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SPACE TECHNOLOGY TO MONITOR THE TORNADO THAT HIT BRAHMANBARIA DIST. OF BANGLADESH IN 2013 AND DAMAGED A LOT

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ABSTRACT

Bangladesh faces meteorological events like cyclone, depression , nor'easter's, tornado etc. almost every year. Nor'wester's and Tornadoes are the special type of storm which cause lot of destructions and hampers the sustainable development of the country. Nor'westers come mainly from the north westerly direction (and hence the name) and are land based. They are very common phenomenon in Bangladesh during late month of Chaitra and Baishak . They are known as Kalbaishaki in Bengali. The physical cause of such disasters is embodied in law of science and hence proper scientific research is necessary to deal with them. A massive tornado attacked Brahmanbaria dist. in 2013. In this paper , the role of Remote Sensing and GIS technology for monitoring the tornado and its impact have been described.

Keywords: Cause, Monitoring, Natural disaster, Phenomena, Remote sensing, Sustainable development, Technology.

Contribution/ Originality

SPARRSO, has been engaged with monitoring of different natural disasters using remote sensing technology since early seventies'. This type dealing is necessary to study the nature of the events useful for awareness and preparedness towards disaster management.

1. INTRODUCTION

Being one of the disaster prone countries, Bangladesh faces thunderstorm and tornado activities every year. Storms characterized by strong surface wind exceeds 100 miles per hour are termed as tornados which occur frequently in Bangladesh [1]. The maximum velocity that can occur in a tornado is estimated to be about 400 miles/hr. The pre-monsoon weather condition is favorable for formation of such events. They are formed suddenly, usually on land and are extremely localized. Their duration is very short and thus very difficult to locate them and make effective forecasts.

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2. OBJECTIVE

The objective of the study can be summarized as follows :

- To monitor the natural disasters (tornado);
- To observe its movement ;
- To study the impact of disaster;
- To find out its path of destruction & Track of Tornado that hit Bangladesh

3. DATA/METHODOLOGY USED

Mainly the Remote Sensing Technology and real time Satellite data were used for this study. The images of Geo-Stationary Satellite FY-2D (China) and MTSAT (Japan) received at SPARRSO Ground Station were processed and analyzed every hourly using gmsoft and vimsat software/module . Data/Information from internet source as well as the model for international weather monitoring were also used in this study. The special bulletin of weather provided by Bangladesh Meteorological Department (BMD) were used to validate the space based data.

3.1. Monitoring of Tornado'2013(Case Study)

A strong Tornado passed over Bangladesh in 2013 which caused colossal losses to lives and properties. It played havoc in different areas of Brahmanbaria district on Friday, 22 March, 2013. It started at 5 pm and stayed for 10-15 min. The cloud picture showed that the central and northeastern part of Bangladesh was overcast with clouds and a lot of convection had begun to grow which further developed. At least 3 strong convective cells bulging out of the southern periphery of the cloud masses with tornadoic strength [2] .

Fig-1. Convection began to grow of tornado

Fig-2. Funnel shape development oftornado

The anvil clouds spread and turned suddenly to northeast direction with strong winds damaging the environment and population of the localities where it occurred (Fig-1 & Fig-2) . Rains and hail accompanied the twisters, which lasted more than five minutes [2, 3].

The occurrence and movement of this event has monitored using Remote Sensing and GIS Technology at SPARRSO using satellite cloud pictures . The formation and development of the tornado can be seen in FY-2D Geo-stationery Satellite image (Fig-3). Track of tornado is shown in Fig-4.

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Fig-3. FY-2D Satellite image (22-03-2013)

