e-planet **17** (2): 134-138 (December 2019)

Impact of cyclone Fani on tree damage in Bhubaneswar city, Odisha, India

H.K. SAHOO[1], S. DEHURY[1] AND R.C. MISRA[2*]

[1]*Vasundhara, Bhubaneswar- 751024, Odisha, India*

[2]*ICAR-National Bureau of Plant Genetic Resources, Exploration Base Centre, Cuttack-753006, Odisha, India*

**rcmisranbpgr@gmail.com*

Date of receipt: 12.08.2019 Date of acceptance: 25.11.2019

ABSTRACT

The frequency of cyclones has increased manifold in the recent years thus devastating the coastal and adjoining districts of Odisha. The cyclonic storm 'Fani' hit Odisha coast during May 2019 and devastated extensively in many coastal districts including the capital city of Bhubaneswar. It caused a great loss to the vegetation cover with uprooting of trees particularly along tree-lined avenues which necessitated assessing the damage of different tree species in the state capital. This destructive impact of cyclone Fani on the roadside vegetation in parts of the city was evaluated based on visual estimation and type of damages.

Key words: Bhubaneswar city, cyclone, damage, Fani, tree

INTRODUCTION

Over the last two decades, the frequency of cyclones has increased and its effect has devastated coastal Odisha and its adjoining districts. Further, the climate change projections indicate that the average maximum wind speed will increase in the coming decades (Acharya and Panda, 2019). "FANI" was a very severe cyclonic storm that developed over the Bay of Bengal during the first week of May, 2019 (Abhilash, 2019). It crossed Puri coast within 8.30 – 11.30 hrs (IST) of 3rd May 2019 with a wind speed of 180-210 km hr^{-1}. It has left destruction in its wake, not sparing the trees in the coastal districts of Odisha. A provisional estimation reported by different agencieswas that more than 10 million trees have beenuprooted with an equal number of trees damaged in the very severe cyclone (Abhilash, 2019). Preliminary estimates revealed that the cyclone Fani damaged at least two million trees in the city of Bhubaneswar too. It has not only destroyed the green cover but also destroyed the home of many birds and animals (Debata, 2019). It has affected the livelihood of people, especially that of daily-wage labourers and farmers (Acharya and Panda, 2019). Therefore, there is an urgent need to assess ecological, cultural and economic loss faced due to Fani. The present study is to assess tree damage due to cyclone Fani in Bhubaneswar City, which may be used to further restore greenery and economically useful cyclone resistant trees.

MATERIALS AND METHODS

The present study was carried out in and around Bhubaneswar city just after Fani. A rapid assessment was done in the village Kalarahanga, Patia station road, Jayadev Vihar - Nandan Kanan road, OMFED square to Acharya Vihar, Acharya vihar to AG office and to Gopabandhu square, Jayadev Vihar to CRP square and Regional Plant Resource Centre, Niladri Vihar and Sailashree Vihar areas (Fig. 1). Cyclone affected trees were counted and the type of damage estimated on visual estimation basis. The tree species of girth at breast height (GBH) were visually estimated and recorded.

