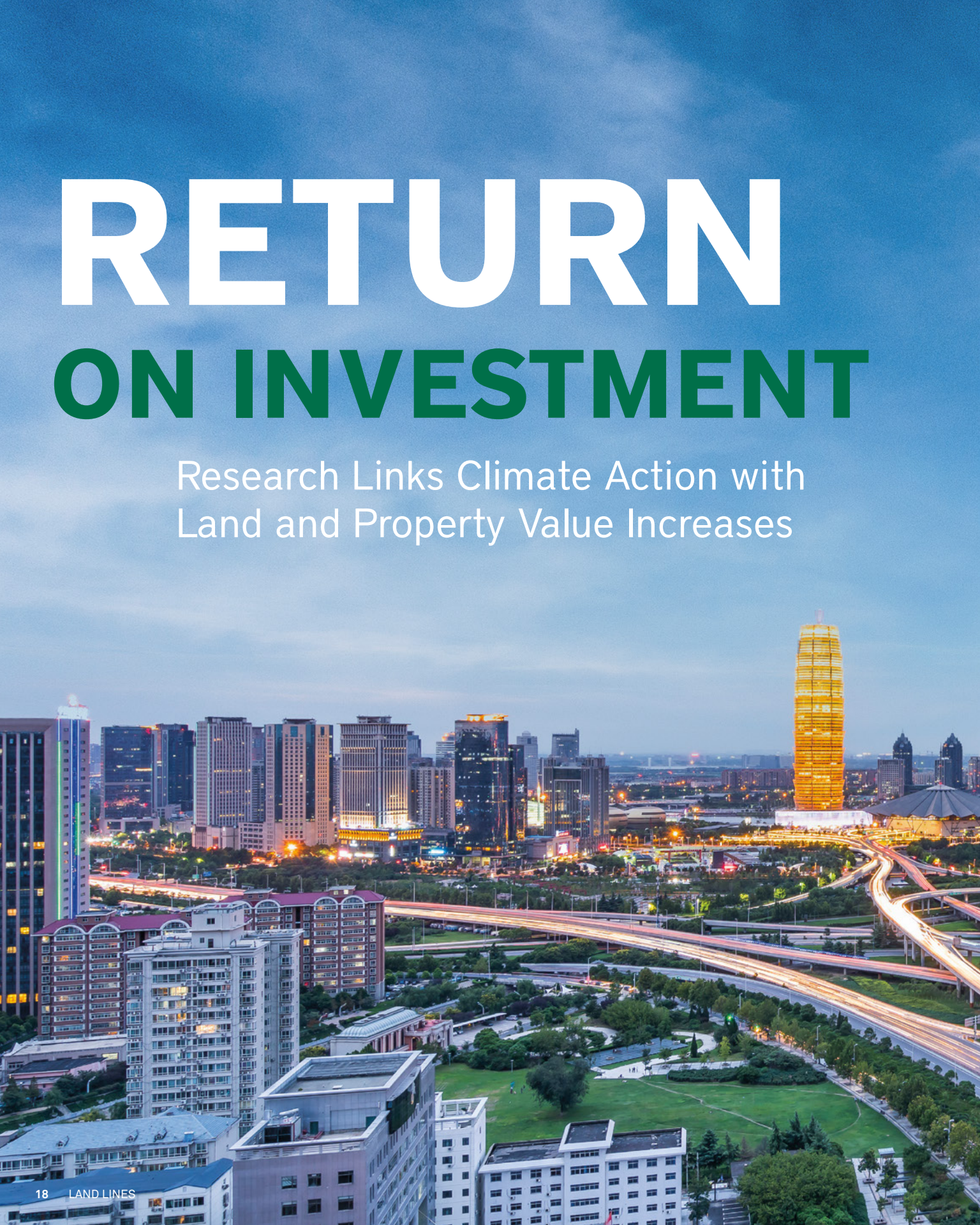
RETURN ON INVESTMENT

Research Links Climate Action with Land and Property Value Increases



By Anthony Flint

IN THE CHINESE CITY OF ZHENGZHOU, a manufacturing center located roughly halfway between Beijing and Shanghai, eye-stinging smog routinely put the metropolis on lists of the most polluted cities in the world. About 10 years ago, local leaders joined a comprehensive national clean air action plan, initiated by multiple central government departments and designed to reduce emissions from industry, energy production, land use, and other consumptive activities.

