Norwegian Meteorological Institute

বাংলাদেশ আবহাওয়া অধিদপ্তর

MET report

no. 08/2016
ISSN 2387-4201
Climate

Climate of Bangladesh

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MET report

Title: Climate of Bangladesh	**Date** 31.05.2016
Section: Climate	**Report no.** no. 08/2016
Author(s): Mossammat Ayesha Khatun, Md. Bazlur Rashid, Hans Olav Hygen	**Classification** ●Free○Restricted
Client(s): [Client(s)]	**Client's reference** [Client's reference]

Abstract

To understand the climate of Bangladesh it is very essential to find out the monthly and seasonal variation of climate parameters. As such temporal and spatial distribution of temperatures (maximum, minimum, and dry bulb), surface wind and rainfall are computed and analyzed. For detailed understanding monthly frequency of the minimum temperature thresholds with the ranges of less than 6°C, 6-8°C, 8-10°C, 10-15°C, 15-20°C, 20-25°C and greater than 25°C; maximum temperatures thresholds with the ranges of greater than 40°C, 38-40°C, 36-38°C, 30-36°C, 25-30°C, 20-25°C and less than 20°C; rainfall categories of light rain (1-10 mm), moderate rain (11-22 mm), moderately heavy rain (23-43 mm), heavy rain (44-88 mm), very heavy rain with greater than 88 mm, very heavy rain with 100-199 mm, very heavy rain with 200-299 mm and very heavy rain with greater than 300 mm etc. are calculated for all the meteorological stations for the period of 1981-2010. In addition seasonal wind distribution of each of the BMD stations are prepared. Trends of these parameters are also analyzed. Finally, spatio-temporal variations of these parameters are calculated for the period of 1981-2010 and then the deviations of the later period than the previous period (1971-2000) are checked. Distribution pattern of annual rainfall during 1971-2000 and 1981-2010 are very similar to each other. But the amounts of annual rainfall increased during 1981-2010 over extreme southeastern part, Hatiya, Sandwip, Rangpur and Jessore regions. But the amounts of rainfall decreased over Rajshahi division and the regions of Faridpur, Dhaka, Sylhet, Kushtia and Barisal. Substantial increments are found at Hatiya (+9%), Teknaf (+8%) and Jessore (+7%). Annual maximum temperature of 1981-2010 increased than that of 1971-2000 notably over southeastern and northeastern parts and then central and southern parts of Bangladesh but it decreased over the regions of Dinajpur, Mymensingh and Feni . The highest increment of annual maximum temperature of 0.5ºC is found at Cox's Bazar, Rangamati and Sylhet. Similarly, annual minimum temperature increased notably over northeastern and central parts of Bangladesh and their adjoining areas. The highest increment of minimum temperature of 0.3ºC is found at Dhaka, Faridpur, Madaripur, Maijdi Court, Cox's Bazar, Sylhet, Srimongal, Rangpur and Bhola.

Keywords: Climate, Temperature, Rainfall, Trend and Wind

Disiplinary signature

Responsible signature

Forward Message

Bangladesh is one of the largest deltas in the world which is highly vulnerable to natural disasters because of its geographical location, flat and low-lying landscape, population density, poverty, illiteracy, lack of institutional setup etc. The physical and social set up, as well as the economic conditions of Bangladesh are very typical to make it the most vulnerable countries to natural disasters.

Bangladesh experiences different types of natural hazards or disasters almost every year which includes cyclones and associated storm surge, flood, flash flood, severe thunderstorm, Tornado, heavy rainfall, heat wave, cold wave, dense fog etc. Loss of lives and properties associated with these hazards or disasters are very common.

Area specific timely and accurate forecast and early warning with sufficient lead time is one of the best ways to reduce loss of lives and properties which may enhance the sustainability of the economic growth of Bangladesh. Bangladesh Meteorological Department (BMD) is the only government organization responsible for monitoring and issuing all types of forecasts and warnings related to these weather events. BMD needs sector specific up-gradation like analysis of weather data and information, introduction of Numerical Weather Prediction (NWP) technique etc. to improve the forecast quality and its service for different sectors of Bangladesh.

An MoU signed between Bangladesh Meteorological Department (BMD) and Norwegian Meteorological Institute (MET Norway) in December 2011 and the Project entitled ‘Institutional Support and Capacity Building for Mitigation of Weather and Climate Hazards in Bangladesh’ as an initiative to overcome this problem. Under this project, several ‘Working Groups’ formulated and ‘Climate Group’ is one of them. Meteorological variables such as temperature, precipitation, wind speed and direction etc. were studied using statistical software ‘R’ and some other common softwares by Climate Group. The result is summarized in this report.

I hope that this report will be helpful for improved understanding the Climate of Bangladesh.

Introduction

Bangladesh has a subtropical monsoon climate characterized by wide seasonal variations in rainfall, moderately warm temperatures, and high humidity. Regional climatic differences in this flat country are minor. Four meteorological seasons are recognized as- pre-monsoon (March, April and May), monsoon (June to September), post-monsoon (October and November) and winter (December, January and February). Generally, Pre-monsoon months are hot and humid; monsoon months are humid and rainy, post-monsoon months are quiet hot and dry but the winter months are cool and dry.

Southwest monsoon or monsoon is the most important feature of controlling the climate of Bangladesh. More than 71% of the annual rainfall is received during this season. Variability in the onset, withdrawal of monsoon and quantum of rainfall during the monsoon season has profound impacts on water resources, power generation, agriculture, economics, ecosystems and fisheries in Bangladesh. On the other hand, in winter season, temperature falls down sharply in the north and north-western parts of Bangladesh.

Bangladesh is one of the most climate vulnerable countries in the world. Due to high impact of climate change, climate information is highly demandable. To support in this aspect this report is prepared under the capacity building project entitles 'Institutional Support and Capacity Building for Mitigation of Weather and Climate Hazards in Bangladesh' financed by the Norwegian Ministry of Foreign Affairs, Norway. Some meteorological variables like minimum temperature, maximum temperature, rainfall etc. are selected and analyzed. The monthly and seasonal magnitudes or ranges of maximum and minimum temperature, dry bulb temperature, rainfall and wind (direction and speed) are calculated for different stations of Bangladesh Meteorological Department (BMD) during the period 1981-2010. The number of days for different ranges or thresholds of temperature and rainfall are also calculated. Available information of the BMD's observatories are also collected and documented for preparing meta-data. Distributions of wind direction and speed for all the stations of BMD have been prepared using Wind Rose software embedded in 'R'. Finally, variability and changes of these parameters during 1981-2010 are calculated and compared with 1971-2000.

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1 Seasons of Bangladesh

Bangladesh is one of the largest deltaic countries in the world. It is a flat low-lying plain land made up of alluvial soil having small hilly area in the northeast and southeast regions. The great Himalayan Range is to the north and the vast Bay of Bengal is on the south. It is located between 20.57ºN to 26.63ºN and 88.02ºE to 92.68E. It is bounded on the west, north and east by India. In the southeast there is a common border with Myanmar. There are 230 rivers in Bangladesh out of which 57 originate from outside the country and most of the rivers flow to the Bay of Bengal from north to south though Bangladesh. The main rivers are the Ganges (Padma), the Brahmaputra, and the Meghna. The coastline of Bangladesh is about 720 km long along the continental shelf which has a shallow bathymetry. The entire area of Bangladesh is about 1, 44,735 sq. km. The population of Bangladesh is about 160 millions but about 80% of them live in the rural areas.

The country is exposed to meteorological, hydrological and seismic hazards. The Great Bakerganj Cyclone of 1876, the Worst Killer Cyclone of November 1970, the Urichar Cyclone of May 1985, the Killer Cyclone of April 1991, Cyclone Sidr of 2007, Cyclone Aila of 2009, floods of 1954, 1987 and 1988, the Historic Flood of 1998, flood of 2007, Demra Tornado of 1969, Manikganj Tornado of 1974, Madaripur Tornado of 1977, Saturia Tornado of 1989, Louhajong Tornado of 1995, and Tangail Tornado 1996 are few of the extreme meteorological and hydrological events.

Bangladesh is located in the sub-tropical monsoon climate regime. Based on the analysis of pressure, rainfall and temperature, the climate of this country can be described under the following four seasons:

1.1 Winter or Northeast Monsoon (December – February)

This season is characterized by very light northerly winds, mild temperature. Dry weather and clear to occasionally cloudy sky with fog over the country is the common characteristics of this season. The mean temperature is in the range of 18-22^{o}C. During this period when the ridge of sub-continental high pressure extends up to northwestern part of Bangladesh, temperature begins to fall over Bangladesh. Sometimes minimum temperature goes below than 10°C and cold wave situation occurs over western and northern part of the country. Bangladesh Meteorological Department use different categories of cold wave for explaining this situation such as- mild cold wave (when minimum temperature lies between 8-10°C), moderate cold wave (when minimum temperature lies 6-8°C) and severe cold wave (when minimum temperature goes below than 6°C) respectively. Only 2% of the annual total rainfall occurs in this season. But the rainfall occurs in the country only when westerly low (Western Disturbance- which originates over the Mediterranean Sea and moves eastward over Middle East, Pakistan, Afghanistan, northern India and sometimes reach to Bihar, West Bengal and then to Assam of India is known as westerly low) conjugates with the Easterly trough over Bangladesh and its adjoining areas.

1.2 Summer or Pre-Monsoon (March - May)

The mean temperature of Bangladesh during the summer months varies between 23-30^{o}C. April and May are the hottest months. The highest maximum temperature ranging from 36-40^{o}C is attained in the northwestern and southwestern districts. When the maximum temperature goes above 36°C heat wave situation occurs over Bangladesh. The heat wave is classified as- mild heat wave (maximum temperature lies between 36-38°C), moderate heat wave (maximum temperature lies between 38-40°C), severe heat wave (maximum temperature greater than 40°C). Due to intense heating of the land surface heat low develops over Bihar, West Bengal of India and adjoining northwestern part of Bangladesh. Occasionally moisture incurs in the afternoon from the Bay of Bengal to that low pressure results the formation of thunder cloud and development of severe thunderstorms. These severe thunderstorms are known as Nor'westers ('Kalbaishakhi' in Bengali) that often accompanied by destructive squalls, thunder and heavy rainfall with hails. During the pre -monsoon season Nor'westers occur frequently at many places over Bangladesh. Due to heavy rainfall associated with severe thunderstorm in the northeastern part of Bangladesh and adjoining northeastern states of India flash flood occurs in the northeastern part of Bangladesh. Only19 % of the total annual rainfall occurs in this season. This season is also characterized by cyclogenesis in the Bay of Bengal. Some of the low

pressure formed over the Bay of Bengal intensified into depression and sometimes turned into cyclonic storm move initially northwestwards and then recurve to northeast moves towards Bangladesh and Myanmar coasts. Some of these cyclonic storms attains into a very severe cyclonic storm and landfall to Bangladesh coast. They are occasionally associated with storm surges and causes of high causalities and damages. It may be mentioned here that the cyclonic storm that hit the east coast of the country on 29 April 1991 and reported causalities was about 1, 38,882.

1.3 Southwest Monsoon (June - September)

In this season, the surface wind changes to southwesterly/southerly direction over the southern and the central districts and to southeasterly over the northern districts of the country. Wind speed remains light to moderate. The onset and withdrawal of monsoon vary from year to year and place to place. The normal date of onset of Southwest Monsoon in the southeastern districts of the country is 2nd June which engulfs the whole country during 1st half of June. Monsoon starts withdrawal from the northwestern part of the country and the normal date of withdrawal from this part is 30 September (Ahmed and Karmakar, 1993). Generally rain with widespread cloud coverage and high humidity are the characteristics of this season. Due to occasional heavy to very heavy rainfall landslides occur in the hilly regions of southeastern part of the country. More than 71 % of the total annual rainfall occurs in this season. With the advance of the monsoon, the summer extreme temperatures fall appreciably throughout the country. During this season, monsoon depression forms over the Bay of Bengal. They generally move northwestwards and cross Indian coast. Some of them move towards Bangladesh coasts and caused heavy rainfall. Depressions seldom attain into cyclone state in this season. Due to the presence of southwest monsoon season almost every year flood situation occurs in Bangladesh.

1.4 Autumn or Post-Monsoon (October - November)

This is the transitional season from summer monsoon to the winter. Rainfall decreases considerably during October and November and the dry period starts setting over the country. Only 8% of the annual total rainfall occurs in this season. Temperature falls noticeably. But the lowest minimum does not generally fall below than 10.0^{o}C throughout the country. Cyclonic disturbances form over the Bay of Bengal during this season. They move initially westward and then northwest. Sometimes they recurve northeastwards and make landfall to Bangladesh coast. Some of these cyclonic disturbances attains into very severe intensity and make landfall to Bangladesh coast along with storm surge.

2 Weather observations in Bangladesh

2.1 Bangladesh meteorological department (BMD)

Bangladesh Meteorological Department (BMD) is a government organization under the administrative control of the Ministry of Defence, Government of the People's Republic of Bangladesh. The main responsibility is to monitor and issuance of forecasts and warnings of all meteorological extreme events like tropical cyclone, severe thunderstorm/ tornadoes, heavy rainfall, drought, cold and heat wave along with daily routine forecasts of all time scales round the clock. During the British period a total of 17 meteorological observatories were established in this region and the 1st observatory was established at Narayangonj on 01.05.1867 and another one at Jessore in 1867. The observatory at Narayangonj was closed on 01.12.1980 but the observatory at Jessore is still in operation. At that time the meteorological services were focused on military expeditions and commercial shipping. But the meteorological service expanded later on after the initiation of the modern weather activities in this region. After partition of India in 1947, Pakistan Meteorological Department (PMD) was established. BMD is inherited from PMD in 1972 after Liberation of Bangladesh in 1971.

2.2 Observational stations in BMD

2.2.1 Basic observation networks

A total of 46 synoptic stations are in operation under Bangladesh Meteorological Department (BMD). In addition, BMD operates 10 Pilot Balloon stations and 4 Rawinsonde stations. According to Blue Book (WMO/UNDP/BGD/79/031 TECH. NOTE No.8) there were 15 observatories for basic Meteorological observation in 1947. There were also some part time observatories during that time. The number of observatories increased to 41 but a few of them were closed subsequently and by gradual addition/deletion the total number of observatories

were 33 in 1981. Projects are being implemented by BMD to increase the observational networks. In this study data collected from of 34 observatories were considered only. The processed monthly surface synoptic data from 22 observatories during the period of 1948-1960 and 38 observatories during the period of 1961-1980 were published in WMO/UNDP/BGD/79/031 TECH. NOTE No. 8 and WMO/UNDP/BGD/79/031 TECH. NOTE No. 9 respectively. The raw data were archived in tape and hard disk. The data before 1948 were not available at BMD.

All observed and collected data are received and gathered at the National Meteorological Communication Centre, Dhaka and transmitted through GTS link to RSMC New Delhi and vice-versa. Details of the BMD observatories are given below:

1. **Observatories established during British Rule (before 1947):**
   Barishal, Bogra, Brahmanbaria, Chittagong (MMO), Comilla, Cox's Bazar, Dinajpur, Faridpur, Jessore, Khulna, Mymenshingh, Narayangong, Pabna, Rajshahi, Rangpur, Satkhhira, Sirajgonj, Srimongal (Total 18).
2. **Observatories established during Pakistan Rule (1947-1971):**
   Bhola, Chandpur, Dhaka PBO, Hatiya, Ishwardi, Jamalpur, Kaptai, Lalmonirhat, Maijdi Court, Rangamati, Sandwip, Sylhet (Total 12).
3. **Observatories established after the independence of Bangladesh (After 1971-1991):**
   Borhanuddin, Chuadanga, Feni, Khepupara, Kutubdia, Madaripur, Mongla, Patuakhali, Sitakunda, Syedpur, Tangail,Teknaf (Total 12).
4. **New observatories established in 2015:**
   Tetulia, Dimla, Rajarhat, Badalgachhi, Tarash, Kumurkhali, GopalganjSadar, NetrokonaSadar, Nikli, Saint Martin, Bandarban Sadar, Dighinala ((Total 12) which are fully running from January 2015.
5. **GTS Station:**
   Barisal, Bogra, Chittagong MMO, Cox's Bazar, Dhaka PBO, Feni, Ishwardi, Jessore, Rangpur, Sylhet (Total 10).

Table 2.1: Observatories of BMD which data are used in the present study

Sl. No.	Name of the observatory	Operational period	International Station Number	Latitude (North)	Longitude (East)	Elevation in meters
1.	Barisal	1883	41950	22°43'	90°22'	2.10
2.	Bhola	1965	41951	22°41'	90°39'	4.30
3.	Bogra	1884	41883	24°51'	89°22'	17.90

4.	Chandpur	1964	41941	23°14'	90°42'	4.88
5.	Chittagong MMO	1937	41978	22°13'	91°48'	5.50
6.	Chuadanga	1986	41926	23°39'	88°49'	11.58
7.	Comilla	1883	41933	23°26'	91°11'	7.50
8.	Cox's Bazar	1908	41992	21°27'	91°58'	2.10
9.	DhakaPBO	1949	41923	23°46'	90°23'	8.45
10.	Dinajpur	1883	41863	25°39'	88°41'	37.58
11.	Faridpur	1883	41929	23°36'	89°51'	8.10
12.	Feni	1973	41943	23°02'	91°25'	6.40
13.	Hatiya	1965	41963	22°27'	91°06'	2.44
14.	Ishwardi	1963	41907	24°09'	89°02'	12.90
15.	Jessore	1867	41936	23°12'	89°20'	6.10
16.	Khepupara	1973	41984	21°59'	90°41'	1.83
17.	Khulna	1921	41947	22°47'	89°34'	2.10
18.	Kutubdia	1977	41989	21°49'	91°51'	2.74
19.	Madaripur	1976	41939	23°10'	90°11'	7.00
20.	Maijdee Court	1883	41953	22°52'	91°06'	4.87
21.	Mongla	1988	41958	22°28'	89°36'	1.80
22.	Mymensingh	1883	41886	24°44'	90°25'	18.00
23.	Patuakhali	1973	41906	22°20'	90°20'	1.50
24.	Rajshahi	1883	41895	24°22'	88°42'	19.50
25.	Rangpur	1883	41859	25°44'	89°16'	32.61
26.	Rangamati	1957	41966	22°22'	92°09'	68.89
27.	Sandwip	1966	41964	22°29'	91°26'	2.10
28.	Satkhira	1877	41946	22°43'	89°05'	3.96
29.	Sitakunda	1977	41965	22°38'	91°42'	7.30
30.	Srimangal	1905	41915	24°18'	91°44'	21.95
31.	Syedpur	1980	41858	25°45'	88°55'	39.60
32.	Sylhet	1952	41891	24°54'	91°53'	33.53
33.	Tangail	1982	41909	24°15'	89°56'	10.20
34.	Teknaf	1976	41998	20°52'	92°18'	5.00

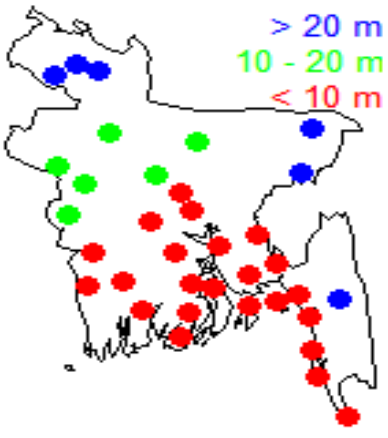

Fig. 2.1: Station elevation map of BMD

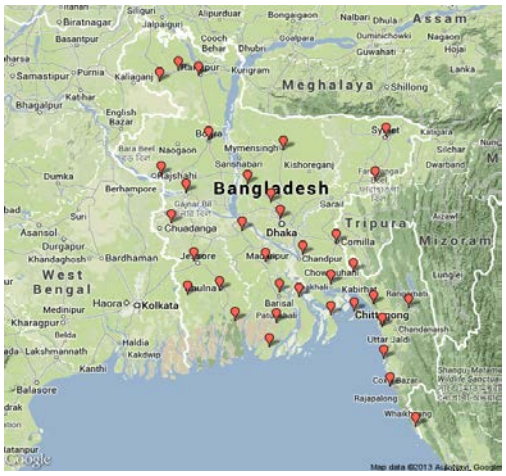

Fig. 2.2: Station location in Rgooglemaps

Table 2.2: List of closed observatories in Bangladesh

Sl. No.	Name of the observatory	Abbreviated name	Year of Establishment.	Year of Close	Data Available	International Station Number	Latitude (North)	Longitude (East)	Elev. in (m)
01	Borhanuddin	BRN	1973	1978	1973-1977	-	22°29′	90°43′	3.7
02	Brahmanbaria	BBR	1905	1972	1948 -1971	-	23°59′	91°07′	8.2
03	Jamalpur	JML	1958		1958-1980	884	24°56′	89°57′	17.7
04	Kaptai	KPT	1963		1963-1980	967	23°59′	91°07′	8.2
05	Lalmonirhat	LMT	1962	1970	1964-1969	-	25°53′	89°29′	32.6
06	Narayangonj	NGJ	1867	1980	1948 -1979	-	23°37′	90°30′	6.4
07	Pabna	PBN	1905	1972	1955-1971	-	24°01′	89°14′	12.8
08	Sirajgonj	SRJ	1883	1986	1950-1980	898	24°27′	89°42′	13.4

Table 2.3: Lowest minimum and highest maximum temperatures and highest daily rainfall with dates recorded at different observatories of Bangladesh during 1948-2013 (Ever recorded values are highlighted)

Name of the observatory	Lowest minimum temperature in °C	Date	Highest maximum temperature in °C	Date	Highest 24 hours rainfall in mm	Date
Barisal	5.0	22.1.1975	43.6	16.4.1956	258	11.10.1967
Bhola	4.4	14.1.1978	32.0	24.5.1982	564	06.11.1971
Bogra	4.5	10.1.2013	44.0	21.4.1989	279	24.6.1988
Chandpur	7.2	09.1.2013	39.7	07.6.2010	334	19.6.1983
Chittagong PBO	9.5	13.1.2011	39.5	04.5.2009	438	27.6.2012
Chittagong MMO	7.7	31.1.1979	39.5	27.5.2001	511	04.8.1983
Chuadanga	3.9	09.1.2013	43.5	01.5.1995	257	21.7.2007
Comilla	5.3	10.1.2013	41.8	30.4.1960	442	03.8.1958
Cox’s Bazar	9.6	10.2.1949	37.5	13.5.1998	399	23.6.1974
DhakaPBO	5.6	18.1.1964	42.3	30.4.1960	341	14.9.2004
Dinajpur	3.9	01.1.1955	43.6	20.5.1959	508	29.9.1996
Faridpur	4.1	18.1.1964	41.2	27.4.2009	370	27.9.1986
Feni	7.1	25.1.1995	38.8	31.5.1979	420	16.7.2005
Hatiya	6.5	18.1.2011	39.7	12.5.1987	337	15.6.2001
Ishwardi	3.5	27.1.1964	44.0	13.5.1970	351	11.7.1976
Jessore	3.6	12.2.1950	43.8	02.4.1963	281	30.6.1965
Khepupara	8.4	13.1.2011	38.1	31.5.1979	373	02.7.1995
Khulna	6.4	23.1.2003	43.5	29.3.1969	430	27.9.1986
Kutubdia	5.4	22.1.1994	38.5	15.5.1994	422	16.7.1998
Madaripur	6.0	09.1.2013	40.0	29.3.1986	243	13.6.1995
Maijdee Court	4.8	18.1.1962	38.0	07.6.1989	520	18.7.1981
Mongla	7.2	09.1.2013	40.5	09.4.2010	204	27.9.1997

Mymensingh	4.2	11.1.1978	43.3	01.4.1975	508	27.9.1971
Patuakhali	7.4	12.12.1997 09.1.2013	43.0	20.3.1976	312	10.6.1982
Rajshahi	3.4	23.1.2003	**45.1**	**19.5.1972**	247	22.6.2004
Rangpur	3.5	10.1.2013	43.3	28.3.1958	294	25.9.2002
Rangamati	5.5	18.2.1961, 12.1.2013	43.3	10.4.1966	352	21.7.1960
Sandwip	7.4	13.1.2011	39.3	16.6.1999	**590**	**15.6.2001**
Satkhira	4.9	07.1.1974	43.4	18.5.1959	302	27.9.1986
Sitakunda	5.5	11.1.2013	39.2	22.4.2008	329	10.10.1990
Srimangal	**2.8**	**04.2.1968**	43.3	11.4.1952	514	07.9.1976
Syedpur	3.0	10.1.2013	41.0	14.4.1992	341	10.9.1991
Sylhet	3.4	09.1.2013	40.5	30.4.1960	362	13.6.2000
Tangail	5.1	10.1.2013	40.6	13.4.1988	305	03.9.1993
Teknaf	9.5	07.1.1978	38.0	01.4.1980	481	15.6.2010

Table 2.4: List of some devastating cyclones (with causalities) that made landfall over Bangladesh coast:

Cyclones	Maximum wind speed in kph	Surge height in meter	Deaths
1867 Cyclone Severe Cyclonic storm with Hurricane wind	**-**	**3-13.7 m**	**200,000**
28 May 1963 Severe Cyclonic storm	200	6.0 m	11,520
12 November1970 Severe Cyclonic storm with Hurricane wind	224	**10 m**	**300,000**
25 May 1985 Severe Cyclonic storm	154	4.6 m	4,264
29 November1988 Severe Cyclonic storm with Hurricane wind	160	4.5 m	5,708
29 April 1991 Severe Cyclonic storm with Hurricane wind	**225**	6-7.6 m	138,000
2 May 1994 Severe Cyclonic storm with Hurricane wind	220	3.6-4.8 m	188
19 May 1997 Severe Cyclonic storm with Hurricane wind	220	4.55 m	155
15 November 2007 Severe Cyclonic storm with Hurricane wind 'SIDR'	223	6.02 m	3,363
25 May 2009 Cyclonic Storm 'AILA'	92	2.50 m	190

3 Bangladesh climate normals 1981 – 2010

Monthly normal of rainfall and temperatures are calculated for each 34 weather stations of Bangladesh Meteorological Department. But a few of these observatories namely Chuadanga (Established in 1989), Kutubdia (Established in 1985), Mongla (Established in 1989), Sayedpur (Established in 1991) and Tangail (Established in 1987) were established after 1981. So these data collected from these observatories have the data length less than 30 years. The normal's of these stations are prepared on the basis of the available observed data which are archived at the climate division of BMD. Missing data is excluded from the analysis. The month which have missing data for 15 (fifteen) days or more are considered as missing and are not considered for preparation of normal's.

3.1 Temperature

3.1.1 Maximum temperature

Monthly normal maximum temperatures (°C) of 34 observatories of BMD are listed in Table 3.1. It is found that the magnitudes of normal maximum temperature in April and May are very close to each other. It is equal at Patuakhali. It the higher in April at Barisal, Bhola, Bogra, Chuadanga, Dhaka, Dinajpur, Faridpur, Feni, Ishurdi, Jessore, Madaripur, Maijdi Court, Mymensingh, Rajshahi and Rangamati. But it is higher in May at other locations (Table 3.1). It is the lowest in January at all locations.

3.1.2 Minimum temperature

Monthly normal minimum temperatures (°C) of 34 observatories of BMD are listed in Table 3.2. Table 3.2 depicts that the magnitudes of normal minimum temperatures are higher in the

monsoon months of June, July, August and September and they are very close to each other. It is lower in the winter months of December, January and February and the lowest in January. It varies between 10.0-15.4, 12.5-17.6, 17.3-22.0, 21.1-25.0, 22.9-26.0, 24.6-26.5, 24.8-26.3, 24.8-26.4, 24.6-26.0, 22.2-24.5, 16.7-21.1 and 12.1-17.0°C respectively in January, February, March, April, May, June, July, August, September, October, November and December.

3.1.3 Dry bulb temperature

Monthly normal dry bulb temperatures (°C) of 34 observatories of BMD are listed in Table 3.3. Table 3.3 indicates that the magnitudes of dry bulb temperatures are higher in the months of May, June, July, August and September and they are very close to each other. It is lower in the winter months of December, January and February but the lowest in January. It varies between 16.3-21.4, 19.2-23.3, 23.5-27.0, 25.8-29.6, 26.7-30.3, 27.4-29.8, 27.4-29.0, 27.5-29.3, 27.6-28.8, 26.2-27.9, 22.2-25.6 and 18.1-22.4°C respectively in January, February, March, April, May, June, July, August, September, October, November and December.

Table 3.1: Monthly normal maximum temperature (°C) for different observatories of BMD

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peroid
Barisal	25.5	28.5	32.4	33.5	33.4	32.0	31.2	31.4	31.7	31.7	29.8	26.8	1981-2010
Bhola	25.6	28.5	31.9	33.0	32.9	31.7	30.8	31.2	31.4	31.7	29.8	26.9	1981-2010
Bogra	24.4	27.5	31.4	33.5	33.3	32.8	32.1	32.5	32.2	31.9	30.2	26.6	1981-2010
Chandpur	24.6	27.9	31.7	33.1	33.2	32.2	31.5	31.8	31.8	31.6	29.5	26.2	1981-2010
Chittagong	26.0	28.3	30.8	31.9	32.4	31.7	31.0	31.4	31.8	31.7	30.0	27.2	1981-2010
Chuadanga	24.4	28.5	33.4	36.1	35.8	34.1	32.8	33.1	32.9	32.2	29.9	26.2	1989-2010
Comilla	25.2	27.8	30.9	32.4	32.7	31.9	31.3	31.9	31.9	31.6	29.7	26.7	1981-2010
Cox’s Bazar	27.1	29.1	31.5	32.7	32.8	31.2	30.5	30.8	31.5	32.0	30.6	28.1	1981-2010
Dhaka PBO	25.1	28.3	32.5	33.8	33.4	32.5	31.8	32.1	32.0	31.8	29.7	26.5	1981-2010
Dinajpur	23.0	26.5	30.9	32.9	32.6	32.6	31.9	32.3	31.7	31.0	28.9	25.3	1981-2010
Faridpur	24.5	28.0	32.5	34.4	33.7	32.5	31.6	31.8	31.8	31.6	29.3	25.9	1981-2010
Feni	25.7	28.3	31.3	32.2	32.3	31.3	30.6	31.1	31.5	31.5	29.8	27.0	1981-2010
Hatiya	25.3	27.9	30.9	32.1	32.2	30.9	30.1	30.5	30.9	31.0	29.3	26.4	1982-2010
Ishwardi	24.2	27.7	32.9	35.5	34.7	33.5	32.4	32.5	32.4	31.7	29.5	26.0	1981-2010
Jessore	25.5	28.9	33.4	35.8	35.4	33.8	32.6	32.7	32.9	32.5	30.3	26.9	1981-2010
Khepupara	25.8	28.7	31.8	32.8	32.9	31.5	30.7	30.8	31.1	31.3	29.6	26.9	1981-2010
Khulna	25.4	28.8	32.9	34.7	34.7	33.2	32.0	32.2	32.4	32.1	29.9	26.6	1981-2010
Kutubdia	25.6	27.5	30.1	31.8	32.3	31.0	30.3	30.7	31.1	31.4	29.9	27.2	1985-2010
Madaripur	25.1	28.0	31.5	33.0	32.8	31.6	30.8	31.1	31.4	31.5	29.4	26.2	1981-2010
M. Court	25.3	28.5	32.6	34.2	34.0	32.7	31.9	32.1	32.3	32.2	30.0	26.7	1981-2010
Mongla	25.3	28.9	32.8	34.8	34.5	32.8	31.8	31.9	32.0	31.6	29.5	26.6	1989-2010
Mymensingh	24.5	27.0	30.6	31.9	31.7	31.5	31.2	31.7	31.4	31.4	29.5	26.1	1981-2010
Patuakhali	25.6	28.7	32.3	33.4	33.4	31.8	31.0	31.3	31.6	31.7	29.6	26.8	1981-2010
Rajshahi	24.1	27.9	33.1	36.0	35.1	33.8	32.5	32.8	32.5	31.7	29.3	25.8	1981-2010
Rangpur	23.1	26.3	30.4	31.7	31.8	31.9	31.7	32.2	31.5	30.7	28.5	25.1	1981-2010
Rangamati	25.9	28.9	32.3	33.4	33.0	31.8	31.2	31.7	32.0	31.7	29.4	26.6	1981-2010
Sandwip	25.4	27.6	30.3	31.5	31.7	30.8	30.1	30.6	31.0	31.3	29.5	26.6	1981-2010
Satkhira	25.6	28.8	33.0	35.1	35.2	33.6	32.2	32.3	32.3	32.2	30.1	26.9	1981-2010
Sitakunda	26.6	28.9	31.4	32.3	32.5	31.4	30.6	31.3	31.8	32.1	30.4	27.8	1981-2010
Srimangal	25.1	28.1	31.6	32.9	32.2	32.1	32.1	32.5	32.2	31.5	29.3	26.6	1982-2010
Sayedpur	22.8	26.6	30.8	32.3	32.5	32.2	32.1	32.5	32.1	31.1	28.9	25.3	1991-2010
Sylhet	25.6	27.7	30.7	31.0	31.2	31.3	31.5	32.1	31.7	31.4	29.6	26.7	1981-2010
Tangail	23.9	27.5	31.7	33.9	33.4	32.7	31.9	32.2	32.1	31.7	29.4	26.0	1987-2010
Teknaf	27.4	29.1	31.0	32.2	32.3	30.6	29.9	30.2	30.9	31.5	30.3	28.2	1981-2010

Table 3.2: Monthly normal minimum temperature (°C) for different observatories of BMD

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peroid
Barisal	12.0	15.4	20.5	23.8	24.9	25.8	25.7	25.8	25.4	23.7	18.9	13.6	1981-2010
Bhola	12.6	16.0	21.0	24.1	25.2	26.1	25.9	26.1	25.7	24.0	19.4	14.4	1981-2010
Bogra	11.7	14.4	19.0	22.6	24.1	25.8	26.2	26.4	25.7	23.3	18.3	13.7	1981-2010
Chandpur	13.5	16.1	20.7	23.7	24.8	25.9	25.9	26.1	25.8	24.3	20.0	15.4	1981-2010
Chittagong	14.0	16.3	20.5	23.6	24.9	25.4	25.2	25.3	25.2	24.1	20.3	15.8	1981-2010
Chuadanga	10.7	14.3	19.1	23.7	25.1	26.1	26.2	26.3	25.7	23.4	18.0	12.6	1989-2010
Comilla	12.1	15.5	19.7	22.7	24.1	25.4	25.5	25.6	25.2	23.5	18.5	13.4	1981-2010
Cox's Bazar	15.4	17.6	21.2	24.2	25.3	25.4	25.3	25.3	25.1	24.5	21.1	17.0	1981-2010
Dhaka	13.1	16.2	20.8	23.8	24.8	26.2	26.3	26.4	25.9	23.9	19.4	14.8	1981-2010
Dinajpur	10.4	13.0	17.3	21.1	23.2	25.1	25.7	26.2	25.3	22.3	16.7	12.2	1981-2010
Faridpur	12.2	15.1	19.7	23.4	24.5	25.8	25.9	26.2	25.9	24.0	19.3	14.2	1981-2010
Feni	12.7	15.8	20.4	23.4	24.5	25.4	25.3	25.3	25.1	23.5	19.1	14.4	1981-2010
Hatiya	14.1	16.8	21.1	24.0	25.1	25.8	25.5	25.6	25.4	24.4	20.3	15.8	1982-2010
Ishwardi	10.4	13.3	18.2	23.0	24.4	25.8	26.0	26.2	25.6	23.0	17.5	12.3	1981-2010
Jessore	11.3	14.7	19.6	23.6	25.0	26.0	26.0	26.0	25.5	23.1	17.8	12.6	1981-2010
Khepupara	13.6	16.9	21.8	24.8	25.7	26.3	25.9	26.0	25.7	24.3	20.1	15.3	1981-2010
Khulna	12.2	15.6	20.5	24.2	25.3	26.2	26.2	26.3	25.9	24.1	19.4	14.0	1981-2010
Kutubdia	15.0	17.4	21.2	24.3	25.4	25.7	25.5	25.6	25.5	24.5	20.8	16.7	1985-2010
Madaripur	13.7	16.3	20.4	23.6	24.9	25.8	25.7	25.8	25.7	24.5	20.5	15.8	1981-2010
Maijdee Court	12.3	15.3	20.1	23.5	24.6	25.9	26.0	26.3	25.9	23.8	19.3	14.1	1981-2010
Mongla	13.9	17.5	22.0	25.0	26.0	26.5	26.3	26.4	26.0	24.5	20.6	15.7	1989-2010
Mymensingh	11.9	14.9	18.9	22.3	23.5	25.6	26.1	26.3	25.6	23.3	18.2	13.5	1983-2010
Patuakhali	13.6	16.7	21.2	24.2	25.4	26.2	26.0	26.1	25.8	24.3	20.1	15.2	1981-2010
Rajshahi	10.6	13.2	17.9	22.8	24.4	25.8	26.1	26.2	25.6	22.9	17.5	12.6	1981-2010
Rangpur	10.9	13.2	17.3	21.2	23.3	25.3	26.0	26.3	25.3	22.6	17.4	13.0	1981-2010
Rangamati	13.0	15.1	19.4	22.7	24.0	24.9	24.8	24.8	24.6	23.3	19.8	15.3	1981-2010
Sandwip	14.2	17.0	21.5	24.4	25.3	25.8	25.4	25.5	25.4	24.4	20.4	15.9	1981-2010
Satkhira	12.1	15.9	20.7	24.4	25.6	26.4	26.2	26.2	25.7	23.5	18.4	13.3	1981-2010
Sitakunda	12.0	14.9	19.8	23.5	24.7	25.5	25.4	25.4	25.2	23.6	18.8	13.8	1981-2010
Srimangal	10.0	12.5	17.5	21.3	22.9	24.8	25.1	25.2	24.6	22.2	16.7	12.1	1982-2010
Sayedpur	10.7	13.6	17.5	21.2	23.4	25.2	26.1	26.3	25.4	22.6	17.4	12.9	1991-2010
Sylhet	12.9	14.9	18.6	21.1	22.9	24.6	25.2	25.3	24.6	22.9	18.7	14.5	1981-2010
Tangail	11.4	14.4	18.9	22.8	24.0	25.6	26.1	26.3	25.7	23.5	18.5	13.5	1987-2010
Teknaf	15.0	17.0	20.7	24.1	25.4	25.5	25.2	25.1	25.2	24.3	21.0	16.9	1981-2010

Table 3.3: Monthly normal dry bulb temperature (°C) for different observatories of BMD

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peroid
Barisal	17.9	21.5	25.9	28.3	28.9	28.7	28.2	28.4	28.2	27.2	23.6	19.2	1981-2010
Bhola	18.1	21.5	25.8	28.1	28.7	28.5	28.1	28.3	28.1	27.2	23.7	19.6	1981-2010
Bogra	17.5	21.0	25.1	27.9	28.2	28.8	28.8	28.9	28.2	26.4	22.7	18.8	1981-2010
Chandpur	18.4	21.6	25.9	28.1	28.7	28.8	28.5	28.7	28.5	27.6	24.2	20.1	1981-2010
Chittagong	19.8	22.3	25.7	27.9	28.6	28.4	27.9	28.1	28.3	27.7	24.9	21.2	1981-2010
Chuadanga	16.4	20.7	25.5	29.1	29.3	29.1	28.6	28.7	28.1	26.6	22.6	18.1	1989-2010
Comilla	18.1	21.3	24.9	27.1	28.0	28.3	28.0	28.4	28.1	27.0	23.5	19.4	1981-2010
Cox's Bazar	20.4	22.7	26.0	28.3	28.9	27.8	27.4	27.5	27.8	27.6	25.1	21.7	1981-2010
Dhaka	18.6	22.0	26.3	28.4	28.8	29.0	28.7	28.9	28.5	27.4	24.0	20.0	1981-2010
Dinajpur	16.5	19.8	24.4	27.2	28.1	28.9	28.8	29.1	28.3	26.6	22.7	18.4	1981-2010
Faridpur	17.8	21.2	25.8	28.5	28.8	28.9	28.6	28.9	28.7	27.5	23.8	19.5	1981-2010
Feni	18.4	21.5	25.4	27.5	28.1	28.1	27.7	28.0	28.0	27.1	23.8	19.8	1981-2010
Hatiya	19.2	22.1	25.8	28.1	28.8	28.4	27.9	28.0	28.2	27.5	24.4	20.5	1982-2010
Ishwardi	16.5	19.9	25.0	28.6	28.9	29.0	28.5	28.8	28.3	26.6	22.6	18.2	1981-2010
Jessore	17.6	21.3	26.1	29.2	29.7	29.4	28.8	28.8	28.5	27.1	23.2	18.8	1981-2010
Khepupara	19.2	22.5	26.5	28.8	29.5	29.1	28.5	28.5	28.4	27.6	24.4	20.4	1981-2010
Khulna	18.2	21.8	26.3	28.9	29.5	29.2	28.7	28.9	28.6	27.6	24.0	19.5	1981-2010
Kutubdia	20.2	22.4	25.6	27.8	28.8	28.1	27.6	27.8	27.9	27.7	24.0	21.7	1985-2010
Madaripur	19.0	21.9	25.8	28.2	28.9	28.6	28.2	28.5	28.5	27.8	24.6	20.5	1991-2010
M.Court	18.6	22.1	26.5	29.0	29.4	29.1	28.7	29.0	28.8	27.9	24.4	20.1	1991-2010
Mongla	19.0	22.6	27.0	29.3	29.8	29.3	28.7	28.7	28.5	27.6	24.5	20.5	1991-2010
Mymensingh	18.1	21.0	24.9	27.2	27.8	28.5	28.5	28.8	28.3	27.1	23.6	19.6	1991-2010
Patuakhali	19.0	22.2	26.3	28.5	29.2	28.8	28.3	28.5	28.4	27.5	24.3	20.3	1991-2010
Rajshahi	16.5	20.0	25.0	28.8	29.1	29.2	28.7	28.9	28.4	26.6	22.5	18.2	1991-2010
Rangpur	16.3	19.2	23.5	26.1	27.4	28.4	28.6	28.9	28.0	26.2	22.2	18.2	1991-2010
Rangamati	18.6	21.5	25.6	27.7	28.2	27.9	27.5	27.8	27.8	27.0	23.7	20.0	1991-2010
Sandwip	19.5	22.3	26.0	28.2	28.8	28.4	27.9	28.2	28.3	27.8	24.7	20.8	1991-2010
Satkhira	18.6	22.4	26.9	29.6	30.3	29.8	29.0	28.9	28.7	27.6	24.0	19.7	1991-2010
Sitakunda	18.7	21.7	25.4	27.8	28.5	28.3	27.7	28.0	28.2	27.4	24.1	20.1	1991-2010
Srimangal	16.8	20.0	24.2	26.8	27.3	28.0	28.0	28.2	27.7	26.4	22.4	18.5	1982-2010
Syedpur	16.3	19.9	24.1	26.4	27.8	28.6	29.0	29.3	28.5	26.5	22.5	18.5	1991-2010
Sylhet	18.5	20.5	24.1	25.8	26.7	27.4	27.7	28.1	27.6	26.4	23.2	19.6	1981-2010
Tangail	16.9	20.4	24.8	27.8	28.2	28.7	28.5	28.8	28.3	26.8	23.1	18.7	1987-2010
Teknaf	21.4	23.3	26.2	28.4	29.0	27.9	27.4	27.5	27.9	27.8	25.6	22.4	1981-2010

3.2 Rainfall

Table 3.4 shows monthly normal rainfall calculated at different stations of BMD. Table 3.4 illustrates that normal rainfalls are higher in the monsoon months but it is the highest in July almost all places except at Barisal, Bhola, Syedpur, Sylhet and Srimongal where normal rainfalls are highest in June. But the normal rainfalls are lower during the winter months and it is the lowest in January. Monthly normal rainfall of Bangladesh varies 3.5-13.9, 6.6-38.4, 12.5-136.6, 40.5-384.6, 136.8-563.2, 229.5-1007.6, 298.9-1120.1, 203.0-896.1, 239.3-555.3, 110.3-277.4, 7.9-91.8 and 2.7-15.1 mm respectively in January, February, March, April, May, June, July, August, September, October, November and December. Spatial distributions of annual rainfall for the duration of 1971-2000 and 1981-2000 are shown in Fig. 3.1. Distribution patterns for both the periods are almost similar, is the indication of almost consistent pattern of annual rainfall on Bangladesh during these decades. Comparison of country average monthly rainfall depicts that amounts of rainfall decreased in February, April, May, August and November; increased in July, September and October and remained nearly unchanged during the remaining months of the year (Fig. 3.2).

Table 3.4: Monthly normal rainfall duration: 1981-2010

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peroid
Barisal	10.3	26.1	52.4	103.7	199.0	401.7	409.9	342.6	284.4	185.5	48.5	5.9	1981-2010
Bhola	8.2	26.5	47.9	115.8	233.0	461.0	442.7	361.5	307.3	185.1	41.8	6.7	1981-2010
Bogra	7.6	13.4	19.6	75.7	203.9	329.3	357.6	279.0	299.9	155.9	10.3	9.9	1981-2010
Chandpur	6.0	23.0	62.0	143.0	268.0	371.0	420.0	349.0	285.0	165.0	38.0	7.0	1981-2010
Chittagong	7.3	25.0	55.5	136.4	314.0	591.3	735.6	513.9	239.3	197.8	59.5	14.1	1981-2010
Chuadanga	10.9	22.3	25.8	40.5	143.2	229.5	333.3	203.0	315.7	133.4	17.9	9.4	1989-2010
Comilla	7.5	22.3	64.8	141.8	311.8	368.5	394.0	291.1	254.1	160.6	34.4	9.5	1981-2010
Cox'sBazar	5.1	22.2	31.2	99.3	327.1	859.9	933.4	665.5	401.9	217.8	91.8	14.8	1981-2010
Dhaka	7.5	23.7	61.7	140.6	278.4	346.5	375.5	292.9	340.0	174.5	31.1	12.1	1981-2010
Dinajpur	10.2	11.4	12.5	70.1	218.3	366.2	436.0	348.8	362.5	156.8	7.9	8.3	1981-2010
Faridpur	7.2	27.9	49.8	114.5	221.7	317.8	328.1	284.5	264.5	155.2	34.8	12.1	1981-2010
Feni	5.6	27.8	64.6	163.5	355.7	529.5	705.5	496.5	357.8	201.6	46.4	8.9	1981-2010
Hatiya	5.1	20.5	42.4	116.9	269.7	627.8	727.8	538.2	437.4	267.2	51.0	12.4	1982-2010
Ishwardi	6.2	22.2	33.3	77.0	167.7	237.5	298.9	218.2	292.7	110.3	16.3	8.4	1981-2010
Jessore	13.9	26.0	44.1	71.6	182.0	314.8	325.4	266.7	278.1	134.5	31.0	11.5	1981-2010
Khepupara	9.6	27.3	44.1	87.2	251.2	504.7	631.9	453.3	398.5	268.0	60.2	8.2	1981-2010

Khulna	12.8	35.1	50.4	77.5	177.2	330.8	322.4	295.6	289.7	152.1	38.0	6.3	1981-2010
Kutubdia	6.8	24.4	43.9	81.7	272.2	633.3	767.2	500.8	324.0	206.3	70.8	8.7	1985-2010
Madaripur	7.4	24.7	51.7	116.7	228.6	371.6	378.6	329.1	275.6	157.5	34.9	4.6	1991-2010
M.Court	10.9	26.0	71.0	142.9	327.0	571.1	723.4	588.3	399.9	211.6	45.7	6.6	1991-2010
Mongla	10.2	29.0	43.4	56.8	172.0	346.0	368.5	305.8	331.3	178.8	42.6	2.7	1991-2010
Mymensingh	7.1	20.2	39.3	141.4	323.0	402.5	455.1	329.3	329.8	207.8	18.4	9.6	1991-2010
Patuakhali	8.8	26.6	42.5	111.3	227.4	538.1	578.8	439.3	378.5	218.0	47.4	4.3	1991-2010
Rajshahi	8.0	15.1	23.0	56.5	136.8	243.7	303.2	240.6	271.7	115.3	12.6	9.8	1991-2010
Rangpur	9.2	12.5	25.9	118.4	267.7	467.1	476.5	344.8	390.1	180.5	8.7	8.1	1991-2010
Rangamati	5.4	23.8	64.2	131.4	330.5	476.6	531.3	420.0	291.7	164.9	55.2	12.3	1991-2010
Sandwip	10.5	24.7	63.5	138.5	359.2	691.7	855.4	607.3	476.2	277.4	56.0	7.8	1991-2010
Satkhira	13.2	33.1	39.9	85.6	154.2	294.3	333.8	290.4	299.1	141.4	32.2	7.0	1991-2010
Sitakunda	4.9	20.2	70.1	156.0	340.7	569.9	710.2	561.5	400.8	265.8	54.7	6.7	1991-2010
Srimangal	5.6	32.6	88.1	216.6	429.1	423.5	331.0	326.9	282.5	168.3	36.2	12.8	1982-2010
Sayedpur	9.8	6.6	25.7	92.5	243.1	462.0	423.9	319.6	386.4	173.1	10.9	6.0	1991-2010
Sylhet	6.5	38.4	136.6	384.6	563.2	776.0	768.7	606.2	555.3	189.2	30.3	12.7	1981-2010
Tangail	6.1	27.0	43.8	110.7	253.5	317.6	323.8	243.0	287.8	166.0	26.2	11.6	1987-2010
Teknaf	3.5	14.7	15.1	60.2	281.3	1007.6	1120.1	896.1	446.3	250.9	81.9	15.1	1981-2010

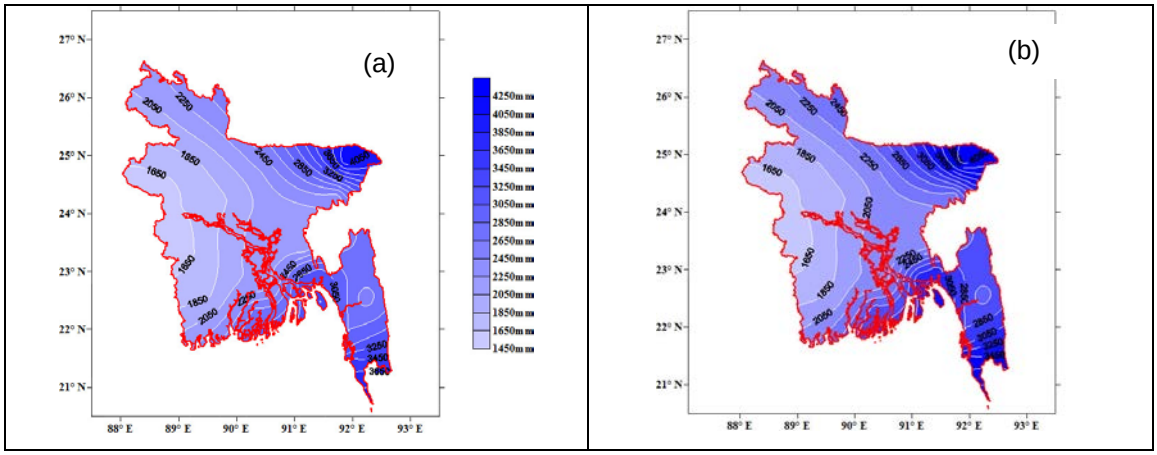

Fig. 3.1: Spatial distribution of annual normal rainfall (a) during 1971-2000 and (b) during 1981-2010 in Bangladesh

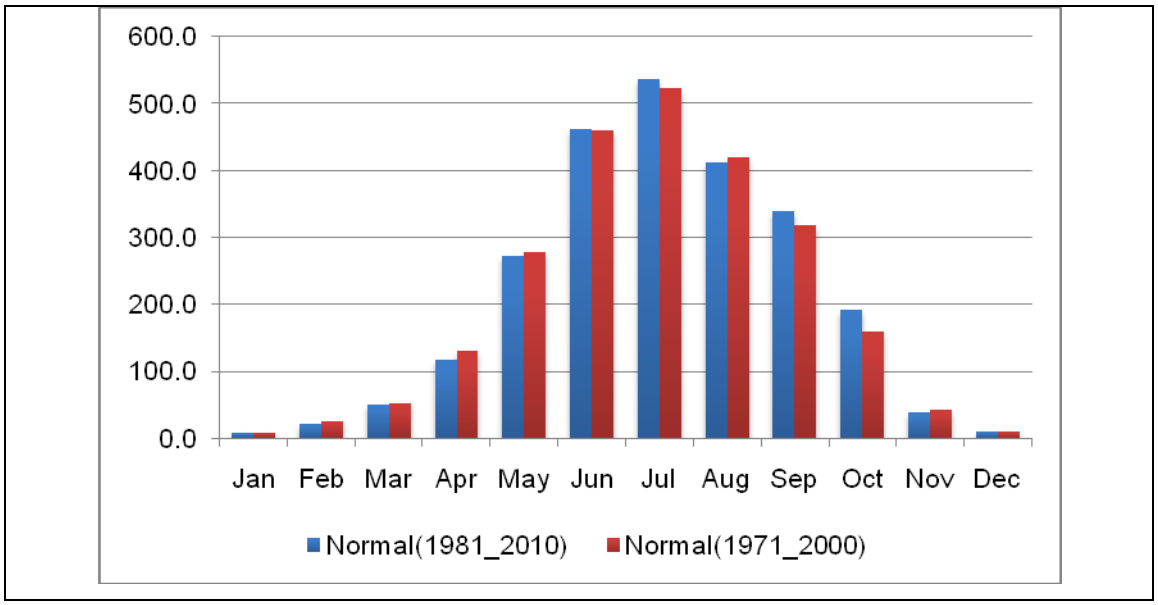

Fig 3.2: Comparison monthly normal rainfall over Bangladesh based on 1981 – 2010 and 1971-2000 respectively

4 Frequency of common weather in Bangladesh

4.1 Temperature

4.1.1 Minimum temperature

Monthly number of days with different temperature ranges, i.e., less than 6°C, 6-8°C, 8-10°C, 10-15°C, 15-20°C, 20-25°C and greater than 25°C are calculated for all the stations for the period of 1981-2010 and results of some of these stations are given in Table 4.1(a-g). It may be mentioned here that the results of Chittagong, Dhaka, Khulna, Rajshahi, Rangpur and Sylhet are shown in Fig. 4.1(a-g) and the results of other weather stations of Bangladesh are presented in the appendix. During the study missing data have been found at some of the stations and considerable numbers of missing data have been found at Madaripur, Srimongal and Sylhet with the missing dates of 671, 406 and 288 respectively. It is also noticed that the number of days with minimum temperature range less than 6°C, i.e., severe cold wave days were highest in the north-eastern, north-western and western part of the country. This situation is observed mainly during January and February but it is considerable during January only. In January, the number of days having temperature of less than 6°C was the highest at Srimongal (31 days) and then at Ishurdi (28 days) and Rajshahi (25 days). In February, it was at Srimongal (5 days). In January, moderate cold wave (6-8°C) days are found in the north-eastern, northwestern and western part of the country and the highest at Srimongal (150 days) and then at Rajshahi (117 days) and at Ishurdi (115 days). The number of days with the minimum temperature of 8-10°C are maximum at Srimongal (255 days), and then at Rajshahi (246 days), Ishurdi (228 days) and Rangpur (222 days). The numbers of cold wave days are also highest in January. The number of minimum temperature with the range of 10-15°C is higher during the winter months of December, January and February. It is the highest at Sylhet (740 days) during the observed period. The number of days with the minimum temperature of 20°- 25°C is higher during March to

November and the numbers of days with minimum temperature greater than 25°C are higher during May to September. In the analysis upper limit of each of the ranges are excluded in the calculation. The real ranges of minimum temperatures are therefore 6.0-7.9, 8.0-9.9, 10.0-14.9, 15.0-19.9, 20.0-24.9ºC. Accordingly, the results are accomplished.

Table 4.1a: Number of minimum temperature days at Barisal, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	14
6° - 8°	18	-	-	-	-	-	-	-	-	-		-	18	
8° - 10°	149	19	-	-	-	-	-	-	-	-	-	26	194	
10° - 15°	645	383	37	-	-	-		-	-	-	61	644	1770	
15° - 20°	115	370	328	60	13	-	-	-	-	37	505	251	1679	
20° - 25°	2	75	523	487	388	228	197	149	250	635	329	8	3271	
Greater than 25°	-	-	41	353	529	665	732	780	650	257	3	-	4010	

Table 4.1b: Number of minimum temperature days at Chittagong, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	3	-	-	-	-	-	-	-	-	-	-	-	3	14
6° - 8°	29	4	-	-	-	-	-	-	-	-	-	-	33	
8° - 10°	149	21	-	-	-	-	-	-	-	-	-	20	190	
10° - 15°	675	464	71	-	-	-	-	-	-	-	68	635	1913	
15° - 20°	74	340	497	114	20	1	-	-	1	53	580	273	1953	
20° - 25°	-	18	350	634	557	203	107	65	211	644	250	-	3039	
Greater than 25°	-	-	9	152	352	689	823	864	688	233	2	-	3812	

Table 4.1c: Number of minimum temperature days at Dhaka, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	11
6° - 8°	9	1	-	-	-	-	-	-	-	-	-	-	10	
8° - 10°	56	4	-	-	-	-	-	-	-	-	-	4	64	
10° - 15°	652	279	17	-	1	-	-	-	-	31	19	469	1468	
15° - 20°	209	477	325	74	13	-	-	74	-	31	491	446	2140	
20° - 25°	2	85	520	441	429	202	88	441	169	582	378	11	3348	
Greater than 25°	-	-	68	384	487	696	842	384	730	316	10	-	3917	

Table 4.1d: Number of minimum temperature days at Khulna, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	38
6° - 8°	25	1	-	-	-	-	-	-	-	-	-	1	27	
8° - 10°	146	15	-	-	-	-	-	-	-	-	-	20	181	
10° - 15°	623	329	33	-	-	-	-	-	-	-	47	580	1612	
15° - 20°	133	428	336	48	12	-	-	-	-	27	462	322	1768	
20° - 25°	2	74	505	442	355	166	107	84	166	532	385	6	2824	
Greater than 25°	-	-	56	410	562	732	790	846	734	371	5	-	4506	

Table 4.1e: Number of minimum temperature days at Rajshahi, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	25	1	-	-	-	-	-	-	-	-	-	-	26	94
6° - 8°	117	13	-	-	-	-	-	-	-	-	-	23	153	
8° - 10°	246	82	4	-	-	-	-	-	-	-	2	116	450	
10° - 15°	490	515	169	2	-	-	-	-	-	-	194	626	1996	
15° - 20°	50	225	511	132	20	1	-	-	2	102	558	165	1766	
20° - 25°	-	9	234	548	513	195	121	78	214	623	189	-	2724	
Greater than 25°	-	-	12	211	394	690	805	842	679	202	2	-	3837	

Table 4.1f: Number of minimum temperature days at Rangpur, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	3	1	-	-	-	-	-	-	-	-	-	-	4	116
6° - 8°	70	8	-	-	-	-	-	-	-	-	-	2	80	
8° - 10°	222	71	1	-	-	-	-	-	-	-	-	44	338	
10° - 15°	588	539	193	3	-	-	-	-	-	-	121	711	2155	
15° - 20°	37	220	570	236	35	1	1	-	2	96	646	173	2017	
20° - 25°	-	7	162	634	687	323	145	92	292	723	132	-	3197	
Greater than 25°	-	-	3	25	207	572	752	807	573	111	-	-	3050	

Table 4.1g: Number of minimum temperature days at Sylhet, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	288
6° - 8°	2	2		-	-	-	-	-	-	-	-	-	4	
8° - 10°	61	9	-	-	-	-	-	-	-	-	-	11	81	
10° - 15°	740	421	62	1	-	-	-	-	-	-	24	517	1765	
15° - 20°	127	369	562	255	67	2	1	-	2	54	588	381	2408	
20° - 25°	-	19	277	574	687	460	325	292	481	730	258	4	4107	
Greater than 25°	-	-	4	41	143	408	573	606	387	115	-	-	2277	

4.1.2 Maximum temperature

Monthly number of days with different maximum temperature ranges, i.e., greater than 40°C, 38-40°C, 36-38°C, 30-36°C, 25-30°C, 20-25°C and less than 20°C respectively round the year for all stations during the period of 1981-2010 are calculated and the results of some of these stations are given in Table 4.2(a-g). During the study period of 1981-2010, some of the stations have missing data. The stations namely Sandwip, Ishurdi and Madaripur have the highest number of missing days with 484, 378 and 332 respectively. Table 4.2(a-g) shows the result for divisional cities but the results of other weather stations are presented in the appendix. It is seen that the number of moderate to severe heat wave days i.e., the maximum temperature with greater than 40°C is higher in the months of April and May and for this reason April and May are the hotter months in Bangladesh. This range of temperature is found in the northwestern and western parts of the country. The number of severe heat days is the highest at Rajshahi (175 days) and then at Ishurdi (126 days) and Chaudagna (109 days). It is also found that the number of days with the maximum temperature range of 30-36°C is higher during the months of March to November. Also the number of days with the maximum temperature range of less than 20°C is the highest in January over the country. In the analysis upper limit of each of the ranges are also excluded in the calculation. The real ranges of maximum temperatures are therefore 20.0-24.9, 25.0-29.9, 30.0-35.9, 36.0-37.9, 38.0-39.9ºC. Accordingly, the results are accomplished.

