Progressive Agriculture 27: 57-63, 2016 ISSN: 1017 - 8139

Progressive Agriculture
Journal homepage:http://www.banglajol.info/index.php/PA

Studies of thunderstorms and lightning on human health, agriculture and fisheries in Mymensingh and Jamalpur district of Bangladesh

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Abstract

An investigation was carried out to the assessment on thunderstorm and lightning and their impact on human health, agriculture and fisheries. More than half of the respondents (58%) were illiterate and lack of knowledge about thunderstorm (Melandaha Upazila) and 30% were illiterate in Mymensingh Sadar Upazila. In Mymensingh Sadar Upazila, about 70% respondents suffered with light dumb disease and about 46% respondents suffered with moderate headache disease. About 40% respondents suffered with severe heart failure disease. In Melandaha Upazila, about 42% respondents suffered with light heart failure and neural damage disease. About 28% respondents suffered with moderate skin irritation and headache disease. About 32% respondents suffered with severe heart failure and neural damage disease. In Mymensingh Sadar Upazila, about 53% of the respondents reported that fishes are at risk condition at the time of Thunderstorm and lightning and about 47% of the respondents reported that fishes were at very risk condition during TS and lightning. In Melandaha Upazila, about 67% of the respondents reported that fishes were at risk condition at the time of TS and lightning and about 33% of the respondents reported that fishes were at very risk condition during TS and lightning. Most of the respondents reported that TS affected the agricultural production very much. For TS and lightning, agricultural land was unsuitable for agricultural production. Trees and crops were uprooted, damaged and fired. So, people lose their property and lose to their lives. Farmers were struck by thunderbolt while they were working at paddy field and harvesting paddy field. Routine research work with wide public awareness, government and NGO participation, and government regulation are needed for safe and sound environment.

Key words: Thunderstorms & lightning, human health, agriculture, fisheries

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Introduction

Bangladesh is a disaster prone country. Almost every year, the country experiences disasters of one kind or another such as tropical cyclones, storm surges, thunderstorm (TS), coastal erosion, floods, and droughts causing heavy loss of life and property and jeopardizing the development activities (Ali, 1999). Thunderstorms are responsible for the development and formation of many severe weather phenomena. Thunderstorms, and the phenomena that occur along with them, pose great hazards to populations and landscapes. Damage that results from thunderstorms is mainly inflicted by downburst winds, large hailstones, and flash flooding caused by heavy precipitation. Stronger thunderstorm cells are capable of producing tornadoes and waterspouts (Gomes *et al*., 2006).

All thunderstorms produce lightning and are very dangerous. In the world, every year, over 20,000 people are affected by lightning and several thousand succumb to their injuries. Only a few studies have been done on lightning in Bangladesh (Karim, 1995, Gomes *et al*., 2006) and those few reveal that the number of lightning incidents in the country is quite

high. But there is no study on lightning in Jamalpur and Mymensingh district still now. Media reports on lightning incidents in Bangladesh frequently carry news on incidents where a single lightning flash killing multiple victims (the number may reach even 10-12). Most of the people, killed by lightning are villagers in rural areas who work in open fields (Gomes *et al*., 2011).

Most of us tend to look at lightning as a harmful side effect of storms, but in realities these lightning provide benefits to our planet. These benefits include assisting farmers by helping plants grow. Lightning helps fertilize plants. Our atmosphere consists of approximately 78% nitrogen, but this nitrogen exists in a form that plant life cannot use (Kerr, 2012). Therefore, proper dissemination of knowledge on lightning protection and safety measures, down to village level, is essential to curb the death toll and other hazards to the human beings and livestock.

Materials and Methods

A list of people of the study area was prepared by researcher herself with the help of the local block supervisors, and local leaders. Hundred (100) of people of ten (10) different villages constituted the sample of this study. In Mymensingh Sadar Upazila, fifty (50) of people of five (05) different selected villages constituted the sample of this study. In Melandaha Upazila, fifty (50) of people of five (05) different selected villages constituted the sample of this study. An interview schedule was prepared for collection of data from the respondents keeping the objectives of the study in mind. The questions and statements contained in the schedule were simple, direct and easily understandable by the peoples. Simple and direct questions, different scales, closed open form statements were included in the interview schedule to obtain necessary information. Data were collected by the researcher during two seasons (April-September, 2014) and (February-May, 2015). Before starting the collection of data the research established adequate rapport so that the responded did not feel hesitate to provide actual information. Whenever any respondent faced difficulty in understanding a particular question the researcher took care to explain the same clearly. The research was based on both primary and secondary data. Primary data were collected through field observation and secondary data were collected from governmental organization, personal records, journals and papers (published and unpublished), articles, and from electronic and web based information.

