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City Greens, Post Amphan: A Survey

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Abstract

Kolkata has lost a substantial portion of its green cover due to the tropical super-cyclone Amphan. The green casualty consisted mostly of old trees fully grown with a large canopy. Post Amphan it was found necessary to conduct a qualitative survey about the citizen's stand on the havoc caused by Amphan, their reasons for the disastrous loss of greenery and their stand on future greening of their city. The policy of "**right place, right tree**" provides technical support towards intelligent greening of cities. The need for **urban forestry is to be planned & integrated** and **systematic approach** to urban tree management should be stressed.

Keywords: urban greening, sustainable urbanization, urban forestry, super cyclone, biodiversity restoration, Amphan

INTRODUCTION:

Amphan, a tropical super cyclone ravaged coastal Bengal, Orissa and parts of Bangladesh on 20th May 2020. North and South 24 Parganas and East Midnapore districts of West Bengal were the worst affected with lakhs rendered homeless and shelterless, huge agricultural and crop loss, thousands of trees damaged, destroyed and uprooted and other accompanying damages and losses much beyond immediate comprehension and repair. Kolkata has lost a substantial portion of its green cover due to this cyclone. The green casualty consisted mostly of old trees fully grown with a large canopy (Sen, 2020a). With over 15000 trees lost or damaged out of approximately five lakhs in Kolkata alone, the task to urban-green restoration is greatly challenging.

OBJECTIVES:

Post Amphan it was found necessary to conduct a qualitative survey about the citizen's stand on the havoc caused by Amphan, their reasons for the disastrous loss of greenery and their stand on future greening of their city.

a. To see the overall awareness of the people about the location of plants in their locality, whether the plants are in their own **private** terrace/balcony/roof-top or garden or in **public** community park/playground/garden or at the roadside/avenue.

b. To find out post- Amphan about the nature of damage to the plants, whether they were completely uprooted or with broken branches or bent or remained totally unaffected.

c. To find out the precise location of the damaged or uprooted trees, whether they were situated in the roadside, cemented around roots or roadside, uncemented around roots or in community parks or in own garden.

d. To find out the most probable cause(s) of damaged/uprooted trees (mostly due to overgrown canopy or shallow roots or weakly wooded stems & brittle branches or being diseased and infected).

e. To observe the reason for tree damage from the perspectives of lack of space, overcrowded with wires, cables etc. or due to unscientific pruning/no pruning or ignorance of 'Right place, right tree' norm or even wrong species selection.

f. To assess the future urban greening plan in terms of tree plantation through the adaptation of various ways and means such as either planting trees only in the community green spaces or on roadsides or planting of right species only or limiting plants in one's personal garden only or just keeping it unchanged as it has been all this while.

MATERIAL AND METHODS

Variables:

Dependent Variable:

- Awareness related to City Greens

Independent Variable:

- Gender (male and female)
- Profession (Employed/ Student/ Seeking Employment / Homemaker)

- **Delimitations:**

The data was limited to 50 people/participants [both male and female] of Kolkata and adjoining areas.

- **Tools:**

An information schedule cum questionnaire was formulated by the researchers for collecting data.

- **Methodology:**

The study was designed on a survey based descriptive research methodology. The questionnaire was administered on the selected sample to collect data and the data was qualitatively analyzed (by percentage analysis) to describe further.

- **Sample:**

The sample comprised of 50 participants out of which 39 were female and 11 were male, living in different parts of Kolkata and adjoining areas (so that more or less Amphan would have had similar impact) between 25-40 years of age and incidental sampling technique was adopted.

Among 50 participants 25 were employed, 17 were students, 06 were employment seekers as well as 02 were homemakers.

