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FLOODING INTERVALS IN ALBANIA

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Abstract: One of the most dangerous natural disasters facing many countries in the world including Albania are floods. Albania is quite exposed to this danger as the river and stream system is a major threat to the floods that are generally originating from rainy rabes.
Floods in the lower flow cause great damage as they are more frequent and catch larger surfaces. These are formed by heavy rainfall and high intensity rainfall, which fill the soils with water and cause leakage out of the riverbed.
The hydrographic basin includes an area of 43 305 km², in which 14 557 km² belong to the Drin River catchment and the River Vjosa, which surrounds parts of Greece, Macedonia and Kosovo. The eight main rivers of Albania (Drini, Buna, Mati, Ishmi, Erzeni, Shkumbini, Vjosa and Semani) are grouped in 6 watersheds that cross the country from East to West.[47]
Albania has been hit on average by one flood per year. The Repeat Period (also known as the repetition interval) is an estimate of the time interval between events such as flooding, and that are important in terms of intensity and size.
The period of theoretical Repeatability is the inverse of the number of events expected to occur within a year, ie a 10-year-old earthquake 1/10 = 0.1 or 10% chance to occur more than once in 10 years. A 50-year flood is 0:02 or 2% likely to happen more often in any year. This does not mean that a 100-year flood will be repeated regularly every 100 years, despite the determination of the name "repetition period". A 100-year event could happen once, twice, more or any time during this period of 100 years.
The article will analyze the period of flood repetition as well as the risk map of floods from the recovery period, 100 years expressed by the PPS standard (peak flow rates).
Keywords: Flooding, periods, intervals, consequences

1. FLOODING CHARACTERISTICS

Floods are a catastrophic phenomenon which many countries in the world are facing with. Albania is quite exposed to this danger because of the rivers and streams system represents a great threatening for floods which are usually rainfalls. Floods on the downstream cause great damages because they happen often and they include major surfaces. These are formed from precipitations which last for a long time, saturating the ground with water and create leaks outside the riverbed. The average multiyear flow rate of the general flow of our rivers is about 1,245 m^3/sec (roughly the Po River water flow 1,275m3/sec).
All other major rivers flow into the Adriatic.
Our country's rivers are characterized by a large flow as Buna perennial average 652 m^3/sec, Drini 340 m^3/sec, Vjosa 210 m^3/sec, Seman 101 m^3/sec, Mati 74 m^3/sec, Shkumbin m^3/sec.[48]
Besides the major rivers there are rivers and streams emanating from the heights above 500-1,000 m, above sea level who value large hydropower (Valbona, Curraj, Cemi, Big and small Fani, Kiri, Gjadri, Bence etc).
Hydrographic basin covers an area of 43,305 km², in which 14,557 km² belonging and Drin river basin Vjosa River, which surrounds a part of Greece, Macedonia and Kosovo. Albania's eight major rivers are grouped in 6 watersheds from East to West. Their annual discharge is 1,308 m³/s, which corresponds to the discharge of 30 m³/s/km².
Floods are common during the period from November to March, when the country has about 80-85 percent of the annual rainfall. Due to topographical features, these floods occur quickly, since the water is directed through the main hydrographic network of rivers for about 8-10 hours.[49]
The implications of disasters related to other river basins are relatively low, ranging from 4000-8000 (± 10 percent) for the affected buildings, appropriate housing and other forms of assistance to people from 25 000 to 50 000 (± 10 percent).
100 years return period in the Western Flood Plan could affect 20 regions (out of 36), 341 towns (from 2962), 110 municipalities (from 308), about 85 500 buildings, covering 7.9 million m² and 565 000 people.
Even small rivers and streams often cause flooding.

[47]Pano. N. Albanian water resources. Academy of Sciences of Albania. Tirana 2008.
[48]; Academy of Sciences. Physical Geography of Albania, Tirana 1991..
[49] Academy of Sciences. The extraordinary events of 1962-1963. Tirana 1964.

