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80583

EAP DRM KnowledgeNotes

Working Paper Series No. 26

Disaster Risk Management in East Asia and the Pacific

Urban communities in northern Bangkok, Thailand.

LAND VALUE CAPTURE IN URBAN DRM PROGRAMS

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SUMMARY

Risk-sensitive land use planning is vital for sustainable economic development and effective disaster risk management (DRM). Urban development programs should adopt risk-sensitive land use planning to encourage resilient development guiding the growth of people, assets and services within and away from hazardous zones. Many East Asia and the Pacific (EAP) countries have national land use policy and local plans which incorporate risk assessments; however, they typically lack the means for their implementation and incorporation into development planning[1]. Facing these constraints, local governments are attracted to economic instruments, such as land value capture (LVC), to leverage finances. Among a wide array of LVC tools, land readjustment (LR) and transfer of development rights (TDR) are particularly relevant as they can spatially direct urban development away from disaster risks. This note introduces the potential of LR and TDR for DRM as seen in their application in Brazil, India, Japan, and the US. The note recommends that if municipalities build capacity for strategic land management, LR and TDR can be used effectively to finance and implement risk-sensitive land use plans. LR offers to accommodate and plan for risks with minimal displacement while TDR promises to equitably relocate development away from hazardous sites through the real estate market.

LAND MARKETS, DISASTERS & THE PROMISE OF LVC

While the EAP region has made significant progress in managing disaster risks through legislation, institutional strengthening, risk identification, communication and mitigation measures, the region lags behind in addressing the underlying risk factors[2], in particular, through land use planning. Some EAP countries have used LVC tools since several decades; others are seeking them to implement risk-sensitive land use plans. LVC tools are based on the premise that since investments in land development increase its value, the speculated increase in land value can be captured beforehand to leverage private investments and finance urban projects that distribute public benefits equitably.

This working paper series is produced by the East Asia and Pacific Disaster Risk Management Team of the World Bank, with support from the Global Facility for Disaster Reduction and Recovery (GFDRR). The series is meant to provide just-in-time good practice examples and lessons learned from projects and programs related to aspects of disaster risk management.

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LVC tools are attractive to municipalities as they promise to address challenges in land market efficiencies, particularly in lieu of risk information and hazard events (see table 1). Land markets respond to hazard information. Hazardous sites are often inexpensive and affordable to the urban poor, thus make them disproportionately vulnerable. After a disaster, land markets first drop due to extensive destruction and persistence of blight and then typically boom with risk mitigation or post-disaster reconstruction investments. Usually, the owner-occupied housing market recovers faster than the rental market. Developers may struggle to obtain finance in weak property markets post-disaster. Post-disaster investments increase property value and potentially gentrify low-income neighborhoods. Demarcating no-build zones results in drastic changes in land values within such zones and outside. Land values drop in the risky areas and increase in the safer parts. Delays in announcing reconstruction policies or no-build zone spurs land speculation[3]. Given that risk information affects land markets, risk communication spurs land speculation, and resilient reconstruction can significantly increases land value, it is possible to capture the increase in land value to implement DRM plans. Well-designed policies after a disaster can result in relatively accessible land markets.

I. LAND READJUSTMENT

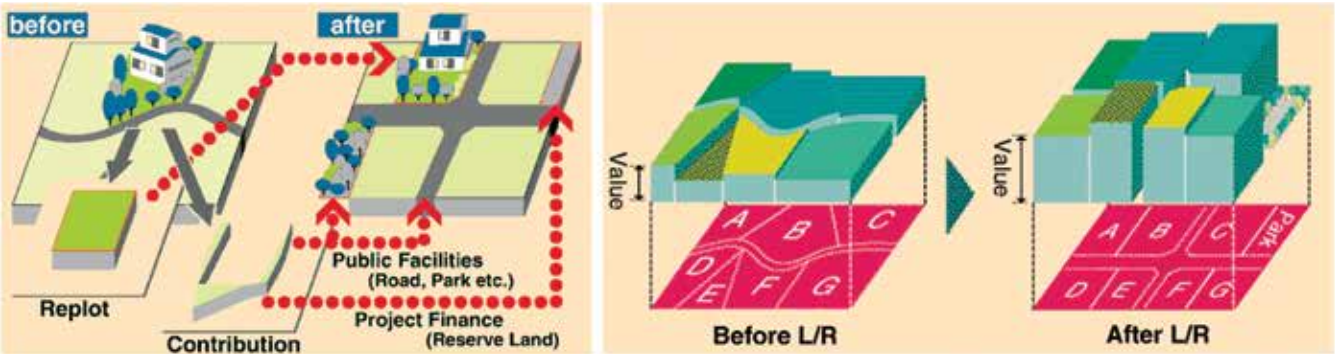
LR (or land pooling / sharing) works on the principle that potential increase in land value after development will provide incentive to landowners to contribute and pool land for public amenities. LR has been applied globally to create serviced plots in the periphery, optimize land use through densification, acquire land for infrastructure projects, regularize tenure, slum upgrading and inner-city revitalization apart from post-disaster reconstruction[5]. In an LR project, a portion of land is deducted from all land owners to provide: i) amenities, and ii) market sale of surplus plots to recover part or all of development costs. Neighborhood layout is rationalized to carve space for public amenities such as roads, schools, hospitals and open spaces. Plots are