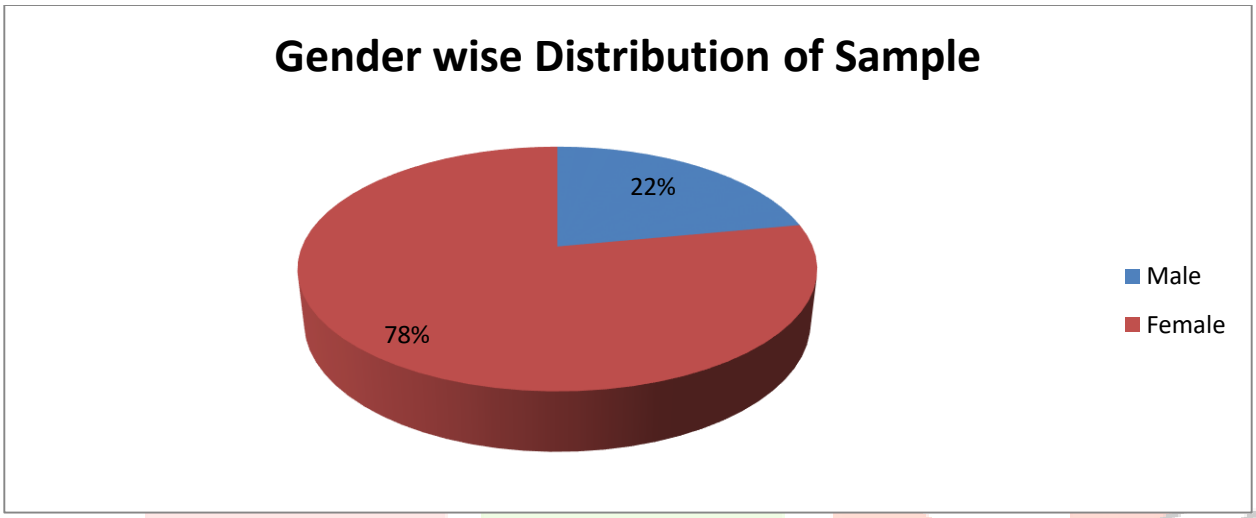

Figure Number: 1- showing Gender wise Distribution of Sample

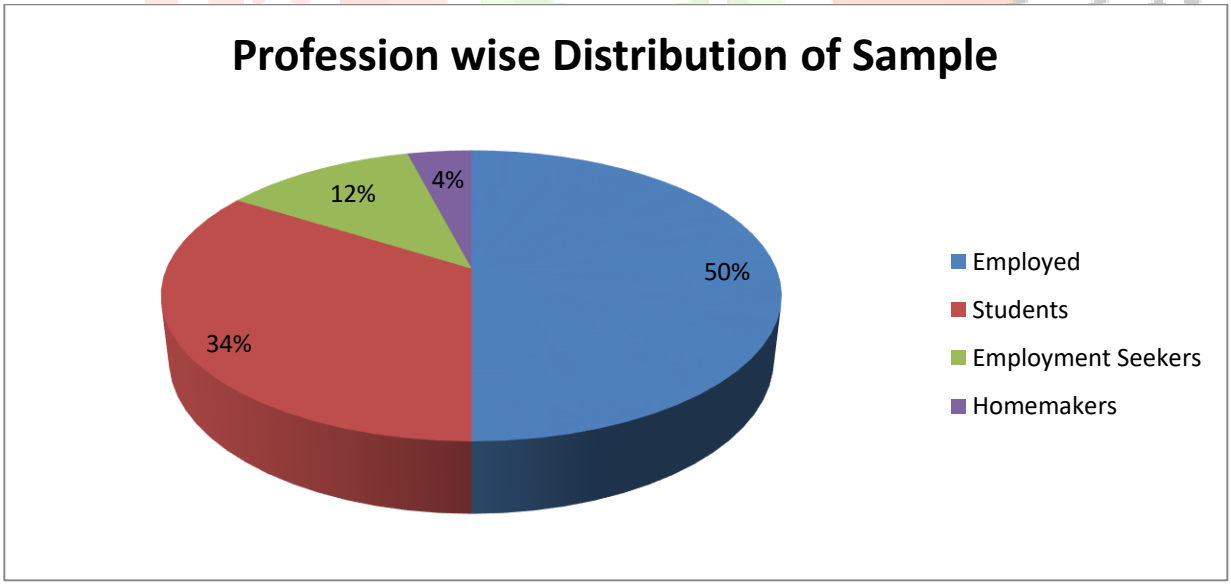

Figure Number: 2- showing Profession Wise Distribution of Sample

RESULTS AND DISCUSSION:

[A]. Item-wise Percentage Analysis of the Entire Sample Comprising of 50 Participants:

Table 1:

Item	Options			
Plants found in your locality were mostly in -	Own terrace/balcony/roof-top	Own garden	Community park/playground/ garden	Avenue/roadside
Response (In terms of % analysis)	22 %	18 %	33 %	27 %
Interpretation	In the light of the findings it can be said that: ▪ 27% plants were near the avenue/roadside. ▪ 33% plants were in the community park/play ground and in the garden. ▪ 18% people had plants in their own garden and ▪ 22% people had plants in their own terrace or balcony and roof tops also.			

