

## A Proposed Framework for Regenerating Urban Green in Dhaka City

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### Abstract

Dhaka has continued to lose its share of 'green' to quite shocking proportions throughout the course of its 'becoming' a megacity. Although growth management tools like floor area ratio (FAR) is proposed to control building density in and around Dhaka city, how extent these tools are likely to effectively compensate the lost parts of green still sceptical. Having identified a significant lack of direction as well as regular follow-up on 'greening' in both national urban policies and existing building construction guidelines maintained by RAJUK, our paper aims to contribute to fulfil this policy void within an 'accommodating' scenario. We discuss a possible policy environment that seeks to propose ways to regularize Dhaka's 'rule-violating' development activities through a mandatory adaptation to a strategic policy tool called '*Compensative Greening*'. Instead of existing compensation policies, we propose for a conceptual framework based on an obligatory on-site adaptation to 'long-term greening'. We discuss how this framework should enable a sustainable mainstreaming of the violated constructions ensuring fiscal benefits for RAJUK, building owner and the 'green industry' alike.

### Background

#### 'Greying' of Dhaka

UNEP recommends a minimum of 25% open space (plantation and water body combined) within a city's total area. In Dhaka, open space area is only about 14.5% according to a 2012 study (Byomkesh et al., 2012: 46). Dewan *et al.* (2012: 315)'s work also adds that urban built-up area within Dhaka has soared from 5,500 hectare in 1975 to 20,549 hectare in 2005, while wetland and vegetation cover reduced to 6,027 hectare and 2,812 hectare respectively. Research conducted by Bangladesh University of Engineering and Technology suggests that *temporary wetlands*\* in Dhaka metropolitan area have reduced significantly to 24,208 hectare in 2005 from 40,765 hectare in 1989. Rahman *et al.* (2011: 485)'s work suggests that there is a systematic declination of vegetation cover (dense and sparse) since 1989; the total 'areas of green loss' were 7743 hectare, 2871 hectare and 198 hectare in 1989, 2002 and 2010 respectively in Dhaka metropolitan area. The scenario is even worse in the city core area. Poor planning or utter absence, coupled with a massively corrupt authorizing-monitoring regime in the regulating authority, i.e. RAJUK have allowed the individual land owner, corporate developers and industrialists to engage in widespread extra-legal building activities. The following table summarizes the findings on core areas as made by Byomkesh et al. (2012: 53):

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\*Temporary wetlands are those landscapes which retain water for certain period of the year, such as floodplains, marshes, channels etc. (*The daily star, May 19, 2006*)

Table 1: Loss of green areas in Dhaka

Year	Loss of Green area (hectares)	Rate of green loss(%)
1975	18,626	-
1988	14,818	20.4%
1999	12,966	12.5%
2005	10,009	22.8%

