BOOK OF PROCEEDINGS

INTERNATIONAL CONFERENCE
13th - 14th October 2023

ISSUES OF HOUSING, PLANNING, AND RESILIENT DEVELOPMENT OF THE TERRITORY

Towards Euro-Mediterranean Perspectives

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Issues of Housing, Planning, and Resilient Development of the Territory Towards Euro-Mediterranean Perspectives

Conference Theme and Rationale

Albania, along with other Western Balkan countries, has undergone significant economic, social, and political changes in recent years. As a result, housing, planning, and the resilient management of territorial development have emerged as critical issues. This is because these regions face significant challenges in providing affordable housing, addressing the impact of urbanization on the environment, fostering evidence-based decision-making on the territory, and bringing forth the commitments towards climate neutrality.

The organizers use the term "multi-modality" to define complex situations (in matters of territorial planning, management, architecture, housing, public space, technology, etc.) that have historically encompassed Western Balkans and Mediterranean cities in a logic of coexistence and value co-creation. A combination of knowledge and heritage that throughout time and history have given life to civilization in this region of Europe. The active involvement of Albania in the existing network of the Mediterranean Basin and the EU, through a joint action plan with UN / UNECE, and the Albanian and regional authorities, including reputable scientific bodies such as the Academy of Sciences of Albania, makes this conference even more intriguing to explore fascinating areas of research. The conclusions, to be considered as a stage for open innovation, will include recommendations for further scientific and applied research, projects, and events.

The geographical focus of the conference covers three dimensions: i) Albania; ii) the Western Balkans; iii) Euro-Mediterranean countries. POLIS University aims to focus on the above-mentioned research areas that are of common interest to both Western Balkans and Mediterranean cities, including, but not limited to: housing policies, urban history and architecture typology, innovation and digitalization in urbanism, energy efficiency, resilience and environmental sustainability, governance and smart technologies for city management, education and gender aspects in urban planning research.

In this regard the main aim of this international conference is to bring together scholars, policymakers, and practitioners to examine the pressing issues of housing, planning, and land development in these regions, in a context of transition fatigue, climate challenges and post-pandemic realities.

Issues of Housing, Planning, and Resilient Development of the Territory Towards Euro-Mediterranean Perspectives

Conference Aim

The main aim of this international conference is to bring together researchers, policy makers and practitioners to examine the urgent issues of housing, planning and land development in these regions, in a context of transition, climate challenges and post-pandemic realities.

Objective

-Consolidation of the cooperation network between Albanian and non-Albanian researchers, lecturers, managers, with the aim of participating in joint research projects at the regional and international level;
-Support of local authorities with contemporary data, on the state of housing issues, planning and sustainable urban and environmental management, as well as representatives of public and private institutions operating in this field.

The conference is organized by POLIS University (U_POLIS) in cooperation with the Academy of Science of Albania, and supported by other local and international partners.
In the framework of resilience, the main conference theme is devoted to Issues of Housing, Planning, and Resilient Development of the Territory from a Euro-Mediterranean Perspective, including Albania, Western Balkans and the Mediterranean Basin. This event aims to bring together academics, policymakers, researchers, experts, practitioners, and stakeholders from diverse backgrounds to discuss and address critical challenges related to housing, urban planning, and the development of resilient territories.

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The influence of climate change on drought occurrences and the measures taken to alleviate drought in Albania.