A few years later, the results were literally clear—nothing dramatic, but more blue skies, and enough of a difference to influence social behavior such as people's willingness to travel and be outside. And a team of researchers discovered something else: the air-quality improvements correlated with across-the-board increases in property values.

Using a spatio-temporal model that clearly quantified the association between cleaner air and land values, the researchers determined that improving air quality by 10 percent led to citywide increases in property values of 5.6 percent, said Erwin van der Krabben, professor at Radboud University in the Netherlands. Over time, that could translate to a potential uplift of $63 billion, Van der Krabben said.

"We can predict, if you further improve air quality, how much value you will get, and so on," said Van der Krabben, who is documenting the ramifications of climate action globally. He recently coauthored a Lincoln Institute working paper on air quality and land values in China with Alexander Lord of the University of Liverpool's School of Environmental Science and Guanpeng Dong, professor of quantitative human geography at Henan University (Lord, Van der Krabben, and Dong 2022).

The idea that environmental action leads to higher land and property values may seem obvious to some, but for the most part, it has not been well demonstrated. The kind of analysis done in Zhengzhou is important because it directly links environmental improvements to increasing value. Demonstrating that link is crucial in making the case for a financial tool that could be essential for addressing the climate crisis: land value capture.

The idea that environmental action leads to higher land and property values may seem obvious to some, but for the most part, it has not been well demonstrated. The kind of analysis done in Zhengzhou is important because it directly links environmental improvements to increasing value.

Once a little-known financial instrument, value capture is used around the world to help fund transit, affordable housing, open space, and other public infrastructure. The approach calls for developers and landowners to contribute a portion of the increases in property value, or land value increment, that are prompted by public investment and government actions. Municipalities use the resulting revenue for infrastructure or other projects that benefit the public (Germán and Bernstein 2020).

As the world prepares to spend trillions of dollars in a massive effort to transition from fossil fuels, reduce emissions, and build resilience, value capture could help close the global climate finance gap, particularly at the local level.

Establishing that what's good for the planet is good for the economy, Van der Krabben said, gets to the heart of the fiscal argument to use value capture. In China, where land is state owned and leased to developers, land value

Zhengzhou, Henan Province, China. Credit: Zhang mengyang via iStock/Gettty Images.

increases get built into the price developers pay. "So if Chinese cities act in a rational way, if they invest that additional income from land leases, if they continue investing that in cleaner air, then you have this kind of virtuous cycle," he said.

Accordingly, increasingly sophisticated valuation and assessment methodologies are being deployed to describe the impact of government action on land and property values—and not just detailing how a new transit station or a flood-resilient park creates uplift in a local neighborhood, but how broader policies, like clean air requirements or the promotion of walking, biking, and transit, can have a positive economic impact across a wider catchment.

The "virtuous cycle" analysis may make not only a powerful economic argument for a shared responsibility in financing climate action, but a moral one, too. In many places, private developers and landowners generally walk away with the windfalls created by public investments.