Results and Discussion

Most of the respondents said that TS is very dangerous for human being and agriculture. They also said TS is very harmful for human being, agriculture, fisheries and other sectors. From survey report , 70% of respondents said that TS and lightning occured in rainy season. 15% of the respondents said that it occured in March-May month and 10% were said that it also occured in wet season (In Mymensingh Sadar Upazila). In Melandaha Upazila, 76% of respondents said that TS and lightning occured in rainy season. 17% of the respondents said that it occured in March-May month. Rest of the respondents said that TS occured any time of year, but are less likely to happen in winter and far more common during summer.

In Bangladesh, thunderstorms occur in all seasons of pre-monsoon, monsoon and post-monsoon and are characterized by strong surface wind generally from 40 to 100 miles per hour and accompanied by heavy rain and often destructive hail with lightning (Ferdousi *et al.,* 2014).

Causes of thunderstorm

In Mymensingh Sadar Upazila, 33% of the respondents reported that thunderstorms caused by rain, 57% of the respondents reported that thunderstorms caused by heavy rainfall and 10% of the respondents reported that thunderstorms caused by high wind (Figure 1). In Melandaha Upazila, 41% of the respondents reported that thunderstorms caused by rain, 54% of the respondents reported that thunderstorms caused by heavy rainfall and 5% of the respondents reported that thunderstorms caused by high wind (Figure 1).

Strong thunderstorms also produced tornadoes, which can cause massive destruction to personal and business property. Thunderstorms occurred when warm, moist air within a rain cloud, rises in large volumes and with increasing velocity. Similar result was also supported by (NSSL, 2008).

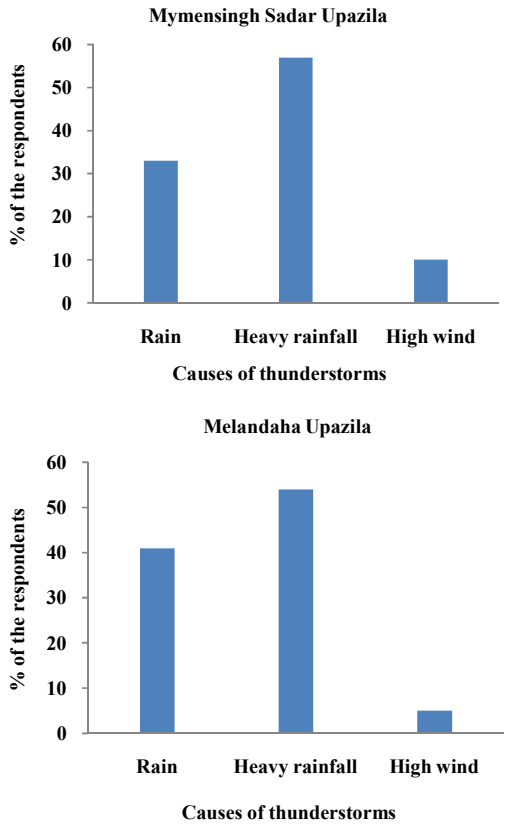

Figure 1: Causes of thunderstorm

Effects of thunderstorm and lightning

In Mymensingh Sadar Upazila, 33% of the respondents reported TS disrupted in human life, 27% of the respondents were lost their property and lives, 16% of the respondents were injured, 9% of the respondents were burnt and 7% of the respondents were death due to TS and lightning (Figure 2). In Melandaha Upazila, 38% of the respondents reported TS disrupted in human life, 29% of the respondents were lost their property and lives, 14% of the respondents were injured, 13% of the respondents were burnt and 6% of the respondents were death due to TS and lightning (Figure 2). According to Daily Star (2015), the felling of millions of trees even deaths due to lightning hazard, many houses and academic activities are being seriously damaged, crops and trees are uprooted even death and fires. Some people were killed and some were injured in every year and others animals were being death and injured. The storm destroyed over 100 houses, crops on two hectres of land uprooted a number of trees.