Source: Byomkesh et al., 2012: 53

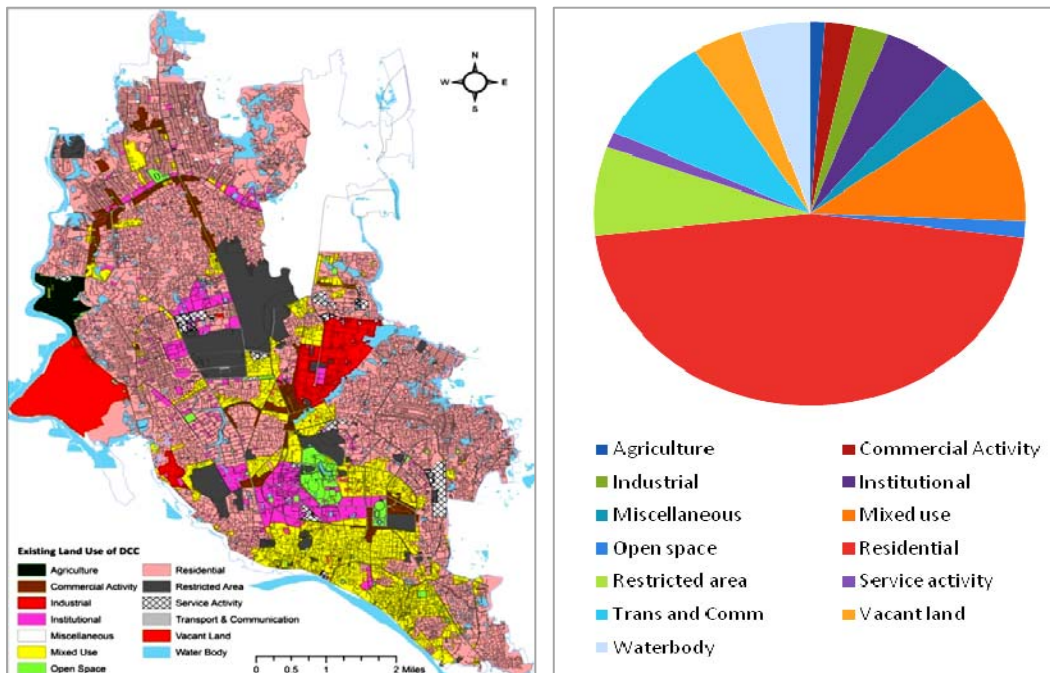


Figure 1: Status quo of Dhaka city's land uses; Source: *Reproduced from DAP GIS data*)

From Figure 1, it is clear that the highest proportion of land cover is in the built-up areas (all land uses except agriculture, open space, water body and vacant land) which is about 88% (78.56km<sup>2</sup>) of the dynamic city core. These areas were massively built up by replacing vegetated areas or wetlands without leaving much realistic chance to revert to the original form. Most of these built-up areas are also the same areas which have been constructed prior to the introduction of FAR, and where most building code violations have taken place throughout the abovementioned periods – going against then prevailing RAJUK rules.

#### ***Justification of a New Policy Tool for Reviving 'Urban Greening'***

Dhaka as a city and RAJUK as its regulatory authority continue to struggle with illegal development activities. In order to recuperate the 'livability' and revitalize its ailing core, one of the most essential tasks that await the urban planner is to envisage an alternative approach. The idea to re-designate some sort of responsibility back on to the vast rule-violating constructions to

the property owners hence seems realistic. In order to compensate for the damage that has already taken place in Dhaka's social, physical and aesthetic environments, a realistic option can be the engagement of the same violators in the 'restoration of green' itself. The loss of green, we argue, can only be replenished by the legislative adoption to a strategic use of greening with long term spatial, ecological and socio-economical consequences in mind. In so doing, we situate our discussions within the larger scenario of international policies and practices on urban 'greening'. We also contextualize Dhaka's case by reviewing various forms of building rule violation. An argument on the many sectors of benefit from using 'compensative greening' follows, while we conclude through a brief review on the potential applicability of a recent model for restoring physical greening of built forms.

### **Greening as 'Urban Public Policy' as in Practice**

Greening, as defined in this article, is actually OECD formulated as follows : "certain policy topics or business sectors, including the design, construction, maintenance, and dismantling of buildings; resource extraction; agriculture/gardening; natural resource management (e.g. air, water, land/open space, forests/other ecosystems, fisheries) and other environmental services (e.g. planning, engineering, monitoring, financing, education)" (Hammer *et al.* 2011: 14). The need for 'greening' is not the lone case for Dhaka. Many cities from both developed and transitioning world, which are experiencing urbanization of the similar sort, have adapted to 'greening' as their key policy tool for achieving a long term sustainability goal. In a recent OECD report titled "Cities and Green Growth", a summary of 'green practices' drawn from developed cities shows diverse sectors of interest, which those cities are pursuing to advance their socio-economic development.

