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Urban Forestry and Urban Greening • Volume 59 • April 2021 • Article number 127008

Document type

Article

Source type

Journal

ISSN

16188667

DOI

10.1016/j.ufug.2021.127008

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Spatiotemporal variation of forest cover and its relation to air quality in urban Andean socio-ecological systems

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Abstract

Confronting the dynamics of global urbanization is one of the challenges of sustainability in the 21st century. Latin America is expected to be one of the regions with the highest urban growth; however,

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research related to variations in urban land coverage and air quality is relatively new, despite its importance for urban planning and citizens well-being. This study determines the relationship between the spatial variability of some atmospheric pollutants and changes in land cover in a Andean mountain cities of Latin American. We quantified the changes and transitions of land cover using SPOT optical images and generating an object-based classification. In addition, we identified variations in the mean concentrations of some atmospheric pollutants; and, finally, using various linear regression models, we explained the relationship between the spatiotemporal variation of atmospheric pollutants with the spatiotemporal variations of the land cover and some meteorological and topographical factors. Changes in land cover indicated an increase of impervious cover and a loss of urban non-forest vegetation. However, there was also an increase in forest fragments and urban woodland to the detriment of green areas and shrubbery. On the other hand, the concentrations of the air pollutants CO, O₃, and PM_{2.5} showed significant variations between periods, reducing their concentrations in the air. Finally, land cover such as forests and urban trees, as well as meteorological and topographical factors were associated with and explained ($r^2 > 0.6$) the spatiotemporal variation of air pollutants. Urban green infrastructure management in developing regions should consider a multidisciplinary approach to achieve an equitable and minimum distribution of local green infrastructure; by promoting conditions that allow the conversion of land use and coverage, in order to maximize the benefits and the ecosystemic forest services that a city demands. © 2021 Elsevier GmbH

Author keywords

Air quality ; Green infrastructure ; Spatiotemporal variation ; Systematic transitions ; Urban land cover


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References (98)

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- 1 [Adugna, A., Abegaz, A., Legass, A., Antille, D.L.](#)
Random and systematic land-cover transitions in north-eastern Wollega, Ethiopia

(2017) *Bois et Forêts des Tropiques*, (332), pp. 3-15. Cited 4 times.
<http://bft.revuesonline.com/>

[View at Publisher](#)

-
- 2 Aguiar, R., Rivas-Medina, A., Caiza, P., Quizanga, D.
Control spectra for Quito ([Open Access](#))

(2017) *Natural Hazards and Earth System Sciences*, 17 (3), pp. 397-407. Cited 3 times.
http://www.nat-hazards-earth-syst-sci.net/volumes_and_issues.html
doi: 10.5194/nhess-17-397-2017

View at Publisher
-
- 3 Alo, C.A., Pontius Jr., R.G.
Identifying systematic land-cover transitions using remote sensing and GIS: The fate of forests inside and outside protected areas of Southwestern Ghana

(2008) *Environment and Planning B: Planning and Design*, 35 (2), pp. 280-295. Cited 113 times.
<http://www.sagepub.in/journals/Journal202437>
doi: 10.1068/b32091

View at Publisher
-
- 4 Alonso, R., Vivanco, M.G., González-Fernández, I., Bermejo, V., Palomino, I., Garrido, J.L., Elvira, S., (...), Artíñano, B.
Modelling the influence of peri-urban trees in the air quality of Madrid region (Spain)

(2011) *Environmental Pollution*, 159 (8-9), pp. 2138-2147. Cited 36 times.
doi: 10.1016/j.envpol.2010.12.005

View at Publisher
-
- 5 Andersson, E., Ahrné, K., Pykönen, M., Elmqvist, T.
Patterns and scale relations among urbanization measures in Stockholm, Sweden ([Open Access](#))

(2009) *Landscape Ecology*, 24 (10), pp. 1331-1339. Cited 31 times.
doi: 10.1007/s10980-009-9385-1

View at Publisher
-
- 6 Beckett, K.P., Freer-Smith, P.H., Taylor, G.
Urban woodlands: Their role in reducing the effects of particulate pollution

(1998) *Environmental Pollution*, 99 (3), pp. 347-360. Cited 470 times.
doi: 10.1016/S0269-7491(98)00016-5

