Journal of Engineering Research and Reports

20(9): 103-112, 2021; Article no.JERR.70677
ISSN: 2582-2926

Rainfall in Bangladesh

Debajani Chakraborty[1*], Mst. Mahbuba Khatun[1] and Iftekharul Alam[2]

[1]Department of Irrigation and Water Management, Faculty of Agricultural Engineering and Technology, Sylhet Agricultural University, Sylhet, Bangladesh.
[2]Department of Customs Administration, Faculty of Public Administration, University of International Business & Economics (UIBE), Beijing, China.

Authors' contributions

This work was carried out in collaboration among all authors. Author DC designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MMK and IA managed the analyses of the study. Author MMK managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JERR/2021/v20i917379
Editor(s):
(1) Dr. Tian- Quan Yun, South China University of Technology, China.
Reviewers:
(1) G. Udhaya Sankar, Alagappa University, India.
(2) Mohamed Behnassi, Ibn Zohr University, Morocco.
Complete Peer review History: https://www.sdiarticle4.com/review-history/70677

Original Research Article

Received 27 April 2021
Accepted 02 July 2021
Published 10 July 2021

ABSTRACT

Rainfall is the important climatic parameter on which the agriculture and economic condition of Bangladesh depends. For this reason, the scenario of rainfall throughout the country was illustrated briefly in this paper. Secondary data which were annual rainfall data of 34 stations were mainly used for this study, and these data were collected from BBS (Bangladesh Bureau of Statistics) between 2007 and 2019. The data were analyzed and visualized with the aid of Excel. However, the highest rainfall almost 5944 mm was recorded in Sylhet during the year 2017, and the lowest was 792 mm in Rajshahi in 2010. On the contrary, the minimum fluctuation of rainfall was observed in Mongla, whereas, the maximum fluctuation was found in Sylhet.

Keywords: BBS; fluctuation; rainfall; secondary data; stations.

1. INTRODUCTION

Bangladesh, a flat and low-lying country, faces several natural calamities due to its geographical location [1,2]. Bangladesh has a subtropical monsoon climate which is characterized by wide seasonal variations in rainfall, high temperature, and humidity. Bangladesh is mainly an

**Corresponding author: Email: debajanisharmi@gmail.com;*

agricultural country and that's why rainfall plays an important factor in agricultural production and economy [3]. However, the agricultural production of this country is affected by rainfall several times, and there are various examples of these types of climatic extremes events [4,5]. If rainfall happens heavily, it can cause flood and waterlogging problems within the country [6], while drought can occur if rainfall amount is low and both incidents are dangerous for a country. To understand, evaluate and predict such events, a person needs to have a better understanding of the rainfall condition and pattern of this country, and that's why this paper tries to give a brief description of the rainfall condition of the country, Bangladesh.

2. MATERIALS AND METHODS

Secondary data was mainly used for this study, which was annual rainfall data of 34 stations of the country, and these data were collected from BBS (Bangladesh Bureau of Statistics) [7-10] for 12 years from 2007 to 2019, and these data were represented in the form of bar graphs.

3. RESULTS AND DISCUSSION

From Figs. 1 and 2, in the years 2007 and 2008, the highest annual rainfall was 4465 mm and 5412 mm in Teknaf, and the lowest annual rainfall was 1573 mm and 1304 mm in Ishwardi respectively. In 2009, the highest annual rainfall again happened in Teknaf, which was 3810 mm, but the lowest annual rainfall was recorded in Rajshahi, which was only 1043 mm (Fig. 3). The quantity of annual rainfall was largest in Sylhet, and it was 4939 mm, while about 792 mm rainfall occurred in Rajshahi in 2010 (Fig. 4). The maximum annual rainfall was experienced by Teknaf, which was 4978 mm and 4869 mm for both years 2011 and 2012, compared to Jashore (1361 mm in 2011) and Ishwardi (1062 mm in 2012) where the least amount of rainfall was recorded (Figs. 5 and 6).

From Fig. 7, the annual rainfall was between 4203 mm in Kutubdia and 1129 mm in Ishwardi in 2013. On the other hand, in 2014, 2015, and 2016, the highest volume of rainfall was 3507 mm, 5447 mm, and 4299 mm in Teknaf respectively, and the lowest amount was in Chuadanga (1090 mm in 2014), Rajshahi (1421 mm in 2015) and Bogra (1081 mm in 2016) (Figs. 8, 9 and 10).