Table 4.2a: Number of maximum temperature days at Barisal, duration: 1981-2010

Max temp (°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater	-	-	-	-	-	-	-	-	-	-	-	-	0	
38° - 40°	-	-	2	1	-	2	-	-	-	-	-	-	5	21
36° - 38°	-	-	28	75	47	13	-	-	1	-	-	-	164	
30° - 36°	4	265	789	778	832	722	747	797	749	802	459	9	6953	
25° - 30°	629	521	100	43	48	155	181	133	147	122	424	802	3305	
20° - 25°	277	59	10	1	1	1			1	6	16	111	483	
Less than 20°	19	2	-	-	-	-	-	-	-	-	-	5	26	

Table 4.2b: Number of maximum temperature days at Chittagong, duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater	-	-	-	-	-	-	-	-	-	-	-	-	0	
38° - 40°	-	-	-	1	1	-	-	-	-	-	-	-	2	112
36° - 38°	-	-	6	4	6	8	-	-	3	2	-	-	29	
30° - 36°	8	166	564	656	689	597	575	653	662	674	426	28	5698	
25° - 30°	590	492	189	52	62	133	165	119	85	97	312	645	2941	
20° - 25°	168	45	10	5	-	1	-	-	-	2	12	67	310	
Less than 20°	8	1	-	-	-	-	-	-	-	-	-	1	10	

Table 4.2c: Number of maximum temperature days at Dhaka, duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater	-	-	-	-	-	-	-	-	-	-	-	-	0	
38° - 40°	-	-	13	30	9	-	-	-	-	-	-	-	52	28
36° - 38°	-	-	74	156	110	25	-	5	5	1	-	-	376	
30° - 36°	2	246	688	635	720	763	807	849	778	804	436	9	6737	
25° - 30°	556	509	139	65	83	106	123	74	115	116	442	774	3102	
20° - 25°	324	85	12	6	6	1	-	-	2	9	20	140	605	
Less than 20°	46	4	-	-	-	-	-	-	-	-	-	6	56	

Table 4.2d: Number of maximum temperature days at Khulna, duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater	-	-	-	2	5	-	-	-	-	-	-	-	7	
38° - 40°	-	-	7	31	19	2	-	-	1		1	-	61	45
36° - 38°	-	2	75	225	251	114	11	1	8	4	-	-	691	
30° - 36°	11	297	745	613	620	696	770	831	769	808	469	15	6644	
25° - 30°	574	484	92	23	31	87	117	98	120	110	408	761	2905	
20° - 25°	324	60	8	3	2	-	1	-	1	6	20	148	573	
Less than 20°	21	4	-	-	-	-	-	-	-	-	-	6	31	

Table 4.2e: Number of maximum temperature days at Rajshahi, duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater	-	-	4	96	63	12	-	-	-	-	-	-	175	
38° - 40°	-	-	42	196	118	47	1	1	-	-	-	-	405	
36° - 38°	-	1	131	179	169	116	16	7	3	1	-	-	623	301
30° - 36°	1	181	588	334	491	650	836	858	793	774	343	-	5849	
25° - 30°	368	526	120	45	58	64	77	53	82	118	515	684	2710	
20° - 25°	470	108	12	1	-	-	-	-	6	7	11	194	809	
Less than 20°	60	3	-	-	-	-	-	-	-	-	1	21	85	

Table 4.2f: Number of maximum temperature days at Rangpur, duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater	-	-	-	-	-	-	-	-	-	-	-	-	0	
38° - 40°	-	-	1	14	7	1	1	1	-	-	-	-	25	
36° - 38°	-	-	5	57	40	18	4	12	-	-	-	-	136	132
30° - 36°	-	41	551	570	655	711	736	760	675	704	172	1	5576	
25° - 30°	266	584	339	246	214	165	157	120	185	198	700	583	3757	
20° - 25°	532	213	31	11	10	1		2	7	28	27	316	1178	
Less than 20°	116	6	-	-	-	-	-	-	-	-	1	29	152	

Table 4.2g: Number of maximum temperature days at Sylhet, duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater	-	-	-	-	-	-	-	-	-	-	-	-	0	
38° - 40°	-	-	1	-	2		1	-	-	-	-	-	4	
36° - 38°	-	-	15	11	23	17	22	21	24	3	-	-	136	24
30° - 36°	27	176	587	621	619	622	679	760	678	753	394	21	5937	
25° - 30°	569	555	276	235	245	244	226	145	190	151	480	793	4109	
20° - 25°	313	109	46	30	39	8	2	2	8	21	23	105	706	
Less than 20°	20	6	1	-	-	-	-	-	-	-	3	11	41	

4.2 Rainfall

For rainfall analysis 34 stations of BMD during the period of 1981-2010 are considered. The numbers of rainy days for different rainfall ranges, i.e., light rain (1-10 mm), moderate rain (11-22 mm), moderately heavy rain (23-43 mm), heavy rain (44-88 mm), very heavy rain (greater than 88 mm) etc. are calculated for all the stations. Table 4.3(a-g) shows the result for the weather stations representing the divisions of Bangladesh during the study period of 1981-2010. From these tables it is seen that the number of days with moderate rainfall (11-23 mm) are the highest in February and lowest in December during winter season. Rainfall and rainy days increases during the remaining months of the year. During the months of May to September the frequency of moderately heavy to heavy rainfall days becomes higher over the country. Heavy to very heavy rainfall days are the highest in July among the monsoon months (June to September) and it is the maximum in the south-eastern part of the country. Analysis also reveals that there are 'extremely very heavy rainy days' over Dhaka during the observed period. They are- (i) 333 mm on 28.7.2009 and (ii) 341 mm on 14.9.2004. The number of days with 'extremely very heavy rainy days' is the maximum at Sandwip with the ever highest recorded rainfall of 590 mm on 19.06.2001.

Table 4.3a: Frequency of rainy days over Dhaka for different rainfall ranges during the period 1981-2010.

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	886	768	806	653	504	366	284	294	371	655	844	904	7335	
Light rain 1-10	36	60	22	116	208	263	348	408	281	151	34	15	1942	3
Moderate rain 11-22	5	12	18	64	85	119	138	113	108	44	10	4	720	
Moderate heavy 23-43	2	5	8	41	70	84	86	67	78	43	3	6	493	
Heavy rain 44-88		2	3	24	53	53	61	37	48	27	4	1	313	
Very heavy rain > 89			1	2	10	15	13	11	14	10	3		79	
Very heavy rain 100-199				2	4	10	8	9	11	9	1		54	
Very heavy rain 200-299													0	
Very heavy rain > 300							1		1				2	

*28 July 2009 --- 333 mm rainfall, *14 September 2004 --- 341 mm

Table 4.3b: Frequency of rainy days over Barisal for different rainfall ranges during the period 1981-2010.

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	896	758	827	698	588	334	205	256	365	662	832	904	7325	
Light rain 1-10	23	67	58	113	157	270	369	386	305	144	44	20	1956	7
Moderate rain 11-22	7	16	20	41	84	107	163	138	113	49	9	4	751	
Moderate heavy 23-43	2	5	19	31	65	97	125	99	77	35	6	2	563	
Heavy rain 44-88	1	1	5	17	33	67	58	40	29	27	7		285	
Very heavy rain > 89			1		3	19	10	11	11	13	2		70	
Very heavy rain 100-199			1		2	15	8	7	8	9			50	
Very heavy rain 200-299								1	1	1			3	
Very heavy rain > 300													0	

Table 4.3c: Frequency of rainy days over Chittagong for different rainfall ranges during the period 1981-2010.

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	784	683	718	586	458	281	240	279	352	558	702	749	6390	
Light rain 1-10	19	34	50	74	154	203	245	273	268	122	43	14	1499	89
Moderate rain 11-22	1	10	12	39	51	80	95	91	87	44	16	5	531	
Moderate heavy 23-43	1	4	18	30	77	83	86	69	39	43	7	6	463	
Heavy rain 44-88	1	3	7	15	35	73	74	60	29	30	9	1	337	
Very heavy rain > 89			1	6	18	45	66	34	5	9	3		187	
Very heavy rain 100-199				3	14	29	43	23	5	4	2		123	
Very heavy rain 200-299						4	6	6		1			17	
Very heavy rain > 300							3	1					4	

*5 July 1983 ----407 mm, * 9 July 1985 ---374 mm, * 8 July 1988 ---- 305 mm, *4 August 1983 --511mm

Table 4.3d: Frequency of rainy days over Khulna for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	888	766	831	725	601	384	223	279	376	672	841	905	7491	
Light rain 1-10	31	53	52	106	166	277	374	385	303	136	36	23	1942	
Moderate rain 11-22	6	13	25	38	87	102	171	133	111	54	10		750	30
Moderate heavy 23-43	4	11	14	26	40	79	91	92	68	40	6	1	472	
Heavy rain 44-88	1	4	6	2	33	42	35	36	33	21	2	1	216	
Very heavy rain > 89			2	3	3	16	5	5	9	7	5		55	
Very heavy rain 100-199				2		11	4	3	3	6	3		32	
Very heavy rain 200-299						1			2				3	
Very heavy rain > 300									1				1	

** 27 September 1986 --- 430 mm

Table 4.3e: Frequency of rainy days over Rajshahi for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	887	781	832	739	639	459	325	386	439	726	866	905	7984	
Light rain 1-10	37	52	75	92	160	244	373	333	253	104	24	18	1765	
Moderate rain 11-22	4	11	18	41	68	80	100	109	83	43	5	3	565	15
Moderate heavy 23-43	2	3	4	20	47	67	80	57	79	39	2	2	402	
Heavy rain 44-88			1	2	15	37	44	38	36	14	3	2	192	
Very heavy rain > 89					1	6	8	5	10	4			34	
Very heavy rain 100-199					1	1	7	3	9	1			22	
Very heavy rain 200-299													0	
Very heavy rain > 300													0	

Table 4.3f: Frequency of rainy days over Rangpur for different rainfall ranges during the period 1981-2010.

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	891	801	849	672	487	338	311	428	404	709	870	901	7661	
Light rain 1-10	24	36	55	127	204	244	280	237	226	117	25	20	1595	
Moderate rain 11-22	8	7	16	37	106	116	117	92	94	37	2	5	637	97
Moderate heavy 23-43	3	3	8	47	91	105	87	75	66	29	1	4	519	
Heavy rain 44-88			2	13	37	66	73	46	57	25	2		321	
Very heavy rain > 89				2	5	28	31	21	23	13			123	
Very heavy rain 100-199				1	5	15	25	14	16	8			84	
Very heavy rain 200-299						4	2	2	4	4			16	
Very heavy rain > 300													0	

Table 4.3g: Frequency of rainy days over Sylhet for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	896	739	685	419	319	141	79	149	272	635	849	900	6083	
Light rain 1-10	28	73	131	169	209	259	306	307	257	150	28	17	1934	
Moderate rain 11-22	4	22	51	129	149	175	218	200	134	53	9	8	1152	8
Moderate heavy 23-43	2	9	35	113	125	156	169	154	110	56	8	3	940	
Heavy rain 44-88		4	25	57	95	104	110	88	95	30	5	2	615	
Very heavy rain > 89			2	13	33	58	48	32	32	6	1		225	
Very heavy rain 100-199			2	8	23	44	35	22	26	5	1		166	
Very heavy rain 200-299				1	3	4	7	1	3				19	
Very heavy rain > 300						1		1					2	

** 13 June 2000 --- 362 mm&** 1 August 1987 --- 302 mm

5 Wind pattern for different seasons in Bangladesh

Wind is a vital indicator of the atmospheric circulation. Changes in wind speed and direction is an indication of the changes in circulation position due to either natural or anthropogenic processes. In meteorology, wind direction is considered as the direction from which wind blows and expressed in degrees and measured clockwise from the geographical north or in terms of the points of the compass. The wind direction is generally measured by an instrument called wind vane which is one of the oldest metrological instruments. Wind speed is the rate of movement of air in its instantaneous direction and is measured as kilometers per hour or meter per second or knots. In this study the unit of wind speed is meter per second is considered.

According to meteorological convention, wind is usually defined as the horizontal component of air motion. Though there are different methods of wind speed measurement but the rotating cup anemometer is commonly used for wind speed measurement in BMD. 3-cup counter anemometers are used to measure and report at each synoptic hour. Seasonal wind pattern and distribution of wind speed of all the stations of BMD are prepared and compiled in this study.

The winter season in Bangladesh comprises of December, January and February. During winter season (December, January and February) the northeasterly winds prevail over the country blowing from land to sea except northern hilly areas where mainly easterly wind prevails. Clear sky, low temperatures, low humidity and light winds are the common weather phenomenon of winter season. But during the passage of upper air cyclonic circulation over northwestern part of the country (called western disturbances) light rain occurs over the country.

During summer season (March to May) heating belt shifts northward due to apparent northward movement of the sun. The summer months experience high temperature and falling of air pressure over the country. Circulation of air begins to set in around this low pressure area results

strong gusty, hot, dry winds blowing the day. Thunderstorms are very common during this season over the country. In this season, localized thunderstorms associated with violent winds, torrential downpours and occasionally hail occur. These are locally known as the 'Kalbaishakhi' are the common weather phenomena.

The prominent features of wind climatology in Bangladesh are the circulations influenced by the strong southwest monsoon when warm and humid air moves towards the land. Generally monsoon season onsets early June and withdraws by the end of September in Bangladesh. During this season, the persisting low pressure over the northern India and Bangladesh intensifies and attracts the trade winds of the southern hemisphere. These trade winds originate over warm sub-tropical oceanic areas of the southern hemisphere, cross the equator and blow in a southwesterly direction entering the Indian peninsula and the Bay of Bengal. After that, it covers the whole Bangladesh as a southwest monsoon.

The post-monsoon season in Bangladesh continues during October to November. During this season the low pressure trough over Bangladesh territory becomes weaken and gradually replaces by a high pressure system. After withdrawal of monsoon, the period of October and November months acts as a transition from hot rainy season to dry winter conditions. So, wind pattern shows more variable than other seasons. The low pressure conditions transfers to the Bay of Bengal by early November resulting in formation of depressions which of them sometimes intensified into a cyclonic storms. These cyclones generate high wind along the path and generally cross Indian coast/ Bangladesh causing widespread heavy rain.

Windrose (using R software) of 34 stations of BMD are prepared for different seasons. Actually wind rose is a method of graphical representation of the distribution of winds (speed and direction) at a location showing their strength, direction and frequency. It is a very useful and simplified representation of a large quantity of data in a simple graphical plot. Figures wind distribution (as windrose) for divisional cities are given below (Fig. 5(a-x)) and other figures are listed in the appendix.

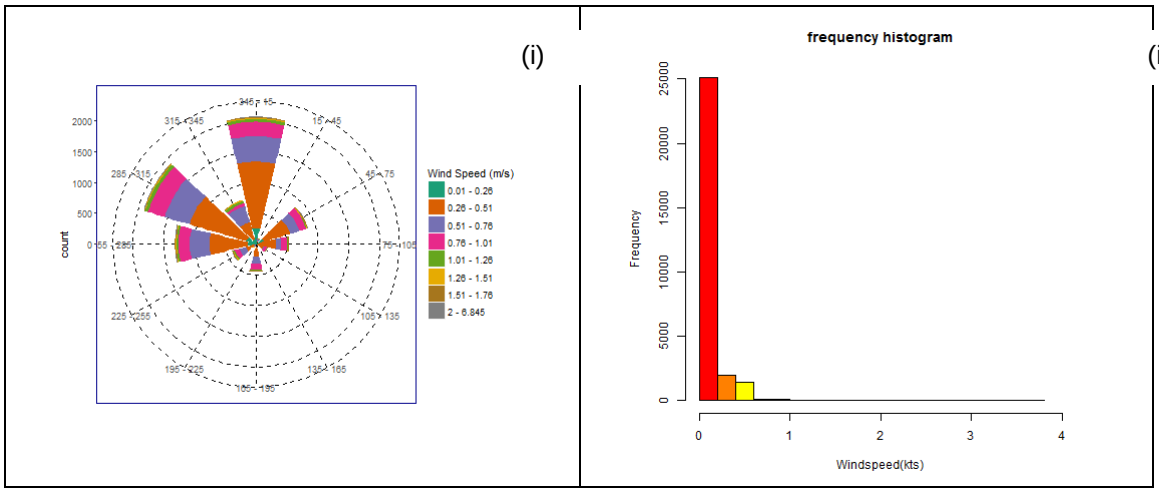

Fig.5a: Distribution of (i) wind direction and (ii) wind speed of Dhaka during Winter Season

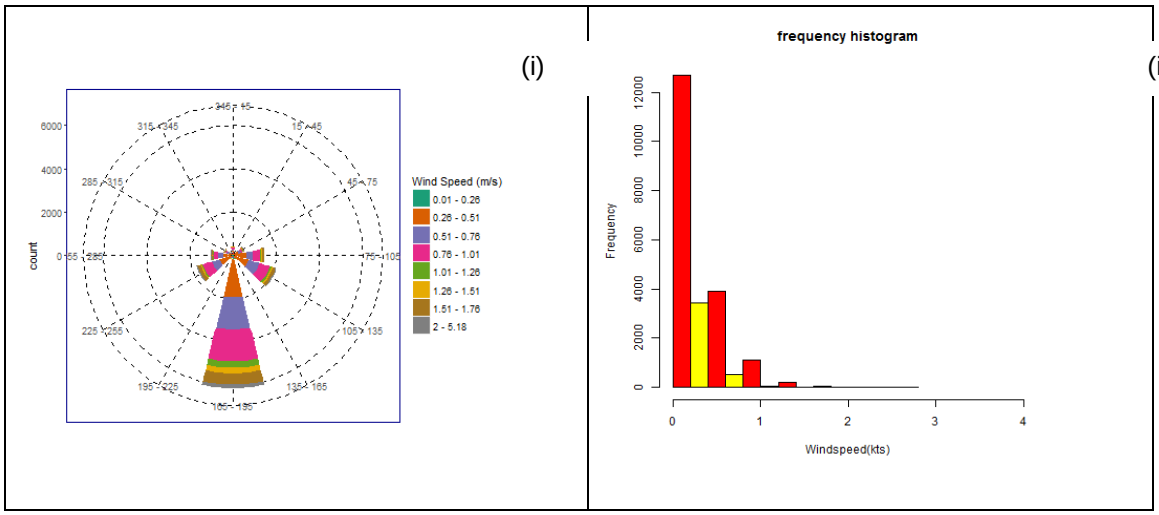

Fig.5b: Distribution of (i) wind direction and (ii) wind speed of Dhaka during Pre-monsoon Season

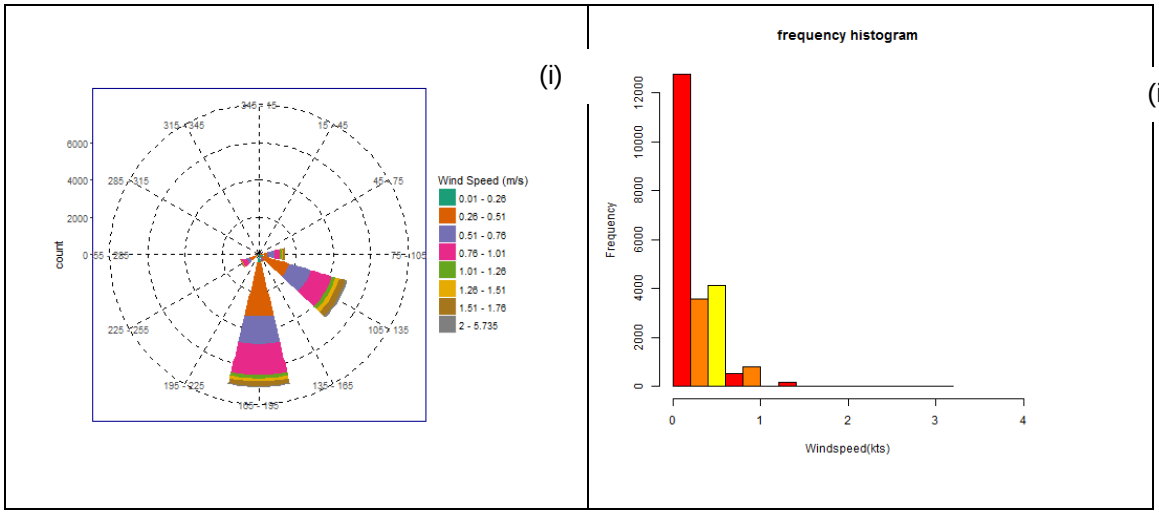

Fig.5c: Distribution of (i) wind direction and (ii) wind speed of Dhaka during Monsoon Season

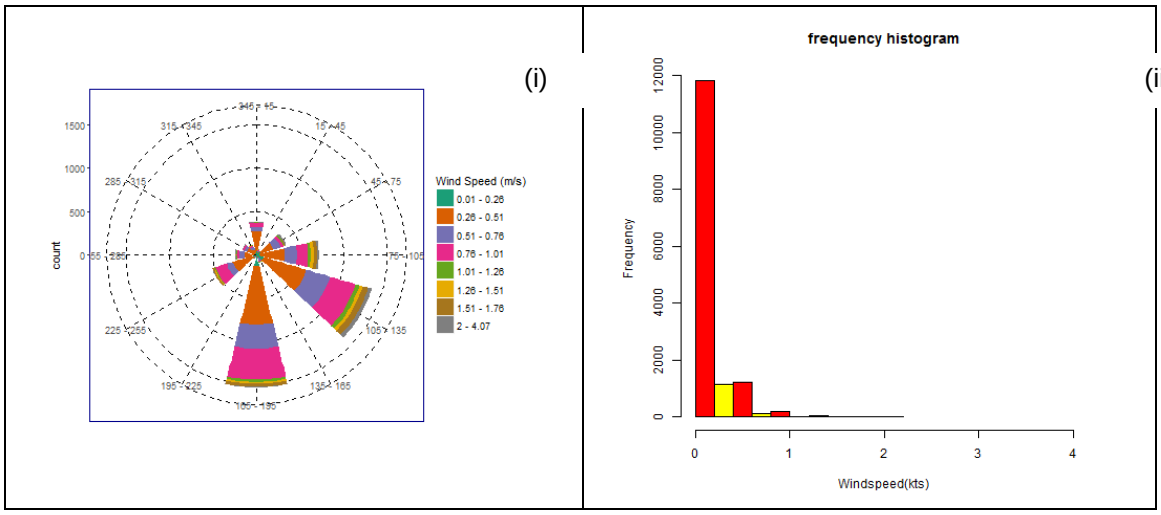

Fig.5d: Distribution of (i) wind direction and (ii) wind speed of Dhaka during Post-monsoon Season

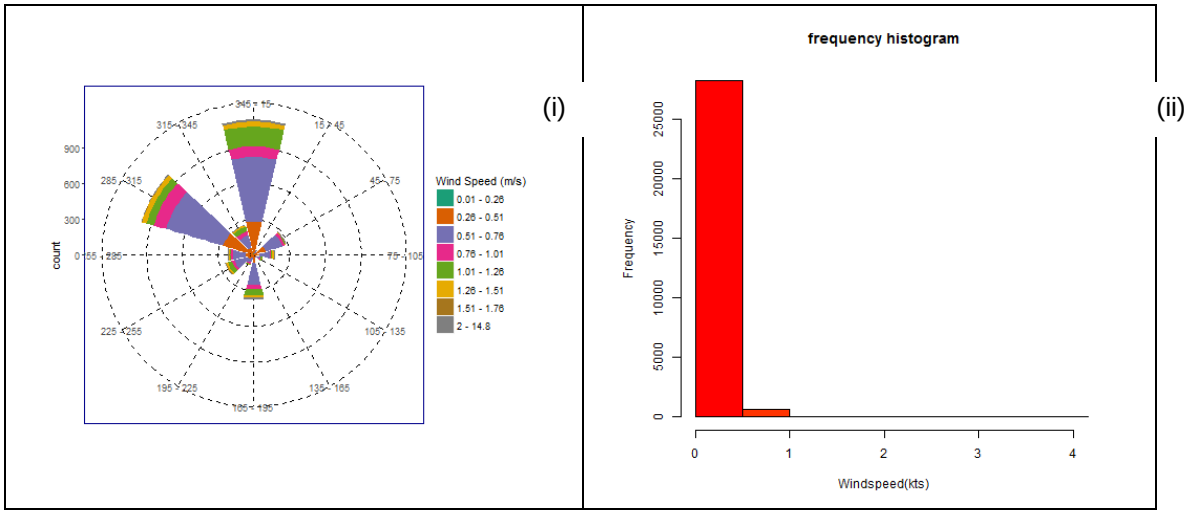

Fig.5e: Distribution of (i) wind direction and (ii) wind speed of Barisal during Winter Season

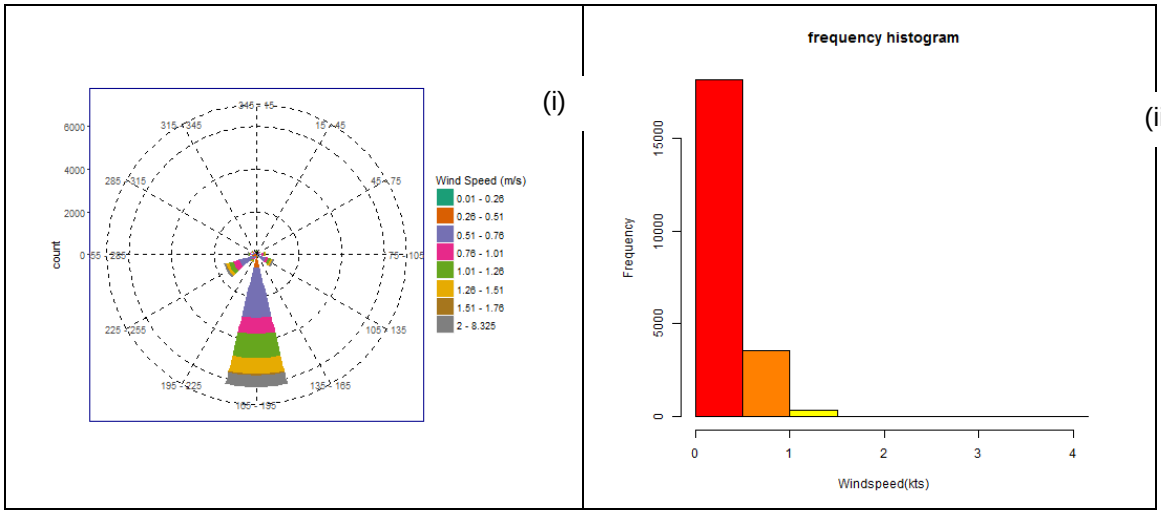

Fig.5f: Distribution of (i) wind direction and (ii) wind speed of Barisal during Pre-monsoon Season

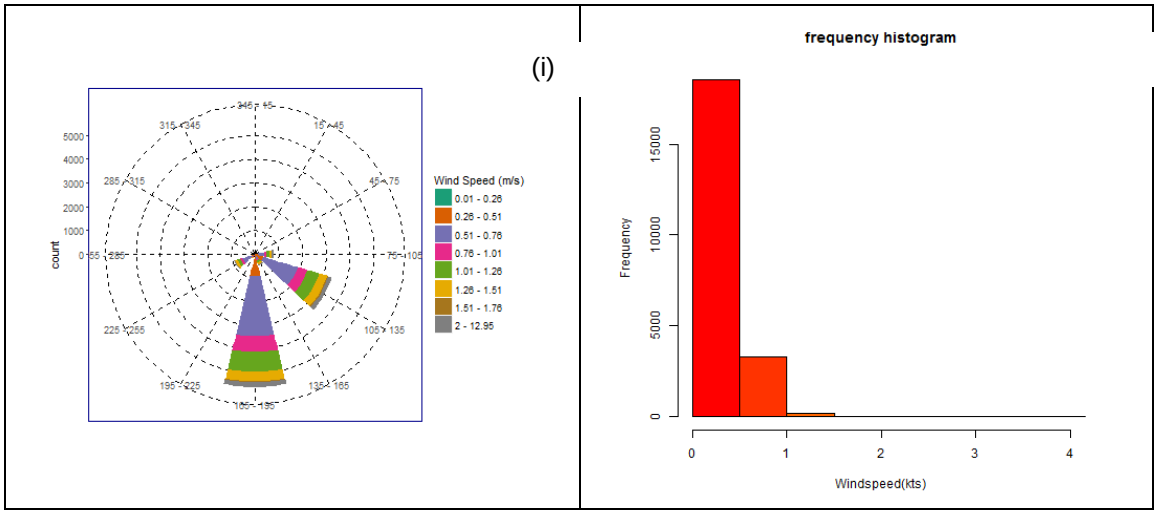

Fig.5g: Distribution of (i) wind direction and (ii) wind speed of Barisal during Monsoon Season

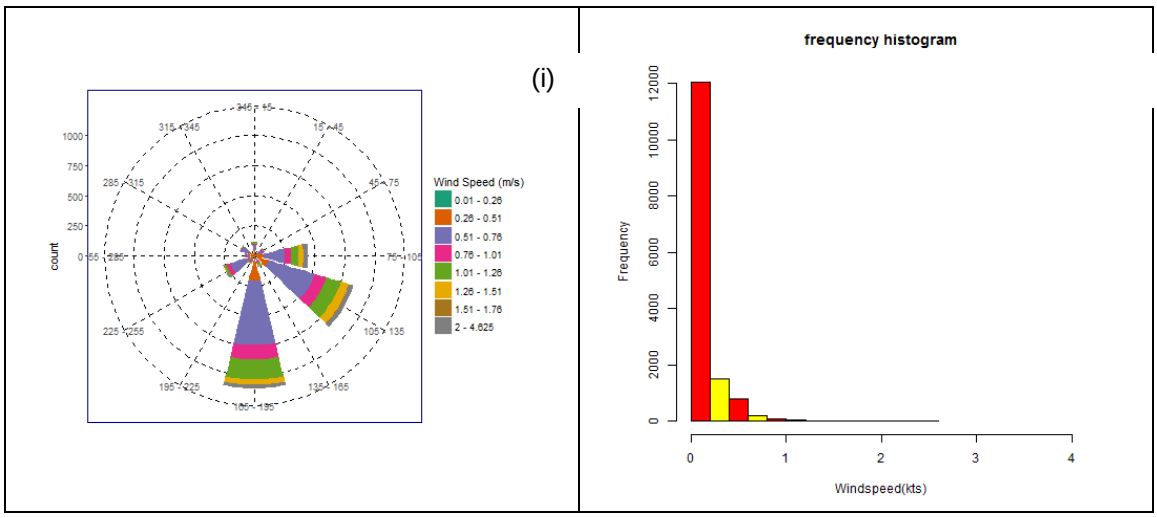

Fig.5h: Distribution of (i) wind direction and (ii) wind speed of Barisal during Post-Monsoon Season

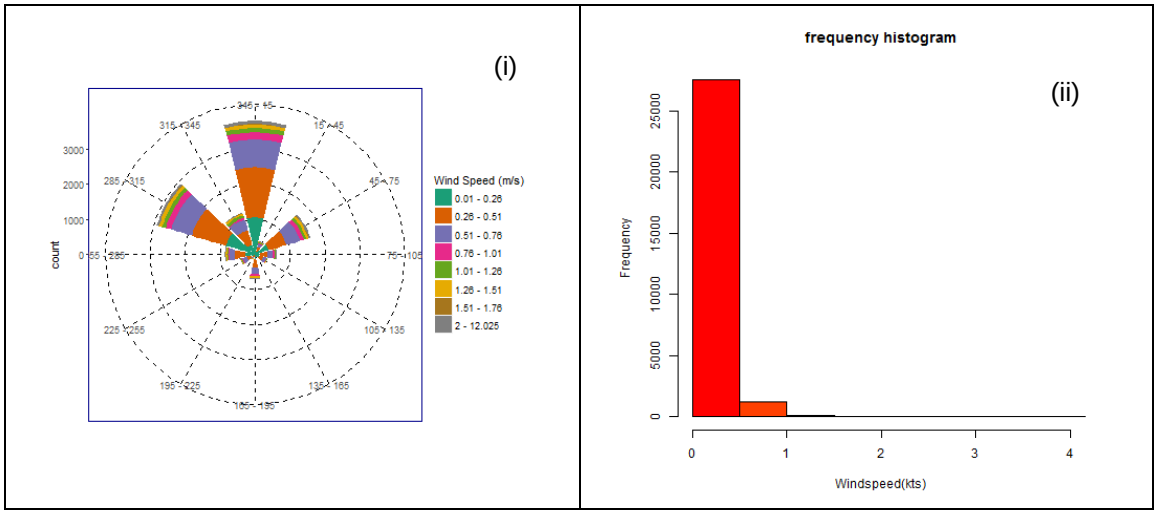

Fig.5i: Distribution of (i) wind direction and (ii) wind speed of Khulna during Winter Season

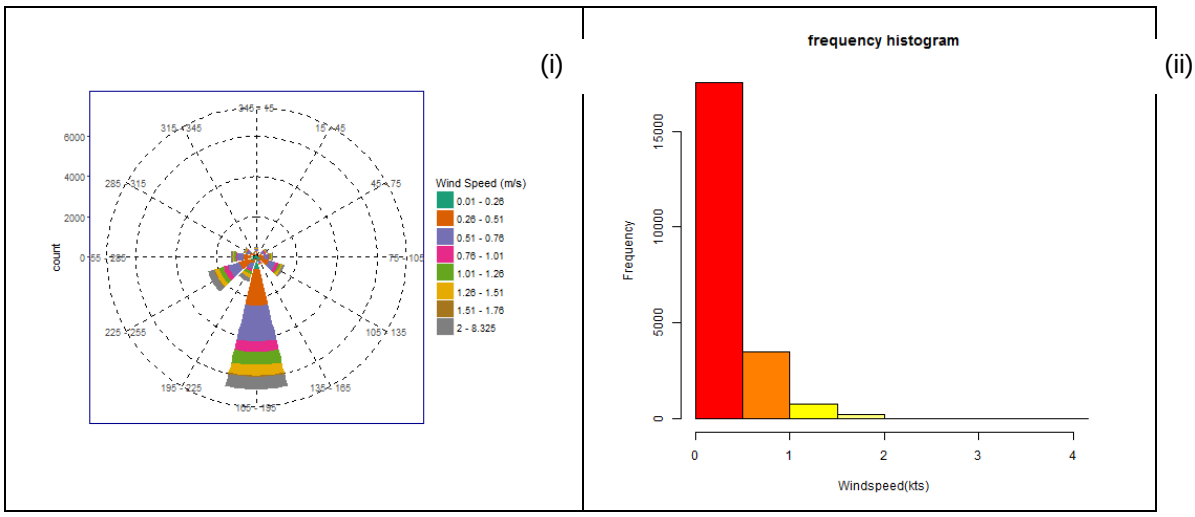

Fig.5j: Distribution of (i) wind direction and (ii) wind speed of Khulna during Pre-monsoon Season

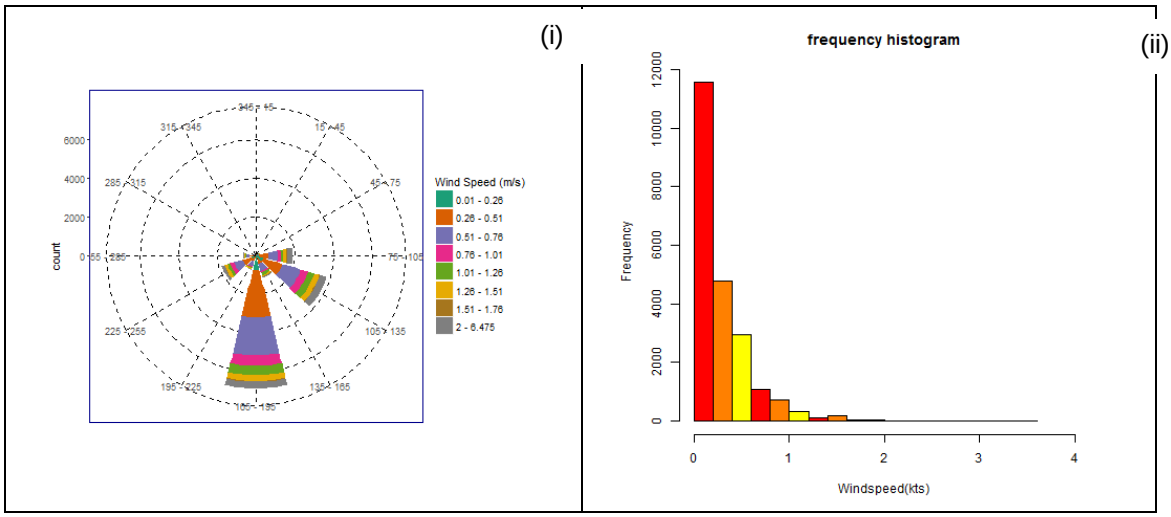

Fig.5k: Distribution of (i) wind direction and (ii) wind speed of Khulna during Monsoon Season

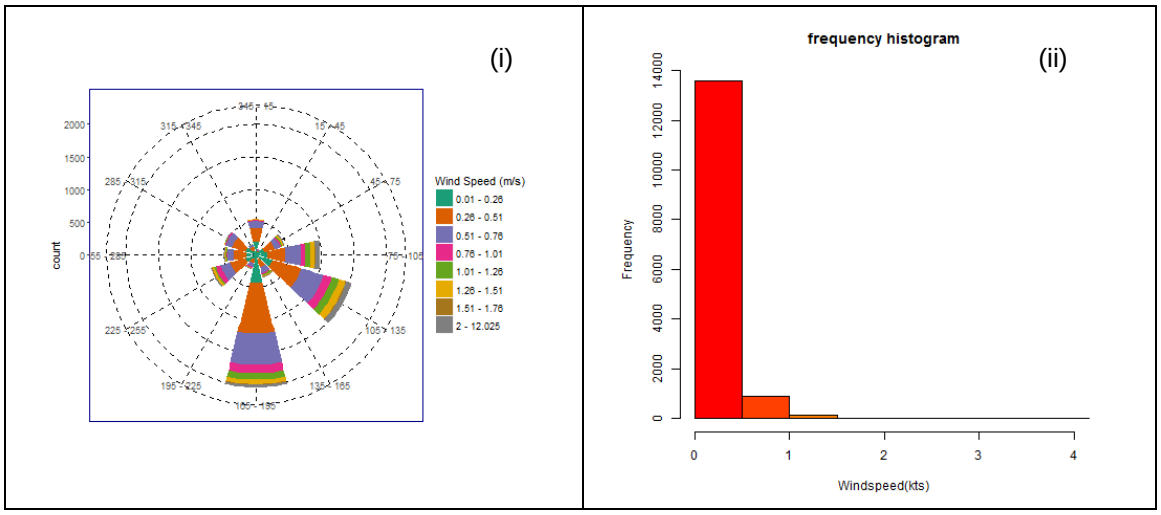

Fig.5l: Distribution of (i) wind direction and (ii) wind speed of Khulna during Post-monsoon Season

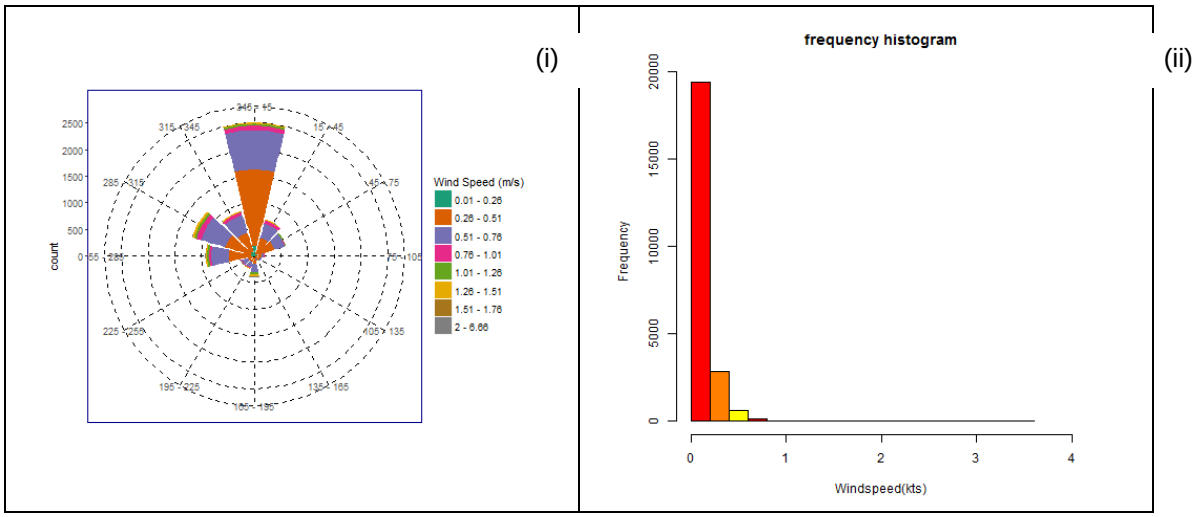

Fig. 5m: Distribution of (i) wind direction and (ii) wind speed of Chittagong during Winter Season

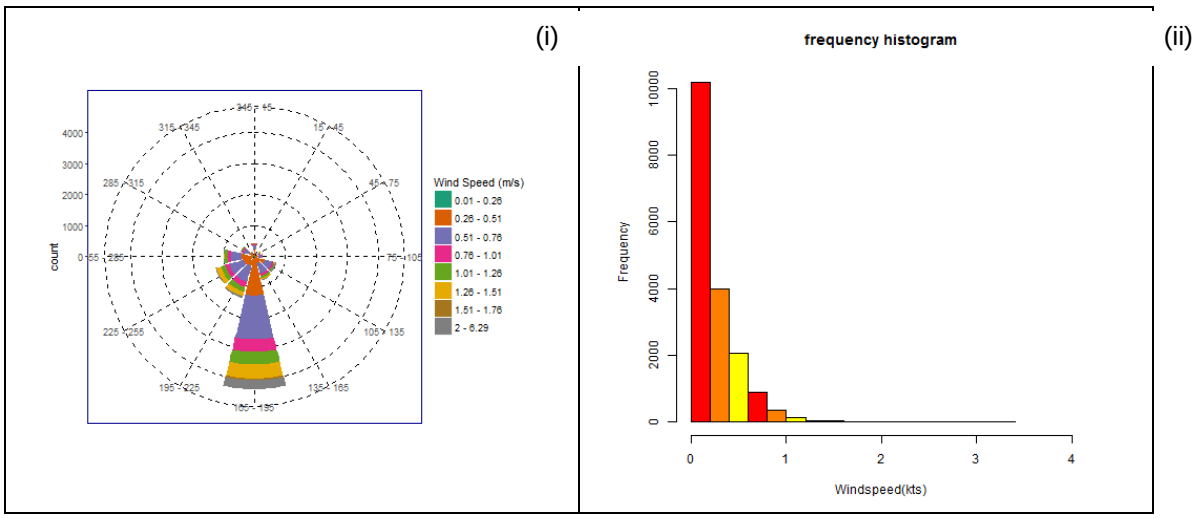

Fig. 5n: Distribution of (i) wind direction and (ii) wind speed of Chittagong during Pre-monsoon Season

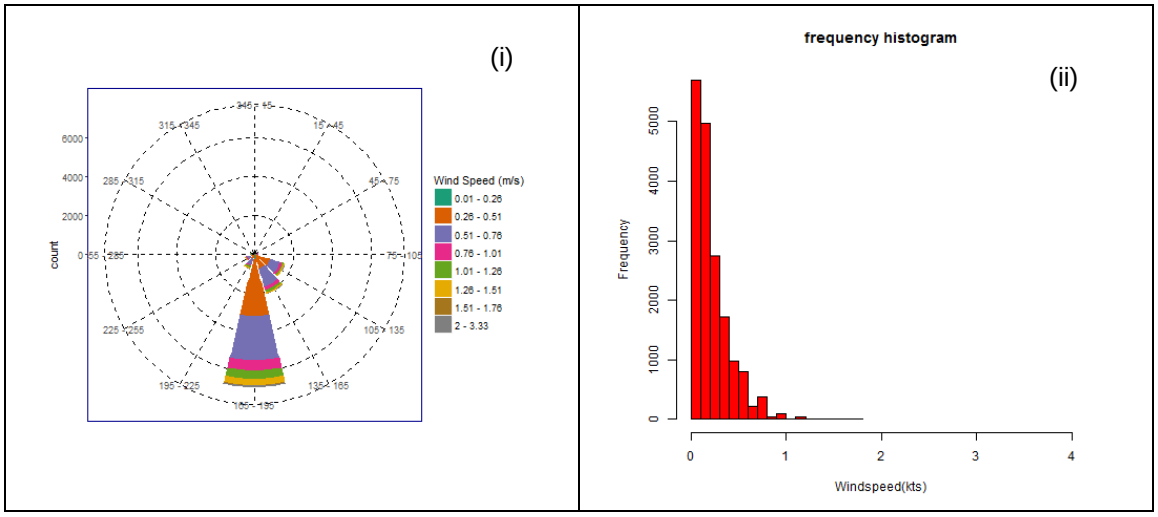

Fig. 5o: Distribution of (i) wind direction and (ii) wind speed of Chittagong during Monsoon Season

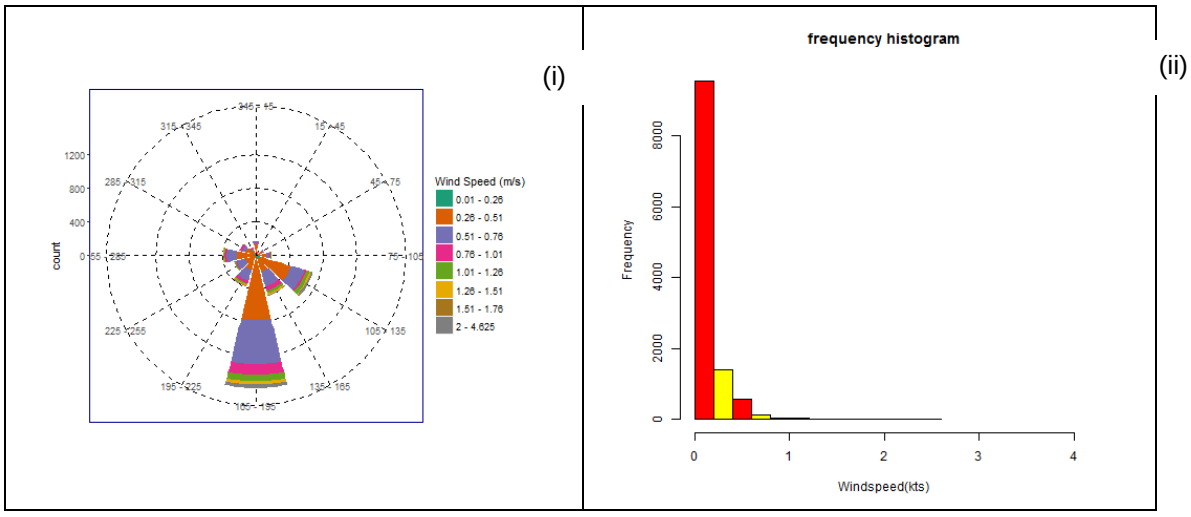

Fig. 5p: Distribution of (i) wind direction and (ii) wind speed of Chittagong during Post-monsoon Season

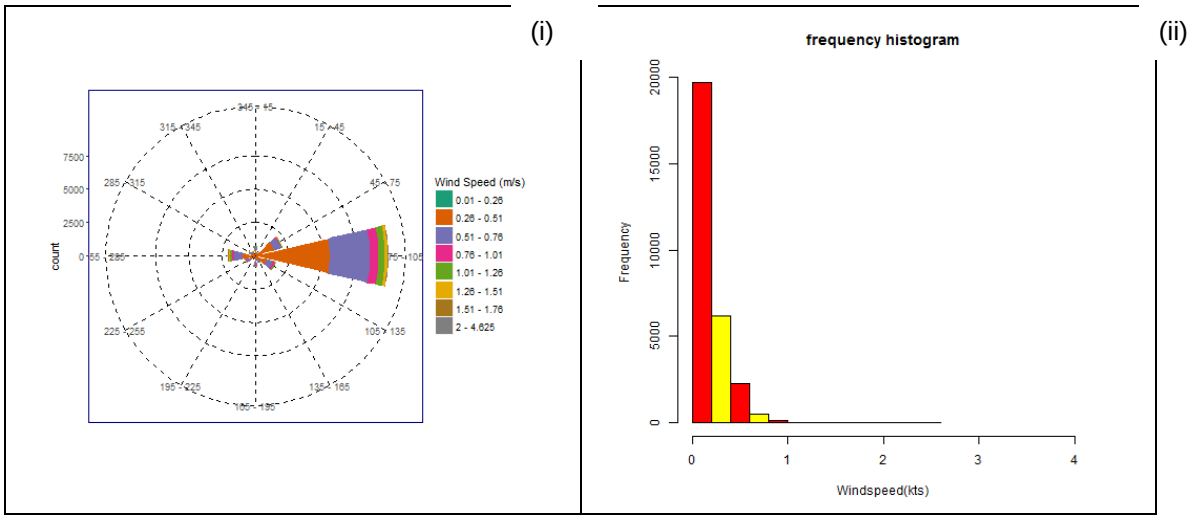

Fig. 5q: Distribution of (i) wind direction and (ii) wind speed of Sylhet during Winter Season

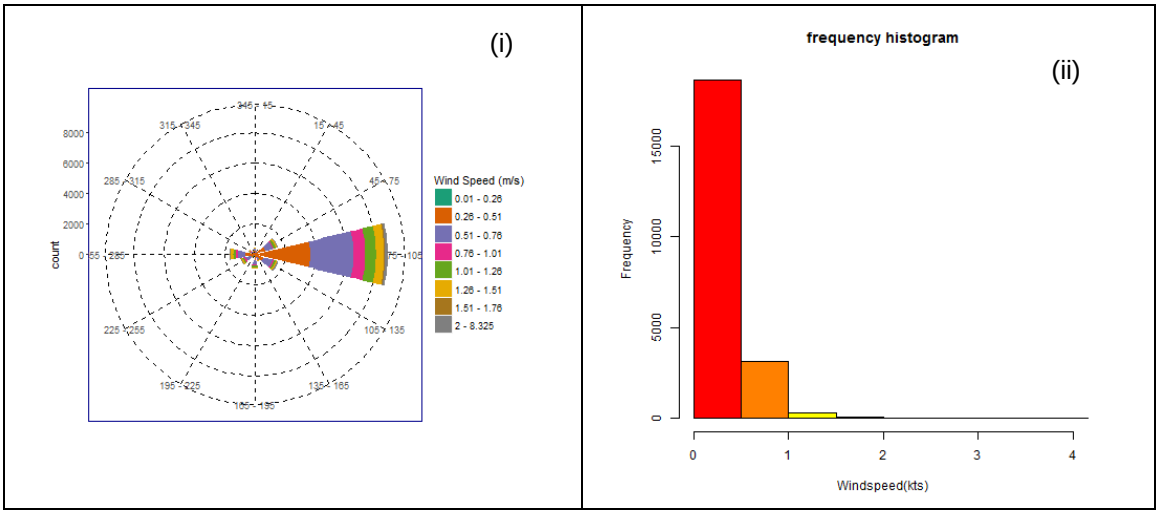

Fig. 5r: Distribution of (i) wind direction and (ii) wind speed of Sylhet during Pre-monsoon Season

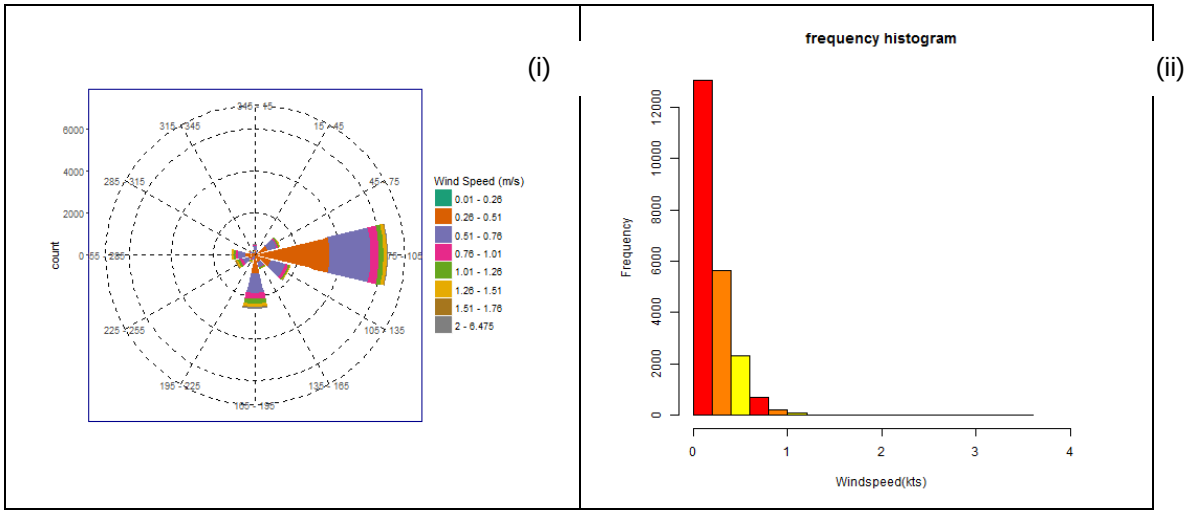

Fig. 5s: Distribution of (i) wind direction and (ii) wind speed of Sylhet during Monsoon Season

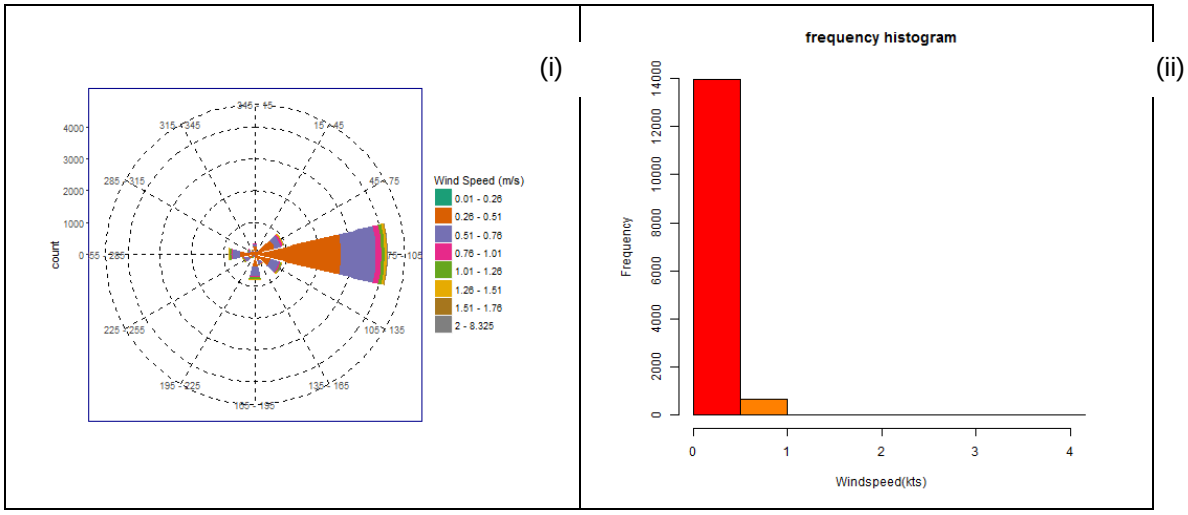

Fig. 5t: Distribution of (i) wind direction and (ii) wind speed of Sylhet during Post-monsoon Season

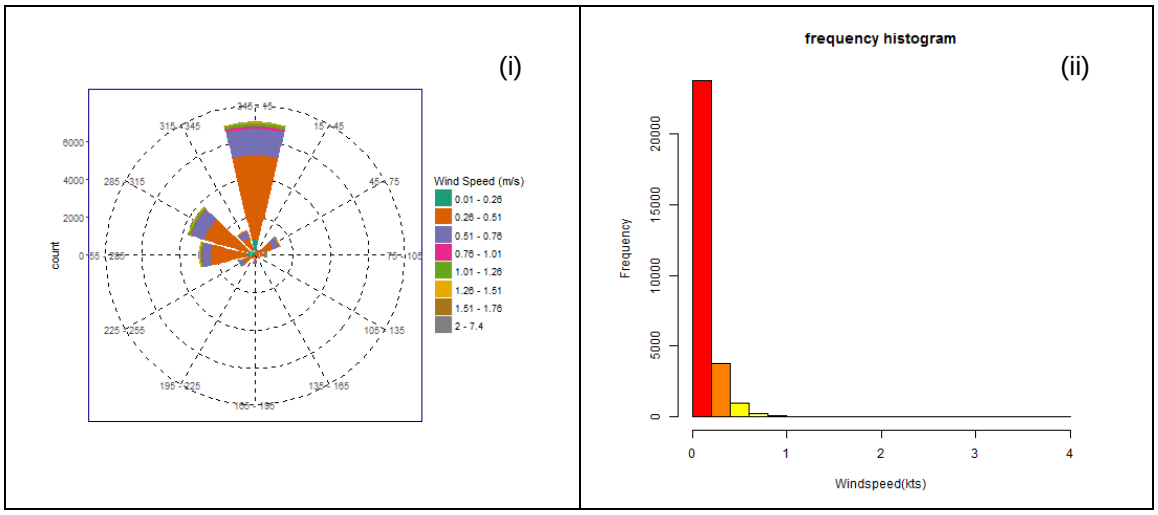

Fig. 5u: Distribution of (i) wind direction and (ii) wind speed of Rajshahi during Winter Season

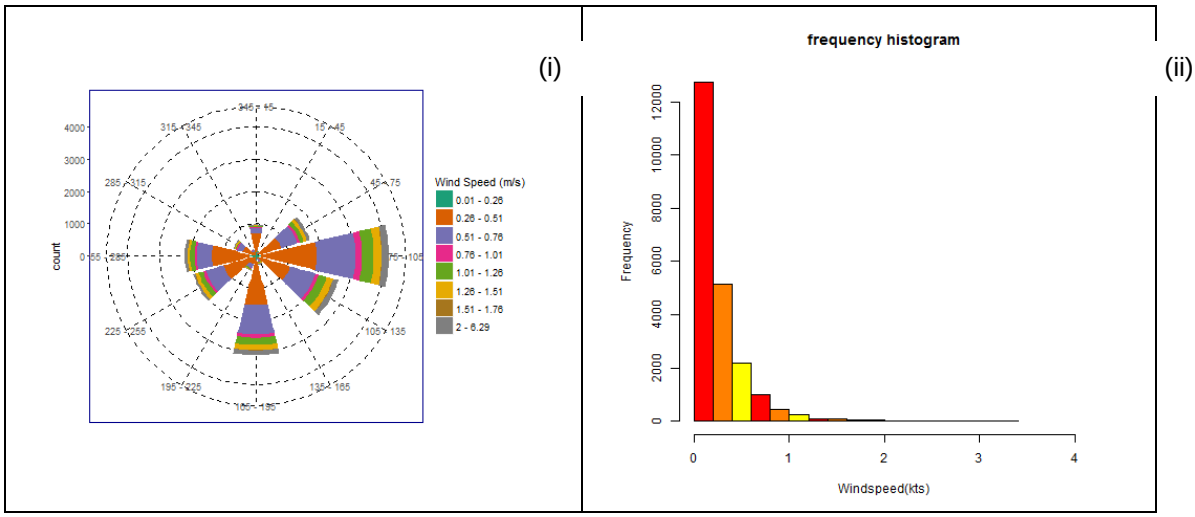

Fig. 5v: Distribution of (i) wind direction and (ii) wind speed of Rajshahi during Pre-monsoon Season

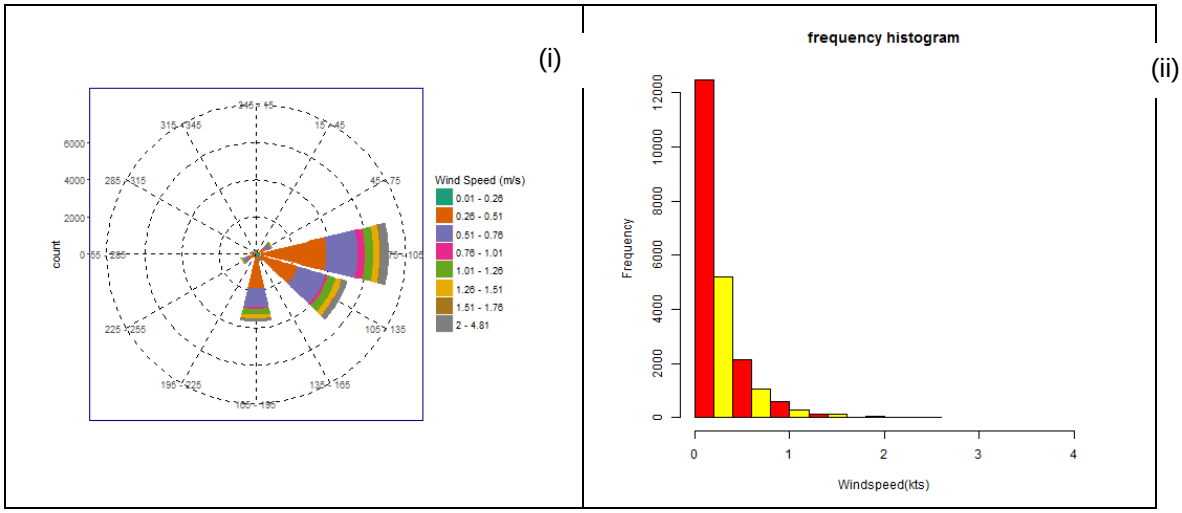

Fig. 5w: Distribution of (i) wind direction and (ii) wind speed of Rajshahi during Monsoon Season

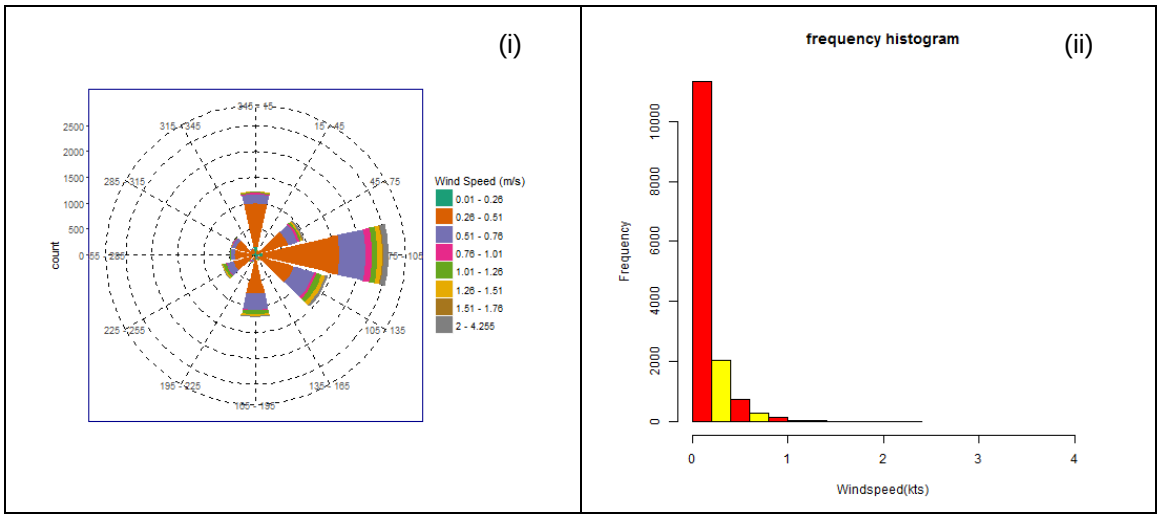

Fig. 5x: Distribution of (i) wind direction and (ii) wind speed of Rajshahi during Post-monsoon Season

6 Detected changes in Bangladesh climate

6.1 Temperature trend

The maximum temperature of all of the stations used under this study shows increasing trend except at Dinajpur, Rangpur and Mymensingh where it shows negative trend during the available observation period at each of the station. The significant rates of increment per hundred years are 3.9°C at Mongla, 3.7°C at Patuakhali, 3.6°C at Tangail, 3.4°C at Khepupara, 3.2°C at Kutubdia & Cox's Bazar and 2.8°C at Hatiya & Sayedpur. Analysis also reveals that the rates of increment of the stations located over the southern part of country are higher than that of the stations located over north and northwestern parts of the country.