View at Publisher
-
- 7 Benedict, M., McMahon, E.
Green infrastructure
(2012) *Linking Landscape and Communities*, p. 20009. Cited 2 times.
M. Benedict E. McMahon Washington, DC
-
- 8 Benton-Short, L., Rennie, J.
Cities and nature
(2008) *Cities and Nature*. Cited 61 times.
L. Benton-Short J. Rennie Routledge New York
-

- 9 Berland, A., Manson, S.M.
Patterns in Residential Urban Forest Structure Along a Synthetic Urbanization Gradient ([Open Access](#))
(2013) *Annals of the Association of American Geographers*, 103 (4), pp. 749-763. Cited 8 times.
doi: 10.1080/00045608.2013.782598
[View at Publisher](#)
-
- 10 Birnbaum, Z., Tingey, F.
One-sided confidence contours for probability distribution functions (1951) *American Mathematical Society*, pp. 592-596. Cited 92 times.
University of Washington. Washington
-
- 11 Bonilla-Bedoya, S., Mora, A., Vaca, A., Estrella, A., Herrera, M.Á.
Modelling the relationship between urban expansion processes and urban forest characteristics: An application to the Metropolitan District of Quito
(2020) *Computers, Environment and Urban Systems*, 79, art. no. 101420. Cited 16 times.
www.elsevier.com/inca/publications/store/3/0/4/
doi: 10.1016/j.compenvurbsys.2019.101420
[View at Publisher](#)
-
- 12 Bonilla-Bedoya, S., Estrella, A., Santos, F., Herrera, M.Á.
Forests and urban green areas as tools to address the challenges of sustainability in Latin American urban socio-ecological systems
(2020) *Applied Geography*, 125, art. no. 102343. Cited 5 times.
<http://www.elsevier.com/inca/publications/store/3/0/3/9/0/index.htm>
doi: 10.1016/j.apgeog.2020.102343
[View at Publisher](#)
-
- 13 Bottalico, F., Chirici, G., Giannetti, F., De Marco, A., Nocentini, S., Paoletti, E.
Air pollution removal by green infrastructures and urban forest in the city of Florence
(2016) *Procedia*, 8, pp. 244-251. Cited 55 times.
-
- 14 Calaza, P., Cariñanos, P., Escobedo Montoya, F.J., Schwab, J., Tovar, G.
Building green infrastructure and urban landscapes
(2018) *Unasylva*, 69 (250), pp. 11-21. Cited 5 times.
<http://www.fao.org/3/i8707en/i8707EN.pdf>
-
- 15 Carter, B.Y.E.J.
(1994) *The Potential of Urban Forestry in Developing Countries: A Concept Paper*, 19.
Roma. Retrieved from
<http://www.fao.org/3/t1680e/t1680e00.htm>
-
- 16 Cavanagh, J.-A.E., Zawar-Reza, P., Wilson, J.G.
Spatial attenuation of ambient particulate matter air pollution within an urbanised native forest patch
(2009) *Urban Forestry and Urban Greening*, 8 (1), pp. 21-30. Cited 116 times.
doi: 10.1016/j.ufug.2008.10.002
[View at Publisher](#)