Table 2:

Item	Options			
Post Amphan, most plants in your locality were	Completely uprooted	Broken branches	Bent	Unaffected
Response (In terms of % analysis)	40 %	48 %	8 %	4 %
Interpretation	In the light of the findings it can be said that post Amphan: ▪ 48% plants had broken branches. ▪ 40% plants were completely uprooted. ▪ 8% plants were bent/ deformed and ▪ Only 4% plants remained unaffected.			

Table 3:

Item	Options			
Uprooted or damaged trees were mostly located in	Roadside, cemented around roots	Roadside, uncemented around roots	Community park	Own garden
Response (In terms of % analysis)	18 %	58 %	14 %	10 %
Interpretation	In the light of the findings it can be said that uprooted/damaged trees were mostly located in: ▪ 58 % plants were on the roadside, uncemented around roots. ▪ 18 % plants were at the roadside, cemented around roots. ▪ 14 % plants were located in the community park and ▪ 10 % plants were uprooted from the private gardens.			

Table 4:

Item	Options			
The damaged /uprooted trees were mostly due to -	Overgrown canopy	Shallow roots	Weakly wooded stems & brittle branches	Diseased and infected
Response (In terms of % analysis)	68 %	22 %	10 %	-
Interpretation	In the light of the findings it can be said that the trees were uprooted or damaged mostly due to the following reasons: ▪ 68% due to overgrown canopy. ▪ 22% due to shallow roots and ▪ 10 % due to weakly wooded stems and brittle branches.			

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Table 5:

Item	Options			
Reason for tree damage -	Lack of space, overcrowded with wires, cables etc.	Unscientific pruning/ no pruning	'Right place, right tree' norm not followed	Wrong species selection
Response (In terms of % analysis)	64 %	8 %	20 %	8 %
Interpretation	In the light of the findings reasons for tree damage were: ▪ 64 % plants were damaged due to lack of space, overcrowded with wires, cables etc. ▪ 20 % plants were damaged due to 'right place, right tree' norm not followed. ▪ 8% due to unscientific pruning/ no pruning at all and ▪ 8% for wrong species selection.			

Table 6:

Item	Options			
What would your future urban greening plan be -	Trees only in community green spaces	Trees in roadsides, but right species	Trees are for personal gardens only	Unchanged, as it has been all this while
Response (In terms of % analysis)	14 %	78 %	-	8 %
Interpretation	In the light of the findings it can be said that people would opt for the following approaches for their future urban greening plan : ▪ 78 % plants/trees would be planted in roadsides but right species. ▪ 14 % trees would be planted in community green spaces and ▪ 8% would stick to the old planting pattern.			

As can be expected from a metropolis, most people accounted their greenery to the public parks, playgrounds and gardens and then to the avenue trees. With an acute space crunch and a teeming population, a low percentage could opt for private gardens or rooftop/terrace gardens (Table 1)

The green loss due to Amphan was huge and most people (88%) observed that trees were with broken branches or completely uprooted. Only 4% trees remained unaffected, according to the survey. The reports and post-Amphan photographs in various newspapers and television channels bear ample proof of such observations. (Table 2)

According to participants a large percentage of damaged or uprooted trees were uncemented around the roots (Table 3). Most of the participants felt that the green damage was largely due to overgrown canopy (Table 4) and overcrowding due to lack of space, and aggregation of wires, cables etc (Table 5). The participants also selected the option of right place, right tree as their future urban greening plan (Table 6).