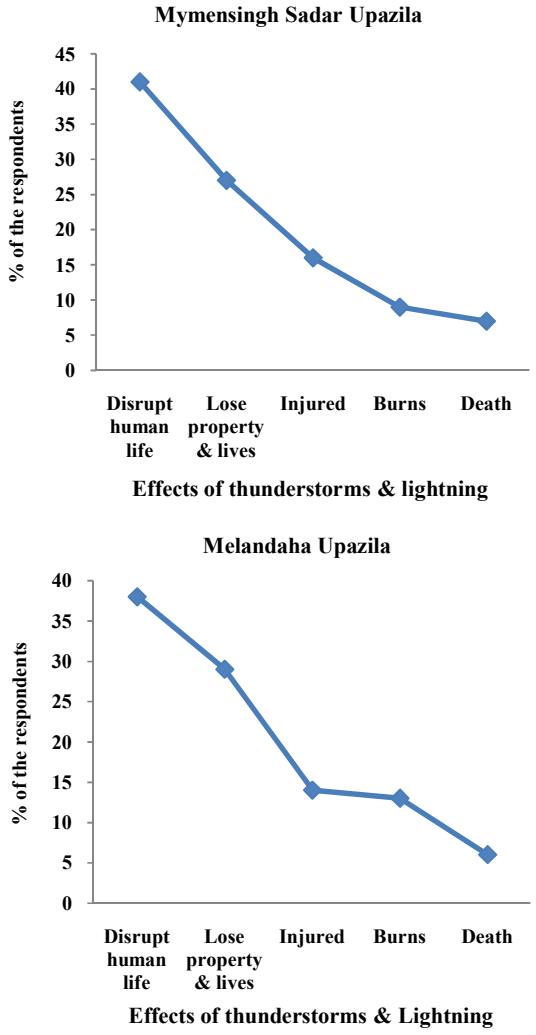

Figure 2. Effects of thunderstorm and lightning

Effects of thunderstorm and lightning on human health

TS have recently attracted more attention in terms of causing not only social and environmental problems but also health problems including their influence on humans. In Mymensingh Sadar Upazila, peoples suffered with different diseases from TS and lightning which is showed in the Figure 3.

Survey result showed the list of diseases that was reported by the respondents. It was found that 70% of the respondent suffered with light dumb diseases from TS and lightning, compared to 20% of the respondents suffered with moderate dumb diseases and 10% of them were suffered from severe dumb diseases. It also revealed that 40% of the respondent suffered with light chronic diseases by TS and

lightning, compared to 36% of the respondents suffered with moderate chronic diseases, 20% of them were suffered from severe chronic diseases and 4% of the respondents not affected with chronic disease. It was found that 54% of the respondent suffered with light heart failure diseases by TS and lightning, compared to 16% of the respondents suffered with moderate heart failure diseases and 30% of them were suffered from severe heart failure diseases. It also revealed that 26% of the respondent suffered with light stroke diseases by TS and lightning, compared to 20% of the respondents suffered with moderate stroke diseases, 40% of them were suffered from severe stroke diseases and 14% of the respondents not affected with stroke disease.54% of the respondent suffered with light skin irritation diseases by TS and lightning, compared to 6% of the respondents suffered with moderate skin irritation diseases, 34% of them were suffered from severe skin irritation diseases and 6% of the respondents not affected with skin irritation disease. It also found that 16% of the respondent suffered with light headache diseases by TS and lightning, compared to 46% of the respondents suffered with moderate headache diseases, 18% of them were suffered from severe headache diseases and 20% of the respondents not affected with headache disease. 34% of the respondent suffered with light asthma diseases by TS and lightning, compared to 18% of the respondents suffered with moderate asthma diseases, 40% of them were suffered from severe asthma diseases and 8% of the respondents not affected with asthma disease It also showed that 48% of the respondent suffered with light neural damage diseases by TS and lightning, compared to 18% of the respondents suffered with moderate neural damage diseases, 32% of them were suffered from severe neural damage diseases and 2% of the respondents not affected with neural damage disease (Figure 3). In Melandaha Upazila, peoples suffered with different diseases from TS and lightning. Survey result showed the list of diseases that was reported by the respondents. It was found that 34% of the respondent suffered with light dumb diseases by TS and lightning, compared to 22% of the respondents suffered with moderate dumb diseases, 28% of them were suffered from severe dumb diseases and 4% of the respondents not affected with dumb disease. It also showed that 36% of the respondent suffered with light chronic diseases by TS and lightning, compared to 24% of the respondents suffered with moderate chronic diseases, 30% of them were suffered from severe chronic diseases and 10% of the respondents not affected with chronic disease. It also showed that 42% of the respondent suffered with light chronic diseases by TS and lightning, compared to 26% of the respondents suffered with moderate chronic diseases and 32% of them were suffered from severe chronic diseases.

