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RESEARCH ARTICLE

TIME DISTRIBUTION OF THE RAINFALL IN BISSAU FROM 1971 TO 2015

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ABSTRACT

This investigation on the time distribution of the rainfall in Bissau from 1971 to 2015 has shown that within this period a slowly decrement of the rainfall regime is going. This phenomenon is clearly visible by the end of the period where intensive rainfall with pluviometry greater or equal to 600 mm/month was becoming rare and rare. This situation calls the authorities of the country to take very important and urgent measures to reduce or even to stop its evolution as it seems to be the beginning.

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INTRODUCTION

Rainfall has economic, ecologic and social impacts. In the economic area, it is obvious that the macro economy of many countries, particularly developing ones, does not depend only on rural materials, but also on agriculture. It is certain that without water agricultural activities cannot be developed. The quasi totality of this water is brought to plants by rainfall. Thus it is understandable that its diminution in a locality could be catastrophic. On the ecologic sphere, between other positive impacts, the rainfall is the cleaner of the atmosphere. It eliminates from the air dangerous substances such as microbes, chemical molecules and gas from machines and industries. Thus, the atmosphere remains cleaned and human beings can comfortable, safely and quietly in it. In the social plan, it uses to happen that rainfall acts negatively on our daily activities. For example during the rainy season the rhythm of execution of many buildings is reduced. It is clear that investigating the rainfall regime is very important because if we master it a lot of our activities will be well planned. Unfortunately this study is sometimes blocked by many problems between others, the large time space variability of the rainfall. Some works have been done at a regional scale of West Africa and Sahelian countries, (Lebel et al., 2009, Bodian, 2011, Bodian 2014, Panthou, 2013). In a sub-regional scale, the variability of the rainfall from 1932 to 2014 has been studied for the river Kayanga/Gêba in Guinea (Conakry), Senegal and Guinea Bissau, (Saly et al., 2018). Almost these works have good qualitative results.

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The author is certain that to understand natural phenomena at last at a sub-regional, we should start by mastering them at local scale because it is there that they are generated.The present studytries to solve this problem. It concerns the time distribution of the rainfall in Bissau from 1971 to 2015. The 45 years period has been divided into 5 years sub-periods. Also the rainfall represented by its pluviometry has been divided into sub-intervals of equal length of 50 mm then each sub-interval is represented by its middle for further investigation.
This work is divided into four paragraphs. The first one is introduce the problem. The second presents the material and methodology. The results and their analysis are in the third paragraph. In the fourth one are the conclusion, recommendation and acknowledgement. At last, the references in alphabetic order end the work.

MATERIAL AND METHODOLOGY

Material

Guinea Bissau is a littoral country in West Africa. It is situated on the border of the Atlantic Ocean. It is limited in its northern and southern parts respectively by Senegal and Guinea Conakry. Bissau is its capital. The data used in this work was collected at the meteorological station at the international airport of Bissau. It was already treated data presented in tabular form of monthly means of pluviometry in the locality. Three main reasons explained the choice of this city. First the station is well-equipped, second – the personnel is well-trained, and third – the chronological series are regular, complete, accurate and very probably representative.

Guinea Bissau has two seasons: one dry and another rainy which usually starts from May to November, i.e. seven months. Thus in any sub-period will be 35 to be treated, and 315 for the whole period.

Methodology

The 45 years period has been divided into 9 sub-periods of 5 years each. When consulting the data on pluviometry, we have realized that it varies from 0 to 750 mm/month.

This tendency clearly appeared for pluviometry greater or more than 450 mm/month. This tendency to the decrement is still kept when passing from a sub-period up to another. This fact is particularly visible by the end of the period. For the whole period, the probability to have a pluviometry greater or more than 425.0 mm/month is less than 5.00% and its tendency is to the decrement with the increment of the pluviometry. For more deeply analysis let us consider Table 3.2 concerning the time distribution of the rainfall with at least 450 mm/month.