Similarly, minimum temperatures of almost all the stations shows increasing trends except at Barisal, Khulna, Sandwip, Sitakunda, Rangamati and Rajshahi where trends are decreasing. The significant trends of minimum temperature per hundred years are 3.8°C at Madaripur, 2.6°C at Dhaka, 2.5°C at Rangpur, 2.3°C at Sayedpur, 2.3°C at Maijdi Court, 2.2°C at Cox's Bazar and 2.1°C at Srimangal & Kutubdia.

The Mann-Kendall test is a non-parametric test for identifying the trends in times series. A positive (negative) value of Kendall's Tau statistic indicates upward (downward) trends. Mann-Kendall trend test has been conducted for significant test under this study and Kendall-package in R program is used. Tau values of all the stations are well matched for temperature trends graph. Trends for maximum and minimum temperatures are highly statistically significant but the trend of maximum temperature for Mymensingh and trends of minimum temperatures of Tangail, Khulna and Hatiya are not statistically significant (shown Table 79).

The trends of the deviations of maximum and minimum temperatures of the available period at each of the stations are calculated but the trends at Dhaka, Barisal, Chittagong, Khulna, Rajshahi, Rangpur and Sylhet stations are shown in Fig. 6.1(a-g). The remaining Figs. are depicted in the Appendix.

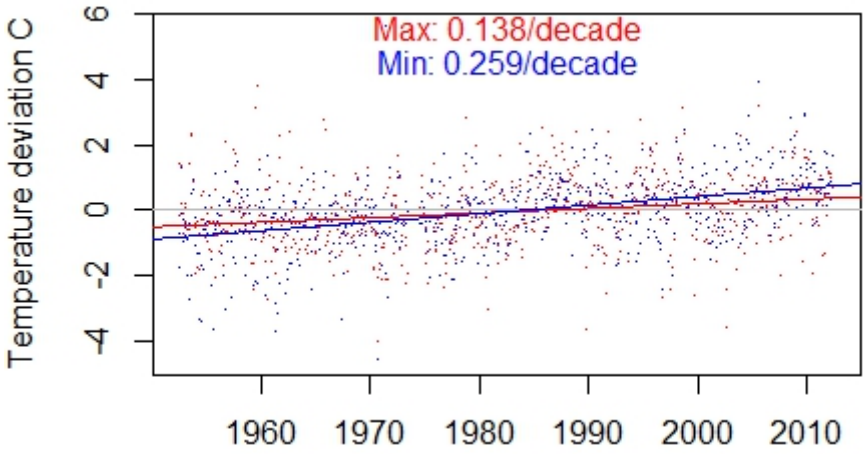

Fig. 6.1a: Maximum and minimum temperature trend over Dhaka

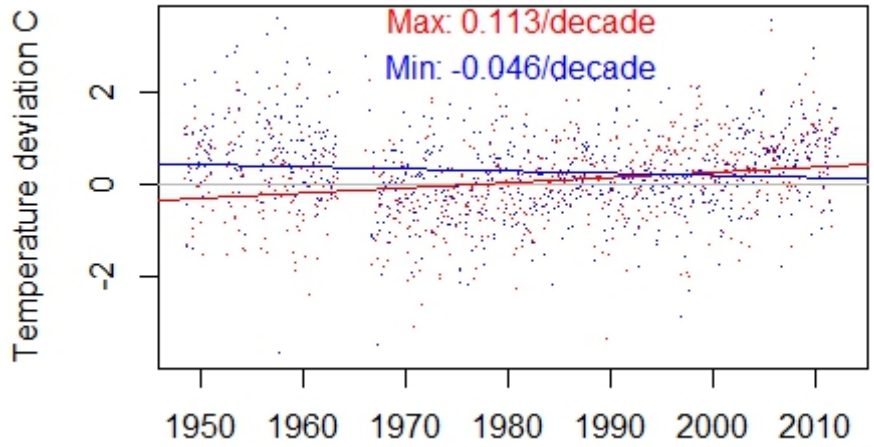

Fig.6.1b: Maximum and minimum temperature trend over Barisal

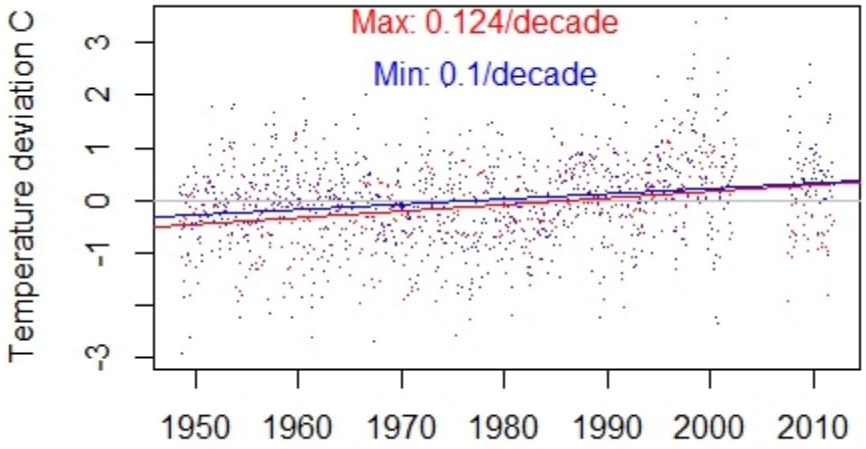

Fig. 6.1c: Maximum and minimum temperature trend over Chittagong

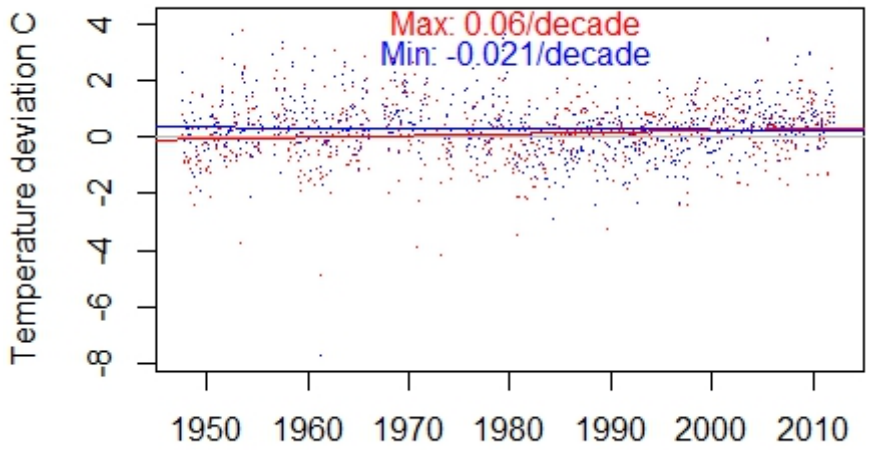

Fig. 6.1d: Maximum and minimum temperature trend over Khulna

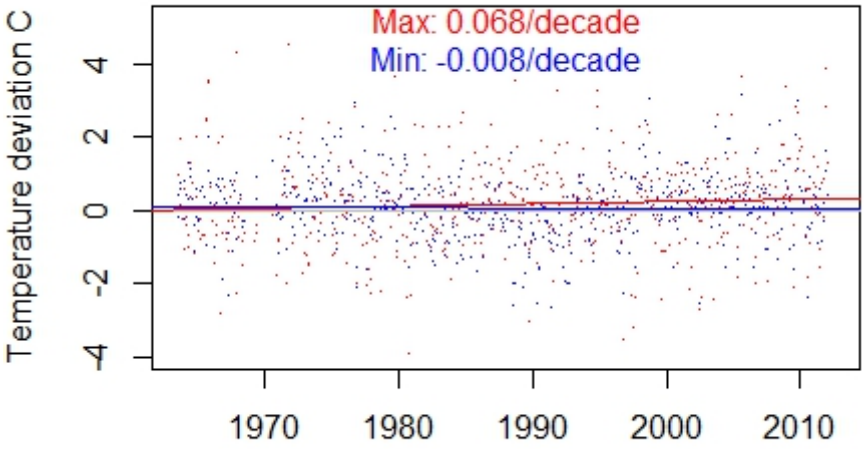

Fig. 6.1e: Maximum and minimum temperature trend over Rajshahi

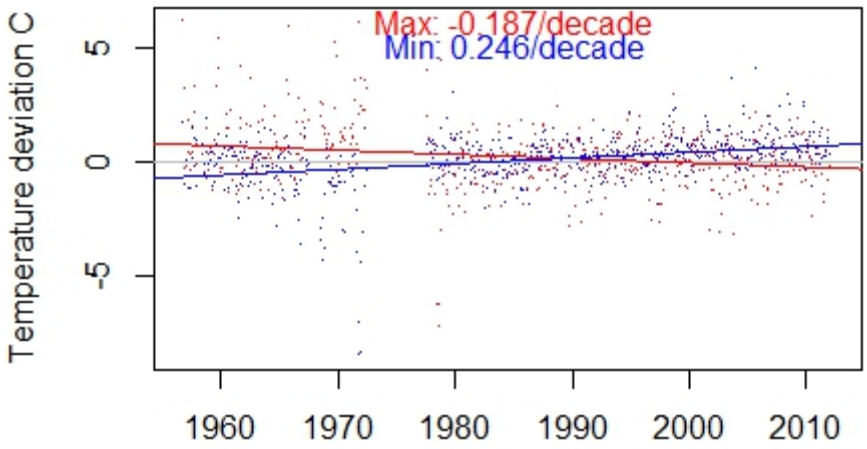

Fig. 6.1f: Maximum and minimum temperature trend over Rangpur

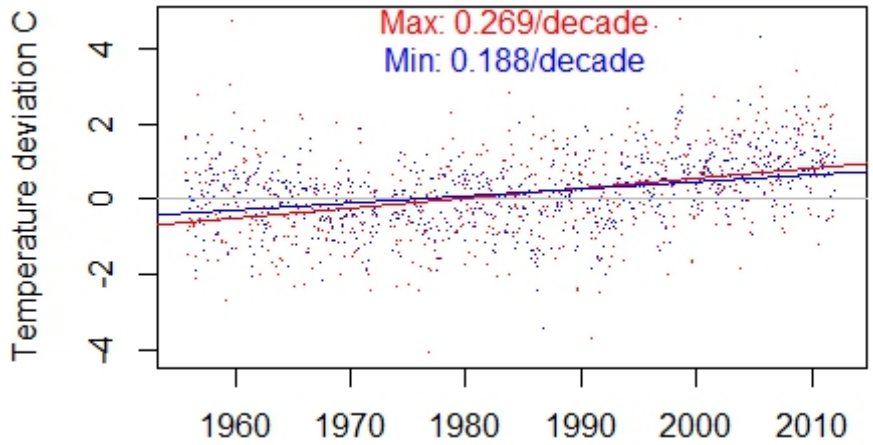

Fig. 6.1g: Maximum and minimum temperature trend over Sylhet

6.2 Seasonal change of rainfall and temperature:

6.2.1 Rainfall

For calculating the monthly and seasonal changes of rainfall, two rainfall data sets for the period of 1971-2000 and 1981-2010 are used. The normal rainfall during 1971-2000 is considered as the base period and then the change of rainfall during the period of 1981-2010 is calculated. It is found that the rainfall during 1981-2010 increases in July, September and October and it decreases in March to June. It remains nearly unchanged during the remaining months (Fig. 6.2.1).

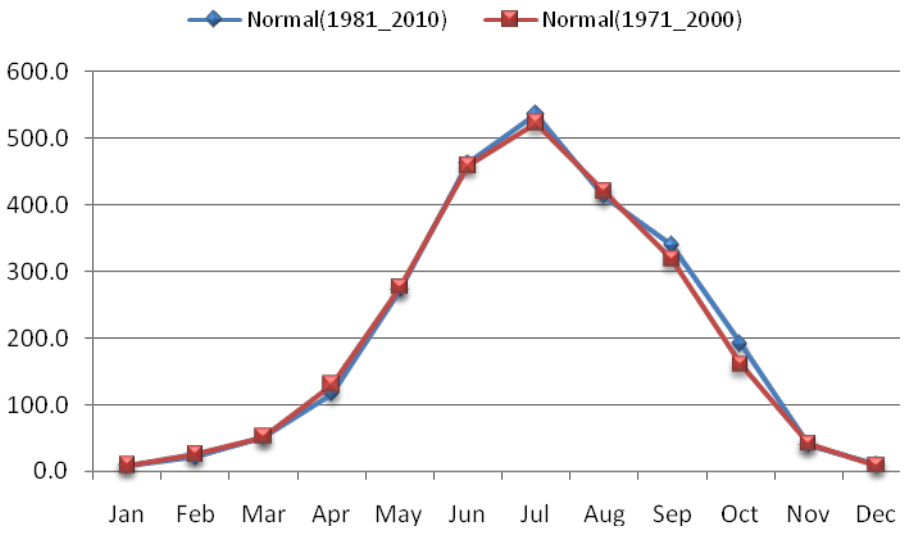

Fig. 6.2.1: Country normal rainfall comparison over Bangladesh

It is also found that the rainfall of winter season decreases over southwestern part of Bangladesh during 1981-2010 than 1971-2010 and accordingly the significant decreases are found at Madaripur (-28%), Mongla and Bhola (-25% each), Feni (-22%) and Satkhira (-20%). But it increases in the southeastern and adjoining southern and northeastern parts. Considerable increase of rainfall is found at Teknaf (+36%), Cox's Bazar (+22%) and Khepupara (+15%). Spatial distribution of winter rainfall during 1981-2010 and 1971-2000 and their deviations are shown in Fig.6.2.2.

Rainfall deviations are negative at Barisal division, some parts of Dhaka division and Pabna region but it is negative in the remaining parts of the country during pre-monsoon season (Fig.6.2.3). Significant negative deviations are found at Barisal (-38%), Madaripur (-15%), Faridpur and Ishurdi (-14% each), Bhola (-13%) and Dhaka (-12%). Positive deviations of rainfall during this season are found southeastern, northeastern and extreme northwestern parts and Satkhira region (Fig.6.2.3). Significant positive deviations are detected at Kutubdia (+18%) and Sayedpur (10%).

During monsoon season negative deviations of rainfall are found over Rajshahi division and some parts of Dhaka, Sylhet and Chittagong divisions but positive deviations are found over the remaining parts of the country. Accordingly, significant positive deviation is found at Hatiya (+12%), Teknaf (+7%), Cox's Bazar, Jessore and Sitakundha (+7% each). But the noted negative deviation are found at Ishurdi (-9%) and Rajshahi (-7%) as depicted in Fig. 6.2.4.

During post-monsoon season negative deviations are found over northeastern part of Bangladesh adjoining areas including Dhaka region but positive deviations are observed over the northwestern part, southwestern part and the regions Noakhali and Comilla (Fig. 6.2.5). Considerable maximum positive deviations are found at Dinajpur (+39%), Rangpur (37%), Chandpur (26%) and Sayedpur (25%) and negative deviation are found at Sylhet (-11%).

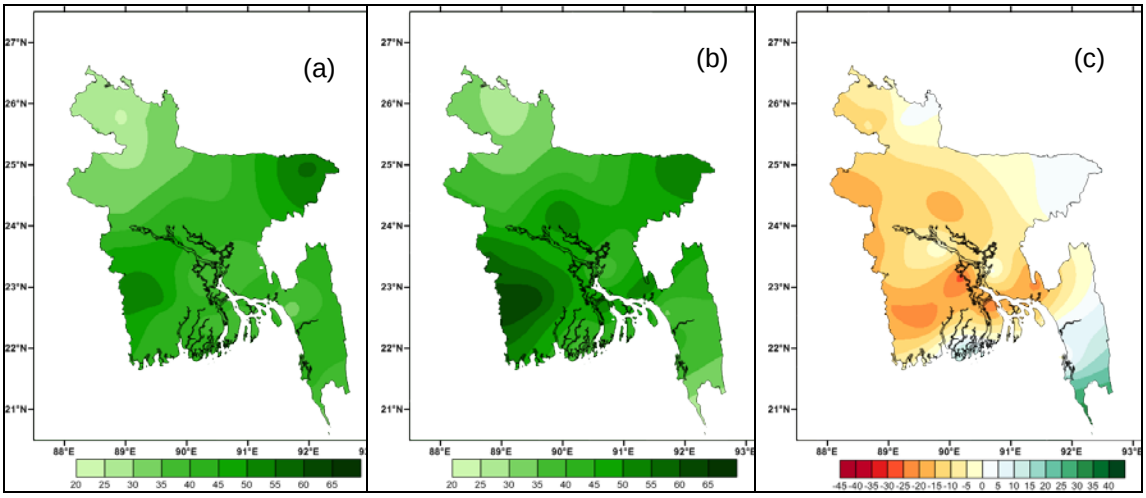

Fig. 6.2.2: Spatial distribution of Winter Rainfall (a) during 1981-2010, (b) during 1971-2000 and (c) deviation (%) of Winter Rainfall during 1981-2010 based on 1971-2000.

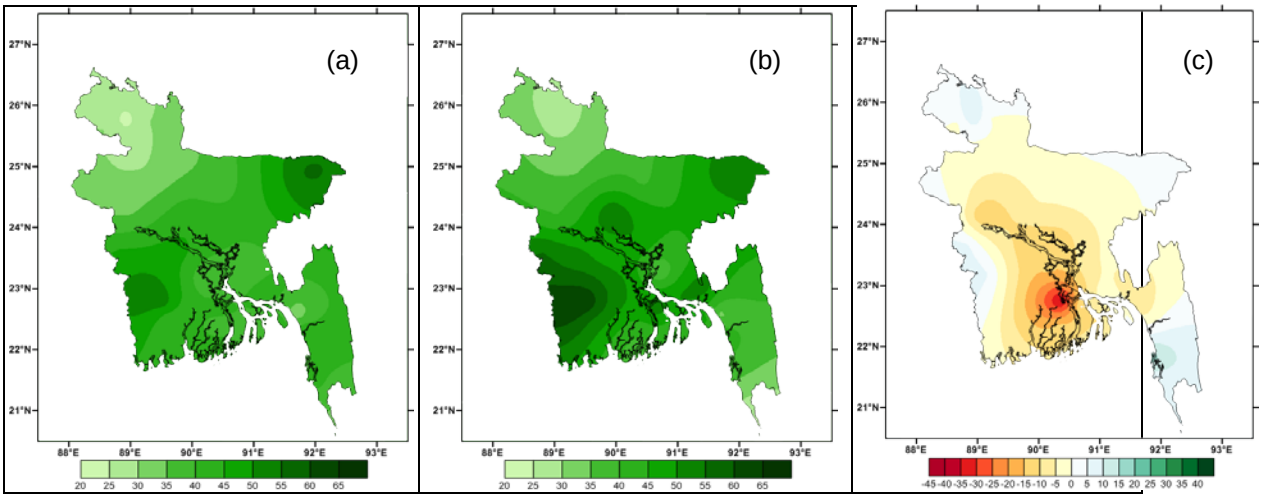

Fig. 6.2.3: Spatial distribution of Pre-Monsoon Rainfall (a) during 1981-2010, (b) during 1971-2000 and (c) deviation (%) of Pre-Monsoon Rainfall during 1981-2010 based on 1971-2000.

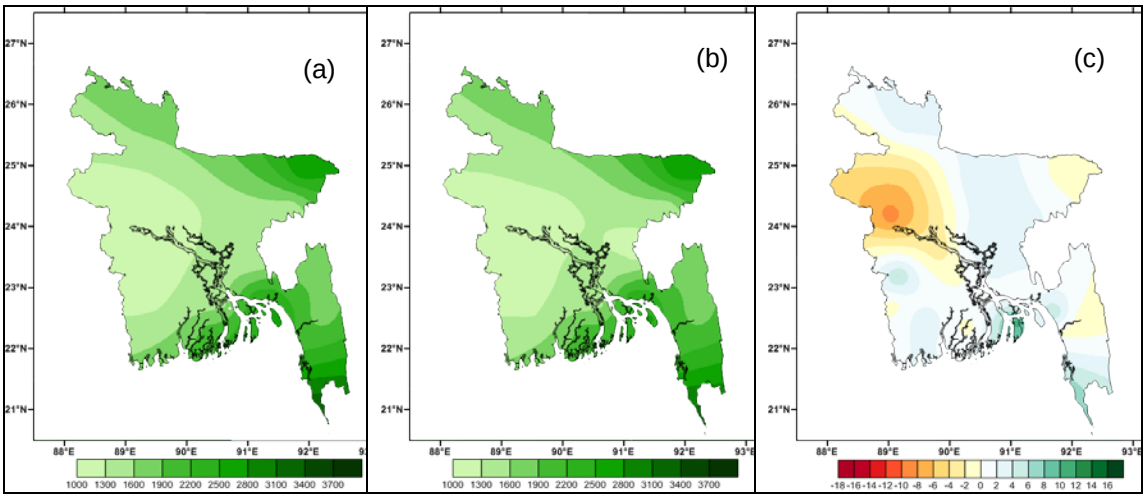

Fig. 6.2.4: Spatial distribution of Monsoon Rainfall (a) during 1981-2010, (b) during 1971-2000 and (c) deviation (%) of Monsoon Rainfall during 1981-2010 based on 1971-2000.

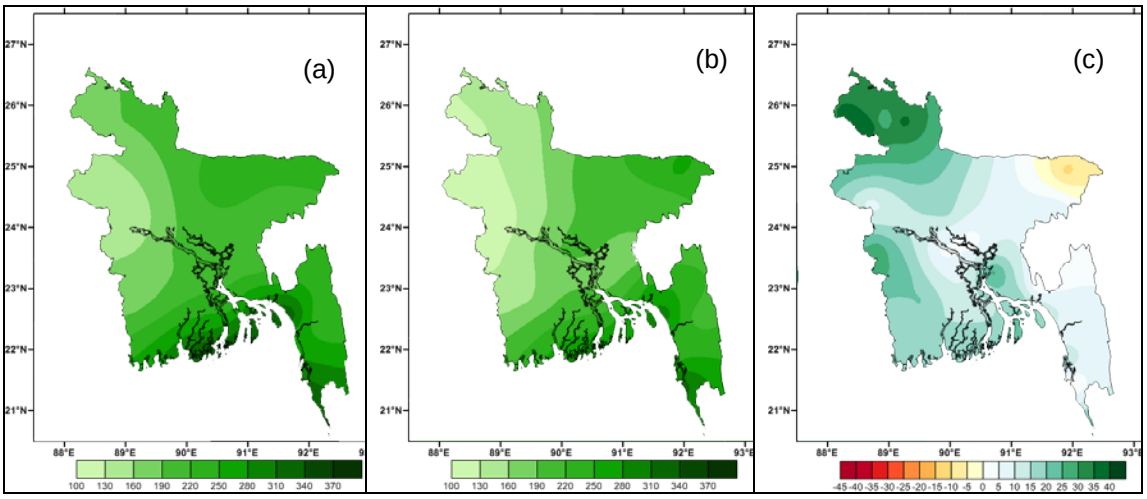

Fig. 6.2.5: Spatial distribution of Post-monsoon Rainfall (a) during 1981-2010, (b) during 1971-2000 and (c) deviation (%) of Post-monsoon Rainfall during 1981-2010 based on 1971-2000.

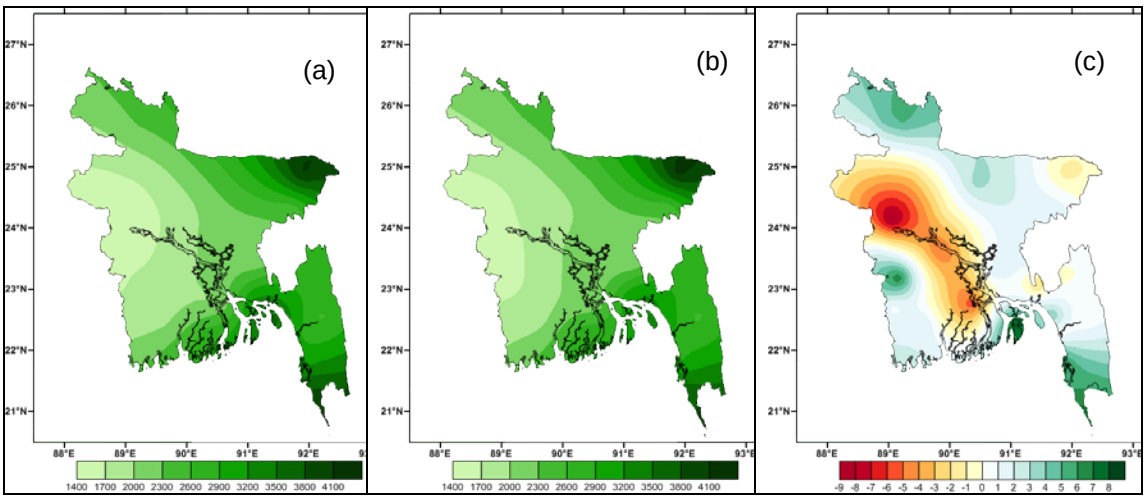

Fig. 6.2.6: Spatial distribution of Annual Rainfall (a) during 1981-2010, (b) during 1971-2000 and (c) deviation (%) of Annual Rainfall during 1981-2010 based on 1971-2000.

Distribution pattern of annual rainfall during 1981-2010, 1971-2000, and their deviations are shown in Fig. 6.2.6. It is very similar of distribution pattern of annual rainfall during 1971-2000 and 1981-2010 to each other. But the comparison between these two periods shows that the amounts of annual rainfall increased during 1981-2010 over extreme southeastern part, Hatiya-Sandwip, Rangpur and Jessore regions. But the amounts of rainfall decreased over Rajshahi division and the regions of Faridpur, Dhaka, Sylhet, Kushtia and Barisal. Substantial increments are found at Hatiya (+9%), Teknaf (+8%) and Jessore (+7%) but the considerable declines are found at Ishurdi (-9%), Barisal (-6%), Rajshahi and Faridpur (-5% each).

6.2.2 Temperature

For comparison monthly as well as seasonal normal minimum and maximum temperatures of Bangladesh are calculated using the period of 1971-2000 and 1981-2010. It is found that the monthly minimum temperature of Bangladesh during 1981-2010 increased in February, May to October and nearly equal in other months (Fig. 6.2.7a). Country average monthly maximum temperature slightly increased in February to September and nearly equal in all other months (Fig. 6.2.7b).

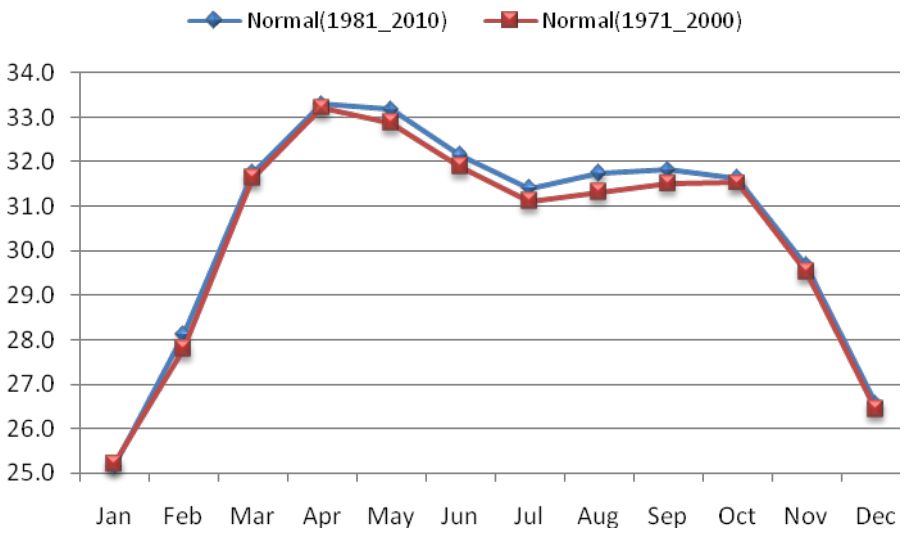

Fig. 6.2.7a: Country averaged maximum temperature of Bangladesh during 1971-2000 and 1981-2010

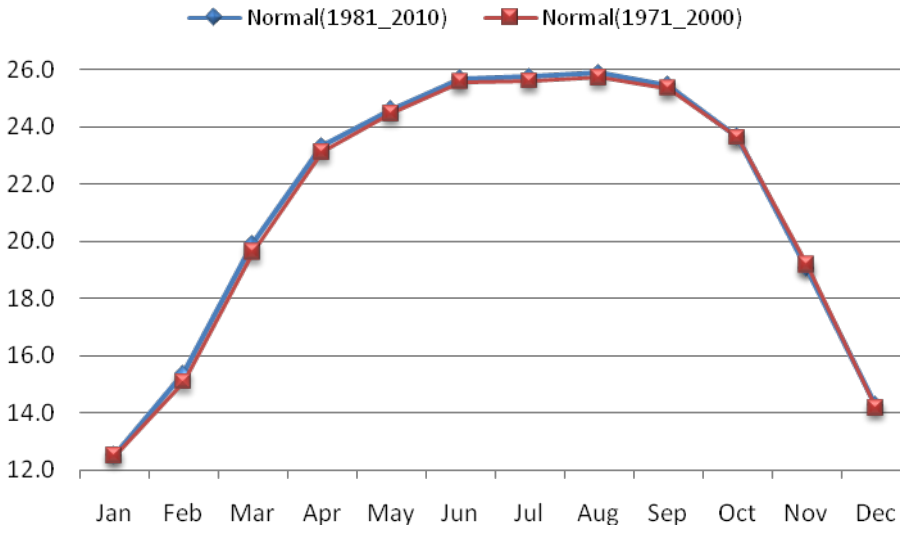

Fig. 6.2.7b: Country averaged minimum temperature of Bangladesh during 1971-2000 and 1981-2010

During pre-monsoon season the maximum temperature during 1981-2010 decreased over Rangpur & Rajshahi divisions and the regions of Tangail & Mymensingh but it increased over the remaining parts of Bangladesh (Fig. 6.2.8). Considerable increment of maximum temperature is at Cox's Bazar (+0.6°) and Sitakunda (+0.5°) but the significant decrement is at Bogra (-0.3°C). In pre-monsoon season, minimum temperature decreased in the period of 1981-2010 over Sandwip, Hatiya & Rangamati regions but it increased over the remaining parts of Bangladesh. Notable increment minimum temperature is found at Mongla (+0.8°C), Rangpur and Faridpur (+0.5°C each). But decrement of minimum temperature is found at Sandwip (-0.2°C).

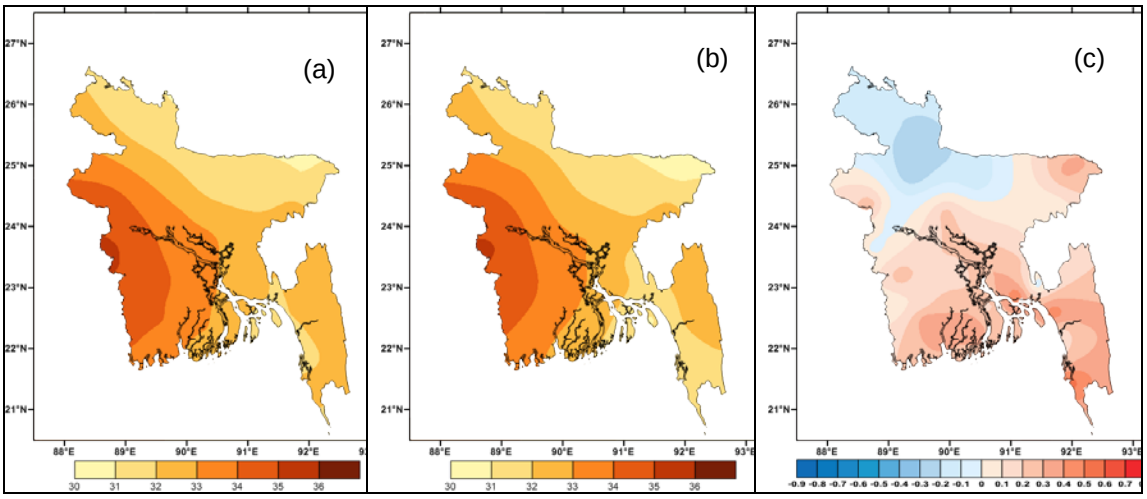

Fig. 6.2.8: Spatial distribution of pre-monsoon maximum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of pre-monsoon maximum temperature during 1981-2010 from 1971-2000.

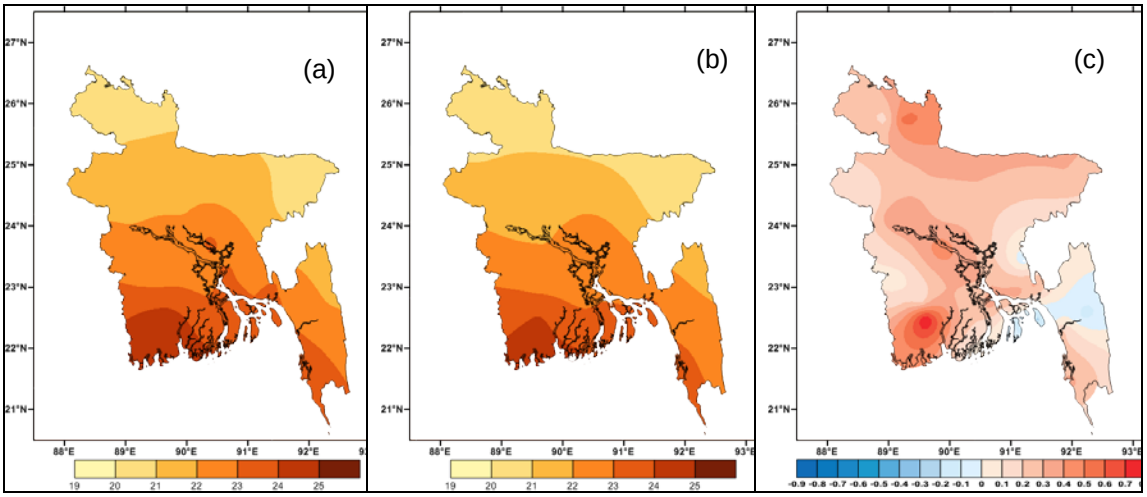

Fig. 6.2.9: Spatial distribution of pre-monsoon minimum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of pre-monsoon minimum temperature during 1981-2010 from 1971-2000.

During monsoon season, maximum temperatures increased all over Bangladesh during 1981-2010 than 1971-2000 (Fig.6.2.10). Notable signature of increment is found at Sylhet (+0.8°C), Rangamati and Maijdi Court (+0.6°C each). Similarly, minimum temperature during monsoon season of 1981-2010 increased over extreme northeastern part and south-central part of Bangladesh. It decreased over Sandwip & Rangamati regions (Fig.6.2.11). The minimum decrement is found at Sandwip & Rangamati (-0.1°C each) but the significant maximum increment is at Faridpur, Maijdi Court, Teknaf, Sylhet, Patuakhali and Bhola (+0.3°C each).

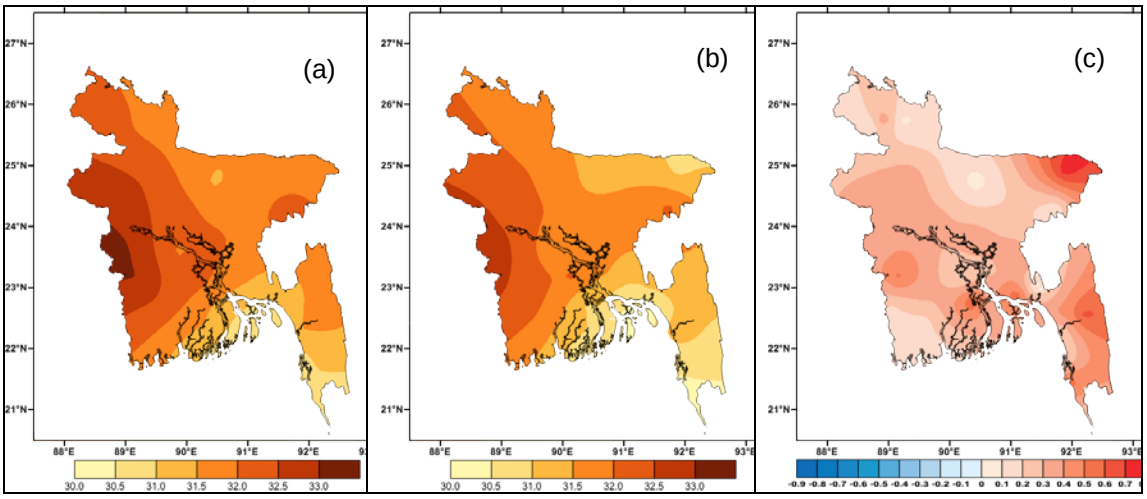

Fig. 6.2.10: Spatial distribution of monsoon maximum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of monsoon maximum temperature during 1981-2010 from 1971-2000.

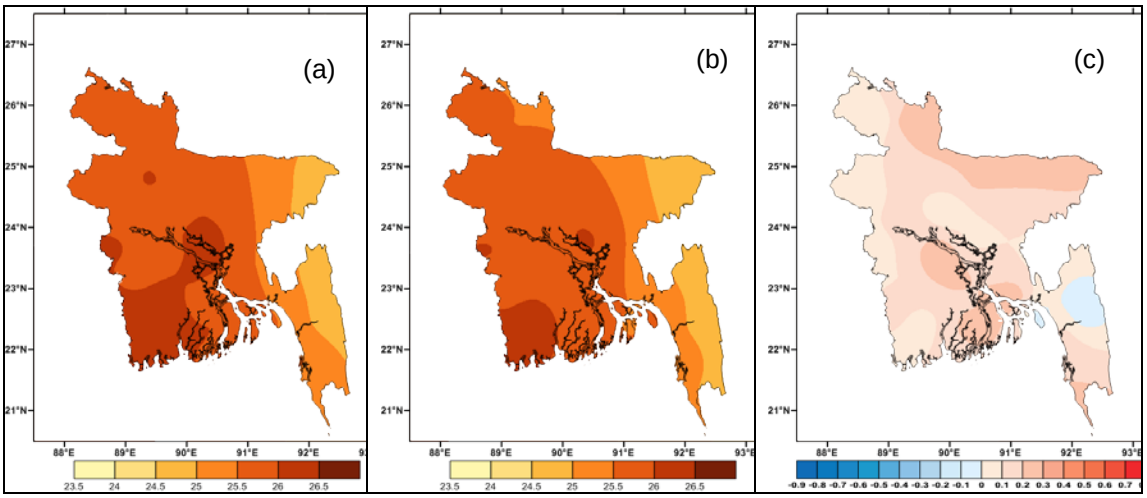

Fig. 6.2.11: Spatial distribution of monsoon minimum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of monsoon minimum temperature during 1981-2010 from 1971-2000.

During post-monsoon season maximum temperature decreased during 1981-2010 with respect to the period of 1971-2000 over western border region and extreme northwestern parts of the country but it increased over Chittagong, Sylhet & Barisal divisions. Minimum deviation is found at Chuadanga (-0.2°C) but the maximum deviation is at Cox's Bazar (+0.5°C). During post-monsoon season minimum temperature during 1981-2010 decreased over south and southwestern part of the country and the regions of Dhaka & Tangail but it increased over Sylhet division and the regions of Comilla, Faridpur and Rangpur. The lowest decrement of

minimum temperature is found at Rangamati (-0.7°C), Hatiya (-0.6°C) and Sandwip (-0.5°C) but the highest increment of maximum temperature is found at Sylhet (+0.3°C).

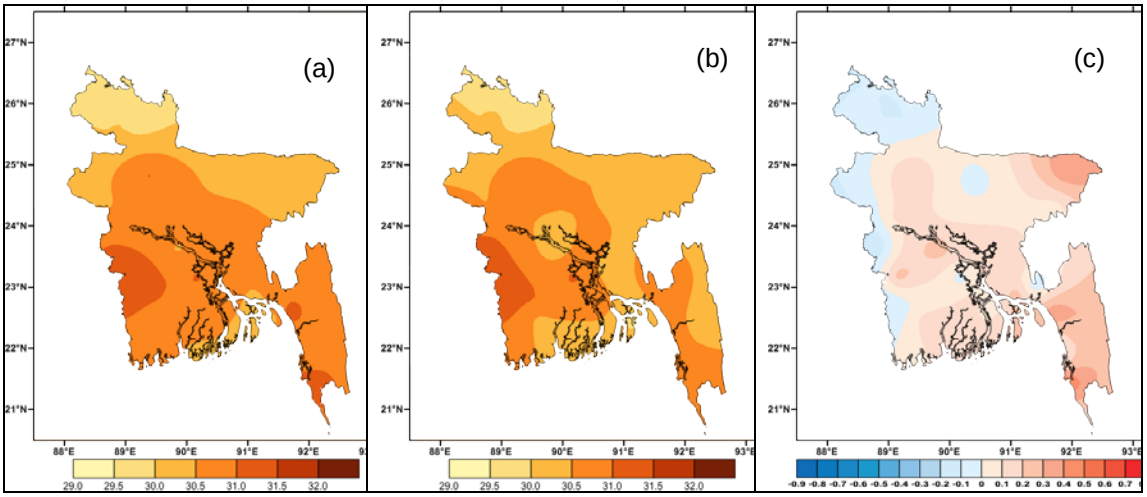

Fig. 6.2.12: Spatial distribution of post-monsoon maximum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of post-monsoon maximum temperature during 1981-2010 from 1971-2000.

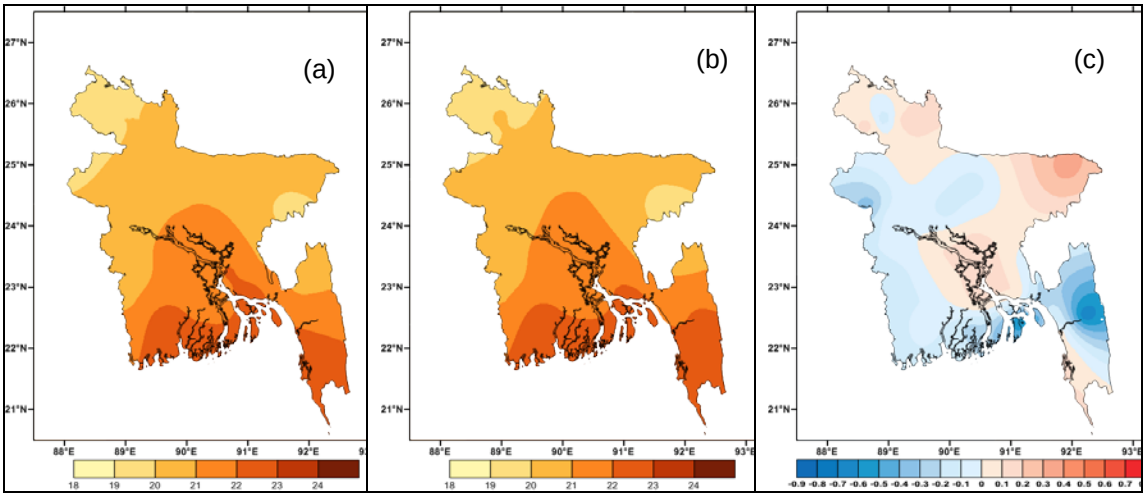

Fig. 6.2.13: Spatial distribution of post-monsoon minimum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of post-monsoon minimum temperature during 1981-2010 from 1971-2000.

During winter season, maximum temperature decreased over Rajshahi division and the regions of Dinajpur, Kushtia, Tangail & Mymensingh but it increased over Sylhet, Chittagong & Barisal divisions and the regions of Faridpur & Rangpur (Fig.6.2.14). The lowest decrement is found at Mymensingh & Dinajpur (-0.2°C) but the highest increment is found at Rangamati (+0.8°C), Hatiya, Cox's Bazar (+0.5°C each). Minimum temperature during winter season of 1981-2010 increased than 1971-2000 over northeastern and adjoining central parts of country but it declined over south-southeastern part of the country and the regions of Rajshahi and Dinajpur (Fig.6.2.15). Considerable increment is found at Srimangal and Dhaka (+0.6 ºC each), however considerable decline of -0.8ºC is found at Rangamati.

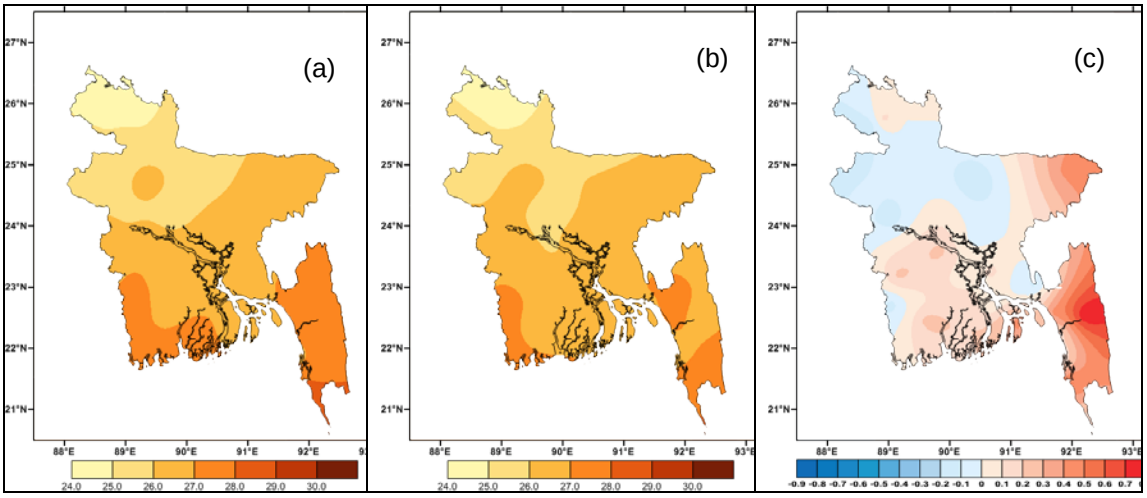

Fig. 6.2.14: Spatial distribution of winter maximum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of winter maximum temperature during 1981-2010 from 1971-2000.

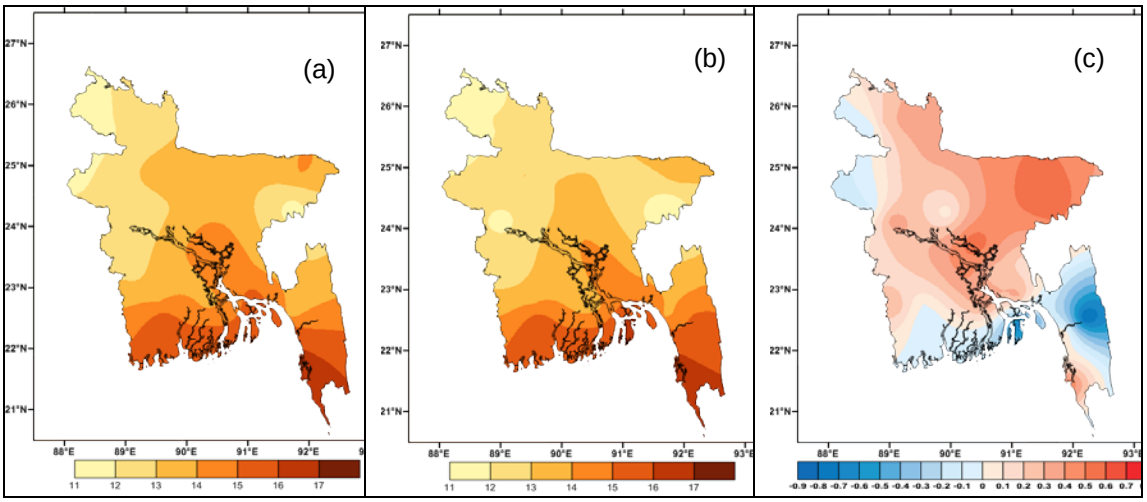

Fig. 6.2.15: Spatial distribution of winter minimum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of winter minimum temperature during 1981-2010 from 1971-2000.

Annual maximum temperature of 1981-2010 increased than that of 1971-2000 notably over southeastern and northeastern parts and then central and southern parts of Bangladesh. But it decreased over the regions of Dinajpur, Mymensingh and Feni (Fig.6.2.16). The highest increment of annual maximum temperature of 0.5ºC is found at Cox's Bazar, Rangamati and Sylhet but the lowest decline of -0.1ºC is found at Dinajpur, Mymensingh and Feni. Annual minimum temperature of 1981-2010 increased than that of 1971-2000 notably over northeastern and central parts of Bangladesh and their adjoining areas but it decreased noticeably over Rangamati region (Fig.6.2.17). The highest increment of minimum temperature of 0.3ºC is found at Dhaka, Faridpur, Madaripur, Maijdi Court, Cox's Bazar, Sylhet, Srimongal, Rangpur and Bhola. The lowest decline of -0.4ºC is found at Rangamati and then -0.3ºC at Hatiya and Sandwip.

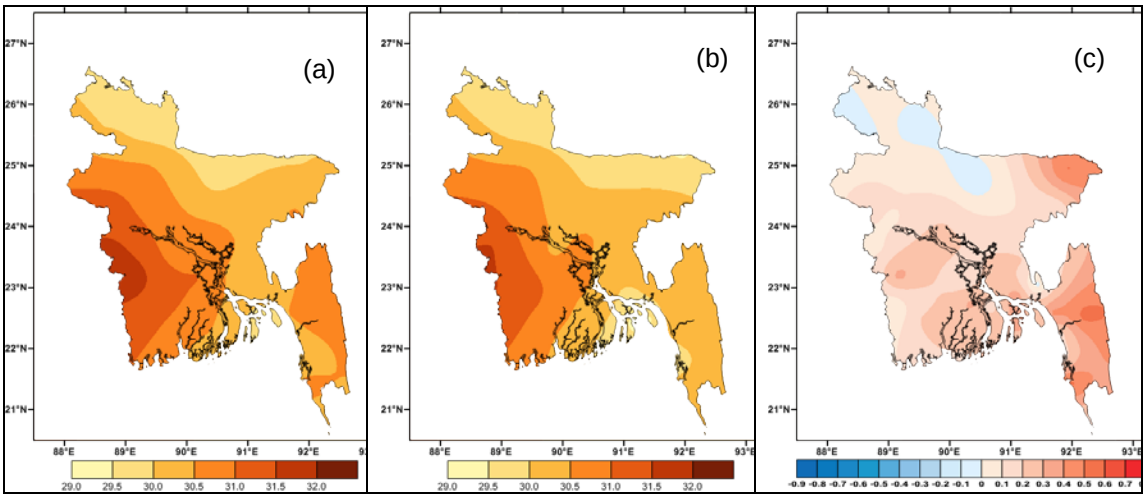

Fig. 6.2.16: Spatial distribution of annual maximum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of annual maximum temperature during 1981-2010 from 1971-2000.

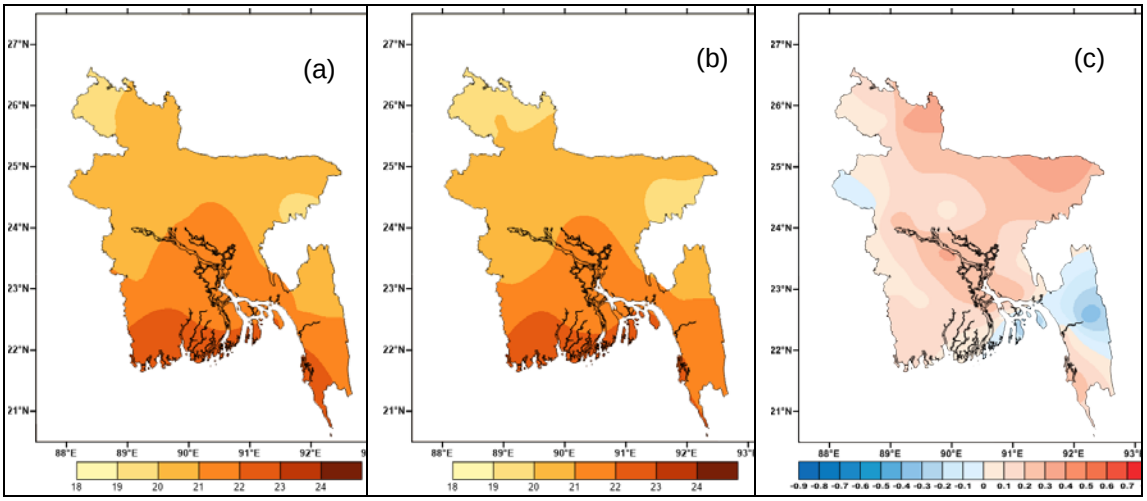

Fig. 6.2.17: Spatial distribution of annual minimum temperature (a) during 1981-2010, (b) during 1971-2000 and (c) deviation of annual minimum temperature during 1981-2010 from 1971-2000.