Floods caused by small rivers and streams often affect valleys of Northern, Central and South Albania, damaging farmland and road network infrastructure. There are 19 small rivers or streams that pose a permanent risk for flooding. Their main features that are very fast and often "treacherous" alluvial bring large volumes and can cause unpredictable damage to infrastructure, housing and agriculture facilities.

2. REPETITIVE INTERVALS

Repetition period (known as the recurrence interval) is an estimated time interval between events, such as earthquakes, floods, etc., which are important in terms of intensity and size. The period of theoretical Repeatability is the inverse of the number of events expected to occur within a year, a 10-year-old earthquake 1/10 = 0.1 or 10% chance to occur more than once in 10 years. A 50-year flood is 0.02 or 2% likely to happen more often in any year. This does not mean that a 100-year flood will be repeated regularly every 100 years, despite the determination of the name "repetition period". A 100-year event could happen once, twice or any time during this period of 100 years.

What will happen has a probability which can be calculated. Also, the estimated period of repetition is a statistic, it is calculated from a set of data, estimated out as a theoretical value in an idealized distribution. In reality it is not known if an event of the same or greater will occur with 1% of probability , what is known is that this event is observed once in 100 years.

Structural measures taken designed by a flood return period of 50 years had an important role in reducing the effects of the flood of winter 1970-1971 compared with the period 1962-1963. Recognizing that the system of dams remains intact and that the installation of the pump remain in work, the period of restoration of flood water of 50 years or less poses no danger to areas in the Western Lowland .[50]

Floods long return periods can be created by the same conditions as the flood of the years 1962-1963, estimating a flood return period of 100 years. Relying on data from 67 hydrological stations, specific peak flows (SPF) of the period of return are calculated for 70 rivers in the catchment area of 100- 400 km².

Flood risk maps from the period of restoration, 100 years expressed by SPF standards, show that there are large fluctuations flood risks. The region with the greatest risk of flooding in 100 years return period (SPF = 5-10 m³ / s / km²) is the Western Lowland, Ishëm the Drini River. A lower risk (SPF = 2-3 m³ / s / km²) concerns Devoll river basins, Osum, the lower part of the river Shkumbin and Mat. A higher risk (SPF <2 m³ / s / km²) includes regions associated with mountain rivers, south-central Albania.[51]

While the risk of flood in 100 years return period in other parts of the country is quite low.

The Western Lowland flooding will certainly cause greater damage physical properties and agriculture created by man, and will load drastically all the emergency services and all other sources of national physical human."

Table No. 3. Flood risk areas in Albania for 100 years return period.

Risk flood zone	**Specific Area of peak flow**	**Superficies (km^2)**	**Percentage to total territory**
Low	> 2	6,660	23,5
Secondary	2 – 3	11,433	40,3
Large	3 – 4	5,878	20,7
High	4 –5	2,837	10,0
The extreme	>5	1,564	5,5

[52]

In table 3 are given the expected consequences for the current flood of Western Plain, which can be repeated once in 100 years.

[50] Academy of Sciences. The climate of Albania, Tirana 1975
[51] R. Uruci; Flooding in Albania and their management. Pg..32.
[52] National Plan of Civil Emergencies

Table. 4 Consequences of the flood of Western Lowland for 100 years repetition period by rivers and areas that straddle