Table 1: The Promise of Land Value Capture Tools

Challenges in Implementing Land use plans for DRM[4]	Potential Benefits of LVC Tools
■ **Political commitments** are shorter than typical land use planning cycles; ■ **Strong public opposition** to land acquisition and relocation since compensations are inadequate and restrictions on housing in buffer zones are not supported with timely relocation; ■ **Safe, serviced and affordable urban land** is scarce; land scarcity is exacerbated by out-dated land use regulations; land tenure is often ambiguous; land records may be outdated, erroneous or lost, and land management capacity is mostly inadequate; ■ **Finance** for land acquisition is limited; funds available during emergency/ relief usually fall short during reconstruction; ■ **Existing inequities** may be reinforced since relocation disrupts socio-economic lifelines of the urban poor; if land title is a pre-requisite for housing assistance, relocation/ reconstruction programs exclude renters and informal residents; residents with weak tenure may be reluctant to evacuate in fear of losing their land; rapid land value appreciation with post-disaster reconstruction tends to gentrify neighborhoods.	■ **Public opposition is avoided** by compensating land owners appropriately and minimize relocation; ■ **Overall supply of serviced urban land and housing is increased** in the city by reviewing land use regulations; ■ **Public finance is minimized** for public amenities by leveraging private investment; ■ **Equitable distribution of public amenities**; benefits of development financed by land value increase are shared by all economic sections; additionally informal residents, renters and low-income households can be accommodated with provisions for occupancy rather than ownership rights; ■ **Politically acceptable** tools to implement land use plans for DRR.

reshaped and resized to accommodate existing land owners who receive smaller but regular, serviced plots that are equivalent or greater than the former value. Additional plots for renters and informal residents may be provided. Land use may be optimized for densification and mixed use. LR projects rely on voluntary or mandatory community cooperation[6].

Figure 1: How Land Readjustment Works



Source: Schnidman, Frank. "Land Readjustment." Urban Land, February 1988: 2-6.

LR is a useful tool in post-disaster reconstruction to `build back better' on safe pockets with hazard-resilient building regulations. The Earthquakes and Mega Cities Initiative (EMI) promotes LR as a tool to incorporate DRM in urban development[7].

Key benefits of LR projects: i) continued land ownership, ii) recognition of different land tenure arrangements, iii) stronger consensus and cooperation amongst residents, community organizations, private developers and the government, iv) bargaining power offered to low-income residents through community consensus prior to project approval, and v) increased municipal revenues through property taxes from serviced land[8].

Key challenges of LR projects: A number of preconditions have to be met: i) land owners must believe that final profits will justify project and value improvements in neighborhood amenities and public infrastructure, ii) land ownership is not scattered, and affected landowners want to stay in the neighborhood, iii) destruction allows for readjusted plot boundaries and residents are equally impacted and willing to cooperate; where some houses are not damaged, individuals are likely to not want to lose some of their land for readjustment project, iv) technical skill is available for designing project incentives, v) ownership records (cadasters) are updated and reliable, and vi) potential disputes can be resolved through agreement or legislation[9].

CASE STUDIES

Japan Land Readjustment

Locally known as *Kukaku Seiri*, LR has been used extensively in Japan for post-disaster urban infrastructure (roads, station plazas, parks and sewer system) in major cities and regional towns[10]. After the 1995 Hanshin-Awaji earthquake, LR projects were implemented in the most severely affected urban centers in the Kobe region, particularly for redevelopment of aging neighborhoods from the 1940-50s[11]. By adopting risk-resilient construction practices for rebuilding, LR projects have reduced damage from future disasters. The damages in districts improved by LR after WWII in Kobe were less severe following the 1995 Hanshin-Awaji earthquake[12]. After the 2011 earthquake, the Sendai City Earthquake Disaster Reconstruction Plan recommends LR to accommodate relocation from inundated areas[13].

Project Design & Implementation: LR projects in Japan are voluntary, with legislation dating back to 1919[14]. Almost half have been implemented by private associations for suburban residential development or center-city redevelopment. Projects must conform to city's zoning and infrastructure requirements[15]. The 1992-93 master plan allows for densification in such projects[16]. Community consent is important, as readjusted plans, cost and revenue estimates as well as land contribu-

tion requirements from residents are subject to public comment and final plans are approved by landowners. Private associations must obtain agreement of the majority of landowners and lease holders. If there are a few hold-outs, legal procedures exist to buy-out landowners and ensure project implementation. Land contribution is typically 20% of land for public facilities and 10% for sale (called cost-equivalent land). Redistributed parcels must conform closely in terms of location, environmental condition, land use and size. Any equity loss must be compensated for, or else settled through financial adjustment[17]. In public projects, subsidies or low-interest loans from national, prefectural and local governments may supplement revenues from cost-equivalent land sold. After the 1995 Hanshin-Awaji earthquake, national finds paid for land and public facilities; the city also purchased land from willing sellers that helped minimize parcel reductions for those who remained[18]. Private projects are self-financed[19]. 70-80% of cost-equivalent land is sold at market rates to public agencies for schools/ public housing and the remainder is sold to owners/ lessees within the project area[20]. LR projects have 5-10 years timeline[21].

Misuga Nishi (Kobe) LR Project

Objective: Kobe city used LR simply as a means under the national law (Land Readjustment Law of 1954) to receive national funds for reconstruction after the 1995 Hanshin-Awaji earthquake[22]. In Misuga Nishi, a residential neighborhood of wooden row houses and narrow alleys, 70% of the wooden buildings in two blocks, Mikura 5 and 6, were burnt. The area was occupied by low-income families and elderly had a high proportion of tenants and multiple ownership of property. Landlords were reluctant to rebuild due to economic recession. The area was designated as part of the Disaster Restoration Land Readjustment Project to widen streets from 4-6 m, allocate space for parks and public open spaces, regulate and update building codes and zoning[23].

Actions: Two blocks were re-organized to include 2 high-rise apartment buildings (90 units) and 1 collective housing. A local volunteer group provided information and technical data on LR in appropriate language for the residents. They persuaded owners to rebuild new apartments and share the value of their lands with their tenants[24]. Volunteers also sent fliers to former residents of the Mikura community residing in distant emergency shelters[25]. The co-housing project accommodated tenants and small landowners with insufficient land for contribution. Additionally 10 off-site owners donated their land in the city in exchange for participation right[26].

Results: The project provided much needed open space in a declining inner-city neighborhood. Replacing small single family homes, the new multi-store building was resistant to earthquake and fire[27]. The project accom-

Figure 2: Misuga Nishi Land Readjustment Project

Mikura 5 and 6 Blocks before disaster & after LR project

Source: Yasui, Etsuko. Community Vulnerability and Capacity in Post-disater Recovery: The cases of Mano and Mikura neighbourhoods in the wake of the 1995 Kobe earthquake. Unpublished Thesis Report, University of British Columbia, 2007.