7 Conclusions

For better understanding the climate of Bangladesh the report prepared under this study has been divided broadly into six chapters namely- climate of Bangladesh, weather observation in Bangladesh, Bangladesh climate normal 1981-2010, frequency of common weather in Bangladesh, wind pattern in different seasons in Bangladesh and detected changes in Bangladesh climate. Brief conclusion of each of the chapter is presented below.

As per discussion in Chapter 1, there are four seasons in Bangladesh, such as winter or northeast monsoon (December-February), summer or pre-monsoon (March-May), southwest monsoon (June-September) and autumn or post-monsoon (October-November). It is evident that the mean temperature in winter season is in the range of 18-22^{o}C. Sometimes minimum temperature goes below than 10°C and cold wave situation occurs over western and northern part of the country. Only 2% of the annual total rainfall occurs in this season mainly due to the presence of Western Disturbance. The mean temperature of Bangladesh during the pre-monsoon months varies between 23-30^{o}C. The maximum temperature ranging from 36-40^{o}C attains in the northwestern and southwestern districts. During the pre-monsoon season nor'westers frequently occur at many places over Bangladesh. Occurrence of heavy to very heavy rainfall associated with severe thunderstorm in the northeastern part of Bangladesh and adjoining northeastern states of India, leads to flash flood situation in the northeastern part of Bangladesh. Only19 % of the total annual rainfall occurs in this season. This season is also characterized by cyclogenesis in the Bay of Bengal. Southwest monsoon starts over of Bangladesh in the month of June. The normal date of onset of southwest monsoon in the southeastern districts of the country is 2nd June which engulfs the whole country during 1st half of June. Generally rain with widespread cloud coverage and high humidity are the characteristics of monsoon season. Due to occasional heavy to very heavy rainfall landslides occur in the hilly regions of southeastern part of the country. More than 71% of the total annual rainfall occurs in this season. Flood situation occurs almost

every year in Bangladesh during this season. In the post-monsoon season, only 8% of the annual total rainfall occurs. Cyclonic disturbances form over the Bay of Bengal during this season. They move initially westward, then north-westward and sometimes re-curve and make landfall to Bangladesh coast.

Current and previous observational facilities of BMD are briefly discussed in Chapter 2. A total of 46 synoptic stations are in operation under BMD. In addition, BMD operates 10 Pilot Balloon stations and 4 Rawinsonde stations. As per the record 18 Observatories were established during British Rule (before 1947), 12 observatories were established during Pakistan Rule (1947-1971), 12 Observatories were established after the independence of Bangladesh (during 1971-1991) and 12 observatories are established in 2015. The data collected before 1948 are not available at BMD.

Station wise monthly normal of maximum temperature, minimum temperature, dry bulb temperature and rainfall for the period of 1981-2010 are tabulated and analyzed in Chapter 3. An updated climate normal has therefore been prepared.

In chapter 4, maximum and minimum temperature days and rainy with different ranges are examined. The extreme events are well recognized. This information will certainly fulfil the demands of sector specific user.

Seasonal wind pattern at each station locations are prepared and explained in Chapter 5. Seasonal wind distribution has clearly identified in this section. The analysis will definitely contribute a lot for wind energy generation in Bangladesh.

Climate change related information like seasonal and annual temperature (maximum and minimum) and rainfall trends, their spatial variations are calculated and discussed in Chapter 6. Monthly, seasonal and annual distributions and their trends of these parameters for the period 1981-2010 are compared with the period of 1971-2000. It is found that the temperature (maximum and minimum) increased almost every station during 1981-2010 than in 1971-2000. Comparison depicts the country averaged rainfall decreased in February, April, May, August and November but increased in July, September and October and remained nearly unchanged during the remaining months of the year. Negative deviations of rainfall during monsoon season are found over Rajshahi division and some parts of Dhaka, Sylhet and Chittagong divisions but positive deviations are found over the remaining parts of the country. Comparison between these two periods also shows that the amounts of annual rainfall increased during 1981-2010 over extreme southeastern part, Hatiya-Sandwip, Rangpur and Jessore regions. But the amounts

of rainfall decreased over Rajshahi division and the regions of Faridpur, Dhaka, Sylhet, Kushtia and Barisal.

Acknowledgements

Authors, in favour of BMD are grateful to Norwegian Ministry of Foreign Affairs for supporting the capacity building project entitled 'Institutional Support and Capacity Building for Mitigation of Weather and Climate Hazards in Bangladesh'. Authors, in favour of BMD express their special gratitude to Mr. Hans Olav Hygen, Norwegian Meteorological Institute for providing valuable suggestions and extending his full supports and cooperation in this study. Special thanks are due to him to learn 'R' programming which has enhanced in this work.

Authors owe a deep sense of gratitude to Mr. Md. Sadekul Alam, Assistant Director, BMD and Mr. S. M. Quamrul Hassan, Meteorologist, BMD for their prompt inspirations, timely suggestions with kindness, enthusiasm and dynamism which enabled to complete the report.

Authors are extremely thankful to Mr. Md. Abdul Mannan, Meteorologist, Bangladesh Meteorological Department, for writing, constructive comments and valuable suggestions on the Draft Report, which helped improve the quality of this Final Report.

Grateful acknowledgement is due to Miss. Nayma Baten, Meteorologist, Climate Division, BMD for providing the necessary climate data whenever required to prepare the report.

Finally, authors are happy express gratitude to Mr. Shamsuddin Ahmed, Director, BMD for giving valuable ideas. Authors also wish to extend thanks to staffs of BMD, who provide assistance.

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APPENDIX:

Table 1: Number of minimum temperature days at Bhola, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	
6° - 8°	4	-	-	-	-	-	-	-	-	-	-	-	4	
8° - 10°	89	8	-	-	-	-	-	-	-	-	-	7	104	29
10° - 15°	686	315	11	-	-	-	-	-	-	-	30	561	1603	
15° - 20°	146	417	293	42	9	-	-	-	1	24	483	350	1765	
20° - 25°	3	107	569	446	343	161	100	77	158	581	380	9	2934	
Greater than 25°	-	-	57	410	578	733	810	849	740	325	7	-	4509	

Table 2: Number of minimum temperature days at Bogra, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	3	-	-	-	-	-	-	-	-	-	-	-	3	
6° - 8°	29	4	-	-	-	-	-	-	-	-	-	-	33	
8° - 10°	149	21	-	-	-	-	-	-	-	-	-	20	190	14
10° - 15°	675	464	71	-	-	-	-	-	-	-	68	635	1913	
15° - 20°	74	340	497	114	20	1	-	-	1	53	580	273	1953	
20° - 25°	-	18	350	634	557	203	107	65	211	644	250	-	3039	
Greater than 25°	-	-	9	152	352	689	823	864	688	233	2	-	3812	

Table 3: Number of minimum temperature days at Chandpur, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	
6° - 8°	-	-	-	-	-	-	-	-		-	-	-	0	
8° - 10°	20	2	-	-	-	-	-	-		-	-	2	24	82
10° - 15°	699	270	14	-	1	-	-	-		-	12	394	1390	
15° - 20°	211	503	338	52	13	-	-	-	1	20	409	508	2055	
20° - 25°	-	72	532	491	412	161	110	68	137	515	444	11	2953	
Greater than 25°	-	-	46	357	503	733	820	862	753	372	5	-	4451	

Table 4: Number of minimum temperature days at Comilla, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	
6° - 8°	19	1	-	-	-	-	-	-	-	-	-	1	21	
8° - 10°	120	9	-	-	-	-	-	-	-	-		43	172	33
10° - 15°	695	365	38	-	-	-	-	-	-	-	83	645	1826	
15° - 20°	93	408	429	114	18	2	-	-	-	34	504	227	1829	
20° - 25°	2	58	455	573	517	293	208	164	307	709	312	12	3610	
Greater than 25°	-	-	7	210	392	647	720	765	592	187	-		3520	

Table 5: Number of minimum temperature days at Cox's Bazar, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	
6° - 8°	-	-	-	-	-	-	-	-	-	-	-	-	0	
8° - 10°	-	-	-		-		-		-	-	-	-	0	94
10° - 15°	334	75	-		-		-		-	-	1	112	522	
15° - 20°	587	654	219	25	-		2		-	3	287	730	2507	
20° - 25°	4	116	677	495	339	259	239	209	282	557	570	82	3829	
Greater than 25°	-	-	25	360	584	626	680	717	613	365	35	-	4005	

Table 6: Number of minimum temperature days at Dinajpur, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	12	-	-	-	-	-	-	-	-	-	-	-	12	
6° - 8°	85	16	-	-	-	-	-	-	-	-	-	10	111	
8° - 10°	287	74	1	-	-	-		-	-	-	2	84	448	13
10° - 15°	523	552	201	19	10	4	9	-	-	-	210	736	2264	
15° - 20°	23	197	551	228	52	26	12	-	1	145	592	98	1925	
20° - 25°		8	176	620	642	274	143	107	309	669	96	-	3044	
Greater than 25°		-	1	32	224	593	764	822	589	115	-	-	3140	

Table 7: Number of minimum temperature days at Faridpur , Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	
6° - 8°	17	-	-	-	-	-	-	-	-	-	-	-	17	
8° - 10°	112	19	-	-	-	-	-	-	-	-	-	23	154	27
10° - 15°	689	396	44	-	-	-	-	-	-	-	37	546	1712	
15° - 20°	111	387	430	87	24	-	-	-	-	17	487	354	1897	
20° - 25°	1	44	424	523	474	222	161	111	196	563	373	1	3093	
Greater than 25°	-	-	32	284	429	672	766	819	702	350	2	-	4056	

Table 8: Number of minimum temperature days at Feni, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	
6° - 8°	5	-	-	-	-	-	-	-	-	-	-	-	5	
8° - 10°	79	4	-	-	-		-	-	-	-	-	5	88	102
10° - 15°	712	327	29	1	-		-	-	-	-	47	591	1707	
15° - 20°	134	437	350	86	23		-	-	-	25	502	321	1878	
20° - 25°	-	78	478	512	440	301	301	269	354	710	346	13	3802	
Greater than 25°	-	-	38	301	465	587	577	661	546	195	4	-	3374	

Table 9: Number of minimum temperature days at Hatiya, Duration: 1982-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	
6° - 8°	-	-	-	-	-	-	-	-	-	-	-	-	0	
8° - 10°	8	1		-		-	-	-	-	-		-	9	178
10° - 15°	478	157	7	1		-	-	-	-	-	7	221	871	
15° - 20°	256	432	218	26	6	-	-	-	-	7	284	475	1704	
20° - 25°	2	88	491	389	296	188	198	172	189	391	388	17	2809	
Greater than 25°	-	-	28	288	442	528	515	568	501	314	11	-	3195	

Table 10: Number of minimum temperature days at Ishurdi, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	28	2	-	-	-	-	-	-	-	-	-	-	30	357
6° - 8°	115	13	-	-	-	-	-	-	-	-	-	22	150	
8° - 10°	228	70		-	-		-	-	-	-	1	188	487	
10° - 15°	478	499	154	2	-		-	-	-	-	150	620	1903	
15° - 20°	49	222	474	122	25		-	-	-	93	535	140	1660	
20° - 25°		7	249	510	471	193	115	71	202	598	182	-	2598	
Greater than 25°		2	22	234	402	670	780	839	691	200	1	-	3841	

Table 11: Number of minimum temperature days at Jessore , Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	4	1	-	-	-	-	-	-	-	-	-	-	5	64
6° - 8°	69	4	-	-	-	-	-	-	-	-	-	13	86	
8° - 10°	231	34		-	-	-	-	-	-	-	1	93	359	
10° - 15°	514	383	67	2	-	-	-	-	1	-	138	656	1761	
15° - 20°	77	375	424	77	12	-	-	-	1	86	534	157	1743	
20° - 25°	-	37	413	485	399	183	105	94	189	626	226	1	2758	

Table 12: Number of minimum temperature days at Khepupara, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	100
6° - 8°	-	-	-	-	-	-	-	-	-	-	-	-	0	
8° - 10°	15	3	-	-	-	-	-	-	-	-	-	5	23	
10° - 15°	648	206	6	-	-	-	-	-	-	-	8	389	1257	
15° - 20°	265	505	217	33	7	6	-	-	1	5	407	490	1936	
20° - 25°	2	133	594	332	278	145	168	138	172	521	473	15	2971	
Greater than 25°	-	-	113	535	636	710	735	792	727	403	11	-	4662	

Table 13: Number of minimum temperature days at Kutubdia, Duration: 1985-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	56
6° - 8°	-	-	-	-	-	-	-	-		-	-	-	0	
8° - 10°	-	-	-	-		-	-		-	-	-	-	0	
10° - 15°	403	98	1	-	-	-	-	-	-	-	-	125	627	
15° - 20°	396	533	216	27	10	4	-	-	-	3	294	604	2087	
20° - 25°	2	103	573	393	248	196	206	134	176	415	437	45	2928	
Greater than 25°	-	-	15	358	523	580	600	671	604	366	15	1	3733	

Table 14: Number of minimum temperature days at Madaripur, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	671
6° - 8°	11	1	-	-	-	-	-	-		-	-	-	12	
8° - 10°	118	16	-	-	-	-	-	-	-	-	-	14	148	
10° - 15°	649	355	41	2	-	-	-	-	-	-	37	533	1617	
15° - 20°	121	387	370	66	14	-	-	-		22	452	322	1754	
20° - 25°	1	57	446	483	421	177	105	63	118	526	356	4	2757	
Greater than 25°	-	-	45	311	464	669	782	741	669	315	2	-	3998	

Table 15: Number of minimum temperature days at MaijdiCourt, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	220
6° - 8°	-	1	-	-	-	-	-	-	-	-	-	-	1	
8° - 10°	14	3	6	-	-	-	-	-	-	-	-	-	23	
10° - 15°	629	263	31	1	-	-	-	-	-	-	8	259	1191	
15° - 20°	253	460	315	65	10	2	3	-	-	2	345	644	2099	
20° - 25°	2	97	519	472	347	194	151	138	190	499	528	27	3164	
Greater than 25°	-	1	32	332	542	637	767	792	709	428	19	-	4259	

Table 16: Number of minimum temperature days at Mymensingh , Duration: 1983-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	4	-	-	-	-	-	-	-	-	-	-	-	4	145
6° - 8°	22	-	-	-	-	-	-	-	-	-		3	25	
8° - 10°	125	7	-	-	-	-	-	-	-	-		29	161	
10° - 15°	597	372	75	-	2	-	-	-	-	-	76	602	1724	
15° - 20°	86	358	440	125	34	1	-	-	-	61	525	233	1863	
20° - 25°	-	24	306	567	536	241	107	97	230	600	238	1	2947	
Greater than 25°	-	1	16	118	276	598	761	770	610	207	1	-	3358	

Table 17: Number of minimum temperature days at Patuakhali , Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	19
6° - 8°	-	-	-	-	-	-	-	-	-	-	-	1	1	
8° - 10°	31	2	-	-	-	-	-	-	-	-	-	1	34	
10° - 15°	653	235	13	-	-	-	-	-	-	4	9	418	1332	
15° - 20°	244	494	261	40	3	2	2		3	15	422	496	1982	
20° - 25°	2	116	612	459	312	152	121	82	140	522	459	13	2990	
Greater than 25°	-	-	43	399	615	746	805	840	757	387	8	-	4600	

Table 18: Number of minimum temperature days at Rangamati, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	202
6° - 8°	6	2		-	-	-	-	-	-	-	-	-	8	
8° - 10°	65	12	-	-		-	-	-	-	-		2	79	
10° - 15°	610	354	54	1	-	-	-	-	-	-	13	374	1406	
15° - 20°	202	406	421	115	27	1	-	-		29	436	500	2137	
20° - 25°	-	44	419	604	545	420	465	452	554	720	420	23	4666	
Greater than 25°	-	1	4	180	357	473	464	478	342	151	8	-	2458	

Table 19: Number of minimum temperature days at Rangpur, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total missing
Less than 6°	3	1	-	-	-	-	-	-	-	-	-	-	4	116
6° - 8°	70	8	-						-			2	80	
8° - 10°	222	71	1	-	-	-	-	-	-	-		44	338	
10° - 15°	588	539	193	3	-	-	-	-	-	-	121	711	2155	
15° - 20°	37	220	570	236	35	1	1		2	96	646	173	2017	
20° - 25°	-	7	162	634	687	323	145	92	292	723	132	-	3197	
Greater than 25°	-	-	3	25	207	572	752	807	573	111	-	-	3050	

Table 20: Number of minimum temperature days at Sandwip, Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	232
6° - 8°	-	-	-	-	-	-	-	-		-	-	-	0	
8° - 10°	8	2	-	-	-	-		-	-		1	-	11	
10° - 15°	499	169	9	-		1	-		-	-	13	247	938	
15° - 20°	329	471	232	35	6	-	-	-	-	5	320	537	1935	
20° - 25°	-	119	477	355	323	198	245	199	218	487	456	28	3105	
Greater than 25°	-	-	118	387	497	611	592	613	575	342	18	-	3753	

Table 21: Number of minimum temperature days at Sitakunda , Duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	204
6° - 8°	28	3	-	-	-	-	-	-	-			1	32	
8° - 10°	138	31	-	-	-	-	-	-			-	30	199	
10° - 15°	632	415	72	-	-	-	-	-		-	74	623	1816	
15° - 20°	131	316	353	70	8	-	-	-	-	41	507	261	1687	
20° - 25°	1	65	445	485	422	241	238	187	289	689	309	15	3386	
Greater than 25°	-	-	29	315	467	613	661	731	611	200	5	-	3632	

Table 22: Number of minimum temperature days at Srimangal, Duration: 1982-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
Less than 6°	31	5	-	-	-	-	-	-	-	-	-	2	38	406
6° - 8°	150	37	-	-	-	-	-	-	-	-	-	19	206	
8° - 10°	255	126	6	-	-	-	-	-	-	-	4	153	544	
10° - 15°	354	466	215	2	-	-	-	-	-	-	237	567	1841	
15° - 20°	46	156	430	230	50	1	-	1		130	464	91	1599	
20° - 25°	1	24	243	546	651	376	280	227	468	688	134	6	3644	
Greater than 25°	-	-	4	62	165	463	600	611	357	50	1	-	2313	

Table 23: Number of minimum temperature days at Teknaf, duration: 1981-2010

Minimum temp	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
Less than 6°	-	-	-	-	-	-	-	-	-	-	-	-	0	206
6° - 8°	-	-	-	-	-	-	-	-	-	-	-	-	0	
8° - 10°	-	-	-	-	-	-	-	-	-	-	-	-	0	
10° - 15°	438	135	9	1	-	-	-	-	-	-	3	153	739	
15° - 20°	483	633	319	27	2	-	-	1		9	302	687	2463	
20° - 25°	4	79	586	519	315	293	304	306	302	541	530	87	3866	
Greater than 25°	-	-	16	352	585	600	580	602	566	349	32	1	3683	

Table 24: Number of maximum temperature days at Bogra, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater				3	10	1							14	
38° - 40°			2	43	32	4		1					82	
36° - 38°			25	150	116	50	7	17	16	4			385	52
30° - 36°		134	662	599	650	734	812	835	766	814	548		6554	
25° - 30°	475	591	223	97	114	100	110	75	113	106	339	732	3075	
20° - 25°	376	111	13	2	5				4	6	12	151	680	
Less than 20°	61	8	1								1	17	88	

Table 25: Number of maximum temperature days at Chandpur, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°						1			1				2	
36° - 38°			13	18	38	12		1					82	15
30° - 36°		175	758	809	822	747	774	820	771	806	378	3	6863	
25° - 30°	501	583	148	69	66	133	156	109	121	119	504	751	3260	
20° - 25°	388	87	11	4	3				1	5	19	170	688	
Less than 20°	41	2										5	48	

Table26:Number of maximum temperature days at Chuadanga, Duration: 1989-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater			3	51	46	9							109	
38° - 40°		1	22	128	97	30	1	1					280	
36° - 38°		2	117	187	176	100	15	10	16	10			633	14
30° - 36°	6	181	463	274	342	482	615	641	598	593	357	4	4556	
25° - 30°	331	381	69	16	17	37	49	30	44	72	293	538	1877	
20° - 25°	306	55	7						1	7	10	132	518	
Less than 20°	39	1										8	48	

Table 27: Number of maximum temperature days at Bhola, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°					1								1	
36° - 38°			22	30	21	4			1	2			80	234
30° - 36°	2	232	747	786	815	694	694	786	739	798	473	15	6781	
25° - 30°	617	526	119	50	60	165	200	141	158	126	411	801	3374	
20° - 25°	257	58	10	1	2					4	16	109	457	
Less than 20°	20	3										4	27	

Table 28: Number of maximum temperature days at Comilla: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°				1									1	
36° - 38°			4	23	48	9	1	9	7	2			103	75
30° - 36°	6	142	689	781	776	726	732	801	781	802	454	19	6709	
25° - 30°	578	608	216	83	98	152	193	119	111	118	430	778	3484	
20° - 25°	278	82	17		5	1			1	7	16	116	523	
Less than 20°	37	1										6	44	

Table 29:Number of maximum temperature days at Cox's Bazar, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°													0	
36° - 38°	1		18	18	13	3			3	4			60	151
30° - 36°	36	324	770	829	862	652	622	706	739	801	639	121	7101	
25° - 30°	790	493	123	33	45	223	293	212	141	111	243	776	3483	
20° - 25°	91	24	8	2		1				3	10	32	171	
Less than 20°	1												1	

Table 30: Number of maximum temperature days at Dinajpur, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater			1	10	10	2							23	
38° - 40°			1	47	33	10							91	
36° - 38°			27	137	89	54	8	18	2				335	34
30° - 36°		57	586	512	629	713	775	808	733	760	266	1	5840	
25° - 30°	281	592	288	182	160	115	146	101	156	147	613	627	3408	
20° - 25°	512	189	24	4	5			3	7	22	19	260	1045	
Less than 20°	131	7									1	42	181	

Table31:Number of maximum temperature days at Faridpur, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater			1	8	3								12	
38° - 40°			10	66	25					1			102	
36° - 38°		1	80	201	133	46		2	2	3			468	29
30° - 36°		196	697	559	696	748	808	832	775	795	341	1	6448	
25° - 30°	471	551	129	56	66	103	118	94	119	118	540	707	3072	
20° - 25°	411	95	12	6	2	1			1	11	19	207	765	
Less than 20°	47	3										11	61	

Table32:Number of maximum temperature days at Feni, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°													0	
36° - 38°		1	16	26	32	5	1	3	5	2			91	158
30° - 36°	8	222	695	785	780	657	579	712	720	771	467	27	6423	
25° - 30°	662	563	169	78	107	219	286	187	168	151	413	794	3797	
20° - 25°	235	57	14	9	6	5			4	5	19	103	457	
Less than 20°	25	2										4	31	

Table33:Number of maximum temperature days at Hatiya, Duration: 1982-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°					1								1	
36° - 38°			6	3	7					2			18	197
30° - 36°		131	532	648	665	507	445	550	541	564	247	7	4837	
25° - 30°	469	484	199	46	70	209	267	185	149	146	435	615	3274	
20° - 25°	265	63	7							1	8	90	434	
Less than 20°	8												8	

Table34:Number of maximum temperature days at Ishurdi, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater			5	74	41	5	1						126	
38° - 40°			22	149	101	25	1	1					299	
36° - 38°		1	135	207	180	113	11	10	6	3			666	378
30° - 36°	1	164	592	376	510	654	817	851	799	780	382		5926	
25° - 30°	412	535	129	46	60	64	68	53	84	101	470	697	2719	
20° - 25°	436	111	12	3	1				2	10	16	189	780	
Less than 20°	49	5										11	65	

Table35:Number of maximum temperature days at Jessore, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater			2	38	28	3							71	
38° - 40°			22	141	99	29	1			1			293	
36° - 38°		5	139	287	277	151	14	19	19	12			923	39
30° - 36°	16	312	670	394	491	646	832	852	804	837	557	24	6435	
25° - 30°	600	464	87	22	23	69	79	58	73	71	328	786	2660	
20° - 25°	284	62	7	2					2	9	14	111	491	
Less than 20°	29	4									1	9	43	

Table36:Number of maximum temperature days at Khepupara, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°													0	
36° - 38°			17	27	16	5			1	2			68	107
30° - 36°	8	290	782	827	466	697	673	741	714	790	422	15	6425	
25° - 30°	685	506	119	44	48	160	226	188	184	134	465	793	3552	
20° - 25°	231	50	6	2					1	4	13	90	397	
Less than 20°	3												3	

Table37:Number of maximum temperature days at Kutubdia, Duration: 1985-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°					2								2	
36° - 38°			3	4	7	1			3	3			21	101
30° - 36°	1	54	481	723	709	576	519	599	639	670	404	20	5395	
25° - 30°	583	634	317	50	63	200	284	204	129	105	335	717	3621	
20° - 25°	215	46	5	2		1				3	8	38	318	
Less than 20°	3												3	

Table38:Number of maximum temperature days at Madaripur, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater			1										1	
38° - 40°			2	13	6	1	1	1		1			25	
36° - 38°			48	180	160	52	1	2	3	1			447	332
30° - 36°	7	263	748	633	680	720	815	834	763	796	476	10	6745	
25° - 30°	584	488	89	39	49	96	105	58	96	93	378	757	2832	
20° - 25°	307	64	10	3	4					8	16	127	539	
Less than 20°	30	2										4	36	

Table39: Number of maximum temperature days at Maijdee Court, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°				2	1	1							4	
36° - 38°			6	43	82	19		3	2	5			160	132
30° - 36°	2	164	738	781	748	648	648	725	718	771	367	6	6316	
25° - 30°	550	579	156	67	95	195	282	202	179	148	517	776	3746	
20° - 25°	316	66	13	6	2				1	4	15	146	569	
Less than 20°	23	3										2	28	

Table 40: Number of maximum temperature days at Mogla, Duration: 1989-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater				3	1								4	
38° - 40°			2	29	24	1							56	
36° - 38°		4	48	168	166	59	5	2	2	2			456	9
30° - 36°	11	230	566	434	465	529	581	607	568	570	306	7	4874	
25° - 30°	412	349	59	21	23	25	96	73	90	103	344	590	2185	
20° - 25°	239	36	7	3						6	9	83	383	
Less than 20°	19	1										2	22	

Table41:Number of maximum temperature days at Mymensingh, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°				1									1	
36° - 38°			9	47	30	11	2	4	6	3			112	17
30° - 36°	1	73	587	642	679	699	730	800	707	768	384	9	6079	
25° - 30°	468	620	304	196	205	187	197	126	181	142	496	725	3847	
20° - 25°	415	146	29	14	16				4	15	17	178	834	
Less than 20°	46	5										16	67	

Table 42: Number of maximum temperature days at Patuakhali, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°				6	2								8	
36° - 38°		3	30	62	77	14	1	1	2	2			192	36
30° - 36°	8	273	795	787	798	722	707	759	738	786	411	11	6795	
25° - 30°	629	511	95	39	48	162	217	165	157	129	471	802	3425	
20° - 25°	280	59	8	1	1				1	7	15	113	485	
Less than 20°	13	1										2	16	

Table 43: Number of maximum temperature days at Rangamati, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater				1	1								2	
38° - 40°			2	16	8	2		1					29	
36° - 38°			51	113	95	14		2					275	110
30° - 36°	9	295	725	686	721	695	683	775	784	817	406	22	6618	
25° - 30°	637	477	106	74	100	181	243	152	116	106	474	798	3464	
20° - 25°	245	47	11	7	3		1			6	18	108	446	
Less than 20°	8										2	2	12	

Table 44: Number of maximum temperature days at Satkhira, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater			2	4	9								15	
38° - 40°			16	77	55	17		1		1			167	
36° - 38°		1	82	251	326	156	9	5	8	3			841	27
30° - 36°	15	303	735	533	512	659	823	849	777	829	534	33	6602	
25° - 30°	613	479	87	21	19	64	97	75	113	89	353	761	2771	
20° - 25°	282	60	7	3	1				1	8	13	132	507	
Less than 20°	19	4										4	27	

Table 45: Number of maximum temperature days at Sandwip, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°						1							1	
36° - 38°			4	8	9		1	7	1	1			31	484
30° - 36°	5	125	475	671	718	564	474	553	618	683	324	28	5238	
25° - 30°	544	566	350	93	100	231	361	250	173	146	477	714	4005	
20° - 25°	273	68	8	5	1	1				1	9	90	456	
Less than 20°	11											1	12	

Table 46: Number of maximum temperature days at Sitakunda, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°			2	3	3				2				10	
36° - 38°			27	32	39	6	1	2	7	12	1		127	20
30° - 36°	38	312	699	781	795	680	636	755	763	799	570	101	6929	
25° - 30°	740	496	189	81	90	197	291	172	128	117	315	775	3591	
20° - 25°	146	38	13	3	2	2				1	14	53	272	
Less than 20°	6	1										1	8	

Table 47: Number of maximum temperature days at Srimangal, Duration: 1982-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°			2	6	1		1	1					11	
36° - 38°			37	85	38	12	5	13	15	1			206	283
30° - 36°	6	194	660	642	652	699	771	790	718	706	330	31	6199	
25° - 30°	635	544	176	97	155	122	117	64	103	123	477	711	3324	
20° - 25°	324	78	22	7	20	5	1	1	4	17	29	110	618	
Less than 20°	34	3										13	50	

Table 48: Number of maximum temperature days at Teknaf, Duration: 1981-2010

Max temp(°C)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing
40° and greater													0	
38° - 40°			1		1								2	
36° - 38°		1	9	5	4	2		1					22	31
30° - 36°	34	268	688	862	832	579	505	579	707	820	595	100	6569	
25° - 30°	825	530	196	25	64	311	392	350	193	105	293	785	4069	
20° - 25°	40	20	5	3		1				3	9	14	95	
Less than 20°														

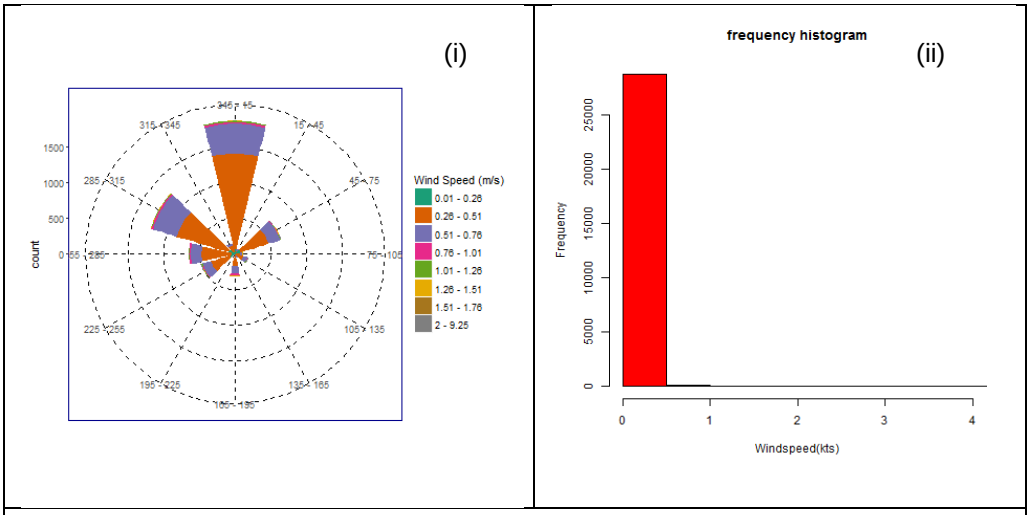


Fig. 1. Distribution of (i) wind direction and (ii) wind speed of Bhola during Winter Season

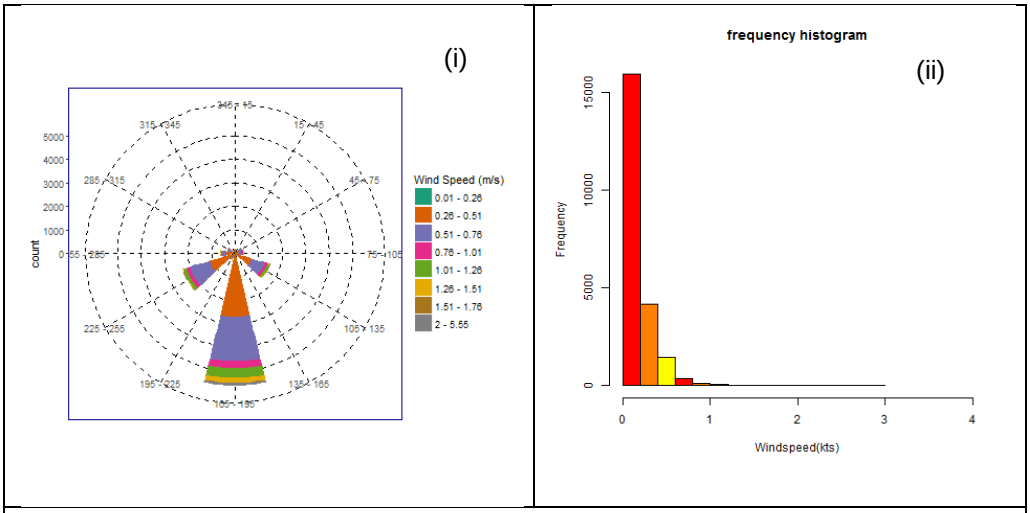


Fig.2. Distribution of (i) wind direction and (ii) wind speed of Bhola during Pre-monsoon Season

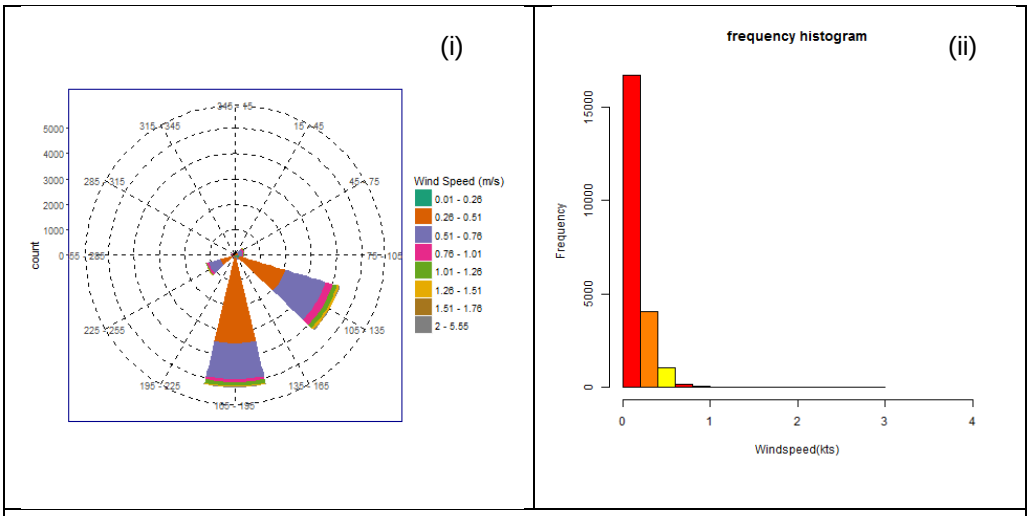


Fig.3. Distribution of (i) wind direction and (ii) wind speed of Bhola during Monsoon Season

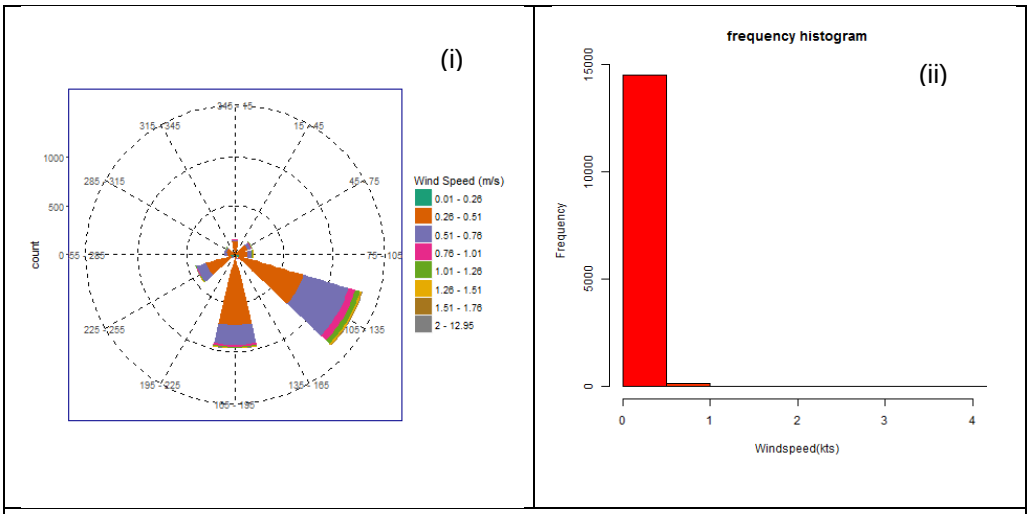


Fig.4. Distribution of (i) wind direction and (ii) wind speed of Bhola during Post-monsoon Season

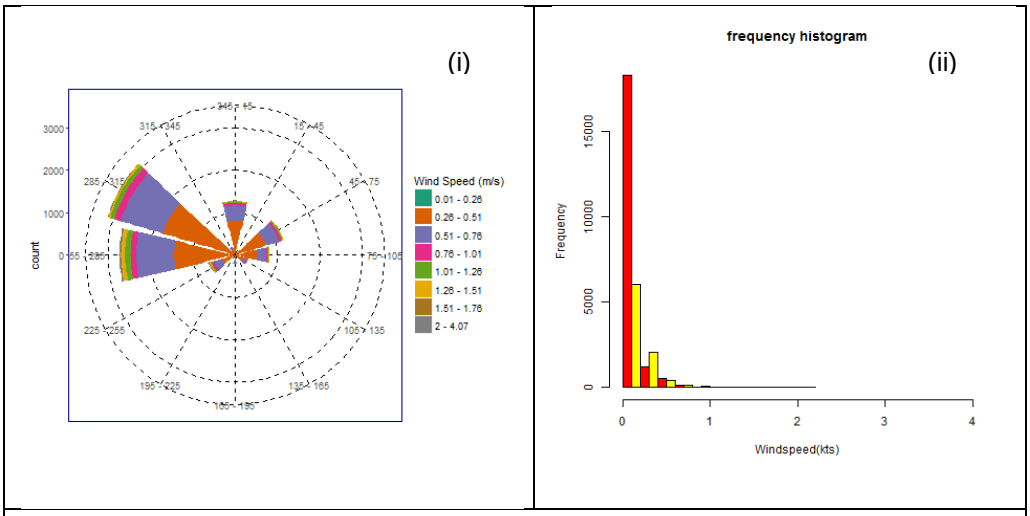


Fig.5. Distribution of (i) wind direction and (ii) wind speed of Bogra during Winter Season

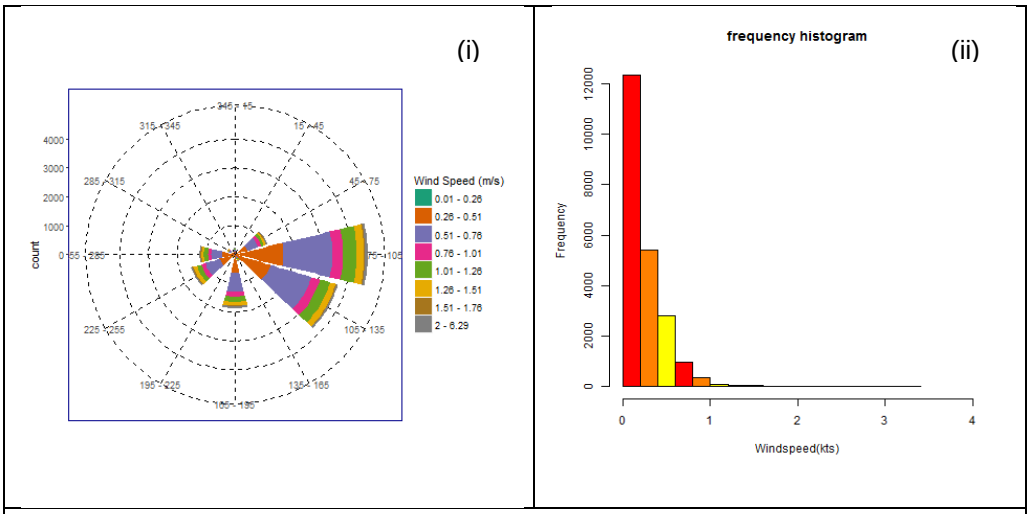


Fig.6. Distribution of (i) wind direction and (ii) wind speed of Bogra during Pre-monsoon Season

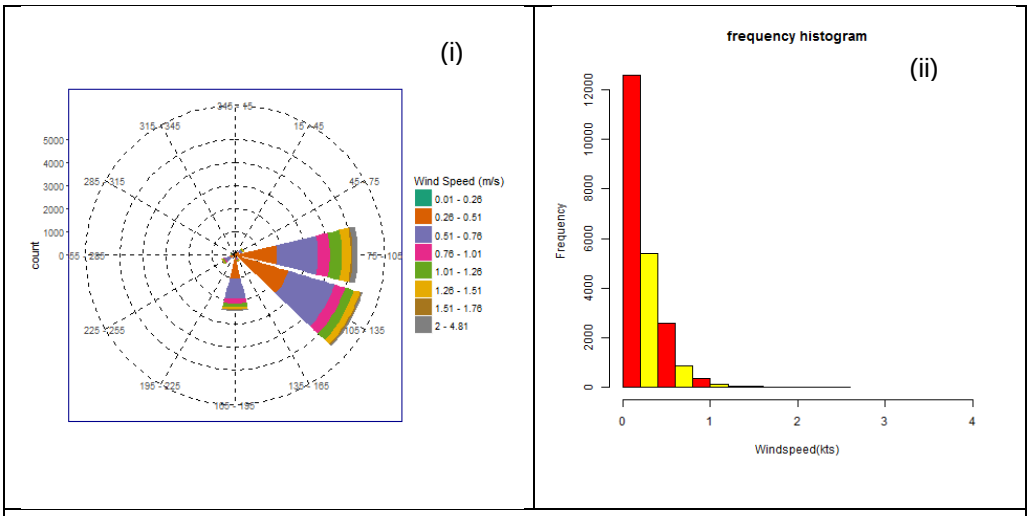


Fig.7. Distribution of (i) wind direction and (ii) wind speed of Bogra during Monsoon Season

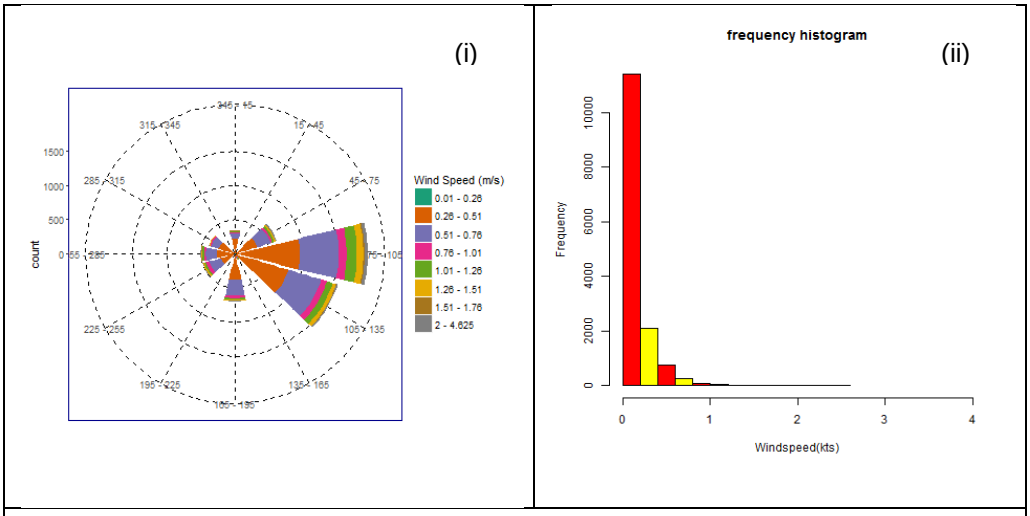


Fig.8. Distribution of (i) wind direction and (ii) wind speed of Bogra during Post-monsoon Season

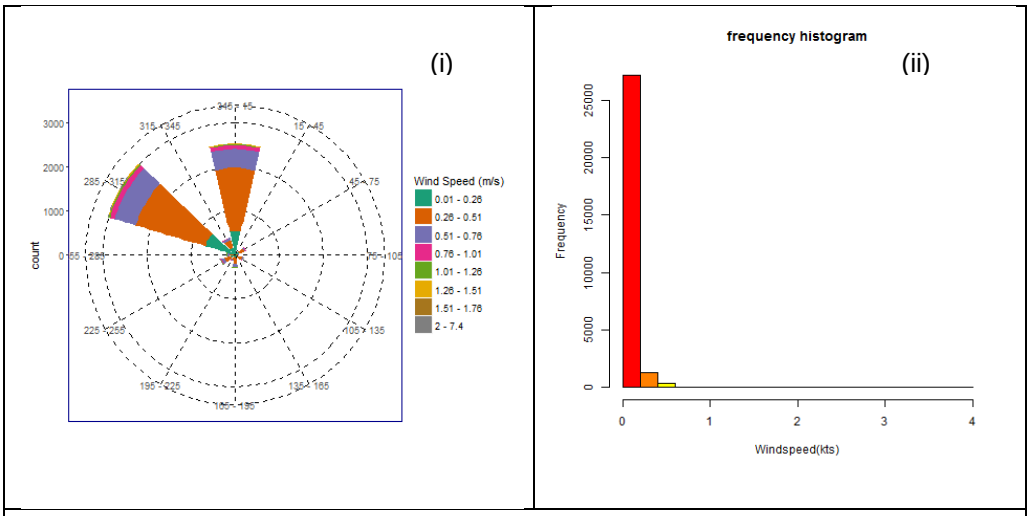


Fig.9. Distribution of (i) wind direction and (ii) wind speed of Chandpur during Winter Season

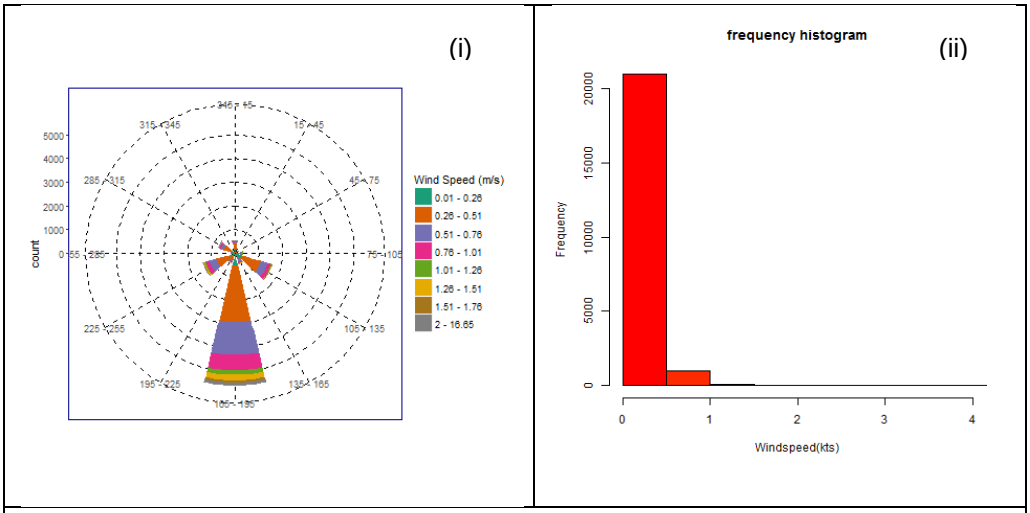


Fig.10. Distribution of (i) wind direction and (ii) wind speed of Chandpur during Pre-monsoon Season

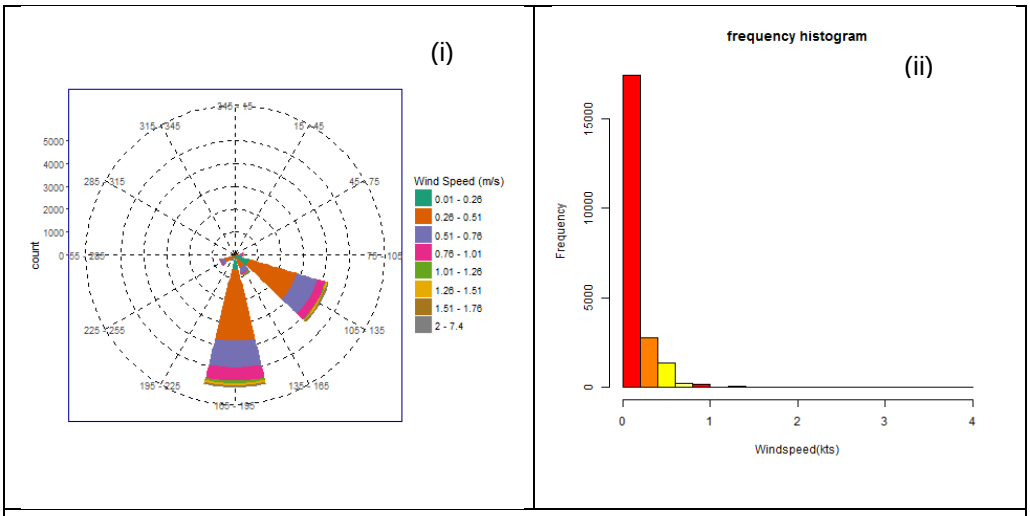


Fig.11. Distribution of (i) wind direction and (ii) wind speed of Chandpur during Monsoon Season

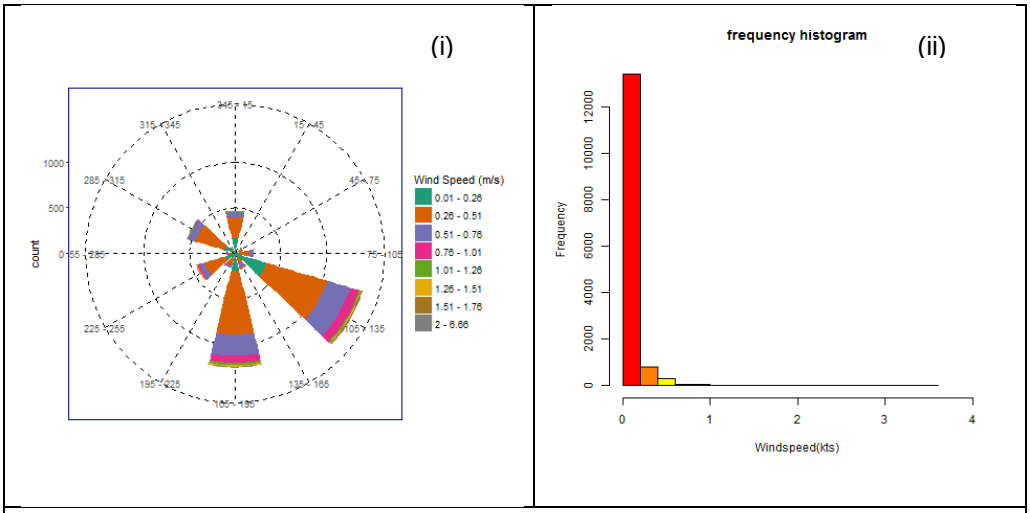


Fig.12. Distribution of (i) wind direction and (ii) wind speed of Chandpur during Post-monsoon Season

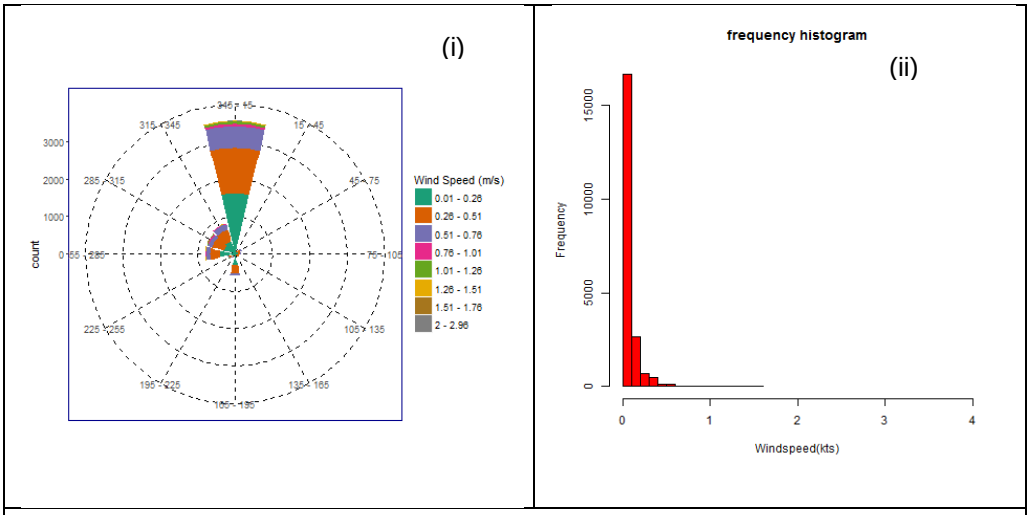


Fig.13. Distribution of (i) wind direction and (ii) wind speed of Chuandanga during Winter Season

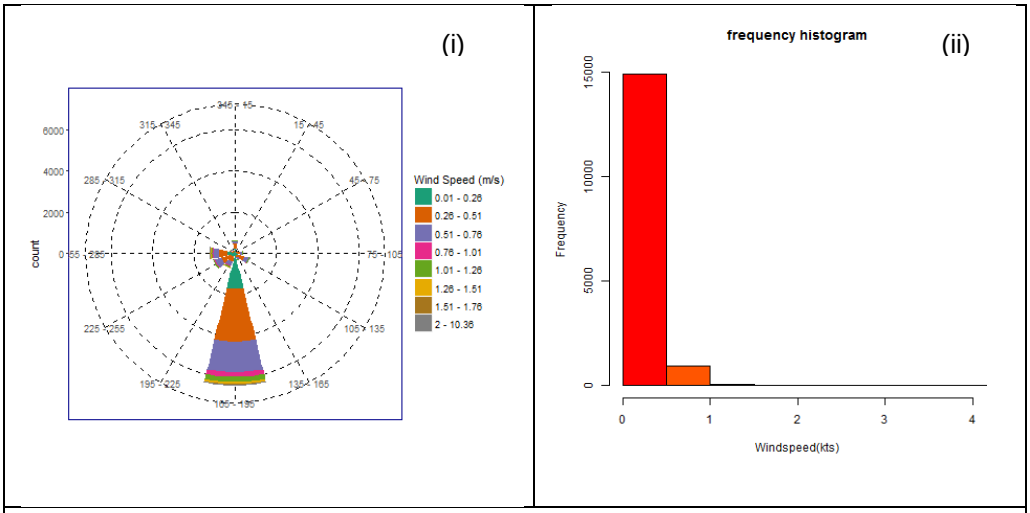


Fig.14. Distribution of (i) wind direction and (ii) wind speed of Chuandanga during Pre-monsoon Season

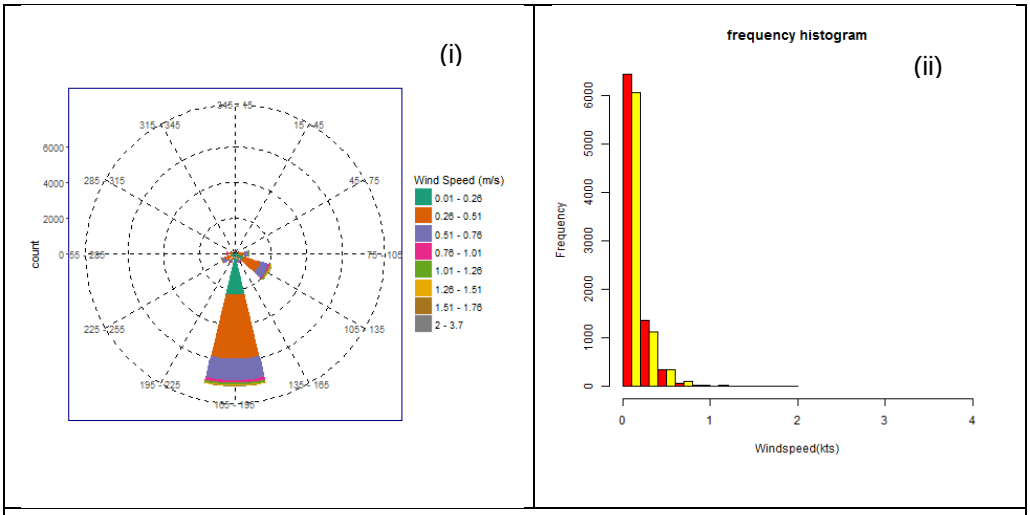


Fig.15. Distribution of (i) wind direction and (ii) wind speed of Chuadanga during Monsoon Season

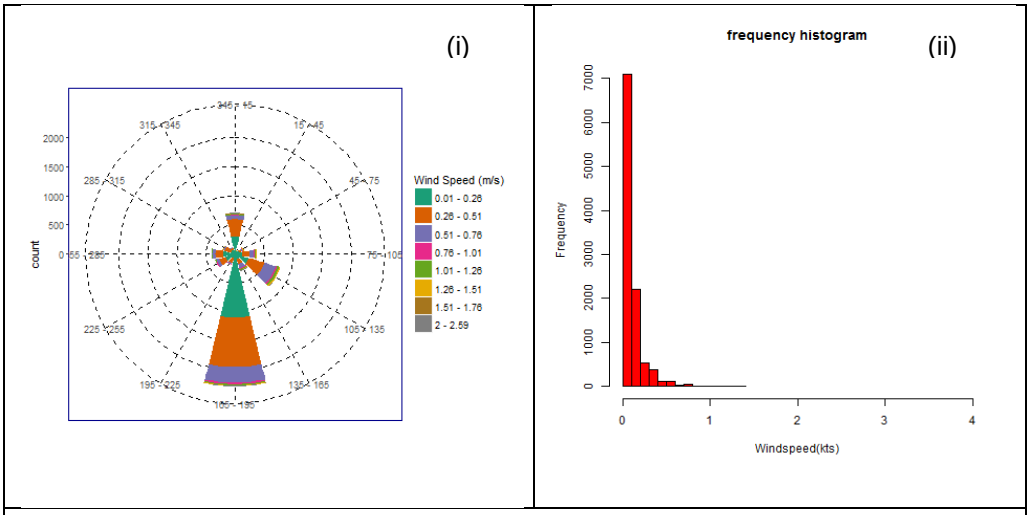


Fig.16. Distribution of (i) wind direction and (ii) wind speed of Chuadanga during Post-monsoon Season