River County	Village Circle	No of villages	No of municipalities	The amount of buildings	Construction surface m^2	Population
BUNA		*36*	*10*	*13,948*	*1,741,700*	*119,249*
Shkodër	***Shkodër***	*36*	*10*	*13,948*	*1,741,700*	*119,249*
DRINI		*78*	*23*	*23,733*	*2,433,840*	*171,956*
Lezhë	***Lezhë***	*35*	*10*	*7,227*	*503,420*	*39,044*
Shkodër	***Shkodër***	*43*	*13*	*16,506*	*1,930,420*	*132,912*
Erzeni		*11*	*4*	*3,762*	*374,620*	*25,789*
Durrës	***Durrës***	*6*	*2*	*1,736*	*175,300*	*12,083*
Tiranë	***Tiranë***	*5*	*2*	*2,026*	*199,320*	*13,706*
ISHMI		*24*	*7*	*8,107*	*687,320*	*49,653*
Durrës	***Durrës***	*4*	*1*	*1,413*	*149,200*	*10,623*
Durrës	***Krujë***	*13*	*3*	*4,233*	*358,640*	*26,287*
Lezhë	***Kurbin***	*7*	*3*	*2,461*	*179,480*	*12,743*
MATI		*28*	*8*	*7,512*	*537,820*	*41,528*
Lezhë	***Kurbin***	*7*	*2*	*2,461*	*179,480*	*12,743*
Lezhë	***Lezhë***	*13*	*5*	*2,844*	*199,020*	*16,204*
SEMANI		*20*	*7*	*4,305*	*278,500*	*28,947*
Berat	***Berat***	*10*	*4*	*996*	*74,040*	*4,942*
Berat	***Kucovë***	*3*	*2*	*961*	*64,540*	*4,814*
Fier	***Fier***	*37*	*12*	*7,830*	*562,900*	*41,704*
Fier	***Lushnjë***	*40*	*12*	*5,729*	*446,060*	*32,369*
SHKUMBINI		*30*	*14*	*6,599*	*513,420*	*38,052*
Elbasan	***Peqin***	*2*	*1*	*294*	*22,620*	*1,433*
Tiranë	***Kavaje***	*4*	*4*	*1,550*	*97,880*	*8,105*
Fier	***Lushnjë***	*24*	*9*	*4,755*	*392,920*	*28,514*
VJOSA		*28*	*8*	*4,579*	*346,380*	*24,858*
Fier	***Fier***	*19*	*6*	*3,076*	*225,600*	*15,528*
Fier	***Mallakastër***	*1*	*1*	*7*	*400*	*29*
Vlorë	***Vlorë***	*8*	*1*	*1,496*	*120,380*	*9,301*
TOTAL		***333***	***109***	***83,357***	***7,741,240***	***552,117***

Given this, all the protection devices are designed based on return period flood in 50 years, while repeating the year of the flood of '62 -'63 is a very likely scenario.

Side effects, which once could be reduced to a level set by the national strategy to prevent flooding, nowadays exacerbated due to degradation of the system of dams, primary and secondary drainage canal installations for multiple water removal, pumping stations and other equipment designed to control flooding.[53]

[53] Risk Assessment in Albania

Map no. 1. The flood risk map of Western Lowland with 100 years return period.