Mikura 5 and 6 Block

Source: Google Earth Satellite Imagery: 4/26/2012.

modated tenants; although many of the original owners did not move back into the community after LR as they had already settled in the relocation area. Only 1/3 of the original residents moved back and the overall population was less than before the earthquake even after 10 years[28].

Lessons from Japan Land Readjustment Projects: LR projects have been successful for several reasons: i) integration with the city master plan, ii) private associations are active in residential projects while the city complements with infrastructure projects, iii) tradition of community based planning in Japan is generally strong, iv) legislation supports selective use of eminent domain to ensure project implementation, v) successful cost recovery in private projects, and vi) risk-resilient building methods incorporated in reconstruction. **Challenges** include: i) finance for public projects, ii) community opposition especially from residents who do not appreciate the project benefits[29], iii) insufficient occupation despite densification, iv) retaining original owners if process is slow and emergency shelters are distant, and iv) duration of LR projects is long in the tight time frames of post-disaster reconstruction[30].

Gujarat (India)

Locally called *Town Planning Schemes* (TPS), LR is used as a mechanism for land assembly and plot adjustments in about 1/3rd of urban projects (Ahmedabad ring road, public spaces in unauthorized and peri-urban developments) in Gujarat state[31]. LR has been used for rebuilding 4 severely affected urban centers after the 2001 earthquake[32].

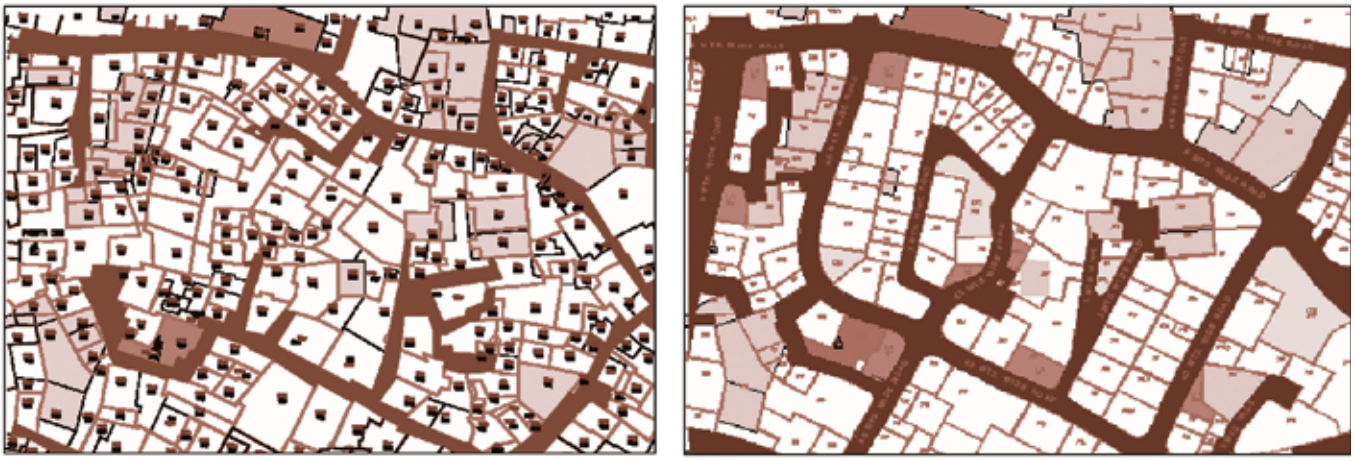
Project Design and Implementation: TPS projects are voluntary and must conform to the master plan. Legislation was established in Maharashtra and Gujarat states in 1915. Community engagement is not effective[33]. TPS is an elaborate multi-stakeholder exercise with legislative to technical departments involving more than 30 steps. Landowners transfer up to 40% of their land to the government in return for serviced plots. Only registered land owners are allowed to participate; renters and informal residents are excluded. Land owners can either build new homes or sell the sites. The government builds roads and public facilities and reserves a portion of land for sale by auction to recover infrastructure costs. The process is slow as local governments have no authority to sanction plans, manage land auctions or revise land use rules and regulations and state government approvals are required[34].

Bhuj Land Readjustment Project

Objectives: Bhuj town endured severe damages during the 2001 earthquake[35]. In the densely populated inner-city, buildings collapsed on narrow streets/ cul-de-sacs and hindered rescue efforts[36]. TPS was undertaken in the inner-city as part of comprehensive city-wide planning initiatives that included significant investments in social amenities at the periphery and trunk infrastructure to 3 relocation sites[37].

Actions: TPS was used in 8 inner-city sites to optimize density, control non-conforming land uses, ensure minimum lot size and plot access to roads and basic infrastructure in the inner-city. Residents had the option to relocate voluntarily or participate in the TPS. Many households preferred to move out of the congested walled city to the well-serviced and well-connected relocation sites in the periphery and the overall number of plots in the TP schemes reduced by 20%. Voluntary relocation reduced resistance to TPS in the inner city. Neighborhood committees were formed for micro-planning tasks. Eminent domain was used for compulsory surrender of plots and houses that were either severely damaged or obstructed the TPS layout. Plot access was ensured by widening streets where buildings had collapsed while maintaining the original street pattern and avoid disturbing built properties. Wide loop roads connected the walled city to the rest of the urban area and amenities[38]. Preparing the new layout was challenging since base maps were lacking, no accurate data was available for underground utilities and it was difficult to work around standing structures. Absence of updated property records caused delays in plot transfers[39]. TPS was sensitive to very small plot owners. There were no deductions for plots < 30sq.m. while plots > 300 sq.m. had to contribute 35%[40]. Further, to ease the burden on low-income residents, a 5 year moratorium on property tax was declared[41]. Land use regulations and development controls were revised to allow uniform height across all wards for seismic resilience[42].