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Abstract

Drought is an extreme weather condition marked by prolonged periods of no precipitation and dry weather. It affects the hydrological balance, soil moisture, temperature, water supply, and river flow rates. Land degradation, biodiversity loss, and significant economic sectors are negatively impacted. Despite its small size, Albania is distinguished by its separation into 13 subzones and 4 phytoclimatic zones, which exhibit noticeable variances in terms of climate indicators and extreme weather occurrences. The seasonality of the yearly rainfall, which falls 80% of the time between October and April, the dry summer, and human activities that harm the environment are further factors contributing to drought in Albania. Albania is one of the nations whose dry and semi-arid regions, which make up around two-thirds of its surface, are experiencing drought and the desertification process. Even on a worldwide scale, nearly one-third of the land is degrading. When compared to the 30-year average, meteorological data from Albania suggest that climate change, the phenomenon of drought, and land desertification are increasing. Therefore, in 2020, the amount of precipitation was 14.4% less at 10 meteorological stations around the nation, and the average maximum temperatures increased by +2.8°C, over the multi-year average of 1961–1990. As a result of the escalation and disastrous effects of drought, climate change is considered a "hot" topic that has attracted the attention of governments, institutions worldwide, and international organizations. This will be done through an in-depth analysis of indicators and indices of climate, hydrological and meteorological drought, exposed economic sectors, and land. Additionally, the key findings of the reduction of environmental, ecological, and agricultural drought, adaptation to climate change in relation to drought protection for the soil, and in particular for agricultural land, will be highlighted.

Keywords
climate change, desertification, drought, resilience, meteorological condition

Introduction

According to the United Nations Convention on Desertification (entered into force 1996) "drought" means the naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems" (UNCD, 1996). Meanwhile, the World Meteorological Organization (WMO) defines drought as a prolonged dry period in the natural climate cycle that can occur anywhere in the world. Drought is caused by high temperatures and lack of rainfall and soil moisture, decreasing water reserves and insufficient water sources. Drought is caused by high temperatures and lack of rainfall and soil moisture, decreasing water reserves and insufficient water sources to fullfill the needs of the economic and social sectors for water.

Drought is a general world phenomenon, expressed to different level between countries and regions, depending on climatic features, geographic latitude, altitude above sea level, relief, atmospheric circulation, land cover, marine, human activity as well as the level of planning and implementation of measures to combat drought, desertification, land and environmental degradation. Climatic factors and human activities are dominant in soil drought.

During the period 1961-2013, the area of drylands in drought has increased on average by slightly more than 1% per year, with large inter-annual variability (IPCC, 2021). In general, the territory of the country, with an average height of 708 m above sea level, is characterized by a Mediterranean-Atlantic climate, with winters with heavy rainfall and hot and dry summers, often with extreme weather events, especially floods and droughts. Drought is also influenced by the mountainous relief in about ¾ of the country's territory, changes in the territory's height from 0-2700 m above sea level, climatic zones and subzones, as well as the planning and implementation of preventive and mitigating measures against drought.

In the territory of the country, in seasonal conditions, in extended periods throughout the country, almost all types of droughts operate: meteorological drought expressed in high temperatures and extreme rainfall deficit in a region or on a national scale, agricultural/ecological droughts, where the lack of rainfall creates a lack of soil moisture necessary for natural vegetation and agricultural crops. Hydrological drought is also present during the summer, which is characterized by the drying up of mountain streams and dry rivers such as (Drino, Kiri, Dukati, etc.), the reduction of flows according to the main rivers during the summer season to the extent of 4-7 times less than other seasons, the reduction of water in the 700 irrigation reservoirs in agriculture and the reduction of underground water.

Literature review

Climate change, drought, land degradation and desertification are currently a "hot" topic of discussion and debate at the global level and as a need for deepening scientific research, strategies and action plans. The United Nations Convention to Combat Desertification (UNCCD), adopted in 1994, is a binding international agreement linking environment and development to sustainable land management.

Europe is warming faster than some other regions (EEA, 2021a), experiencing more summer heatwaves, heavy rainfall and droughts, and sea level rise (IPCC, 2021). According to the (IPCC, 2021) report, South East Europe is predicted to have a warming of up to twice the global average, and with some estimates predicting more than 1.5°C for the region by the end of the 21-st century. These trends are expected to continue to grow in the coming years. As a result of rising temperatures, the region may face a significant increase in the number of fires, droughts, food shortages and environmental and human risks (Kucaj E., et al, 2022). According to UNDP (2016), more