Based on a review of 23 European cities of various sizes, Levent and Nijkamp (2004: 7) find that there has been an increased importance on green spaces amongst most of these cities. In the last 10 years, more than 50% amongst them have experienced an increase in urban green and so to budget allocation. More than half of these cities have special planning instruments for urban greening and at least one department is found responsible for green planning. Success level, for most of these cities, ranges between moderate to high. In the transitioning world, the city of Sao Paulo, which counts as one of the most densely populated city in Latin America and also in the world, a policy called "Green Area System" has been adopted in the city's Master Plan in 2002. To protect water resources, flora and fauna and to increase the number of protected areas owing mostly to massive unplanned urbanization, the plan proposes actions for the expansion and improvement of urban green areas (Gomes and Moretto 2011: 49). In Curitiba, Brazil, average green area per person increased from 1 to 50km<sup>2</sup> although the population increase remained threefold from 1970 to 2008. This pattern also benefitted flood control and drainage, in addition to its typical functions of land use zoning and provisioning public transport infrastructure, by turning flood vulnerable areas into "parks planted with many trees" (UNEP, 2010: 14-15).

Chandigarh, city in India has a functioning Master Plan; more than one third of its land is still under vegetation cover – most of which is meant for public recreational use. On the other end, the IT city of Bangalore, which is also the fastest growing city in India, shows a positive growth in vegetation cover (*Ibid*: 8). Greening, altogether, has become the key 'policy direction' that helps these global cities to forward in the right development path.

#### ***Greening as Planning Tool: Green Plot Ratio (GPR)***

The tool green plot ratio (GPR) is first conceptualized by Dr. Ong Boon Lay, an academician and architect in Singapore. Using a combination of concepts from *Floor Area Ratio* (FAR) and *Leaf Area Index* (LAI), GPR determines the average LAI of the greenery on concerned building site. In biological terms, LAI is defined as the single-side leaf area per unit of ground area. Simply, it is the ratio of leaves to ground covered (Boon Lay, 2003: 197). Considering these criteria, values of

LAI for grass, bushes and matured trees of dense canopy are estimated to 1, 3 and 6 - 10 respectively. Therefore a piece of land when covered with grass, the corresponding GPR would be 1:1. For bush/shrub and matured trees these values will be 3:1 and 6:1 to 10:1 respectively. If an urban built up area, for example, measures 500m<sup>2</sup> - about 30m<sup>2</sup> of grass land, 50m<sup>2</sup> of shrub land and 20m<sup>2</sup> of matured trees have probably been destroyed. According to GPR, these losses can actually be compensated by greening the previously mentioned private and public patches while referring to different LAI categories.

### ***Explicit Benefits of Greening***

There are several key benefits from greening roof tops. A study in the National University of Singapore by Nyuk Hien and Jusuf (2008: 167) shows that energy from cooling load can be saved from 3.28 % to 9.08 % by applying grass turf (LAI value 1), 6.73 % to 18.85 % by applying shrubs (LAI value 3) and 7.16 % to 20.01 % by applying trees (LAI value 6-10). Other studies in the same journal cite that air conditioning energy savings can be up to 80% using this approach. Previous study (Nyuk Hien et al., 2007: 30-37) showed the beneficial impact of roof top greening on the ambient environment by reducing surface temperature down to 31°C and ambient temperature by 1.5°C within 1m distance. A study by Zellner *et al.* (2008: 476) calculates the assimilative capacity of CO<sub>2</sub> by assuming that one hectare of forest (LAI value 6-10) absorbs 1,800,000gm of carbon units every year. Although it is hard to revert to the original conditions, enhancement to the present stock of green coverage is certainly possible even using the smallest of LAI values. A value between 1 and 3 is practically attainable with different LAI values. A yearly CO<sub>2</sub> absorption is hence achievable between the first two values. This is also inspiring in terms of Urban Heat Island (UHI) effect reduction.