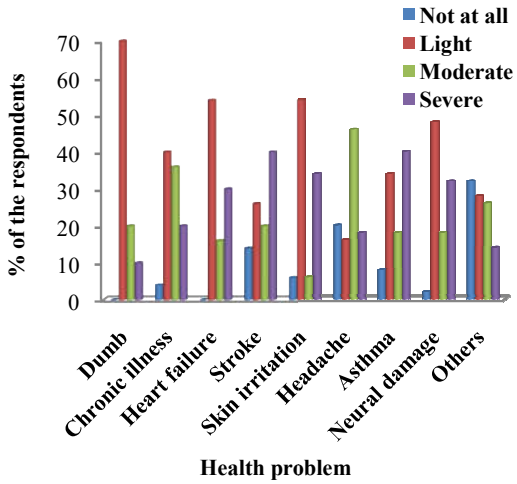

Figure 3. Health problems caused by thunderstorm

It also revealed that 36% of the respondent suffered with light stroke diseases by TS and lightning, compared to 28% of the respondents suffered with moderate stroke diseases, 30% of them were suffered from severe stroke diseases and 6% of the respondents not affected with stroke disease.34% of the respondent suffered with light skin irritation diseases by TS and lightning, compared to 28% of the respondents suffered with moderate skin irritation diseases, 20% of them were suffered from severe skin irritation diseases and 18% of the respondents not affected with skin irritation disease. It also found that 34% of the respondent suffered with light headache diseases by TS and lightning, compared to 22% of the respondents suffered with moderate headache diseases, 28% of them were suffered from severe headache diseases and 16% of the respondents not affected with headache disease. 36% of the respondent suffered with light asthma diseases by TS and lightning, compared to 24% of the respondents

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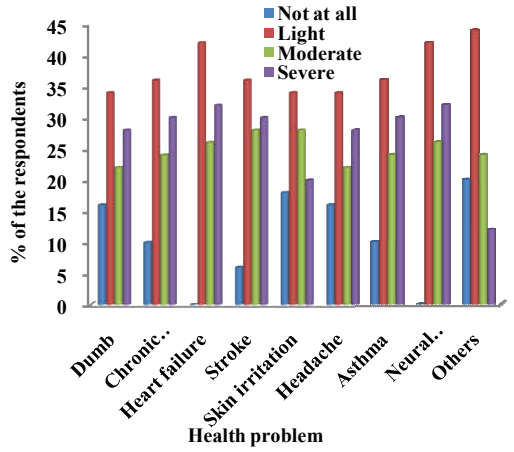

Figure 4. Health problems caused by thunderstorm

Lightning can affect all organ systems, especially the cardiovascular system. Central nervous system injuries are common. Transient confusion, paralysis and amnesia are likely. Coagulation of the brain, subdural hematomas or collections of blood surrounding the brain, and bleeding within the brain is possible with direct strikes. About one half of all lightning victims will have some type of eye damage, usually corneal injury. The most common serious eye injuries are cataracts which can occur from a few days to several years after the lightning strike. Other eye injuries include retinal bleeding, retinal detachment and optic nerve degeneration. There may also be transient autonomic nerve disturbances which can result in dilated or contracted pupils even without concurrent head injury. The ears are also commonly affected with over 50% of lightning victims having ruptured ear drums. Transient hearing loss and tinnitus affect most survivors of lightning strikes. Vertigo or dizziness has also been reported (Hark, 2000).

Effects of thunderstorm and lightning on fisheries

In Mymensingh Sadar Upazila, all of the respondents reported that it is not safe to go fishing during thunderstorm and lightning. About 53% of the respondents said that fishes were at risk condition at the time of TS and lightning and about 47% of the respondents reported that fishes were at very risk condition during TS and lightning (Figure 5).

