

## Series Information

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# The Economics of Solid Waste Management and Drainage: A Sustainable Approach for Making South Asian Cities Climate-Resilient<sup>1</sup>

## THE CONTEXT

Cities in low-income countries are facing increasing threats of waterlogging and water contamination from improperly managed solid waste. Some of the responsible factors include a) rapid growth in urban population which has resulted in city areas expanding into low-lying flood-plains, b) climate change, which is likely to trigger increased intensity in rainfall events that would overwhelm the city drainage systems, and c) indiscriminate dumping of solid waste which might clog the drainage system resulting in water logging.

**Increase in precipitation rate due to climate change makes cities vulnerable to frequent waterlogging.**

In order to understand the economics of the solid waste management and water logging issue, the South Asian Network for Development and Environmental Economics (SANDEE), in collaboration with the Asian Center for Development (ACD), conducted a study in Bharatpur (Nepal) and Sylhet (Bangladesh) using a variety of methods including hydrodynamic modeling, hedonic price model, randomized controlled trial, and choice experiment between 2017 and 2020.

## KEY FINDINGS

### URBAN WATERLOGGING IS NOT ALWAYS AN ENGINEERING PROBLEM

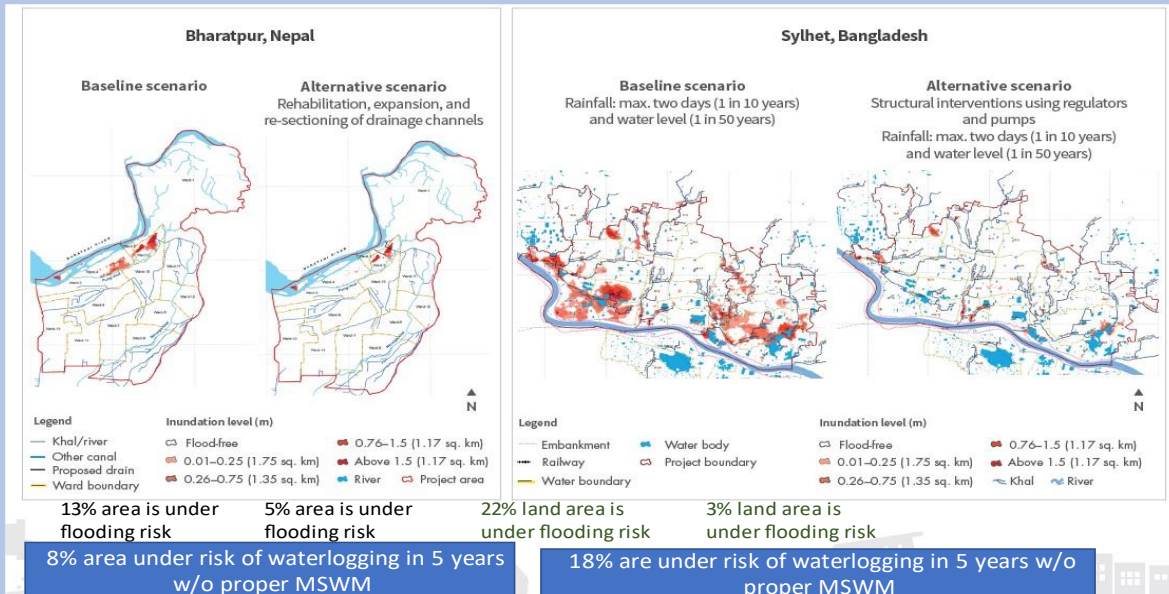
Many people think that proper management of the drainage system of a city is the solution to the problem of urban water logging. This study, using the hydro-dynamic and GIS models, found that about 13% of the land area in Bharatpur and 22% of the land area in Sylhet are currently facing the risk of flooding and water logging risk (Fig 1). Investing in the expansion of the drainage infrastructure would bring down the area under flood risk to 5% and 3% in Bharatpur and Sylhet, respectively. However, using a drainage model, the study has been able to predict that, under current waste management practice, the areas at flood risk would revert to 8% in Bharatpur and 18% in Sylhet in five years' time, reducing the returns from the drainage infrastructure. As such, attempts to reduce the risk of flooding by investing in the drainage infrastructure alone would be futile (Pervin et al. 2020).