In 2017, Sylhet had experienced 5944 mm rainfall annually, which was the biggest amount, and the lowest rainfall was 1463 mm in Rajshahi (Fig. 11). The annual rainfall was between 3905 mm in Sandwip and 896 mm in Dinajpur in the year 2018 (Fig. 12). From Fig. 13, the highest and lowest rainfall was 3772 mm in Teknaf and 1228 mm in Rajshahi in 2019.

From Figs. 1-13, it is seen that, annual rainfall fluctuated between twelve years (2007-2019) were- Chittagong: 2274 to 4340 mm, Cox's Bazar: 2483 to 4716 mm, Kutubdia: 2591 to 4677 mm, Sandwip: 2721 to 5072 mm, Sitakunda: 2598 to 4868 mm, Teknaf: 3507 to 5447 mm, Rangamati: 1780 to 3819 mm, Comilla: 1578 to 3179 mm, Chandpur: 1546 to 3006 mm, Maijdicourt: 2367 to 3902 mm, Feni: 2488 to 4476 mm, Hatiya: 2668 to 4360 mm, Sylhet: 3101 to 5944 mm, Dhaka: 1329 to 2892 mm, Faridpur: 1235 to 2117 mm, Madaripur: 1330 to 2802 mm, Mymensingh: 1479 to 2842 mm, Srimangal: 1875 to 3813 mm, Tangail: 1131 to 2488 mm, Barishal: 1454 to 2624 mm, Bhola: 1493 to 3381 mm, Jashore: 1213 to 2178 mm, Khulna: 1099 to 2317 mm, Mongla: 1508 to 2118 mm, Satkhira: 1264 to 2121 mm, Khepupara: 1877 to 3344 mm, Patuakhali: 1895 to 3098 mm, Bogra: 1081 to 2163 mm, Dinajpur: 896 to 2296 mm, Ishwardi: 893 to 1799 mm, Rajshahi: 792 to 2018 mm, Rangpur: 1390 to 2417 mm, Sayedpur: 1373 to 2153 mm, Chuadanga: 852 to 1851 mm.

3.1 Factors Behind Rainfall Variability in Bangladesh

1. Climate change: Geographic location, climate change, and global warming are the reasons for rainfall variability in Bangladesh. The intensity, amount, and distribution of rainfall vary due to climate change.
2. Human-made causes: Due to overpopulation in Bangladesh, people are doing deforestation, destructing hills, which have negative impacts on both rainfall patterns and temperature.

3.2 Impact of Rainfall Variability in Bangladesh

Many natural calamities will occur regularly like floods, droughts, cyclones, thunderstorms, and hail storms, etc. due to the rainfall variability. It will have a direct impact on the economy, agriculture, and other sectors of Bangladesh.

1. Agriculture and fisheries sector: Agriculture and fisheries are sensitive to climate change, rainfall, and

temperature. So, due to the difference in rainfall amount in Bangladesh, the production rate will vary a lot. Due to sudden floods and cyclones in coastal areas, fish and crop production will hamper, and the country will face economic loss. The north-western part of the country is a drought-prone area that will suffer the most. Due to the increase of drought events, the soil moisture content will decrease, and the crop water requirement will increase, and it will harm the growth, yield, and production of crops. In the north-eastern part of Bangladesh, where most of the haor areas situated, there will be an increase in rainfall, which will have both positive and negative impacts. The positive side is that it will- 1. increase soil moisture content, 2. decrease irrigation requirement and dependency on groundwater, and 3. improve crop productivity. But the negative side is that heavy rain, flash flood events will occur more often, which will destroy crops and fisheries.

2. Public health: Different types of diseases (diarrhea, pneumonia, malaria, fever) have a connection with rainfall. High and low rainfall is responsible for the increased cholera cases in Dhaka, Bangladesh [11].
3. Sea level rise and water salinity: Rainfall has an impact on sea-level rise and water salinity. The north-western part of the country is a drought-prone area. The groundwater level is decreasing in this region which will cause saltwater intrusion more from the ocean to maintain the equality of water table. On the other hand, Due to variation of rainfall, drought, and flood, sea level rise may worsen in Bangladesh [12].
4. Infrastructure: Heavy rainfall, flood, the flash flood will damage roads, rail tracks, and embankments like the bridge, culvert, dam, the barrage.
5. Economy: Due to damage to infrastructures by rainfall and flood, repair and damage costs will increase. Due to crop loss, there will also be food scarcity and economic loss. During extreme events like floods, a large amount of money will invest in disaster management.