frequent droughts will increase competition for water resources, especially between agricultural irrigation needs and water resources. Heavy rains, floods and soil erosion put urban and rural infrastructure at risk, (Ciardini, V. et al, 2016) moreover, the increase in drought events and drought conditions will affect agriculture and increase risks of food insecurity.
Also, the National Strategy (2018) is built on five objectives, one of which is the reduction and management of disaster risk for drought and floods, the increase scientific knowledge on water and climate issues. According to the Lushnje Agricultural Research Institute, it has been proven that in conditions of prolonged drought and insufficient use of water for irrigation, production in some crops decreases by 40-60% (Dhima K, Gjergji LL, 1980). While in the total absence of irrigation and rainfall, agricultural production can be completely destroyed (Kucaj E, 2022). Soil degradation and erosion, worsens from repeated floods and drought affects agricultural production, coastal areas, water resources and is likely to further negatively affect livelihoods (3rd National Communication, 2016).
The concentration of pollutants in the soil brings serious consequences to the well-being of the inhabitants (Kucaj E., et al, 2023). Degradimi dhe erozioni i tokës, të përkeqësuara nga përmbytjet e përsëritura dhe thatësira në mënyrë negative ndikon në prodhimin bujqësor, zonat bregdetare, burimet ujore dhe ka gjasa të ndikojë më tej negativisht në mënyrën e jetesës (3rd NC, 2016).

Method and Methodology

This study is based on the analysis of climate data before and after 1990, through the comparison of periods, the analysis of indicators and the connection with drought, desertification and land degradation. Rainfall and temperature data for 2020 and 2021 were studied, compared with the 30-year average 1961-1990, which show the trend of climate change in Albania and the impacts on drought. Several meteorological measurements have been selected for different climatic zones and subzones of the country, in which the differences for the same periods are evaluated. Some of the influencing factors in soil drought and climate change such as fires, lack of plant cover, water resources and impacts on the environment, soil, desertification, degradation, salinization and loss of productive capacity of the soil have been evaluated.
Through analyzes of soil moisture in several areas of the country, at a depth of 0-30 cm, a correlation has been established between temperature, soil moisture and soil characteristics, as well as soil moisture differences between seasons and different areas. In addition, a review of the literature on the connection between drought and the impacts of climate change on land drought has been done.

Phytoclimatic zones, subzones and seasonal changes of climate indicators

Studies show that drought is a natural feature of climate variability and the water cycle and can occur in all climate zones. It originates from a temporary reduction in the normal rainfall regime over a large area, but other climatic factors, such as high temperatures and winds, low relative humidity, can exacerbate the severity of the event (Vörösmarty et al., 2000, Tallaksen et al., 2004). Although Albania is a small country, it is characterized by 4 phyto-climatic zones and 13 subzones, with distinct climatic features. Climate indicators in Albania show marked differences between phytoclimatic zones and subzones, in extreme events as well as in impacts on the environment, economy, infrastructure, agriculture, public health and tourism development (table no. 1).
In table 1, the significant difference of climate indicators between 4 climate zones and 13 subzones is distinguished. E.g., in the southern pre-montane Mediterranean area, from 650-750 mm of precipitation per year, average annual temperature 9.5-10.5 °C, minimum temperature 0.5-2 °C and

85-95 annual days with precipitation. In the northern submontane Mediterranean area 2000-2500 mm of precipitation per year, average annual temperature 4-6 °C, minimum temperature -4 to -6 °C and number of rainy days 110-140.

Changes in the level of indicators in the phytoclimatic areas of the country require special attention in the planning of measures to prevent, mitigate and combat the summer drought through the improvement of the irrigation infrastructure and provision of water resources, preservation of plant cover, improvement of plant cultivation practices", etc.