- 17 Chen, W., Tang, H., Zhao, H.
Diurnal, weekly and monthly spatial variations of air pollutants and air quality of Beijing
(2015) *Atmospheric Environment*, 119, pp. 21-34. Cited 108 times.
www.elsevier.com/locate/atmosenv
doi: 10.1016/j.atmosenv.2015.08.040
View at Publisher
-
- 18 Chou, C.C.-K., Liu, S.C., Lin, C.-Y., Shiu, C.-J., Chang, K.-H.
The trend of surface ozone in Taipei, Taiwan, and its causes: Implications for ozone control strategies
(2006) *Atmospheric Environment*, 40 (21), pp. 3898-3908. Cited 100 times.
doi: 10.1016/j.atmosenv.2006.02.018
View at Publisher
-
- 19 Cohen, P., Potchter, O., Schnell, I.
The impact of an urban park on air pollution and noise levels in the Mediterranean city of Tel-Aviv, Israel
(2014) *Environmental Pollution*, 195, pp. 73-83. Cited 80 times.
www.elsevier.com/locate/envpol
doi: 10.1016/j.envpol.2014.08.015
View at Publisher
-
- 20 de Mesnard, L.
Pollution models and inverse distance weighting: Some critical remarks
(2013) *Computers and Geosciences*, 52, pp. 459-469. Cited 90 times.
doi: 10.1016/j.cageo.2012.11.002
View at Publisher
-
- 21 Dewan, A.M., Kabir, M.H., Nahar, K., Rahman, M.Z.
Urbanisation and environmental degradation in Dhaka metropolitan area of Bangladesh
(2012) *International Journal of Environment and Sustainable Development*, 11 (2), pp. 118-147. Cited 72 times.
<http://www.inderscience.com/ijesd>
doi: 10.1504/IJESD.2012.049178
View at Publisher
-
- 22 Dobbs, C., Escobedo, F.J., Clerici, N., Barrera, F.D., Eleuterio, A.A., Macgregor-fors, I.
Urban ecosystem Services in Latin America: mismatch between global concepts and regional realities?
(2018) *Urban Ecosyst.*, pp. 1-15. Cited 2 times.
-
- 23 du Toit, M.J., Cilliers, S.S.
Aspects influencing the selection of representative urbanization measures to quantify urban-rural gradients
(2011) *Landscape Ecology*, 26 (2), pp. 169-181. Cited 38 times.
<http://www.springerlink.com/content/103025/>
doi: 10.1007/s10980-010-9560-4
View at Publisher
-

- 24 Uy, P.D., Nakagoshi, N.
Analyzing urban green space pattern and eco-network in Hanoi, Vietnam

(2007) *Landscape and Ecological Engineering*, 3 (2), pp. 143-157. Cited 51 times.
doi: 10.1007/s11355-007-0030-3

View at Publisher
-
- 25 Duci, A., Chaloulakou, A., Spyrellis, N.
Exposure to carbon monoxide in the Athens urban area during commuting

(2003) *Science of the Total Environment*, 309 (1-3), pp. 47-58. Cited 57 times.
www.elsevier.com/locate/scitotenv
doi: 10.1016/S0048-9697(03)00045-7

View at Publisher
-
- 26 Elmqvist, T., Zipperer, W.C., Güneralp, B.
Urbanization, habitat loss and biodiversity decline: Solution pathways to break the cycle

(2015) *The Routledge Handbook of Urbanization and Global Environmental Change*, pp. 139-151. Cited 34 times.
<http://www.tandfebooks.com/doi/book/10.4324/9781315849256>
ISBN: 978-131790932-3; 978-041573226-0
doi: 10.4324/9781315849256-20

View at Publisher
-
- 27 Escobedo, F.J., Nowak, D.J.
Spatial heterogeneity and air pollution removal by an urban forest

(2009) *Landscape and Urban Planning*, 90 (3-4), pp. 102-110. Cited 293 times.
doi: 10.1016/j.landurbplan.2008.10.021

View at Publisher
-
- 28 Escobedo, F.J., Kroeger, T., Wagner, J.E.
Urban forests and pollution mitigation: Analyzing ecosystem services and disservices

(2011) *Environmental Pollution*, 159 (8-9), pp. 2078-2087. Cited 574 times.
doi: 10.1016/j.envpol.2011.01.010

View at Publisher
-
- 29 Escobedo, F.J., Clerici, N., Staudhammer, C.L., Corzo, G.T.
Socio-ecological dynamics and inequality in Bogotá, Colombia's public urban forests and their ecosystem services

(2015) *Urban Forestry and Urban Greening*, 14 (4), pp. 1040-1053. Cited 64 times.
http://www.elsevier.com/wps/find/journaldescription.cws_home/701803/description#description
doi: 10.1016/j.ufug.2015.09.011