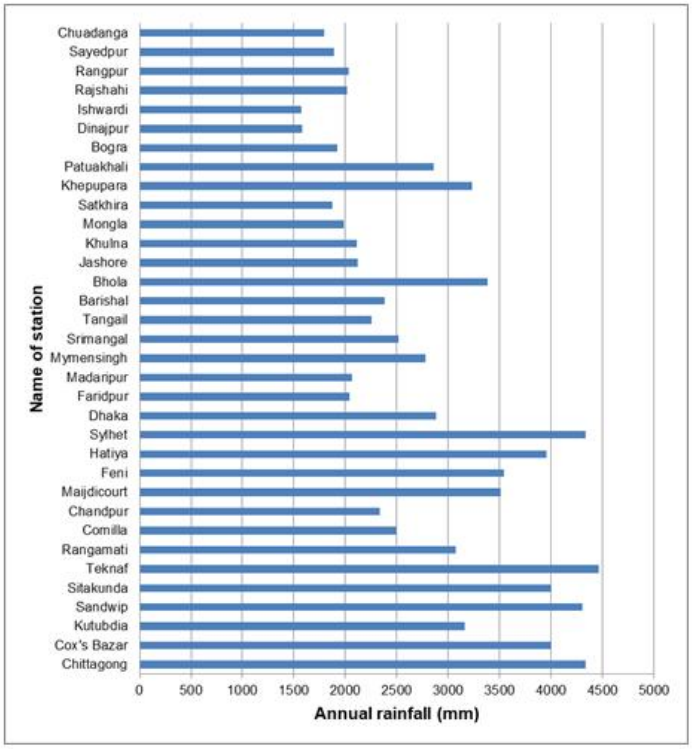

Fig. 1. Annual rainfall (millimetre) in the year 2007

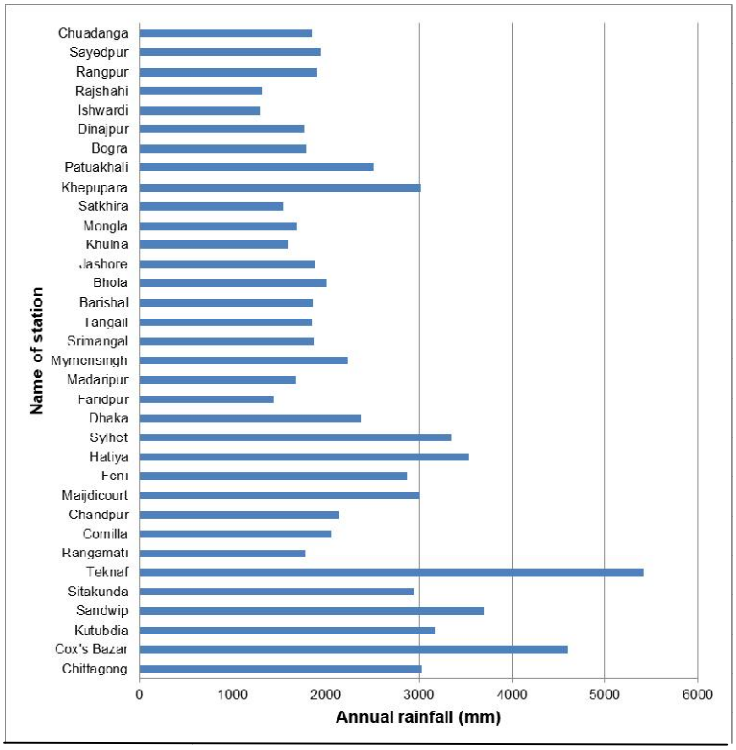

Fig. 2. Annual rainfall (millimetre) in the year 2008

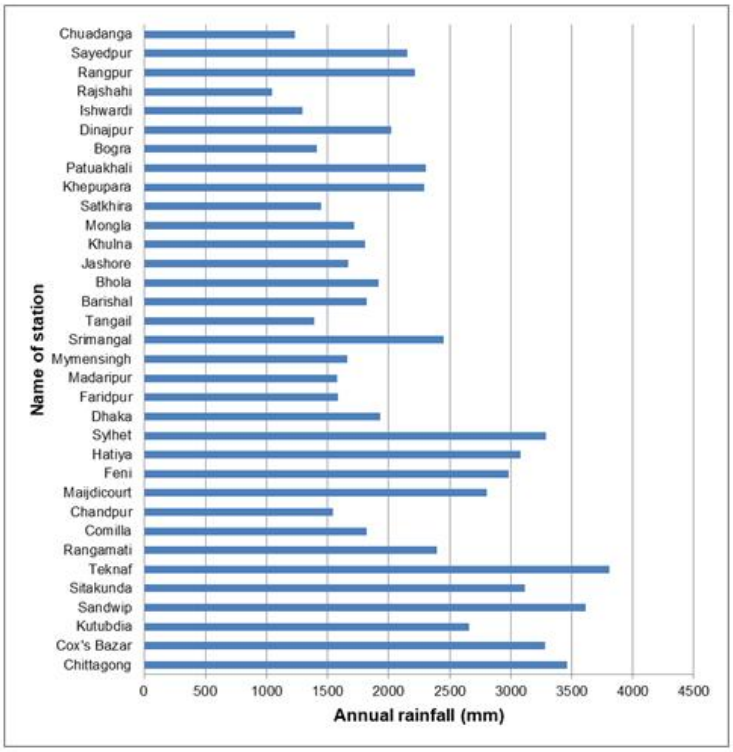

Fig. 3. Annual rainfall (millimetre) in the year 2009

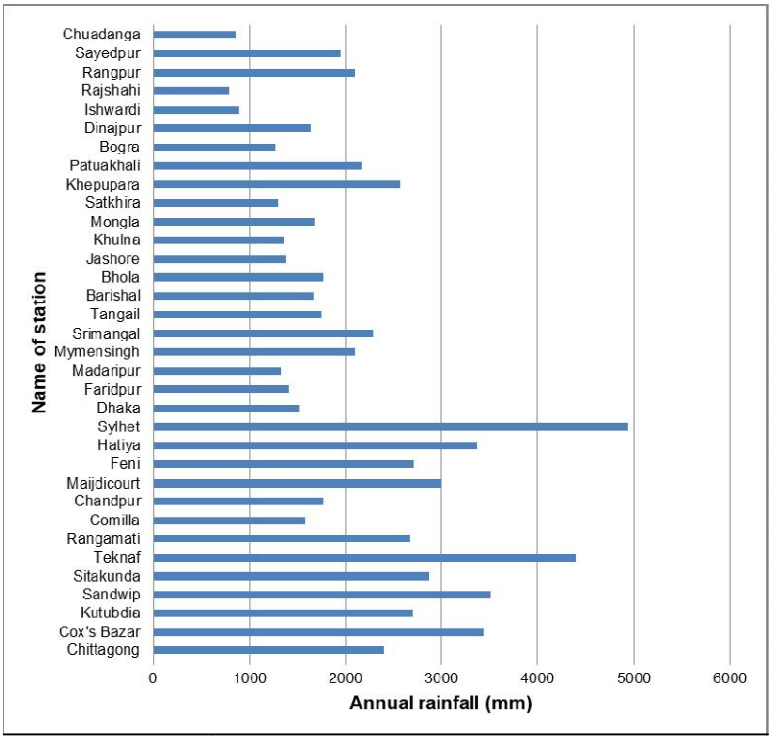

Fig. 4. Annual rainfall (millimetre) in the year 2010

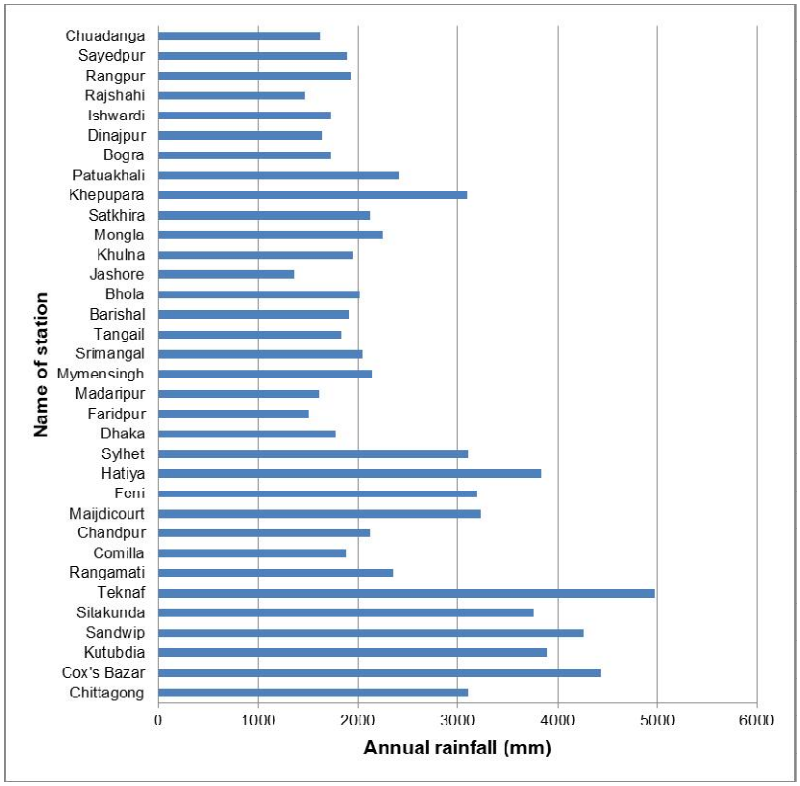

Fig. 5. Annual rainfall (millimetre) in the year 2011

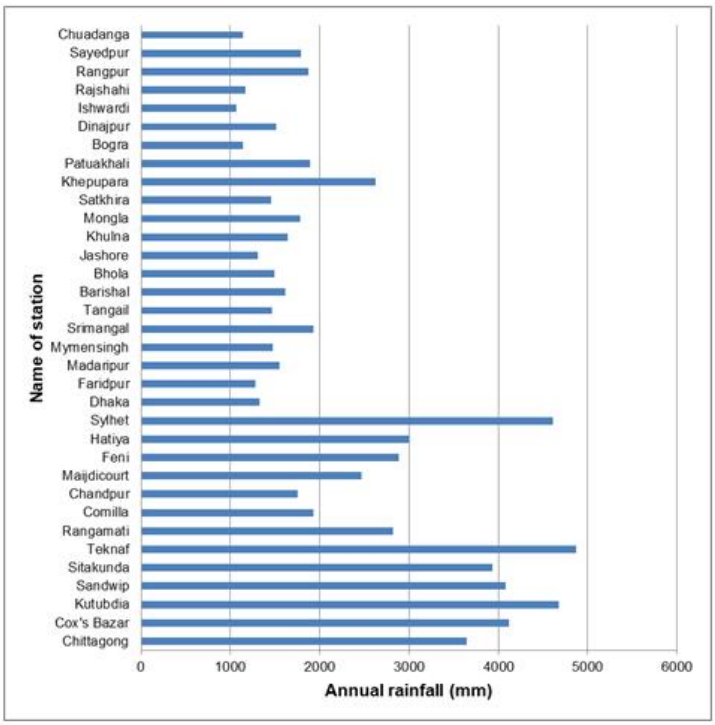

Fig. 6. Annual rainfall (millimetre) in the year 2012

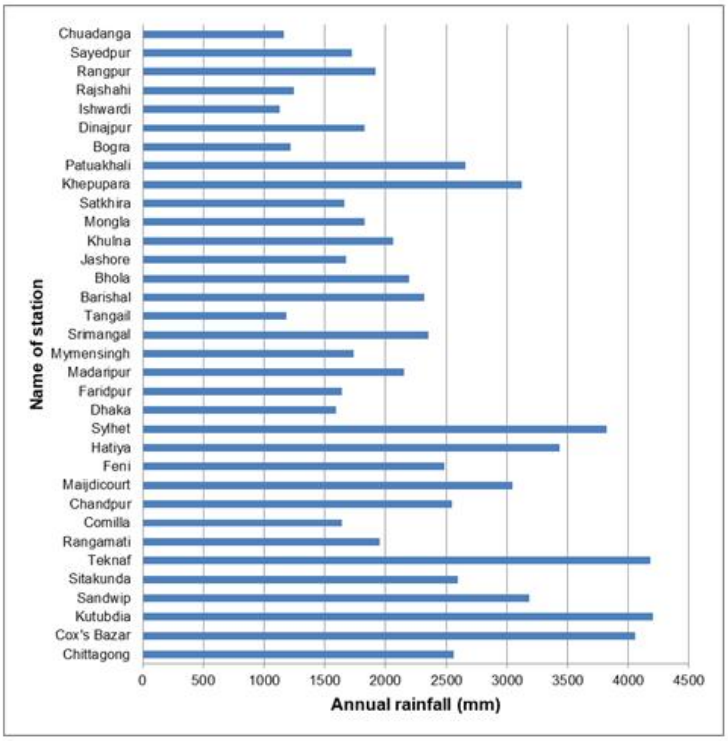

Fig. 7. Annual rainfall (millimetre) in the year 2013