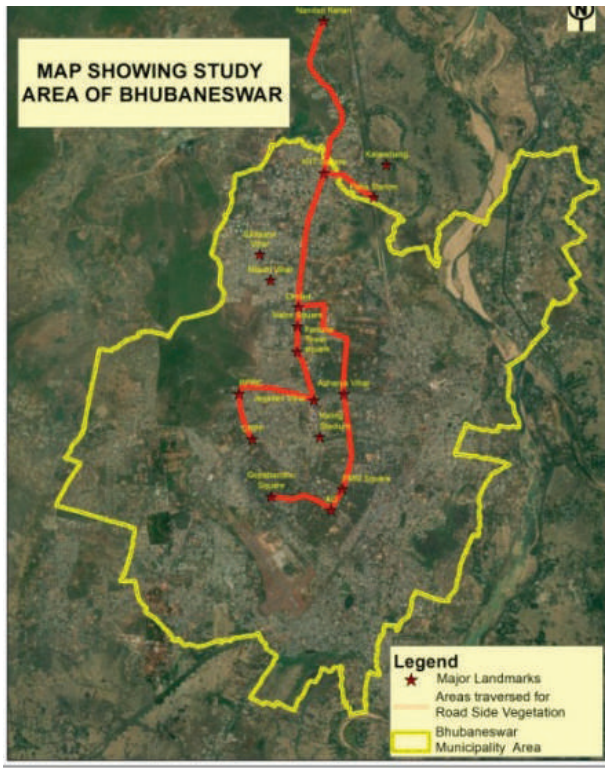

Fig. 1. Map showing study area of Bhubaneswar

RESULTS AND DISCUSSION

The loss of vegetation affected by cyclonic storm Fani was observed and recorded at different locations of Bhubaneswar city (Fig. 2-8). It was observed that more than 99 per cent of trees experienced damage, out of which nearly 5 per cent trees were damaged completely, around 6 per cent trees uprooted, 31 per cent trees experienced severe damage and 57 per cent of trees were damaged partially (Table 1). The species like *Pongamia pinnata* (Karanja) and *Alstonia scholaris* (Chhatiana) were found to have experienced partial damage and were able to withstand the flow of wind. Although the fig plants like *Ficus benghalensis* (Bara) and *Ficus religiosa* (Ashwastha) faced minimum uprooting, they suffered loss from their branches. The species like *Azadirachta indica* (Nimba), *Mimusops elengi* (Baula), *Terminalia bellirica* (Bahada), *Syzygium cumini* (Jamu), *Mangifera indica* (Amba), *Terminalia arjuna* (Arjuna), *Pongamia pinnata* (Karanja), *Alstonia scholaris* (Chhatiana), *Ficus benghalensis* (Bara), *Ficus religiosa* (Ashwastha) and *Cassia fistula* (Sunari) were able to withstand the wind speed significantly with partial loss (< 50%) of branches. Trees like *Anthocephalus cadamba* (Kadamba), *Peltophorum pterocarpum* (Bishnuchuda), *Delonix regia* (Krushna chuda), *Albizzia lebbeck* (Sirisa), *Samanea saman* (Chakunda) were severely damaged due to loss of main and lateral branches which experienced maximum loss.

A study of cyclone Thane revealed that there was greater uprooting in introduced plantation species such as *Acacia auriculiformis* and *Tectona grandis*, whereas native species like *Azadirachta indica* and *Mangifera indica* underwent comparatively lesser damage (Sundarapandian et al., 2014). According to Bellingham et al. (1995) and Gleason et al. (2008), the plant species may vary in their capacity to resist wind (resistance), to offset the effects of injury (tolerance) and to recover from injury (resilience). It is unlikely that any one taxon will display all three of these characteristics, *viz.* resistance, resilience and tolerance. This is because of site and habitat-specific and resource limitations which will force a trade-off amongst them. Species which experienced more uprooting spread their roots on the surface soil and do not penetrate deeper into the soil (Bellingham et al., 1995; Gleason et al., 2008; Sundarapandian et al., 2014). Mickovski et al. (2007) noticed several factors that help in anchoring the plants and prevent uprooting. Further research is needed in order to identify species that are wind resistant, tolerant and resilient.

Fig. 2. Uprooted teak plants at Patia station road

Fig. 3. Damaged Kadamba plant at Niladri Vihar

Fig. 6. Village Kalarahanga affected by Fani

Fig. 4. Damage of house and vegetation including peepal tree at Kalarahnga square