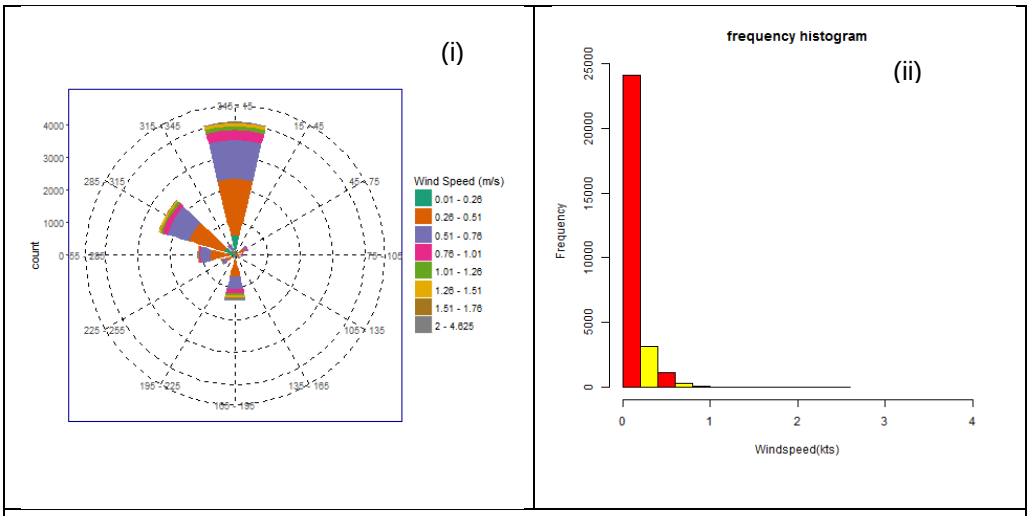


Fig. 17. Distribution of (i) wind direction and (ii) wind speed of Comilla during Winter Season

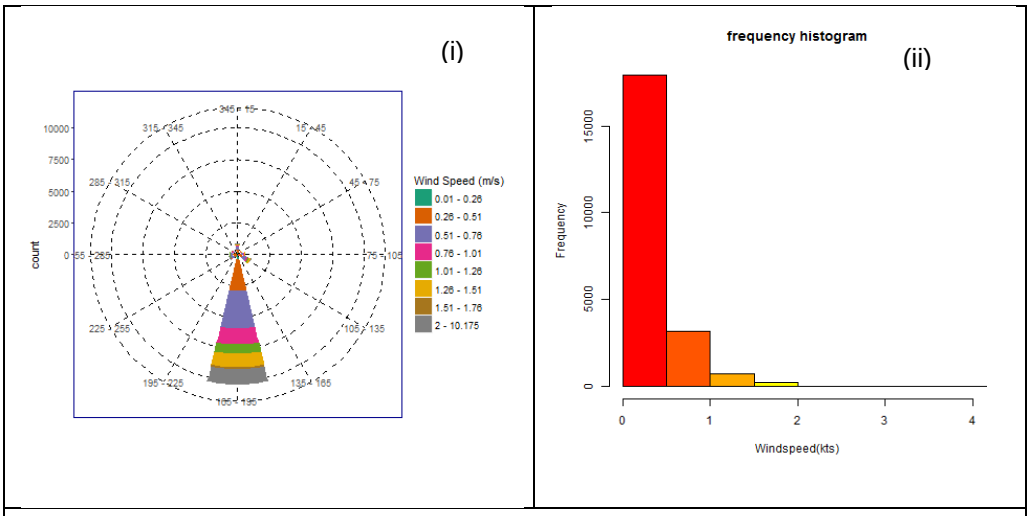


Fig.18. Distribution of (i) wind direction and (ii) wind speed of Comilla during Pre-monsoon Season

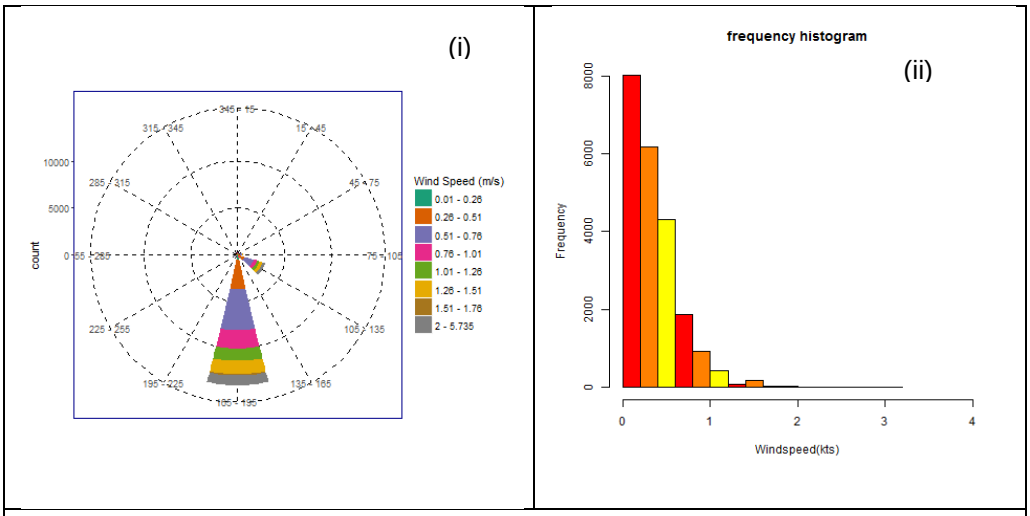


Fig.19. Distribution of (i) wind direction and (ii) wind speed of Comilla during Monsoon Season

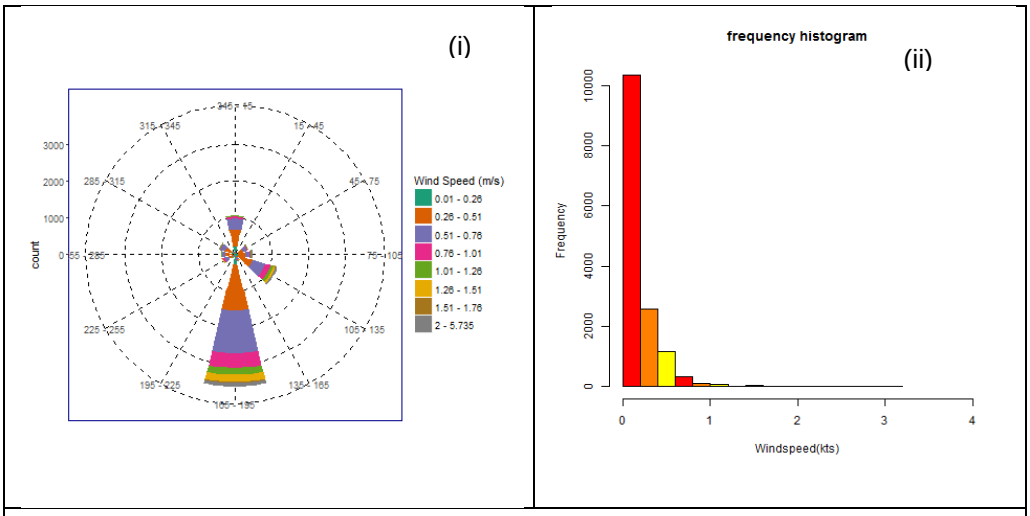


Fig.20. Distribution of (i) wind direction and (ii) wind speed of Comilla during Post-monsoon Season

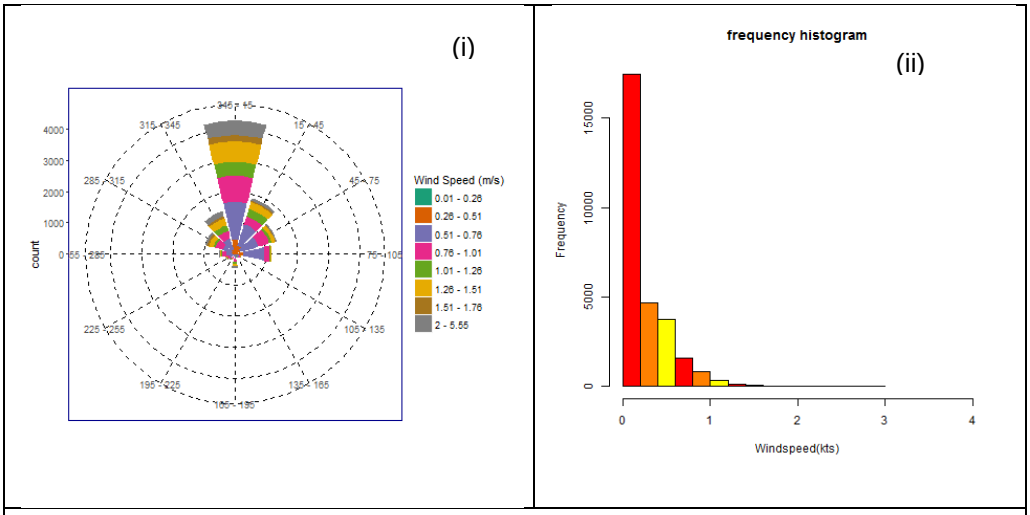


Fig.21. Distribution of (i) wind direction and (ii) wind speed of Coxsbazar during Winter Season

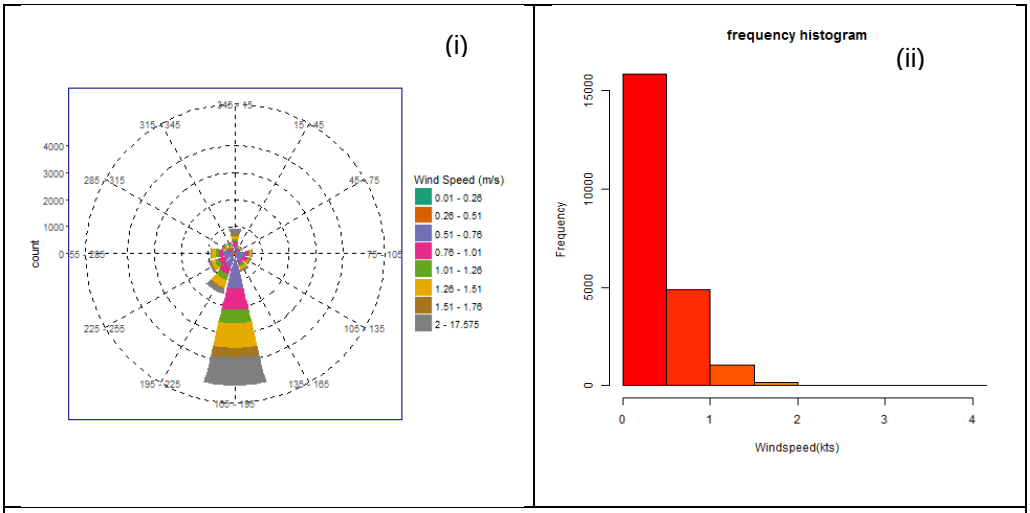


Fig.22. Distribution of (i) wind direction and (ii) wind speed of Coxsbazar during Pre-monsoon Season

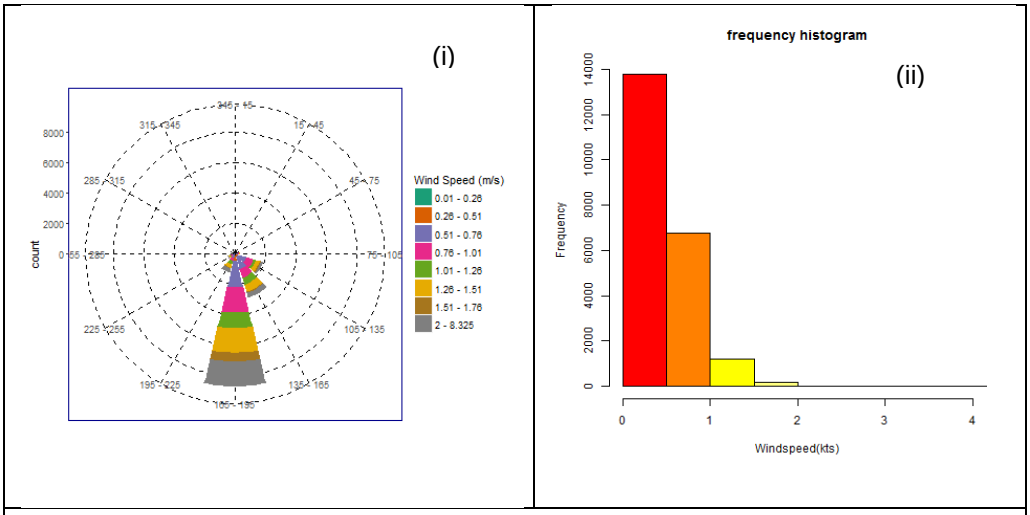


Fig.23. Distribution of (i) wind direction and (ii) wind speed of Coxsbazar during Monsoon Season

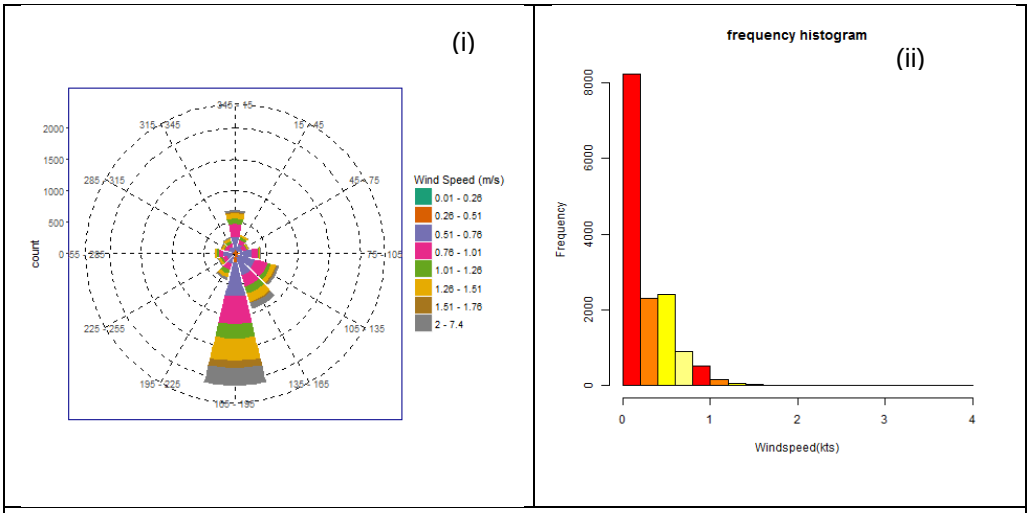


Fig.24. Distribution of (i) wind direction and (ii) wind speed of Coxsbazar during Post-monsoon Season

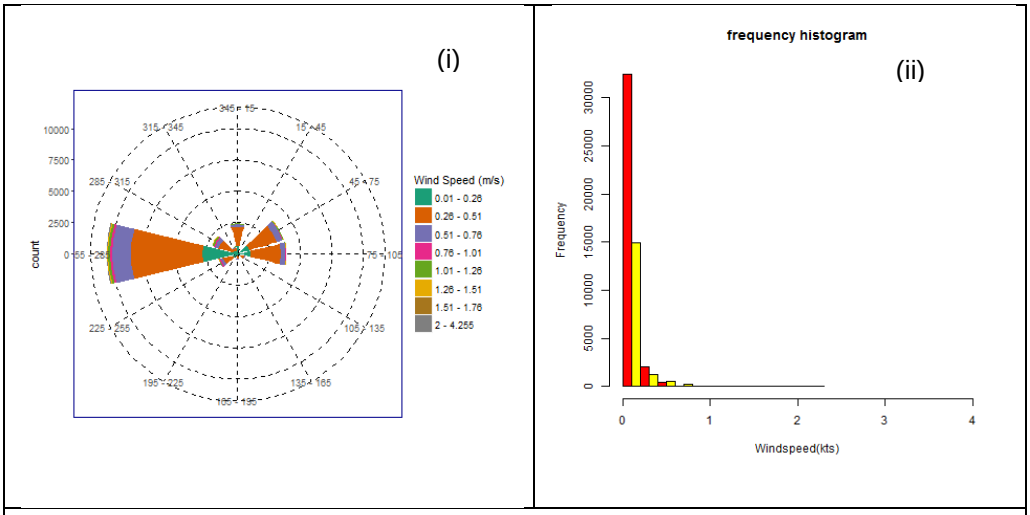


Fig.25. Distribution of (i) wind direction and (ii) wind speed of Dinajpur during Winter Season

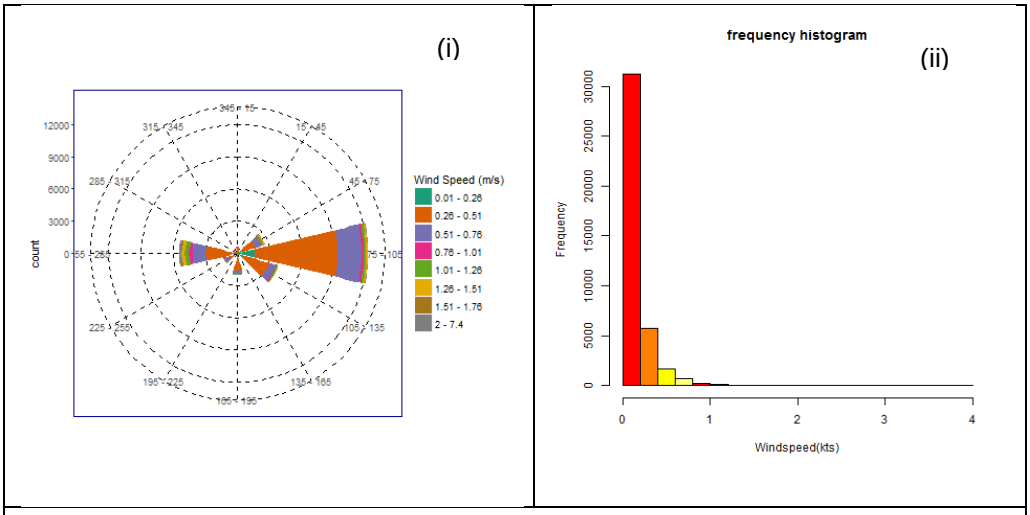


Fig.26. Distribution of (i) wind direction and (ii) wind speed of Dinajpur during Pre-monsoon Season

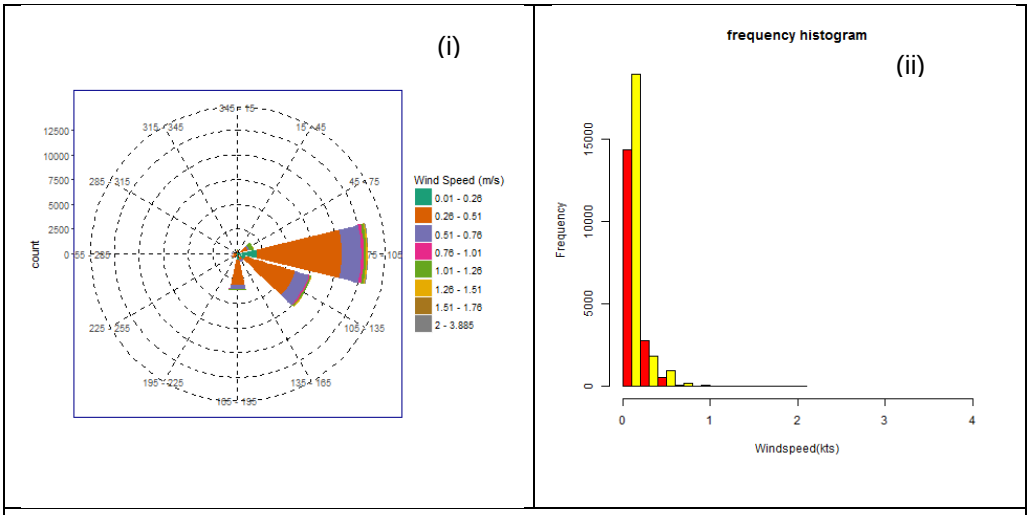


Fig.27. Distribution of (i) wind direction and (ii) wind speed of Dinajpur during Monsoon Season

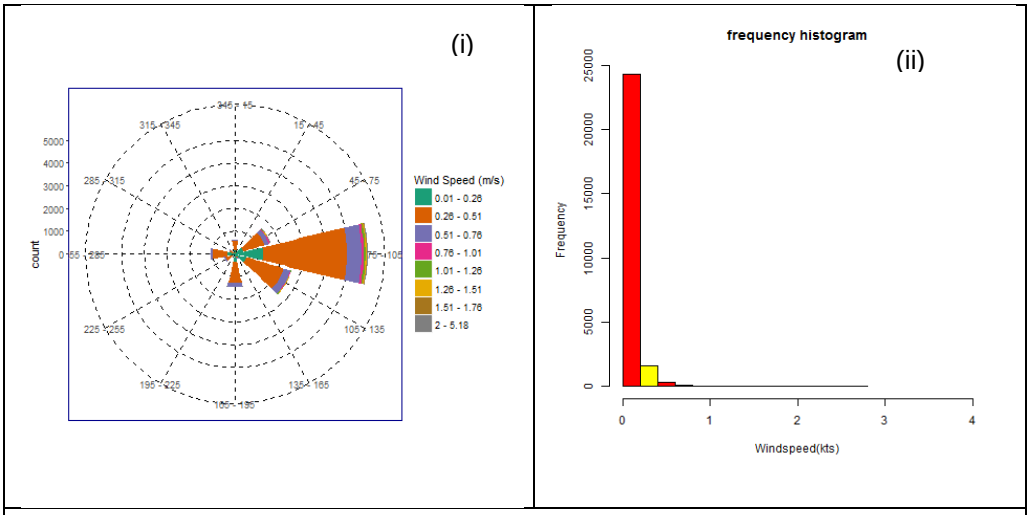


Fig.28. Distribution of (i) wind direction and (ii) wind speed of Dinajpur during Post-monsoon Season

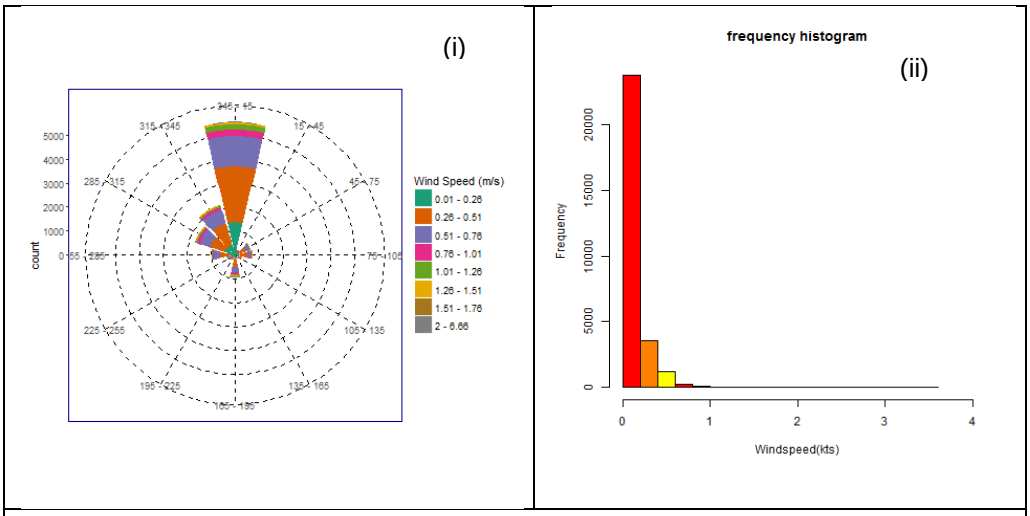


Fig.29. Distribution of (i) wind direction and (ii) wind speed of Faridpur during Winter Season

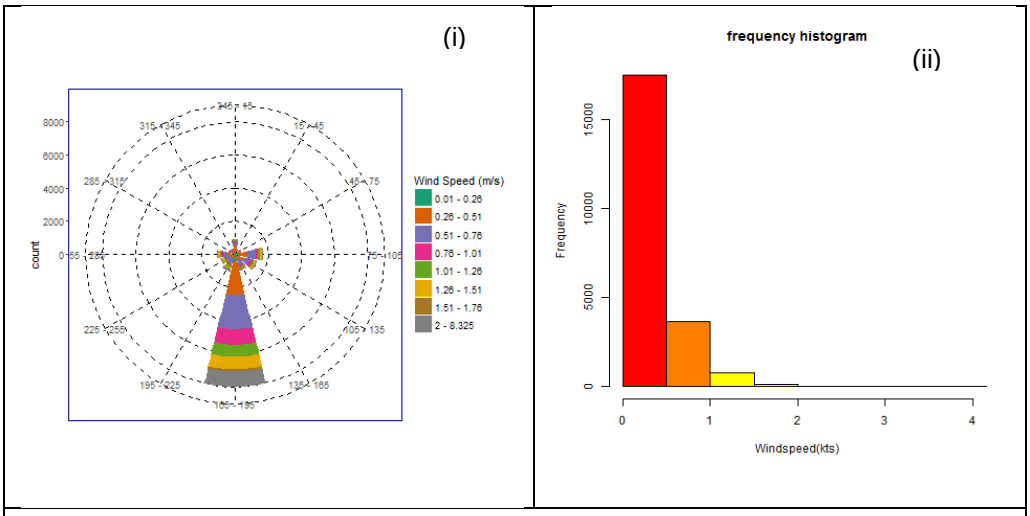


Fig.30. Distribution of (i) wind direction and (ii) wind speed of Faridpur during Pre-monsoon Season

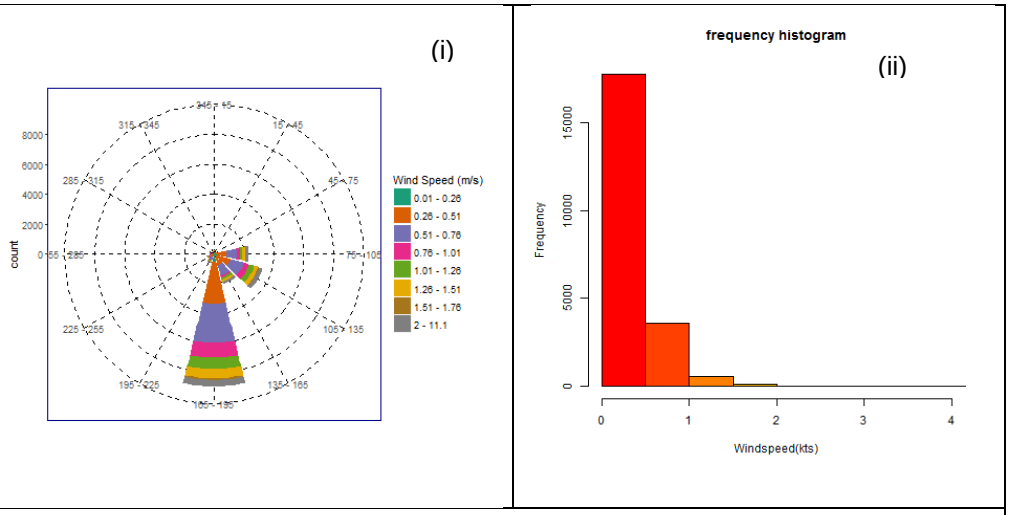


Fig.31. Distribution of (i) wind direction and (ii) wind speed of Faridpur during Monsoon Season

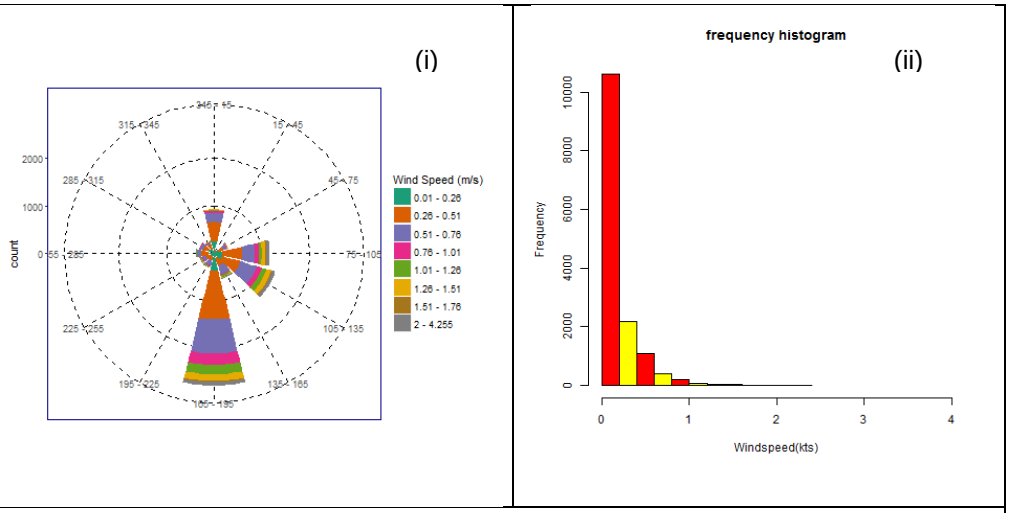


Fig.32. Distribution of (i) wind direction and (ii) wind speed of Faridpur during Post-monsoon Season

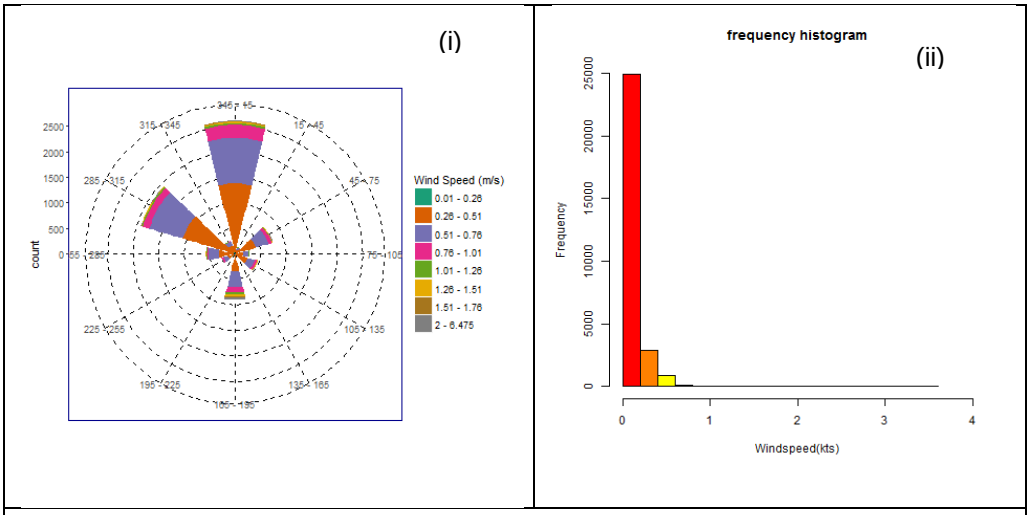


Fig. 33. Distribution of (i) wind direction and (ii) wind speed of Feni during Winter Season

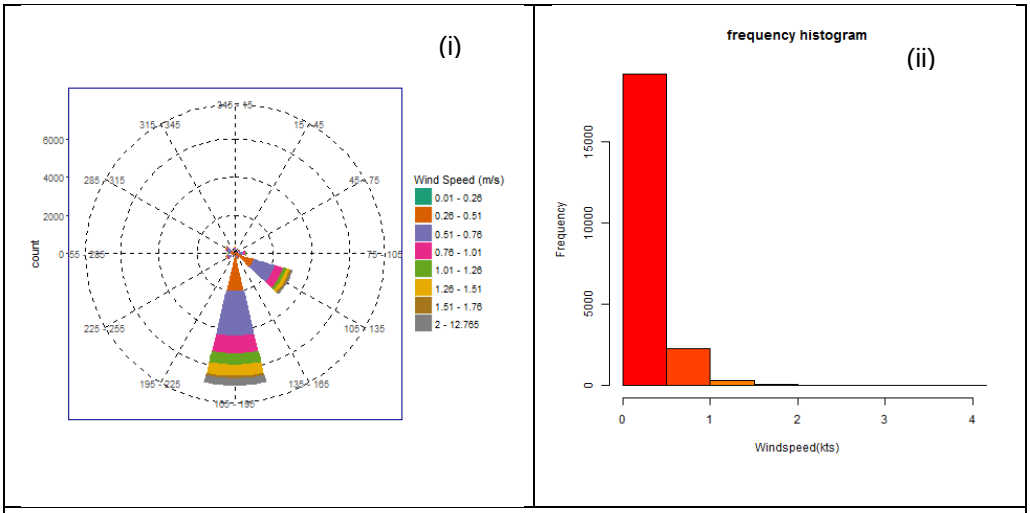


Fig.34. Distribution of (i) wind direction and (ii) wind speed of Feni during Pre-monsoon Season

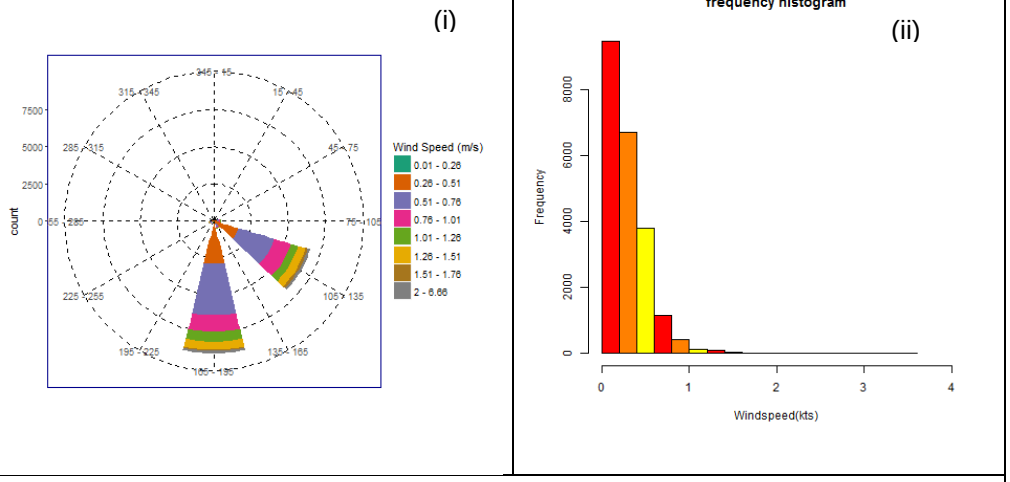


Fig.35. Distribution of (i) wind direction and (ii) wind speed of Feni during Monsoon Season

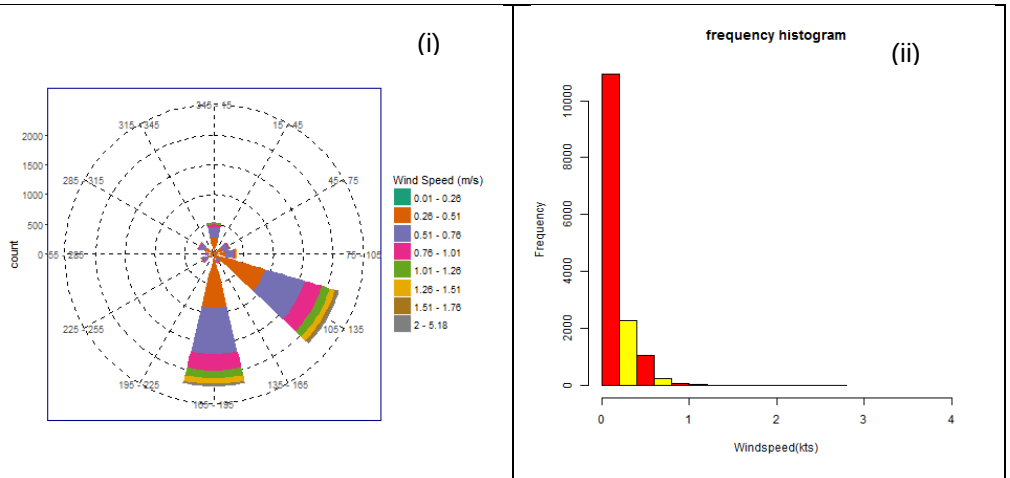
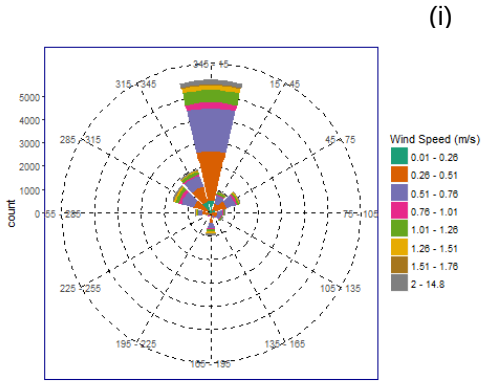


Fig.36. Distribution of (i) wind direction and (ii) wind speed of Feni during Post-monsoon Season



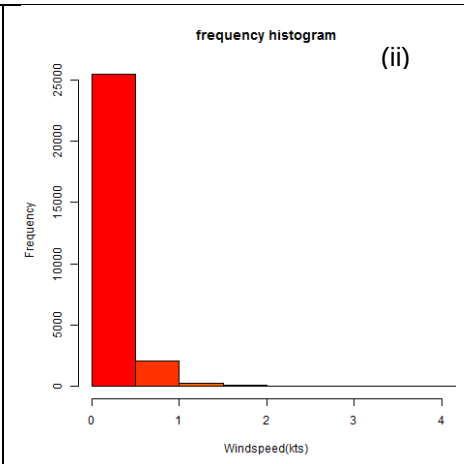
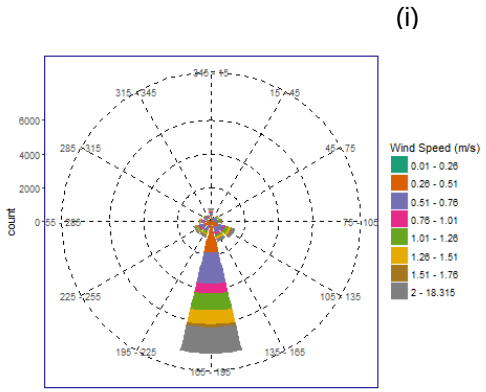


Fig.37. Distribution of (i) wind direction and (ii) wind speed of Hatiya during Winter Season



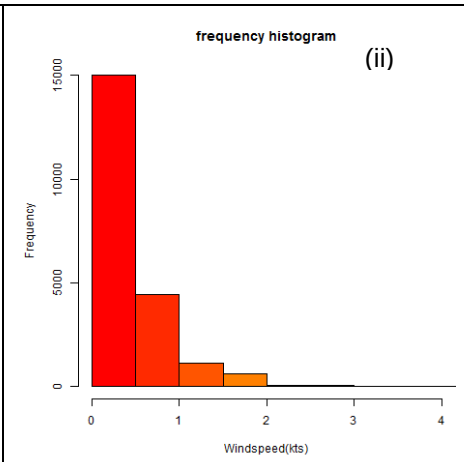
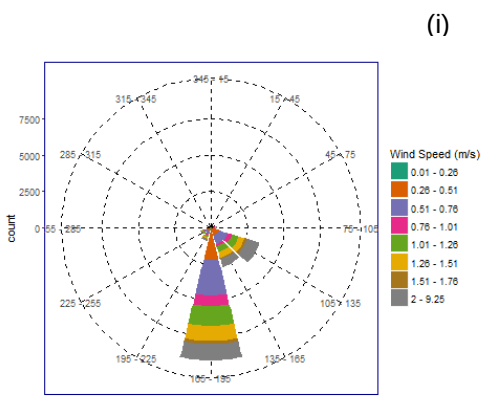


Fig.38. Distribution of (i) wind direction and (ii) wind speed of Hatiya during Pre-monsoon Season



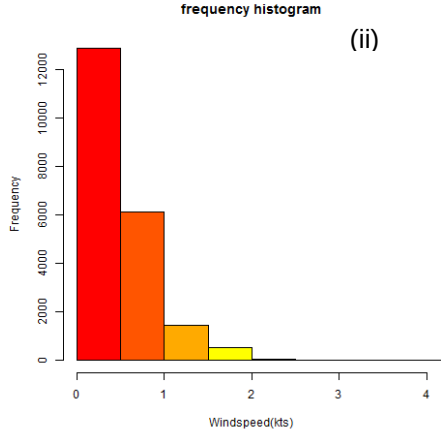
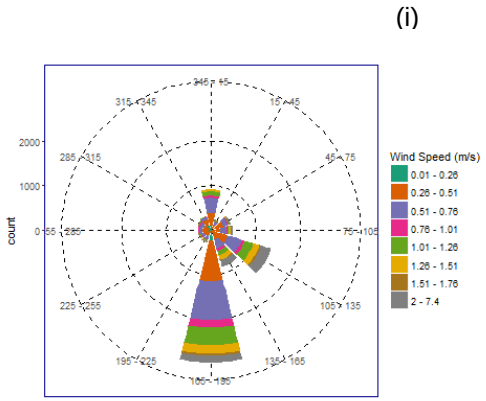


Fig.39. Distribution of (i) wind direction and (ii) wind speed of Hatiya during Monsoon Season



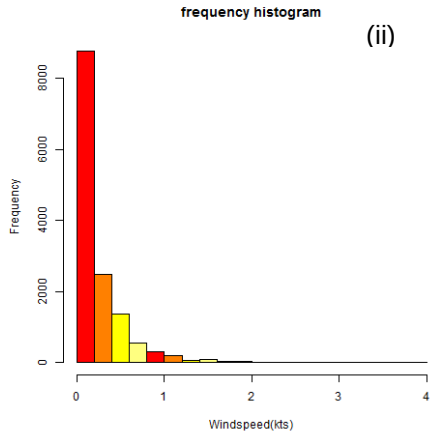


Fig.40. Distribution of (i) wind direction and (ii) wind speed of Hatiya during Post-monsoon Season

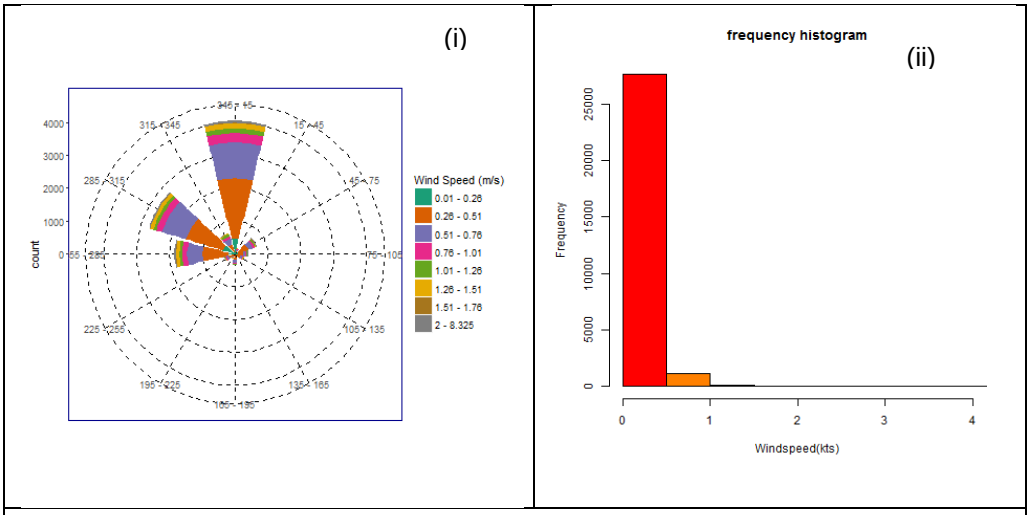


Fig.41. Distribution of (i) wind direction and (ii) wind speed of Ishurdi during Winter Season

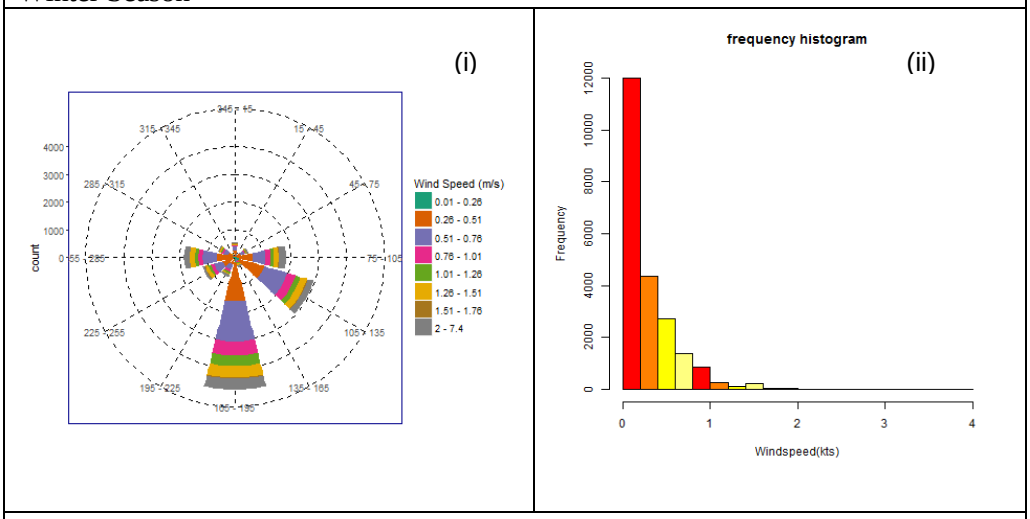


Fig.42. Distribution of (i) wind direction and (ii) wind speed of Ishurdi during Pre-monsoon Season

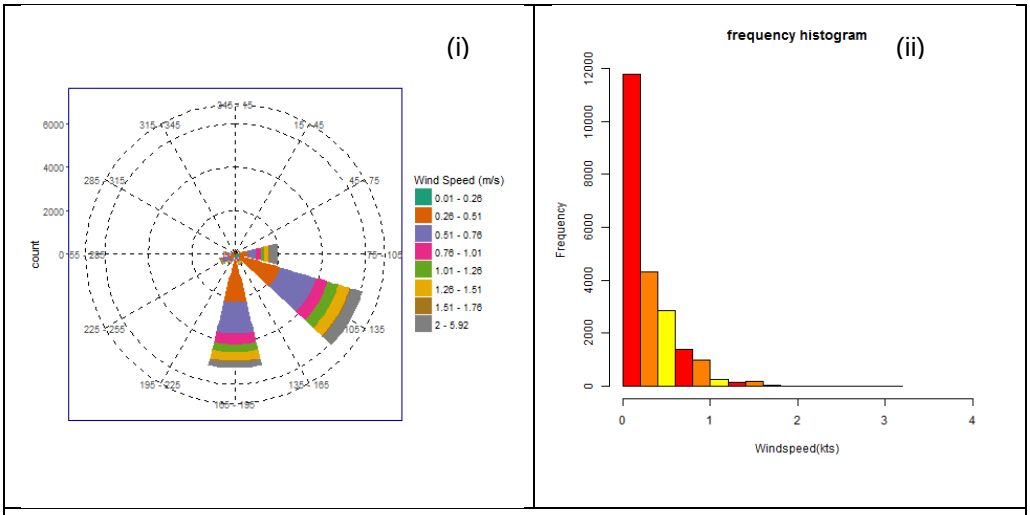


Fig. 43. Distribution of (i) wind direction and (ii) wind speed of Ishurdi during Monsoon Season

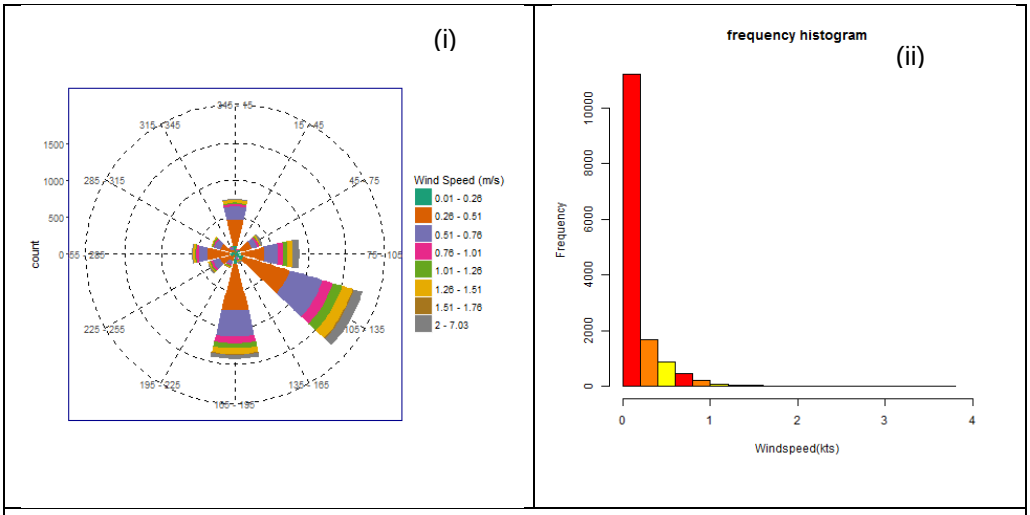


Fig.44. Distribution of (i) wind direction and (ii) wind speed of Ishurdi during Post-monsoon Season

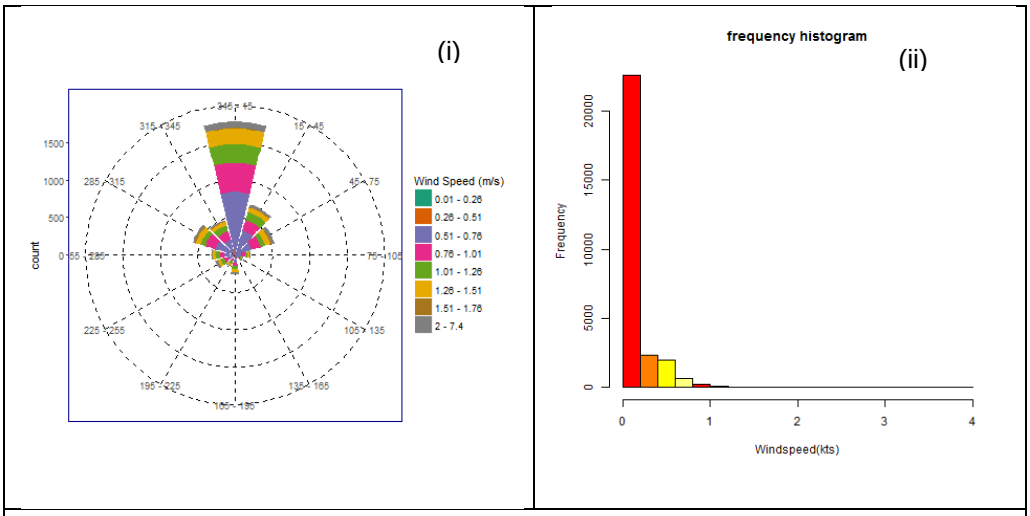


Fig.45. Distribution of (i) wind direction and (ii) wind speed of Jessore during Winter Season

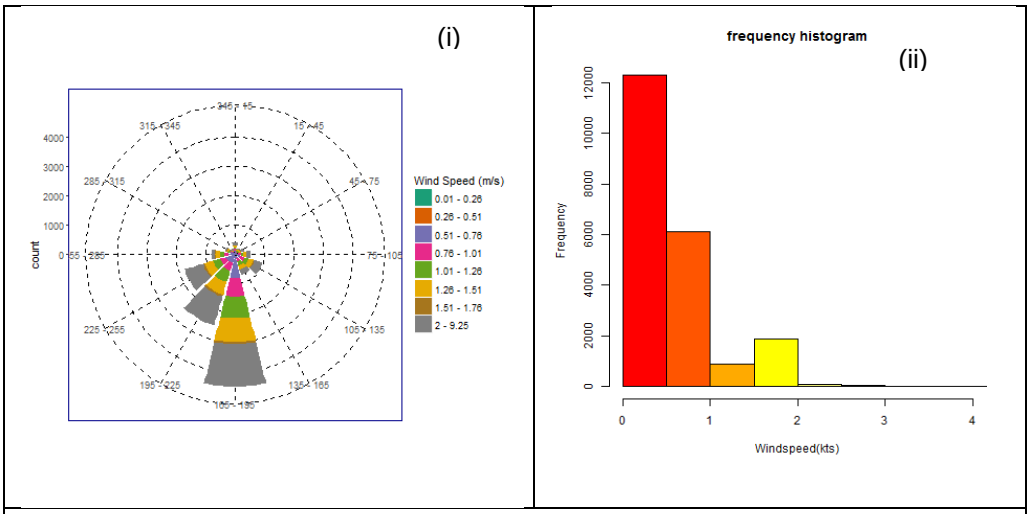


Fig. 46. Distribution of (i) wind direction and (ii) wind speed of Jessore during Pre-monsoon Season

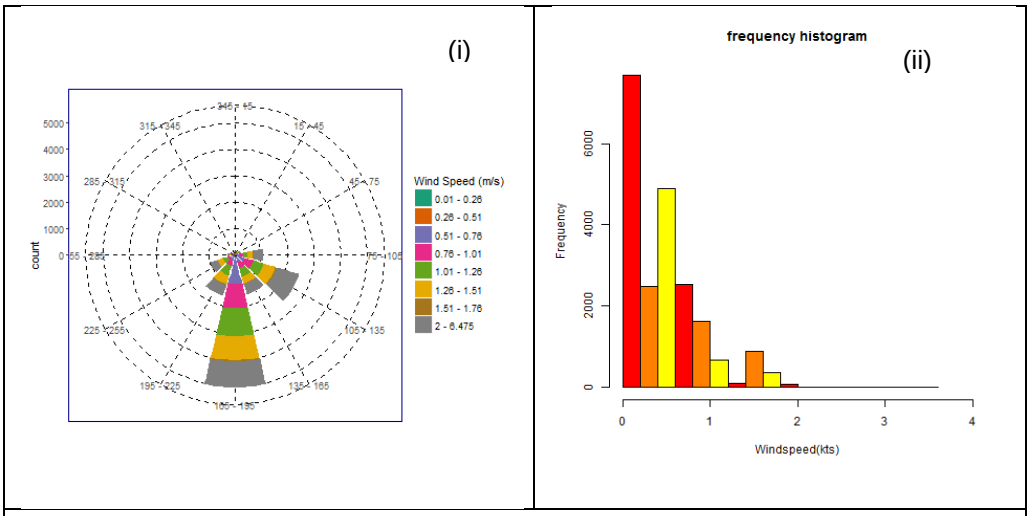


Fig. 46. Distribution of (i) wind direction and (ii) wind speed of Jessore during Monsoon Season

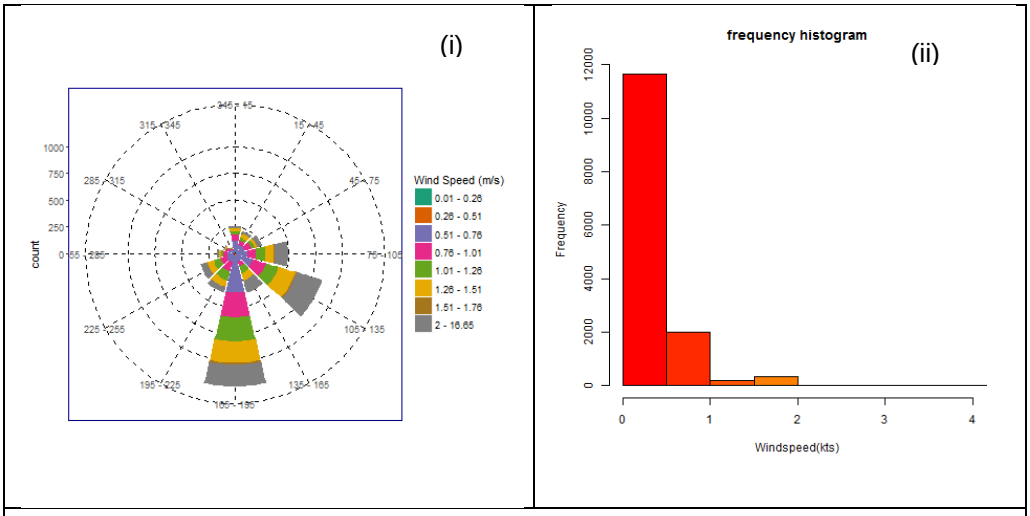


Fig. 47. Distribution of (i) wind direction and (ii) wind speed of Jessore during Post-monsoon Season

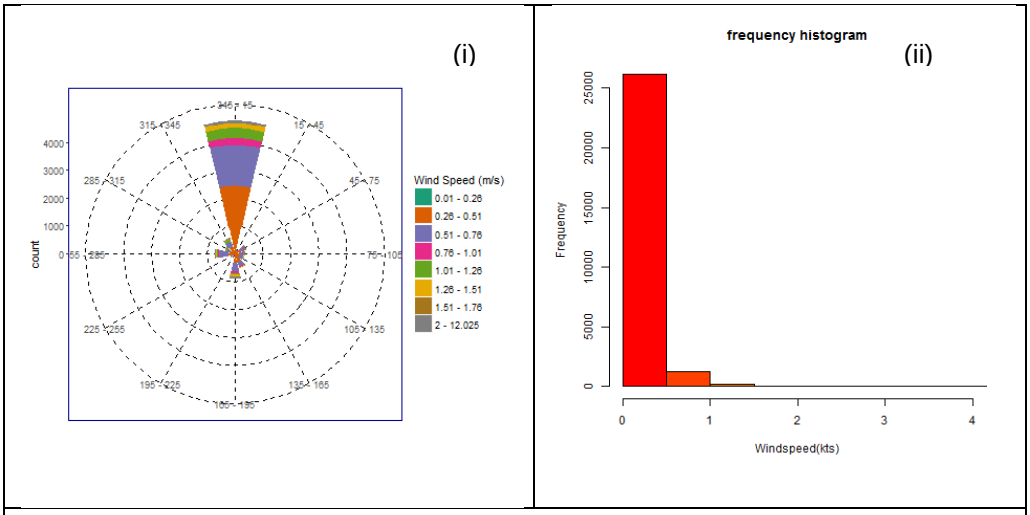


Fig. 48. Distribution of (i) wind direction and (ii) wind speed of Khepupara during Winter Season

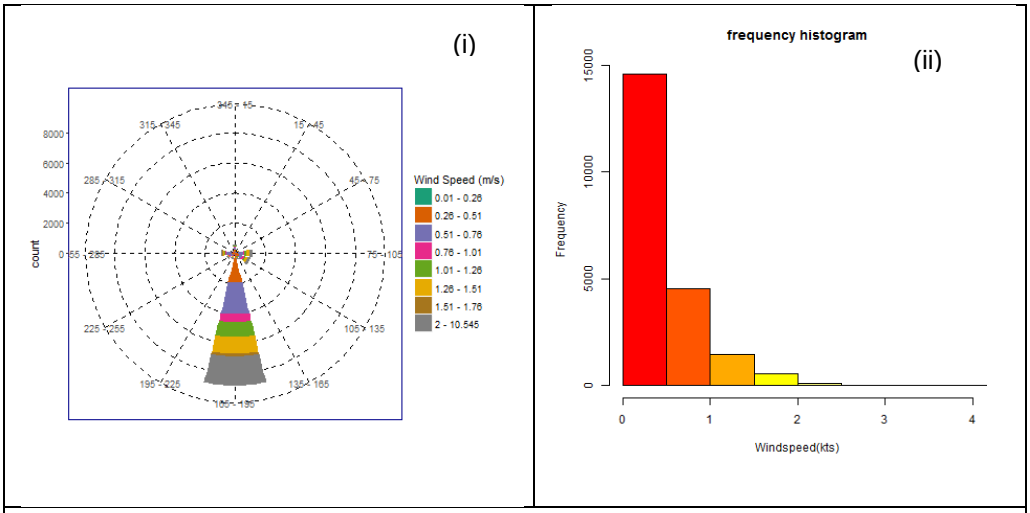


Fig.49. Distribution of (i) wind direction and (ii) wind speed of Khepupara during Pre-monsoon Season