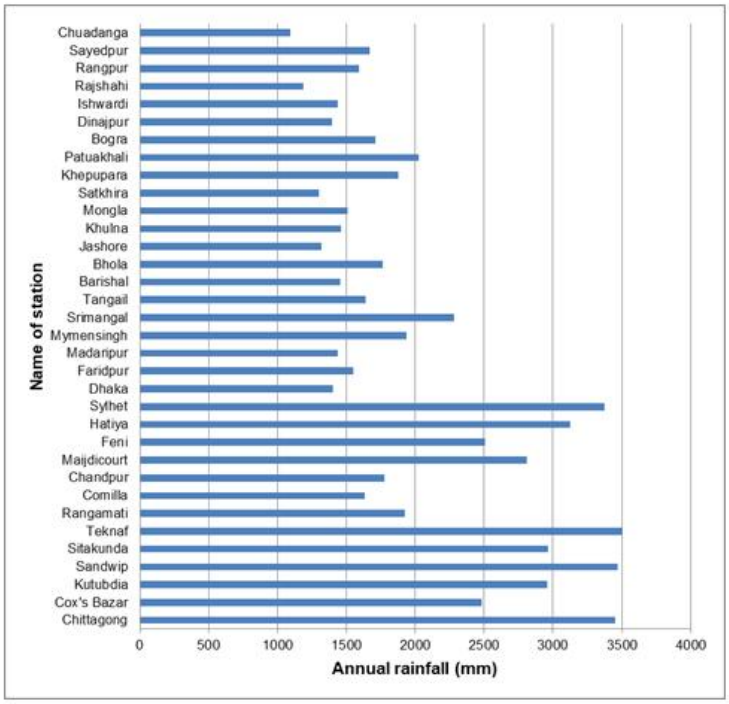

Fig. 8. Annual rainfall (millimetre) in the year 2014

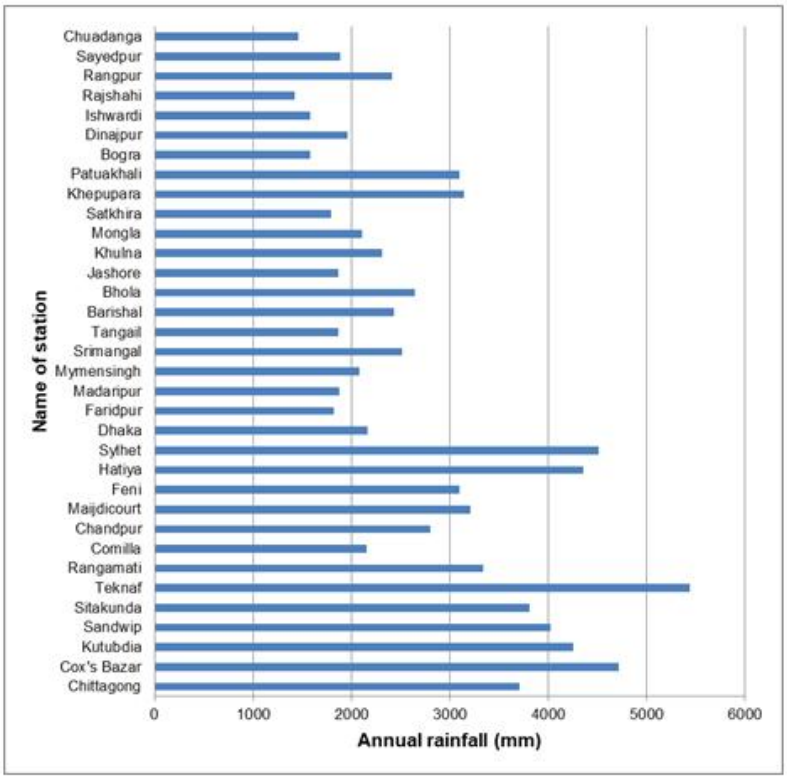

Fig. 9. Annual rainfall (millimetre) in the year 2015

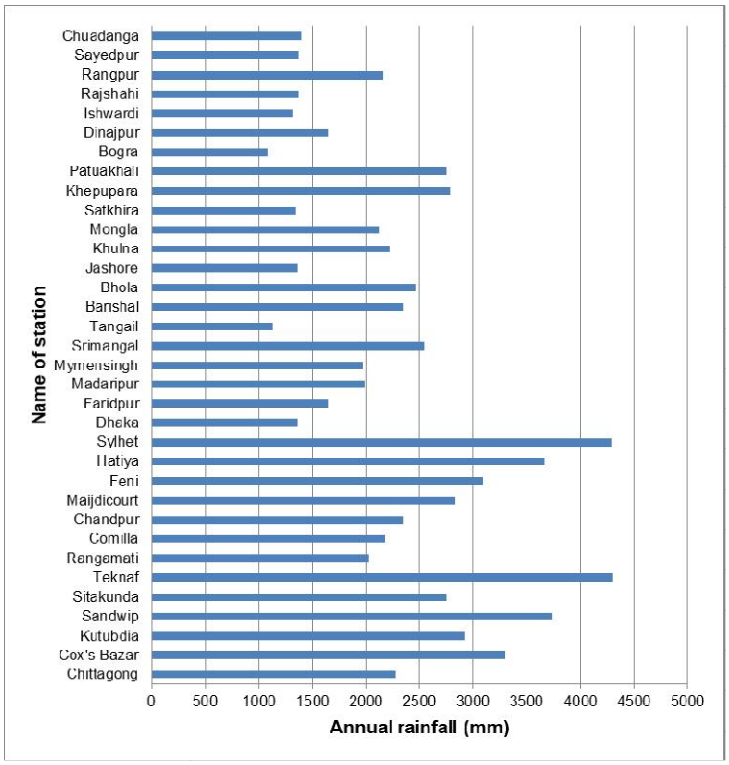

Fig. 10. Annual rainfall (millimetre) in the year 2016

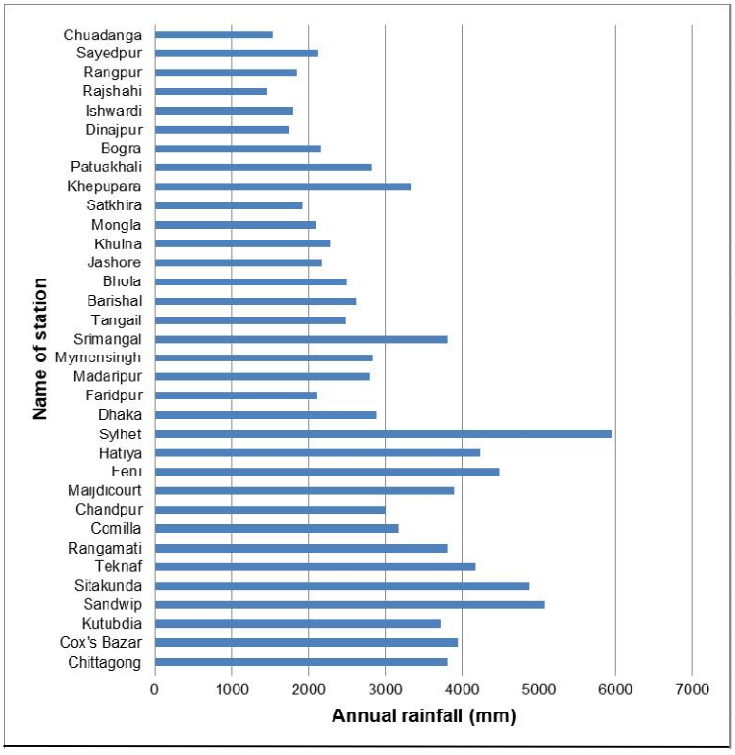

Fig. 11. Annual rainfall (millimetre) in the year 2017

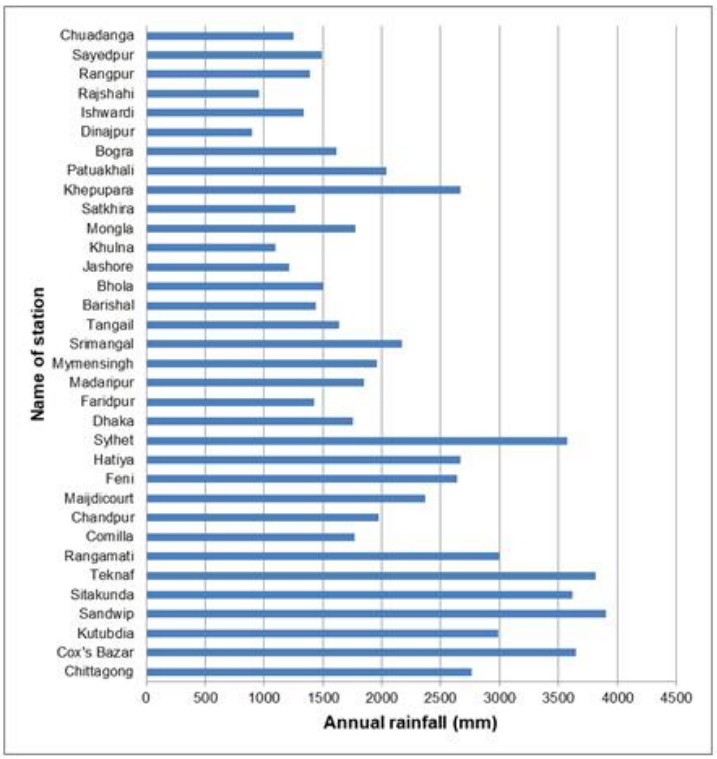

Fig. 12. Annual rainfall (millimetre) in the year 2018

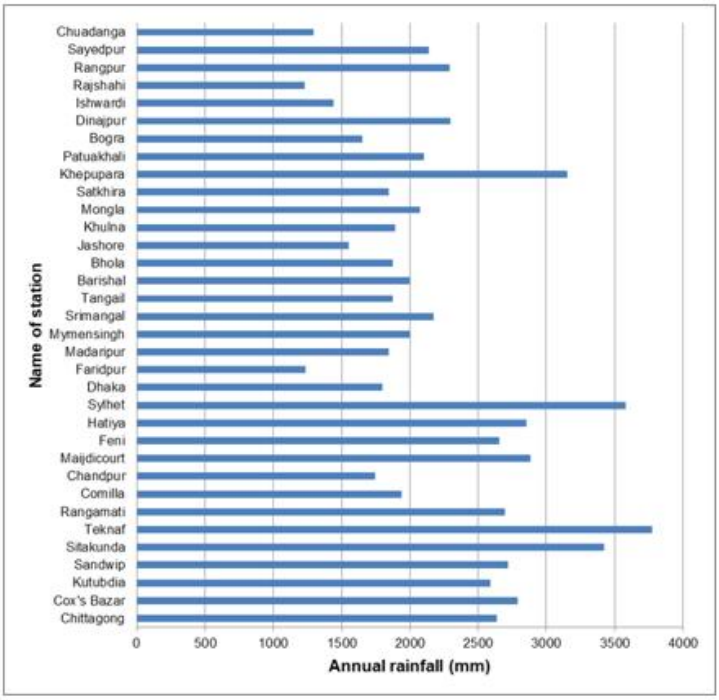

Fig. 13. Annual rainfall (millimetre) in the year 2019

4. CONCLUSION