View at Publisher
-

- 30 Favaro, A.K.M.I., Maria, N.C., Cutolo, S.A., de Toledo, R.F., Landin, R., Tolffo, F.A., Baptista, A.C.S., (...), Giatti, L.L.
Inequities and Challenges for a Metropolitan Region to Improve Climate Resilience
(2016) *Climate Change Management*, pp. 419-432. Cited 6 times.
[springer.com/series/8740](https://www.springer.com/series/8740)
doi: 10.1007/978-3-319-24660-4_24
[View at Publisher](#)
-
- 31 Foley, J.A., DeFries, R., Asner, G.P., Barford, C., Bonan, G., Carpenter, S.R., Chapin, F.S., (...), Snyder, P.K.
Global consequences of land use
(2005) *Science*, 309 (5734), pp. 570-574. Cited 7454 times.
doi: 10.1126/science.1111772
[View at Publisher](#)
-
- 32 Forman, R.
Urban Ecology. New York
(2014)
-
- 33 Fox, J., Weisberg, S., Adler, D., Bates, D., Boud-Bovy, G., Ellison, S.
Package 'car.'
(2015). Cited 2 times.
-
- 34 Freer-Smith, P.H., Holloway, S., Goodman, A.
The uptake of particulates by an urban woodland: Site description and particulate composition
(1997) *Environmental Pollution*, 95 (1), pp. 27-35. Cited 126 times.
doi: 10.1016/S0269-7491(96)00119-4
[View at Publisher](#)
-
- 35 Gerrish, E., Watkins, S.L.
The relationship between urban forests and income: A meta-analysis ([Open Access](#))
(2018) *Landscape and Urban Planning*, 170, pp. 293-308. Cited 66 times.
www.elsevier.com/inca/publications/store/5/0/3/3/4/7
doi: 10.1016/j.landurbplan.2017.09.005
[View at Publisher](#)
-
- 36 Gouveia, N., Junger, W.L., Romieu, I., Cifuentes, L.A., de Leon, A.P., Vera, J., Strappa, V., (...), Tzintzun-Cervantes, G.
Effects of air pollution on infant and children respiratory mortality in four large Latin-American cities
(2018) *Environmental Pollution*, 232, pp. 385-391. Cited 69 times.
www.elsevier.com/inca/publications/store/4/0/5/8/5/6
doi: 10.1016/j.envpol.2017.08.125
[View at Publisher](#)
-
- 37 Greenstein, R., Sabatini, F., Smolka, M.
Forces, Consequences, and Policy Responses
(2000). Cited 2 times.
-

- 38 Güneralp, B., Seto, K.C.
Futures of global urban expansion: Uncertainties and implications for biodiversity conservation ([Open Access](#))

(2013) *Environmental Research Letters*, 8 (1), art. no. 014025. Cited 171 times.
http://iopscience.iop.org/1748-9326/8/1/014025/pdf/1748-9326_8_1_014025.pdf
doi: 10.1088/1748-9326/8/1/014025

View at Publisher
-
- 39 Gupta, K., Kumar, P., Pathan, S.K., Sharma, K.P.
Urban Neighborhood Green Index - A measure of green spaces in urban areas

(2012) *Landscape and Urban Planning*, 105 (3), pp. 325-335. Cited 149 times.
doi: 10.1016/j.landurbplan.2012.01.003

View at Publisher
-
- 40 Hahs, A.K., McDonnell, M.J.
Selecting independent measures to quantify Melbourne's urban-rural gradient

(2006) *Landscape and Urban Planning*, 78 (4), pp. 435-448. Cited 199 times.
www.elsevier.com/inca/publications/store/5/0/3/3/4/7
doi: 10.1016/j.landurbplan.2005.12.005

View at Publisher
-
- 41 Hastenrath, S.
Annual cycle of upper air circulation and convective activity over the tropical Americas ([Open Access](#))

(1997) *Journal of Geophysical Research Atmospheres*, 102 (4), pp. 4267-4274. Cited 40 times.
[http://agupubs.onlinelibrary.wiley.com/doi/10.1002/\(ISSN\)2169-8996/](http://agupubs.onlinelibrary.wiley.com/doi/10.1002/(ISSN)2169-8996)
doi: 10.1029/96jd03122

View at Publisher
-
- 42 Hernandez, W., Mendez, A., Zalakeviciute, R., Diaz-marquez, A.M.
Robust confidence intervals for PM2.5 concentration measurements in the Ecuadorian Park la Carolina ([Open Access](#))

(2020) *Sensors (Switzerland)*, 20 (3), art. no. 654. Cited 6 times.
<https://www.mdpi.com/1424-8220/20/3/654/pdf>
doi: 10.3390/s20030654