Fig. 7. Devastated natural vegetation at Regional Plant Resource Centre

Fig. 5. Loss of natural vegetation at Nayapalli

Fig. 8. Damaged horticultural garden near Patia

Table 1. List of avenue species affected in part of Bhubaneswar city

Scientific Name	Local name	Total Nos.	UPR	CD	HD	PD	UPR%	CD%	HD%	Total%
Ailanthus excelsa	Mahalaya	23	-	-	6	17	0	0	26	26
Albizia lebbeck	Sirisha	118	4	5	79	30	8	4	67	79
Alstonia scholaris	Chhatiana	179	-	-	10	169	0	0	6	6
Anthocephalus cadamba	Kadamba	196	3	27	63	103	15	14	32	61
Artocarpus heterophyllus	Panasa	47	29	14	4	-	92	30	9	130
Azadirachta indica	Limba	77	-	-	19	58	0	0	25	25
Cassia fistula	Sunari	31	-	-	4	27	0	0	13	13
Cocos nucifera	Nadia	31	-	-	-	31	0	0	0	0
Delonix regia	Krushana chuda	119	20	15	54	30	29	13	45	87
Ficus benghalensis	Bara	68	-	1	46	21	2	1	68	71
Ficus religiosa	Ashwastha	18	-	-	8	10	0	0	44	44
Gmelina arborea	Gambhari	17	-	-		17	0	0	0	0
Lagestroemia flosreginae	Patali	26	-	2		24	8	8	0	15
Lannea coromondelica	Mahi	16	-	-		16	0	0	0	0
Mangifera indica	Amba	154	19	7	78	50	17	5	51	72
Mimusops elengi	Baula	25	2	5	7	11	28	20	28	76
Hyophorbe lagenicaulis	Bottle palm	34				34	0	0	0	0
Peltophorum pterocarpum	Bishnuchuda	92			66	26	0	0	72	72
Pongamia pinnata	Karanja	201			8	193	0	0	4	4
Simarouba glauca	Mahatila	11			1	10	0	0	9	9
Sygygium cuminii	Jamu	21		4	12	5	19	19	57	95
Tectona grandis	Saguan	153	24	19	54	56	28	12	35	76
Terminalia bellirica	Bahada	11				11	0	0	0	0
Terminalia catappa	Pestabadam	9				9	0	0	0	0
TOTAL		1,677	101	99	519	958	12	6	31	49

UPR: Uprooted, CD: Completely damaged, HD: Heavily damaged, PD: Partially damaged

Recommended tree species for avenue plantation

From the above study, it is revealed that the avenue plantation should consist of *Pongamia pinnata, Alstonia scholaris, Azadirachta indica, Terminalia arjuna, Putranjiva roxburghii, Ficus benghalensis, Ficus religiosa* and *Casia fistula.* These plants have experienced less damage during the cyclone Fani.

ACKNOWLEDGEMENT

We thank Bibhore Deo for assisting in collection of information from secondary sources. Special thanks are due to Mr Manas Ranjan Mishra, Executive Director, Vasundhara for encouraging to perform this study.

REFERENCES

Abhilash, P.C. 2019. Flood to Fani: climate-related disasters taking a toll on sustainable development. *Clim. Change Env. Sust.* **7**(1): 1-2.

Acharya, D. and Panda, G.K. 2019. Evaluation of impacts of cyclones on the livelihood status of the people of coastal Odisha and its remedial measures. *e-planet* **17**(1): 83-88.

Bellingham, P.J., Tanner, E.V.J. and Healey, J.R.1995. Damage and responsiveness of Jamaican montane tree species after disturbance by a hurricane. *Ecology* **76**: 2562–2580.

Debata, S. 2019. Impact of cyclone Fani on the breeding success of sandbar-nesting birds along the Mahanadi River in Odisha, India. *J. Threatened Taxa* **11**(14): 14895-14898.

Gleason, S.M., Williams, L.J., Read, J., Metcalfe. D.J. and Baker, P.J. 2008. Cyclone effects on the structure and production of a tropical upland rainforest: Implications for life-history trade-offs. *Ecosystems* **11**: 1277–1290.

Mickovski, S.B., Bengough, A.G., Bransby, M.F., Davies, M.C.R., Hallett, P.D. and Sonnenberg, R. 2007. Material stiffness, branching pattern and soil matric potential affect the pullout resistance of model root systems. *Eur. J. Soil Sci.* **58**(6): 1471-1481.

Saxena, H.O. and Brahmam, M. 1994-96. *Flora of Orissa*. vol. 1-4. OFDC, Bhubaneswar.

Sundarapandian, S.M., Mageswaran, K., Gandhi, D.S. and Dar, J.A. 2014. Impact of Thane cyclone on tree damage in Pondicherry University campus, Puducherry, India. *Curr. World Environ.* **9**(2): 287-300.