Annual rainfall data of 34 stations of 12 years were collected from BBS, and it is found that the largest amount of rainfall happened in Sylhet (5944 mm in 2017), while the least quantity was 792 mm in Rajshahi in the year 2010. Rainfall fluctuation varied in a wide range, but minimum in Mongla and maximum in Sylhet.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Khan A. Bangladesh. The Most Climate Vulnerable Country. The World Bank; 2013.
2. Tol RSJ. The economic impact of climate change in the 20th and 21st centuries. Clim Chan. 2013;117(4):795-08.
3. Hossain MS, Roy K, Datta DK. Spatial and temporal variability of rainfall over the South-West Coast of Bangladesh. Clim. 2014;2(2):28–46.
4. Zakaria M, Aziz MA, Hossain MI, Rahman NMF. Effects of rainfall and maximum temperature on aman rice production of Bangladesh: A case study for last decade. Int j scien techno res. 2014;3(2):131–37.
5. Basak JK. Changing rainfall pattern effects on water requirement of T. aman cultivation in Bangladesh. Pub j env scien. 2011;11:1-8.
6. Hossain MM, Hasam MZ, Alauddin M, Akhter S. Historical and future rainfall variations in Bangladesh. World academy of science, engineering and technology. Int J Env Ecol Engg. 2017;11(7):679-84.
7. BBS. (Bangladesh Bureau of Statistics), Yearbook of agricultural statistics- 2012, 24th series, Statistics