



Expansion of Urban Land Cover around El Yunque National Forest

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Introduction

Urban expansion alters forest processes and functions by fragmenting the landscape, modifying hydrologic systems, and altering nutrient cycles, among other effects. Urban expansion also alters forest processes and functions by removing forest cover. Together these changes modify the benefits and services provided by forests. Stakeholders (scientists, forest managers, municipal planners, and community members) who participated in a series of focus groups in a recent study identified urban expansion as one of the main factors affecting El Yunque National Forest and its ecosystem services (see “Participatory Listing, Ranking, and Scoring of Ecosystem Services and Drivers of Change”, another publication within the “El Yunque Ecosystem Services” series for more information).

This fact sheet presents trends in urban expansion from 1998 to 2010 in the eight municipalities that have a portion of El Yunque National Forest (El Yunque) lands within their boundaries. Urban land cover for 1998 and 2010 was created from the digitalization of aerial photographs. This information can help forest managers, municipal and land-use planners, and policymakers with urban land-use planning and decision making around El Yunque.

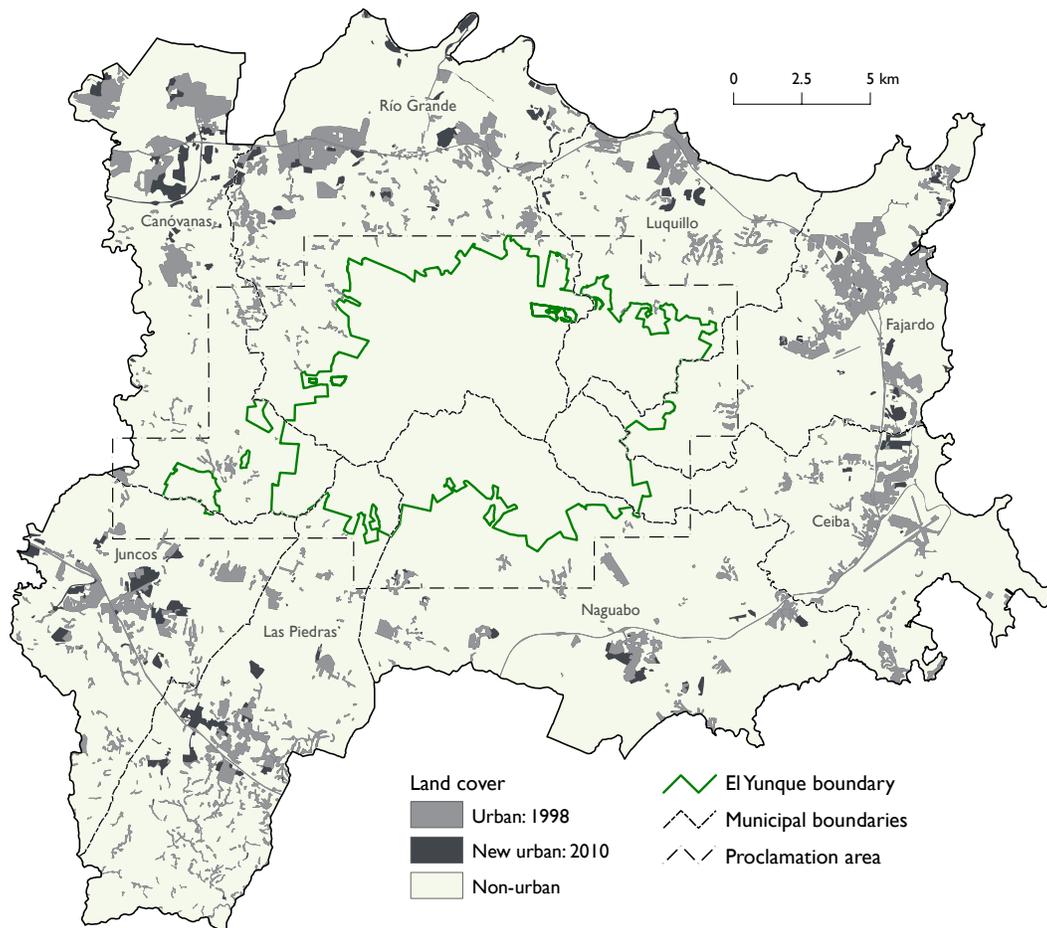


FIGURE 1. Urban land cover in 1998 and 2010.

Key Findings

Urban Cover in 1998

- Urban areas covered 15,841 acres (9%) of the total area of the eight municipalities that contain a portion of El Yunque within their boundaries.
- Río Grande had the most total urban land area (2,922 acres), while Luquillo had the least (1,236 acres).
- Fajardo and Canóvanas had the largest percentages of their total areas in urban land cover (14% and 11%, respectively), while Naguabo had the smallest (4%).

TABLE 1. Change in the total area and percentage of urban land cover increase from 1998 to 2010.

MUNICIPALITY	ACRES	PERCENTAGE
Juncos	619	36
Canóvanas	696	31
Las Piedras	456	23
Río Grande	620	21
Naguabo	280	20
Luquillo	216	17
Fajardo	281	10
Ceiba	129	8
Total	3,297	21

To convert acres to *hectares* divide the number of acres by 2.47. To convert acres to *cuerdas* (a unit of measurement commonly used in Puerto Rico to measure land) multiply the number of acres by 1.03.