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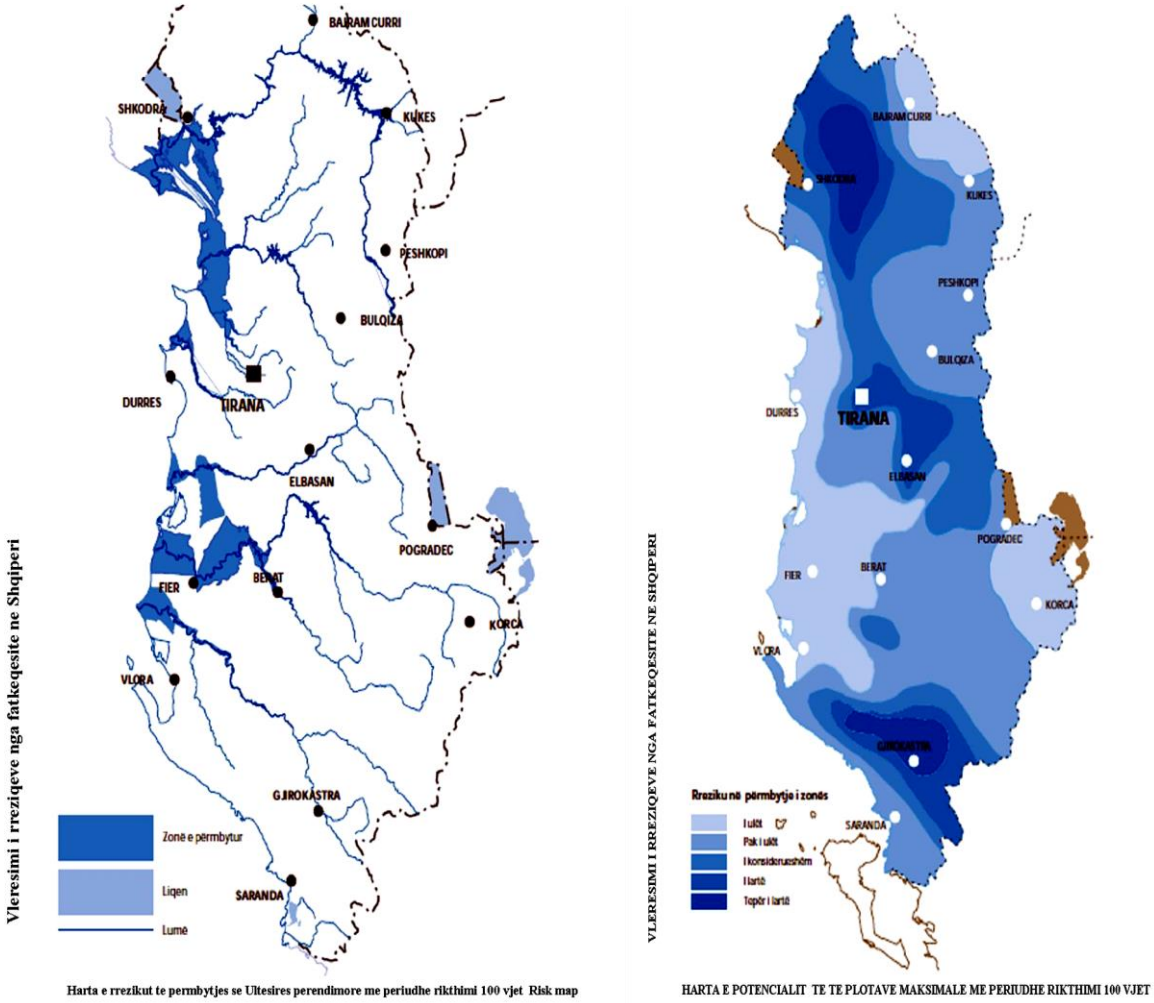

Map No.2 Map of the full potential maximum return period of 100 years[54]

Presentation on the map No.1 represents the expected flooding with the possibility of renewal once in 100 years. With current capacity, the National Civil Emergency Plan reflects the ability to cope with a flood level relatively smaller than the recurrence 100 years.

The above material shows that Western Lowland area is threatened by floods, the fact that it coincides with estuaries that are the lowest in their territory.

According to the study summary "Risk Assessment in Albania," repeated Flooding 80-90 year cycle would affect 20 districts, 110 municipalities, 341 villages, 85 500 buildings with 7.9 million m² building area and 565 000 inhabitants.

The analysis done to table no. 1 shows that in addition to special floods that occurred in rivers, flooding also differ involving the rivers in most of them. Such were the years 1878-1879, 1960, 1962-1963, 1970-1971, 1995-1996, 1998, 2010-2011. Such situations have created roughly around 11 year cycles and this indicates about the approximate correlation of solar stains. There is a correlation between 11-year cycle of sunspots or solar stains with features such as rainfall and their indirect indicator flood and water level changes in the lakes, air temperature, atmospheric pressure, and wind and cyclones.

[54] Aide Memoire's mission of World Bank "Emergency Response and Management for Floods. Tiranë

As a rule occurs the increase of precipitation for the maximum number of sunspots. At about 40 degrees latitude ascertain areas where an excess of rainfall observed in the period of maximum sunspot up to Gulf of Alaska and Iceland (not far from centers almost stationary low pressure).[55]

The amount of precipitation that had fallen from 1885 to 1960 in the 40-50 degrees correlates strongly with 11-year cycle, but sign of correlation varies considerably in some cases in the limits of this period (Clayton).

It is also found that a large amount of precipitation in the form of snow (25% more than the rate) falls 1 year up to a maximum of sunspots and less (20% below rate) during the minimum sunspot.

A supplementary indicator of correlation with maximum sunspots is the raising water in lakes. According to Clayton who analyzed data on the level of water in the Nile River in the territory of Egypt during period 1737-1908 concluded that the highest level of the river has been 1 year after sunspot maximum and lowest minimum 1 year before solar stains.