Climatic zone	Climatic subzones	Average annual temp. °C	Minimum temp.°C	Amount of Rainfall (mm)	No. of rainy days
Mediterranean lowland area	North	15.0-16.0	4.0-5.0	1500-2000	107-115
	Central	15.0-16.0	6.5-7.5	1500-1700	85-100
	South	16.0-18.0	8.0-10.0	1600-1800	95-100
Mediterranean hilly area	North	11.0-14.0	2.0-4.0	1300-1800	95-100
	Central	11.0-13.0	4.0-6.0	1100-1300	95-105
	Southeasterly	14.0-15.0	4.0-5.0	1500-1700	110-120
	Southwest	13.0-15.0	5.0-7.0	1700-2000	110-120
Mediterranean submontane zone	North	10.0-11.0	(-2.0)-(-3.0)	1700-1900	110-115
	South	9.5-10.5	0.5-2.0	650-750	85-95
Mediterranean mountainous area	North	4.0-6.0	(-4.0)-(-6.0)	2000-2500	110-140
	Eastern	2.0-6.0	(-4.0)-(-6.0)	1300-1800	100-125
	Southeasterly	3.0-6.0	(-5.0)-(-6.0)	900-1200	100-110
	South	6.0-10.0	(-1.0)-(-2.0)	1400-2000	85-95

Table 1: Phytoclimatic zones and subzones in Albania / Source: Statistical Yearbook and year processing by the authors

Meteorological measurements	Koplik	Shkodër	Ura Shenjtë	Bushat	Velipojë	Lezhë		Likmetaj	Kamëz	Tiranë	Sukth
Precipitation mm	1645	2065	**2732**	1641	1522.8	1463.5		1099.4	1299.8	1271.5	1108.6
Meteorological measurements	Kavajë	Vrap	Elbasan	Peqin	Lushnjë	Kuçovë		Fier	Ballsh	Llakatund	Vlorë
Precipitation mm	1055.3	1567.8	1209.1	1065.5	962.9	927.6		985,3	1048.1	1016,2	**954,8**

Tablel 2: Average multi-year precipitation amount 1951-1980 in 20 measurement sites. / Source: Statistical Yearbook and year processing by the authors

Also, the territory of Albania is historically characterized by marked changes between meteorological, hydrological, agricultural, ecological, environmental drought seasons, mainly in the summer season, with high temperatures and low rainfall. In the period November-April in Albania, an average of 70-80% of annual rainfall falls, the country is affected by frequent floods, soil salinization intensifies during the summer in the coastal area. While in the other period of the year, only 20-30% of rain falls, a period in which temperatures are high, water evaporation from the ground is high and the demands of economic sectors are in difficulty for water.

According to the measurements carried out in 20 meteorological stations distributed throughout the country, the average amount of rainfall for 30 years (1951-1980), according to the stations, varies from 954.8 mm in Vlora to 2732 mm in the Ura e Shenjte meteorological station (in the north of the country).

The distribution of precipitation according to the seasons in the 30-year average 1951-1980, in 20 stations, the average amount of precipitation in the summer season (June, July, August) according to the stations results from 7.14-12.37% of the annual amount, while in winter, autumn and spring together with 87.63-92.86% of precipitation. Precisely in this period, when average monthly temperatures are higher than in other seasons, drought intensifies, water evaporation increases, soil loses water, water demands increase, extreme events require measures and interventions to protect social life, water needs in agriculture and water balance in the soil.

Intensification of drought under climate change conditions and driving factors

During the last decades, due to the expansion of cities, changes in land use and land cover, emissions of greenhouse gases, warming of the atmosphere, drought and desertification of the land, "urban hot islands" and natural hazards have increased. Albania is one of the countries affected by climate change and land desertification. OBM (2016) and national Hydro-Meteorological institutions have prioritized the global agenda for adaptation to climate change and drought reduction. How are the main climate indicators changing in Albania?

Through an analysis of the maximum and minimum air temperatures, in 10 measurement sites distributed in different areas and sub-areas, it results that, during 2020, the average maximum annual temperatures marked an increase of +2.8° C above the multi-year average 1961-1990 and