Table 3.1.Time distribution of the rainfall in Bissau from 1971 to 2015

	25	75	125	175	225	275	325	375	425	475	525	575	625	675	725
1971-1975	11	3	3	3	2	1	3	0	1	1	2	3	1	1	0
1976-1980	13	4	3	3	6	2	2	0	1	2	0	2	2	0	0
1981-1985	11	4	3	2	4	3	0	4	3	0	1	1	0	0	0
1986-1990	11	2	4	3	1	3	2	1	2	1	3	1	1	0	0
1991-1995	11	1	5	1	2	4	2	2	0	3	2	1	0	0	1
1996-2000	8	3	3	2	3	5	2	2	1	1	1	3	1	0	0
2001-2005	10	2	2	5	1	2	1	6	2	1	1	0	2	0	0
2006-2010	8	4	3	4	1	5	1	3	2	1	3	0	0	0	0
2011-2015	8	6	3	2	2	1	3	0	3	2	2	3	0	0	0
Period	91	29	29	25	22	26	16	18	15	12	15	14	7	1	1
Probability%	28.89	9.21	9.21	7.93	6.98	8.25	5.10	5.71	4.76	3.81	4.76	4.44	2.22	0.32	0.32

Table 3.2.Time distribution of rainfall with at least 450 mm/month in Bissau from 1971 to 2015

	≥450	≥500	≥550	≥600	≥650	≥700
1971-1975	8	7	5	2	1	0
1976-1980	6	4	4	2	0	0
1981-1985	2	2	1	0	0	0
1986-1990	6	5	1	1	0	0
1991-1995	7	4	2	1	1	1
1996-2000	6	5	2	1	0	0
2001-2005	4	3	4	2	0	0
2006-2010	4	3	2	0	0	0
2011-2015	7	5	3	0	0	0
Period	50	38	24	9	2	1
Probabilities %	40.32	30.61	19.35	7.26	1.61	0.81

This interval has been divided into sub-interval of equal length of 50mm/month. Each sub-interval was represented by its middle for further analysis which consisted of counting the number of rainfall in each sub interval for a given sub-period. These results were presented in tabular form. This table enables us to diagnose the time tendency of pluviometry in Bissau, either it is increasing or decreasing. The cases of pluviometry greater or equal to 450, 500, 550, 600 and 700 mm/month were considered. This has permitted us to investigate the deterioration or not of the rainfall regime in Bissau.

RESULTS AND ANALYSIS

The results are presented in Table 3.1. It shows the number of rainfall in each sub-interval at a given sub-period. Thus, it is the table of distribution of rainfall for the period of investigation. Table 3.1 shows that during the period from 1971 to 2015 the modal numbers of rainfall, 8-13 cases, in Bissau occurred in the sub-interval [0, 50] corresponding to probabilities between 22.90-37.14%. This lower amount of pluviometry was registered mostly at the beginning and the end of the rainy season. When going into the rainy season the pluviometry considerably reduced to an average modal number of 2-3 cases for probabilities of 5.71-8.57% for the whole period. It is also remarkable that during this period, the numbers of modal cases were decreasing when the pluviometry was increasing.

Table 3.2 shows that with the growth of the pluviometry their frequencies considerably decrease, from 8 to 0. For pluviometry≥450 the frequencies varied from 2 to 8 cases, pluviometry≥500, from 2 to 7 cases, pluviometry≥550, from 1 to 5 cases, pluviometry≥600, from 1 to 2 cases, and pluviometry≥650, from 0 to 1 cases. As we have 124 total cases, it comes that the probability to register a pluviometry≥450 was 40.32%, a pluviometry≥500- 30.61%, a pluviometry≥550 - 19.35%, a pluviometry≥600 – 7.26%, a pluviometry≥650 – 1.61%, apluviometry≥700 – 0.81%. This study shows a slightly deterioration of the rainfall regime in Bissau. To avoid the reinforcement of the situation, authorities should take important measures by now to reduce its evolution to other localities or even eradicate it as it seems to be just the beginning.

Conclusion and recommendation

Even though slowly, the deterioration of the rainfall regime in Bissau is effective and is still going on. The first measure to be taken by the authorities is to strictly stop with the forest exploitation. Then they should organize and encourage planting trees and creation of public parks. They should also implement the policy of social forestry as it is already done in other countries. The author ceases this occasion to sincerely thank Dr. Njipouakouyou Yvonne, M.D. working at the UN hospital in Bissau, Njipouakouyou Ntentié Marie, M. SC. and Ph.D. student, Vice Dean in the Faculty of Foreign Students at

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