View at Publisher
-
- 43 INEC Instituto Nacional de Estadísticas y Censos
Contenido. Quito-Ecuador
(2012)
-
- 44 Inostroza, L., Baur, R., Csaplovics, E.
Urban sprawl and fragmentation in Latin America: A dynamic quantification and characterization of spatial patterns

(2013) *Journal of Environmental Management*, 115, pp. 87-97. Cited 183 times.
doi: 10.1016/j.jenvman.2012.11.007

View at Publisher

- 45 Darrel Jenerette, G., Harlan, S.L., Stefanov, W.L., Martin, C.A.
Ecosystem services and urban heat riskscape moderation:
Water, green spaces, and social inequality in Phoenix, USA
- (2011) *Ecological Applications*, 21 (7), pp. 2637-2651. Cited 283 times.
<http://www.esajournals.org/doi/pdf/10.1890/10-1493.1>
doi: 10.1890/10-1493.1

[View at Publisher](#)

- 46 Jim, C.Y., Chen, W.Y.
Assessing the ecosystem service of air pollutant removal by
urban trees in Guangzhou (China)
- (2008) *Journal of Environmental Management*, 88 (4), pp. 665-676. Cited 277
times.
doi: 10.1016/j.jenvman.2007.03.035

[View at Publisher](#)

- 47 King, K.L., Johnson, S., Kheirbek, I., Lu, J.W.T., Matte, T.
Differences in magnitude and spatial distribution of urban
forest pollution deposition rates, air pollution emissions, and
ambient neighborhood air quality in New York City
- (2014) *Landscape and Urban Planning*, 128, pp. 14-22. Cited 39 times.
www.elsevier.com/inca/publications/store/5/0/3/3/4/7
doi: 10.1016/j.landurbplan.2014.04.009

[View at Publisher](#)

- 48 KLAKE, T., HOLTZCLAW, M.
The Housing, Geography, and Mobility of Latin American
Urban, Poor: The Prevailing Model and the Case of Quito,
Ecuador
- (1993) *Growth and Change*, 24 (2), pp. 247-276. Cited 17 times.
doi: 10.1111/j.1468-2257.1993.tb00963.x

[View at Publisher](#)

- 49 Kleine Deters, J., Zalakeviciute, R., Gonzalez, M., Rybarczyk, Y.
Modeling PM_{2.5} Urban Pollution Using Machine Learning
and Selected Meteorological Parameters ([Open Access](#))
- (2017) *Journal of Electrical and Computer Engineering*, 2017, art. no.
5106045. Cited 74 times.
<http://www.hindawi.com/journals/jece/>
doi: 10.1155/2017/5106045

[View at Publisher](#)

- 50 Lattes, A.
Población urbana y urbanización en América Latina
(2001) *La ciudad construida urbanismo en América Latina*, pp. 49-76. Cited
10 times.
F. Carrión Quito-Ecuador: FLACSO - JUNTA DE ANDALUCIA

- 51 Lattes, A.E.
Población urbana y urbanización en América Latina.
(2001) *La Ciudad Construida Urbanismo En América Latina*, pp. 49-76. Cited
10 times.
F. Carrión Flasco - Junta de Andalucía Quito-Ecuador
-

- 52 Li, X., Chen, W.Y., Sanesi, G., Laforzezza, R.
Remote sensing in urban forestry: Recent applications and future directions ([Open Access](#))

(2019) *Remote Sensing*, 11 (10), art. no. 1144. Cited 24 times.
https://res.mdpi.com/remotesensing/remotesensing-11-01144/article_deploy/remotesensing-11-01144.pdf?filename=&attachment=1
doi: 10.3390/rs11101144

View at Publisher
-
- 53 Liu, J., Dietz, T., Carpenter, S.R., Alberti, M., Folke, C., Moran, E., Pell, A.N., (...), Taylor, W.W.
Complexity of coupled human and natural systems ([Open Access](#))

(2007) *Science*, 317 (5844), pp. 1513-1516. Cited 2062 times.
doi: 10.1126/science.1144004

View at Publisher
-
- 54 Liu, H., Liu, S., Xue, B., Lv, Z., Meng, Z., Yang, X., Xue, T., (...), He, K.
Ground-level ozone pollution and its health impacts in China