Fig 3: Bhuj Inner-city Land Readjustment Project



Narrow streets and cul-de-sacs before disaster

Wider and continous streets after LR

Source: Jha et al. *Safer Homes, Stronger Communities: Resources for Reconstructing Housing and Communities after Natural Disasters.* Washington DC: The World Bank, 2010.

Results: The Bhuj TPS project decongested parts of the walled city by ensuing minimum lot sizes and plot access; but it did not minimize relocation. Although the process was expedited to be completed in half the time during post-disaster reconstruction, compared to a convention TPS in Gujarat, it cost the government almost a third more[43]. The significant expansion of serviced land in the periphery along with LR in the walled city appears to have moderated real estate price increase in the periphery; and the overall supply of safe, serviced and affordable land sites for the urban poor increased in Bhuj[44].

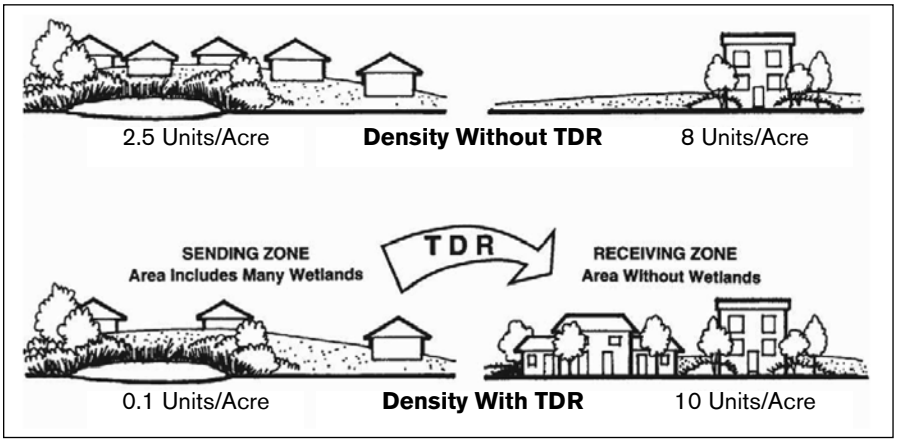
Lessons from Gujarat Land Readjustment Projects: The projects have been successful given their: i) integration with the master plan, ii) selective use of eminent domain ensures project implementation, and iii) combination with other LVC tools, such as tax holiday in Bhuj. **Drawbacks** include: i) focus on land owners only - renters and informal residents are excluded, ii) weak community engagement, and iii) delays caused by bureaucratic state government procedures for local development.

II. TRANSFER OF DEVELOPMENT RIGHTS

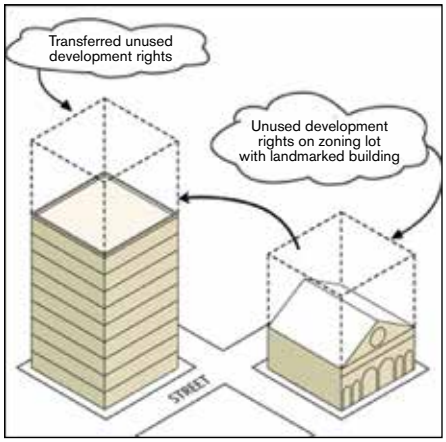
TDR (or density transfers / air rights) works on the principle that absolute property rights can be considered as a `bundle' of different rights, such as the right to build, to mine, to farm, among others and that these `partial' rights are available for market transactions. The concept of severance of rights is used in several countries for programs: farmland and environmental conservation, urban growth management/ TOD, heritage preservation and social housing[45]. The owner of a property with considerable public amenity (infrastructure, low-income housing etc.) value can trade `development rights' from a designated `sending zone' to a buyer for use in a designated `receiving zone' resulting in a `transfer of development rights'. The land owner in the sending zone loses his right to develop but is compensated for the development potential of his land at market value. The buyer, usually a private developer, is given density bonuses to provide public amenities. Developers may also trade development rights in the open market. TDR balances `wipeouts' for property owners in preservation areas where land values drop and `windfalls' for property owners in growth areas where land values increase[46]. The design of a TDR program can be complex and is based on a city's comprehensive plan and real estate market. TDR programs can be mandated or voluntary. Although municipal TDR programs are common, TDR programs are also planned to guide regional development[47].

TDR is a promising tool to guide development away from hazard buffer zones to high-density compact de-

Figure 4: How does Transfer of Development Rights Work



Source: Huron River Watershed Council: http://www.hrwc.org/publications/smart-growth-publications/transfer-of-development-rights/.



Source: New York City Department of City Planning http://www.nyc.gov/html/dcp/html/zone/glossary.shtml.

velopment in safe zones. The EMI endorses the use of TDR to reduce/ mitigate risk by reducing densities in most sensitive areas and conserving habitat[48]. In Philippines, TDR programs have been recommended for mainstreaming DRR through land use planning[49]. In Marikina, it is recommended for earthquake mitigation that is challenged by relocation of informal settlers from risk areas, scarcity of developable land and high population density[50].

Key benefits of TDR projects: i) economic equity for the land owners; ii) preserved amenity (environmental/ cultural) value of land, iii) new development guided into designated zones, and iv) government can plan for public amenities at minimal cost without land acquisition[51].

Key challenges for TDR projects: i) information on TDR sellers, buyers and prices is not available and landowners find it difficult to find buyers (if the prices fluctuate a lot, landowners may speculate and not sell TDRs), ii) land market values are high enough for developers to make enough profit from the additional development they can sell, even after paying for the services the city wants them to provide, iii) large public subsidies reduce land market price differentials essential to make TDR viable, iv) restricted technical skills available to design the program incentives; v) limited demand for additional density in receiving areas, and vi) complex program design and approval procedures[52].

CASE STUDIES

USA

Several US counties use TDR to direct development away from hazard buffer (landslide, coastal and seismic) zones. The New Jersey State TDR Bank recommends TDR to coastal communities for protection of habitat, riparian buffers, watershed, steep slopes and wellheads and transfer development to areas with access to public infrastructure and amenities[53]. Florida State identifies TDR as one of the tools to implement beach-front post-disaster redevelopment planning and reduce demand for evacuations and shelter by guiding development in hazardous areas[54]. The US EPA recommends TDR as a tool for designating coastal retreat zones as sending areas in order to decrease risks from sea level rise[55]. In the US, about 140 TDR programs have effectively preserved about 49,000 acres of land[56].