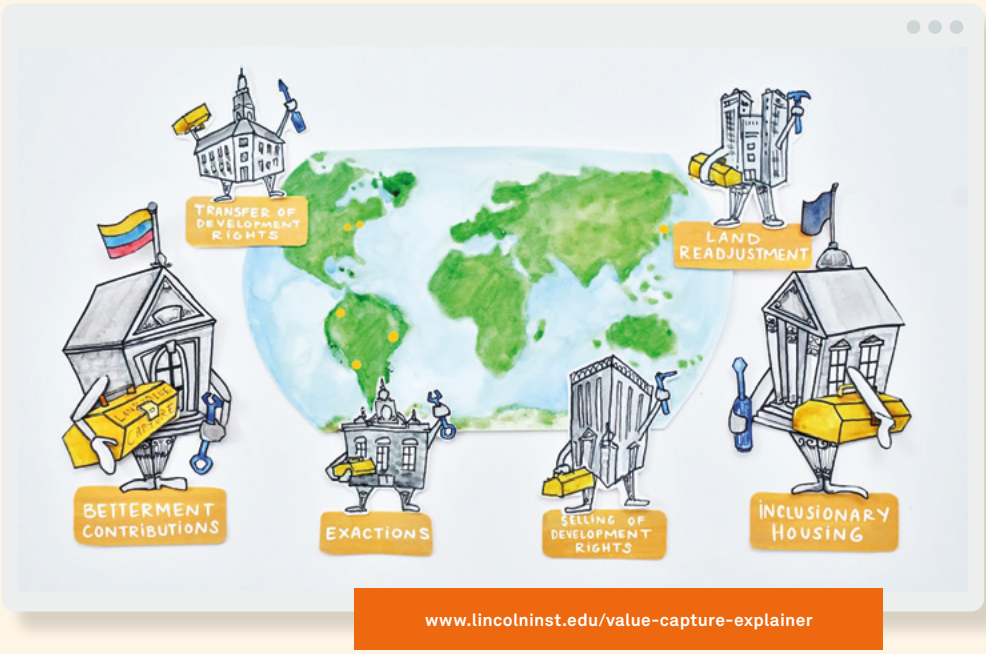
"There's a well-documented lack of funding for the action that's needed to address the climate crisis," said Amy Cotter, director of Climate Strategies at the Lincoln Institute. "Precious little of it operates like land value capture: created by the very action it enables, within local control." Land value capture "won't solve climate finance, but we see its significant potential to fill an important gap," Cotter said.

ONE COMPELLING FEATURE of the Zhengzhou air pollution case study is that the benefits were spread across an entire city. But a wide range of projects and policies that can contribute to climate resilience are manifesting themselves economically in urban contexts, whether at the scale of one city block or an entire neighborhood:

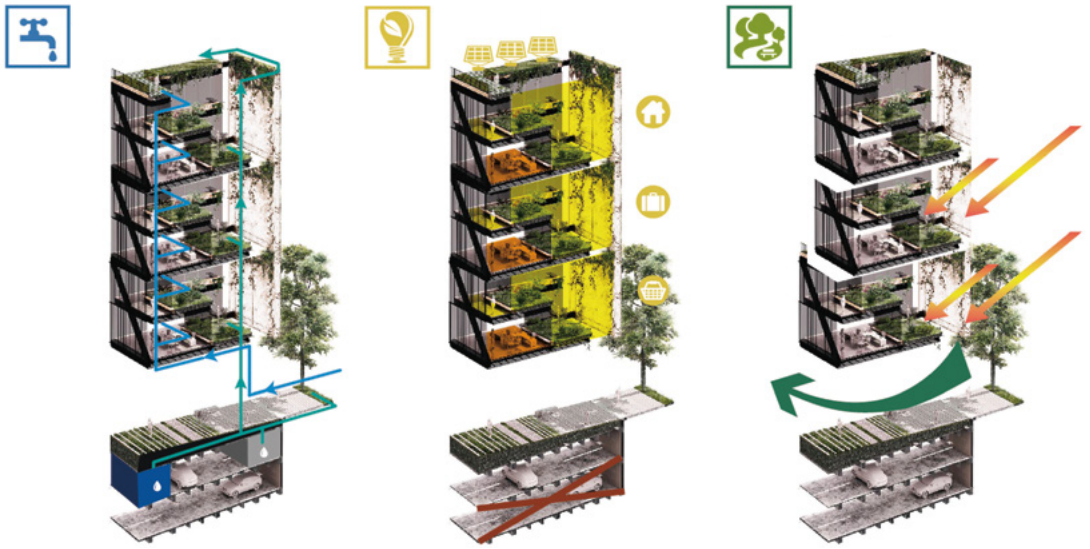
A wide range of projects and policies that can contribute to climate resilience are manifesting themselves economically in urban contexts, whether at the scale of one city block or an entire neighborhood.