and information division (SID), ministry of planning, Government of the People's Republic of Bangladesh; 2014.
   Available:www.bbs.gov.bd
8. BBS. (Bangladesh Bureau of Statistics), Yearbook of agricultural statistics- 2017, 29th series, statistics and information division (SID), ministry of planning, Government of the People's Republic of Bangladesh; 2018.
   Available:www.bbs.gov.bd
9. BBS. (Bangladesh Bureau of Statistics), statistical yearbook Bangladesh 2018, 38th edition, statistics and information division (SID), ministry of planning, Government of the People's Republic of Bangladesh; 2019.
   Available:www.bbs.gov.bd
10. BBS. (Bangladesh Bureau of Statistics), statistical yearbook Bangladesh 2019, 39th edition, statistics and information division (SID), ministry of planning, Government of the People's Republic of Bangladesh; 2020.
    Available:www.bbs.gov.bd
11. Hashizume M, Armstrong B, Hajat S, Wagatsuma Y, Faruque A, Hayashi T, Sack D. The effect of rainfall on the incidence of cholera in Bangladesh. Epidem. 2008;19(1):103-10.
12. Nishat A. Climate change and water management in Bangladesh. Conference on global climate change and its effects. International Union for Conservation of nature, Dhaka; 2008.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle4.com/review-history/70677