(2018) *Atmospheric Environment*, 173, pp. 223-230. Cited 175 times.
www.elsevier.com/locate/atmosenv
doi: 10.1016/j.atmosenv.2017.11.014

View at Publisher
-
- 55 Lou, C., Liu, H., Li, Y., Peng, Y., Wang, J., Dai, L.
Relationships of relative humidity with PM_{2.5} and PM₁₀ in the Yangtze River Delta, China

(2017) *Environmental Monitoring and Assessment*, 189 (11), art. no. 582. Cited 64 times.
www.wkap.nl/journalhome.htm/0167-6369
doi: 10.1007/s10661-017-6281-z

View at Publisher
-
- 56 Marsaglia, G., Tsang, W.W., Wang, J.
Evaluating Kolmogorov's distribution ([Open Access](#))

(2003) *Journal of Statistical Software*, 8, pp. 1-4. Cited 492 times.
<http://www.jstatsoft.org/v08/i18/k.pdf>
doi: 10.18637/jss.v008.i18

View at Publisher
-
- 57 Marsh, W.M.
Landscape planning
(2010) *Environ. Appl.*. Cited 3 times.
-
- 58 McPherson, E.G., Service, F., Nowak, D.J., Rowntree, R.A.
Chicago' S Urban Forest Ecosystem : Results of the Chicago Urban Forest Agriculture Chicago' S Urban Forest Ecosystem : Results of the Chicago Urban Forest Climate Project. Radnor, Pennsylvania
(1994)
-
- 59 McPherson, G., Simpson, J., Peper, P., Xiao, Q.
BENEFIT-COST analysis of Modesto' s municipal urban forest
(1999) *J. Arboricult.*, 25 (September), pp. 235-248. Cited 119 times.

- 60 Molina, M.J., Molina, L.T.
Megacities and atmospheric pollution

(2004) *Journal of the Air and Waste Management Association*, 54 (6), pp. 644-680. Cited 499 times.
doi: 10.1080/10473289.2004.10470936

View at Publisher
-
- 61 Murray, S.
Silvicultura Urbana Y Periurbana En Quito, Ecuador: Estudio De Caso. Roma (1998) . Cited 3 times.
-
- 62 Nowak, D.J., Service, U.F.
The Effects of Urban Trees on Air Quality. Syracuse, New York (2002) . Cited 60 times.
-
- 63 Nowak, D.J., Civerolo, K.L., Trivikrama Rao, S., Sistla, G., Luley, C.J., Crane, D.E.
A modeling study of the impact of urban trees on ozone

(2000) *Atmospheric Environment*, 34 (10), pp. 1601-1613. Cited 183 times.
doi: 10.1016/S1352-2310(99)00394-5

View at Publisher
-
- 64 Nowak, D.J., Hirabayashi, S., Bodine, A., Greenfield, E.
Tree and forest effects on air quality and human health in the United States ([Open Access](#))

(2014) *Environmental Pollution*, 193, pp. 119-129. Cited 403 times.
www.elsevier.com/inca/publications/store/4/0/5/8/5/6
doi: 10.1016/j.envpol.2014.05.028

View at Publisher
-
- 65 Nowak, D.J., Hirabayashi, S., Doyle, M., McGovern, M., Pasher, J.
Air pollution removal by urban forests in Canada and its effect on air quality and human health

(2018) *Urban Forestry and Urban Greening*, 29, pp. 40-48. Cited 174 times.
http://www.elsevier.com/wps/find/journaldescription.cws_home/701803/description#description
doi: 10.1016/j.ufug.2017.10.019

View at Publisher
-
- 66 Barona, C.O., Devisscher, T., Dobbs, C., Aguilar, L.O., Baptista, M.D., Navarro, N.M., da Silva Filho, D.F., (...), Escobedo, F.J.
Trends in Urban Forestry Research in Latin America & The Caribbean: A Systematic Literature Review and Synthesis

(2020) *Urban Forestry and Urban Greening*, 47, art. no. 126544. Cited 15 times.
http://www.elsevier.com/wps/find/journaldescription.cws_home/701803/description#description
doi: 10.1016/j.ufug.2019.126544