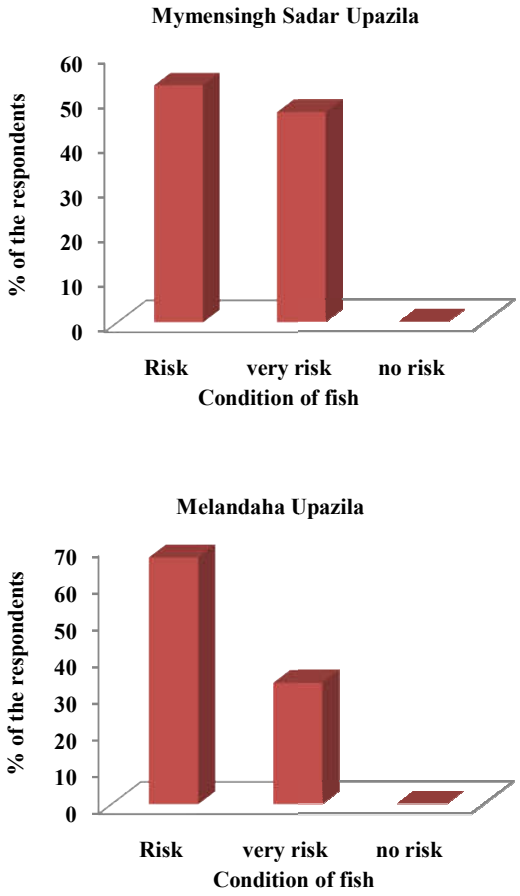

Figure 5. Effects of thunderstorm and lightning on fisheries.

In Melandaha Upazila, all of the respondents reported that it is not safe to go fishing during thunderstorm and lightning. About 67% of the respondents said that fishes were at risk condition at the time of TS and lightning and about 33% of the respondents reported that fishes were at very risk condition during TS and lightning (Figure 5).

Effects on thunderstorm and lightning in agriculture

Thunderstorm and lightning affected the agricultural production very much. In Mymensingh Sadar

Upazila, 41% of the respondents reported land was unsuitable for agricultural production by TS and lightning, 39% of the respondents reported agricultural production were decreased,26% of the respondents reported crops were damaged and 4% of the respondents reported crops were fired (Figure 6).

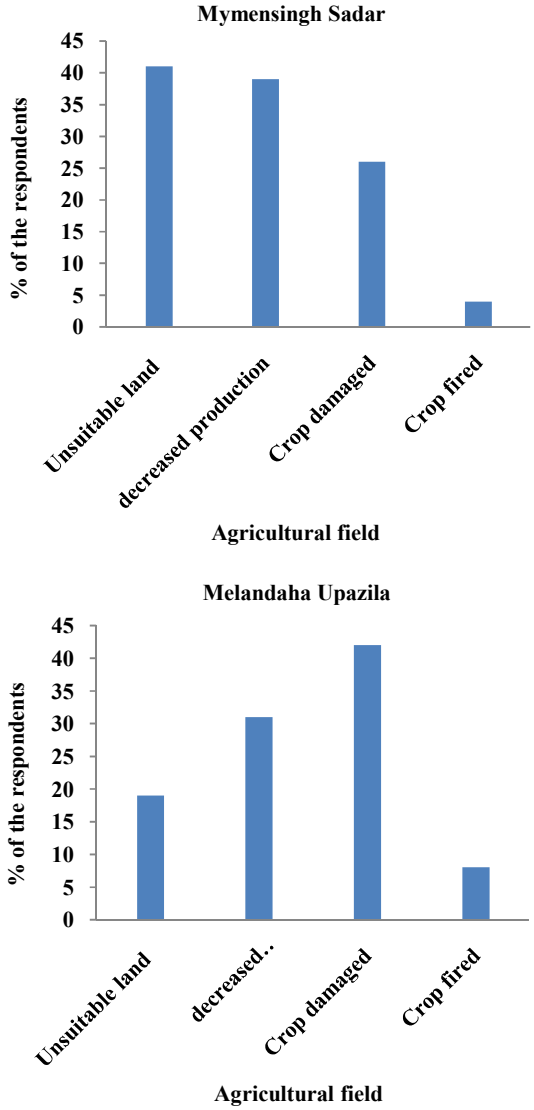

Figure 6. Effects on thunderstorm and lightning in agriculture.