No	Average maximum temperature (°C)				Average minimum temperature °C		
	Stations	1961-1990	2020	2021	1961-1990	2020	2021
1	Belsh	20.1	22,9	22.1	10	11.5	11.3
2	Brataj	20.0	23.1	23.2	8	9.9	10.3
3	Çukë	20.6	22.5	22.3	9.8	10.9	11.3
4	Dardhe	12.4	15.2	14.6	4.2	5.6	5.3
5	Liqenas	15.1	17.7	17.6	6.1	7.4	7.3
6	Petresh	18.0	20.9	20.3	10.5	11.5	10.7
7	Rapsh	14.4	17.6	16.7	6.8	8.22	8.3
8	Shupenzë	16.6	19.7	19.6	5.4	5.8	5.5
9	Tirane	20.7	23.3	23.0	11.0	11.3	11.1
10	Tropoje	16.5	19.4	19.1	6.6	7.2	6.7

Table 3: Average maximum and minimum air temperature for the years 2020, 2021 and multi-year average 1961-1990 in 10 meteorological locations

the average amount of precipitation has decreased by 300 mm per year (table no. 3, graph 1). For the same measurement locations, the average value of the minimum air temperatures marked an increase of +1.1 °C over the multi-year average value (1961 - 1990) (table 3). The trend of increasing temperature and decreasing rainfall is also observed in 2021, where the average maximum temperature increases by 2.3 °C, the minimum temperature by 0.9 °C. One of the factors of the increase in the maximum air temperature remains the frequent fires as a global and local phenom-

enon, which destroy the land cover, the increase in evaporation, the decrease in soil moisture, heat waves and the intensification of drought. On the Mediterranean coast, more than 300 thousand km2 are subject to desertification also due to burning by fires. Albania is considered one of the countries most at risk from climate change. In the period 2007-2020, the burnt areas in Albania mark about 356915 ha of forest land, or 30-35% of the total forest area.

In the conditions of lack of rainfall and rising temperatures, the flow level of all rivers almost decreases significantly in the summer season. In all the rivers of Albania, in the river Shkumbin, e.g. in the Uren e Rogozhina measurements, the average water flows m3/sec in the summer season (June-August) occupy only 8% of the annual flows and 77% in winter-spring (Lushaj et al, 2004). Drino River (Ura Leklit station) flows in the summer season account for only 6% of the flow, in the winter and spring seasons 81.2% (Lushaj Sh, Toto R, 2018). According to JRC Report, in Europe "Groundwater levels remained lower than normal across of the continent for the whole summer 2020" (Barbosa P. 2021).

In Albania, it is necessary to review the National Action Program in the fight against desertification at the national and local level, with the aim of increasing management capacities and the role of local communities, identifying problems and areas affected by drought and desertification, planning measures from the bottom-up and deepening scientific research. Although Albania has made progress in drafting legislation in this area, implementation is at a low level.

Loss of soil moisture

Soil moisture is an indicator of the productive capacity of the soil, and varies depending on the amount of precipitation and air temperature. The loss of soil moisture is an indicator of the intensification of environmental, agricultural and ecological drought, mainly due to the decrease in the amount of precipitation and the increase in air and soil temperatures. From the analysis of 14 soil samples, in different areas and periods, it results that the moisture content changes in correlation with the season, the area, and the air temperature (table 4).