### **Compensative Greening Potentials for Dhaka**

In contrast to the cities of the developed nations, Dhaka's case cannot easily be conceptualized in relation to such 'green policies'. In reality, Dhaka and its prevailing land-use complexities need a number of immediate hurdles to overcome; some preconditions are crucial for a smoother implementation of urban greening. One such issue, certainly, should be what to do with the overwhelming number of illegal establishments – both individual buildings and large scale projects by developers (Mahmud, 2007: 2-4) by public organizations (Ali, 2007) and even by RAJUK itself<sup>2</sup>. Such constructions can be found in both core and peripheral areas of Dhaka. It is estimated that around 90% of Dhaka's pre-FAR buildings, in one way or another, are constructed in violation of statutory codes (Ali 2007; Mahmud, 2007: 6). Therefore, one has to be certain about the legal status of the buildings and projects before actually advocating for green at the scale of the city. This is the situation exactly where our proposal for a strategic use of greening aims to fit in; the objective of our proposed framework is to compensate for the loss of green that these violated projects caused in the first place. We also feel the code-violation penalty is not necessarily compensating in the long run.

### ***Existing compensation policies***

A review of the existing compensation policies in various documents is out of scope of this paper. However, the traditional penalty schemes – monetary, or through physical demolition or by imprisonment, as found in official documents, and also as it is practiced lack practicability and imagination altogether. As for monetary penalty, the official documents never clearly mentions of how the money collected through penalty will be used, for what purpose, for whom and for which duration. It is not at all clear how this money should be compensated for the prior damage. Now if

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<sup>2</sup> The renowned case of BGMEA building can be remembered here; see Morshed (2011)

we consider imprisonment as another form of penalty, plenty of skepticism prevails; it does not sound convincing that the affluent landlords and influential developers will be imprisoned for such ‘little’ crime. The option for demolition seems even more dubious –for the criteria for selecting buildings/projects to be demolished. Even, in case of demolition of big illegal building in recent past (e.g. Rangs building at Dhaka) caused life losses because of not having modernized equipment for demolition works. Demolition, both in terms of financial feasibility and associated health, environmental hazards, sounds unsustainable as well. Even if we consider that a fair and unbiased situation will prevail, with its current resources and manual demolition system, RAJUK will have to work a few hundred years to actually get rid of the mass of illegal buildings with boundless uncertainties. Indeed as ‘the ultimate solution’ comes under serious scrutiny.

### **Proposed Framework for ‘Compensative Greening’ for Dhaka City**

Although urban greening is believed to have environmental benefits chiefly, many social and economic gains are integral to it as Table 2 shows. Such benefits, however, are only achievable through their positive interplay and synergistic correlation. But a sustainable performance from Dhaka’s physical greening demands more complexity; for being set within a third world megacity’s context, initiatives for Dhaka typically need to work through widespread corruptions, government’s fiscal insolvency, a lack of community participation due to anonymity and a bureaucratic culture of governance. A successful and robust scheme for compensatory greening in Dhaka would initially require a merely neighborhood level introduction of greening and its periodic follow up, supported by a legislative framework overseen by a team made up of the rule violating building’s owners, NGO partners of RAJUK, and experts with technical knowledge – preferably a few of the architects or engineers who designed the rule violating buildings.

Therefore a compensatory greening project, supported by a detailed policy framework and based on the rule violating building owner’s active participation seems appropriate. Compared to the piecemeal solution that RAJUK is currently practicing, compensatory greening offers a chance for both RAJUK and the rule violator to go for a win-win situation. Since both RAJUK and the owner have been engaged in the corrupt practices of approval and construction (Mahmud, 2007), ‘compensative greening’ should come as a chance for both to balance for the damage they are party to. Levent and Nijkamp (2004)’s review of urban greening in 23 European cities underscores the necessity of a set of prerequisites for planning and managing urban green spaces. The underlying theme stated here is that policies need to be developed locally, which should satisfy local needs and help attain ‘situated’ sustainability objectives. They also observe that planning and managing urban green spaces is better accomplished when the overall responsibility is assumed by one organization. More organizations’ involvement means sharing responsibilities among different institutions; this may lead to weaker coordination, conflicting decisions, a more bureaucratic planning system, slower work process in both planning and application.