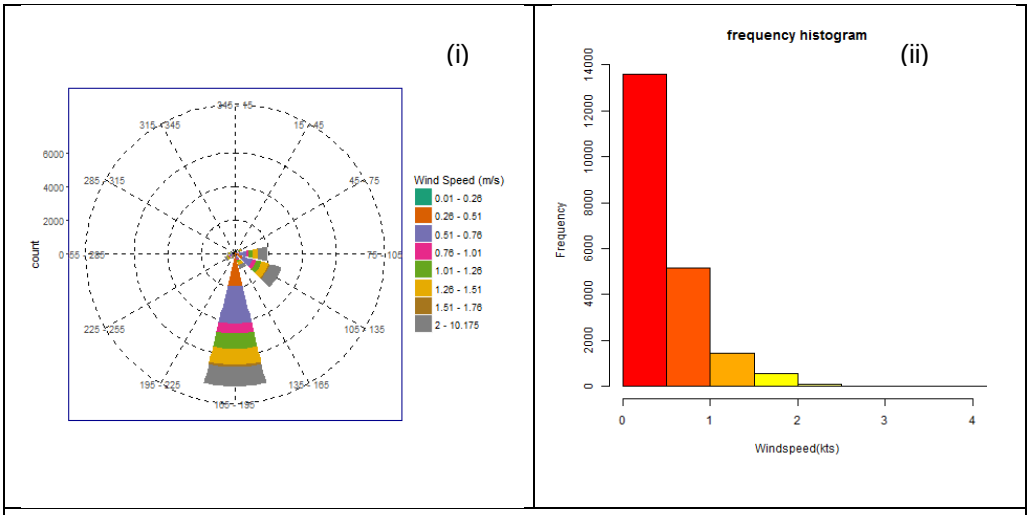


Fig.50. Distribution of (i) wind direction and (ii) wind speed of Khepupara during Monsoon Season

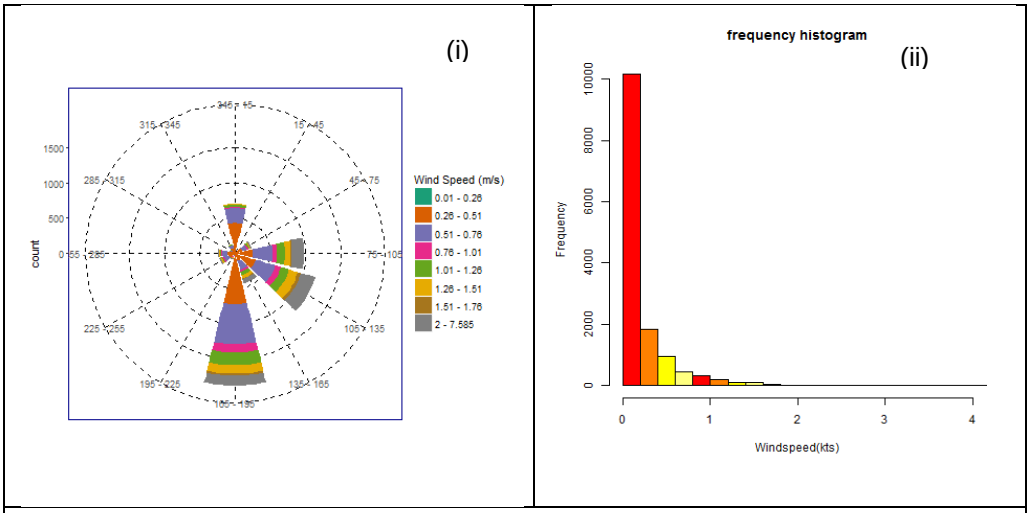


Fig.51. Distribution of (i) wind direction and (ii) wind speed of Khepupara during Post-monsoon Season

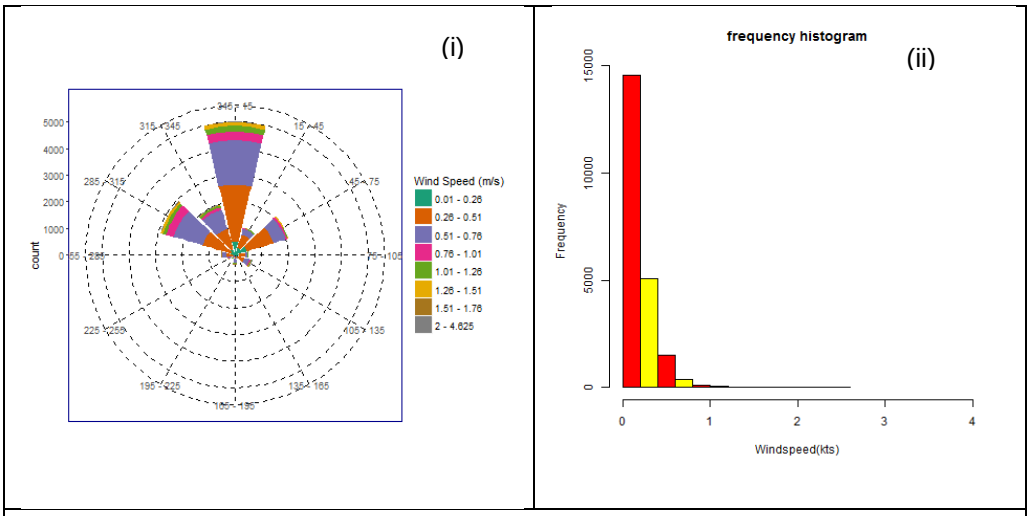


Fig.52. Distribution of (i) wind direction and (ii) wind speed of Kutubdia during Winter Season

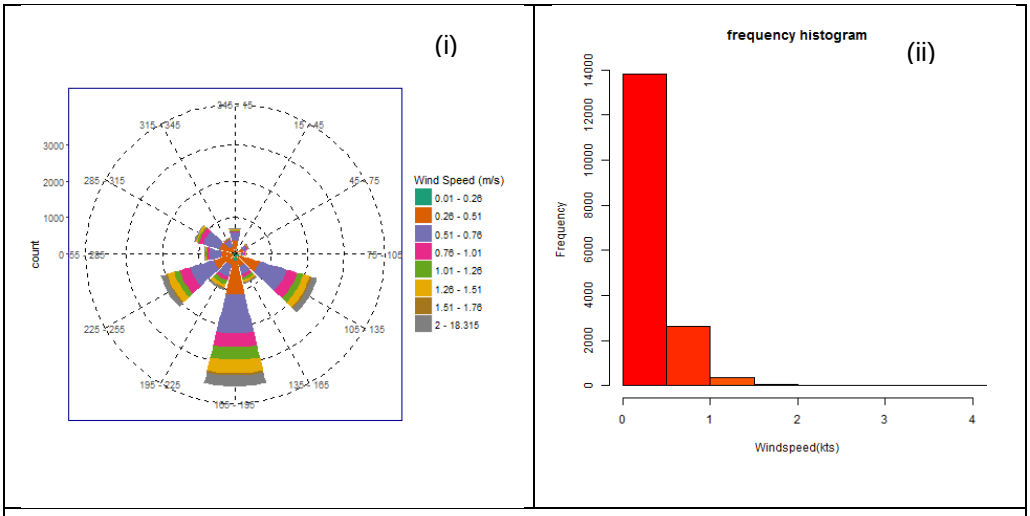


Fig.53. Distribution of (i) wind direction and (ii) wind speed of Kutubdia during Pre-monsoon Season

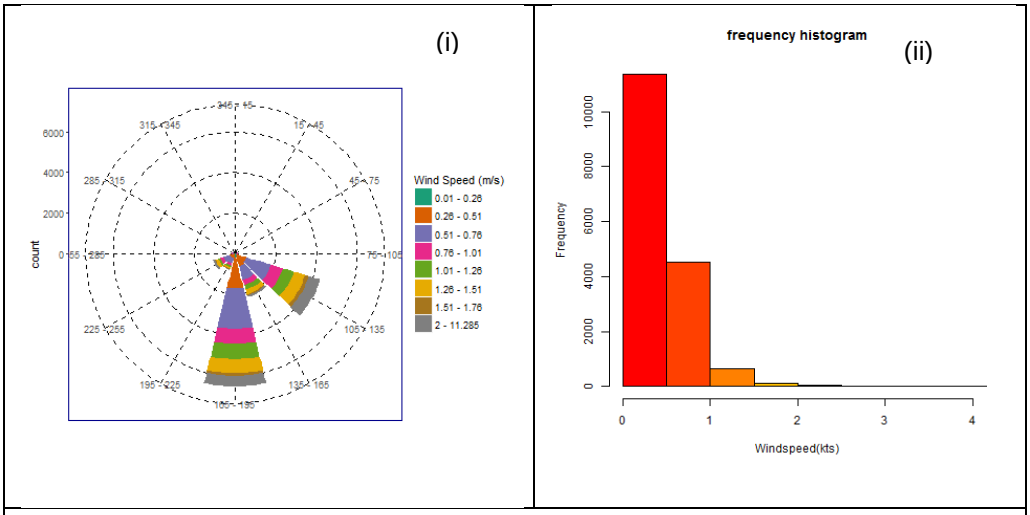


Fig.54. Distribution of (i) wind direction and (ii) wind speed of Kutubdia during Monsoon Season

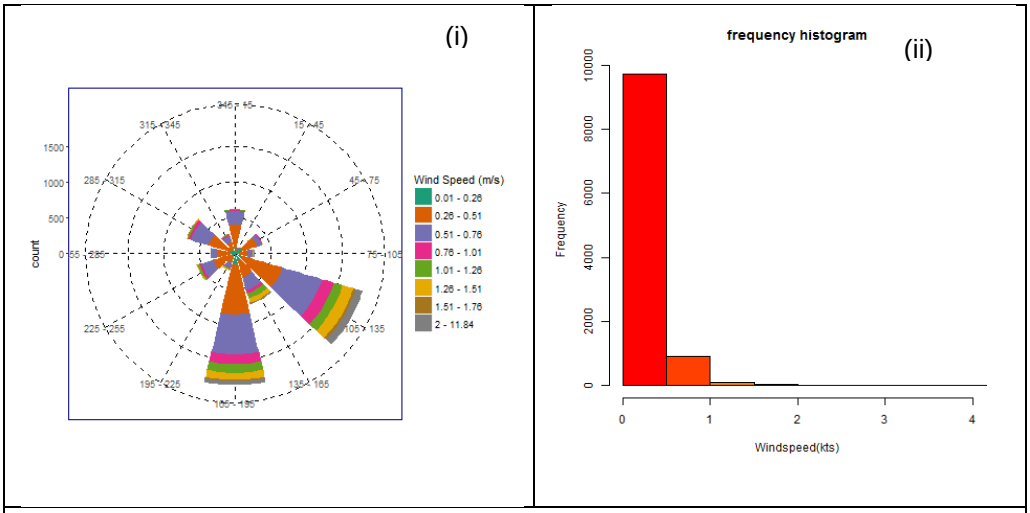


Fig.55. Distribution of (i) wind direction and (ii) wind speed of Kutubdia during Post-monsoon Season

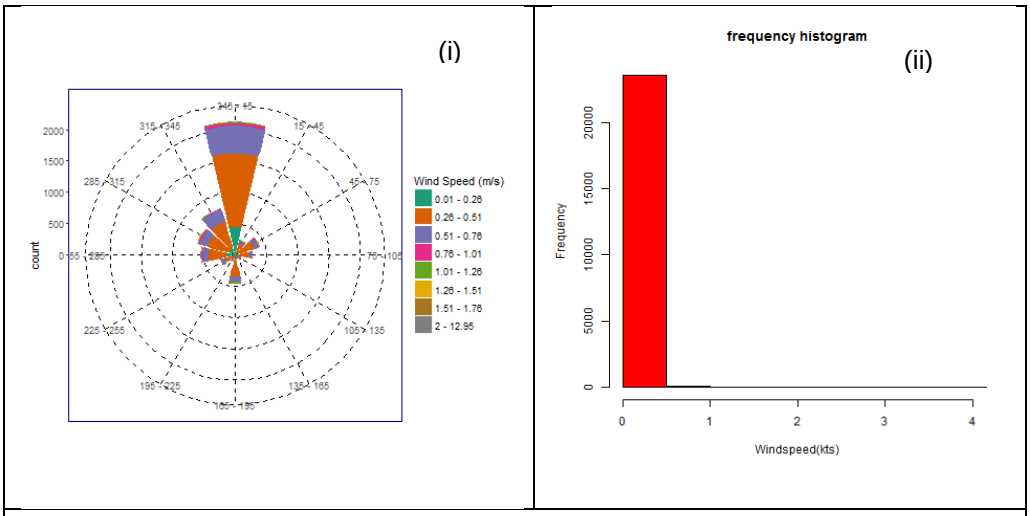


Fig.56. Distribution of (i) wind direction and (ii) wind speed of Madaripur during Winter Season

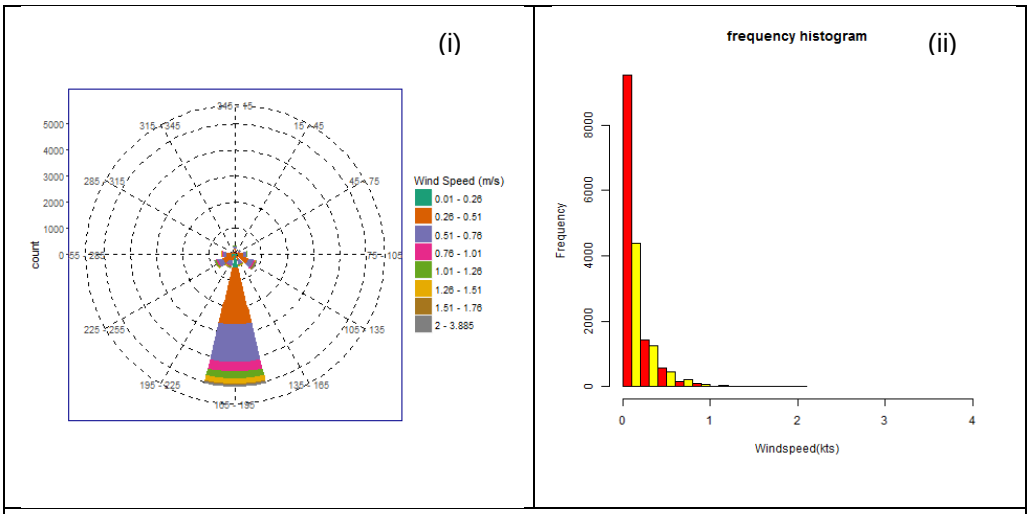


Fig.57. Distribution of (i) wind direction and (ii) wind speed of Madaripur during Pre-monsoon Season

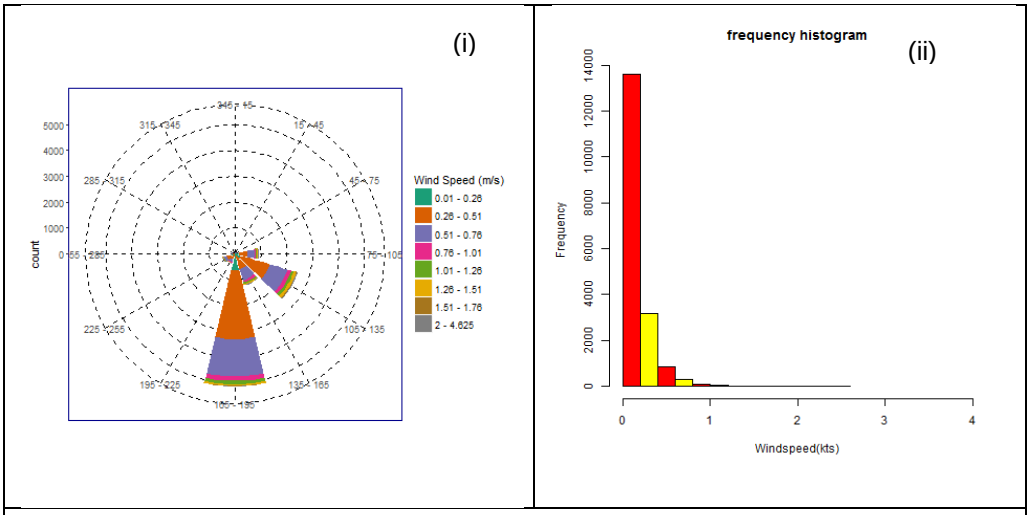


Fig.58. Distribution of (i) wind direction and (ii) wind speed of Madaripur during Monsoon Season

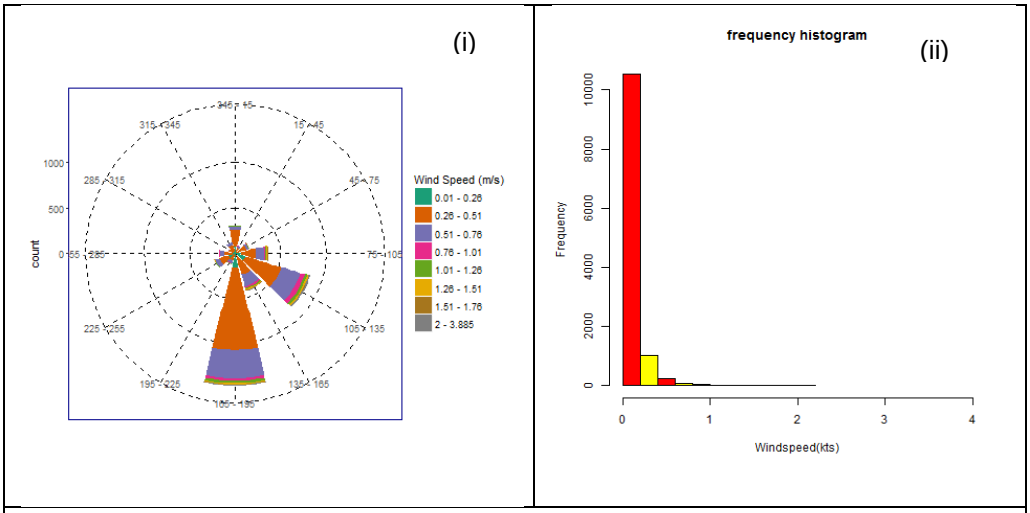


Fig.59. Distribution of (i) wind direction and (ii) wind speed of Madaripur during Post-monsoon Season

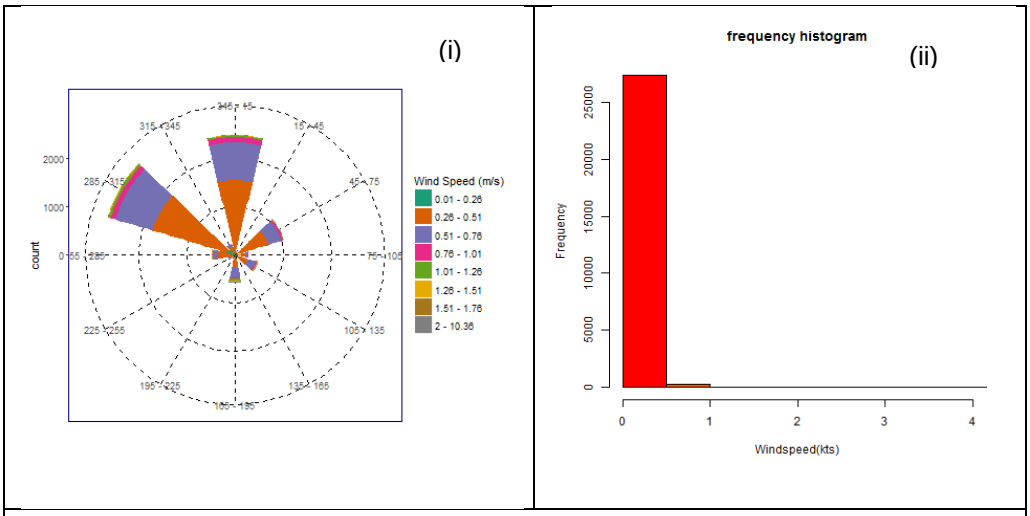


Fig.60. Distribution of (i) wind direction and (ii) wind speed of Mcourt during Winter Season

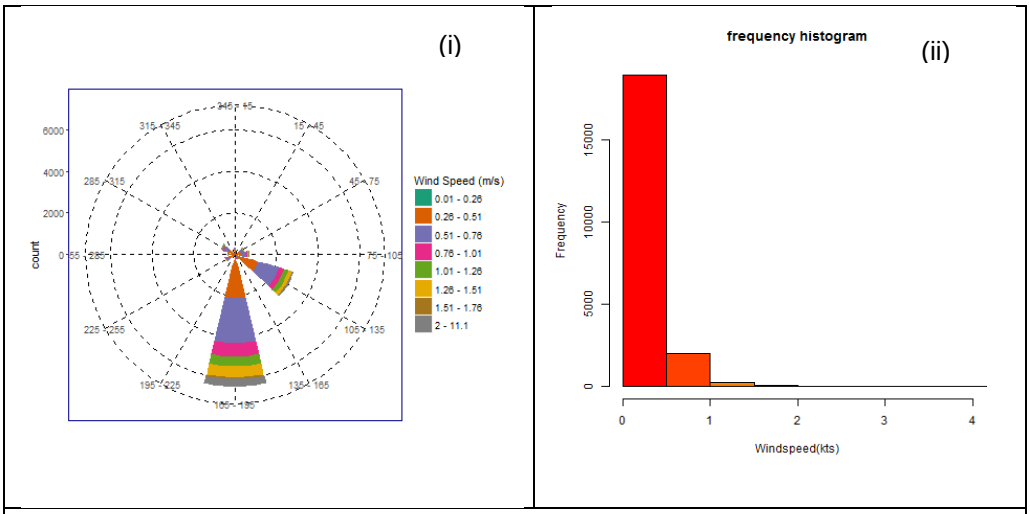


Fig.61. Distribution of (i) wind direction and (ii) wind speed of Mcourt during Pre-monsoon Season

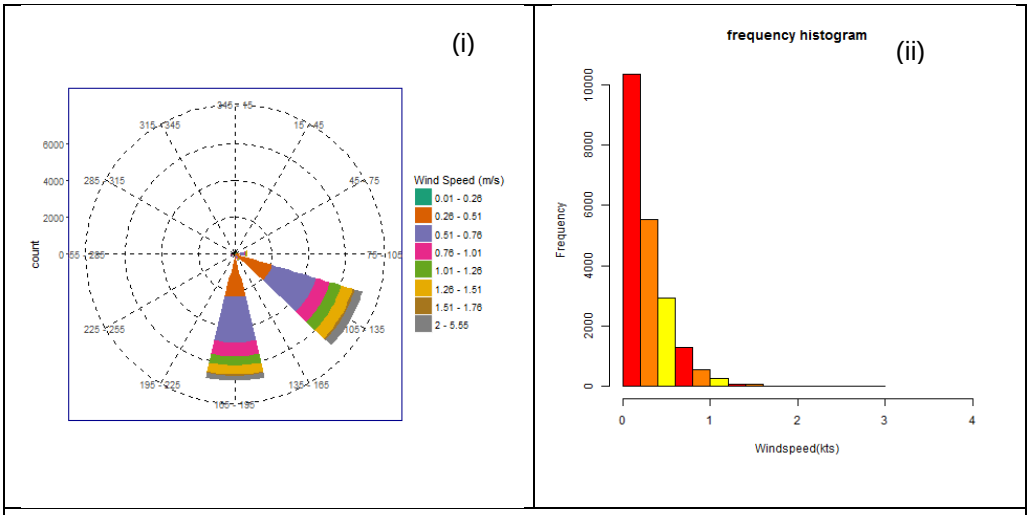


Fig.62. Distribution of (i) wind direction and (ii) wind speed of Mcourt during Monsoon Season

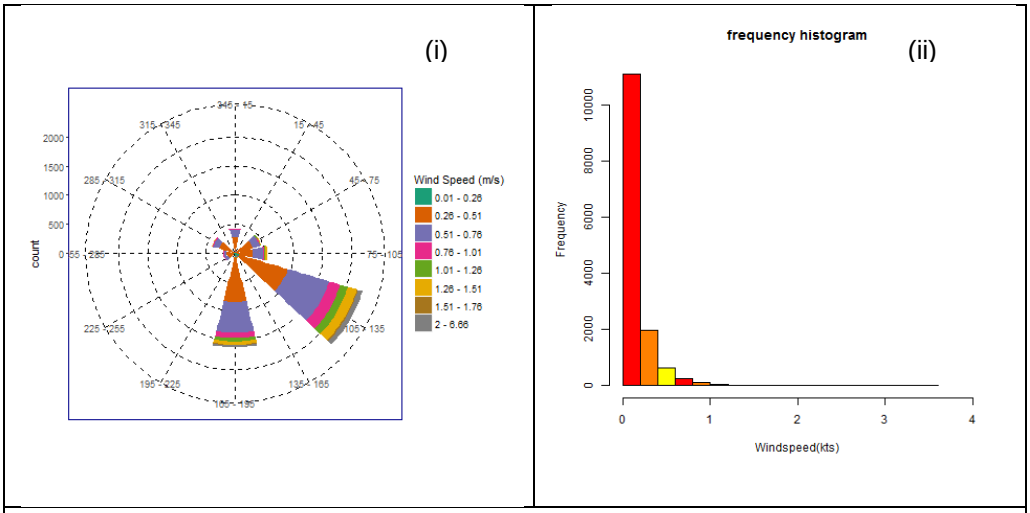


Fig.63. Distribution of (i) wind direction and (ii) wind speed of Mcourt during Post-monsoon Season

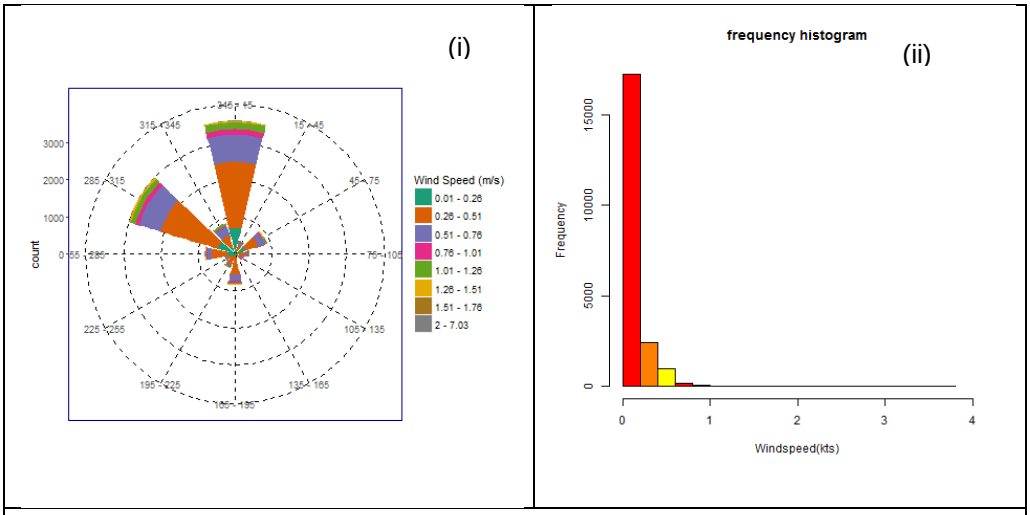


Fig.64. Distribution of (i) wind direction and (ii) wind speed of Mongla during Winter Season

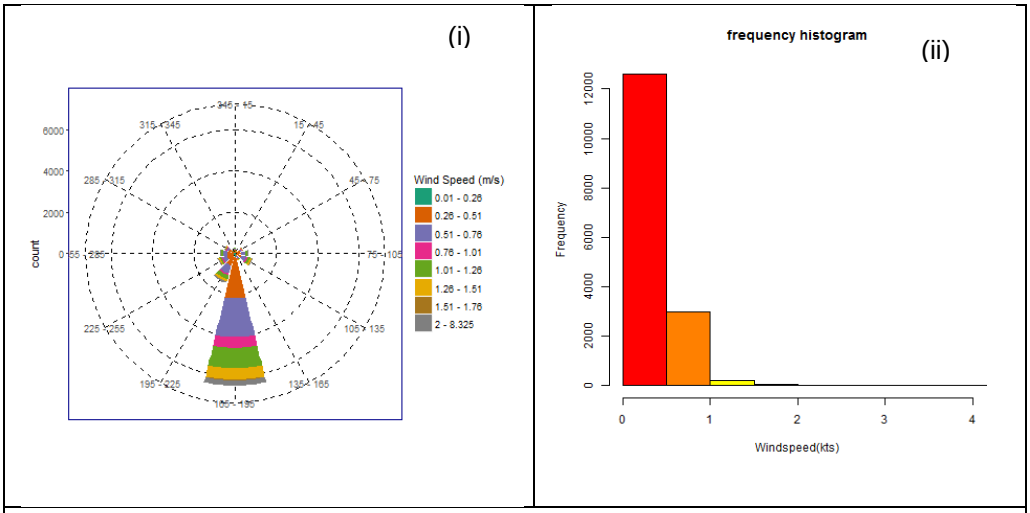


Fig.65. Distribution of (i) wind direction and (ii) wind speed of Mongla during Pre-monsoon Season

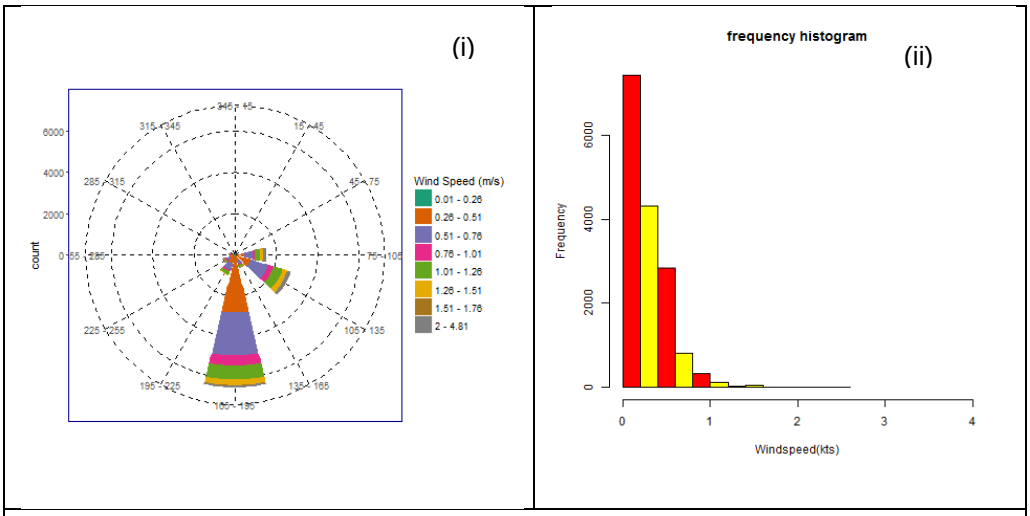


Fig.66. Distribution of (i) wind direction and (ii) wind speed of Mongla during Monsoon Season

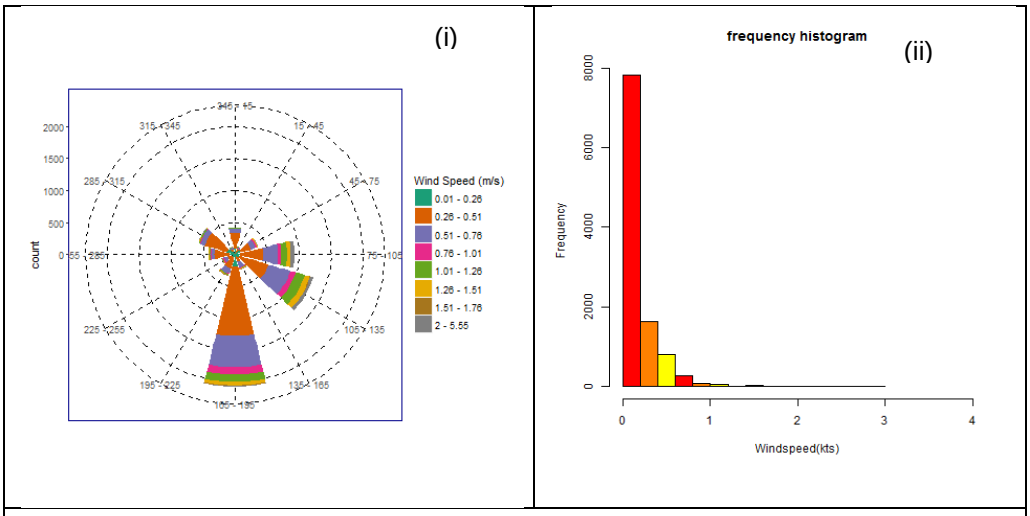


Fig.67. Distribution of (i) wind direction and (ii) wind speed of Mongla during Post-monsoon Season

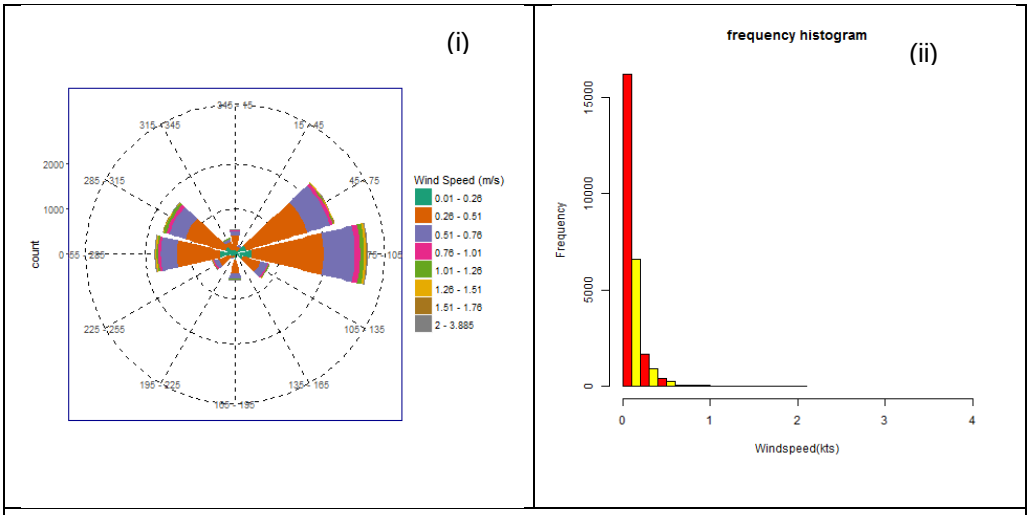


Fig.68. Distribution of (i) wind direction and (ii) wind speed of Mymensingh during winter Season

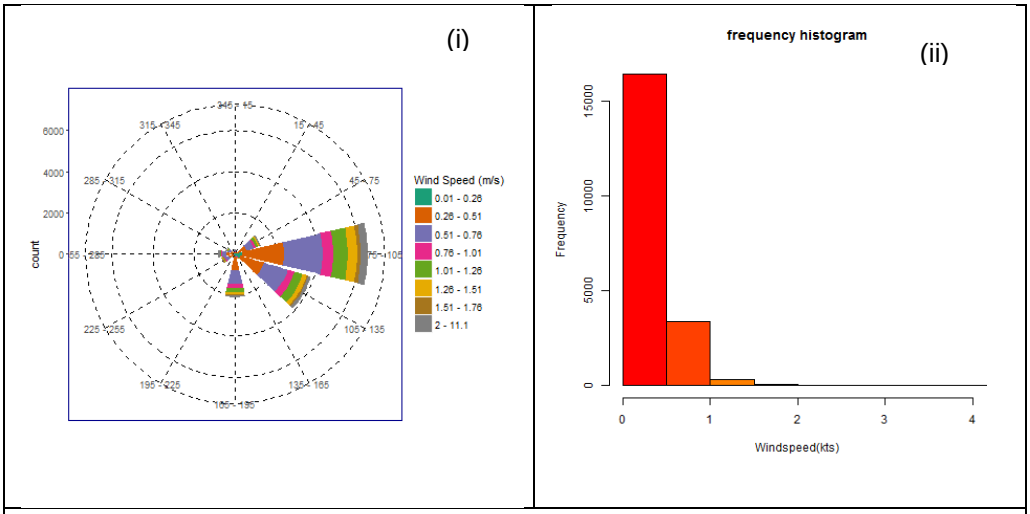


Fig.69. Distribution of (i) wind direction and (ii) wind speed of Mymensingh during Pre-monsoon Season

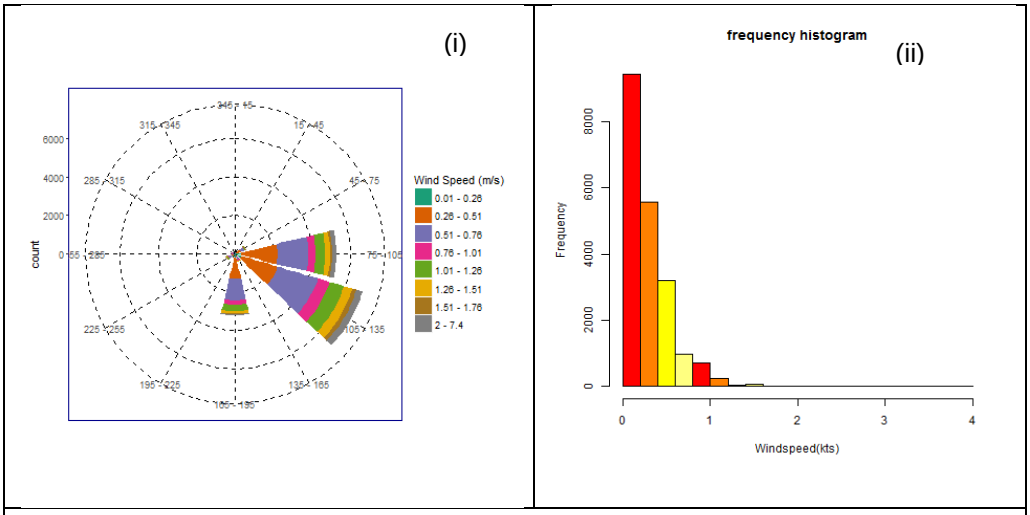


Fig.70. Distribution of (i) wind direction and (ii) wind speed of Mymensingh during Monsoon Season

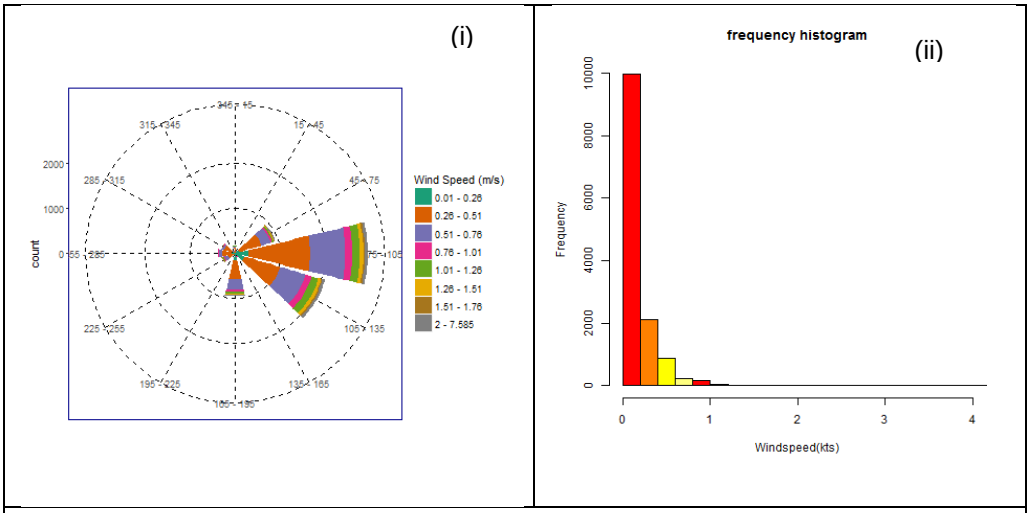


Fig.71. Distribution of (i) wind direction and (ii) wind speed of Mymensingh during Post-monsoon Season

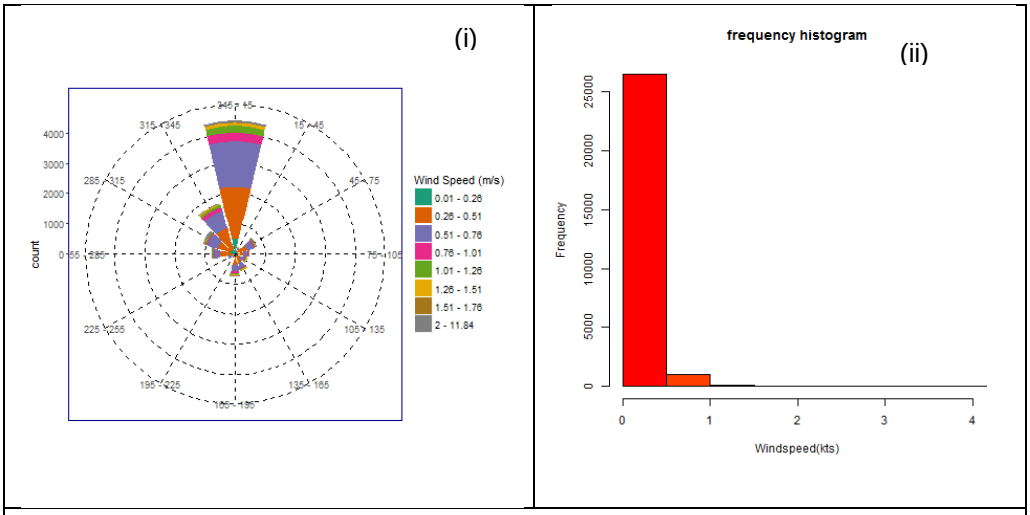


Fig.72. Distribution of (i) wind direction and (ii) wind speed of Patuakhali during Winter Season

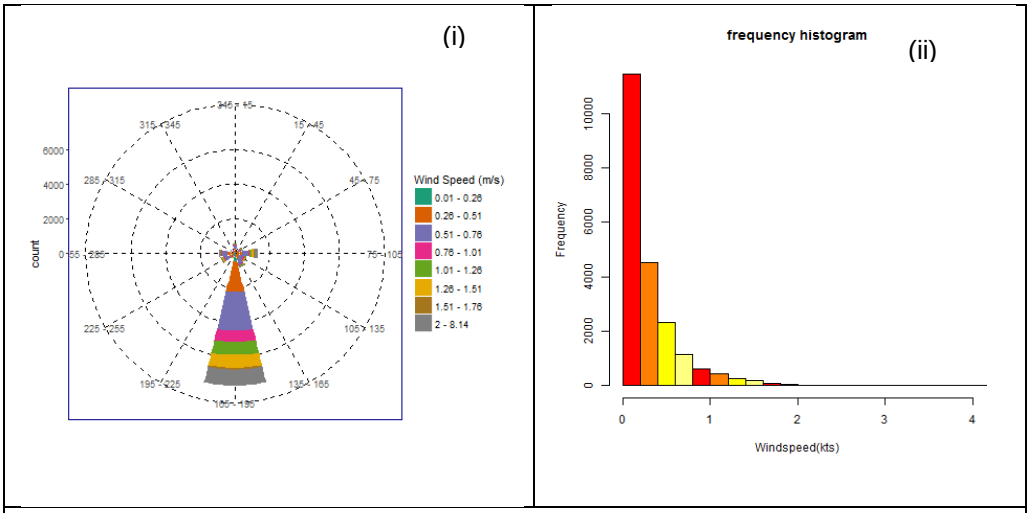


Fig.73. Distribution of (i) wind direction and (ii) wind speed of Patuakhali during Pre-monsoon Season

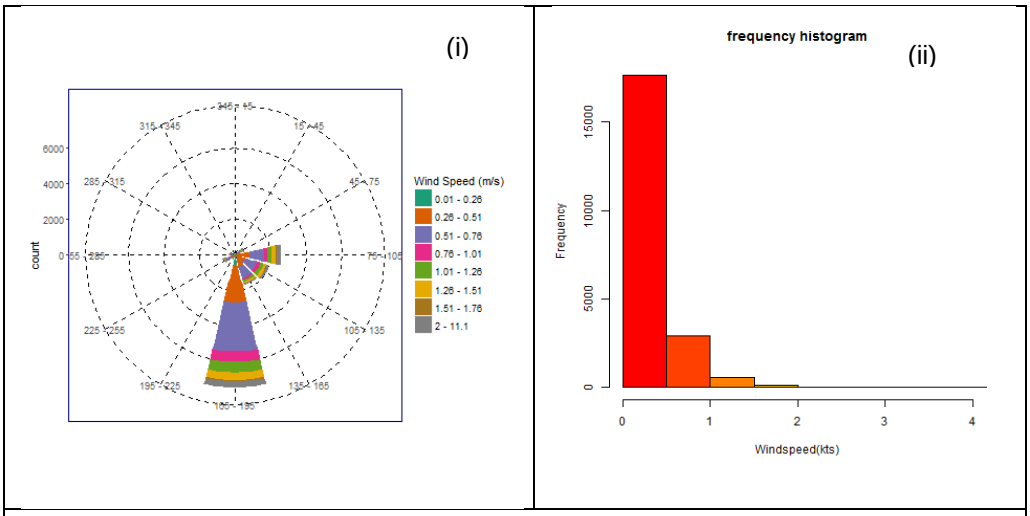


Fig.74. Distribution of (i) wind direction and (ii) wind speed of Patuakhali during Monsoon Season

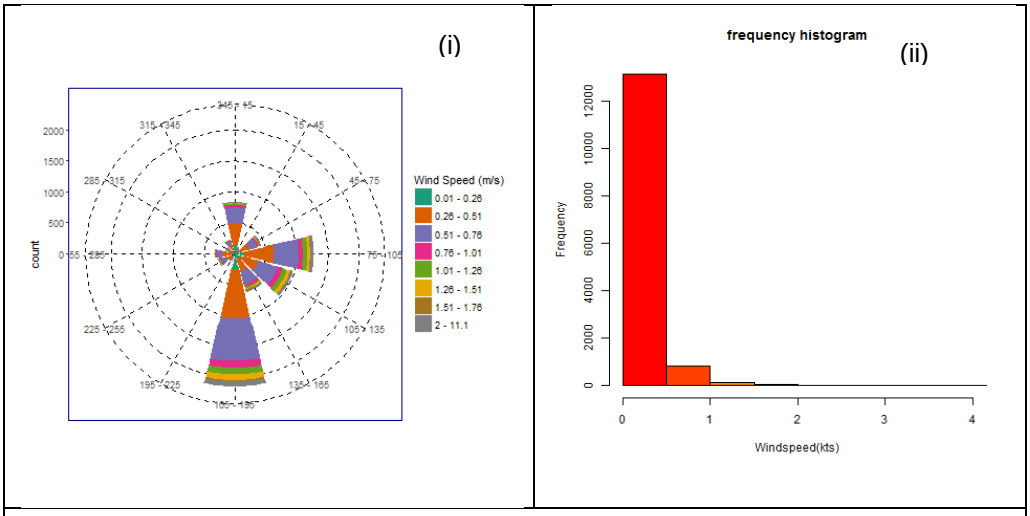


Fig.75. Distribution of (i) wind direction and (ii) wind speed of Patuakhali during Post-monsoon Season

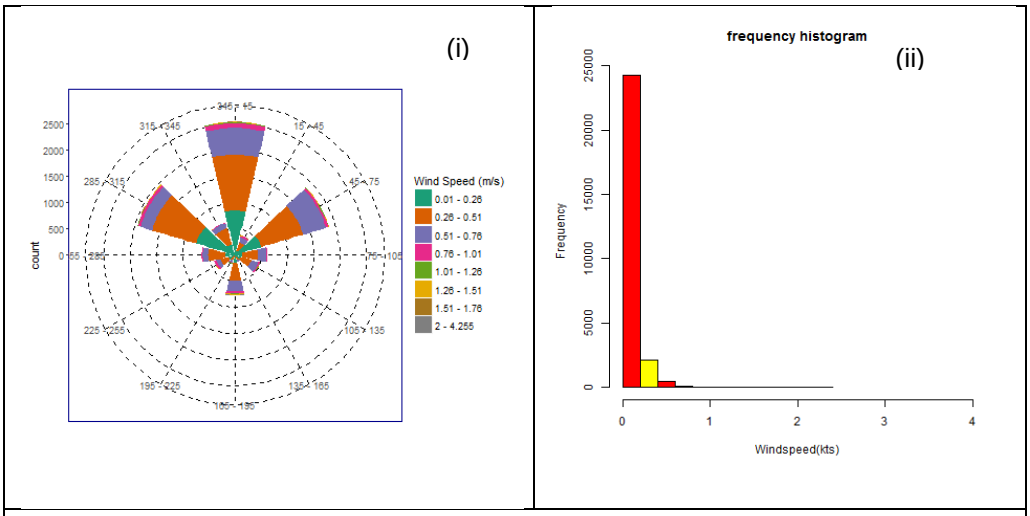


Fig.76. Distribution of (i) wind direction and (ii) wind speed of Rangamati during Winter Season

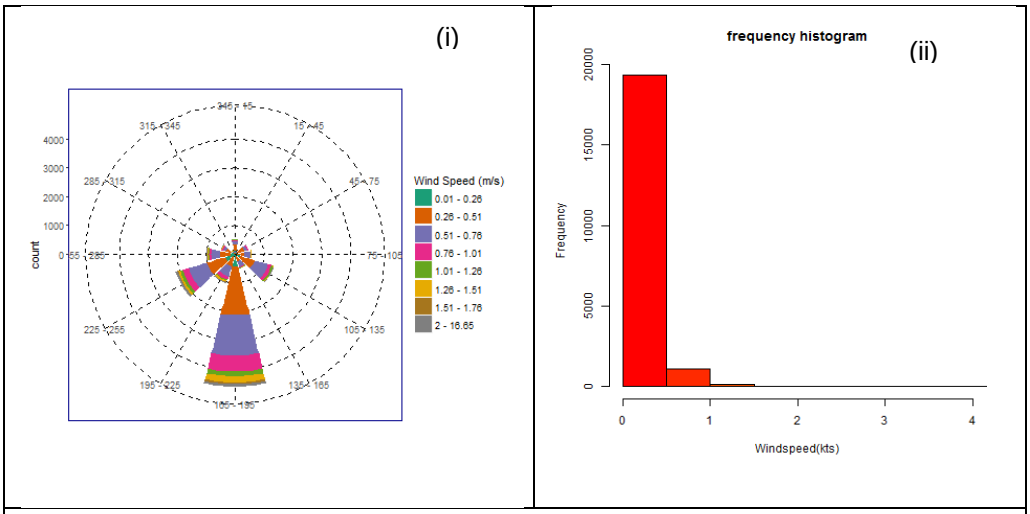


Fig.77. Distribution of (i) wind direction and (ii) wind speed of Rangamati during Pre-monsoon Season

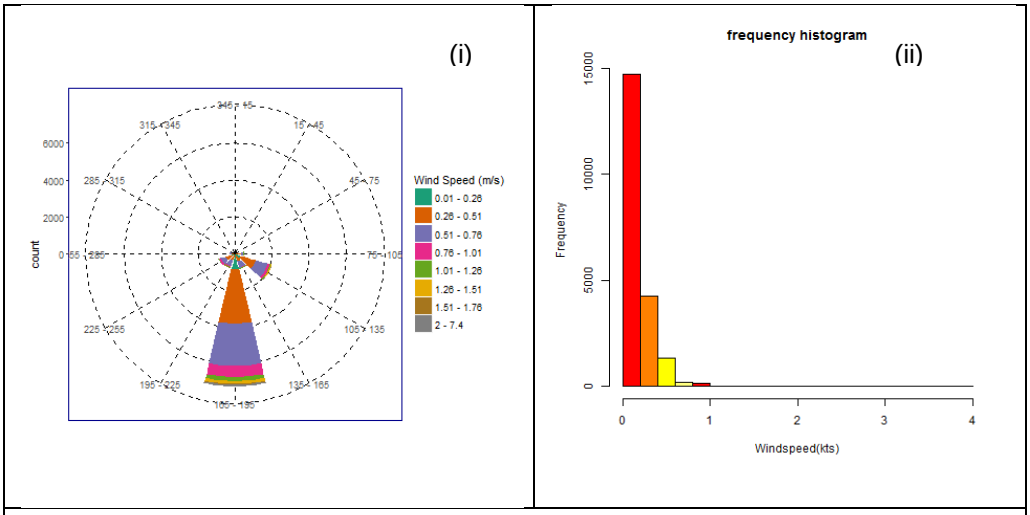


Fig.78. Distribution of (i) wind direction and (ii) wind speed of Rangamati during Monsoon Season

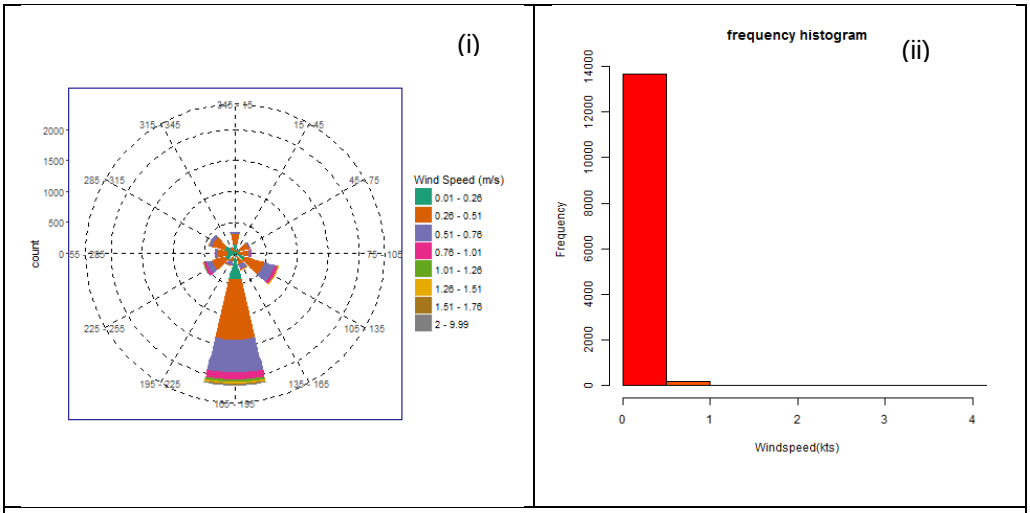


Fig.79. Distribution of (i) wind direction and (ii) wind speed of Rangamati during Post-monsoon Season

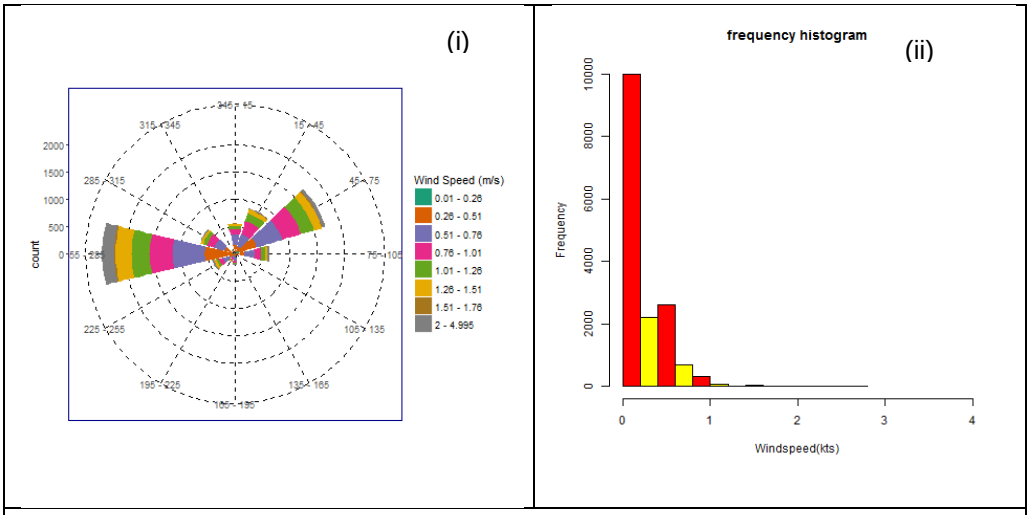


Fig.80. Distribution of (i) wind direction and (ii) wind speed of Sayedpur during Winter Season

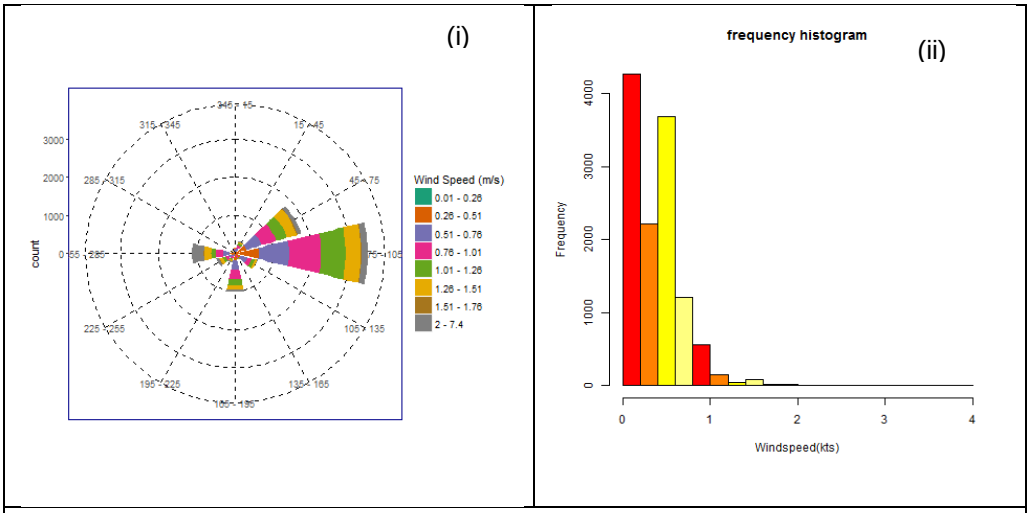
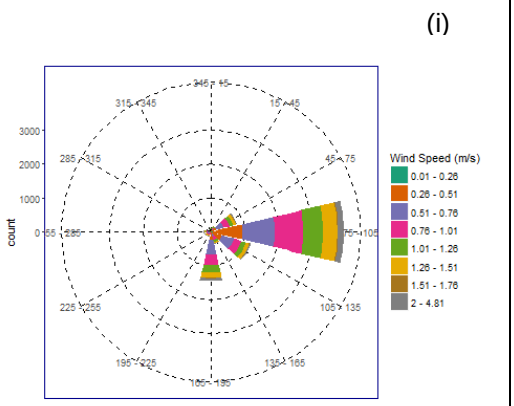


Fig.81. Distribution of (i) wind direction and (ii) wind speed of Sayedpur during Pre-monsoon Season