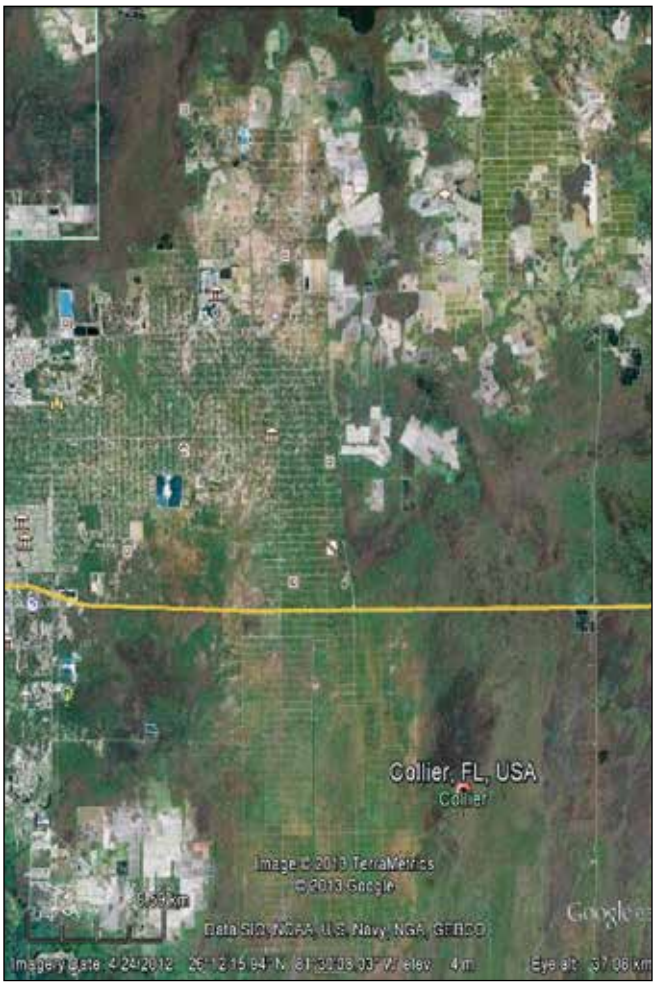
Program Design and Implementation: There are many models for TDR programs with different designating sending and receiving areas and incentive ratios. Most programs are municipal but there have been also successful regional programs. The New Jersey Pinelands is one of US's most successful regional programs across 13 municipalities to protect sensitive aquifers. Most TDR programs are voluntary[57].

Collier County TDR Program

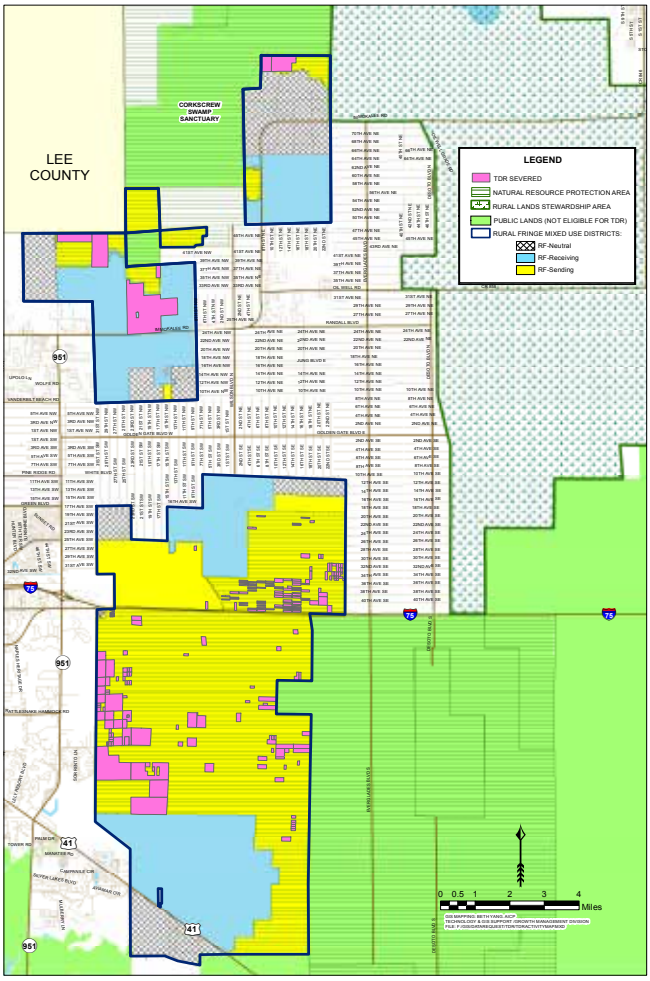
Objective: 3 TDR programs address rapid urban growth that is threatening unique wildlife habitat and water resources near Naples city, a wealthy community located along the Collier County (Florida) coast adjoining the Everglades National Park, Big Cypress National Reserve and the Florida Panther National Wildlife Refuge[58].

Actions: TDR programs were adopted in 1974 to: i) preserve coastal islands and marshes, and later in 2002-3 to ii) preserve agricultural land in the urban-rural fringe, and to iii) control development in rural areas. Over time, the County adjusted the program incentives to address real-estate market fluctuations and public opinion. Initially, stringent restrictions and approval processes for new developments and public disapproval to density bonuses in receiving areas subverted TDR transactions[59]. Later, a low floor price for TDRs was set that was not attractive to landowners. Landowners in the sending area preferred to sell land outright for better market price. In both later programs bonus TDR were offered to boost the programs[60] and TDR sales picked up. Connections to public sewer and water service are prohibited in the TDR sending areas. In the rural area, TDR program sending and receiving areas are based on land characteristics (soils, land use and land cover). Land use benefits are differentiated in 8 layers to compensate landowners for land potential other than development and TDRs are generated by removing a layer of land use. All receiving developments are clustered to maximize habitation, preserve native vegetation and

Figure 5: Collier County TDR Program



Source: Google Earth Satellite Imagery 2012.



