower-income nations. The Milan Urban Food Policy Pact, which aims to increase urban gardening around the world, has 211 cities signed up, many in Africa, South America and South-East Asia. China's Ministry of Ecology and Environment, established in 2018, has made fighting pollution one of its three critical battles, spurring the building of parks, green spaces and wildlife corridors in many cities. Admittedly, lower-income countries face many challenges in building greener cities, but they can learn from the mistakes already made in older-growth cities in the West, says Ramaswami. "There's a lot of opportunity for sustainability in developing cities," she says.

Urban greening

Some researchers are thinking of new ways to get policy-makers across the world to value nature more. Biologist Gretchen Daily at Stanford University in California pioneered the concept of ecosystem services as a way of evaluating the benefits nature provides and factoring these values into economic decision-making. In conjunction with Berman and others, she published a paper in 2019 outlining how this approach could be used to put a price on the mental health benefits of nature in cities. "The intense pressure on urban land means we need to invest strategically," she says. Daily has founded the Natural Capital Project, which offers free science-based computer programs to guide such investments. "Software modules on health are being tested now for release in the first half of 2021," she says.

"How we plan cities now will affect the well-being of billions in the future"

But it will take more than policy-makers to push urban greening up the agenda. "We need a grassroots movement," says Berman. Community involvement ensures that different cultural and local needs are met, says Ramaswami. "You want the imagination of those people in those communities to think of their own vision."

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In some parts of the world, that is already happening: the economically disadvantaged favelas of Rio de Janeiro in Brazil, for example, are home to a burgeoning forestation movement. A common problem, however, is that people don't know about the benefits of nature, says Berman. "Scientists need to work a bit harder to get out of the ivory tower, to get their message across," he says. "It's important to talk to communities. It's not going to work to be paternalistic."

And it isn't just about knowledge: people need to also experience the effect that urban green spaces have on their sense of well-being. "If we can do interventions where we can encourage people to try it, then I think they will buy in," says Berman.

That is why the pandemic could be such a powerful force for change. "Our planning – today and into the future – will affect the well-being of billions of people," says Daily. And if we can build back greener, that will create a virtuous circle. Recent studies from both China and England find that feeling more connected with nature makes people more likely to adopt positive environmental behaviours. If so, then greener cities won't just improve the mental health of their residents, but also focus our minds on the needs of nature beyond our urban jungles.

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When it comes to pinning down the link between well-being and access to nature, there are big confounding factors. To begin with, what is psychological well-being? The World Health Organization defines mental health as "a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community". That is hard to quantify.

Then there is the question of what "access to nature" means. Some studies measure passive access, or how much green space is available in someone's local area. Others look at active access, which is the actual exposure a person gets to green space. That makes it difficult to compare results and build a coherent picture.

A few researchers have tried to assess what the appropriate dose of nature might be. A 2019 study (see below) involving almost 20,000 participants in England concluded that at least 120 minutes a week of recreational nature contact was associated with good health or well-being. The team, led by Mathew White at the University of Exeter, UK, found that the effect peaks at between 200 and 300 minutes a week, with people reporting no further gain after that.

What exactly this means for you – or any individual – is unclear. As other studies indicate, the mental health benefits a person gets from access to nature are likely to be influenced by myriad factors, including age, gender, personality traits, personal preferences and socio-economic status. Your culture matters too – and, so far, most research into the well-being effects of nature has been done in Western societies.

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Spending at least 120 minutes a week in nature is associated with good health and wellbeing

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Abstract

Spending time in natural environments can benefit health and well-being, but exposure-response relationships are under-researched. We examined associations between recreational nature contact in the last seven days and self-reported health and well-being. Participants (n = 19,806) were drawn from the Monitor of Engagement with the Natural Environment Survey (2014/15-2015/16); weighted to be nationally representative. Weekly contact was categorised using 60 min blocks. Analyses controlled for residential greenspace and other neighbourhood and individual factors. Compared to no nature contact last week, the likelihood of reporting good health or high well-being became significantly greater with contact ≥120 mins (e.g. 120-179 mins: ORs [95%CIs]: Health = 1.59 [1.31-1.92]; Well-being = 1.23 [1.08-1.40]). Positive associations peaked between 200-300 mins per week with no further gain. The pattern was consistent across key groups including older adults and those with long-term health issues. It did not matter how 120 mins of contact a week was achieved (e.g. one long vs. several shorter visits/week). Prospective longitudinal and intervention studies are a critical next step in developing possible weekly nature exposure guidelines comparable to those for physical activity.