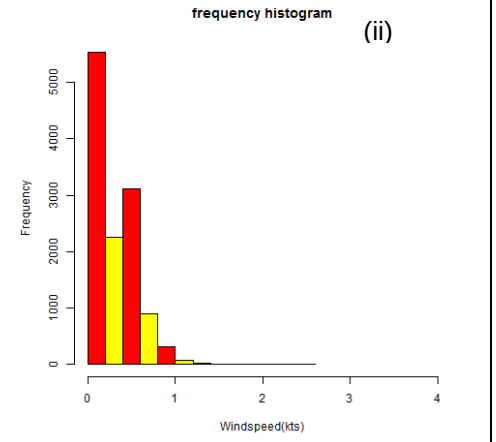
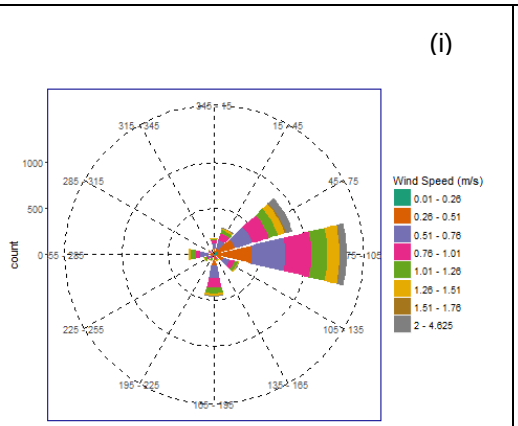


Fig.82. Distribution of (i) wind direction and (ii) wind speed of Sayedpur during Monsoon Season



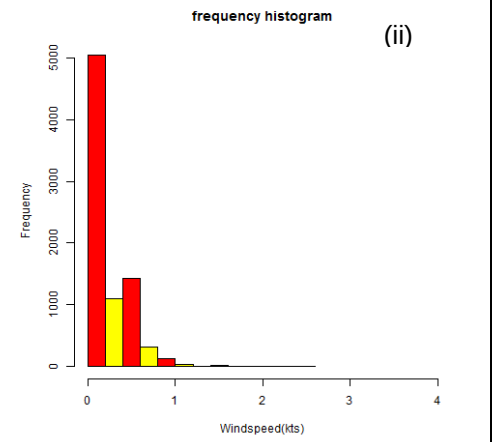


Fig.83. Distribution of (i) wind direction and (ii) wind speed of Sayedpur during Post-monsoon Season

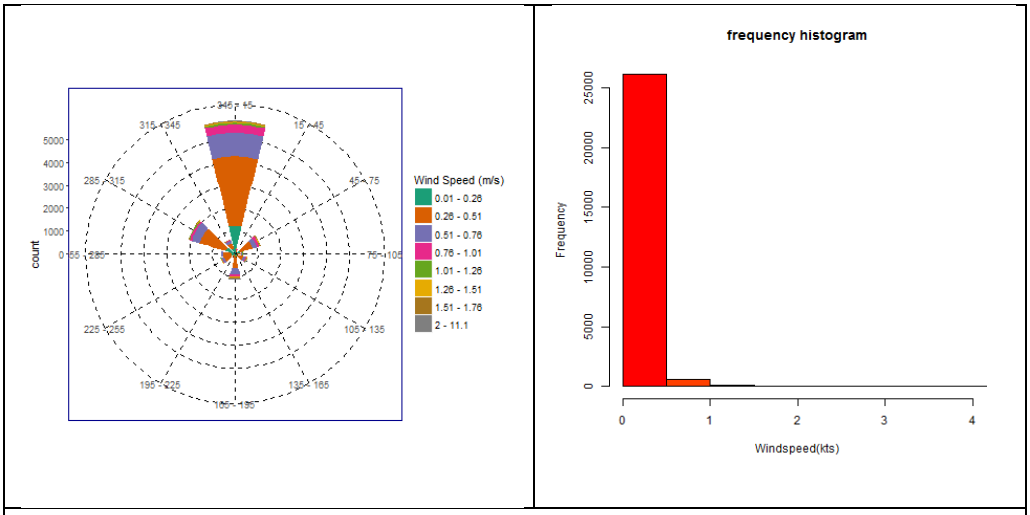


Fig.84. Distribution of (i) wind direction and (ii) wind speed of Sandwip during Winter Season

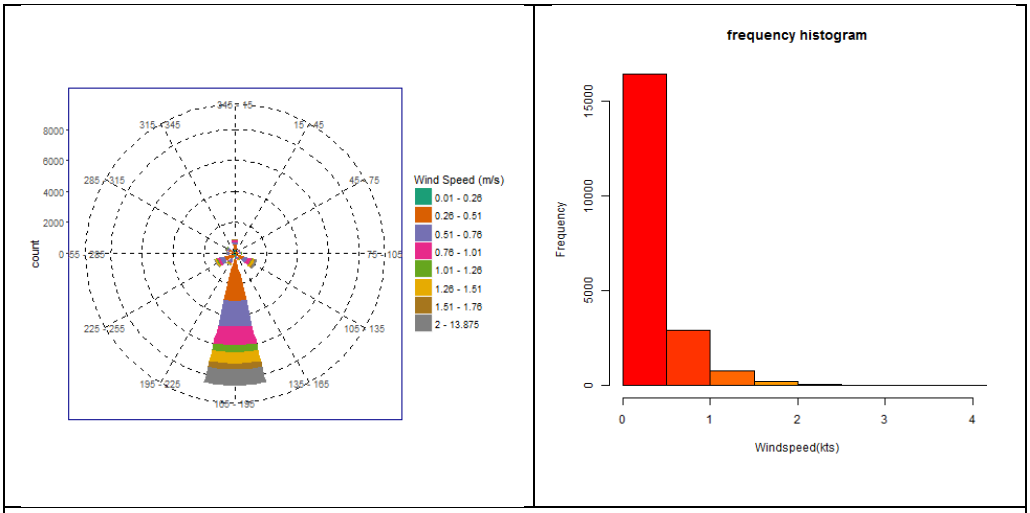


Fig.85. Distribution of (i) wind direction and (ii) wind speed of Sandwip during Pre-monsoon Season

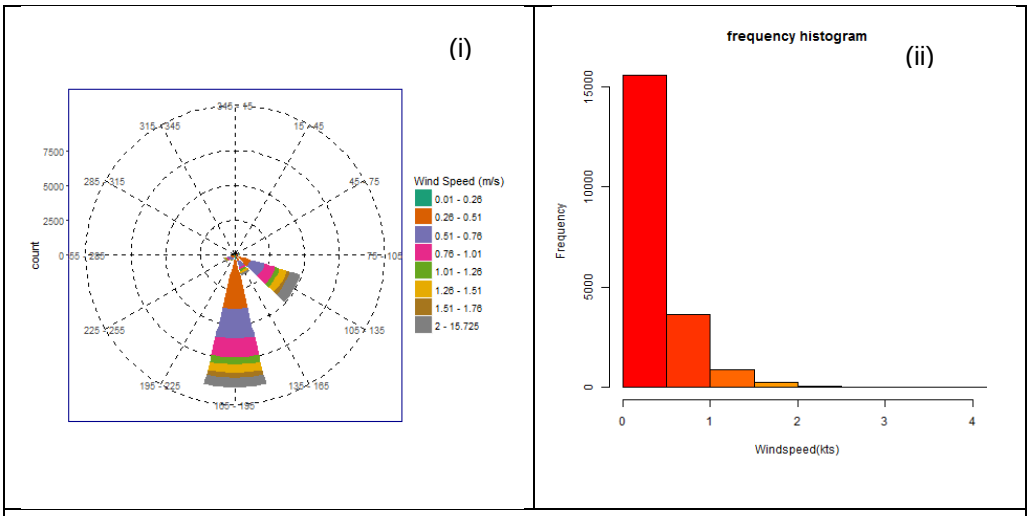


Fig.86. Distribution of (i) wind direction and (ii) wind speed of Sandwip during Monsoon Season

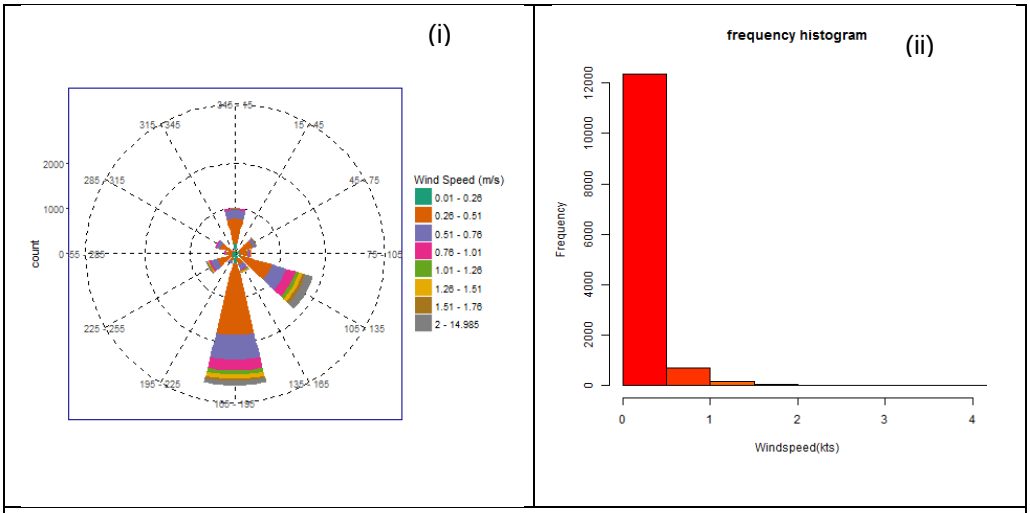


Fig.87. Distribution of (i) wind direction and (ii) wind speed of Sandwip during Post-monsoon Season

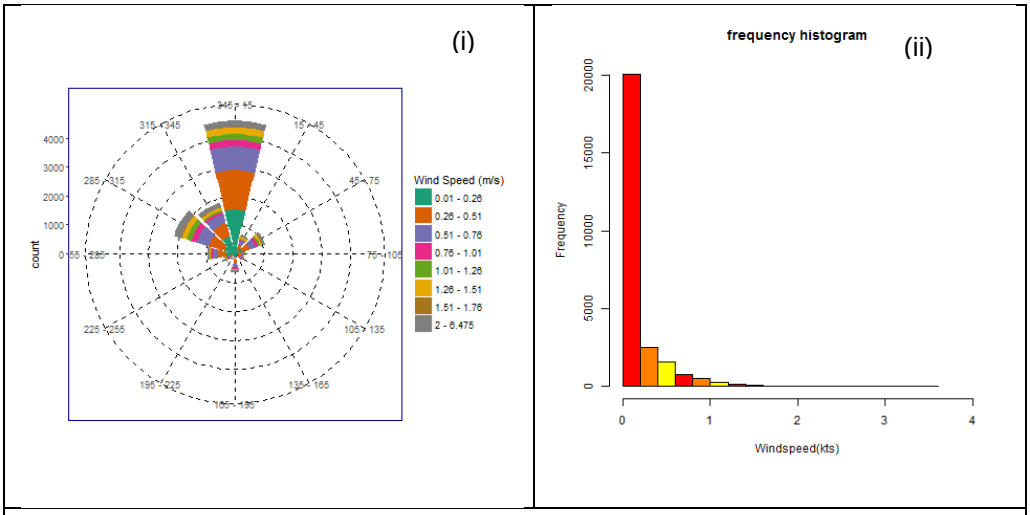


Fig.88. Distribution of (i) wind direction and (ii) wind speed of Satkhira during Winter Season

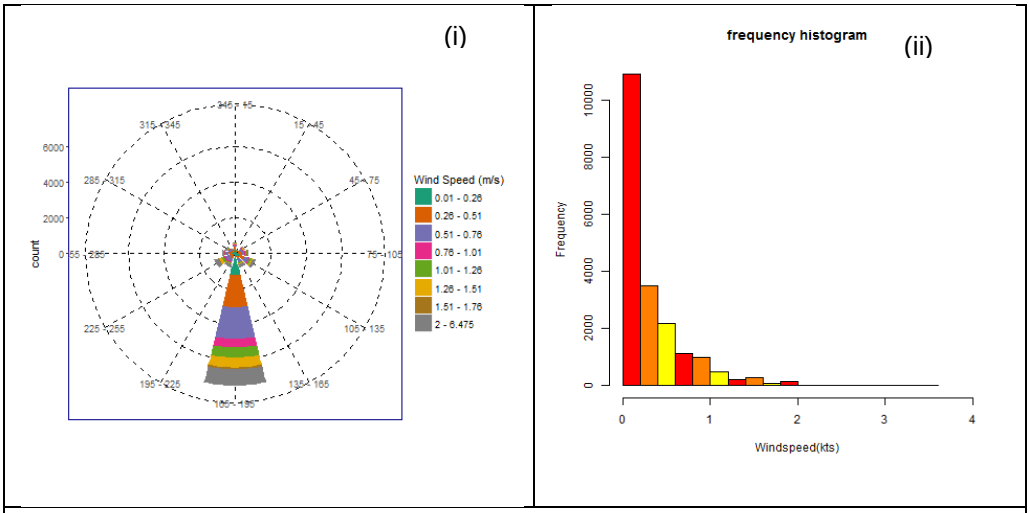


Fig.89. Distribution of (i) wind direction and (ii) wind speed of Satkhira during Pre-monsoon Season

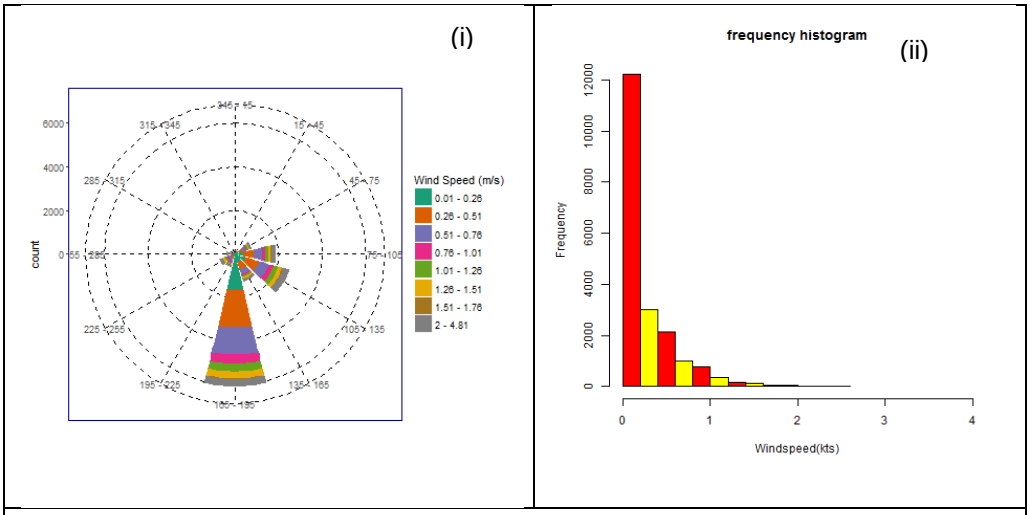


Fig.90. Distribution of (i) wind direction and (ii) wind speed of Satkhira during Monsoon Season

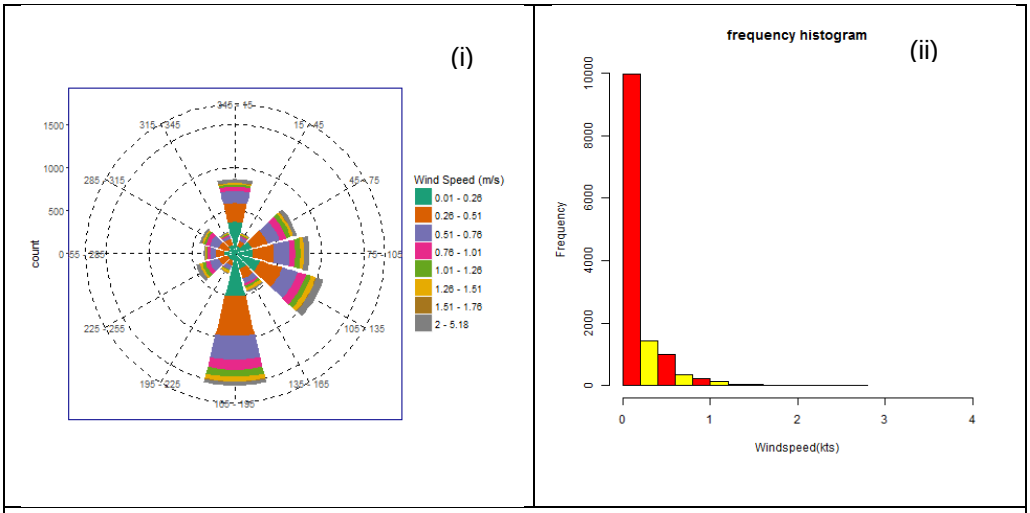


Fig.91. Distribution of (i) wind direction and (ii) wind speed of Satkhira during Post-monsoon Season

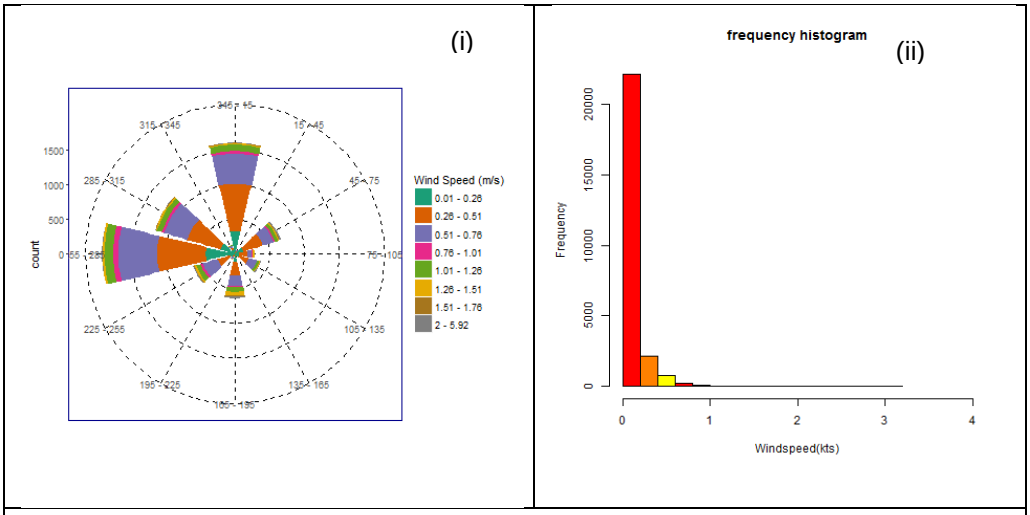


Fig.92. Distribution of (i) wind direction and (ii) wind speed of Sitakunda during Winter Season

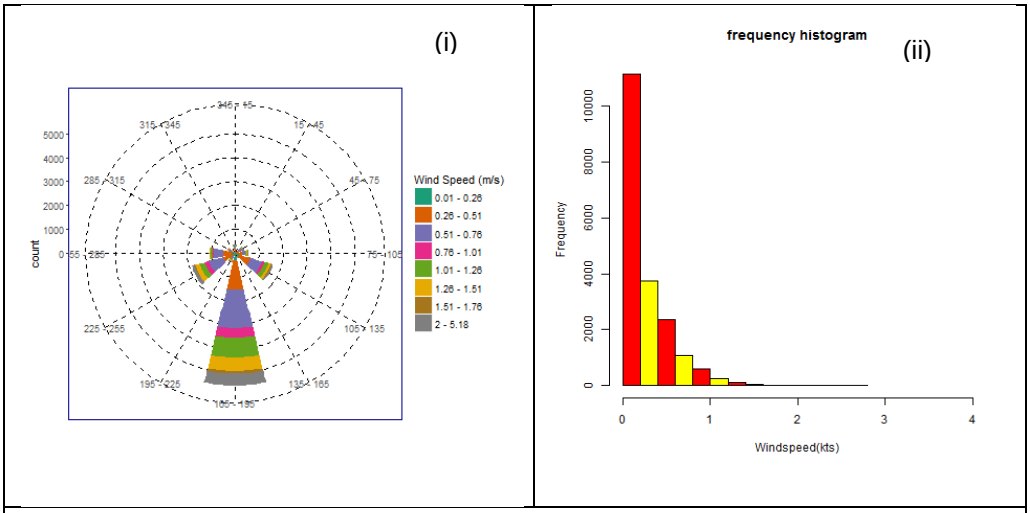


Fig.93. Distribution of (i) wind direction and (ii) wind speed of Sitakunda during Pre-monsoon Season

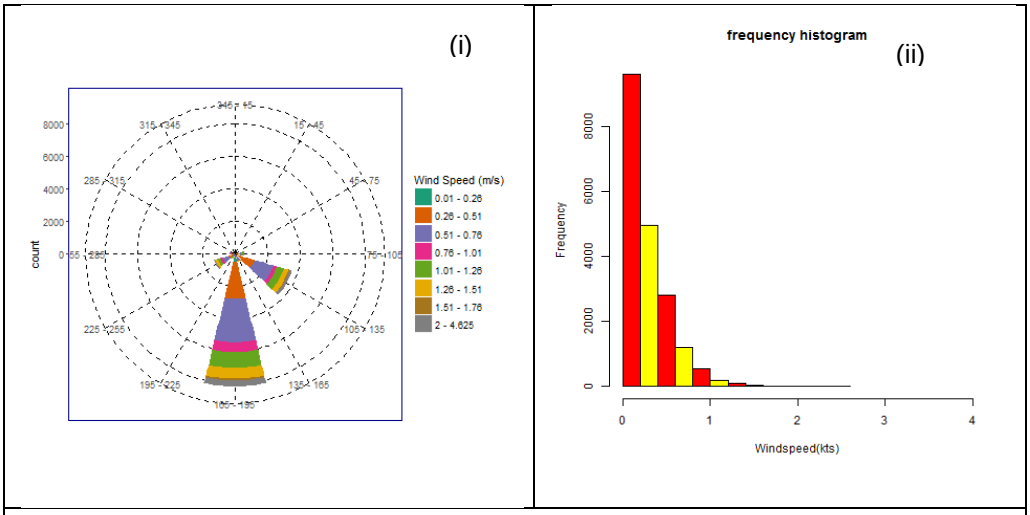


Fig.94. Distribution of (i) wind direction and (ii) wind speed of Sitakunda during Monsoon Season

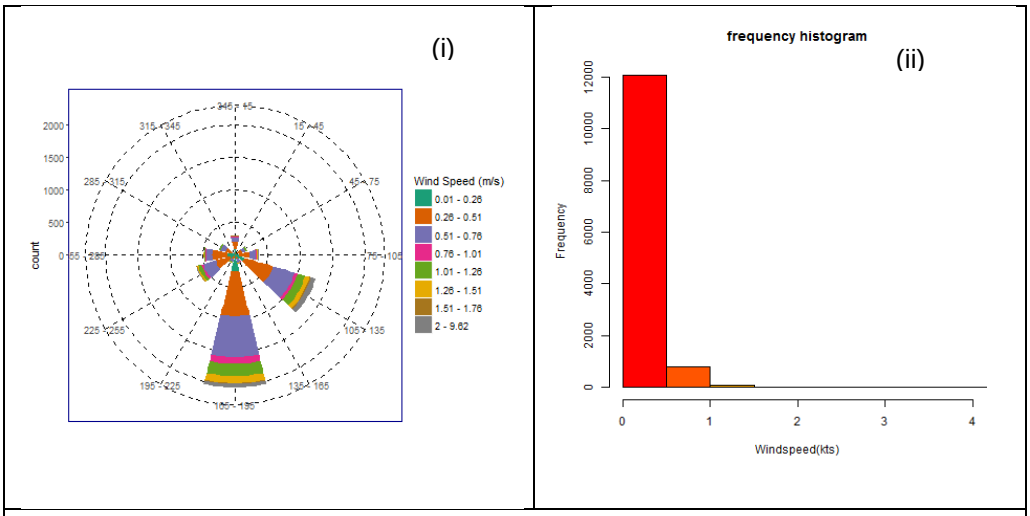


Fig.95. Distribution of (i) wind direction and (ii) wind speed of Sitakunda during Post-monsoon Season

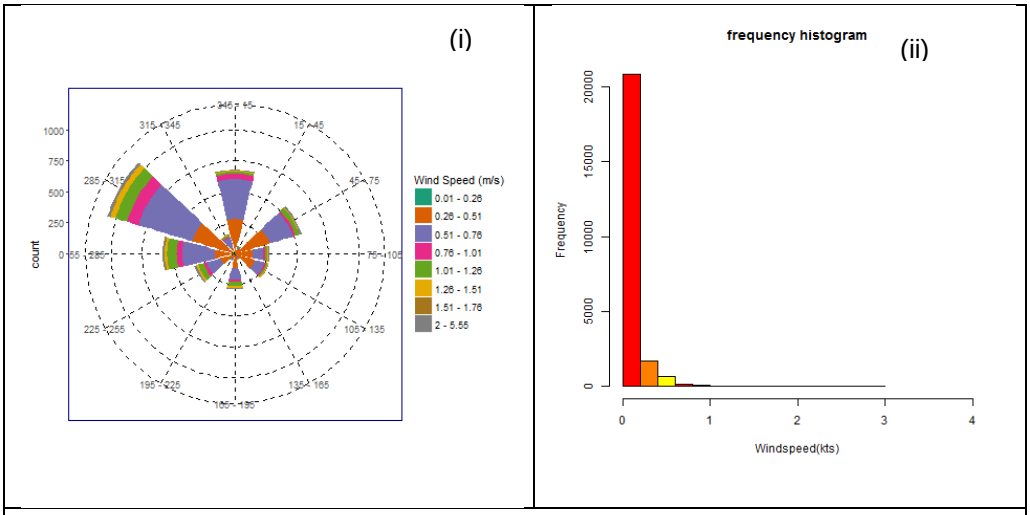


Fig.96. Distribution of (i) wind direction and (ii) wind speed of Srimangal during Winter Season

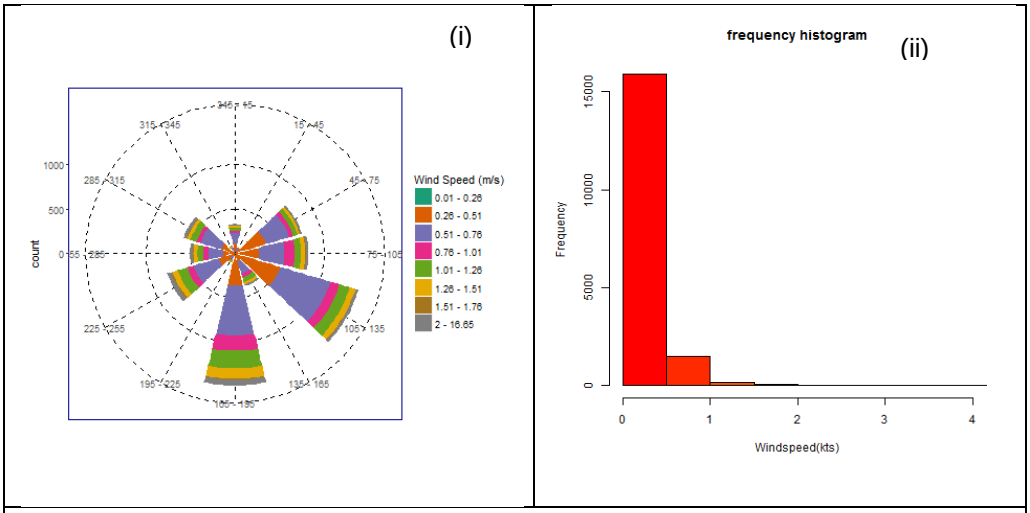


Fig.97. Distribution of (i) wind direction and (ii) wind speed of Srimangal during Pre-monsoon Season

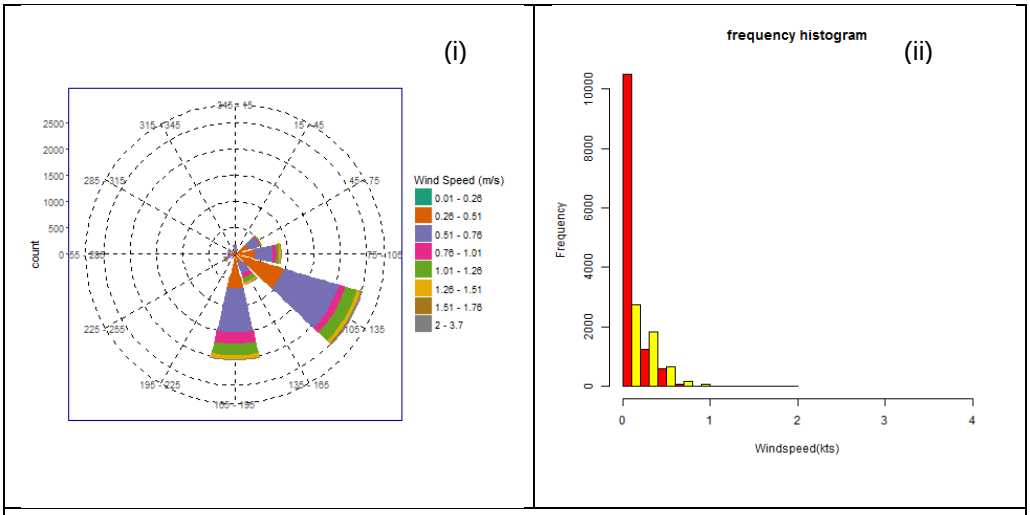


Fig.98. Distribution of (i) wind direction and (ii) wind speed of Srimangal during Monsoon Season

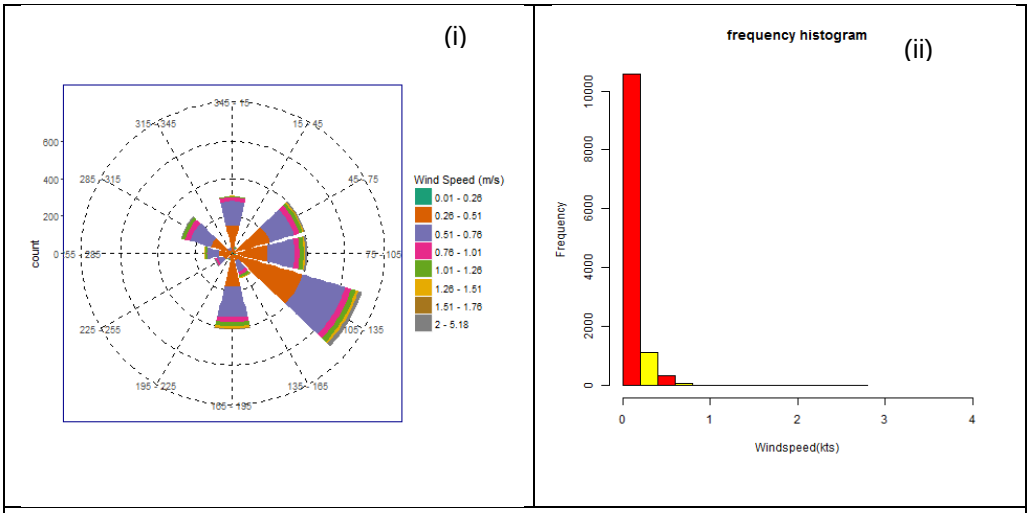


Fig. 99. Distribution of (i) wind direction and (ii) wind speed of Srimangal during Post-monsoon Season

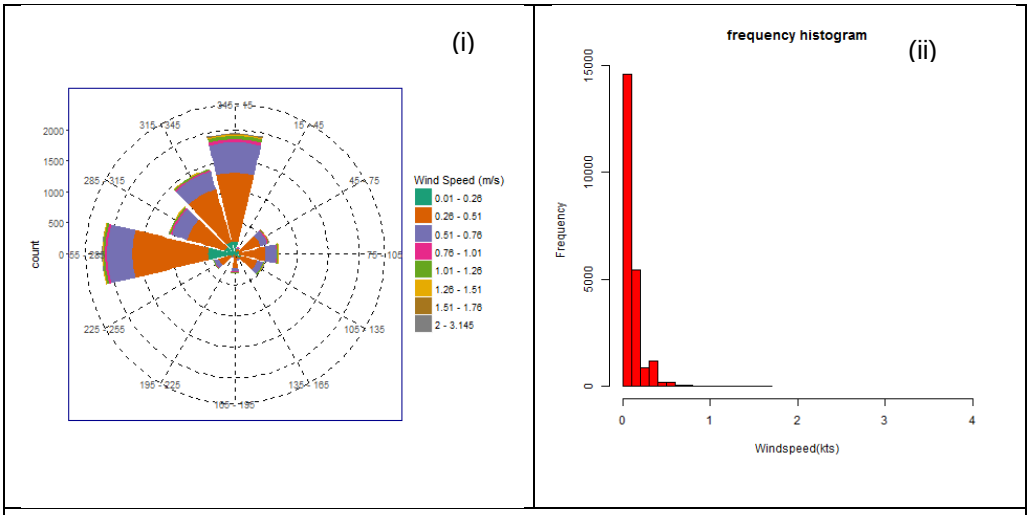


Fig.100. Distribution of (i) wind direction and (ii) wind speed of Tangail during Winter Season

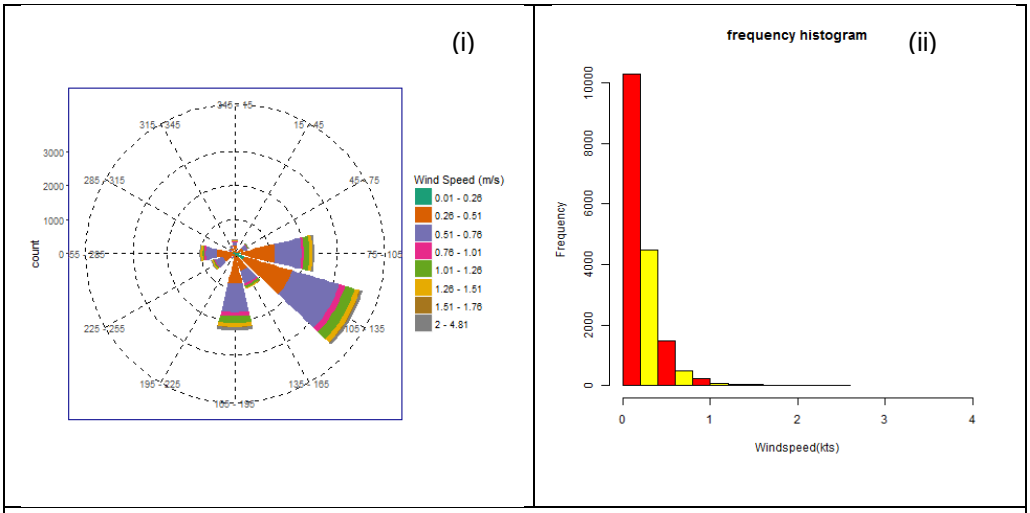


Fig.101. Distribution of (i) wind direction and (ii) wind speed of Tangail during Pre-monsoon Season

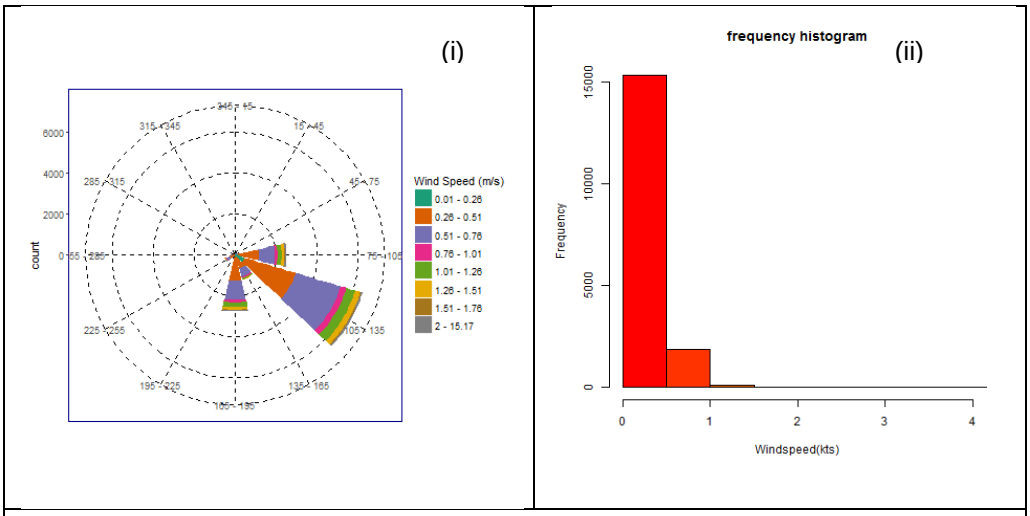


Fig.102. Distribution of (i) wind direction and (ii) wind speed of Tangail during Monsoon Season

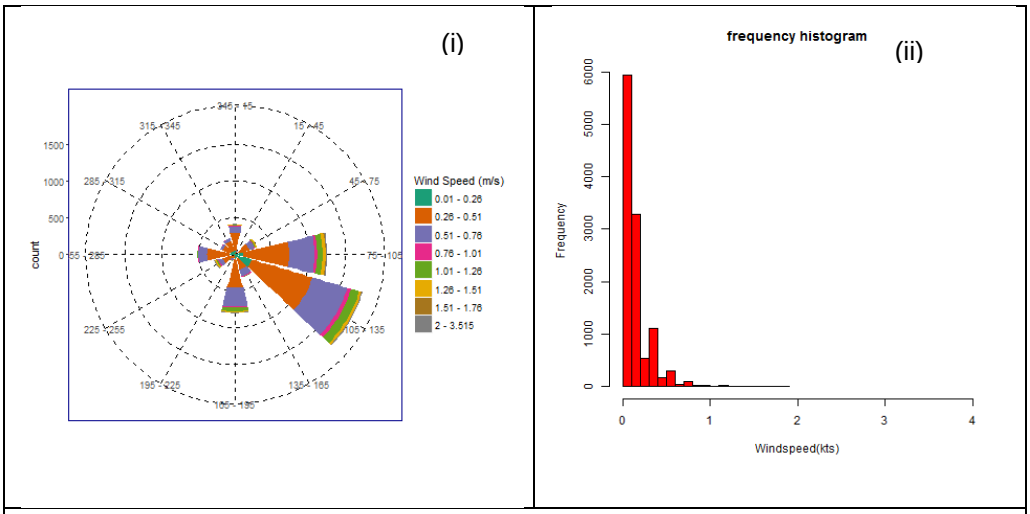


Fig.103. Distribution of (i) wind direction and (ii) wind speed of Tangail during Post-monsoon Season

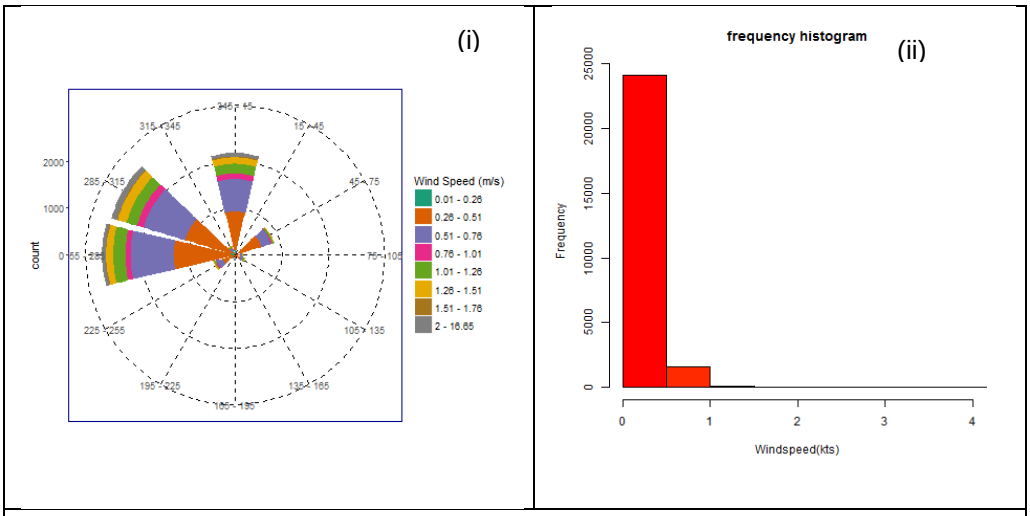


Fig.104. Distribution of (i) wind direction and (ii) wind speed of Teknaf during Winter Season

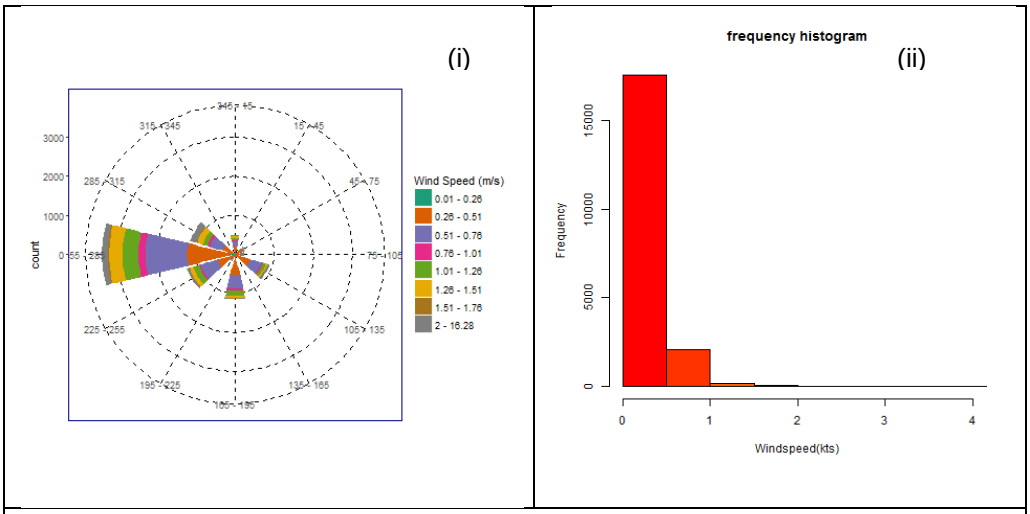


Fig.105. Distribution of (i) wind direction and (ii) wind speed of Teknaf during Pre-monsoon Season

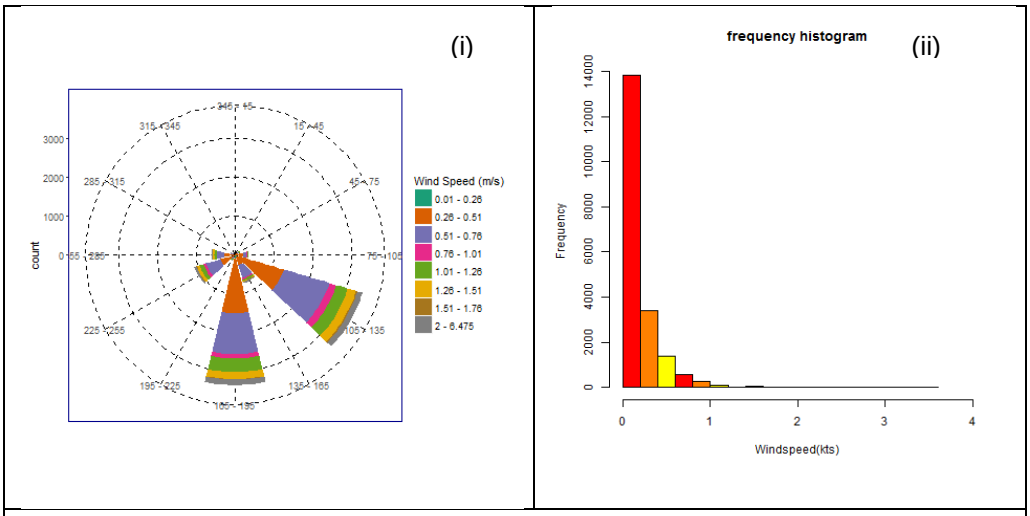


Fig.106. Distribution of (i) wind direction and (ii) wind speed of Teknaf during Monsoon Season

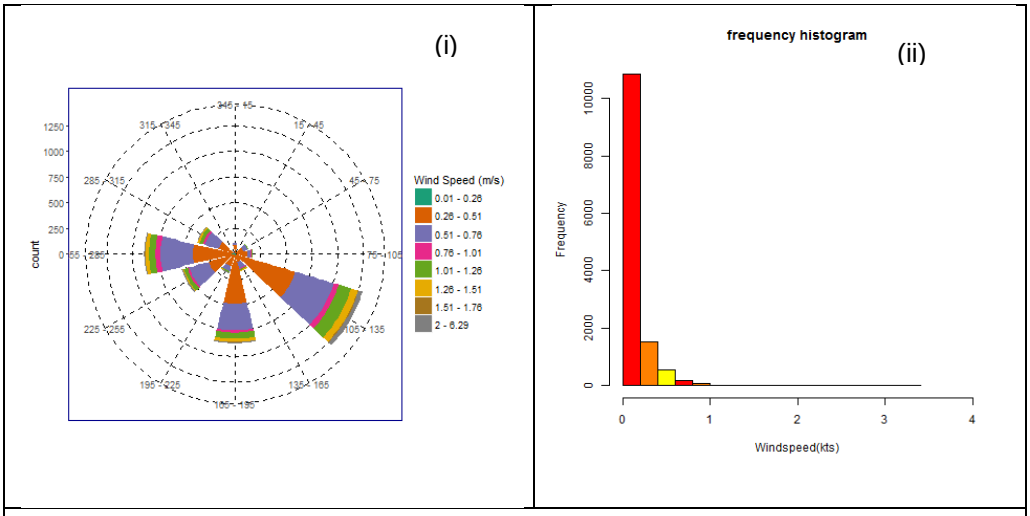


Fig. 107. Distribution of (i) wind direction and (ii) wind speed of Teknaf during Post-monsoon Season