Source: Collier County Florida: http://www.colliergov.net/Index.aspx?page=270.

connections to preserved lands and wildlife corridors. Receiving areas must be used for compact mixed-use developments and no increase in density is permitted except through purchase of development rights. Since developers can get additional density though `Planned Unit Development' projects and cluster developments, there is less incentive to purchase TDR[61].

Results: Colliers County depends on its TDR program to manage growth and has designated 41,500 acres in sending areas, almost half in private ownership[62]. The first TDR program designated a 'special treatment overlay zone' over 80% of the county and preserved 325 acres[63]. The two later programs (rural-urban fringe and rural land stewardship program) covered 73,222 acres overall in the urban-rural mixed-use fringe and the rural areas. A new town and university rely on TDR from preserved land. The Colliers Rural Lands Stewardship Area program is promoted as a model by the Florida State. Counties in Florida must adopt TDR program for preserving agricultural land in rural areas[64].

Lessons from US TDR Programs: TDR programs have significantly reduced public expenditure for public amenities as compared to land acquisition. But they have been challenging to implement since they depend on: i) development pressure and the fluctuating market for TDRs, ii) complex program design for designating sending and receiving areas, allocation rates and approval procedures, iii) ensuring adequate services for the receiving areas, and iv) other municipal programs with the same objectives that land owners may find it easier or more profitable to use instead of TDR[65].

India (Mumbai)

TDR has been used in Mumbai since 1991 to supplement finance for infrastructure, slum redevelopment and heritage preservation[66]. Following the Mumbai program, several Indian cities are adopting TDR, especially for transportation and slum redevelopment[67], and to manage disaster risks. Zoning regulations in Mangalore incorporate TDR to appropriately compensate for private property acquired as part of the GOI-UNDP Urban Earthquake Vulnerability Reduction Project, a sub-component of the DRM program in 38 cities located in Seismic Zones III, IV and V with a population of half million and above[68].

Program Design and Implementation: The program, in particular for slum redevelopment, serves as a model in India. It has one coordinating planning agency and multiple executing agencies that include private developers, public bodies, NGOs and cooperative housing societies of slum dwellers. The program designates the relatively dense Mumbai CBD (island city) as a sending area. All TDR generated from plots within the island city are to be used in the suburbs. Suburbs can serve as sending and receiving areas. TDR generated in the suburbs can be used in the same ward or in another ward north of the plot. Incentive Floor Space Index (FSI) [69] is offered to cover costs of construction costs and private land, transit camps, offsite infrastructure, maintenance corpus fund, servicing of loans, and for adequate developer profits. Incentive FSI varies with land value (lower in high-value island city and higher in the suburbs) and can be used in the same plot or as TDR in receiving sites, or mortgaged[70]. However, uncontrolled generation of TDR from the three programs has created a glut in the TDR market several times thereby reducing TDR market price and making TDR projects financially not viable[71].

Community organizations play a crucial role in explaining the benefits of the TDR program. Consent of 70% of slum residents is mandatory. The program is sensitive to the needs of informal residents, renters and particularly vulnerable sections within the urban poor. All pavement and slum dwellers who establish that their names were on the electoral roll before a cut-off date are eligible. Women are organized into cooperative self-help groups to access funds from credit institutions[72]. Older and special needs residents are allotted ground floor units[73]. Cooperatives of slum dwellers receive leasehold title to the land. Municipal taxes are pegged at 20% to reduce burden on slum families with a provision to increase them gradually over time. Apart from slum redevelopment, the TDR program was used to minimize displacement while clearing land of slums for the Mumbai Urban Transportation Project[74].

Mumbai TDR in the Coastal Regulation Zone

Objective: The rapidly urbanizing coast line of Mumbai has high-value real estate and large number of slums located in flood-prone stretches. The 1991 Coastal Regu-

lation Zone (CRZ) under notification by the Ministry of Environment and Forests controls development along the coast. The CRZ restricts all developments within 500 meters of the high tide line. Being flood-prone, the CRZ, especially CRZ II is home to many slum dwellers who cannot afford safer housing. The Slum TDR was modified to prevent additional development in the CRZ[75].

Actions: Although the government offers incentive FSI to promote slum redevelopment in less expensive areas, program imposes restrictions on incentive FSI in the CRZ. TDR is not allowed within and from this zone, making slum redevelopment with TDR financially not viable[76]. Public share of 51% has been permitted to make it attractive for private developers, but incentive details are unclear. Government committees have argued for permitting increase in FSI for slum redevelopment within the CRZ, and to reduce the CRZ in zones with high population density and built up areas. Revisions to the CRZ have reduced the no-build zone and freed up several slum clusters for redevelopment[77].

Results: The state government lacks the funding to enforce the federal government CRZ notification. Violations are rampant: Navi Mumbai satellite town that was planned to decongest the city was constructed by destroying mangroves directly in violation of the CRZ. TDR is a tool that has been successful in preserving environmentally sensitive areas in many countries. In Mumbai, even though it has been used to clear large parcels of land required for expansion of road and suburban railway network, and metro, monorail and river development projects, its potential to enforce the CRZ regulations and provide financial incentives to direct development away and relocate slums from the CRZ has not been explored. Unfortunately, environmentalists consider Slum TDR in the CRZ as environmentally irresponsible while proponents of slum redevelopment consider it socially irresponsible[78].

Lessons from Mumbai (India) TDR Program: The Mumbai TDR has been successful as it: i) increased the overall housing stock through incentive FSI in high-

Figure 6: Mumbai Coastal Regulation Zone

CRZ designation

Source: http://www.sciencedirect.com/science/article/pii/S0964569112001019.