LEARN MORE ABOUT LAND VALUE CAPTURE

The Lincoln Institute offers many resources for understanding the many forms land value capture can take, including an explainer video (https://www.lincolninst.edu/value-capture-explainer); a policy brief, *Land Value Return: Tools to Finance Our Urban Future*, by Lourdes Germán and Allison Ehrich Bernstein (https://www.lincolninst.edu/publications/policy-briefs/land-value-return); and a forthcoming Policy Focus Report, *Land Value Capture in the United States: Funding Infrastructure and Local Government Services*, by Gerald Korngold (September 2022).



www.lincolninst.edu/value-capture-explainer



1. Water Efficiency

2. Energy Efficiency

3. Technological, Urban, and Environmental Contributions

In Quito, Ecuador, land value capture is a key element of an effort to encourage greener buildings and high-density, transit-oriented construction. Credit: Secretaria de Territorio Habitat y Vivienda, Quito.

- The Eco Efficiency Ordinance for the Metropolitan District of **Quito**, which won a Guangzhou Award for Urban Innovation in 2021, incentivizes energy efficiency and density by selling developers the right to construct taller buildings if the projects have green elements and are near transit. Since the city adopted the ordinance in 2016, 35 projects have been approved that penciled out so well, developers had no issues returning a portion of their profits through this value capture tool. The city will invest the $10.7 million raised so far in improvements such as parks and affordable housing, and is making the ordinance part of its new land use and management plan.

- A study by the Center for Neighborhood Technology and SB Friedman Development Advisors found that green stormwater infrastructure installations in **Seattle and Philadelphia**, such as rain gardens and swales, resulted in statistically significant increases in sales prices of homes nearby (CNT and SB Friedman Development Advisors 2020). Doubling the square footage of rain gardens, swales, planters, or pervious pavement within 250 feet of a home is associated with a 0.28 percent to 0.78 percent higher home sale value, on average.

- In **Buenos Aires**, a similar assessment of proposed blue-green infrastructure projects in the Medrano Stream Basin found strong potential for positive land value impacts stemming from both the reduction of flood risk associated with traditional gray infrastructure, and the improvements in public green space (Kozak et al. 2022). The authors cite a project that improved public access to the Paraná River in Santa Fe, Argentina, as an example of how this can play out; the revitalization of that waterway led to an average land value uplift of 21 percent within a 10-block band of the waterfront.

- Major transit projects around the globe that are contributing to decarbonization goals, from **Tokyo's** Tsukuba Express transit extension to

The Canary Wharf Crossrail station in East London. Land value capture policies yielded more than $1.2 billion of the $23 billion capital costs for the rail network, also known as the Elizabeth line. Credit: Jui-Chi Chan via iStock/Getty Images Plus.

the modernization and electrification of the interurban passenger railway in **San Jose, Costa Rica**, to **London's** Crossrail project—the latter expected to achieve approximately 2.75 million tons of carbon savings over its lifetime—are being financed largely or in part by the assumption that property values will increase all along their corridors.

- Developers and homeowners alike seek safety from rising seas and other climate impacts, and are willing to pay for that sense of security. **Boston** has established a Climate Resiliency Fund, to which developers contribute to help the city coordinate the construction of seawalls and natural systems to keep prized urban land high and dry. Contributing toward adaptation is increasingly seen as a small price to pay to safeguard real estate assets and ensure their continued inherent value, said Brian Golden, the recently retired director of the Boston Planning and Development Agency.

The same appears to be true for individual homebuyers. They've always taken into account property characteristics and consumer preferences such as the number and composition of rooms or the quality of the local public schools. Now they want to know about—and might be willing to pay more for—features that make the home more resilient to climate change, according to Katherine Kiel, an economics professor at College of the Holy Cross in Massachusetts and author of a Lincoln Institute working paper on adaptation and property values (Kiel 2021).