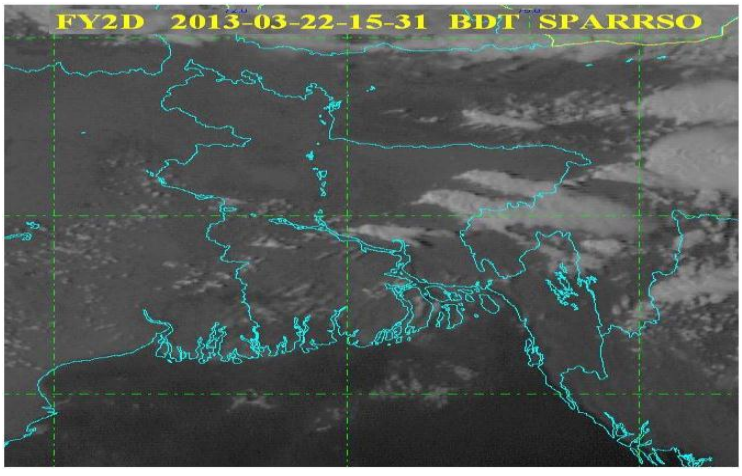
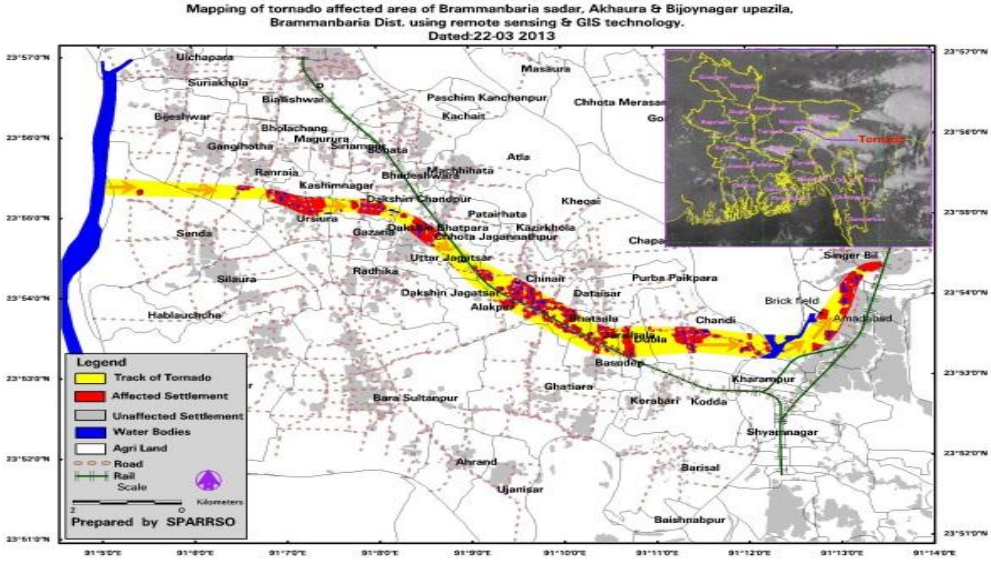


Fig-4. Map showing of Track of Tornado



3.2. Impact of Tornado, 2013

The tornado devastated innumerable thatched houses, uprooted thousands of trees, damaged crops, huge property and killed 50 cows in the affected areas. 21 people were killed and over 5 hundred injured as a tornado lashed 21 villages of Sadar, Akhaura and Bijaynagar upazilas of Brahmanbaria Dist. [4] Many electric poles were uprooted, leaving power supply snapped and standing crops on a vast tract of land also destroyed [2]. Roofs were blown off like paper scraps, witnesses said .The most affected villages were Gaingahata, Chinair, Jibantula, Ujanishar, Gaingha, Urshiura, Shilaour, Senda, Sultanpur, Bathsala, Pagachong, Chandpur, Ghatiara, Jaritula, Dobli, Chandi, Ramrail, Machihata ,Patirhata , Paikpara, Merashani of 3 upazilas

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including Barahmanbaria Sadar [3, 5] . The data for damage of mostly affected area due to Tornado'2013 is shown in Table-1.

Table-1. Data for mostly affected area due to Tornado'2013

Affected Dist	No. of Affected Upazila	No. of Affected Union	No. of Affected Family	No. of Affected House	No. of Death	No. of Injured	Affected Crops Acrs	No. of cattle death
Brahmanbaria	3	6	1667	2552	31	388	1285	299

Some of its impact and damage are shown in followings natural pictures (Fig-5&6)

Fig-5. Damaged structures and houses

Fig-6. Uprooted Trees due to tornado

3.3. Other Damages

- Electric transmission lines and poles were disrupted and the whole Brahmanbaria city was seriously affected.
- Road Communication, especially Sylhet-Chittagong Highway collapsed due to fall down and uprooting of numerous trees.
- Besides the Katcha houses, 175 meter boundary wall of the district prison collapsed.

4. CONCLUSION

Tornados are formed suddenly and are extremely localized. They usually occurred on land and their duration is very short. Thus it is very difficult to monitor or locate them and make effective forecasts. Despite significant improvement in prediction and monitoring of such disasters on a wide of scale in last decade, much distraction and losses to lives and properties are going on. It is important to warn people much ahead of time about the occurrence of the weather calamities like Tornado to mitigate the losses due to them [6]. The study and researches on such meteorological events thus is useful. Space technology can help in this regards [1]. The

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monitoring and information provided by SPARRSO on time using remote sensing and GIS helped the Government and its related organizations to take necessary steps during the disaster and for post disaster management program in the respective areas for the sustainable development of the country.

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