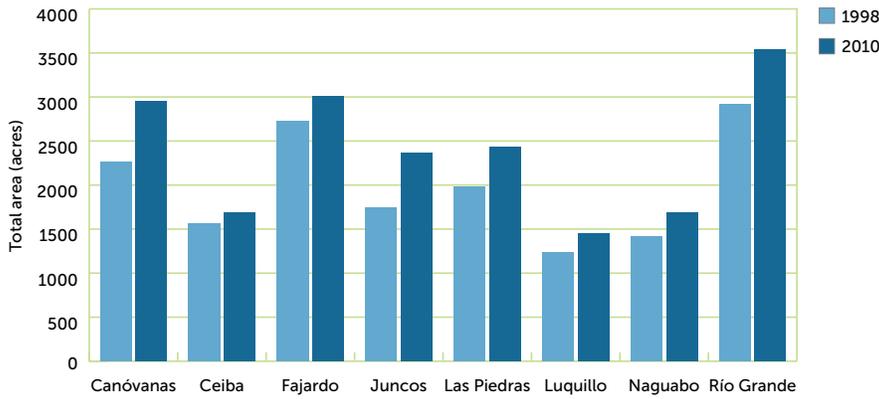


FIGURE 2. Total area (in acres) covered by urban land cover for each municipality in 1998 and 2010.

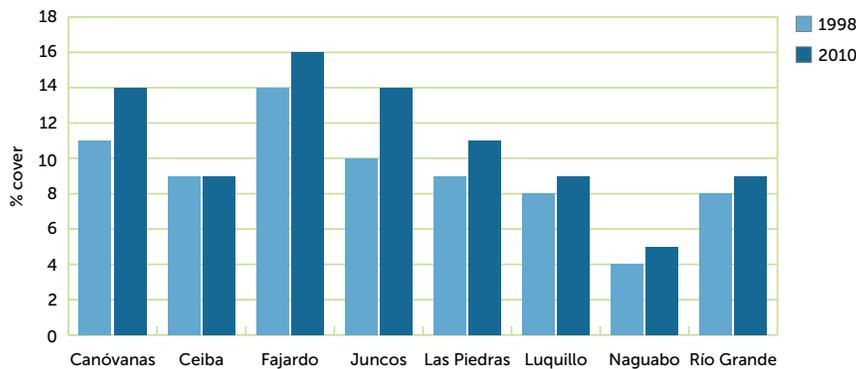


FIGURE 3. Percentage of urban land cover for each municipality in 1998 and 2010.

Urban land cover refers to land areas covered by large amounts of impervious surfaces (more than 80% cover) such as concrete and cement. These areas include high-density constructed areas, such as towns, but also include low-density constructed areas, such as scattered buildings and subdivisions.

Urban land-cover data layers were created by on-screen digitizing of digital aerial photographs taken in 1998 and 2010. The resolution for the 1998 images was 3.3 ft (1.0 m); for the 2010 images it was 1.0 ft (0.3 m).

Urban Cover in 2010

- Urban areas covered 19,138 acres (10%) of the total area of the eight municipalities.
- Río Grande had the most urban land cover (3,542 acres), while Luquillo had the least (1,452 acres).
- Fajardo had the highest percentage of land in urban cover (16%) while Naguabo had the lowest (5%).

Urban Expansion between 1998 and 2010

- Urban land cover increased by 3,297 acres in the total area of the eight municipalities.
- Canóvanas had the highest increase in urban land cover out of all the municipalities (696 acres), whereas Ceiba had the lowest increase (129 acres).
- Juncos had the highest percentage of change in area covered by urban land uses during this time period (36%), whereas Ceiba had the lowest (8%).

Conclusion

Urban areas increased by 21% from 1998 to 2010. Differences were found in the total amount and percentage increase of urban land cover in the municipalities that contain El Yunque within their boundaries. The information provided in this fact sheet can help stakeholders visualize the areas surrounding El Yunque that contain the most urban land cover and where urban areas have increased in the last twelve years. Knowledge of where changes are occurring over time and to what extent can assist with future urban land-use planning and decision making that can support El Yunque's ecosystem services.



Additional Resources

López-Marrero, T. 2003. The study of land-cover change in a Caribbean landscape: what has happened in Puerto Rico during the last two decades? *Caribbean Studies*. 31(2): 5-36.

Lugo, A.E.; López-Marrero, T.; Ramos-González, O.M. [and others]. 2004. Urbanización de los terrenos en la periferia de El Yunque. Gen. Tech. Rep. WO-66. Washington, DC: U.S. Department of Agriculture Forest Service. 29 p. In Spanish.

Acknowledgements

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- El Yunque Ecosystem Services: A Participatory Research Approach
- Land Cover within and around El Yunque National Forest
- Urbanization Trends and Zoning around El Yunque National Forest

- Landowner Incentives for Conservation around El Yunque National Forest
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GIS Data

The 1998 and 2010 urban land-cover GIS data are available and can be downloaded from the InterfaceSouth website at www.interfacesouth.org/projects/el-yunque

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For more information

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