**Investment in drainage infrastructure is futile without improvements in solid waste management practice in urban cities.**

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**Figure 1: Water logging risk in Bharatpur and Sylhet under different scenarios**



Source: Pervin et al., 2020

### CITY DWELLERS ARE WILLING TO PAY MORE TO KEEP THE CITY CLEAN

Waste management is a serious concern in both cities. Over 50% of residents in Bharatpur have expressed dissatisfaction with the current practice of waste management where there is no synchronization between the time households put out their waste and the time the waste is collected although households pay a fee (ranging from NPR 30-100 depending on the frequency of collection per week). As a result, city streets remain littered and the drainage system gets clogged with the waste. City dwellers are ready to pay an extra fee between 10% and 28% to clean up the city (Rai et al. 2019). However, estimates show that there would be a gap between revenue and the cost of waste management (Nepal et al. 2021).

**City dwellers are ready to pay extra to make cities litter-free.**

### MOBILIZING PEOPLE FOR COMMUNITY-BASED COMPOSTING OF KITCHEN WASTES

The Sylhet City Corporation motivated three local clubs to promote community-based composting of kitchen waste. Composting reduces 92% of the waste volume, thereby cutting down on the cost of transporting household waste to landfill sites. It is odor-free and generates organic fertilizer. Moreover, revenues generated from compost can be used to partially finance the composting costs. Nearly 80% of the households participated in the program. They are also willing to pay an additional monthly fee to reduce the litter on the streets.

**Community-based awareness campaigns can reduce the volume of household wastes.**

### FINANCING THE REVENUE GAP

There are two ways of mobilizing additional funds to pay for improved waste management services: a) segregating waste at home, which would help increase the amount of recyclable material while allowing households to compost organic waste at home. This would, in turn, lead to a decline in waste collection cost and increase the life of the

landfill sites. Simultaneously, the city would be able to generate revenue from the recycling to finance plastic-related waste management costs; b) imposition by the government of an additional 1% import tariff on plastic raw materials which would help generate enough revenue to fund the management of plastic waste. Such tariffs would also make single-use plastic items expensive and increase the value of recyclable plastic, thus promoting recycling while providing incentives to replace single-use plastic bags with better substitutes (i.e., cloth or paper bags that easily decompose) (Bhardwaj, Rai and Nepal, 2020).

**Increase in garbage collection fee, tax on imports of plastic products, and increase of the holding tax/fee can be used to finance clean-up activities**

Better managed solid waste not only helps in reducing water logging but also in keeping city neighborhoods clean. There is a significant price premium on housing property in cleaner neighborhoods. In Bharatpur, the self-assessed housing value is 25% higher in cleaner neighborhoods while it is 11% lower in neighborhoods where the community is exposed to open drains, suggesting that the city can enhance its property tax-base by investing more on ensuring cleaner neighborhoods for its residents (Nepal et al. 2020).

### **IMPORTANCE OF COMMUNITY MOBILIZATION ACTIVITIES**

This research shows that simple, low-cost interventions such as awareness-raising on the importance of waste management through information dissemination and placement of waste bins on the streets can bring about cleaner neighborhoods, with more households providing their waste to collectors instead of burning or open disposal. However, in order to improve at-source segregation, provisions for picking and for managing the different types of waste separately are needed (Nepal et al. 2021b). In Sylhet City, the local clubs sensitized the female members of households to ensure at-source segregation of kitchen wastes for community-based composting. Research results suggest that women waste managers perform well with regard to segregating waste at source and composting degradable waste although they do not seem to do as well with regard to managing plastic/paper/metal wastes (Nepal, Cauchy et al. 2021; Rakib et al. 2021). Providing information to these women on the prices of recyclable wastes in the local recycling market has been found to be effective in reducing the volume of recyclable wastes.

**At source segregation of compostable waste is possible through mobilizing the women in the house and community-based campaigns.**

### **POLICY IMPACT**

The findings of this research have been instrumental in the formulation of two policies in Nepal: a) a policy has been introduced in Bharatpur metropolitan city to segregate waste at source. However, the absence of a landfill site for properly disposing the segregated waste is impeding the successful implementation of this policy yet; b) a policy has been introduced by the government of Nepal recently to ban plastic sheets (or bags) less than 40 microns from production, import and use starting from July 16, 2021. The efficacy of this policy, too, will depend on its enforcement.

In the case of the Sylhet City Corporation, the announcement of a green club award by the city corporation mobilized volunteer efforts by local clubs to make their neighborhood clean. The City Corporation announced three awards for cleaning the neighborhood – a) Green Club Award, b) Green Home Award and c) Clean Sylhet Award. Since Sylhet is a city popular with tourists and many tourists visit the city on a regular basis, the project has been able to infuse the city with a novel idea with even the Mayor of the City buying into the idea by resorting to community-based awareness-raising campaigns to promote composting of waste from the city's vegetable markets and restaurants.

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