Slums in CRZ II

Source: Google Earth Satellite Image 1/9/2013.

value lands, even slums[79], ii) legitimized the residency rights of large numbers of pavement and slum dwellers, iii) combines tax rebates and deferment along with TDR to make the program more accessible to the urban poor, and iv) allows TDR certificates to be mortgaged by developers, it provides much needed development finance for private developers who are known to otherwise depend on the underworld to raise capital. **Limitations** relate to lacking: i) designated sending and receiving areas with reference to the CRZ and master plan, so TDR is not used to implement the CRZ, ii) receiving areas developed without adequate infrastructure, and iii) incentive FSI in CRZ such that Slum TDR is financially unviable in the low-value hazard zone.

Brazil

Locally known as *Solo Criado*, TDR is widely used in Brazil for heritage preservation, environmental protection, social housing, inner city redevelopment and urban infrastructure projects such as road access to buildings, drainage works, and relocation of rail road tracks. Sao Paulo used TDR in 1969 to restructure an important road, metro and for development of activity poles[80]. The Joint Urban Operations (*Operações Urbanas Consorciadas)* program for projects implemented by the municipal governments (Sao Paulo, Rio de Janeiro and Curitiba) with land owners, residents and private investors uses TDR Certificates of Additional Construction Potential (CEPAC)[81].

Program Design and Implementation: Brazil has sophisticated TDR programs. In Sao Paulo, allocation of CEPACs is complex and varies according to the Strategic Regional Plans and local master plan. Planners in Sao Paulo evaluate several indicators to assess the carrying capacity of receiving sites that are monitored closely for adverse effects of using additional floor space. In Curitiba, an automated cadaster and land information system was established in the 80s to give the municipality precise information on building coefficients, densities and development potential of every plot in the city. An independent public authority, the Institute for Research and Urban Planning of Curitiba, is responsible for research, planning and implementation of urban plans that assures continuity across different political regimes. CEPACs issued by a municipality can be auctioned or used directly for payment of works. The CEPACs can be traded as bonds on the Stock Exchange. The selling price of bonds is set by the respective Urban Operation Law. The bonds are guaranteed by financial institutions and auctioned to the real estate market to expedite the projects under Urban Operations. Revenues are collected in a state owned bank for specific funds such as social housing[82].

Curitiba Flood Protection TDR Program[83]

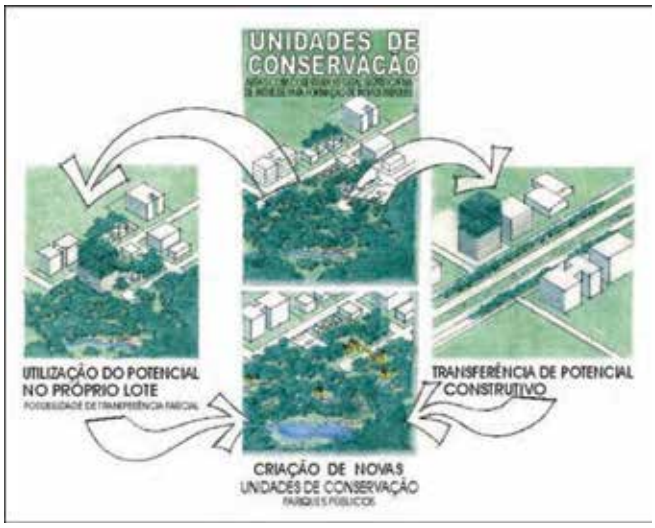
Objective: Curitiba is surrounded by rivers and flooding is a serious problem. Flood prone areas are occupied by slum dwellers. TDR is used to preserve the green recreational areas for flood protection and relocate slum dwellers.

Actions: Curitiba has a TDR program for environmental protection apart from heritage preservation and social housing. In order to protect the city from recurrent floods, Curitiba created a natural drainage system using TDR for environmental protection instead of installing concrete flood protection structures. TDR sending areas include riverbanks that were converted into parks to absorb overflow and lakes constructed to contain flood waters to prevent flooding downstream. Barigui Park (140 Ha. park with 40 Ha. of lake) created using TDR was once occupied by slum dwellers (Fig 7). The right to develop protected and forested areas could be exchanged for the right to develop in other city receiving areas. Other municipal policies support the TDR program. To encourage urban trees, city regulations restrict the area of developable land in proportion to forest area. Tax rebates are given for having trees on private land. A cycling network was created along the streets and inside parks.

Results: The Curitiba park system is estimated to be 5 times less expensive than building flood protection canals. Maintenance costs were reduced by 80% by keeping sheep in the parks to eat grass and provide natural fertilizer. The reserved forests that have increased 50 times since 1970 capture an estimated 140 tons of CO_2 per Ha. Land values adjoining the parks have increased together with property tax revenues.

Lessons from Brazil TDR Programs: i) comply with the master plan and carefully designate receiving zones

Figure 7: Curitiba Environmental TDR program



TDR for Environmental Preservation

Source: Suzuki, Hiroaki, Arish Dastur, Sebastian Moffatt, Nanae Yabuki, and Hinako Maruyama. Eco2 Cities: Ecological Cities as Economic Cities. Washington DC: World Bank, 2010.

Barigui Park

Source: Google Earth Satellite Image - 5/21/2009.

according to infrastructure capacity, ii) use TDRs as publicly tradeable bonds which convert floor space into currency that gives flexibility in using the revenues for public amenities, and iii) combine other municipal policies such as development restrictions, tax rebates and incentives to use flood storage recreational areas to ensure success of the TDR program.

RECOMMENDATIONS FOR IMPLEMENTING LR & TDR

Land value capture mechanisms, such as LR and TDR, are used to manage urban growth in several countries with different resources, technical capacities and governance systems. Often, they can be complex to design and implement especially where land management capacity is poor. To effectively use LR and TDR in implementing land use plans for DRM, local governments must improve existing land management capacity by: i) combining LR and TDR with supporting municipal tools in a `basket of tools', ii) strengthening municipal capacity in land administration and work with real estate markets, and iii) supporting community-based organizations.