View at Publisher
-

- 67 Paoletti, E.
Ozone and urban forests in Italy

(2009) *Environmental Pollution*, 157 (5), pp. 1506-1512. Cited 77 times.
doi: 10.1016/j.envpol.2008.09.019

View at Publisher
-
- 68 Pataki, D.E., Carreiro, M.M., Cherrier, J., Grulke, N.E., Jennings, V., Pincetl, S., Pouyat, R.V., (...), Zipperer, W.C.
Coupling biogeochemical cycles in urban environments: Ecosystem services, green solutions, and misconceptions (Open Access)

(2011) *Frontiers in Ecology and the Environment*, 9 (1), pp. 27-36. Cited 554 times.
<http://www.esajournals.org/doi/pdf/10.1890/090220>
doi: 10.1890/090220

View at Publisher
-
- 69 Pontius Jr., R.G., Shusas, E., McEachern, M.
Detecting important categorical land changes while accounting for persistence

(2004) *Agriculture, Ecosystems and Environment*, 101 (2-3), pp. 251-268. Cited 477 times.
www.elsevier.com/inca/publications/store/5/0/3/2/9/8
doi: 10.1016/j.agee.2003.09.008

View at Publisher
-
- 70 Pourrut, P.
El Agua En El Ecuador. Clima, Precipitaciones, Escorrentía (1995) . Cited 13 times.
ORSTOM. Quito
-
- 71 RMMAQ Red Metropolitana de Monitoreo Atmosférico de Índice Quiteño De La Calidad Del Aire. Quito (2017)
Retrieved from
<http://www.quitoambiente.gob.ec/ambiente/index.php/documentos-indices-quitenno-de-calidad-del-aire>
-
- 72 Romero, H., Vásquez, A., Fuentes, C., Salgado, M., Schmidt, A., Banzhaf, E.
Assessing urban environmental segregation (UES). the case of Santiago de Chile

(2012) *Ecological Indicators*, 23, pp. 76-87. Cited 55 times.
doi: 10.1016/j.ecolind.2012.03.012

View at Publisher
-
- 73 Briones, P.S., Sepúlveda-Varas, A.
Systematic transitions in land use and land cover in a pre-Andean subwatershed with high human intervention in the Araucania region, Chile (Open Access)

(2016) *Ciencia e Investigacion Agraria*, 43 (3), pp. 396-407. Cited 11 times.
<http://www.scielo.cl/pdf/ciagr/v43n3/art06.pdf>
doi: 10.4067/S0718-16202016000300006

View at Publisher
-

- 74 Satterthwaite, D.
Cities' contribution to global warming: Notes on the allocation of greenhouse gas emissions
(2008) *Environment and Urbanization*, 20 (2), pp. 539-549. Cited 402 times.
doi: 10.1177/0956247808096127
View at Publisher
-

- 75 Schneider, A.
Monitoring land cover change in urban and peri-urban areas using dense time stacks of Landsat satellite data and a data mining approach
(2012) *Remote Sensing of Environment*, 124, pp. 689-704. Cited 301 times.
doi: 10.1016/j.rse.2012.06.006
View at Publisher
-

- 76 Sertel, E., Akay, S.S.
High resolution mapping of urban areas using SPOT-5 images and ancillary data
(2015) *Int. J. Environ. Geoinform.*, 2 (2), pp. 63-76. Cited 21 times.
-

- 77 Shapiro, M.
r.sTats - Generates Area Statistics for Raster Map
(2013)
Retrieved December 21, 2020, from
<https://grass.osgeo.org/grass78/manuals/r.stats.html>
-

- 78 Singh, K.P., Gupta, S., Rai, P.
Identifying pollution sources and predicting urban air quality using ensemble learning methods
(2013) *Atmospheric Environment*, 80, pp. 426-437. Cited 109 times.
doi: 10.1016/j.atmosenv.2013.08.023
View at Publisher
-

- 79 Sociedade Brasileira de Arborização Urbana SBAU
Carta a Londrina E Ibiporã. Boletim Informativo
(1996)
-

- 80 Suits, D.B.
Use of Dummy Variables in Regression Equations
(1957) *Journal of the American Statistical Association*, 52 (280), pp. 548-551. Cited 259 times.
doi: 10.1080/01621459.1957.10501412
View at Publisher
-

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