#### ***(i) Role of Top-Down Authorities***

In Dhaka, it is RAJUK that should assume the overall responsibility to conceiving and implementing ‘compensative greening’. The primary focus should be on restoring greening in the more aged neighborhoods – subject to highest building construction rule violation. RAJUK, for example, may commence with the idea that smaller neighborhood-level successes on compensative greening should add up to and hence yield larger accomplishments at the level of the city. A set of ‘must follow’ statutory guidelines may be designed that at first should force engage pre-identified ‘violating’ property owners (individuals, developers etc.) of one chosen neighborhood (e.g. a particular *Mohalla* or at any particular street block level) to a mandatory adopting of re-greening. At the same time, a social campaign through various electronic and social media should run parallel; this should explain the socio-economic-environmental benefits of

compensatory greening. The success of urban greening in fact depends on a number of issues including “the level of participation (particularly by the concerned community) in the project” (Westphal, 1999). Broader public participation is essential while working at local scales; this facilitates acceptance at the users’ level and ensures economic sustainability (Irvine *et al.* 2010).

In addition, RAJUK should enact and implement a pragmatic urban planning tool as a part of private land development rules that will ensure new developers are exercising the greening practice. The tool is to ensure a compensation or addition of buildings to the green stock of city.

Table 2: Benefits from urban greening

Level	Benefits from greening			
	Social & Psychological	Economic	Ecological	Planning
Individual & community	<p>Socialization, play, retreat from world</p> <p>Pleasure from horticulture; sense of accomplishment and effectiveness: a modestly ‘doable’ objective leading to increased confidence for large projects</p> <p>Ripple effect: establishment of green networks amongst communities; inter-transfer of skills and knowledge</p> <p>Empowerment<sup>3</sup>; sites for self expression, self esteem, self efficacy, identity and memory</p> <p>Reduced stress and healing time; reduced domestic violence</p> <p>Children’s development of skills and cognitive abilities</p> <p>Heightened sense of community</p>	<p>Increased food security and nutrition</p> <p>Community’s contacts with agencies and politicians: access to additional external resources</p> <p>Improved productivity</p> <p>Poverty alleviation and social inclusion</p> <p>Opening up of prospective (green) landscape industry and other backward linkage sectors</p> <p>Improved school performance</p> <p>Yield ‘public good’ type benefits (e.g. added safety)</p>	<p>Improved environmental quality</p> <p>Provisioning for urban biodiversity species</p> <p>Fresh water supply</p>	<p>Improvement of visual appearance</p> <p>Heightened ‘accessibility’</p> <p>Sense of accomplishment and joy from planning</p> <p>Views of vegetation and water bodies leading to a greater sense of well-being and neighborhood satisfaction</p>
Organization	<p>Attract more members &amp; organizations</p> <p>Stronger ties with politicians and other elite agencies</p> <p>Greater effectiveness for meeting goal</p>			<p>Green CBDs: more attractive and are believed to have more desirable goods and services</p>
City	<p>Improve livability help define and support identity</p> <p>Political imperative for Mayor for assuming environmental stands</p>	<p>Enhanced attractiveness for living, work, tourism and investment</p>	<p>Air pollution reduction and cooling – less energy need</p>	<p>Improve livability, competitiveness and success</p>

Source: De Zeeuw *et al.* (2011); Irvine *et al.* (2010); Levent and Nijkamp (2004); McKendry (2011); Seymour *et al.* (2010); Westphal (2003)

<sup>3</sup>Creation of a sense of belongingness through participation leads to change for both individual and community; empowerment associates inclusiveness, social network creation, active participation in the decision-making process to improve their own lives (Westphal 1999; Westphal 2003); it also involves improved self- (and community-) governance (Seymour *et al.* 2010)