RECOMMENDATIONS FOR URBAN-GREENING

The following guidelines may be followed for sustainable urban greening, based on the outcomes of our survey:

a. The policy of "**right place, right tree**" provides technical support towards intelligent greening of cities.
b. Characteristics of cyclone-resistant trees to be kept in mind before selecting species for congested areas in cities (Arzoo and Pradhan, 2020).
c. The need for **urban forestry is to be planned & integrated** and **systematic approach** to urban tree management should be stressed
d. Apart from residents, students from educational institutions in the neighbourhood may be truly encouraged to play a active role in the maintenance of the green space (Sen, 2014; 2016).
e. **Planning** is important because trees are very often considered as an afterthought once development has taken place rather than being incorporated as original design phase.
f. An **integrated approach** implies the participation of many different organizations, local council, municipal and national planning bodies, department etc.
g. **Systematic management** entails regulated tree management, operations such as planting, pruning and felling must be conducted in an organized manner at the appropriate time.
h. **Performance-based incentive programs** encourage competition and result in better output (Sen, 2015a, b).
i. **Incorporation of permeable pavements such as grassed footpaths and greening of parking lots** will help to decrease the proportion of paved areas, aid in storm water retention, and reduce surface heating. (Sen, 2020b)
j. **Evergreens** should be selected for roadways to minimize accidents due to leaf shedding from deciduous varieties.
k. Road traffic is a major source of pollution in India. Impetus should be given to greening of transport corridors to reduce atmospheric pollution and trees which minimize pollution could be planted in larger numbers like *Alstonia* sp. (Chhatim).
l. Identification of 'champion trees', i.e. trees of ecological importance due to species richness or physical attributes, and policies for their preservation will help to sustain species variety and richness. For example importance of cultivating *Ficus* sp to provide food for birds (Sen, 2020c)

Nearly a month after the super-cyclone, time is now a vital factor to save the trees. City volunteers have come forward to save the trees uprooted by the natural disaster. Meanwhile, the state government has undertaken a mega drive to plant 3.5 crore saplings. However, green activists say that replanting trees will have a better chance of survival than planting new saplings. Replanting one full-grown tree will have a better impact than planting a few hundred saplings. Experts say there are high chances of the trees surviving but mature trees require maintenance and periodic pruning in order to save them from getting uprooted during storms.

In a race against time, Kolkata has embarked on its biggest ever exercise to save trees that were uprooted by cyclone Amphan. The authorities of the Acharya Jagadish Chandra Bose Indian Botanic Garden will replant a 150-year-old Baobab (*Adansonia*) tree, which stores several thousand litres of water and a century old 'Mad' tree (*Pterygota alata*).

What has buoyed the efforts is that new leaves have already started spouting in some of the trees that were fixed near Rabindra Sarobar. More than 50 trees have been fixed near the lake and another 60 - 70 would be replanted in the near future. Experts said that around 70% of the trees would survive after replantation if the root condition is good and the replanted tree is taken care of. A single tree takes 4-5 hours of work to get re-planted. But new saplings will take several years to mature. On the other hand, if these trees are restored properly, they will start growing within a few weeks. A special committee comprising experts from the State Pollution Control Board, State Biodiversity Board, Botanical Survey of India will identify the trees that can be replanted and help in the drive (Hindustan Times, 09.06.2020).

After the Phani cyclone of 2019, native species such as *Millettia pinnata (*Karanj) and *Alstonia scholaris* (Chhatim) were found to have withstood the ferocious wind speed of the cyclone in Bhubaneswar. These trees with minimal

damage were expected get back much of their lost cover after monsoon. Native species such as Karanj, Chhatim, Neem (*Azadirachta indica*), Baheda (*Terminalia bellirica*), Mango (*Mangifera indica*) and Arjuna (*Terminalia arjuna*) trees withstood the high wind speed. (The Hindu, 20.05.2019) Among the woody trees uprooted by Sidr in Bangladesh in 2007, mahogany (*Swietenia mahagoni)* accounted for the least percentage, indicating the good capacity of this tree to withstand strong winds by maintaining the taproot system (Haq *et al.* 2012). Instead of the flowering and ornamental trees like Krishnachura (*Caesalpinia pulcherrima*,) and Yellow flamboyant (*Peltophorum pterocarpum*) with minimal resistance to wind, varieties of cyclone-resistant and tropical trees such as Bakul (*Mimusops elengi*), chhatim (*Alstonia scholaris*), Java Plum (*Syzygium cumini*), Neem (*Azadirachta indica*) Karanj (*Millettia pinnata*) Jackfruit (*Artocarpus heterophyllus*) may be planted.

We would have to take these lessons from these observations for future urban re-greening. A city's resilience to natural disasters can be understood both by its ability to adapt to changes, and its capacity to help mitigate their impacts. Pro-environmental planning, eco-friendly approach sustainable outlook, and 'nature-based' solutions could go a long way in shaping Kolkata as a green city.

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