WHILE THE CONNECTION between environmental interventions and an uplift in values is positive news for property owners and developers, it has a complicated relationship with gentrification and displacement. One prominent recent example of green improvements affecting local economics is the daylighting of the Saw Mill River in Yonkers, New York, which transformed a downtrodden business area so dramatically that housing

prices shot up all around the adjacent area, said Cate Mingoya, national director of Climate Resilience and Land Use at Groundwork USA. It was "the perception of a cleaner, greener space" that led to the increases, Mingoya said.

"There's nothing about the installation of trees or the daylighting of a river that forces landlords to raise rents so sharply. There's nothing that says that landholders must be entitled to maximize profit from a system that is highly, and unfairly, regulated to their advantage," she said.

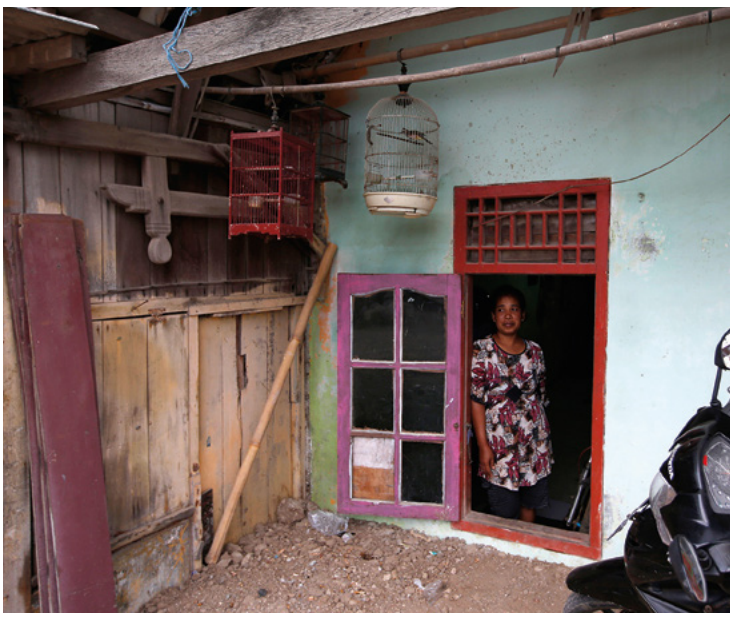
But property owners can and do cash in on these kinds of public investments, said Mingoya, who facilitates cross-sector partnerships to implement climate adaptation measures in vulnerable communities. Some communities seeking to temper green gentrification deploy measures that are "just green enough . . . where a limited number of improvements are made to low-income neighborhoods in an attempt to ward off displacement." These efforts sometimes border on the absurd, Mingoya said: "Should they get 30 trees or 10 trees?" But they clearly demonstrate the growing awareness that green interventions and rising values are linked.

(Strategically designed land value capture policies can help mitigate cases where environmental interventions are associated with gentrification and displacement, with provisions to increase affordable housing, for example.)

Viewed from another perspective, bad environmental conditions that are unaddressed or only partially addressed have a negative economic effect. One recent report by researchers at several universities in Utah estimates that polluted air shortens life expectancy by two years and costs the state nearly $2 billion a year. Some local and state governments are keeping a running tally of the damage caused by climate change, according to the Pew Charitable Trusts, in preparation for litigation against fossil fuel companies.

The absence of climate action—in cases when municipalities can't or won't implement resilience infrastructure and other measures to halt flooding, sea-level rise, mudslides, and the like—drives down values precipitously. A study of land subsidence in Java, Indonesia, where homes have sunk into unstable soil, found that the local practice of rebuilding on sinkhole sites—sometimes two or three times, done in the hopes of salvaging economic viability—did nothing to halt the decline in property values. The only solution for plummeting values, says the study, which was also led by Van der Krabben, would be a massive overhaul of water and soil management—or to give up on the land entirely. Indonesia is moving ahead with the wholesale relocation of its capital city, Jakarta, largely for this reason.

The absence of climate action—in cases when municipalities can't or won't implement resilience infrastructure and other measures to halt flooding, sea-level rise, mudslides, and the like—drives down values precipitously.



In Java, Indonesia, a resident stands by a window that now serves as a door in a house affected by land subsidence. Credit: Willy Kurniawan/REUTERS/Alamy Stock Photo.