### ***(ii) Involvement of Violators and Community Organizations***

Any sort of urban green space, which is associated with citizen support also satisfy planning authorities and citizen alike. First, participation of the affluent property owner<sup>4</sup> should compensate, to a large extent, to the previously mentioned fiscal deficiencies of RAJUK and other government agencies in planning and implementing such a project. In addition to his/her other social contributions, an outline of the exact nature of ‘sector-wise’ monetary expenses that the property owner would require to furnish, should enable a better management of costs for greening owner’s own buildings and also for creating a ‘community fund’ for taking care of the expenditure at the community level. Participation from liable building owners will give themselves chance to find satisfaction from possible contributions. Individual initiatives to compensate for a lack of open space by developing personal green roofs or building fronts, or group projects to compensate for the decaying social interactions by developing ‘green cooperative’ may just be the two of many alternative forms of participation.

### ***(iii) NGO Engagements***

For urban agriculture in transitioning nations, NGO engagement with local stakeholders has remained frequent. For instance, NGOs remained involved in helping establish community gardens in Bulawayo and strengthening group management skills and trainings in Rosario, Argentina, and helping setting up city-wide producer networks, providing access to infrastructure, financing small industries, training business planning and quality control, and establishing farmers’ markets and home delivery chains. While in Bangladesh, local NGOs were reported to be closely engaged in improving social forestry practices (Safa, 2006). Engagement of NGOs with other stakeholders thus appears vital for green initiatives. Notwithstanding their many operational drawbacks and critiques, with rapid resource mobilization capacity, efficiency, networking capability and accessibility to both public and private realms – NGOs should be able to raise awareness amongst rule violating individuals and community cooperatives at the initial level if designated by RAJUK.

### ***(iv) Individual Involvements***

This proposed framework should also ensure that greening occurs at both private and public levels though it primarily concerns the rule violating individuals and individual buildings. At the private level, for example, the building owner may develop small gardens or do personal landscaping on building roofs, front-yards or facades, or transform house-front sidewalks while at the public level, the ‘greening committee’ may take it further to the main Street or any open space in the concerned neighborhood and develop accordingly. Other forms of ‘grey’ sites, as Harnik (2010) points out; derelict community gardens and parks, old landfills, wetlands and storm water storage corridors and ponds, rail tracks, rooftops of parking lots and superstores etc., schoolyards, reservoir tops, rivers and canals, cemeteries, road-sides, and dead-end streets can all become public level compensative greening sites for communities to engage upon.

So, the proposed framework can be shown in the following schematic diagram:

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<sup>4</sup> Daily star (2008)’s report implicitly points to the growing affluence of property (land, apartment) owners in Dhaka