In Melandaha Upazila,19% of the respondents reported land was unsuitable for agricultural production by TS and lightning, 31% of the respondents reported agricultural production were decreased, 42% of the respondents reported crops were damaged and 8% of the respondents reported crops were fired (Figure 6). Farmers were struck by a thunderstorm while they were working at a paddy field and harvesting paddy. In Bangladesh, at least 23 farmers were killed by thunderbolt when they were working in their crop land. Standing crops on 5000 acres of land were damaged by the thunderstorm and lightning and damaging 120 houses and crops on two hectares of land uprooted a number of trees (Daily star, 2015).

Lightning Knowledge and Experience

A last group of questions dealt withlightning knowledge and experience.In Mymensingh Sadar Upazila, 92% of the respondents had seen a lightning damaged tree, 76% of the respondents reported that lightning already hit their residential building, 78% of the respondents reported that TS affect plant growth, 86% of the respondents faced social problems for TS, 57% of the respondents suffered from TS and any organization has no working to prevent TS and lightning (Figure 7).

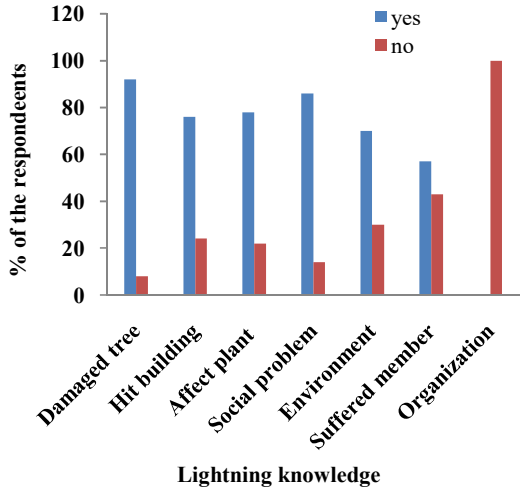

Figure 7. Lightning knowledge and experience

In Melandaha Upazila, 81% of the respondents had seen a lightning damaged tree, 67% of the respondents reported that lightning already hit their residential building, 90% of the respondents reported that TS affect plant growth, 79% of the respondents faced social problems for TS,64% of the respondents suffered from TS and any organization has no working to prevent TS and lightning (Figure 8). Maria *et. al.* (2009) found 12% reported lightning already hit their residential building, 62% said they faced some social problems and 96% had seen a lightning damaged tree.

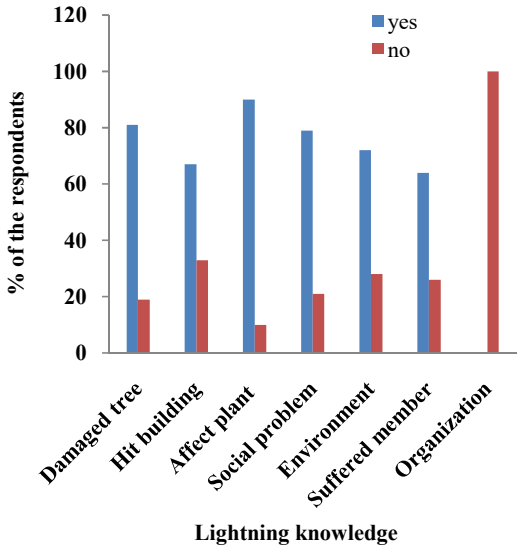

Figure 8. Lightning Knowledge and Experience

Conclusion

In conclusion, it may be said that though Bangladesh is not a large country, the space/time distributions of TSs vary greatly. In southern areas, there is a wide variation as to the intense period of TS activity. Since lightning can be monitored easily, and continuously, from ground networks, lightning may become a useful tool for monitoring changes in important climate parameters in the future.

The government (through Department of Meteorology) or a relevant private sector that owns region-wide lightning detection system should provide thunderstorm forecasting and lightning information to the concerned community. This should be done in collaboration with mass media, especially audio-visual media such as radio and television. Some thunderstorms can be seen approaching, while others hit without warning. It is important to learn and recognize the danger signs and to plan ahead.

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