# Land Value Capture instruments for Green Resilient Infrastructure benefits

## the urban environmental corridor Cañaveralejo in Cali, Colombia

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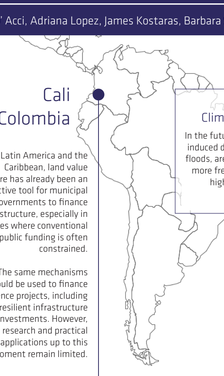
*Financing urban climate resilience is a critical urban challenge, particularly in low and middle income countries.*

*Combining the field of climate change adaptation and resilience with land policy to explore financing resilience is a new and promising concept to explore.*

*Green infrastructure and ecosystem services support cities to reduce flood risk and enhance cimate resilience, while simultaneously delivering other sustainability benefits.*

*Green corridors for flood management, restoration of natural floodplains, multifunctional public space for recreation and stormwater management, are examples of green infrastructure that can enhance urban resilience.*



### Cali Colombia

In Latin America and the Caribbean, land value capture has already been an effective tool for municipal governments to finance infrastructure, especially in cases where conventional public funding is often constrained.

The same mechanisms could be used to finance resilience projects, including green resilient infrastructure investments. However, research and practical applications up to this moment remain limited.

### Climate change

In the future, climate change induced disasters, including floods, are expected to occur more frequently and with higher intensity.

### Urbanization

Unsustainable patterns of development and reduction of vegetation in cities increase the challenges faced by the population living in flood risk prone areas.

### Flood risk

The impact of floods on land and real estate values is receiving increased attention.
In most Latin American cities, the poorest population is generally the most vulnerable to the effects of natural disasters and floods.

## Research questions

Can green resilient infrastructure increase land values, particularly at risk areas like the Cañaveralejo project area?

How can resilience (risk reduction) and other benefits of green resilient infrastructure projects be captured using land value capture instruments?

Which benefits of green resilient infrastructure projects can impact land or real estate values in Cali?

Can Colombia's land value capture mechanisms for general purposes be used effectively to finance green resilient infrastructure projects in Cali?

## Research findings

Quantitative analysis combining a hedonic pricing model with GIS, was conducted at the city level in Cali and at the Cañaveralejo area. This analysis demonstrated that investments in green resilient infrastructure for flood risk reduction will increase land values and that the increment can be captured to finance further investment on urban resilience.

To date, there have been few examples of the use of land value capture to explicitly fund investment in climate adaptation measures in Latin America and the Caribbean. However, the findings of this study indicate that the application of specific land value capture instruments to finance green resilient infrastructure and risk reduction is as a possible scenario and a promising idea.

At the non-canalized, river segment of Cañaveralejo, green resilient infrastructure interventions such as bike lanes, pedestrian paths, trees and vegetation are expected to increase land values due to the benefits they provide. Flood risk reduction will also increase land values, both at the river and the canal (gray infrastructure) segments. However, the benefits due to the green infrastructure interventions are richer than only flood reduction.

The feasible land value capture instruments are limited by technical, administrative and political challenges. Stakeholders and experts concluded that land value capture mechanisms that are incentive-based, such as "aportes por edificabilidad" would be more effective than taxes and betterment levies such as "valorization", in generating resources to finance urban resilience.

## Methodology


The Cañaveralejo area

green resilient infrastructure: Cañaveralejo project

flood risk reduction benefit

green infrastructure benefits

*other benefits*

*avoided costs (damages) method*

*avoided costs (insurances) method*

hedonic pricing model

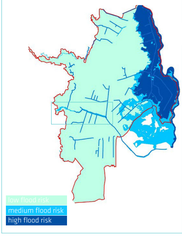
*willingness to pay method*

land values before the intervention

Market land values
The source is the Lonja of Cali, a database based on market transactions. The Lonja is considered more accurate than the cadaster values as it based on registered transactions.

