

What's the annual value of trees? \$500 million per megacity, study says

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A recent study published in the online journal *Ecological Modelling* reported that in 10 megacities they studied, tree-based ecosystem benefits had a median annual value of \$505 million. Credit: ESF

In the megacities that are home to nearly 10 percent of the world's 7.5 billion people, trees provide each city with more than \$500 million each year in services that make urban environments cleaner, more affordable and more pleasant places to live.



In a recent study published in the online journal *Ecological Modelling*, an international team of researchers reported that in the 10 megacities they studied, tree-based ecosystem benefits had a median annual value of \$505 million, which is equivalent to \$1.2 million per square kilometer of trees. From another perspective, the value was \$35 per capita for the average megacity resident.

The study's lead author, Dr. Theodore Endreny of the College of Environmental Science and Forestry (ESF) in Syracuse, New York, said the value of trees' services could easily be doubled by simply planting more of them.



"Megacities can increase these benefits on average by 85 percent," Endreny said. "If trees were to be established throughout their potential cover area, they would serve to filter air and water pollutants and reduce building energy use, and improve human well-being while providing habitat and resources for other species in the urban area."

The study estimated existing and potential tree cover, and its contribution to ecosystem services in 10 megacity metropolitan areas across five continents and biomes (a large, natural community of plants and animals that occupies a major habitat). The cities were Beijing, China; Buenos Aires, Argentina; Cairo, Egypt; Istanbul, Turkey; London, Great Britain; Los Angeles, United

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The researchers estimated the benefits of tree cover in reducing air pollution, stormwater runoff, energy costs associated with heating and cooling buildings, and carbon emissions. "Trees have direct and indirect benefits for cooling buildings and reducing human suffering during heat waves," Endreny said. "The direct benefit is shade which keeps the urban area cooler, the indirect benefit is transpiration of stormwater which turns hot air into cooler air."

Urban trees perform services most people are unaware of, including removal of airborne particulate matter dangerous to human respiration by capture on leaves; energy savings in the form of cooling and insulation from both summer sunlight and winter winds; and carbon sequestration, which occurs when trees absorb and store carbon dioxide as they mitigate climate change.

"Placing these results on the larger scale of socio-economic systems makes evident to what extent nature supports our individual and community well-being by providing ecosystem services for free," said one of Endreny's co-authors, Professor Sergio Ulgiati of University Parthenope of Naples, Italy. "A deeper awareness of the economic value of free services provided by nature may increase our willingness to invest efforts and resources into natural capital conservation and correct exploitation, so that societal wealth, economic stability and well-being would also increase. As a follow-up of this joint research, we have created in our university an Urban Wellbeing Laboratory, jointly run by researchers and local stakeholders."

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