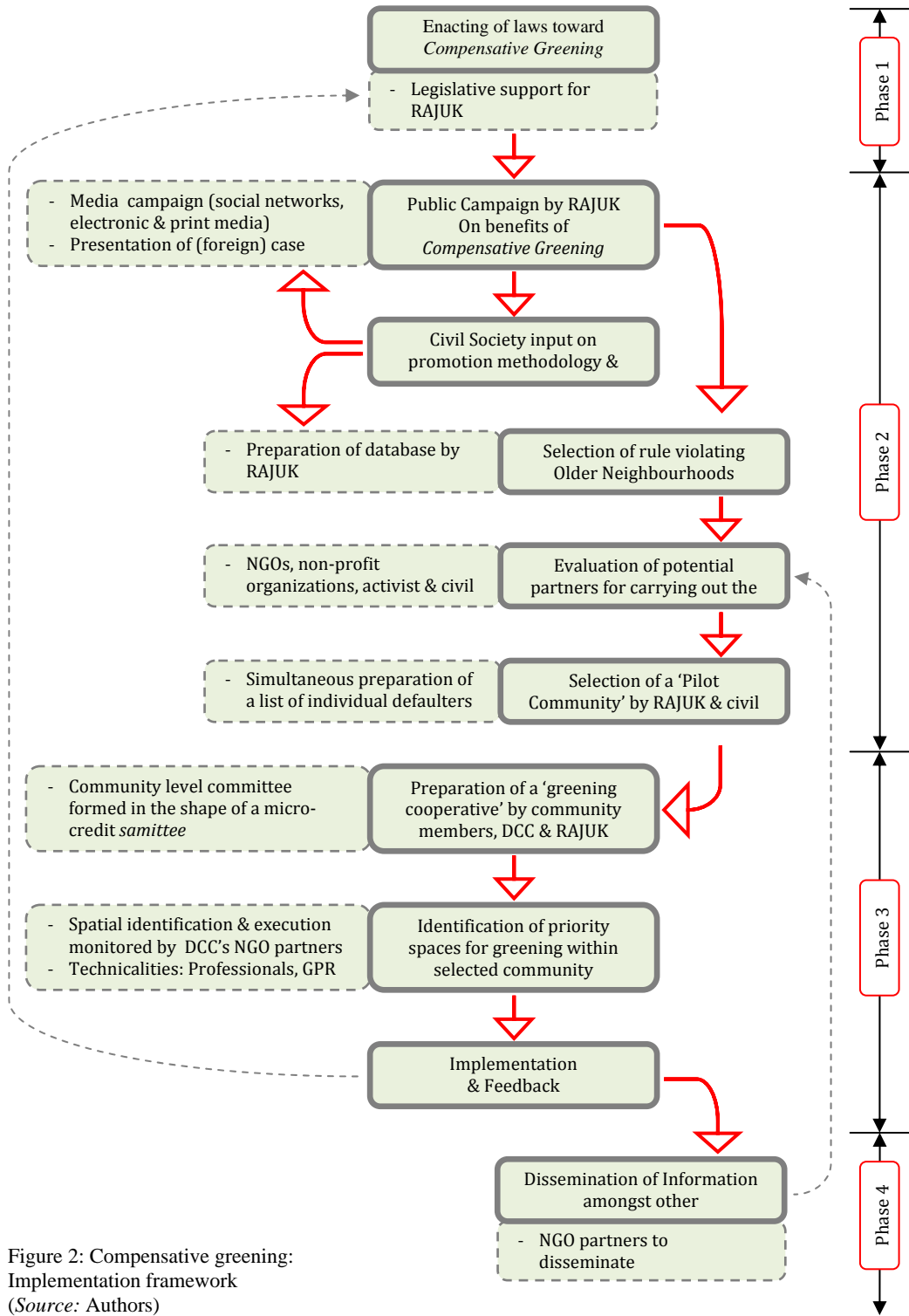


Figure 2: Compensative greening: Implementation framework (Source: Authors)



### Concluding Remarks

Given the opportunity to revive the ambient city environment altogether, RAJUK must enact a mandatory ‘urban greening policy’. Instead of demolishing parts of rule violator’s building, an alternative compensatory greening policy can be adopted, where the rule violators will be forced to do some extra amount of greening ‘as compensation’ and hence a means to avoid penalty as big as demolition. GPR or similar other instruments, as we have demonstrated, should help attain that target. Indeed, we have known ample evidences of the strategic use of urban agriculture. Yet RAJUK has still no strategic vision for it. A greening framework therefore, will not only be based on clear objectives and methodology, it will also save a lot of human and monetary resources for both building owner and RAJUK. Supported by a ‘collaborative and enabling partnership’ from local governments, where the latter and planning authorities engage to develop local standards for green spaces for both housing and non-housing sectors, communities guided by this framework will be in the best position to successfully turning their own miserable creation into a city-wide revolution. There is also a mainstream political imperative to urban greening. A derelict city like Dhaka, whose image in the outside world is nothing more than ‘a city of slums’, *Compensative Greening* promises ample opportunity for significant achievements. Considering rooftop-greening and apartment-surface landscaping to be an emerging trend in present day Dhaka, a timely enforcement of our proposed framework, may actually turn it into a culturally embedded movement for Dhaka’s present and future communities.

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