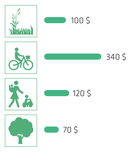
Cali flood risk map

The city-wide flood risk map was developed combining:
- existing studies for flood risk
- interviews with flood risk experts
- empirical knowledge




flood risk reduction variable

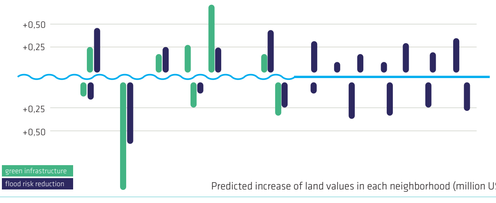
green infrastructure variables



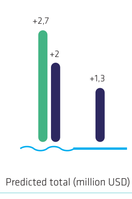

Land value increment, per unit of green infrastructure variable

predicted land values after the intervention

financing green resilient infrastructure




Predicted increase of land values in each neighborhood (million USD)




Predicted total (million USD)

land value capture instruments assessment

### Valorization (betterment contribution)

Valorization is a type of tax that finances the cost of a public project by creating a proportional levy on all those who benefit from the project.

Strengths
+ The contribution imposed on residents is divided among affected properties and is calculated in proportion to the benefit they receive
+ This levy can be applied before, during or after construction to recover the cost of a project.

Weaknesses
- It is a cost recovery mechanism, not an income generating instrument.
- Cali voters are skeptical of valorization taxes because of past experiences of corruption in municipal government, where the planned projects were not finally implemented.

*The land value capture instruments assessment was based on stakeholders workshops in Cali, experts' judgement and desk study.

### Plusvalias (unearned increments)

Plusvalias are taxes defined by law as the main financing instrument for urban interventions in Colombia. They reflect the estimated difference between the commercial value of property before and after the intervention.

Strengths
+ The tax rate is informed by the socio-economic conditions of property owners.
+ It is a strong income generating mechanism for local giovernements.

Weaknesses
- Plusvalias are challenging for voters to understand as their impacts are visible over a longer period.
- Property owners pay plusvalias when they apply for building permits, so informal settlements are excluded.
- Cali never implemented plusvalias up to date.
- Cañaveralejo is not indicated as an area where plusvalias can be implemented, in the land use plan.

### Aportes por edificabilidad (max. building envelope)

In the land use plan, a provision allows additional density above the 'base construction index', to be awarded to developers in exchange for providing amenities, such as public open space.

Aportes por edificabilidad is a mechanism that allows the public sector to negotiate with private developers to build or fund the construction of public space and infrastructure, including green resilient infrastructure, in exchange for the rights to build at a higher density.

Strengths
+ Aportes por edificabilidad theoretically and empirically (based on the examples in Medellin and Cali) triggers a "virtuous circle" of beneficial investment in resilient urban development.
+ This instrument is perceived by stakeholders as an incentive rather than a punitive measure.

### Challenges for the implementation of land value capture for public investments on urban resilience in the context of Cali, Colombia

**Lack of trust / willingness to pay taxes**
The prior experiences with corruption make the public skeptical about the capacity of government to administer plusvalias programs or valorization taxes. Government will need to make an upfront investment in pilot projects and other initial interventions to inspire public confidence.

**Coordination of many stakeholders**
Resilience projects in Cali will require the establishment of a public agency to coordinate the large number of institutional stakeholders.

**Punitive measures may discourage investors**
Punitive measures such as valorization and plusvalias risk having the effect of discouraging investment. During a stakeholder workshop and interviews conducted in Cali, participants expressed an interest in involving the private sector in flood risk reduction, in support of initial investments by the public sector. However this should be done on an ecouraging, voluntary basis, by offering incentives rather than imposing punitive measures like taxes.

**Low investment and maintenance costs**
The relative low cost of the Cañaveralejo project does not necessitate additional or alternative financing because the responsible intitutions have the public funding to support this project. The project also benefits from a program in which private companies and institutions adopt and maintain public spaces in exchange for tax reductions by the city. For these reasons, land value capture instruments for project financing are not being strongly considered.

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