In Miami, a big part of the argument for private sector contributions to resilience infrastructure is that without speedy action, more real estate is virtually guaranteed to be underwater. Seen in this way, protective measures do more than enhance land and property values; they stop values from being less than zero, by keeping land from becoming uninhabitable.

EVEN AS EVIDENCE OF THE LINK between environmental action and economic uplift grows, many barriers must be overcome to make land value capture work. National urban development laws need to be reformed to authorize more local governments to mobilize land value increments and permit own-source revenue. Around the world, a pressing need remains to improve institutional capacity, good governance, land controls, and tenure systems.

Even as evidence of the link between environmental action and economic uplift grows, many barriers must be overcome to make land value capture work.

Governments will also need to keep in mind that land-based finance is just one way to fund climate and environmental initiatives, more suitable for closing gaps than for serving as the sole or primary source of revenue for a carbon-neutral world.

Policy makers may also have to guard against overreach. The benefits of a new transit station on adjacent properties are "plain as day," said Van der Krabben, so developers are more eager to contribute to such infrastructure. The ultimate payoff of an environmentally progressive citywide or regional policy—say, bans on fossil fuel heating and cooling systems in new construction, such as the natural gas bans enacted in major U.S. cities including Seattle, San Francisco, and New York—may be a tougher sell.

"What you really want is for developers to contribute to regional investments, but that's more difficult to negotiate. The benefits are more indirect," Van der Krabben said.

All the more reason, scholars say, to revisit the valuation and assessment practices that establish land and property value increases in the first place. More sophisticated valuation methods have improved assessment accuracy, said Lincoln Institute Senior Fellow Joan Youngman, citing the International Association of Assessing Officers (IAAO)'s technical standard on mass appraisal of real property designed to improve the fairness, quality, equity, and accuracy of valuation. Mass appraisal is defined in that standard as "the process of valuing a group of properties as of a given date and using common data, standardized methods, and statistical testing."

The assessment process may soon be aided by some technological wizardry. The International Property Tax Institute and IAAO both issued recent white papers on the potential use of Artificial Intelligence (AI) in property assessment. While AI poses some challenges and uncertainty, the hope is that it could produce more accurate values than those obtained by traditional approaches.

When it comes to identifying the effects of public action and investment on land value, modern tools, data analytics, and statistical techniques will help identify and measure value increments, Youngman said.

Armed with good practices, a theoretical rationale, and a growing list of cities around the world that have put value capture to use, those addressing the climate crisis hope the connection is becoming clearer between the massive public investments necessary to salvage the planet's future and the economic bounty they provide—and, ultimately, the ways that bounty can be reinvested for the public good (Bisaro and Hinkel 2018, Dunning and Lord 2020, Van der Krabben, Samsura, and Wang 2019).

Golden, the outgoing Boston planner, said he has sensed a "cultural shift" among landowners

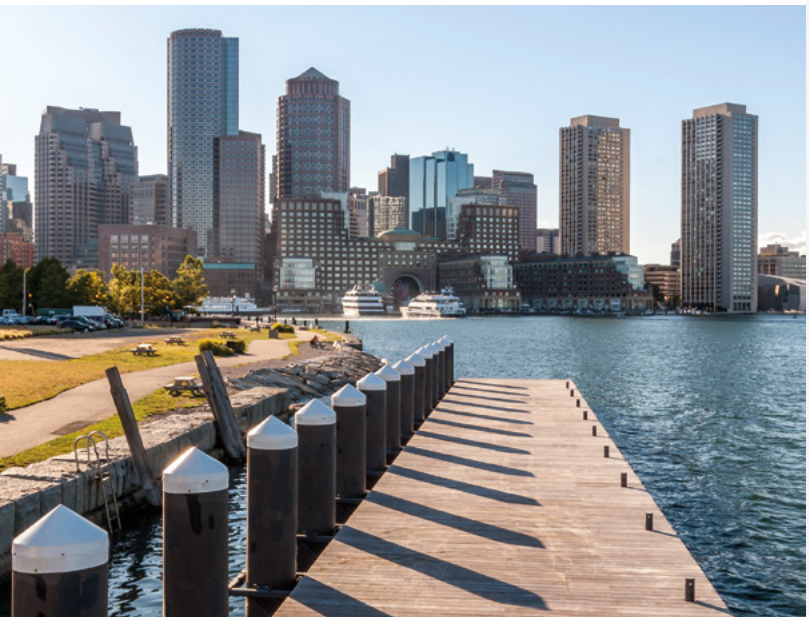
and developers, who recognize that public investments in resilience infrastructure plainly protect private real estate assets, making them more likely to help foot the bill.