Basket of Tools

LR and TDR are not `silver bullets' for the challenges in public finance and land protection in DRM programs. Municipal tools can sometimes work at cross-purposes to LR and TDR mechanisms. Local governments must identify tools that will complement LR and TDR such as, integrating with the master plan and supporting land management tools, enabling legislation and institutional coordination, and adopt risk resilient land use and building regulations.

1. Integrating with the Master Plan

LR and TDR are not stand-alone tools but complement other land management tools, such as, land register/ cadaster, land use planning, land and property valuation and taxation. They must be incorporated with city master plan (as in Brazil, Japan, and the US) for hazard zoning, density management and housing supply (including rental) and environmental protection plans. TDR programs must designate clear sending areas and receiving areas that have adequate infrastructure. LR and TDR are opportunities to create compact, dense, well-serviced neighborhoods and increase overall sup-

ply of affordable housing in the city while avoiding development in hazardous sites. Wipeouts due to hazard buffer zones can be managed by designating no-build zones for eco-system services for hazard mitigation and amenity values as in Curitiba. In the US, local governments facilitate TDR to develop greenways[84]. Restoration, rehabilitation and management of mangroves along Vietnam's coast reduced substantial disaster risks and provided additional income to coastal communities through aquaculture products etc.[85]. Where local governments lack the capacity to execute large scale master/ disaster resilience plans, LR projects can be implemented in an integrated orderly sequence according to the master plan and at a manageable scale. A TDR program is most effective when used in conjunction with other land management tools such as zoning, purchase of development rights, land acquisition and development impact fees, land register/ cadaster, property valuation and taxation. Since gentrification due to increased property taxes after redevelopment is possible, property tax holiday as in Bhuj and Mumbai (India) can ease the impact of higher fees.

2. Enabling Legislation & Institutional Coordination

LVC mechanisms depend on land markets and land markets are not regulated in many countries by appropriate legislation. LVC works best when there is a strong legal framework. Fragmented, inadequate and complex laws increase project costs. Instituting legislation that can enable local governments to use LVC mechanisms for quick recovery after a disaster is paramount. Supporting legislation must enable planning at local level, unlike in India in the past, where state mandates suppressed local planning possibilities for revising development regulations. Selective use of eminent domain has worked well to avoid hold outs, as in Kobe and Bhuj. Implementing LR and TDR can be time consuming and complicated and poor institutional coordination at different levels can delay or stall LVC projects for DRR. Approval procedures for LR and TDR project approvals must be streamlined. In locations where LR and TDR are planned for increased density, coordination with sector agencies is required to provide adequate transportation networks, water supply and sewage and other amenities. Where TDR is used to implement hazard buffer zones extending over several municipalities, inter-jurisdictional cooperation must be strengthened.

3. Risk resilient land use and building regulations

Disaster reconstruction projects often overlook existing risks. LVC projects are opportunities to review land use and building regulations and demarcate hazardous pockets, reserve land for emergency shelters and operations or open spaces for DRR related ecosystem services. In Istanbul, Turkey, LR has been used to provide for public squares, parks, playground, green areas, police/ gendarme stations and hospitals[86]. LR projects must incorporate rebuilding using hazard resistant building codes and materials.

LAND ADMINISTRATION CAPACITY

In many developing countries land markets are robust enough to make LVC tools attractive, but land administration is poor. LR and TDR depend on extensive use of land records, establishing and re-establishing rights over conflicting claims. However, incomplete and outdated land records as well as pluracy of land tenure arrangements as in Kobe (Japan) are common. Land administration capacity should be strengthened for LVC mechanisms. The automated system in Curitiba offers a sophisticated model. However, where land administration capacity is very poor, especially after a natural disaster, LVC projects can be an opportunity to improve capacity. For example, in post-conflict Angola, LR has been effectively implemented without a legal framework and formal governance due to extensive community mobilization by an NGO[87]. It is therefore necessary to identify key land administration strengths required immediately in the aftermath of a disaster and long-term capacities that are required for continued functioning of LVC tools.

To design LR and TDR programs, technical capacity is required to understand the functioning of real estate markets in order to set incentives for private developers such that they are profitable while protecting the interests of the landowners and residents, including the most vulner-

able. Local governments can manage land markets with price information and oversight[88]. Renters are often not considered, as in Bhuj (India). LVC projects must recognize different forms of land tenure arrangements and the legitimacy of renters, as in Misuga (Japan). Since LR reduces plot size, it may be unsuitable for low-income households that rely on extra space for rental income or home-based industries. In such cases, variable deductions of land for infrastructure, as in Bhuj (India) and the option to purchase additional space, as in Misuga (Kobe) can preserve the interests of low-income residents.

COMMUNITY-BASED ORGANIZATIONS

LVC mechanisms depend on successful community engagement such as in Japan and India (Gujarat) where community cooperation is traditionally strong. Community organizations play an important role to communicate project decisions and implementation process, as in Misuga (Kobe) especially where property owners do not recognize their obligation to pay for services and are reluctant to give up part of their land to cover project costs. Community organizations can better ensure that the needs of the most vulnerable residents are heard. Local governments must develop capacity to support and leverage the skills of CBOs. After the Kobe earthquake, the role of community-based organizations in DRM has been recognized and local governments in Japan are expected to support them[89]. UN-HABITAT has launched the Participatory and Inclusive Land Readjustment (PILaR program that focuses particularly on community development in addition to institutional and governance reform[90].

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Special thanks and appreciation are extended to the partners who support GFDRR's work to protect livelihood and improve lives: ACP Secretariat, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Egypt, European Commission, Finland, France, Germany, Haiti, India, Indonesia, International Federation of Red Cross and Red Crescent Societies, Ireland, Islamic Development Bank, Italy, Japan, Korea, Republic of, Luxembourg, Malaysia, Mexico, Morocco, the Netherlands, New Zealand, Nigeria, Norway, Portugal, Saudi Arabia, Senegal, Solomon Islands, South Africa, Spain, Sweden, Switzerland, Togo, United Kingdom, United Nations Development Programme, United States, UN International Strategy for Disaster Reduction, and the World Bank.