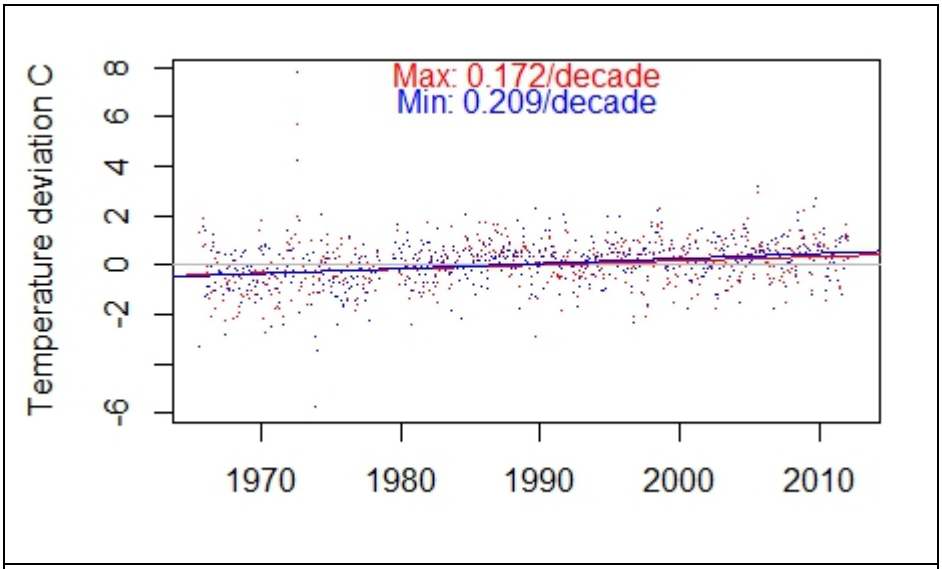


Fig.108. Maximum and minimum temperature trend over Bhola

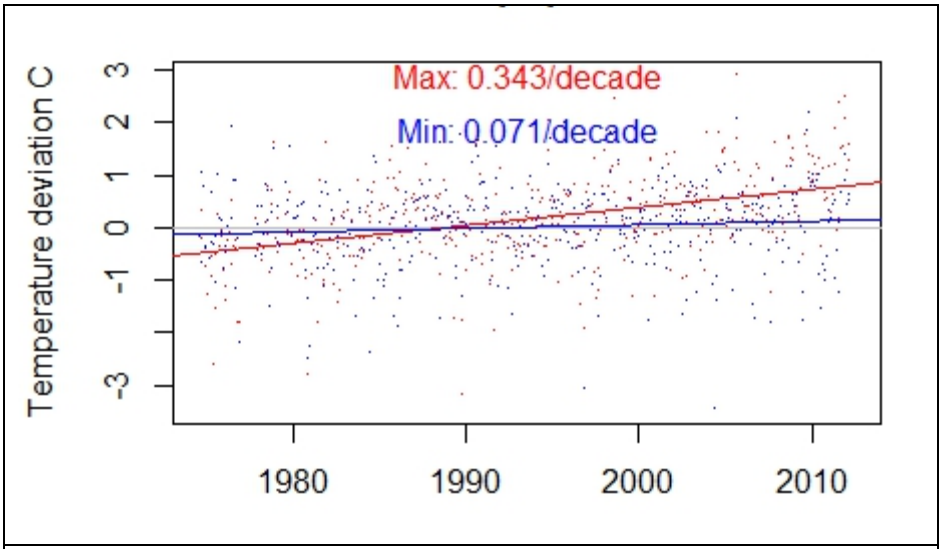


Fig.109. Maximum and minimum temperature trend over Khepupara

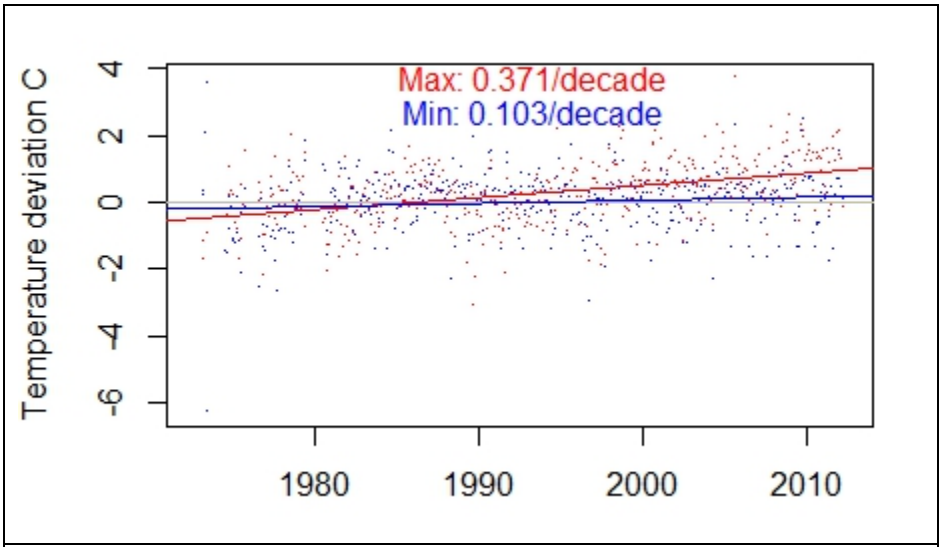


Fig. 110. Maximum and minimum temperature trend over Patuakhali

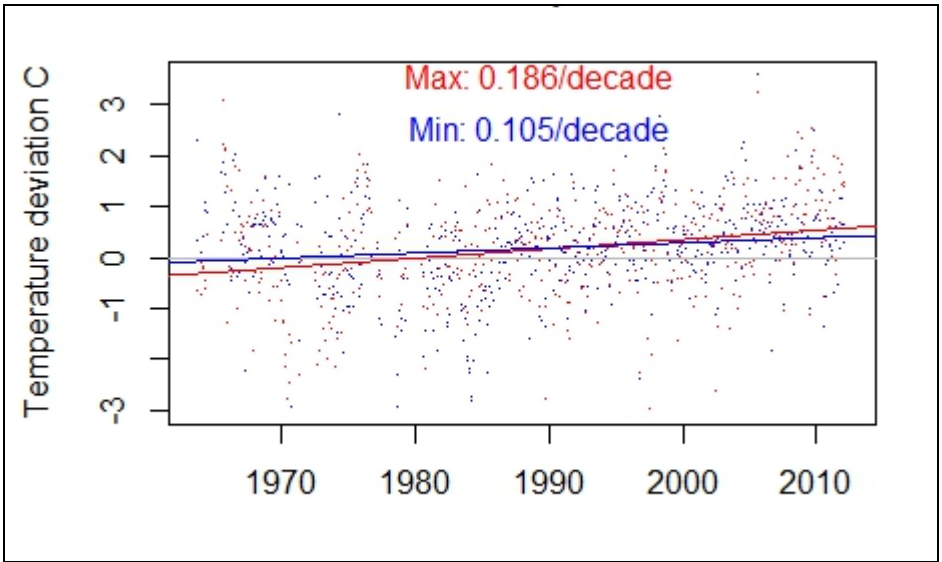


Fig. 111. Maximum and minimum temperature trend over Chandpur

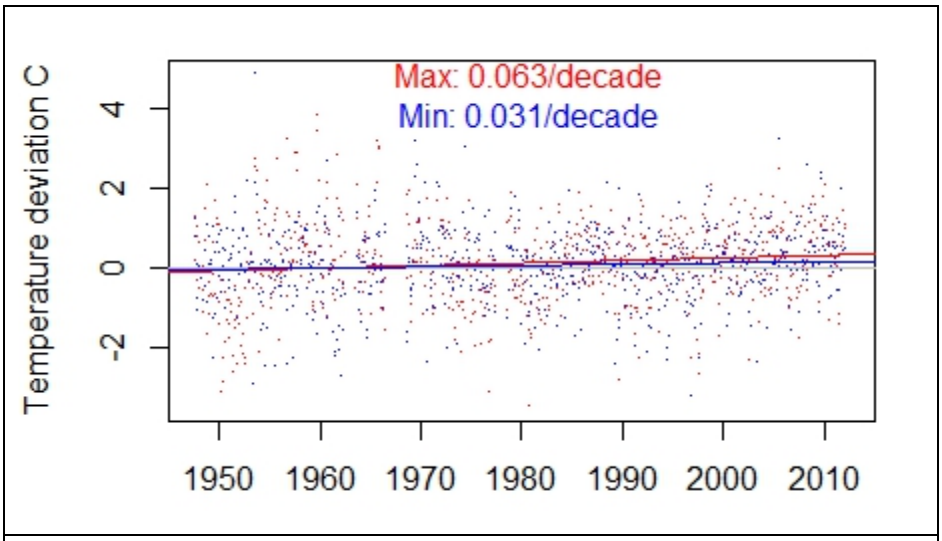


Fig.112. Maximum and minimum temperature trend over Comilla

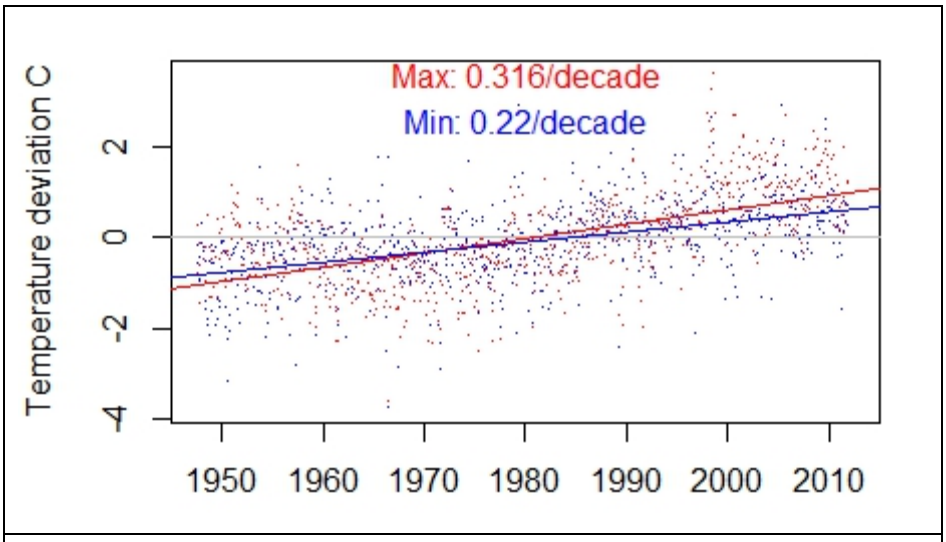


Fig.113. Maximum and minimum temperature trend over Coxsbazar

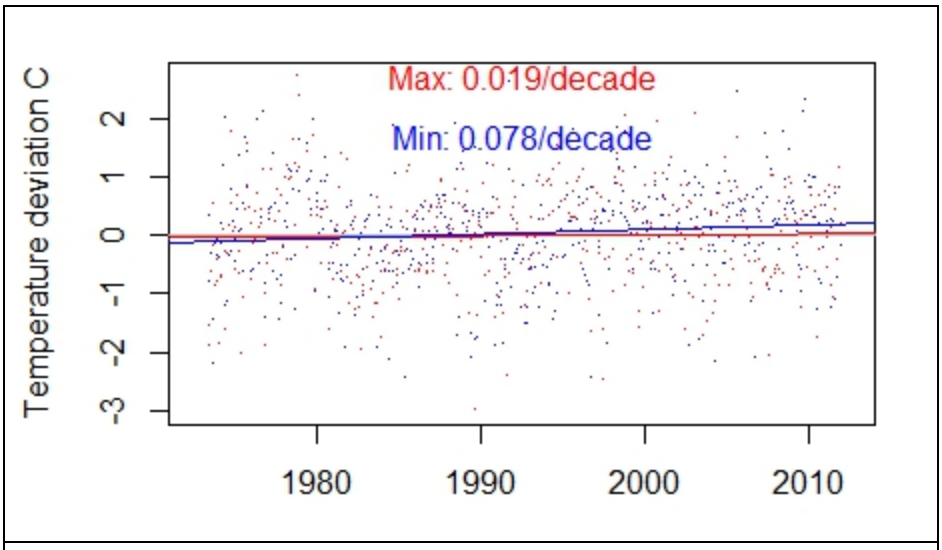


Fig.114. Maximum and minimum temperature trend over Feni

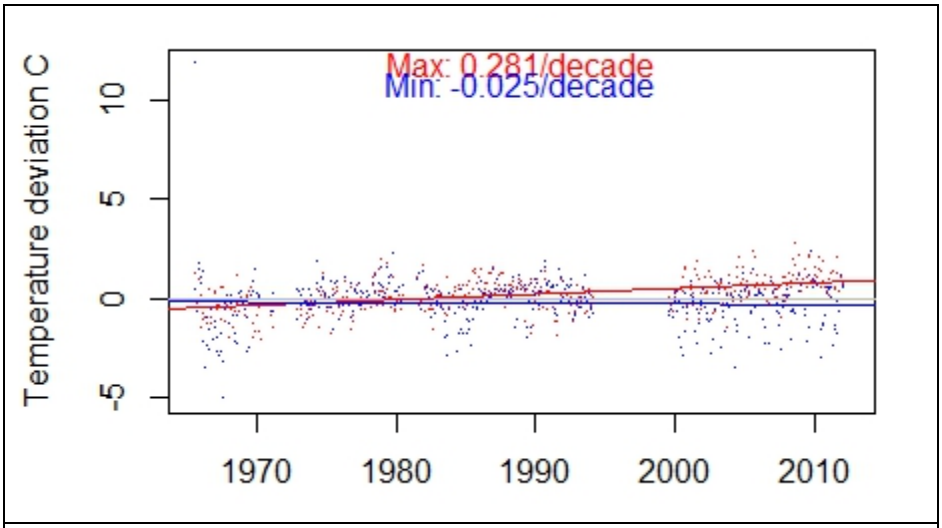


Fig.115. Maximum and minimum temperature trend over Hatiya

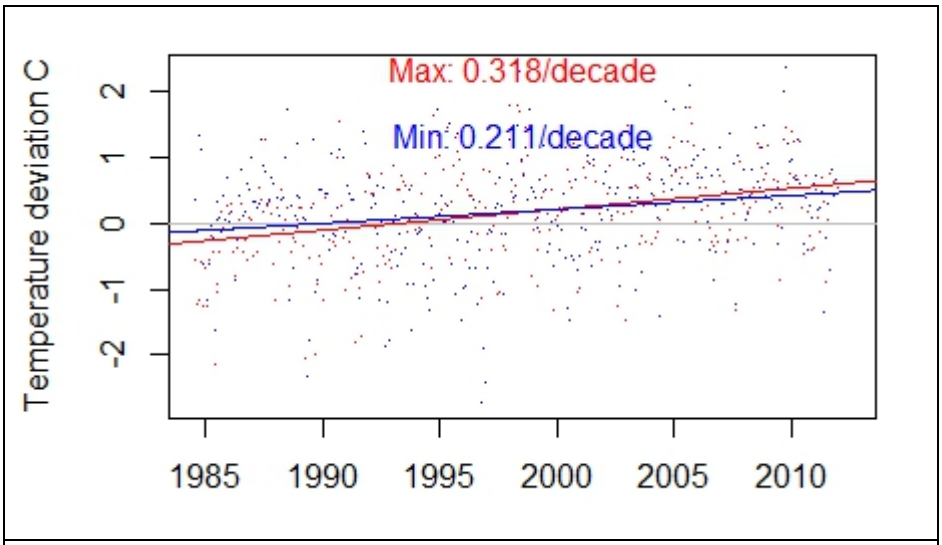


Fig.116. Maximum and minimum temperature trend over Kutubdia

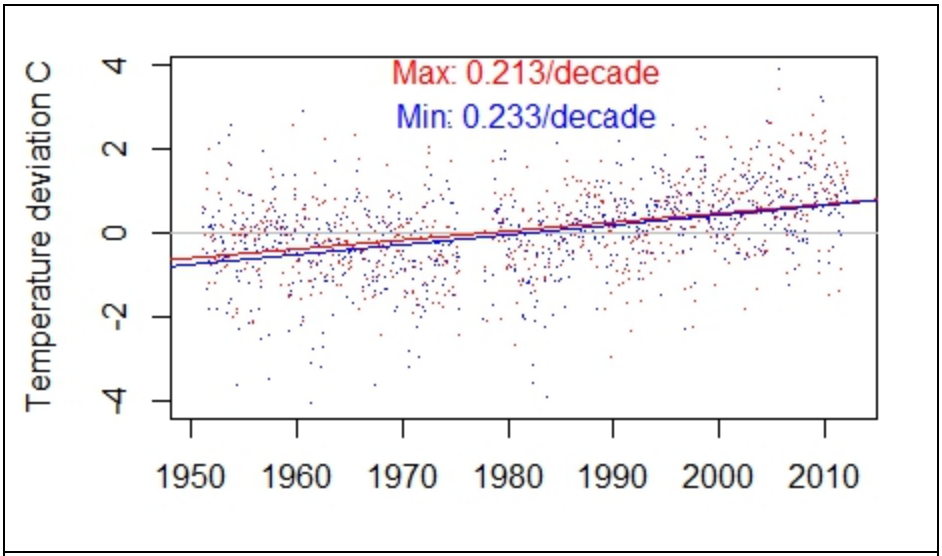


Fig.117. Maximum and minimum temperature trend over M court

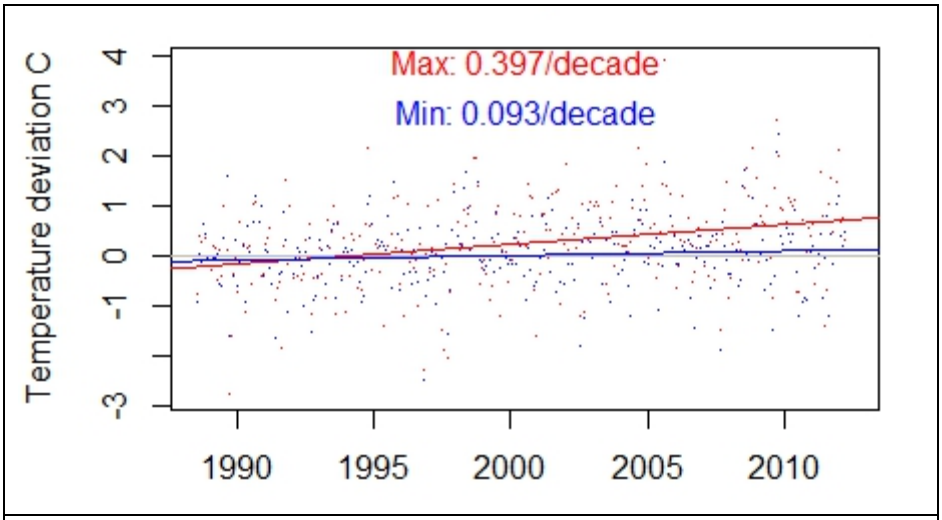


Fig.118. Maximum and minimum temperature trend over Mongla

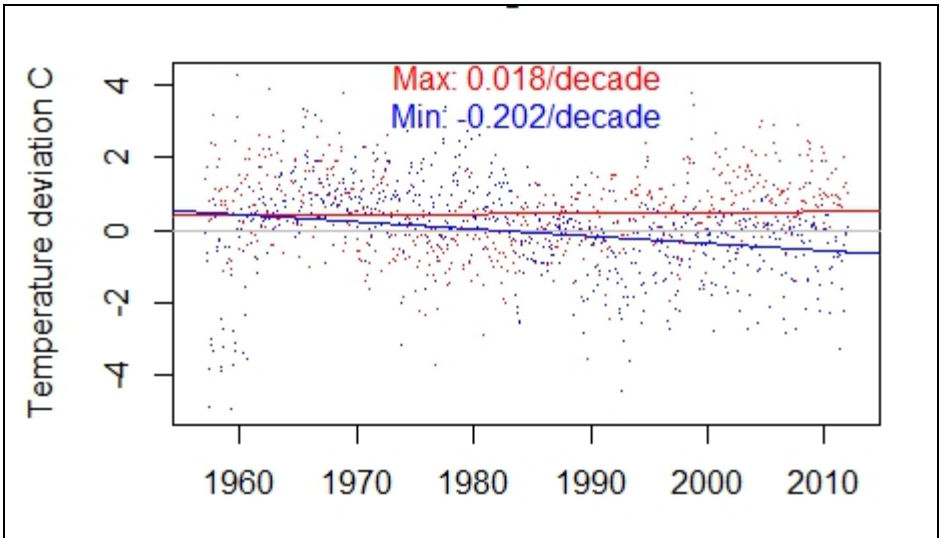


Fig.119. Maximum and minimum temperature trend over Rangamati

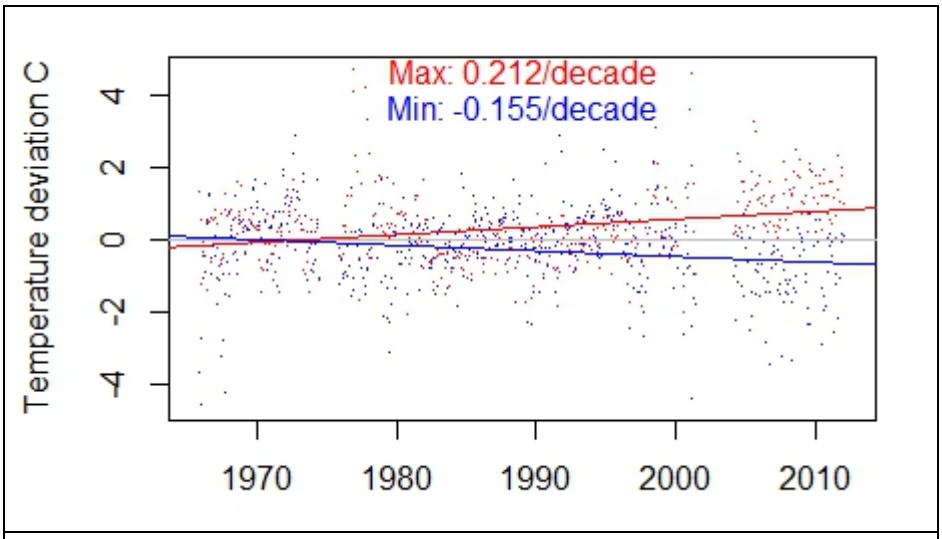


Fig. 120. Maximum and minimum temperature trend over Sandwip

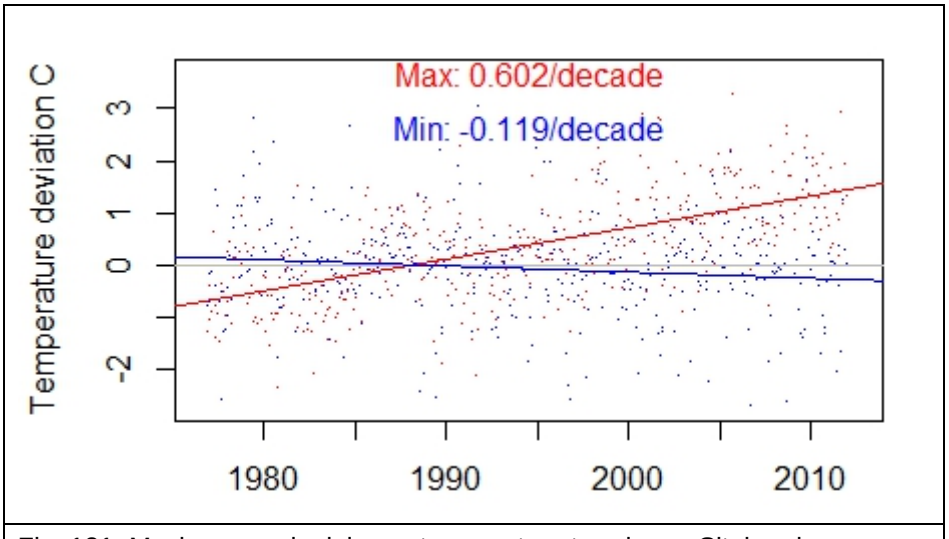


Fig. 121. Maximum and minimum temperature trend over Sitakunda

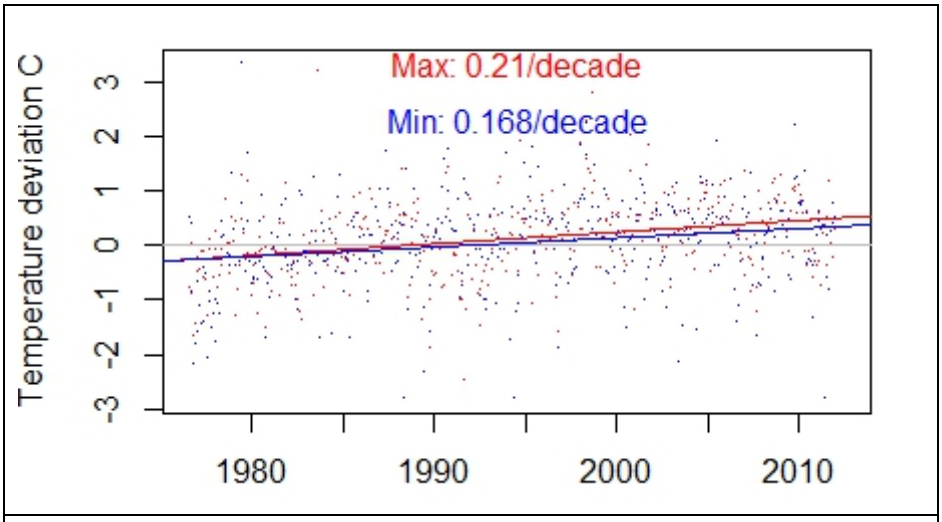


Fig.122. Maximum and minimum temperature trend over Teknaf

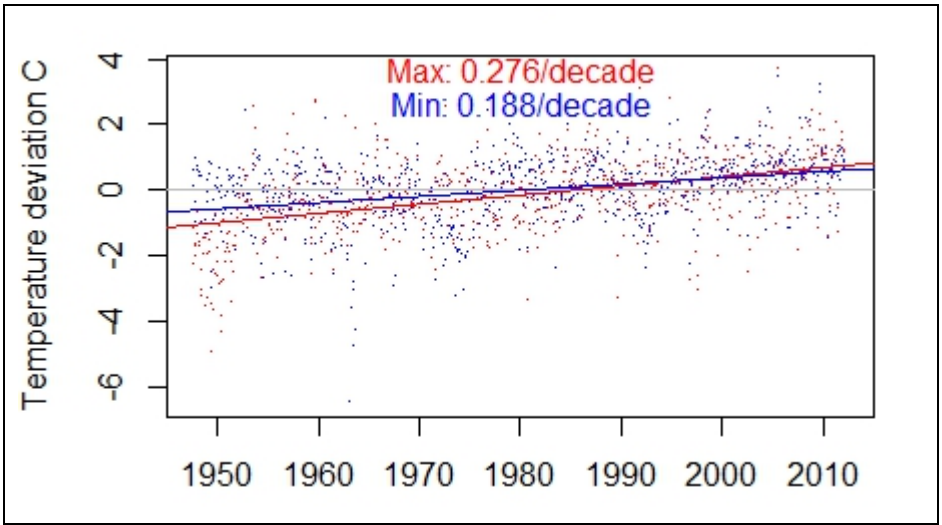


Fig.123. Maximum and minimum temperature trend over Faridpur

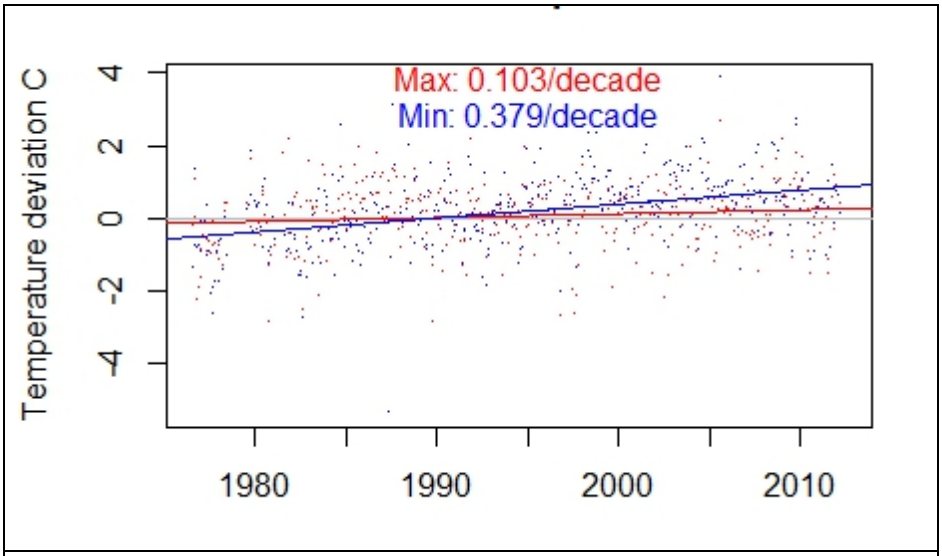


Fig.124. Maximum and minimum temperature trend over Madaripur

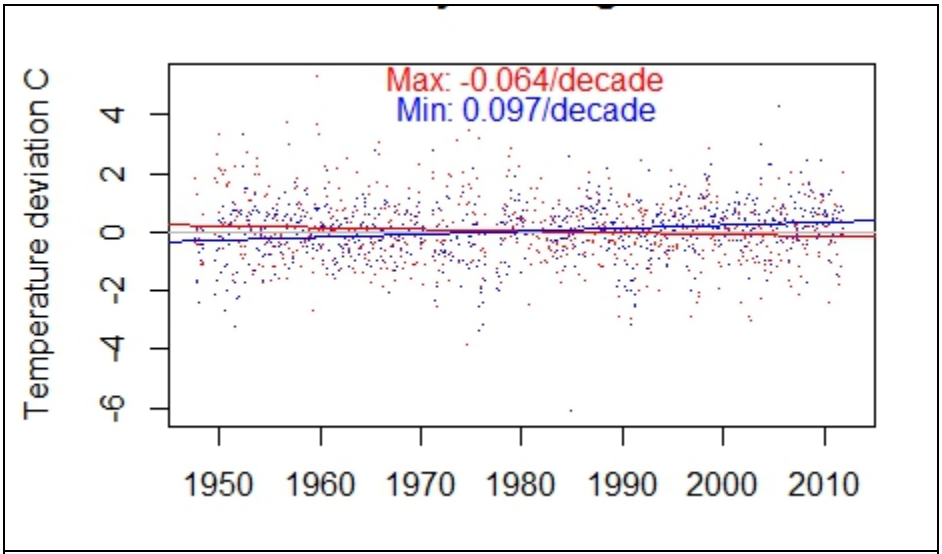


Fig.125. Maximum and minimum temperature trend over Mymensingh

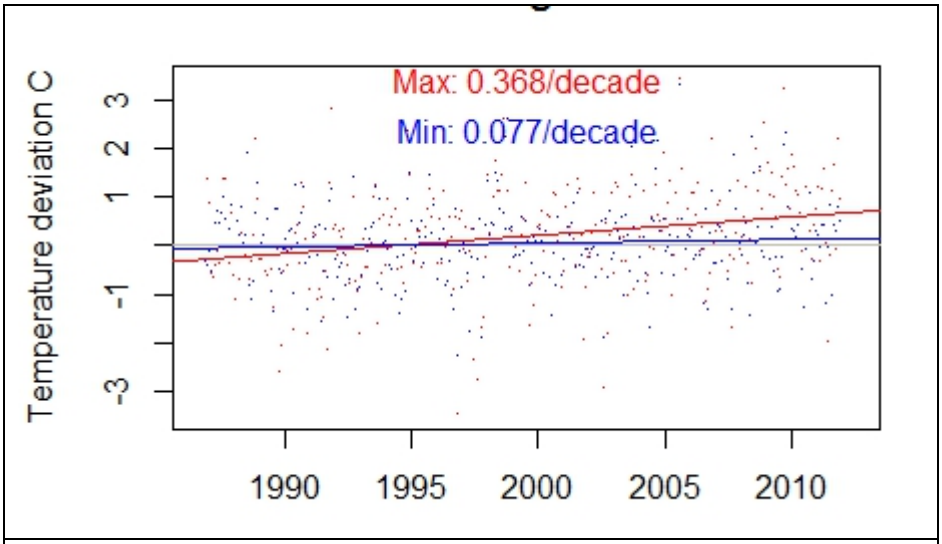


Fig.126. Maximum and minimum temperature trend over Tangail

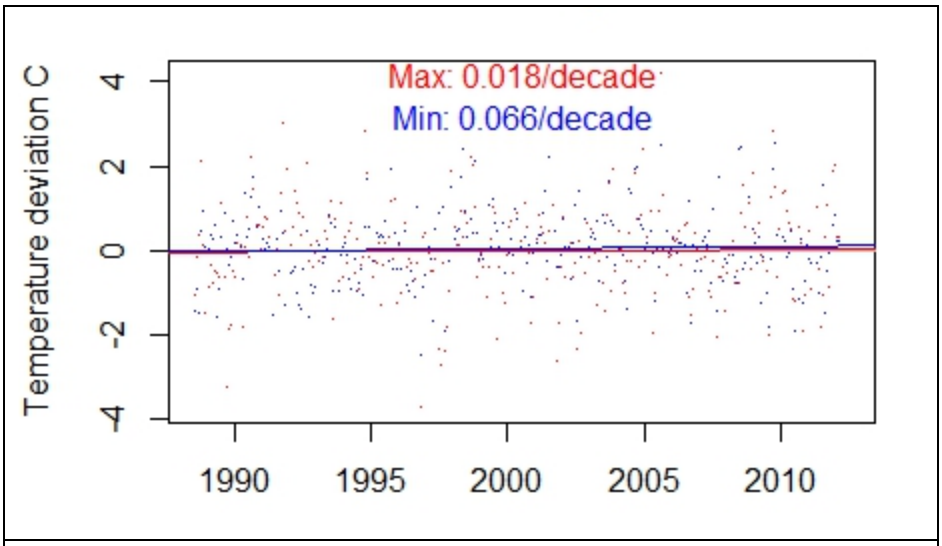


Fig.127. Maximum and minimum temperature trend over Chuadanga

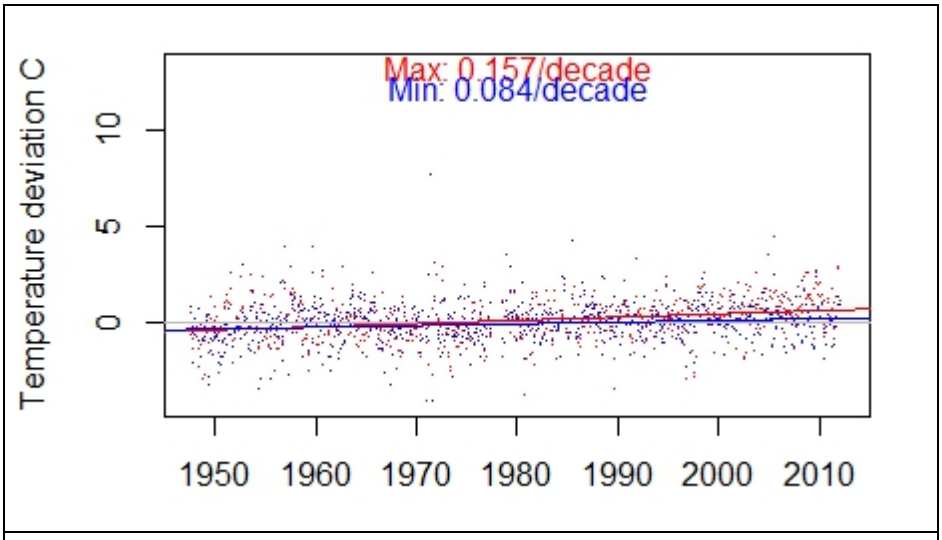


Fig.128. Maximum and minimum temperature trend over Jessore

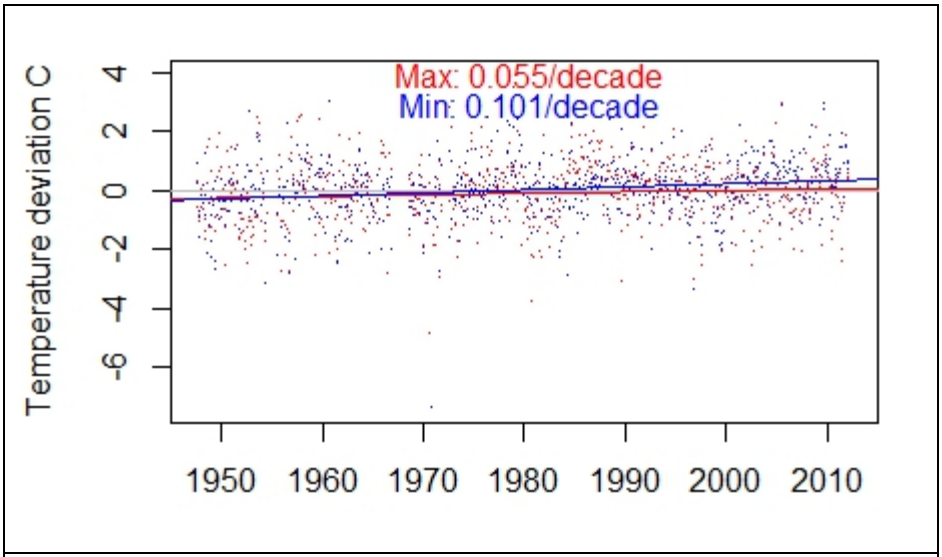


Fig.129. Maximum and minimum temperature trend over Satkhira

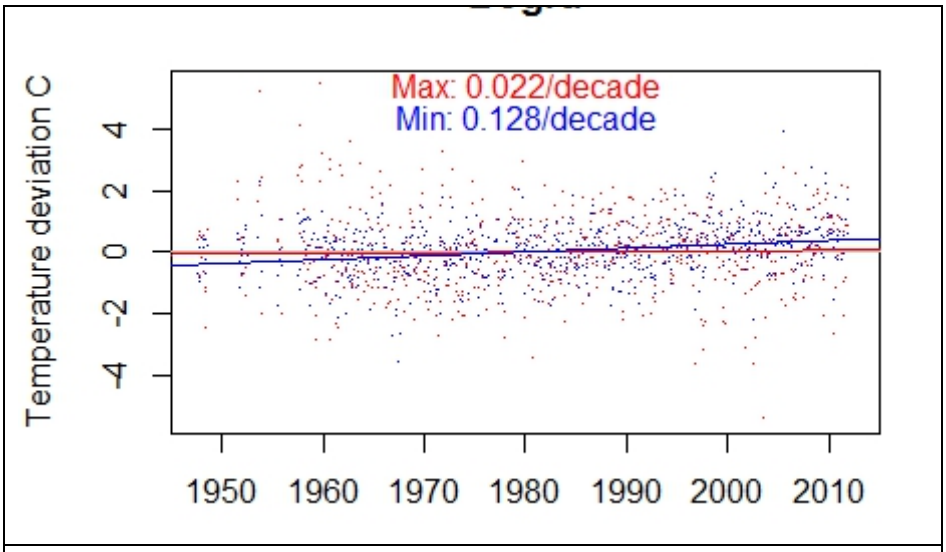


Fig.130. Maximum and minimum temperature trend over Bogra

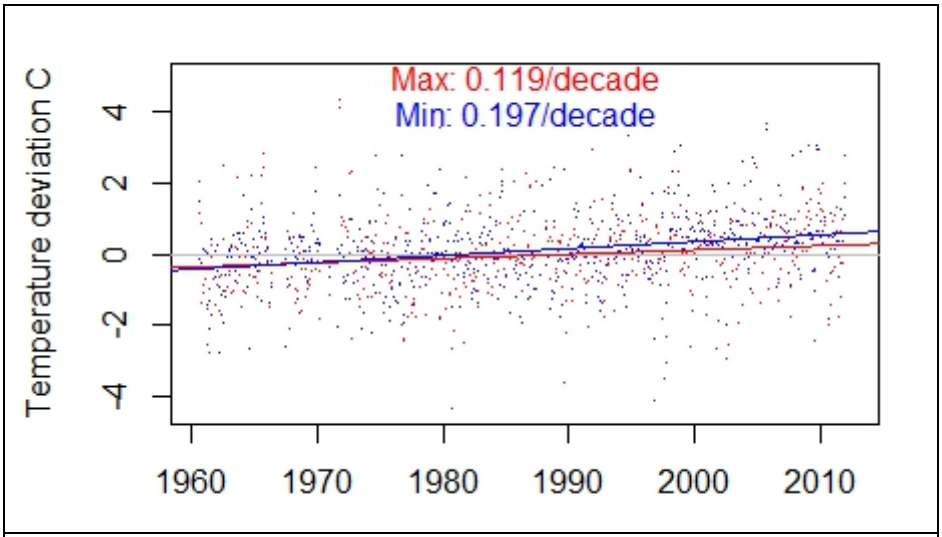


Fig.131. Maximum and minimum temperature trend over Ishurdi

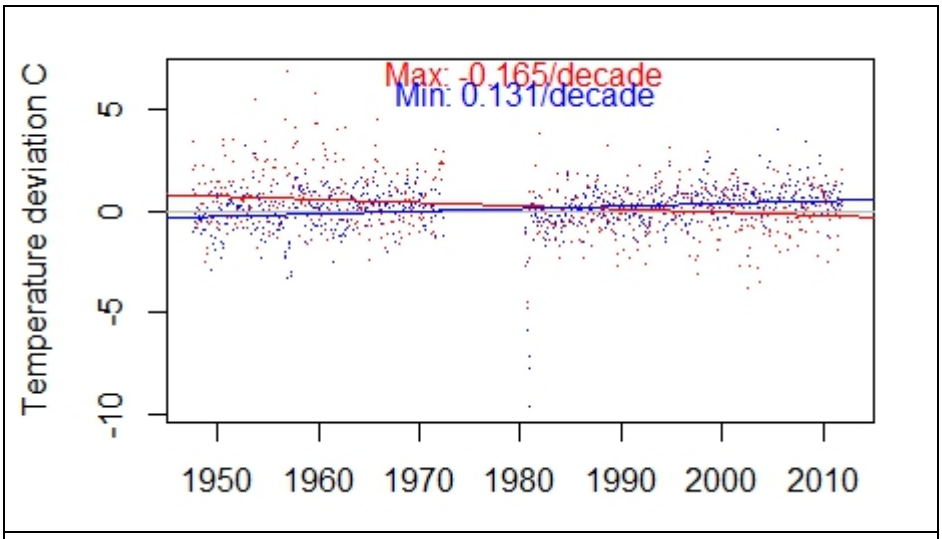


Fig.132. Maximum and minimum temperature trend over Dinajpur

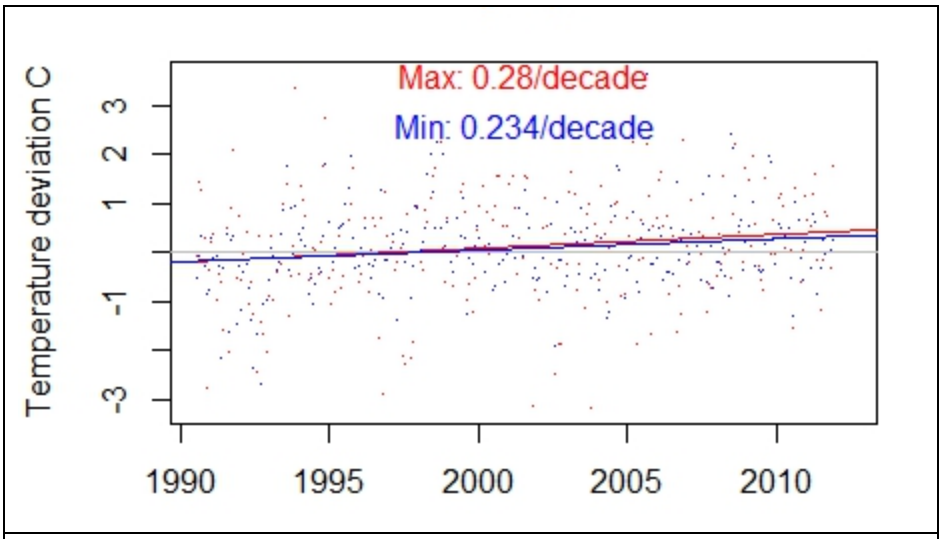


Fig.133. Maximum and minimum temperature trend over Sayedpur

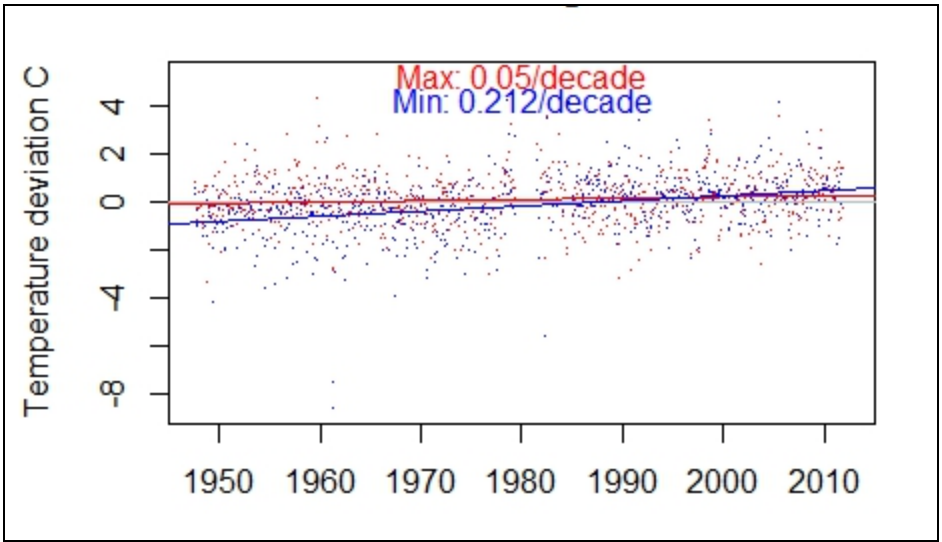


Fig.134. Maximum and minimum temperature trend over Srimangal

Table 49: Frequency of rainy days over Bhola for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	900	765	820	692	566	317	197	242	383	682	837	905	7306	
Light rain 1-10	22	58	71	116	165	259	363	399	285	131	36	19	1924	6
Moderate rain 11-22	6	15	14	32	79	118	157	129	113	44	11	3	721	
Moderate heavy 23-43	2	7	17	43	81	105	141	103	67	30	9	3	608	
Heavy rain 44-88		2	6	13	32	72	55	40	37	29	4		290	
Very heavy rain > 89			2	4	7	23	17	17	15	14	3		102	
Very heavy rain 100-199			1	1	5	16	9	8	7	9	2		58	
Very heavy rain 200-299						2	1		2	1			6	
Very heavy rain > 300													0	

Table 50: Frequency of rainy days over Bogra for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	895	783	843	721	536	392	316	372	405	694	854	900	7711	
Light rain 1-10	29	51	67	110	212	244	329	335	255	123	38	23	1816	6
Moderate rain 11-22	5	13	14	33	85	199	123	102	113	49	5	4	745	
Moderate heavy 23-43			5	27	60	82	96	72	67	33	1	1	444	
Heavy rain 44-88	1		1	9	35	46	48	38	49	22	2	2	253	
Very heavy rain > 89					2	11	11	11	11	9			55	
Very heavy rain 100-199					2	9		10	10	8			39	
Very heavy rain 200-299						1							1	
Very heavy rain > 300													0	

Table 51: Frequency of rainy days over Chandpur for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	895	777	803	672	546	375	267	305	405	707	844	904	7500	
Light rain 1-10	30	50	82	122	173	239	308	352	274	106	26	20	1782	
Moderate rain 11-22	5	11	14	43	82	124	159	134	104	46	14	3	739	13
Moderate heavy 23-43		7	22	38	73	90	120	76	69	31	6	3	535	
Heavy rain 44-88		2	7	13	46	52	68	47	37	30	4		306	
Very heavy rain > 89			2	9	10	14	8	15	11	10	3		82	
Very heavy rain 100-199			2	6	8	11	4	9	5	6	2		53	
Very heavy rain 200-299				1			3		1				5	
Very heavy rain > 300						2							2	

* 3 August 1982 --- 300 mm

Table 52: Frequency of rainy days over Comilla for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	897	780	813	668	517	380	302	350	391	686	842	906	7532	
Light rain 1-10	27	50	65	110	175	246	341	323	317	128	35	16	1833	
Moderate rain 11-22	6	11	26	56	87	106	122	133	83	40	9	5	684	7
Moderate heavy 23-43		4	18	41	82	88	85	76	72	43	5	2	516	
Heavy rain 44-88		2	4	21	58	52	56	41	27	24	8		293	
Very heavy rain > 89			4	4	11	21	24	7	10	9	1	1	92	
Very heavy rain 100-199			2	3	7	13	14	5	7	3	1		55	
Very heavy rain 200-299			1			1			1				3	
Very heavy rain > 300							1						1	

** 10 June 2008 -----360 mm

Table 53: Frequency of rainy days over Cox'sbazar for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	910	795	862	739	544	230	156	180	321	631	793	897	7058	
Light rain 1-10	15	36	43	73	173	239	251	306	300	140	48	18	1642	
Moderate rain 11-22	3	7	9	29	81	98	123	160	112	53	20	5	700	35
Moderate heavy 23-43	2	5	7	30	53	122	149	116	81	52	18	6	641	
Heavy rain 44-88		4	4	17	54	111	163	118	62	40	11	2	586	
Very heavy rain > 89			2	2	25	91	85	47	24	11	8		295	
Very heavy rain 100-199			1	2	17	65	59	29	17	7	5		202	
Very heavy rain 200-299					2	3	5	4	1				15	
Very heavy rain > 300						1								

** 10 June 2008 -----360 mm

Table 54: Frequency of rainy days over Dinajpur for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	890	799	872	729	578	409	305	418	423	750	877	905	7955	
Light rain 1-10	26	38	45	100	167	232	322	257	242	95	15	17	1556	
Moderate rain 11-22	11	7	12	42	79	108	120	106	102	36	5	5	633	3
Moderate heavy 23-43	3	3	1	23	63	76	74	78	76	19	2	3	421	
Heavy rain 44-88				5	37	51	87	49	35	14	1		279	
Very heavy rain > 89				1	6	22	22	22	21	16			110	
Very heavy rain 100-199					4	14	13	14	11	11			67	
Very heavy rain 200-299						2	2	1	5	1			11	
Very heavy rain > 300									2	1			3	

** 28 September 1995 --- 366 mm, ** 26 September 1996--- 508 mm & ** 3 October 2005--- 335 mm mm

Table 55: Frequency of rainy days over Faridpur for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	886	768	815	684	553	394	277	334	399	692	849	903	7554	
Light rain 1-10	40	57	69	106	176	238	370	370	307	118	29	18	1898	
Moderate rain 11-22	3	13	22	55	96	130	138	109	87	48	9	3	713	3
Moderate heavy 23-43	1	5	18	39	62	87	90	75	67	38	3	4	489	
Heavy rain 44-88		3	6	15	39	38	41	26	28	30	6	1	233	
Very heavy rain > 89		1		1	4	14	11	16	12	4	4	1	68	
Very heavy rain 100-199				1	4	10	9	12	6	3	2		47	
Very heavy rain 200-299													0	
Very heavy rain > 300									1				1	

** 27 September 1986 --- 370 mm

Table 56: Frequency of rainy days over Feni for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	904	782	801	691	529	353	227	328	389	689	840	908	7441	
Light rain 1-10	20	43	50	78	142	201	248	261	252	114	29	11	1449	
Moderate rain 11-22	5	14	18	56	78	127	121	117	114	49	14	9	722	71
Moderate heavy 23-43	1	4	18	35	95	90	139	108	69	39	5	1	604	
Heavy rain 44-88		3	7	33	73	90	112	84	63	23	11	1	500	
Very heavy rain > 89		1	2	6	13	34	52	32	13	16	1		170	
Very heavy rain 100-199		1	2	3	10	25	37	22	8	13	1		122	
Very heavy rain 200-299							2	1	1	1			5	
Very heavy rain > 300							1						1	

** 16 July 2005 --- 420 mm

Table 57: Frequency of rainy days over Hatiya for different rainfall ranges during the period 1982-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	757	664	708	591	471	236	158	190	265	506	662	721	5929	
Light rain 1-10	12	26	36	83	131	182	206	261	192	98	31	14	1272	
Moderate rain 11-22	4	8	12	37	65	102	112	103	90	46	11	5	595	235
Moderate heavy 23-43	1	7	11	22	60	99	109	103	78	32	11	3	536	
Heavy rain 44-88			7	10	38	91	99	69	56	35	1	1	407	
Very heavy rain > 89		1	1	7	10	36	40	23	17	18	4		157	
Very heavy rain 100-199			1	2	8	26	24	18	13	12	3		107	
Very heavy rain 200-299				1			4	1		2	1		9	
Very heavy rain > 300						1		1					2	

** 21 August 2005 --- 330 mm&** 15 June 2001 --- 337 mm

Table 58: Frequency of rainy days over Isurdhi for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	893	777	832	727	593	472	321	416	434	713	854	905	7937	
Light rain 1-10	31	45	56	91	167	232	349	311	241	136	32	18	1709	
Moderate rain 11-22	5	18	29	47	82	85	128	113	108	34	6	3	658	17
Moderate heavy 23-43	1	6	11	24	61	64	82	57	63	26	5	3	403	
Heavy rain 44-88			1	9	26	35	39	27	41	14	2	1	195	
Very heavy rain > 89				1		6	9	4	13	5			38	
Very heavy rain 100-199				1		5	6	4	8	2			26	
Very heavy rain 200-299										1			1	
Very heavy rain > 300													0	

Table 59: Frequency of rainy days over Jessore for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	880	773	814	735	605	406	311	299	408	686	845	904	7666	
Light rain 1-10	36	45	71	97	165	241	343	411	288	131	39	18	1885	
Moderate rain 11-22	9	22	25	33	73	111	134	125	94	58	5	5	694	0
Moderate heavy 23-43	5	6	14	26	51	87	83	60	66	28	4	2	432	
Heavy rain 44-88		1	6	8	34	46	50	26	31	22	4		228	
Very heavy rain > 89				1	2	9	9	9	13	5	3	1	52	
Very heavy rain 100-199					1	6	6	8	7	5	2	1	36	
Very heavy rain 200-299						1		1	3				5	
Very heavy rain > 300													0	

Table 60: Frequency of rainy days over Khepupara for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	899	781	844	738	575	304	164	198	328	627	816	874	7148	
Light rain 1-10	25	40	55	81	158	233	320	382	303	147	52	15	1811	
Moderate rain 11-22	2	14	14	39	76	119	147	160	115	58	12	6	762	99
Moderate heavy 23-43	3	10	11	32	73	101	135	101	72	43	10	4	595	
Heavy rain 44-88		2	3	8	39	77	94	69	61	33	3		389	
Very heavy rain > 89	1		3	2	9	29	39	20	21	22	7		153	
Very heavy rain 100-199			3	2	4	19	21	16	14	11	2		92	
Very heavy rain 200-299					3	1	2	2	2	6	2		18	
Very heavy rain > 300							1						1	

** 2 July 1995 --- 373 mm

Table 61: Frequency of rainy days over Khulna for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	888	766	831	725	601	384	223	279	376	672	841	905	7491	
Light rain 1-10	31	53	52	106	166	277	374	385	303	136	36	23	1942	
Moderate rain 11-22	6	13	25	38	87	102	171	133	111	54	10		750	30
Moderate heavy 23-43	4	11	14	26	40	79	91	92	68	40	6	1	472	
Heavy rain 44-88	1	4	6	2	33	42	35	36	33	21	2	1	216	
Very heavy rain > 89			2	3	3	16	5	5	9	7	5		55	
Very heavy rain 100-199				2		11	4	3	3	6	3		32	
Very heavy rain 200-299						1			2				3	
Very heavy rain > 300									1				1	

** 27 September 1986 --- 430 mm

Table 62: Frequency of rainy days over Madaripur for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	893	769	808	706	573	376	253	282	394	668	809	879	7410	
Light rain 1-10	29	52	63	95	160	256	373	368	278	118	34	16	1842	
Moderate rain 11-22	6	14	38	42	80	95	145	112	90	40	12	4	678	155
Moderate heavy 23-43	2	10	15	35	71	97	93	84	68	43	9		527	
Heavy rain 44-88			5	21	43	58	48	40	29	21	4		269	
Very heavy rain > 89			1	1	3	18	18	13	11	9	2		76	
Very heavy rain 100-199				1	3	10	12	10	8	5	1		50	
Very heavy rain 200-299						1							1	
Very heavy rain > 300													0	

Table 63: Frequency of rainy days over Maijdee court for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	870	766	815	696	530	294	202	234	352	668	831	905	7163	
Light rain 1-10	21	50	60	99	164	229	240	288	274	128	37	18	1608	
Moderate rain 11-22	3	14	19	34	84	115	165	142	119	56	16	5	772	47
Moderate heavy 23-43	3	9	16	35	76	135	159	133	88	30	5	1	690	
Heavy rain 44-88	2	1	17	19	58	82	117	99	44	30	8	1	478	
Very heavy rain > 89			2	7	18	38	47	34	23	17	3		189	
Very heavy rain 100-199			2	3	8	29	31	26	18	12	2		131	
Very heavy rain 200-299						3	4	1	3	2			13	
Very heavy rain > 300							1	1	1				3	

** 18 July 1981 --- 520 mm, ** 3 August 1983 --- 371 mm &** 14 September 2004 --- 376 mm

Table 64: Frequency of rainy days over Mymensingh for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	896	778	812	633	470	307	226	308	348	678	865	904	7225	
Light rain 1-10	28	50	84	134	187	303	362	348	288	126	25	16	1951	
Moderate rain 11-22	5	10	19	69	98	121	161	132	114	46	3	6	784	0
Moderate heavy 23-43	1	9	11	46	108	95	97	84	97	33	1	3	585	
Heavy rain 44-88			4	16	60	56	58	47	42	27	6	1	317	
Very heavy rain > 89				2	7	18	26	11	11	20			95	
Very heavy rain 100-199				2	4	12	20	9	8	15			70	
Very heavy rain 200-299						2	2						4	
Very heavy rain > 300										1			1	

** 15 October 1991 --- 314 mm

Table 66: Frequency of rainy days over Patuakhali for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	893	767	835	719	583	290	154	224	336	632	832	909	7174	
Light rain 1-10	27	59	62	86	140	260	356	350	294	150	39	17	1840	
Moderate rain 11-22	8	13	13	45	97	137	151	179	113	60	14	2	832	2
Moderate heavy 23-43	2	5	12	32	67	103	137	87	91	41	6	2	585	
Heavy rain 44-88		3	7	13	35	77	103	72	45	31	5		391	
Very heavy rain > 89			1	5	8	33	28	18	21	15	4		133	
Very heavy rain 100-199				2	4	22	19	10	15	10			82	
Very heavy rain 200-299						5	1	1	4	2	1		14	
Very heavy rain > 300						1							1	

** 10 June 1982 --- 312 mm

Table 67: Frequency of rainy days over Rangamati for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	874	757	794	692	509	283	211	223	307	632	806	901	6989	
Light rain 1-10	22	42	55	105	186	279	373	394	341	160	46	18	2021	
Moderate rain 11-22	1	14	24	41	85	146	156	148	137	64	25	5	846	96
Moderate heavy 23-43	2	3	15	36	80	101	90	85	68	43	11	4	538	
Heavy rain 44-88		2	9	22	55	56	60	58	41	27	11	2	343	
Very heavy rain > 89		1	2	4	15	29	40	22	6	4	1		124	
Very heavy rain 100-199		1	2	4	10	19	28	12	3	2			81	
Very heavy rain 200-299					5	1	3	2					11	
Very heavy rain > 300						2	2	1					5	

** 21 June 2004 --- 304 mm, ** 26 June 1999 --- 307 mm, ** 11 July 2004 --- 337 mm,
** 15 July 1998 --- 317 mm&** 4 August 1983 --- 335 mm

Table 68: Frequency of rainy days over Sandwip for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	874	758	816	668	519	325	242	304	335	611	765	878	7095	
Light rain 1-10	17	41	40	76	146	192	195	212	220	103	36	13	1291	
Moderate rain 11-22	4	12	16	36	77	97	135	115	120	50	16	5	683	167
Moderate heavy 23-43	3	6	10	35	75	103	129	101	80	46	11	2	601	
Heavy rain 44-88	1	1	13	17	51	92	123	90	56	36	10	1	491	
Very heavy rain > 89		1	4	8	23	54	75	46	29	22	2		264	
Very heavy rain 100-199		1	2	7	14	39	51	28	20	16	2		180	
Very heavy rain 200-299					4	3	8	7	3	3			28	
Very heavy rain > 300						4	3		2				9	

** 4 June 2002 --- 339 mm, ** 15 June 2001 --- 590 mm, ** 17 June 2001 --- 395 mm, ** 21 June 2001 --- 366 mm, ** 9 July 2002 --- 370 mm, ** 20 July 2000 --- 311 mm, ** 20 July 2004 --- 374 mm, ** 14 September 2004 --- 422 mm &** 15 September 2004 --- 391 mm

Table 69: Frequency of rainy days over Satkhira for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	875	768	824	733	616	398	268	257	369	687	847	905	7547	
Light rain 1-10	41	45	70	93	172	276	377	406	292	126	30	22	1950	
Moderate rain 11-22	10	26	17	38	66	109	131	143	119	57	16	1	733	0
Moderate heavy 23-43	4	5	15	24	55	68	102	85	66	32	1	1	458	
Heavy rain 44-88		2	4	9	20	38	43	34	43	22	3		218	
Very heavy rain > 89		1		3	1	11	9	5	11	6	3	1	51	
Very heavy rain 100-199				2	1	7	3	3	9	5	1		31	
Very heavy rain 200-299						10							0	
Very heavy rain > 300									1				1	

** 27 September 1986 --- 302 mm

Table 70: Frequency of rainy days over Sitakhunda for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	905	791	825	689	544	313	247	277	354	634	810	910	7299	
Light rain 1-10	21	42	48	93	163	237	281	314	283	140	46	14	1682	
Moderate rain 11-22	3	4	29	53	71	101	116	123	97	62	11	4	674	29
Moderate heavy 23-43	1	7	14	31	75	108	112	95	86	45	9	1	584	
Heavy rain 44-88		3	9	24	54	80	111	71	55	25	11	1	444	
Very heavy rain > 89			5	10	23	46	62	50	24	23	2		245	
Very heavy rain 100-199			5	7	15	29	43	35	16	12	2		164	
Very heavy rain 200-299					1	3	3	3	2	5			17	
Very heavy rain > 300								1		1			2	

** 5 August 1983 --- 310 mm&** 10 October 1990 --- 329 mm

Table 71: Frequency of rainy days over Srimangal for different rainfall ranges during the period 1982-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	814	735	731	507	360	252	266	258	317	631	809	874	6554	
Light rain 1-10	22	52	88	167	214	288	370	385	299	120	39	13	2057	
Moderate rain 11-22	5	15	34	72	97	128	126	123	143	75	9	5	832	130
Moderate heavy 23-43		9	33	63	108	93	83	79	72	43	7	6	596	
Heavy rain 44-88		3	12	28	74	64	38	45	34	26	3	1	328	
Very heavy rain > 89			1	3	15	15	13	9	5	4	3		68	
Very heavy rain 100-199				2	7	11	10	5	3	3	2		43	
Very heavy rain 200-299					2								2	
Very heavy rain > 300					2								2	

** 15 May 1984 --- 313 mm&** 18 May 2009 --- 328 mm

Table 72: Frequency of rainy days over Sylhet for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	896	739	685	419	319	141	79	149	272	635	849	900	6083	
Light rain 1-10	28	73	131	169	209	259	306	307	257	150	28	17	1934	
Moderate rain 11-22	4	22	51	129	149	175	218	200	134	53	9	8	1152	8
Moderate heavy 23-43	2	9	35	113	125	156	169	154	110	56	8	3	940	
Heavy rain 44-88		4	25	57	95	104	110	88	95	30	5	2	615	
Very heavy rain > 89			2	13	33	58	48	32	32	6	1		225	
Very heavy rain 100-199			2	8	23	44	35	22	26	5	1		166	
Very heavy rain 200-299				1	3	4	7	1	3				19	
Very heavy rain > 300						1		1					2	

** 13 June 2000 --- 362 mm&** 1 August 1987 --- 302 mm

Table 73: Frequency of rainy days over Teknaf for different rainfall ranges during the period 1981-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	918	818	894	785	569	235	123	152	358	650	795	901	7198	
Light rain 1-10	9	19	20	66	166	165	197	244	214	109	52	18	1279	
Moderate rain 11-22	2	4	8	22	69	112	133	142	130	64	17	3	706	40
Moderate heavy 23-43	1	3	6	17	64	121	154	159	102	54	14	4	699	
Heavy rain 44-88		3	2	9	46	163	185	164	73	33	17	1	696	
Very heavy rain > 89				1	16	97	107	69	23	20	5	1	339	
Very heavy rain 100-199					10	62	73	55	16	14	3	1	234	
Very heavy rain 200-299					1	8	5	4		1			19	
Very heavy rain > 300						1	1						2	

** 15 June 2010 --- 481 mm &** 3 July 2008 --- 367 mm

Table 74: Frequency of rainy days over Chaudanga for different rainfall ranges during the period 1989-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	645	565	627	584	470	309	242	278	290	488	596	637	5731	
Light rain 1-10	31	39	33	46	97	206	241	278	204	92	27	14	1308	
Moderate rain 11-22	4	12	14	18	67	76	103	66	70	35	2		467	83
Moderate heavy 23-43	1	5	7	9	38	48	59	39	48	24	2	1	281	
Heavy rain 44-88	1		1	3	10	16	23	20	36	17	3	2	132	
Very heavy rain > 89						5	14	1	11	2			33	
Very heavy rain 100-199						4	6		6	1			17	
Very heavy rain 200-299							2		1	1			4	
Very heavy rain > 300													0	

Table 75: Frequency of rainy days over Kutubdia for different rainfall ranges during the period 1985-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	792	693	741	642	497	286	220	267	355	563	705	785	6546	
Light rain 1-10	8	28	39	77	132	187	210	234	237	117	33	14	1316	
Moderate rain 11-22	1	5	11	31	57	84	113	113	76	46	14	3	554	16
Moderate heavy 23-43	1	2	8	17	52	94	104	105	51	40	15	4	493	
Heavy rain 44-88	2	6	4	9	42	85	89	60	47	27	10		381	
Very heavy rain > 89			3	3	13	44	70	27	14	13	3		190	
Very heavy rain 100-199			3		10	35	42	16	8	8	2		124	
Very heavy rain 200-299						3	2	5	1				11	
Very heavy rain > 300							1						1	

** 16 July 1998 --- 422 mm

Table 76: Frequency of rainy days over Mongla for different rainfall ranges during the period 1991-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	587	515	564	490	407	227	124	155	231	434	563	608	4905	
Light rain 1-10	23	30	28	68	112	187	273	287	202	99	23	11	1343	
Moderate rain 11-22	9	14	13	30	43	81	108	84	78	32	4	1	497	0
Moderate heavy 23-43	1	3	10	10	37	61	78	68	49	27	5		349	
Heavy rain 44-88		3	5	2	20	38	34	23	30	21	2		178	
Very heavy rain > 89					1	6	3	3	10	7	3		33	
Very heavy rain 100-199					1	3	2	2	7	5	2		22	
Very heavy rain 200-299									1				1	
Very heavy rain > 300													0	

Table 77: Frequency of rainy days over Saidpur for different rainfall ranges during the period 1991-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	586	541	577	497	359	239	262	300	292	484	576	607	5320	
Light rain 1-10	27	21	29	51	136	158	175	171	150	73	19	7	1017	
Moderate rain 11-22	5	2	10	24	49	69	60	54	58	26	1	5	363	0
Moderate heavy 23-43	2	1	2	18	41	67	52	52	49	13	3	1	301	
Heavy rain 44-88				9	30	48	55	33	36	13	1		225	
Very heavy rain > 89			2	1	5	19	16	10	15	11			79	
Very heavy rain 100-199			1	1	5	15	14	7	8	8			59	
Very heavy rain 200-299								1	3	3			7	
Very heavy rain > 300						1			2				3	

** 28 June 2010 --- 311 mm, ** 10 September 1991 --- 341 mm&** 29 September 1995 --- 341 mm

Table 78: Frequency of rainy days over Tangail for different rainfall ranges during the period 1987-2010

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total	Total Missing Days
Dry days	713	616	657	549	439	309	245	276	330	541	677	723	6075	
Light rain 1-10	29	43	50	96	126	209	292	300	221	111	29	12	1518	
Moderate rain 11-22	2	12	20	37	83	73	93	77	67	35	5	5	509	7
Moderate heavy 23-43		4	14	26	56	75	72	64	60	24	5	3	403	
Heavy rain 44-88		3	3	11	35	40	28	24	33	28	4	1	210	
Very heavy rain > 89				1	5	7	14	3	9	5			44	
Very heavy rain 100-199				1	3	6	10	1	3	3			27	
Very heavy rain 200-299										1			1	
Very heavy rain > 300									1				1	

** 3 September 1993 --- 305 mm

Table 79: Kendall Tau statistic and p-value

	Maximum Temperature			Minimum Temperature		
Station	Tau Statistic	p-value	result	Tau Statistic	p-value	result
Bhola	0.0633	2.22e-16	Highly significant	0.0561	2.22e-16	Highly significant
Barisal	0.0546	2.22e-16	Highly significant	-0.009	0.051407	Insignificant
Bogra	0.041	2.22e-16	Highly significant	0.0294	3.256e-10	Highly significant
Chandpur	0.0695	2.22e-16	Highly significant	0.0341	2.6373e-10	Highly significant
Chittagong	0.063	2.22e-16	Highly significant	0.0334	2.22e-16	Highly significant
Chuadanga	0.0186	0.010213	Highly significant	0.014	0.051682	Insignificant
Comilla	0.0407	2.22e-16	Highly significant	0.0113	0.013225	Highly significant
Coxsbazar	0.162	2.22e-16	Highly significant	0.07	2.22e-16	Highly significant
Dhaka	0.0617	2.22e-16	Highly significant	0.0477	2.22e-16	Highly significant
Dinajpur	-0.0229	1.3706e-06	Highly significant	0.0317	1.6722e-11	Highly significant
Faridpur	0.107	2.22e-16	Highly significant	0.046	2.22e-16	Highly significant
Feni	0.0137	0.018656	Highly significant	0.0284	5.9985e-07	Highly significant
Hatiya	0.0906	2.22e-16	Highly significant	-0.0109	0.57972	Insignificant
Ishurdi	0.0477	2.22e-16	Highly significant	0.025	8.1099e-07	Highly significant
Jessore	0.0755	2.22e-16	Highly significant	0.0234	1.4743e-07	Highly significant
Khepupara	0.0891	2.22e-16	Highly significant	0.02	0.00058243	Highly significant
Khulna	0.0344	2.22e-16	Highly significant	0.00323	0.48463	Insignificant
Kutubdia	0.0826	2.22e-16	Highly significant	0.0493	2.22e-16	Highly significant
Madaripur	0.026	1.5408e-05	Highly significant	0.0717	2.22e-16	Highly significant
Mcourt	0.102	2.22e-16	Highly significant	0.0643	2.22e-16	Highly significant
Mongla	0.052	2.22e-16	Highly significant	0.0178	0.013268	Highly significant
Mymensingh	-0.00657	0.14895	Insignificant	0.0293	2.7017e-10	Highly significant
Patuakhali	0.1	2.22e-16	Highly significant	0.032	4.077e-08	Highly significant
Rajshahi	0.049	2.22e-16	Highly significant	0.0144	0.0052616	Highly significant
Rangamati	0.0183	0.00012985	Highly significant	-0.0513	2.22e-16	Highly significant
Rangpur	-0.0221	1.473e-05	Highly significant	0.0488	2.22e-16	Highly significant
Saidpur	0-0426	1.9518e-08	Highly significant	0.0182	0.016289	Highly significant
Sandwip	0.0891	2.22e-16	Highly significant	-0.0311	1.287e-08	Highly significant
Satkhira	0.0254	1.9408e-08	Highly significant	0.0325	2.22e-16	Highly significant
Sitakunda	0.159	2.22e-16	Highly significant	-0.019	0.0015162	Highly significant
Srimangal	0.0298	5.0179e-11	Highly significant	0.0497	2.22e-16	Highly significant
Sylhet	0.0906	2.22e-16	Highly significant	0.0382	2.22e-16	Highly significant
Tangail	0.0669	2.22e-16	Highly significant	-0.00137	0.84474	Insignificant
Teknaf	0.0651	2.22e-16	Highly significant	0.0709	2.22e-16	Highly significant