"What you really want is for developers to contribute to regional investments, but that's more difficult to negotiate. The benefits are more indirect."

Requiring developers to help finance the berms, seawalls, and natural systems restoration that will guard against an estimated 40-inch sea-level rise along the city's 47-mile coastline is seen as a matter of self-interest, Golden said—not only for individual development sites, but also for the continued prosperity of Boston as a regional economic engine. The private sector has exerted virtually no pushback on initiatives like the resiliency fund. "We have a lot of work to do," Golden said. "They get it."

Anthony Flint is a senior fellow at the Lincoln Institute, host of the *Land Matters* podcast, and a contributing editor to *Land Lines*.

In Boston, developers contribute to the costs of protecting the city's vulnerable waterfront. Credit: Marcio Silva via iStock/Getty Images Plus.



REFERENCES

Bisaro, Alexander, and Jochen Hinkel. 2018. "Mobilizing Private Finance for Coastal Adaptation: A Literature Review." *WIREs* 9(3). https://doi.org/10.1002/wcc.514.

CNT and SB Friedman Development Advisors. 2020. "Green Stormwater Infrastructure Impact on Property Values." November. Chicago, IL: Center for Neighborhood Technology. https://cnt.org/publications/green-stormwater-infrastructure-impact-on-property-values.

Dunning, Richard J., and Alex Lord. 2020. "Viewpoint: Preparing for the Climate Crisis: What Role Should Land Value Capture Play?" *Land Use Policy* Volume 99. December. https://www.sciencedirect.com/science/article/abs/pii/S0264837720302908?via%3Dihub.

Germán, Lourdes, and Allison Ehrich Bernstein. "Land Value Return: Tools to Finance Our Urban Future." Policy brief. Cambridge, MA: Lincoln Institute of Land Policy (January). https://www.lincolninst.edu/publications/policy-briefs/land-value-return.

Kiel, Katherine A. 2021. "Climate Change Adaptation and Property Values: A Survey of the Literature." Working paper. Cambridge, MA: Lincoln Institute of Land Policy (August). https://www.lincolninst.edu/publications/working-papers/climate-change-adaptation-property-values.

Kozak, Daniel, and Hayley Henderson, Demián Rotbart, Alejandro de Castro Mazarro, and Rodolfo Aradas. 2022. "Implementación de Infraestructura Azul y Verde (IAV) a través de mecanismos de captación de plusvalía en la Región Metropolitana de Buenos Aires: El caso de la Cuenca del Arroyo Medrano." Working paper. Cambridge, MA: Lincoln Institute of Land Policy (February). https://www.lincolninst.edu/publications/working-papers/implementacion-infraestructura-azul-verde-iav-traves-mecanismos. [English version available at https://www.mdpi.com/2071-1050/12/6/2163.]

Krabben, van der, Erwin, Samsura, Ary, and Wang, Jinshuo. 2019. "Financing Transit Oriented Development by Value Capture: Negotiating Better Public Infrastructure." Working paper. Cambridge, MA: Lincoln Institute of Land Policy (June). https://www.lincolninst.edu/sites/default/files/pubfiles/van_der_krabben_wp19ek1.pdf.

Lord, Alexander, Erwin van der Krabben, and Guanpeng Dong. 2022. "Building the Breathable City: What Role Should Land Value Capture Play in China's Ambitions to Prepare for Climate Change?" Working paper. Cambridge, MA: Lincoln Institute of Land Policy (June). https://www.lincolninst.edu/publications/working-papers/building-breathable-city.