During the first decade of the twentieth century are set fair correlation between the number of sunspots on the surface area of particular regions of the planet. It should be noted that the impact of solar activity on climate, weather and so distinct, appears to change the baric systems, their intensity, localization and their generating winds, affecting the dynamic effects of variations pressure**.** Variations of the global distribution of average pressure values during the year, summer (July-August) and winter (December-February) were obtained by calculations of averages 5 years of activity during maximum and minimum sunspot.

Atmospheric action centers suffer displacement in the minimum sunspot, so it is concluded that stands to increase the position of centers baric more than the maximum, as the maximum of the Azores and Iceland minimum in the north and then moving towards southeast.

Cyclone routes can be changed depending on the phases of the solar cycle limited to 30-60 degree area with thunderstorms accompanied by rain, especially in winter. Displacement trends in prevailing south roads that cross the North Atlantic Ocean to the maximum of solar activity being displaced and the south and west of Europe even in our country.[56]

Along the years of existence wet cycles 11 years and 80-90 years of drought there are also 20-22 year cycles associated with sunspots. Pressure in areas further from south latitude, northern hemisphere 40 degree is moderately higher in maximum number of sunspots years in this cycle.

During the minimum of sunspot, the maximum cycle after 22 years occurred to drop large amounts of rainfall amounting to 1 / 4-3 / 4 of the annual rainfall in 24 hours (as in the case of Adelaide).

In the conditions of global warming, there has been an increase in rainfall storms.

BIBLIOGRAPHY

[1] Academy of Sciences. The extraordinary events of 1962-1963. Tirana 1964.
[2] Academy of Sciences. Encyclopedic Dictionary. Tirana 1985
[3] Academy of Sciences. Physical Geography of Albania, Tirana 1991.
[4] Part 1 Academy of Sciences. Physical Geography of Albania, Tirana Part 2, 1991.
[5] Academy of Sciences. The climate of Albania, Tirana 1975.
[6] Academy of Sciences and Hydrological Institute. Hydrology of Albania Tirana 1984.
[7] Academy of Sciences. Hydraulic calculation of the river Buna, studies published in journals "Hydraulic Research" of the Hydraulic Research Center 1985-1990.
[8] Academy of Sciences. Climatic and hydrological features of the Western Lowlands, Tirana 1985.
[9] State Archives. Data for the exceptional natural hazards. Tirana 2002.
[10] A.Q.SH.
[11] Aliaj.Sh. The features of neo-tectonic structure of Albania. No. geographical studies. 3. 1988. 12. World Bank, UNISDR, WMO, the Finnish Institute of Meteorology, 2010. Strengthening of meteorological services in Southeast Europe, "Coping and Mitigation of Disaster Risk"
[12] The drainage district boards.
[13] Briges.Smithons.Bell: Fundamentals of physical geography.
[14] Buletine 1999. Hydrological. Hydro meteorological Institute's annual publications, Tirana 1957-1986.
[15] GDCE. Flood risk assessment and management study. -Plan Final report of risk management for flood plains of the Drin basin and Buna. 2012.

[55] Uruci R; Flooding in Albania and their management. Pg..
[56] Herman.R.John; Goldberg.A.Richard; Sun, Ëeather and Climate. 1978

[16] Draft Aide Memoire's mission of World Bank "Emergency Response and Management for Floods. Tiranë 2011. 23. Directorate of Civil Emergency
[17] Pano. N. Albanian water resources. Academy of Sciences of Albania. Tirana 2008.
[18] Pano. N. maximum inflows in Albania. Meteorological and Meteorological Studies. 8. Tirana 1982.
[19] Pano. N. regime fully and minimum flows in the territory of Albania hydrographic Paris in 1974.
[20] Selenica A. repetition maximum flow rare Vjosë River. St. HIDMET.nr 8.
[21] The French Study; February 2010 and Italian Study on the Drin basin.
[22] Shehu.B; Calculation of rainfall recognizing the historical maximum level. HIDMET studies. Tirana 1974
[23] Uruci R; Flooding in Albania and their management. Pg..