Cyclones- threat to coconut plantation in coastal Odisha

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Cyclone, a massive and complex system of wind circulation is increasingly becoming a threat to many parts of the world, especially the coastal areas where people become homeless, devoid of food, power, electricity, incur huge agricultural loss due to damage of standing crops and harvested produce. People also face financial loss due to death of livestock which overall create a great impact on the entire ecosystem.

The east coast of India is one of the six most cyclone prone areas in the world. During the last century, the Indian sub-continent has experienced 1019 cyclonic disturbances of which 890 were along the east coast and 129 were along the western coast. 260 cyclonic disturbances had their landfall along the Odisha coast, out of which 23 were severe storms. The geographical location and physical environment make Odisha coastal zone vulnerable to frequent cyclonic disturbances. Taking together the storms and severe storms, coastal Odisha is about twice as vulnerable as compared to the other eastern states. The 480km coastline exposes the state to cyclones and storm surges.

Cyclones are becoming increasingly unpredictable worldwide. In the recent years, the US has witnessed multiple cyclones that gained rapid intensification. India has also encountered severe cyclones in recent past like Cyclone Phailin which originated in Bay of Bengal, hit Gopalpur of Ganjam district of Odisha on 12th October 2013.

Cyclone Hudhud, made a landfall near Visakhapatnam with a wind speed of 170-180km/hr on 12th October 2014.

Cyclone Ockhi was a strong tropical cyclone that originated in Arabian sea and devastated parts of Sri Lanka and India between 29th November to 6th December 2017. It stroke Lakshwadeep on November 30.

Cyclone Titli , a severe cyclonic storm, originated in Bay of Bengal, hit the coast of Odisha on 10th October 2018.

Table 1: District wise area affected by Fani									
No.	District Uproot-ed	Broken		Partial crown damaged		Full crown damage		Total Damage	
		In nos.	In ha.@175 nos./ha.	In nos.	In ha.@175 nos./ha.	In nos.	In ha.@175 nos./ha.	In nos.	In ha.@175 nos./ha.
1.	Cuttack	525	3	3500	20	1050	6	5075	29
2.	J.B. Pur	787	4.5	438	2.5	350	2	1575	9
3.	Jajpur	1925	11	8487	48.5	4498	25.7	14910	85.2
4.	Kendra-pada	1750	10	5250	30	3500	20	10500	60
5.	Puri	328650	1878	357525	2043	473200	2704	1159375	6625
6.	Khordha	24290	138.3	42350	242	129675	741	196315	1121.8
	Total	**357927**	**2045.3**	**417550**	**2386**	**612273**	**3498.7**	**1387750**	**7930**

Cyclone Gaja, originated from a low-pressure area over the Gulf of Thailand and intensified into a cyclonic storm on 11th November 2018,made a landfall in Tamil Nadu and Puducherry area at a highest speed of 150kmph.

The cyclone FANI made landfall on 3rd May 2019 between Satapada and Puri as an extremely severe cyclonic storm. As reported by IMD, the maximum sustained surface wind speed of 170-180 kmph gusting to 205 kmph was observed during the landfall. After the landfall, it continued for 6 hours and then afterwards it decreased. The Doppler Rader image at Paradeep shows that the cyclone completely made landfall on 3rd May 2019.

Reasons of Cyclone

Ocean temperature is rising due to global warming. This has fundamentally altered the character of cyclones. Cyclones are fed by moisture which is sucked up due to the increasing temperature over the sea surface. Since 1970, sea surface temperatures worldwide have gone up by an average of 0.1°Celsius per decade as oceans act like heat sinks. Warm air holds more water vapour and this provides additional fuel for cyclones. Apart from warming oceans, cyclones are also influenced by air pressure and local wind patterns. A cyclone forms around a low-pressure area that pulls air from the ground, expands and cools down. When this process keeps repeating, the cyclone collects moisture and grows.

Super-cyclone "Fani" and its devastating effect

Fani storm made a landfall at Puri on 3rd May 2019 after meandering over the sea and land for 11 days, making it the longest-lived cyclone in the Bay of Bengal ever observed.

As per report released from Disaster Management Department, Govt of Odisha, about 1.43lakhs hectare of agriculture crops and 2638 hectares of horticulture crops sustained crop loss of more than 33% due to the cyclonic storms and subsequent heavy rain. 34.31 lakh livestock and 53.52 lakh poultry have been affected. 6753 fishermen boats and 7680 fishing nets were damaged either lost or fully/partially damaged. Apart from this, there were huge loss in handloom and handicraft sector, rural water supply,irrigation,primary health centres, power supply, etc. Loss of public properties were estimated at around twelve thousand lakh of rupees.