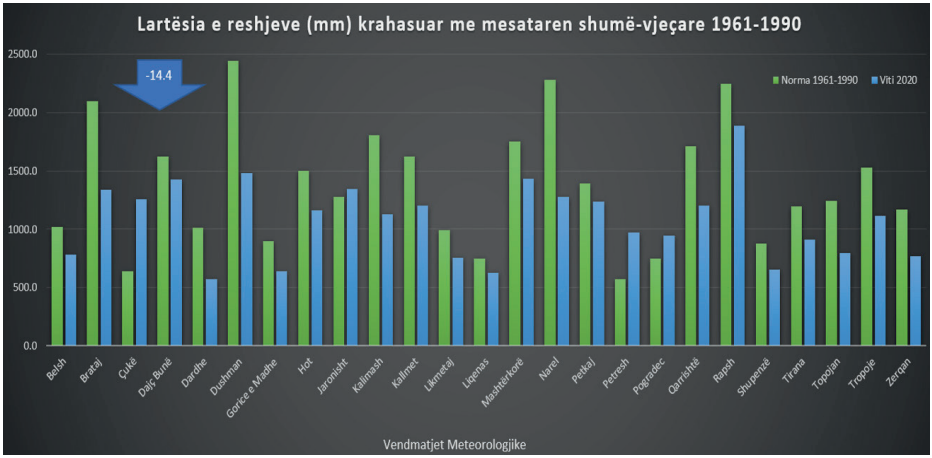
Soil samples	Stations	Depth cm	Date of sampling	Soil moisture %
1	Vlore	31-60	6.08.2019	8.75
2	Berxull (Tirane)	0-60	17.04.209	19.8
3	Gjirokaster	0-30	25.7.2020	12.48
4	Zheje (Lac)	0-30	24.12.2020	27.2
5	Qerret (kruje)	0-30	10.06.2020	15.8
6	Xhafzotaj	0-30	19.08.2020	12.23
7	Mamuras	0-30	10.02.2021	19.6
8	Dorez	0-30	26.02.2021	17.51
8	Kelcyre	0-60	25.03.2022	17.9
10	Libohove	0-60	25.03.2022	19.4
11	Grabian	0-30	28.03.2022	14.9
12	Katundi Ri	0-30	21.08.2023	4,81
13	Fushe-kuqe	0-30	21.08.2023	12.25
14	Kutalli (Berat)	0-30	21.08.2023	7.34

Table 4: Soil moisture in different periods 2019-2023.

In table 4, the samples analyzed during the months of December-February, the soil moisture content is 16.35-27.2%, in March 14.9-19.4%, in June 15.8% and in August 4.81-12.2% (samples 1, 6, 12, 13 , 14). The reduction of precipitation, which is predicted to decrease up to 8% by 2050, as well as the increase of transpiration and evaporation of water from the ground, the decrease of the snow cover, will cause in Albania a moisture deficit of up to 18% or 700 m3 of water/ha for agricultural use. Due to the reduction of rainfall and the increase in temperatures, the intensification of drought and the lack of water for irrigation, the agricultural production per unit area varies to decrease up to 25-35%. Measures to increase investment in irrigation remain important, as the actual irrigation of agricultural land varies up to 35-40% of the surface from 65.8% in 1990.

No	Stations	1961-1990	2020 mm	Difference 2020/61-90	Stations	1961-1990	2020 mm	Difference 2020/61-90
1	Belsh	1022	781	-240	Mashtër-korë	1750.	1432.	-318.
2	Brataj	2098	1337	-761	Narel	2279.2	1274.4	-1004,8
3	Çukë	641	1257.	616	Petkaj	1396.	1240.	-156.
4	Dajç Bunë	1623	1429.	-194	Petresh	1622.	969.	349.
5	Dardhe	1012	575.	-436	Pogradec	747.8	942.5	194.7
6	Dushman	2443	1484.	-959.7	Qarrishtë	1711.7	1201.1	-510.6
7	Gorrie	897.0	641.2	-255.8	Rapsh	2244.4	1890.8	-353.7
8	Hot	1500.3	1161.6	-338.7	Shupenzë	879.7	652.7	-227.0
9	Jaronisht	1277.9	1343.0	65.1	Tirana	1198.3	909.4	-288.9
10	Kalimash	1807.1	1130.9	-676.2	Topojan	1245.9	797.4	-448.5
11	Kallmet	1622.6	1202.8	-419.8	Tropoje	1527.7	1116.7	-411
12	Likmetaj	996.2	755.0	-241.2	Zerqan	1168.3	772.4	-395.9
13	Liqenas	752.1	629.2	-122.9				

Table 5: Amount between annual rainfall mm, in 25 meteorological stations of the country in the years 2020, 1961-1990 / Source: IGJEUM 2020, Statistical Yearbook 1961-1990



Graph 1: Amount of precipitation, annual average year 2020, compared to the 30-year average 1960-1990 / Source: Institute of Geosciences

Climatology of precipitation in Albania

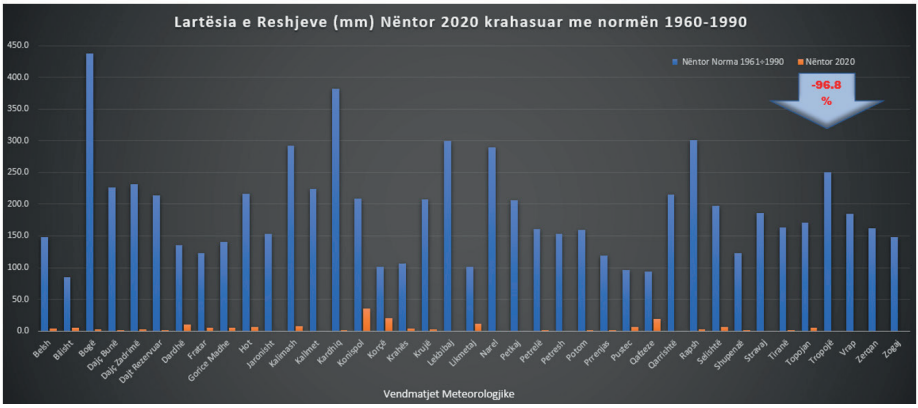
The spatial and temporal distribution of atmospheric precipitation in the Albanian territory depends on many factors, the most important of which are the phytoclimatic zones and subzones, the circulation of air masses, the height above sea level, the distance from the coastline, etc.

These and other local factors cause the amount of precipitation to be around 3000 mm per year in the northern Alps of the country, while in the southeastern areas falls average of 700 mm. Evaluating the situation in 2020 with the study of 25 meteorological measuring sites, distributed throughout the country, results that the amount of precipitation is decreased by 14.4%, compared to the multi-year average 1961-1990 (table 5, graph 1). The amount of precipitation in 21 stations for 2020 ranges from 122.9-959.7 mm less than the 30-year averages from 1961-1990 and only in 4 stations is higher.

Thus, from the analysis of the indicators, the year 2020, in 39 meteorological measurement sites, shows that in 21 stations the precipitation in November is lower than the 30-year average of the same month 1961-1990, creating a deficit of 96.8% of the multi-year average and (in 12 stations no rainy day occurred), in 13 stations up to 3 mm per month and in 14 stations with more than 3

	Amount of precipitation (mm), November 2020				Rainfall height mm		
No.	Stations	1961-1990	2020	No.	Stations	1961-1990	2020
1.	Belsh	148.2	3.7	13	Lekbibaj	299.5	0
2.	Bilisht	85.1	4.8	14	Narel	290.3	0
3.	Bogë	437.2	3	15	Petkaj	206.7	0
4.	Dajç Bunë	226.9	0.5	16	Petrele	160.6	0.8
5.	Dajç Zadrimë	231.1	2.3	17	Pertesh	153.0	0
6.	Dajt Rezervuar	213.7	0.2	18	Stravaj	186.3	0
7.	Dardhë	135.5	10.5	19	Tropoje	250.9	0
8.	Fratar	123.4	5.7	20	Vrap	184.4	0
9	Hot	216.5	7.0	21	Zerqan	162.1	0
10	Kalimash	292.1	8.1	22	Zogaj	148.4	0
11.	Kallmet	224.3	0.0	23	Kruje	207.6	3.0
12.	Kardhiq	382.4	0.3	24	Jeronisht	153.5	0

Table 6: Average rainfall for November 2020.



Graph 2: The amount of average annual precipitation in November 2020 / Source: Institute of Geosciences

mm. The precipitation values of 2021 indicate a decrease in the number of rainy days compared to the 30-year average of 1961-1990 with a negative impact on droughts.

Impacts of drought on productive capacity, desertification and land degradation

xtreme weather events have drastic impacts on land (especially agricultural land), the environment and the Albanian economy. In the conditions of climate change, intensified extreme weather events cause impacts on the territory, especially on agricultural land, such as: Frequent flooding of lands in extreme conditions up to 100 thousand ha, extreme high temperatures and heat waves, droughts prolonged seasonal in the summer-autumn period, frosts, storms, forest fires.
Land desertification has affected 2/3 of the total surface, erosion and landslides, land degradation and loss of biodiversity and productive capacity. After 1990, with the privatization of land, the irrigation capacity of agricultural lands from 65.8% of the total area currently occupies about 35-40% of the area, the irrigation forms and technology that are applied lose 55-65% of the water in the network, in the reservoirs, in which about 50% of the water used for irrigation is provided.