It was reported that " Cyclone Fani, the second-most powerful cyclone to have hit Odisha, has uprooted about 14 lakh coconut trees, affecting around 50,000 coconut farmers in the state. The storm, which made landfall in Puri on May 3, 2019 with a wind speed of 175 kilometres per hour, rampaged nearly 8,000 hectares of coconut farms. Besides coconut farms, the cyclone also damaged weavers' looms, betel vineyards, craftsmen's tools, trees and fishermen's boats and have left agricultural fields inundated." *(www.downtoearth.org.in/NATURAL- DISASTERS)*

As reported by State Govt., due to 'Fani', an area of 7930 ha was affected out of which 5544ha was permanently damaged due to uprooting/ broken/ crown damage. Partial crown damage has occurred in an area of 2386 ha.

The district wise coconut area affected is given in Table 1 *(Source: Directorate of Horticulture, Govt. of Odisha)*.

Damage caused by extremely severe super cyclone "Fani"
Farmers field at Brahmagiri, District-Puri

Present scenario of coconut plantation

As per the statistics of Horticulture Division, Dept of Agriculture & Cooperation, Ministry of Agriculture & Farmers Welfare, Government of India, of 2018-19, total area under coconut plantation in Odisha was 50,910 hectares with production of 342 million nuts (6719nuts/ha). Puri district itself used to contribute 25% of total production, area wise covering 20% of total coconut plantation (8840nuts/ha). Most of the coconut orchards/gardens including seed gardens were located in different areas of Puri district like Brahmagiri, Konark, Nimapara, Chandanpur etc which were mostly ravaged due to 'Fani'. Regulated market of coconut located at Sakhigopal is in distress situation having no local supply, which only depends on supply of coconut from neighbouring state like Andhra Pradesh and Tamil Nadu.

Thus the production from around 45000 hactares (after deducting 5544 hectare fully damaged area from total area) will give less production of around 40%, as the partially damaged plants will require another 2 to 3 years for recovering the loss due to crown damage, as per expert opinion. Naturally there has become a great impact on income generation through coconut cultivation.

Such immense loss of coconut could be prevented if the coconut growers adopted scientific method of planting based on soil texture, proper pit digging, proper spacing, nutrition management, integrated pest management etc. High density of planting with close spacing, shallow depth of pit and unhealthy growth with narrow trunks were accountable for more damage apart from the wind speed.

Technical advice

Technical advice as given by the ICAR and OUAT scientists and Coconut Development Board are as follows:

- To cut and remove the uprooted and broken palms from the field so that pest and disease will not prevail. If felled trunks and boles remain in the field, it will act as breeding ground for coconut pests. So field sanitation is essential.
- To cut the twisted spear leaves upto 6 inches below twist and remove the leaves which are obstructing the spindle leaf, and drench/pour immediately with copper based fungicide and cover with polythene to prevent bud rot infections.
- Adequate Irrigation to the palms
- Application of double dose of fertiliser
- Tilted or bent young coconut palms are to be erected immediately by providing support.

Damage at DSP Farm, Pitapally, Odisha

DSP Farm, Pitapalli after 10 months

Action taken at DSP Farm and result thereof

DSP Farm, CDB,Pitapalli, District- Khurda which is only 60km away from Puri sea coast, was also devastated due to 'Fani'. Landfall process started in the morning between Satapada and Puri, and continued for 3 hours at wind speed of 170-180kmph gusting to 205kmph. This farm experienced highest speed of wind @ 150-160kmph at different intervals between 10.30am and 1.00 am, though stormy wind started at 7-30AM and continued upto 2-30PM. This resulted in 490 palms (13% of total palms) being completely uprooted or broken at mid-trunk, around 75% palms suffered crown damage, apart from that branches with full of mango fruits, sapota, cashew, guava etc were broken, also uprooted in many cases, green house, shed-net house, go-downs etc were damaged severely along with other loss of properties like transformer, electric poles, wiring, lights, vermicompost tank sheds, glass window panes of office building etc. Typically, it was observed that the crowns were twisted to one direction which were common in most of the plots as per the direction of cyclonic winds. Altogether, it was a complete mess for the entire farm.

Action was taken to revive the situation of plantation after electricity and water supply became available on the 18th day after 'Fani' like life saving irrigation to all palms and intercrops, removal of broken and dead branches, erecting the young bent palms, drenching of central portion of crown with fungicide to prevent bud rot, and other advices as recommended by the technical committee. Afterwards, crown cleaning, fertiliser application followed with adequate irrigation etc were done as routine operational practices.

As a result, condition of the palms has improved and expected to revive by 70% within another year. But harvesting of nuts shows around 20-25% rejected/barren nuts, which as per scientists of OUAT, is the result of abortion and damage of growing immature nuts caused due to high wind speed.

Unpredictable wind pattern may cause more damages in future to the coconut plantation in the coastal Odisha, but more care should be taken during planting of new seedlings after 'Fani' and management of existing palms to prevent easy fall or broken down of palms during high wind speed. Scientists may also explore the suitability of varieties and package to be developed for coastal eastern and western India, which are vulnerable areas for cyclonic winds. ■