Source: Web

In the territory of the country, after 1990, it is planned to build over 400 small hydropower plants using the water of rivers, mountain streams, where the construction of dams, hydrological modifications and the use of water negatively affects the biodiversity of the area, etc.
All scenarios according to the IPCC reports show that the territory of Albania is likely to become warmer. Increasing trends in annual and seasonal temperatures, both in minimum and maximum and extreme values, are expected to increase. Projections show that the amount of precipitation has a negative trend for all seasons, a tendency for intensification of drought, erosion and landslides, coastal erosion and salinization. After 1990, with the interruption of the coastal land desalination program in Albania, in the absence of irrigation, in the Karavasta area, the salt content reached 9.96%, or 10 times higher than the maximum salinization limit (Lushaj Sh, 2021). The lands of Albania will be affected by drought and climate changes, and in particular the agricultural lands, where over 50% of the surface lies in the coodrine-mountainous area and with very limited irrigation. Agriculture is a primary economic activity affected by drought and climate change, which is applied to about 35-40% of the surface from 65.8% in 1990.

Housing-drought-climate change correlation

According to the literature "Housing relates to climate change not just as a contributor to greenhouse gas emissions but also as a factor that both exposes us to and protects us from climate-related risks, depending on where it is sited and how it is constructed" (OPD&R, 2022). Many countries are experiencing extreme droughts, massive fires, floods and erosion even in residential areas, built without foreseeing the risks and principles of urban planning and the consequences of drought. Therefore, the planner is required to exclude the development in the endangered areas

as well as the way of building houses, to contribute to the reduction of greenhouse gas emissions and atmospheric warming. Albania has all the opportunities and resources to increase renewable energy, including the geothermal energy of the earth at small depths of 8-10 m for the supply of housing and the reduction of greenhouse gas emissions in the atmosphere.

Conclusions and Recommendations

Albania is a country affected by meteorological drought, as a result of the decrease in the amount of precipitation by about 10-15% and the general tendency of the increase in temperatures to 1.5-3 degrees, compared to the 30-year average 1961-1990. From hydrological drought as a result of the reduction of water flows and reserves, agricultural drought, environmental drought as well as from the economic, social and environmental impacts of drought. In 2020, the average maximum temperature is 2.8 degrees higher than the 30-year average 1961-1990. The drought is expected to intensify, given the fundamental differences in climate indicators between the 4 phyto-climatic zones and 13 subzones of the country.

Land drought and impacts on agriculture have intensified. From the analyzes of soil samples in different areas and periods of the country (2019-2023), the moisture content results from 4.81% in August to 27.2% in December. To cope the expected climate changes, it is necessary to increase investments for increasing irrigation capacity, at least 2.5 times higher than at present, improving irrigation technology, increasing water efficiency 3-5 times, compared to traditional irrigation that is widely applied.

The National Action Program needs to be reviewed, for combating drought and desertification, adapting to climate change at the national and local level, the establishment of specialized structures, preferably a specialized unit for drought, to build qualified capacities in this field for the implementation of measures, national programs with international protocols.

The objectives of combating drought, which are included in the 15-year General Local Plans of the municipalities, must be integrated with the implementation plans. Meanwhile, the risks caused by drought (flooding areas, risks from fires, erosion and landslides, etc.), should be foreseen in urban development plans as dangerous areas for housing. Drought monitoring should be perfected as a coordinated system, including other indicators, creating an identifying database with a scientific context.

Control over the territory, water resources, cutting and burning of forests, re-issuance of building permits for HCs after 1990, hydrological modifications and water depletion of rivers and streams negatively affects aquatic and agricultural ecosystems and intensification of drought. Albania must develop a strong international cooperation, in informing and implementing joint plans and protocols in the fight against drought and land desertification.

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